STATE OF MICHIGAN

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET

This contract authorizes the professional services contractor to provide professional services.
(Authority: 1984 PA 431)

CONTRACT FOR PROFESSIONAL SERVICES: Indefinite Scope-Indefinite Delivery

THIS CONTRACT authorized this 30th day of June in the year two-thousand and twenty-three (2023), by the Director, Department of Technology, Management and Budget, BETWEEN the STATE OF MICHIGAN acting through the STATE FACILITIES ADMINISTRATION, DESIGN AND CONSTRUCTION DIVISION of the DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET, 3111 W. St. Joseph Street, Lansing, Michigan 48917, hereinafter called the Department, and

Barr Engineering Company
3005 Boardwalk Street, Suite 100
Ann Arbor, MI 48108

the Prime Professional Services Contractor, hereinafter called the Professional.

WHEREAS, the Department proposes securing professional services for:

Indefinite-Scope, Indefinite-Delivery Contract No. 01008
Index No. (To Be Established) Contract Order No. Y (To Be Assigned)
File No. (To Be Assigned)

Department of Technology, Management and Budget, State Facilities Administration, Design and Construction Division, Professional Architectural and Engineering Indefinite-Scope, Indefinite-Delivery Contract (ISID) for Minor Projects – **2023 Expanded Environmental Remediation ISID Services**

Various State Departments and Facilities
Various Site Locations, Michigan

NOW THEREFORE, the Department and the Professional in consideration of the covenants of this Contract agree as follows:

I. The Professional shall provide primary environmental investigation/assessment services for the Project in the Study Phase to the extent authorized by the Department of Technology, Management and Budget State Facilities Administration (SFA), Design and Construction Division (DCD) [The Department] and be solely responsible for such professional services. The Professional's services shall be performed in strict accordance with the Project.

II. If authorized, the Professional shall provide environmental services for the identified project types.

PROJECT TYPES AND SERVICES OFFERED											
Excavation, Dewatering and Off-Site Disposal	Demolition	Migration Control, Fluid Removal and Containment	Landfills	Indoor Air / Vapor Intrusion	In-Situ Physical / Chemical	In-Situ Physical / Biological	Ex-Situ Physical / Chemical	Ex-Situ Physical / Biological	In-Situ and Ex-Situ Thermal	PFAs	Alternative Technologies
X		X	X	X	X	X	X			X	X

III. The State of Michigan shall compensate the Professional for providing their professional services for the Project in accordance with the conditions of this Professional Services Contract.

IN WITNESS, WHEREOF, each of the parties has caused this Professional Services Contract to be executed by its duly authorized representatives on the dates shown beside their respective signatures, with the Contract to be effective upon the date on which the Professional received a copy executed by the authorized State of Michigan representative(s) by regular, registered, or certified mail or by delivery in person.

FOR THE PROFESSIONAL:

Barr Engineering Co.
Firm Name

VS0109084
SIGMA Vendor Number

Signature

7-19-23
Date

vice president
Title

FOR THE STATE OF MICHIGAN:

Director, Department of Technology, Management and Budget

August 14, 2023
Date

WHEREAS this Professional Services Contract constitutes the entire agreement as to the Project between the parties, any Contract Modification of this Contract and the Department's approved and attached Project/Program Statement scope of work requirements must be in writing, signed by duly authorized representatives of the parties, and shall be in such format and detail as the State may require. No Contract Modification may be entered into to compensate the Professional for correcting, or for responding to claims or litigation for, the Professional firm's final design Contract Documents/architectural and engineering design errors, omissions, or neglect on the part of the Professional.

ARTICLE I
PROFESSIONAL SERVICES SCOPE OF WORK

Provide professional environmental services, technical staff, and support personnel for ISID minor projects on an as-needed basis at various State/Client Agencies within the various site location areas as defined by the State of Michigan.

This Contract is for professional environmental investigation and/or design services for an unspecified number of ISID projects ("Assignment"). The scope of work for each assigned project will be defined at the time the project is awarded by the State to the Professional firm. The professional environmental services required for each of these assigned projects requested by the Department may include any or all of the Tasks included in the Phase 100 – Study through the Phase 900 – Operation and Maintenance Management.

The Professional firm's environmental services shall be performed in strict accordance with this Professional Services Contract and be in compliance with the Department's approved and attached Appendix I– Project/Program Statement.

This Contract does not warrant or imply to the Professional environmental firm, entitlement to perform any specific percentage (%) amount of environmental work during the life of this Contract.

This Contract will remain in effect for three (3) years from the date of this Contract award but may be unilaterally terminated by the State of Michigan at any time, for cause or its convenience, by written notification of the State, to the Professional. Furthermore, this Contract may be extended for two (2) additional years, at the sole option and discretion of the State upon the Department providing written notice to the Professional prior to the expiration of the original Contract period. Any such time extension shall be subject to the terms and conditions of this Contract, including, but not limited to, the existing hourly billing rates included in this Contract for the Professional, their Consultant, and their employees or agents.

Please note that the Professional Services Contract ISID Contract No., as noted on page 1, must be provided on all Project correspondence and documents. Also, services are not to be provided or expenses incurred until individual ISID Projects are assigned to this Contract (see the Article II – Compensation and the Appendix 1 – Project / Program Statement).

Upon award of this Contract and each subsequent assignment, the Professional understands and agrees that time is of the essence. Failure to adhere to timely completion will be grounds for the Department, at its sole discretion, to terminate or limit future work under this Contract.

The Professional shall provide all professional services, technical staff, and support personnel necessary to complete the Project as described in its Project/Program Statement, in the best interest of the State, and within the Professional's fee(s) herein authorized by the State.

Assigned project services shall comprise, without exception, every professional discipline and expertise necessary to meet all the requirements as described in the Project / Program Statement and in accordance with the accepted industry standards for professional practice and services. The Professional's services include attendance at all Project related meetings and conferences. Professional services for the assigned projects under this contract shall be provided in the Phase / Task sequence shown below and shall be rendered in accordance with the Professional's proposed and approved Project Study, Design, and Proposed Construction Schedule.

The Professional's study, design, and proposed construction schedule shall be detailed, undated, and time sequence related for all Phase / Task services appropriate for the Project. The Professional shall field-check and verify the accuracy of all study/drawing and any data furnished by the Department, the State / Client Agency or any other Project related source.

The Professional shall not employ or consult with any firms in completing the Professional's obligations herein who it anticipates will be a construction Bidder for the Project or any part thereof, unless specifically authorized, in writing, by the Department. The Professional acknowledges that the Department is the first interpreter of the Professional's performance under this Contract.

The Professional acknowledges by signing this Professional Services Contract having a clear understanding of the requested professional environmental services required by the Department, and further agrees that the terms and conditions of this Professional Services Contract provide adequate professional fee(s) for the Professional to provide the requested Project scope of work requirements for each assigned project. No increase in compensation to the Professional will be allowed unless there is a material change made to the scope of work of the Assignment/Program Statement and the change is accepted and approved, in writing, by the State. Professional services shall not be performed, and no Project expenses shall be incurred by the Professional prior to the issuance of a written and signed Professional Services Contract and a Contract Order authorizing the Professional to start the Project work. Compensation for Department directed changes to the Project will be provided to the Professional by a Contract Modification and / or Contract Change Order signed by the Department and the Professional. The preparation of Bulletins and Contract Change Orders resulting from changes in the Project scope of work or previously unknown on-site field conditions will be compensated to the Professional, as approved by the Project Director / Agency Project Manager, on an hourly billing rate basis in accordance with this article. This compensation shall not exceed seven and half percent (7.5%) of the Construction Contractor's quotation for the Bulletin or Contract Change Order or an amount mutually agreed upon by the Professional and the Project Director / Agency Project Manager.

The Professional shall immediately inform the Department whenever it is indicated that the Professional's authorized not-to-exceed Budget for any of the assigned Projects may be exceeded. The Professional shall make recommendations to the Department for revisions to be implemented in order to not exceed the original authorized Budget. Any revision to the Project must be accepted and approved by the Department in writing.

The professional services may also include participation in legislative presentations as described in the "Major Project Design Manual for Professional Services Contractors and State/Client Agencies" and as the legislature or the Department may prescribe.

No substitution of any "Key Personnel/Employee" essential for the successful completion of the Project and identified in the Professional's Organizational Chart will be allowed by the Professional for this Contract without the prior written consent from the Project Director / Agency Project Manager.

Before any “Key Personnel/Employee” substitution takes place, the Professional shall submit a written request to the Project Director / Agency Project Manager, and this substitution request shall include the following information: (1) A request in writing for a No Cost Contract Modification; (2) Detailed written justification for this substitution; (3) The Professional’s qualifications of any proposed “Key Principal Personnel/Employee” replacement; and (4) A written statement from the Professional assuring the Department that the Project scope of work will not be adversely affected by this substitution. This request to modify their Professional Services Contract must be accepted and approved in writing by the Project Director / Agency Project Manager and the Director of the Department.

The Department will designate individuals to serve as the Project Director and Agency Project Manager for the Project scope of work who shall be fully acquainted with the Project / Program Statement and have the authority to render Project decisions and furnish information promptly. Except in connection with issues under the Article XII - Contract Claims and Disputes text, the Project Director / Agency Project Manager will exercise general management and administration for the Professional’s services in so far as they affect the interest of the State. The Professional shall indemnify, defend, and hold harmless the State against exposure to claims arising from delays, negligence, or delinquencies by the Professional for the professional services of this Contract.

During the Construction Administration Services Phase of the Project, the Professional is required to complete and submit, the on-site inspection record form, “DTMB-0452, The Professional’s Inspection Record,” for all on-site inspection visits to the Project site. The Inspection Record shall be completed and signed by the Professional and submitted monthly, with the original document sent to the Project Director / Agency Project Manager and copies sent to the Construction Contractor. The Inspection Record shall accompany the Professional’s monthly payment request.

The “DTMB-0460, Project Procedures” contains Department forms which shall be used during the Construction Administration Phase of this Contract.

All professional services will be consistent with the Department’s current "Major Project Design Manual for Professional Services Contractors and State / Client Agencies" unless otherwise approved in writing by the Department.

The professional services required for each Phase of this Contract shall be performed by the Prime Professional and their Consultants in accordance with service descriptions in this article.

The following service descriptions outlined in this Contract represent the Department’s standard of care for the Professional’s responsibilities for providing the professional services of this Contract; but by inclusion, or omission, the descriptions do not limit or exclude any regular or normal professional services necessary to accomplish the Project in accordance with the approved Project Budget and the industries accepted practice and standards for professional services. All the services outlined in this Contract may not be applicable to the Project / Program Statement. The Professional shall determine and coordinate the interface of the services required for the Project and is responsible for identifying any additional services necessary to successfully complete the Project.

The professional shall execute the following PHASES upon written authorization from the Project Director.

PHASE 100 - ENVIRONMENTAL INVESTIGATION/STUDY SERVICES

Provide complete and comprehensive Environmental Investigation / Study Deliverables to meet the requirements of the Project / Program Statement. Upon completion of all field investigation, assessment, research, review and / or oversight, prepare a complete report with an executive summary, and in such detail, as the Project Director may prescribe.

The services under this phase may include but not be limited to coordination, environmental assessments, drilling, field sampling/oversight, data/document review/management, feasibility study, and reporting as described in the Project/Program Statement. Project reports must be in accordance with Department / Client / Agency requirements and as outlined in the Project/Program Statement but shall include, as a minimum and as appropriate, the following items: (1) Problem; (2) Conclusion; (3) Recommendations; and (4) Discussion, details, and documentation.

PHASE 300 - SCHEMATIC DESIGN

Prepare Schematic Design Deliverables consistent with the Project/Program Statement. The deliverables shall consist of conceptual remediation system, drawings, outline specifications, a Schematic Construction Cost Estimate, other related documentation, and shall diagrammatically depict the areas, scales, and relationships of the functions. The services under this phase may include but not be limited to coordination, construction codes and design reviews, civil/site staging investigation, schematic design, and utilities review, drafting, and project cost / proposed construction schedule, as required by the Department / Client / Agency and as outlined in the Project/Program Statement. Acceptance of the Schematic Design by the Department / Client / Agency does not limit subsequent inclusion of minor, but essential, schematic or design details whose necessity and arrangement may best become apparent during subsequent Phases of the Project design. Revise design as necessary and obtain approval from the Department/Client / Agency.

PHASE 400 - DESIGN DEVELOPMENT

Prepare Design Development Deliverables based on the Owner-accepted Schematic Design to depict the intent of the designed remediation system(s). The deliverables shall consist of draft drawings and specifications, Construction Cost Estimates, and other related documentation to clearly establish the complete basis for further detail into final design drawings / specifications. The deliverables shall further define the Project by fixing and describing the Project size, character, site relationships, and other appropriate elements including the environmental, civil, structural, architectural, mechanical, electrical, and safety systems. The services under this phase may include but not be limited to coordination, draft drawings/specifications, site specific staging investigation, structural calculations, and preliminary environmental/architectural/engineering design development / reviews of drawings / specifications, as required by the Department / Client / Agency and as outlined in the Project / Program Statement.

PHASE 500 - CONSTRUCTION DOCUMENTS AND BIDDING DOCUMENTS

Prepare construction documents that revise, refine, amplify, and depict, in detail, the project. The documents shall set forth, in detail, quality levels of and requirements for the construction, and shall consist of final drawings / specifications that comply with applicable regulatory and construction code requirements, enacted at the time of completion of the one hundred percent (100%) construction documents. Prepare bidding documents in Phases / Bid Packages appropriate to the project requirements and funding. Incorporate the current edition of the DTMB “MICHSPEC”, “DCSPEC” or “50KSPEC”, as adopted and modified by the State of Michigan. The construction documents shall contain all information necessary to bid and construct the project.

The services under this phase may include but not be limited to coordination, final drawings / specifications and bidding documents, civil / site staging design, final structural calculations, final environmental / architectural / engineering design development / reviews of drawings / specifications, construction testing program, hazardous materials, health and safety risks, final design correction procedures, design and construction budget, construction codes / permits and construction schedule, as required by the Department / Client / Agency and as outlined in the Project / Program Statement.

PHASE 600 - CONSTRUCTION ADMINISTRATION - OFFICE SERVICES

Provide all required construction oversight administration and timely professional review and administrative services, as the circumstances of the construction may require, allowing the successful review / implementation of the construction documents into a completed remedial actions / abatement measures and / or for the use intended by the Department / Client / Agency. The services under this phase may include but not be limited to coordination, review and approval of shop drawings and submittals, reporting of construction progress, construction quality testing, construction contractor performance review, punch list procedures, claims, establishing close-out procedures and developing / review of as-built documents, as required by the Department / Client / Agency requirements, and as outlined in the Project / Program Statement.

PHASE 700 - CONSTRUCTION ADMINISTRATION - FIELD SERVICES

Provide all required Construction Oversight and Field Services, including timely inspection and professional services, as the circumstances of the construction may require, allowing the successful review / implementation of the construction documents into a completed remedial action / abatement measure and / or for the use intended by the Department / Client / Agency. The services under this phase may include but not be limited to coordination, field inspections, progress meetings and final project inspection, as required by the Department / Client / Agency requirements and as outlined in the Project / Program Statement.

PHASE 900 – OPERATION AND MAINTENANCE SERVICES – REMEDIATION FACILITY

Provide all required Operation and Maintenance (O & M) Services and perform, in a safe and secure environment, all functions, including timely inspection, sampling and professional services, necessary to maintain uninterrupted, effective, and efficient facility / system components for the use intended by the Department / Client / Agency. The services under this phase may include but not be limited to coordination, general system operation / inspections, routine system / building / ground maintenance, sampling, spare replacement parts, consumable supplies, utilities, waste materials removal / treatment / disposal, non-routine emergency services, progress meetings and reporting, as required by the Department / Client / Agency requirements and as outlined in the Project / Program Statement.

ARTICLE II
COMPENSATION

In consideration of the performance of this Contract, the Department agrees to pay the Professional, as compensation for professional services, an hourly billing rate for each employee providing a direct service to this project, on a not-to-exceed basis as specified herein, subject to subsequent modifications mutually agreeable to the parties hereto; provided, however, the Professional may not incur costs, or bill the Department, for professional services in excess of the estimates established for this Project without the prior written agreement of the Department.

The attached proposal prepared by the Professional in response to the Request for Proposal, by the Owner, may describe methodology, services, schedule, and other aspects of the work to be performed under the Contract but does not supersede the Contract.

Compensation to the Professional shall be on an hourly billing rate basis for professional services rendered by salaried and non-salaried professional, technical, and technical support employees, except for any authorized reimbursable expenses provided for in this Contract.
Total compensation for any Phase shall not exceed the amount authorized for that Phase, unless authorized in writing by the Department’s approved Contract Change Order.

Professional services shall not be performed, and no project expense shall be incurred by the Professional firm prior to the issuance of a written and signed Professional Services Contract and a DTMB-0402 - Contract Order by the Department to the Professional, authorizing the Professional to start the Project.

Compensation to the Professional for services and authorized technical and technical support employees performing a direct service for this project shall be determined using the Professional firm's billing rates. The Professional firm's hourly billing rate shall be the actual amount paid for the employee services on the project including fringe benefits, vacations, sick leave, other indirect costs, and profit. The Professional firm's hourly billing rates shall not change during the life of this contract without written approval by the Department.

See attached Appendix**, Overhead Items Allowed for the Professional Services Contractor Firm's Hourly Billing Rate Calculation**, for the guide to overhead items allowed for the professional services contractor firm's hourly billing rate calculation. Reimbursement for the Project / Program Statement scope of work requirements will be provided only for Department approved items authorized for reimbursement compensation in this Contract. The State will not reimburse the Professional for downtime, or for personnel involved in downtime due to mechanical problems or failure of Professional's or Subcontractor's equipment.

The preparation of Bulletins and Contract Change Orders resulting from changes to the project scope of work or previously unknown on-site field conditions will be compensated to the Professional, as approved by the Department on an hourly billing rate basis in accordance with this article. This compensation shall not exceed seven and one-half percent (7.5%) of the Construction Contractor's quotation for the Bulletin or Contract Change Order or an amount mutually agreed upon by the Professional and the Project Director / Agency Project Manager.

The Professional shall provide, but no additional monetary compensation shall be allowed for the services necessary to respond to and resolve all claims arising wholly or in part from the Professional's errors and / or omissions or other aspects of the Project's design or the Professional firm's performance which is inconsistent with the Professional or Construction Contract.

2.1 PREMIUM TIME/OVERTIME: This Contract anticipates that no premium or overtime is required to achieve the Project's scope of work. No compensation will be allowed to the Professional for any premium or overtime cost incurred to achieve the Project schedule of this Contract, unless directed in writing by the Project Director / Agency Project Manager and approved by the Department.

2.2 EMPLOYEE HOURLY BILLING RATES: Hourly billing rates will include all direct and indirect monetary costs to the State for the Professional's services under this Contract other than the authorized and approved reimbursements. Hourly billing rates shall be based on the Professional's documented historical operating expenses and adjusted for Project specific costs. In no case shall this documentation period include more than eighteen (18) months prior to the date of award of this Contract.

Lump-sum payments to employees are not allowed under this Contract. Billing rates for employees who perform professional services of a subordinate or of a position classification having a lower classification / pay range shall be accounted and paid for at the lower hourly billing pay rate. The hourly billing rate charge of any employee may be changed by the Professional with a written and Department approved Contract Modification to account for normal personnel pay increases.

Hourly billing rates include, but are not limited to: Overhead items such as employee fringe benefits, vacations, sick leave, insurance, taxes, pension funds, retirement plans, meals, lodging, and all Project related travel expenses for Projects **less than** one-hundred (100) miles in each direction from the Professional's Michigan office, computer costs/operating costs, data entry, and time, telephone, telephone-related services, and all reproduction services (except Contract Bidding Documents/Deliverables).

The hourly billing rate also includes all reproduction costs for design interpretations, study/design clarifications and Bulletins related to design errors or omissions, construction code compliance (precipitating either from design code compliance and plan review, design interpretations, or construction on-site/field inspections), and all similar, or avoidable costs. All incidental postage, mail, or other shipping or delivery services, acquisition, bad debts, previous business losses, employment fees, depreciation, and operating costs for equipment, including computer design and/or computer drafting systems, and any specialized testing equipment are to be included. The hourly billing rate shall include, without exception, secretarial, computer / typing / word processing, editing, and clerical services utilized in any way for the Project as well as other non-technical and/or employees providing indirect services. The hourly billing rate also includes all profit without regard to its form or distribution.

Items not allowable as part of the Professional's calculated hourly billing rate include but are not limited to: Any costs associated with litigation and settlements for the Professional, other liability suits, out-of-state offices and associated travel, bonuses, profit sharing, premium/overtime costs, public relations, entertainment, business promotion, contributions, and various speculative allowances.

The hourly billing rate for the Professional may not be applied to the work of the Professional's Sub-Consultant's staff. Each Sub-Consultant firm must submit a separate hourly billing rate with proper documentation for Sub-Consultant services provided as part of the Proposal. The hourly billing rate of the respective Consultant firm shall be used for that Consultant firm's personnel only. No mark-up to Consultant firm's charges will be allowed.

2.3 RANGE OF EMPLOYEE HOURLY BILLING RATES: The Professional shall identify the service being provided and include the Professional's or Consultant's employee(s) full names and position classifications for the Project and their current hourly billing rates at the beginning and at the anticipated end of the Project. This hourly billing rate range shall reflect any anticipated pay increases over the life of the Contract. The range of hourly billing rates for any employee position or classification may not be changed without an approved Contract Modification.

2.4 DIRECT COST REIMBURSEMENT ITEMS: The Professional's Consultant services and authorized reimbursable expenses shall be treated as an authorized reimbursable expense item at a direct cost. The Professional shall be responsible for the selection of the supplier of the professional services or materials; the coordination, adequacy, and application of the professional services, whether provided by the Professional's staff or provided by their Consultant, and any Project costs that exceed the budget for each Phase.

Project related travel expenses (mileage, meals, lodging) for Projects **more than** one hundred (100) miles in one-way from the Professional's nearest office shall be treated as an authorized reimbursable expense at the State of Michigan's current travel rates.

Unless authorized elsewhere in this Contract, direct cost reimbursement items shall be limited to the actual cost of printing and reproduction of project deliverables such as Final Study Reports, Surveys, Bidding Documents, and U.S. Mail regular shipping postage of the project deliverables listed above.

In addition, direct cost reimbursement items may include soil borings, site surveys and any required laboratory testing, Design Code Compliance and Plan Review Approval Fees by the licensing agency; reproduction of documents for legislative presentation, artistic productions, mobilization of testing equipment, laboratory costs for testing samples, per-linear-foot cost of soil borings and specialized inspections of the structural, mechanical, electrical, chemical or other essential components of the Project.

Compensation for this Contract shall not exceed the budget per Project Phase identified in the attached Contract Order unless authorized by a Department approved Contract Modification. It shall be the Professional's responsibility to carefully monitor Project costs, activities, and progress and to provide the Project Director / Agency Project Manager timely notification of any justifiable need to increase the authorized budget. The Professional may not proceed with professional services that have not been authorized by the Project Director / Agency Project Manager and shall immediately notify the Project Director / Agency Project Manager if such services have been requested or have become necessary.

Professional / Sub-Consultant staff and hourly billable rates are identified in the attached Professional's proposal.

ARTICLE III
PAYMENTS

Payment for the professional services shall be based on the Professional's performance of authorized professional service(s) performed prior to the date of each submitted payment request. Payment requests shall be submitted monthly to the Project Director / Agency Project Manager on a payment request form (DTMB-0440). Payment for each monthly submitted payment request shall be made within thirty (30) consecutive calendar days following the Department's approval of the payment request. Payment requests shall include signed certification by the Professional of the actual percentage of work completed as of the date of invoicing for each Phase and summarize the amounts authorized, earned, previously paid, and currently due for each Project Phase. Payment requests shall be supported by itemized records or documentation in such form and detail as the Department may require. Each of the Professional's Consultant's submitted payment request applications shall include similar information. This includes, but is not limited to:

a) Phase Numbers for the professional services provided.

b) Professional's personnel and position/classification providing service and hours worked

c) Current hourly billing rate charges for each individual position/classification.

d) Copy of certified on-site visitation log or site visit report showing time on-site.

e) Itemized invoices from each of the Professional's Consultant's documenting that firm's professional services charge and the Project work related services provided.

f) Authorized reimbursable expense items provided with receipts and invoices.

The State has the right to withhold payment of any disputed amounts until the parties agree as to the validity of the disputed amount. The State will notify the Professional of any dispute within a reasonable time. Payment by the State will not constitute a waiver of any rights as to the Professional's continuing obligations, including claims for deficiencies or substandard Contract Activities.

The Professional's acceptance of final payment by the State constitutes a waiver of all claims by the Professional against the State for payment under this Contract, other than those claims previously filed in writing on a timely basis and still disputed.

The State will only disburse payments under the Contract through Electronic Funds Transfer (EFT). Contractor must register with the State at http://www.michigan.gov/SIGMAVSS to receive electronic funds transfer payments. If Contractor does not register, the State is not liable for failure to provide payment. Without prejudice to any other right or remedy if may have, the State reserves the right to set off at any time any amount then due and owing to it by Contractor against any amount payable by the State to Contractor under this Contract.

ARTICLE IV
ACCOUNTING

The Professional shall keep current and accurate records of Project costs and expenses, hourly billing rates, authorized reimbursable expense items, and all other Project related accounting documents to support the Professional's monthly application for payment. Project records shall be kept on a generally recognized accounting basis. Such records shall be available to the Department for a period of ten (10) years after the Department's final payment to the Professional. The State of Michigan reserves the right to conduct, or have conducted, an audit and inspection of these Project records at any time during the Project or following its completion.

ARTICLE V
INSURANCE

The Professional shall purchase, maintain, and require such insurance that will provide protection from claims set forth below which may arise out of or result from the Professional firm's services under this Contract, whether such service is performed by the Professional or performed by any of the Professional firm's Consultant's or by anyone directly or indirectly employed by them, or by anyone for whose acts they may be liable. The following insurance policy limits described below are intended to be the minimum coverage acceptable by the State:

For the purpose of this Section, "State" includes its departments, divisions, agencies, offices, commissions, officers, employees, and agents.

(a) The Contractor must provide proof that it has obtained the minimum levels of insurance coverage indicated or required by law, whichever is greater.

The insurance must protect the State from claims that may arise out of or result from or are alleged to arise out of or result from the Contractor's or a Subcontractor's performance, including any person directly or indirectly employed by the Contractor or a Subcontractor, or any person for whose acts the Contractor or a Subcontractor may be liable.

(b) The Contractor waives all rights against the State for the recovery of damages that are covered by the insurance policies the Contractor is required to maintain under this Section. The Contractor's failure to obtain and maintain the required insurance will not limit this waiver.

(c) All insurance coverage provided relative to this Contract is primary and non-contributing to any comparable liability insurance (including self-insurance) carried by the State.

(d) The State, in its sole discretion, may approve the use of a fully funded self-insurance program in place of any specified insurance identified in this Section.

(e) Unless the State approves, any insurer must have an A.M. Best rating of "A" or better and a financial size of VII or better, or if those ratings are not available, a comparable rating from an insurance rating agency approved by the State. All policies of insurance must be issued by companies that have been approved to do business in the State. To view the latest A.M. Best's Key Ratings Guide and the A.M. Best's Company Reports (which include the A.M. Best's Ratings) visit the A.M. Best Company internet web site at http://www.ambest.com.

(f) Where specific coverage limits are listed in this Section, they represent the minimum acceptable limits. If the Contractor's policy contains higher limits, the State is entitled to coverage to the extent of the higher limits.

(g) The Contractor must maintain all required insurance coverage throughout the term of this Contract and any extensions. However, in the case of claims-made Commercial General Liability policies, the Contractor must secure tail coverage for at least three (3) years following the termination of this Contract.

(h) The minimum limits of coverage specified are not intended and may not be construed; to limit any liability or indemnity of the Contractor to any indemnified party or other persons.

(i) The Contractor is responsible for the payment of all deductibles.

(j) If the Contractor fails to pay any premium for a required insurance policy, or if any insurer cancels or significantly reduces any required insurance without the State's approval, the State may, after giving the Contractor at least 30 days notice, pay the premium or procure similar insurance coverage from another company or companies. The State may deduct any part of the cost from any payment due the Contractor or require the Contractor to pay that cost upon demand.

(k) In the event the State approves the representation of the State by the insurer's attorney, the attorney may be required to be designated as a Special Assistant Attorney General by the Michigan Attorney General.

Required Limits	Additional Requirements
Commercial General Liability Insurance	
Minimum Limits: $1,000,000 Each Occurrence Limit $1,000,000 Personal & Advertising Injury Limit $2,000,000 General Aggregate Limit $2,000,000 Products/Completed Operations	Professional must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds using endorsement CG 20 10 11 85, or both CG 20 10 12 19 and CG 20 37 12 19.
Umbrella or Excess Liability Insurance	
Minimum Limits: $2,000,000 General Aggregate	Professional must have their policy follow form.
Automobile Liability Insurance	
Minimum Limits: $1,000,000 Per Accident	Professional must have their policy: (1) endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds; and (2) include Hired and Non-Owned Automobile coverage.
Workers' Compensation Insurance	
Minimum Limits: Coverage according to applicable laws governing work activities.	Waiver of subrogation, except where waiver is prohibited by law.
Employers Liability Insurance	
Minimum Limits: $500,000 Each Accident $500,000 Each Employee by Disease $500,000 Aggregate Disease.	
Professional Liability (Errors and Omissions) Insurance	
Minimum Limits: $1,000,000 Each Occurrence $2,000,000 Annual Aggregate Deductible Maximum: $50,000 Per Loss	

Required Limits	Additional Requirements
Commercial General Liability Insurance	
Minimum Limits: $1,000,000 Each Occurrence Limit $1,000,000 Personal & Advertising Injury Limit $2,000,000 General Aggregate Limit $2,000,000 Products/Completed Operations	Professional must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds using endorsement CG 20 10 11 85, or both CG 20 10 12 19 and CG 20 37 12 19.
Umbrella or Excess Liability Insurance	
Minimum Limits: $2,000,000 General Aggregate	Professional must have their policy follow form.
Automobile Liability Insurance	
Minimum Limits: $1,000,000 Per Accident	Professional must have their policy: (1) endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds; and (2) include Hired and Non-Owned Automobile coverage.
Workers' Compensation Insurance	
Minimum Limits: Coverage according to applicable laws governing work activities.	Waiver of subrogation, except where waiver is prohibited by law.
Employers Liability Insurance	
Minimum Limits: $500,000 Each Accident $500,000 Each Employee by Disease $500,000 Aggregate Disease.	
Professional Liability (Errors and Omissions) Insurance	
Minimum Limits: $1,000,000 Each Occurrence $2,000,000 Annual Aggregate Deductible Maximum: $50,000 Per Loss	

Required Limits	Additional Requirements
Environmental and Pollution Liability (Errors and Omissions)	
Minimum Limits: $1,000,000 Each Occurrence $2,000,000 Annual Aggregate	Professional must have their policy: (1) be applicable to the work being performed, including completed operations equal to or exceeding statute of repose; (2) not have exclusions or limitations related to Transportation (upset overturn, spills during loading or unloading, Hazardous Materials Handling, and Non-Owned disposal site liability; and (3) endorsed to add “the State of Michigan, its departments, division, agencies, offices, commissions, officers, employees, and agents” as additional insured.

The Professional firm's Errors and Omissions coverage shall include coverage for claims resulting from acts of forbearance that cause or exacerbate pollution and claims of bodily injury and property damage in the amount of $1,000,000 minimum coverage per occurrence, $2,000,000 annual aggregate. This insurance is required of all Professional firms who conduct professional environmental services including, but not limited to, any of the following services:

(i) Remedial System Design.

(ii) Remediation Management.

(iii) Feasibility Development and Implementation.

(iv) Hydrogeological Evaluation.

(v) Media Testing and Analysis.

(vi) Subsurface and Geophysical Investigation.

(vii) Other related activities as determined by the Department.

Contractual Liability Insurance for claims for damages that may arise from the Professional's assumption of liability on behalf of the State under Article VI concerning indemnification for errors, omissions, or negligent acts in the course of the professional service or other provision within this Contract to the extent that such kinds of contractual liability are insurable in connection with and subject to limits of liability not less than for the general liability insurance and the professional liability insurance and set forth in subsections (c) and (d) above.

Except where the State has approved a subcontract with other insurance provisions, the Professional must require any Consultant / Subcontractor to purchase and maintain the insurance coverage required in this Article. Alternatively, the Contractor may include a Consultant / Subcontractor under the Professional's insurance on the coverage required in that Section.

The failure of a Consultant / Subcontractor to comply with insurance requirements does not limit the Professional's liability or responsibility.

Certificate of Insurance documents, acceptable to the State, shall be provided and filed with the Department prior to commencement of the Professional's Project services, unless otherwise approved in writing, and not less than 20 days before the insurance expiration date every year thereafter. Facsimile copies of the Certificate of Insurance **will not** be accepted. Certificate of Insurance documents must be either submitted hard copy or portable document file (.pdf). The Certificate of Insurance documents must specify on the certificate in the oblong rectangle space labeled "Description of Operations / Locations / Vehicles / Exclusions Added By Endorsement / Special Provisions / Special Items" the following items: **(1) The ISID Title; (2) The ISID Contract Number; and (3) The State of Michigan must be named as an "Additional Insured on the General Liability Insurance Policy."** The Certificate of Insurance documents shall contain a provision that the Project insurance coverage afforded under the insurance policies for this Contract will not be modified or canceled without at least thirty (30) consecutive calendar days prior written notice, except for 10 days for non-payment of premium, to the State of Michigan, Department.

The attached, Certificates of Insurance documents required for this Project shall be in force for this Project until the final payment by the State to the Professional is made and shall be written for not less than any

limits of liability specified above. The Professional has the responsibility for having their Consultant firms comply with these insurance requirements.

ARTICLE VI
INDEMNIFICATION

(a) To the extent permitted by law, the Professional shall indemnify, defend and hold harmless the State from liability, including all claims and losses, and all related costs and expenses (including reasonable attorneys' fees and costs of investigation, litigation, settlement, judgments, interest, and penalties), accruing or resulting to any person, firm or corporation that may be injured or damaged by the Professional in the performance of this Contract and that are attributable to the negligence or tortious acts of the Professional or any of its Subcontractors / Consultants, or by anyone else for whose acts any of them may be liable.

(b) Employee Indemnification: In any and all claims against the State of Michigan, its departments, divisions, agencies, boards, sections, commissions, officers, employees and agents, by any employee of the Professional or any of its Subcontractors / Consultants, the indemnification obligation under this Contract shall not be limited in any way by the amount or type of damages, compensation or benefits payable by or for the Professional or any of its Subcontractors / Consultants under worker's disability compensation acts, disability benefit acts or other employee benefit acts. This indemnification clause is intended to be comprehensive. Any overlap in provisions, or the fact that greater specificity is provided as to some categories of risk, is not intended to limit the scope of indemnification under any other provisions.

(c) Patent/Copyright Infringement Indemnification: To the extent permitted by law, the Professional shall indemnify, defend and hold harmless the State from and against all losses, liabilities, damages (including taxes), and all related costs and expenses (including reasonable attorneys' fees and costs of investigation, litigation, settlement, judgments, interest, and penalties) incurred in connection with any action or proceeding threatened or brought against the State to the extent that such action or proceeding is based on a claim that any piece of equipment, software, commodity or service supplied by the Professional or its Subcontractors / Consultants, or the operation of such equipment, software, commodity or service, or the use of reproduction of any documentation provided with such equipment, software, commodity or service infringes any United States patent, copyright, trademark or trade secret of any person or entity, which is enforceable under the laws of the United States.

In addition, should the equipment, software, commodity, or services, or its operation, become or in the State's or Professional's opinion be likely to become the subject of a claim of infringement, the Professional shall at the Professional's sole expense (i) procure for the State the right to continue using the equipment, software, commodity or service or, if such option is not reasonably available to the Professional, (ii) replace or modify to the State's satisfaction the same with equipment, software, commodity or service of equivalent function and performance so that it becomes non-infringing, or, if such option is not reasonably available to Professional, (iii) accept its return by the State with appropriate credits to the State against the Professional's charges and reimburse the State for any losses or costs incurred as a consequence of the State ceasing its use and returning it.

Notwithstanding the foregoing, the Professional shall have no obligation to indemnify or defend the State for, or to pay any costs, damages or attorneys' fees related to, any claim based upon (i) equipment developed based on written specifications of the State; or (ii) use of the equipment in a configuration other than implemented or approved in writing by the Professional, including, but not

limited to, any modification of the equipment by the State; or (iii) the combination, operation, or use of the equipment with equipment or software not supplied by the Professional under this Contract.

ARTICLE VII
OWNERSHIP OF DOCUMENTS

All Project deliverables, including but not limited to reports, Bidding Documents, Contract Documents, electronic documents and data, and other Project related documents, including the copyrights, prepared, and furnished by the Professional shall become the property of the State of Michigan upon completion of the Project, completion, and acceptance of the professional's work, or upon termination of the Contract. Project deliverables shall be delivered to the Department upon their request. The Professional shall have no claim for further employment or additional compensation as a result of this Contract requirement. The Professional may retain a copy of all Project documents for their files.

If the Professional is in default or breach of its obligations under this Contract, the State shall have full ownership rights of the Project deliverables, including Bidding Documents and Contract Documents, including all electronic data. If the Professional is in default or this Contract Agreement is terminated, the State shall not use the Contract Documents and deliverables of this Contract for completion of the Project by others without the involvement of other qualified Professionals who shall assume the professional obligations and liability for the Project work not completed by the Professional.

To the fullest extent allowed by law, the State releases the Professional, the Professionals Consultant(s) and the agents and employees of any of them from and against legal claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of the State's use of the Contract Documents other than in accordance with this Contract Agreement.

All Contract deliverables listed may be published or issued for informational purposes without additional compensation to the Professional. The Professional may not use any of the Contract Documents and Contract deliverables for any purpose that may misrepresent the professional services they provided.

The Professional shall retain full rights to the Contract Documents and deliverables and the right to reuse component information contained in them in the normal course of the Professional's professional activities.

The Contract deliverables, Contract Documents, or other documents produced under this Contract may be used by the Department, or others employed by the Department or State of Michigan, for reference in any completion, correction, remodeling, renovation, reconstruction, alteration, modification of or addition to the Project, without monetary compensation to the Professional.

The State of Michigan will not construct additional Projects or buildings based on the work of this Contract without notice to the Professional.

Whenever renderings, photographs of renderings, photographs or models, or photographs of the Project are released by the State of Michigan for publicity, proper credit for design shall be given to the Professional, provided the giving of such credit is without cost to the State of Michigan.

ARTICLE VIII
TERMINATION

The State may, by written notice to the Professional, terminate this Contract and/or any Assignments, in whole or in part at any time, either for the State's convenience or because of the failure of the Professional to fulfill their Contract obligations. Upon receipt of such notice, the Professional shall:

a) Immediately discontinue all professional services affected (unless the notice directs otherwise), and

b) Deliver to the State all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the Professional in performing this Contract, whether completed or in process.

8.1 If the termination is for the convenience of the State, an equitable adjustment in the Contract price shall be made, but no amount shall be allowed for anticipated profit on unperformed professional services.

8.2 If the termination is due to the failure of the Professional to fulfill their Contract obligations, the State may take over the work and prosecute the same to completion by Contract or otherwise. In such case, the Professional shall be liable to the State for any additional cost occasioned to the State thereby.

8.3 If, after notice of termination for failure to fulfill Contract obligations, it is determined that the Professional had not so failed, the termination shall be deemed to have been affected for the convenience of the State. In such event, adjustment in the Contract price shall be made as provided in Section 8.1 of this article.

8.4 The rights and remedies of the State provided in this article are in addition to any other rights and remedies provided by law or under this Contract.

ARTICLE IX
SUCCESSORS AND ASSIGNS

This Contract shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns; provided, however, that neither of the parties hereto shall assign this Contract without the prior written consent of the other.

ARTICLE X
GOVERNING LAWS

This Contract shall be construed in accordance with the current laws of the State of Michigan. Some Assignments to this Contract will be funded wholly or in part by the Federal Government through grant agreements and/or federal programs. The Professional must comply with such funding requirements along with any current applicable federal regulations in performing the tasks described in the Scope of Work, including but not limited to the following current federal regulations. The absence of reference to any law or regulation does not preclude its applicability to this Contract.

1. The Comprehensive Environmental Response Compensation and Liability Act of 1980 as amended CERCLA (The Superfund Act).

2. Section 306 of the Clean Air Act (42 U.S.C. 1857 (h)).

3. Section 508 of the Clean Water Act (33 U.S.C. 1368).

4. Public Law 98-473 as implemented in the Department of the Interior, Bureau of Indian Affairs.

5. Executive Order 11738.

6. Office of Management and Budget Circular A-87, "Cost Principles for State, Local, and Indian Tribal Governments."

7. 25 CFR Part 20; Financial Assistance and Social Services Programs
8. 40 CFR Part 31; Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments

9. 40 CFR Part 32 Subpart F; Drug-Free Workplace

10. 40 CFR Part 33; Participation by Disadvantaged Business Enterprises in United States Environmental Protection Agency Programs

11. 40 CFR Part 35; State and Local Assistance

12. 40 CFR Part 35 Subpart 0; Cooperative Agreements and Superfund State Contracts for Superfund Response Actions

13. 48 CFR Chapter 1 Part 31 Subpart 31.2; Contracts with Commercial Organizations.

ARTICLE XI
NONDISCRIMINATION

In connection with the performance of the Project under this, the Professional agrees as follows:

a) The Professional will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, age, sex *(as defined in Executive Directive 2019-09)*, height, weight, marital status, or a physical or mental disability that is unrelated to the individual's ability to perform the duties of the particular job or position. The Professional will provide equal employment opportunities to ensure that applicants are employed and that employees are treated during employment, without regard to their race, color, religion, national origin, age, sex, height, weight, marital status, or a physical or mental disability that is unrelated to the individual's ability to perform the duties of the particular job or position. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

b) The Professional will, in all solicitations or advertisements for employees placed by or on behalf of the Professional, state that all qualified applicants will receive equal employment opportunity consideration for employment without regard to race, color, religion, national origin, age, sex, height, weight, marital status, or a physical or mental disability that is unrelated to the individual's ability to perform the duties of the particular job or position.

c) The Professional or their collective bargaining representative will send to each labor union or representative of workers with which is held a collective bargaining agreement or other Contract or understanding, a notice advising the said labor union or workers' representative of the Professional's nondiscrimination commitments under this article.
d) The Professional will comply with the Elliot-Larsen Civil Rights Act, 1976 PA 453, as amended, MCL 37.2201 et seq; the Michigan Persons with Disabilities Civil Rights Act, 1976 PA 220, as amended, MCL 37.1101 et seq; Executive Directive 2019-09; and all published rules, regulations, directives, and orders of the Michigan Civil Rights Commission which may be in effect on or before the date of award of this Contract.

e) The Professional will furnish and file nondiscrimination compliance reports within such time and upon such forms as provided by the Michigan Civil Rights Commission; said forms may also elicit information as to the practices, policies, program, and employment statistics of the Professional and of each of their Consultant firms. The Professional will permit access to all books, records, and accounts by the Michigan Civil Rights Commission, and / or its agent, for purposes of investigation to ascertain nondiscrimination compliance with this Contract and with rules, regulations, and orders of the Michigan Civil Rights Commission relevant to Article 6, 1976 PA 453, as amended.

f) In the event that the Michigan Civil Rights Commission finds, after a hearing held pursuant to its rules, that the Professional has not complied with the contractual nondiscrimination obligations under this Contract, the Michigan Civil Rights Commission may, as part of its order based upon such findings, certify said findings to the State Administrative Board of the State of Michigan, which the State Administrative Board may order the cancellation of the Contract found to have been violated, and/or declare the Professional ineligible for future Contracts with the State and its political and civil subdivisions, departments, and officers, and including the governing boards of institutions of higher education, until the Professional complies with said order of the Michigan Civil Rights Commission. Notice of said declaration of future ineligibility may be given to any or all of the persons with whom the Professional is declared ineligible to Contract as a contracting party in future Contracts. In any case before the Michigan Civil Rights Commission in which cancellation of an existing Contract is a possibility, the State shall be notified of such possible remedy and shall be given the option by the Michigan Civil Rights Commission to participate in such proceedings.

g) The Professional shall also comply with the nondiscrimination provisions of 1976 PA 220, as amended, concerning the civil rights of persons with physical or mental disabilities.

h) The Professional will include, or incorporate by reference, the nondiscrimination provisions of the foregoing paragraphs a) through g) in every subcontract or Contract Order unless exempted by the rules, regulations, or orders of the Michigan Civil Rights Commission, and will provide in every subcontract or Contract Order that said nondiscrimination provisions will be binding upon each of the Professional's Consultant's or seller.

ARTICLE XII
CONTRACT CLAIMS AND DISPUTES

In any claim or dispute by the Professional which cannot be resolved by negotiation, the Professional shall submit the claim or dispute for an administrative decision by the Department of Technology, Management and Budget, Director of State Facilities Administration within thirty (30) consecutive calendar days of the end of the disputed negotiations, and any decision of the Director of State Facilities Administration may be appealed to the Michigan Court of Claims within one (1) year of the issuance of the Director's decision. The Professional agrees that the Department's appeal procedure to the Director of State Facilities Administration is a prerequisite to filing a suit in the Michigan Court of Claims.

ARTICLE XIII
DEFINITION OF TERMS

The definition of terms and conditions of this Contract are described and outlined in the following Articles I through XIV and attached appendices. The capitalized defined terms used in this Professional Services Contract shall have the following definitions:

ADDENDA: Written or graphic numbered documents issued by the Department and/or the Professional prior to the execution of the Construction Contract which modify or interpret the Project Bidding Documents, including drawings, and specifications, by additions, deletions, clarifications, or corrections.

The Addenda shall: (1) Be identified specifically with a standardized format; (2) Be sequentially numbered; (3) Include the name of the Project; (4) Specify the Project Index No., Project File No., the Contract Order No. Y, and a description of the proposed Addenda; and (5) Specify the date of Addenda issuance.

As such, the Addenda are intended to become part of the Project Contract Documents when the Construction Contract is executed by the Professional's recommended lowest responsive, responsible qualified Construction Contractor. An Addendum issued after the competitive construction Bid opening to those construction Bidders who actually submitted a Bid, for the purpose of rebidding the Project work without re-advertising, is referred to as a post-Bid Addendum.

AGENCY PROJECT MANAGER: The assigned staff of the Department or the State / Client Agency authorized by the State to represent and act on behalf of the Project Director on a given project and to thereby provide direction and assistance to the Construction Contractor. The Agency Project Manager may designate in writing a person to act on behalf of the Agency Project Manager when they are unable to perform their required duties or is away from the office. In such cases, the Agency Project Manager must notify the Construction Contractor and the Design and Construction Project Director.

BID: A written offer by a construction Bidder for the Department. Project construction work, as specified, which designates the construction Bidder's Base Bid and Bid Prices for all alternates.

BIDDER: The person acting directly, or through an authorized representative, who submits a competitive construction bid directly to the Department.

BIDDING DOCUMENTS: The Professional's project contract documents as advertised, and all addenda issued before the construction bid opening, and after the construction bid opening, if the project construction work is rebid without re-advertising. Bidding documents shall consist of: the Phase 500 - Final Design Drawings and Specifications, any Addenda issued, Special, General, and Supplemental Conditions of the Construction Contract, and modifications, if any, to standard forms provided by the Department. Such forms consist of: the Project Advertisement, the Instructions to Bidders, the proposal forms, General, Supplemental, and any Special Conditions of the Construction Contract, and the form of agreement between the Department and the Construction Contractor for the project work requirements.

BID SECURITY: The monetary security serving as guarantee that the Bidder will execute the offered construction contract or as liquidated damages in the event of failure or refusal to execute the construction contract.

BUDGET: The maximum legislatively authorized budget amount to be provided by the State of Michigan and available for a specific purpose or combination of purposes to accomplish the project for this contract.

BULLETIN: A standard document form (DTMB-0485, Bulletin Authorization No. and the DTMB-0489, Instructions to Construction Contractors for Preparation of Bulletin Cost Quotations for Contract Change Orders) used by the Department to describe a sequentially numbered change in the project under consideration by the Department and the Professional and to request the Construction Contractor to submit a proposal for the corresponding adjustment in the contract price and / or contract time, if any. These standard document forms are a part of the "DTMB-0460, Project Procedures" documents package.

CONSTRUCTION CONTRACT: A separate written contract agreement between the Construction Contractor and the Department for the construction, alteration, demolition, repair, or rebuilding of a State / Client Agency building or other State property.

CONSTRUCTION CONTRACTOR: Any construction firm under a separate contract to the Department for construction services.

CONSTRUCTION INSPECTION SERVICES: The Professional's field Inspections of the Project during the construction Phase of this Contract which includes but is not limited to: (1) Documenting the quantity and quality of all Project construction work and verifying that the Project construction work is properly completed; (2) Resolve Project problems that are affecting the Project construction work, certify payment requests, process Bulletins, Contract Change Order recommendations, and requests for information (RFI's) in a timely manner as prescribed in the Department's**,** **"**MICHSPEC Standard Construction Contract and General Conditions for Construction (Long Form)" or the current Department, DTMB-0401 - Proposal and Contract / Front-End Package for Small Projects for Professional Services Contractors (PSC) with General Conditions for Construction and Instructions to Bidders" as adopted and modified by the State of Michigan and incorporated into the Construction Contract; and the (3) Inspection of Project construction work completed or in progress by the Construction Contractor to determine and verify to the Department's Project Director / Agency Project Manager and their Department Field Representative that the Project construction work is in compliance with the Professional's design intent and that the Project has been completed by the Construction Contractor in accordance with the Professional's Phase 500 - Contract Documents / drawings and specifications requirements.

The Professional shall provide sufficient Inspections of the Project during the construction Phase to administer the construction Phase field and office services as directly related to the degree of Project complexity, up to and including full-time field Inspections. Construction field Inspections shall occur as the construction field conditions and the Project may require and during the regularly scheduled monthly progress and payment meetings. The Professional shall use for their construction field Inspection services, only personnel having professional expertise, experience, authority, and compatibility with departmental procedures as the Department may approve. The Professional agrees that such characteristics are essential for the successful completion of the Project. Such individuals shall be replaced for cause where the Department determines and notifies the Professional, in writing, of their unacceptable performance.

CONSULTANT: Any individual, firm, or employee thereof, not a part of the Professional's staff, but employed by the Professional and whose professional service cost is ultimately paid by the State of Michigan, either as a direct cost or authorized reimbursement. This includes the recipient(s) of Contract Orders for material, support, and/or technical services. Also, included are persons and firms whose management and / or direction of services are assigned to the Prime Professional as may be provided elsewhere in this Contract.

CONTRACT CHANGE ORDER: A standard document form (DTMB-0403) issued and signed by the State of Michigan and signed by the Professional which amends the Project Design Professional's Contract Documents for changes in the Project / Program Statement or an adjustment in Contract price and / or Contract time, or both.

CONTRACT DOCUMENTS: The Professional's Phase 100 – Study, Final Report and Phase 500 - Final Design Plans / Drawings, Specifications, Construction Contract, Instructions to Construction Bidders, proposal, Bidding Documents, agreement, conditions of the Contract, payment bond, performance / labor and material bond, prevailing wages, all Addenda, and attachments as may be necessary to comprise a Construction Contract for the Project. Specifications for this Contract will be prepared for Division 00 through 49, in the 2004 MasterFormat Outline by the Construction Specifications Institute (C.S.I.), as appropriate for the Project.

CONTRACT MODIFICATION: A form (DTMB-0410) amending the Contract signed by the Department and the Professional. The preparation of Bulletins and Contract Change Orders resulting from changes in the Project / Program Statement or previously unknown on-site field conditions as approved by the Department will be compensated to the Professional by way of the Contract Modification in accordance with the Article II, Compensation text of this Contract. Any Contract Modification of this Professional

Services Contract must be in writing, signed by duly authorized representatives of the parties, and shall be in such format and detail as the Department may require. No Contract Modification will be approved to compensate the Professional for correcting, or for responding to claims or litigation for, the Professional's Phase 100 – Study, Final Report and Phase 500 - Contract Documents study / design errors, omissions, or neglect on the part of the Professional.

CONTRACT ORDER: A form (DTMB-0402) issued and signed by the State of Michigan authorizing a Professional to: (1) Begin to incur Project expenses and proceed with the Project on-site; and (2) Provide professional services for the fee amount designated in the Phases of the Contract Order. Issuance of the DTMB-0402 certifies that: (1) The State will enter into a Professional Services Contract for the professional services described in the various Phases of this Contract; and that (2) The proper three (3) sets of Certificate of Insurance documents have been received and accepted by the State along with the approval and signing of the Professional's Professional Services Contract by the FBSA, DCD Director.

DEPARTMENT: The Department of Technology, Management and Budget, Facilities and Business Administration, Design and Construction Division. The Department will represent the State of Michigan in all matters pertaining to this Project. This Professional Services Contract will be administered through the Department on behalf of the State of Michigan and The State / Client Agency.

DESIGN MANUAL: Provides the Professional with information regarding the Department's current "Major Project Design Manual for Professional Services Contractors and State/Client Agencies" review process requirements regarding the uniformity in Contract materials presented to it by the Professional and the State/Client Agency(ies). This manual contains the following noted standards, instructions, and procedures information for: (1) General instructions for planning documents from Phase 100 - Study through Phase 500 - Final Design; (2) Net and gross area / volume; (3) Project cost format; (4) Outline architectural and engineering specifications; (5) Specifications in documentation Phase; (6) Instructions for proposal; (7) Bidders questionnaire; and the (8) Project job sign.

DIRECTOR: The Director of the Department of Technology, Management and Budget or their authorized State of Michigan representative.

DIRECTOR - SFA: The Director of the Department of Technology, Management and Budget, State Facilities Administration, or their authorized State of Michigan representative.

DEPARTMENT FIELD REPRESENTATIVE: An employee of the State under the direction of the Department who provides the Inspection of construction projects for compliance with the design intent of the Professional's Phase 500 - Contract Documents / drawings and specification requirements and the building construction codes. The Department Field Representative is the liaison between the Construction Contractor, the Professional, and the Project Director / Agency Project Manager.
The Project Director / Agency Project Manager, or their Department Field Representative, has the authority to require the Professional to respond to and resolve study / design related problems, construction field problems and to attend Project meetings. Unless delegated by specific written notice from the Department, the Department Field Representative has no authority to order any changes in the Project scope of work or authorize any adjustments in Contract price or Contract time.

INSPECTION: The Professional and their Consultant firm's on-site and/or off-site examination of the Project construction work completed or in progress by the Construction Contractor to determine and verify to the Department's, Project Director / Agency Project Manager and their Department Field Representative that the quantity and quality of all Project construction work is in accordance with the design intent of the Professional's Phase 500 - Contract Documents / drawings and specifications requirements.

KEY PRINCIPAL PERSONNEL / EMPLOYEE: An individual employee of a Professional who is essential for the successful completion of the Project.

NOTICE OF INTENT TO AWARD: A written notice to the Construction Contractor, by the Department accepting the Professional's written recommendation to award the construction Bid to the lowest responsive, responsible qualified construction Bidder. The Notice of Intent to Award letter will also designate the Contract price and itemize the alternates that the Department, at its sole discretion has accepted.

PHASE: A discretely distinguishable step necessary to produce the Project in the course of the Professional providing study, design, and construction administration services.

PRIME PROFESSIONAL SERVICES CONTRACTOR / PROFESSIONAL: An individual, firm, partnership, corporation, association, or other legal entity who is legally permitted by law to sign and seal final design construction Contract Documents and licensed under the State of Michigan's professional licensing and regulation provisions of the Occupational Code (State Licensing Law), Act 299 of the Public Acts of 1980, Article 20, as amended, to practice architecture, engineering, environmental engineering, geology, civil, land surveying, or landscape architecture services in the State of Michigan.

The Prime Professional Services Contractor / Professional is also legally permitted by the State of Michigan's regulation provisions of the State Construction Code, Act 230 of the Public Acts of 1972, as amended, and designated in a Construction Contract by the Department to recommend construction progress payments to the Construction Contractor.

PROJECT: Any new construction, existing site, new utilities, existing building renovation, roof repairs and / or removal and replacement, additions, alteration, repair, installation, construction quality control and material testing services, painting, decorating, demolition, conditioning, reconditioning or improvement of public buildings, works, bridges, highways, or roads authorized by the Department that requires professional study / design services as part of this Contract.

PROJECT COST: The total Project cost including, but not limited to, site purchase, site survey and investigation, hazardous material abatement, construction, site development, new utilities, telecommunications (voice and data), professional fees, construction quality control and material testing services, testing, and balancing services, furnishings, equipment, plan(s) / drawing(s) design code compliance and plan review approval fees and all other costs associated with the Project.

PROJECT DIRECTOR: The professional licensed employee of the Department who is responsible for directing and supervising the Professional's services during the life of this Contract.
The Project Director, or their Department Field Representative, has the authority to require the Professional to respond to and resolve study / design related problems, construction field problems and to attend Project related meetings.

PROJECT/PROGRAM STATEMENT: The Project / Program Statement is provided by the Department and defines the scope of the problem, describes why this Project is desirable, and provides a preferred resolution of the problem.

PROJECT TEAM: The Professional, the Project Director / Agency Project Manager, Department Field Representative, a representative of the State / Client Agency, and others as considered appropriate by the Department.

PUNCH LIST: A list of minor construction Project items to be completed or corrected by the Construction Contractor, any one of which do not materially impair the use of the Project work, or the portion of the Project work inspected, for its intended purpose. A Punch List shall be prepared by the Professional upon having made a determination that the Project work, or a portion of the Project construction work inspected, in concert with the Professional, the Construction Contractor, the Department, the Project Director / Agency Project Manager and their Department Field Representative, and any construction

manager, is substantially complete and shall be attached to the respective DTMB - 0455, Certificate of Substantial Completion form. This standard document form is a part of the "DTMB - 460, Project Procedures" documents package.

SOIL EROSION AND SEDIMENTATION CONTROL: The planning, design and installation of appropriate Best Management Practices (as defined by the most current version of the Department's Soil Erosion and Sedimentation Control Guidebook) designed and engineered specifically to reduce or eliminate the off-site migration of soils via water runoff, wind, vehicle tracking, etc. and comply with the Soil Erosion and Sedimentation Control in the State of Michigan as regulated under the 1994 Public Act 451, as amended – The Natural Resources Environmental Protection Act, Part 91 – Soil Erosion and Sedimentation Control. Soil Erosion and Sedimentation Control associated with this Contract will be monitored and enforced by the Department of Technology, Management and Budget, State Facilities Administration, Soil Erosion and Sedimentation Control Program.

STATE: The State of Michigan in its governmental capacity, including its departments, agencies, boards, commissions, officers, employees, and agents. Non-capitalized references to a state refer to a state other than the State of Michigan.

STATE / CLIENT AGENCY: A Department of the State of Michigan, for whose use the Project will ultimately serve, which requires professional design services.

AGENCY FIELD INSPECTOR: An employee of the State of Michigan under the direction of the State / client Agency who provides the on-site, Inspection of construction Projects for compliance with the study / design intent of the Professional firm's Contract Documents / drawings and specification requirements and the building construction codes. The Agency Field Inspector is the liaison between the Construction Contractor, the Professional, and the Agency Project Manager. The Agency Project Manager, or their Agency Field Inspector, has the authority to require the Professional to respond to and resolve study / design related problems, construction on-site field problems and to attend Project related meetings.

SUBSTANTIAL COMPLETION: The form (DTMB-0445) stating that the Project work, or a portion of the Project work eligible for separate Substantial Completion, has been completed in accordance with the design intent of the Professional's Contract Documents to the extent that the Department and the State / Client Agency can use or occupy the entire Project work, or the designated portion of the Project work, for the use intended without any outstanding, concurrent work at the Project work site, except as may be required to complete or correct the Project work Punch List items.

SUSTAINABLE DESIGN: The Professional's use of a balance of appropriate materials, products and design methods that reduce the impact to the natural ecosystems and be within the Budget constraints of the Project. Sustainable Design shall be used wherever possible by the Professional in their Project design and an itemized list shall be provided with the Professional's Contract Documents that identifies the processes and products.

TASK: Shall mean the following: (1) A quantifiable component of design related professional study / design Task services required to achieve a Phase of the Project; (2) The most manageable sub-element within a study / design Phase; (3) A unique item of work within a study / design Phase for which primary responsibility can be assigned; and (4) Has a time related duration and a cost that can be estimated within a study, design, and construction Phase.

ARTICLE XIV
COMPLETE AGREEMENT/MODIFICATION

This Professional Services Contract constitutes the entire agreement as to the Project between the parties. Any Contract Modification of this Contract and the Project / Program Statement scope of work requirements must be in writing, signed by duly authorized representatives of the parties, and shall be in such format and detail as the State may require. No Contract Modification may be entered into to

compensate the Professional for correcting, or for responding to claims or litigation for the Professional firm's final design Contract Documents/study/design errors, omissions, or neglect on the part of the Professional.

APPENDIX 1

PROJECT/PROGRAM STATEMENT

MINOR STATE CAPITAL OUTLAY PROJECTS

REQUEST FOR PROPOSALS
FROM
PROFESSIONAL SERVICE CONTRACTORS

(Authority PA 431 of 1984)

For Indefinite-Service, Indefinite-Delivery
Not-to-Exceed Fee, Billable-Rate

Professional Services For

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET

Request for Proposal for
2023 Indefinite Scope Indefinite Delivery (ISID) for
Expanded Environmental Remediation Services
Various Locations, Michigan

PROPOSAL DUE DATE: May 4, 2023, 2:00 p.m., Eastern Standard Time

ISSUING OFFICE

Department of Technology, Management & Budget
State Facilities Administration
Design and Construction Division

Minor State Capital Outlay Projects
REQUEST FOR PROPOSALS

Professional Services for
Department of Technology, Management and Budget
2023 Indefinite Scope Indefinite Delivery (ISID) for
Expanded Environmental Remediation Services
Various Locations, Michigan

Part I – Technical Proposal
Part II – Cost Proposal

SECTION I GENERAL INFORMATION

I-1 Purpose

This Request for Proposals (RFP) provides the prospective professional service contractor (Professional) with information to enable preparation of a professional services proposal for Indefinite-Service, Indefinite-Delivery (ISID) Contracts. ISID contracts provide the State of Michigan with a simple, streamlined, qualifications-based selection process for obtaining professional architectural and engineering services for minor and/or routine design and construction projects. Professionals holding an ISID contract may be contacted by a Department of Technology, Management and Budget (DTMB), State Facilities Administration (SFA), Design and Construction Division (DCD) Project Director to provide a specific proposal of services and fee for a particular project, which, if found acceptable, will then be assigned to that Professional under their ISID contract. DCD reserves the option of requesting such informal proposal from more than one professional for a particular project. Services requested may include, but may not be limited to evaluate, design and/or supervise the implementation of abatements/remedies at assigned sites of environmental contamination under Parts 201 and 213 of the Michigan Natural Resources and Environmental Protection Act (NREPA) 1994 P.A. 451, as amended; Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and other relevant federal and state statutes and requirements.

Firms with ISID contracts are eligible to participate in MIDeal, a cooperative purchasing program, local units of government, K-12 schools, state colleges and universities, and not for profit hospitals, may, if the firm agrees to participate, contract with an ISID contract holder at the billable rates specified in the ISID contract.

Please Note:

1. **FIRMS HOLDING ISID CONTRACTS ARE NOT GUARANTEED ANY ASSIGNMENTS**

ISID contracts may include any of the following phase(s) from DTMB's attached Sample Standard ISID – Environmental Contract for Professional Services:

Phase	
100	Study
200	Program Analysis
300	Schematic Design
400	Preliminary Design
500	Final Design
600	Construction Administration - Office Services
700	Construction Administration - Field Services
900	Operation and Maintenance Management – Remediation Facility

The minimum professional qualifications to complete the scope of work for this project are demonstrated experience in the successful planning and execution of similar projects in full accordance with all applicable Local, State, and Federal regulations.

I-2 Project/Program Statement

See Attachment I, "Project/Program Statement-Scope of Work" for more detailed information. The Professional, by submitting a proposal to DTMB for evaluation, states they can and will provide complete services when an individual project is assigned to them.

No increase in compensation to the Professional will be allowed unless there is a material change made to the scope of work of the Assignment/Program Statement and the change is accepted and approved, in writing, by the State.

I-3 Issuing Office

This RFP is issued by DTMB, on behalf of the State/Client Agency. PROPOSALS SHALL BE RETURNED TO THE ISSUING OFFICE. The point of contact for this RFP is:

Sadi Rayyan
Department of Technology, Management and Budget
State Facilities Administration, Design and Construction Division
3111 W. St. Joseph Street
Lansing, MI 48917
Telephone Number: 517.719.2801
Email: RayyanS@michigan.gov

I-4 Contract Award

The State intends to award contracts to establish a list of firms that can provide one or more specialty services under this ISID as defined in this RFP (See Attachment I Project/Program Statement – Scope of Work). Professionals are requested to submit a proposal in two parts: **Part I – Technical Proposal and Part II – Cost Proposal.**

In addition, to the two parts, the proposal is not considered complete unless all required attachments are provided. **The required attachments to be completed are Attachment II Professional Questionnaire; Attachment III Position, Classification, Employee Billing Rate form; and one or more set of the Specialty Technology Questionnaire (Attachment IV) along with a corresponding experience summary form. Fillable forms for each of these is provided as supplemental documents to this RFP**. A proposal submitted without at least one set of Specialty Technology Questionnaire and a corresponding experience summary form, is not considered complete and cannot be evaluated.

All submissions will be evaluated by an Ad Hoc Advisory Committee and scored accordingly. Firms will be first evaluated for their overall expertise based on all required submissions except for the Specialty Technology Questionnaire(s). The technical portion will account for eighty percent (80%) and the cost portion will account for twenty percent (20%) of the total score. The Ad Hoc committee will then evaluate the submitted questionnaire(s) and supporting documents for each of the marked specialty technologies to establish a list of qualified firms for each specialty technology service. Further information on Proposal evaluation can be found under Scope of Work in Attachment I.

DTMB will award a contract to one or more Professional(s) recommended by the Ad Hoc Advisory Committee after their evaluation of the Proposals. Recommendation is expected within approximately forty-five (45) days following the due date of the proposal.

I-5 Rejection of Proposals

The state reserves the right to reject any or all proposals, in whole or in part, received in response to this RFP.

I-6 Incurring Costs

The state is not liable for any cost incurred by the Professional prior to acceptance of a proposal and the award and execution of a contract and issuance of the state's contract order.

I-7 Mandatory Pre-Proposal Meeting

NO MANDATORY PRE-PROPOSAL MEETING will be conducted by the Issuing Office for this RFP.

Questions on this RFP **MUST BE SUBMITTED, IN WRITING,** to RayyanS@michigan.gov, no later than 12:00 p.m., April 12, 2023. In the event it becomes necessary to amend any part of this RFP, addenda will be posted on the State of Michigan Sigma Vendor Self Service (Sigma VSS) website.

I-8 Responsibilities of Professional

The Professional will be required to assume responsibility for all professional services offered in the proposal regardless of whether the Professional possesses the services within their organization. Further, the state will consider the Professional to be the sole point of contact regarding contractual matters, including payment of all charges resulting from the contract. The Professional shall possess a license to operate and practice business in the State of Michigan pursuant to the Occupational Code (PA 299 of 1980).

I-9 Proposals

The professional must submit a complete, straightforward response to this Request for Proposal. The proposal should describe the professional's ability to meet the requirements of the Request for Proposal.

The proposal must be submitted electronically through the State of Michigan Procurement System (SIGMA VSS). No other distribution of proposals will be made by the Professional. To be considered responsible and responsive, proposals must be uploaded to SIGMA VSS **on or before 2:00 p.m., Eastern time (ET), on Thursday, May 4, 2023.** Proposal must be signed by an official authorized to bind the professional firm to its provisions. NO FACSIMILES OR E-MAILS OF THE REQUEST FOR PROPOSAL WILL BE ACCEPTED.

The proposal and attachments must be fully uploaded and submitted prior to the proposal deadline. **Please do not wait until the last minute to submit a proposal**, as the SIGMA VSS system **will not** allow a proposal to be submitted after the proposal deadline identified in the solicitation, even if a portion of the proposal has been uploaded.

SIGMA has a maximum size limit on file uploads. When uploading, your attachment(s) the attachment must be 6mb or less.

Also, when entering proposal amount, please enter the total cost amount as the bid amount. Bidder's failure to submit a proposal as required may result in being deemed nonresponsive.

Questions on vendor registration, proposal submissions, or navigation in the SIGMA VSS system can be answered by contacting the SIGMA Help Desk either by telephone at 517.284.0540 or toll free at 888.734.9749 or by email at sigma-procurement-helpdesk@michigan.gov
.

SECTION II PROPOSAL FORMAT - PART I - TECHNICAL PROPOSAL

The proposal must be submitted in the format outlined in this RFP. Paginate and ensure the proposals refer specifically to the project described. Ensure proposals are free of typographical and mathematical errors.

The Professional submitting a proposal must complete both Part I and Part II of the proposal and attach the Professional Questionnaire (see attachment II for sample document) and the Position, Classification and Employee Billing Rate form (see Attachments III for sample document). The Professional must also submit one specialized technology questionnaire (see Attachment IV for a sample) and associated experience summary per technology for which they are seeking consideration. Employee resumes related to both questionnaires should also be submitted. Fillable forms are uploaded as supporting documents to this RFP.

II-l General Information and Project Team

Provide the full name and address of the organization, contact name and email address(es). If applicable, list the branch office, sub-consultants, or other subordinate elements that will assist in providing services. Indicate whether the Professional operates as an individual, partnership, or corporation. If a corporation, include the state of incorporation. Indicate whether the Professional is licensed to operate and practice in the State of Michigan.

Within the last 5 years, has your company or any of its related business entities defaulted on a contract or had a contract terminated for cause? If yes, provide the date, contracting entity, type of contract, and details about the termination or default.

If awarded a contract, state the specific SIGMA business address which you would like associated for all communication (Contracts, Contract Order, Contract Modifications and Payments)?
Please list all person(s) authorized to receive and sign a resulting contract and / or subsequent assignment(s). Please include persons name, title, address, email and phone number The Professional must include the Certification and Addendum Acknowledgment forms at the end of this RFP as part of your proposal response.

II-2 Understanding of Project and Tasks

Explain your understanding of the scope of work, ISID contracts, assignments to ISID contracts, and how the Professional or project team is most qualified to provide the services required for these projects and can provide the best value to the State of Michigan for this work.

II-3 Personnel

The professional must be able to staff a project team which has the qualifications and expertise necessary to undertake small facility preservation, maintenance, and alterations projects. Include the full names of all personnel by classification that will be employed in the project. Indicate which of these individuals you consider to be “Key Personnel” for the successful completion of these project types, identify them by position and classification and provide their resumes.

The Professional must identify all Key Personnel that will be assigned to this contract in the table below which includes the following:

a. Name and title of staff that will be designated as Key Personnel.

b. Key Personnel years of experience in the current classification.

c. Key Personnel’s roles and responsibilities, as they relate to this RFP, if the Professional is successful in being awarded the Contract. Descriptions of roles should be functional and not just by title.

d. Identify if each Key Personnel is a direct, or consultant employee.

e. Identify where each Key Personnel staff member will be physically located (city and state) during the Contract performance.

The Professional must provide detailed, chronological resumes of all proposed Key Personnel, including a description of their work experience relevant to their proposed role as it relates to the RFP. Qualifications will be measured by education and experience with particular emphasis to experience on projects similar to that described in the RFP.

Include all submitted resumes under one Appendix.

Provide an organization chart outlining authority and communication lines for each professional firm, including Key Personnel, including sub-consultants, client agency, and DTMB.

II-4 Management Summary, Work Plan, and Schedule for Individual Assigned Projects

This is for reference only and will be required for future assignments but not required for this proposal at this time. The Professional must outline their work plan and methodology so that it is understood what services and deliverables will be provided, and the quality of the services and deliverables. Describe in detailed narrative form, the plan for accomplishing the project. Describe clearly and concisely each professional task, event, and deliverable required for project completion. Do not simply reiterate language and tasks from the DTMB Professional Services Contract. Describe your constructability review and quality control plan. Include a detailed time sequenced-related but undated schedule, showing each event, task, and phase in your work plan. Allow time in the assignment schedule for Owner's review.

II-5 References

Provide references, with contact information, of previous clients, particularly for similar projects. Outline the Professional's experience with similar projects, sites, and clients. Experience with projects located in Michigan is preferred.

SECTION III COST PROPOSAL FORMAT - PART II

III-1 Instructions and Information – Billable Rate

Outline the billable rates for the Professional's staff members who may be assigned to these projects. Specific proposals for individual projects will be obtained at the time of individual project assignment and shall correspond to all phases/tasks of the work plan requested at that time.

If sub-consultants are used for a particular assigned project, their fees shall be provided. **No mark-up** of the sub- consultants' fees or billing rates will be allowed.

Reimbursable Expenses: The State will reimburse the Professional for the actual cost of printing/reproduction and shipping of project deliverables such as surveys, reports, and bidding documents (drawings and specifications). The State will also reimburse for U.S. Mail regular shipping or postage for soil boring/groundwater samples, and any required laboratory testing. **No mark-up** of reimbursable expenses will be allowed.

The Professional firm's hourly billing rate shall be the actual amount paid for the employee services on the Project including fringe benefits, vacations, sick leave, other indirect costs, and profit. The Professional firm's hourly billing rates shall not change during the life of this Contract without written approval by the Department. See attached**, Overhead Items Allowed for the Professional Services Contractor Firm's Hourly Billing Rate Calculation**, for the guide to overhead items allowed for the professional services contractor firm's hourly billing rate calculation. Reimbursement for the Project/Program Statement scope of work requirements will be provided only for Department approved items authorized for reimbursement compensation in this Contract. The State will not reimburse the Professional for downtime, or for personnel involved in downtime due to mechanical problems or failure of Professional's or sub-consultant/subcontractor equipment.

Project related travel expenses (mileage, meals, lodging) for Projects **more than** one hundred (100) miles in one-way from the Professional's nearest office shall be treated as an authorized reimbursable expense at the State of Michigan's current travel rates, based on DTMB's Vehicle and Travel Services Travel Rate Reimbursement for premium mileage rates in effect at execution of the contract.

III-2 Identification of Personnel and Estimated Compensation

Provide compensation information for the Professional as well as any Sub-consultants. Note that employees of a separate professional firm or consultant, if proposed, should also be included, and noted.

A. Primary Professional and Sub-consultant(s) – Position, Classification & Employee Billable Rate Information

Using the format of Form II-2-A (attached), identify the service being provided and the Professional's or Sub-consultant's employee(s) names and position classifications. See Attachment III for guidelines for position classifications. For each employee, list the current hourly billable rate for each year covered under this proposal, Hourly billing rates shall include any anticipated pay increases over the life of the Professional's three-year ISID contract duration. Sub-consultant fees will be included in individually assigned project contracts as not-to-exceed reimbursable amounts. To determine current billing rates, see Section III-1.

For individual assigned projects, the proposal will identify the estimated cost for each task. The total of all phases/tasks shall become the Professional's maximum not-to-exceed cost for the assigned project. Compensation for each phase will be in accordance with the attached sample contract Article II – Compensation. The following items B, C, and D will be required only at the time a proposal for an individual assigned project is requested.

Forms II-2-B, C, and D are for reference only and will be required for future assignments. These forms are not required for this proposal at this time.

B. Fee with Anticipated Hours by Phase – **for Individual Assigned Projects**

Using the format of Form II-2-B, identify for each phase the estimated hours for each employee and include the billable rate for each employee. Provide totals.

C. Reimbursable Expenses – **for Individual Assigned Projects**

Using the format of Form III-2-C, identify the phase number, firm name and description of sub-consulting services expressed as a not-to-exceed amount. Identify the phase number, firm name, and description of all reimbursable direct expenses expressed as a not-to-exceed amount (travel over 100 miles one-way, printing, tests, etc.). Note the mark-up(s) for handling reimbursable expenses. Provide totals.

D. Total, Summarized by Phase – **for Individual Assigned Projects**

Using the format of Form III-2-D, provide a total of the fees and reimbursable expenses, by phase, as outlined in items B and C above. The total of all phases shall become the Professional's maximum not-to-exceed contract for the assigned project. Compensation for each phase will be in accordance with the "Sample Expanded Environmental Remediation ISID Contract for Professional Services

SECTION IV PROPOSAL FORMAT - SPECIALIZED TECHNOLOGIES INFORMATION

The Professional **must** respond to at least one of the specialized technologies listed in this RFP (see 'Expertise in Remedial Technologies' in the Scope of Work). For each specialized technologies responded, the Professional must submit one completed Professional Questionnaire (see Attachment IV for the sample fillable form document) and a corresponding Experience Summary Form for each remedial technology requesting consideration, as described in Appendix I Project/Program Statement – Scope of Work, under Expertise in Remedial Technologies.

In completing the applicable questionnaires, answer the questions precisely, and describe the Professional's experience in the subject technology. **Include all the submitted resumes for both the Professional and Specialty Technology Questionnaire under one Appendix**.

For assistance in completing the Experience Summary Forms, see the example provided with this RFP. A separate Experience Summary Form is required for each technology the Professional is seeking to provide. The Experience Summary Forms must include the extent of which the work related to the subject technology was performed by the Professional, by their Michigan Offices, and by their sub-consultants. This information can be recorded in the three columns to the right of the Experience Summary tables.

More information about the technologies and screen matrix of their performance, can be found at the Inter State Technology and Regulatory Council (ITRC) and the Federal Remediation Technologies Roundtable (FRTR) website.

The following instructions are to be used by the Professional to determine the hourly billing rate for assignments under this ISID contract.

The Professional must submit a separate hourly billing rate for their subcontractors who will be subcontracted to provide services for State of Michigan Projects. **No mark-up of the subcontracted Professional's services hourly billing rates will be allowed**.

The Department will reimburse the Professional for the actual cost of printing and reproduction of the Contract Bidding Documents, soil borings, surveys, and any required laboratory testing services and use of field equipment. **No mark-up of these Project costs will be allowed**.

2023 HOURLY BILLING RATE

Based on 2022 Expenses

OVERHEAD ITEMS ALLOWED FOR THE PROFESSIONAL SERVICES CONTRACTOR FIRM'S HOURLY BILLING RATE CALCULATION

SALARIES:	**EMPLOYEE BENEFITS:**	**INSURANCE:**
Principals (Not Project Related)	Hospitalization	Professional Liability Insurance
Clerical / Secretarial	Employer's Federal Insurance Contributions Act (FICA)Tax	Flight and Commercial Vehicle
Technical (Not Project Related)	Unemployment Insurance	Valuable Papers
Temporary Help Tax	Federal Unemployment	Office Liability
Technical Training	Disability	Office Theft
Recruiting Expenses	Worker's Compensation	Premises Insurance
	Vacation	Key – Personnel Insurance
	Holidays	Professional Liability Insurance
	Sick Pay	
	Medical Payments	
	Pension Funds	
	Insurance - Life	
	Retirement Plans	

TAXES:	**SERVICES (PROFESSIONAL)**	**EQUIPMENT RENTALS:**
Franchise Taxes	Accounting	Computers
Occupancy Tax	Legal	Typewriter
Unincorporated Business Tax	Employment Fees	Bookkeeping
Single Business Tax	Computer Services Bond)	Dictating
Property Tax	Research	Printing
Income Tax	Project / Contract Bond	Furniture and Fixtures
		Instruments

OFFICE FACILITIES:

Rents and Related Expenses
Utilities
Cleaning and Repair

LOSSES:

Bad Debts (net)

Uncollectible Fee
Thefts (not covered by Project / Contract)
Forgeries (not covered by Project / Contract)

FINANCIAL:

Depreciation

SUPPLIES:

Postage

Drafting Room Supplies
General Office Supplies
Library
Maps and Charts
Magazine Subscriptions

PRINTING AND DUPLICATION:

Specifications (other than Contract Bidding documents)
Drawings (other than Contract Bidding documents)
Xerox / Reproduction

Photographs

SERVICES (NONPROFESSIONAL):

Telephone and Telegram

Messenger Services

TRAVEL:

All Project – Related Travel* (refer to page 13)

MISCELLANEOUS:

Professional Organization Dues for Principals and Employees
Licensing Fees

II-2-A. Position, Classification and Employee Billing Rate Information

Firm Name **XYZ, Inc.**

Yearly Hourly Billing Rate Increase **≈4%**

Position / Classification	2023	2024	2025	2026	2027
Principal/Program Manager**	$100.00	$105.00	$110.00	$116.00	$122.00
Senior Eng.	$100.00	$105.00	$110.00	$116.00	$122.00
Quality Control/Assurance	$100.00	$105.00	$110.00	$116.00	$122.00
Licensed Surveyor**	$90.00	$95.00	$99.00	$104.00	$109.00
Project Engineer**	$90.00	$95.00	$99.00	$104.00	$109.00
Project Geologist**	$90.00	$95.00	$99.00	$104.00	$109.00
Engineer	$80.00	$84.00	$88.00	$92.00	$97.00
Hydrogeologist	$80.00	$84.00	$88.00	$92.00	$97.00
Scientist/Surveyor	$65.00	$68.00	$71.00	$75.00	$79.00
Staff Engineer	$65.00	$68.00	$71.00	$75.00	$79.00
Staff Geologist	$65.00	$68.00	$71.00	$75.00	$79.00
Senior Technician	$75.00	$79.00	$83.00	$87.00	$91.00
Technician	$65.00	$68.00	$71.00	$75.00	$79.00
Field Technician	$50.00	$53.00	$56.00	$59.00	$62.00
Technical Support	$35.00	$37.00	$39.00	$41.00	$43.00

*Billing Rate will be in accordance with the attached guideline page for instructions regarding the "Overhead Items used for Professional Billing Rate Calculation," and the "Sample Standard Contract for Professional Services," Article 5, Compensation Text.

** Key Project Personnel

II-2-B. Fee with Anticipated Hours and Billing Rate – Use for Individual Assigned Project Proposal

POSITION/ CLASSIFICATION	TOTAL HOURS	BILLING RATE	TOTAL
Principal/Project Manager	30	$100.00	$3,000.00
Senior Engineer	17	$100.00	$1,700.00
Quality Control/Assurance	2	$100.00	$ 200.00
Licensed Surveyor	9	$ 90.00	$ 810.00
Project Engineer	8	$ 90.00	$ 720.00
Project Geologist	8	$ 80.00	$ 640.00
Engineer	8	$ 80.00	$ 640.00
Hydrogeologist	22	$ 80.00	$1,760.00
Field Technician	40	$ 50.00	$2,000.00
Senior Technician	42	$ 75.00	$3,150.00
SUBTOTAL	**186**		**$14,620.00**

II-2C. Authorized Reimbursables -- Sub-consultants, Testing and Expenses – Use for Individual Assigned Project Proposal

PHASE	NAME OF FIRM	DESCRIPTION OF SERVICES PROVIDED	TOTAL AMOUNT* (Including mark-up)
Phase 400	Forrest T. Arrea, Landscape Architect, Howell, Michigan	Design of Stormwater Management Rain Garden	500.00
Phase 500	XYZ Productions, Inc. Lansing, Michigan	Printing and reproduction of bidding documents	500.00
Phase 500	Forrest T. Arrea, Landscape Architect, Howell, Michigan	Design of Stormwater Management Rain Garden	500.00
Phases 400, 500, 700	Travel Allowance	Travel between office and project (site over 100 miles one-way from office)	1,000.00
	SUBTOTAL		**$ 2,500.00**

II-2D. Total, Summarized By Phase -- Use for Individual Assigned Project Proposal

PHASE	Phase 300	Phase 400	Phase 500	Phase 600	Phase 700	TOTAL
Professional Fee	2,550.00	3,820.00	4,970.00	1,620.00	1,660.00	14,620.00
Reimbursable Expenses	0.00	750.00	1,250.00	0.00	500.00	2,500.00
SUB-TOTAL	**2,550.00**	**4,570.00**	**6,220.00**	**1,620.00**	**2,160.00**	
TOTAL CONTRACT AMOUNT						**$ 17,120.00**

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Excavation, Dewatering & Off-Site Disposal*

Professional's Name: *Sample Professional's Name, Inc.*

Components/Technics: (check all that apply) ☒ Excavation ☒ Dewatering ☒On-Site Treatment of Water

☐Backfilling w/Asphalt Cover ☒ Backfilling w/Concrete Cover ☒ Applied Treatment Train

☒ Sheet Piling/Soil Retention ☒ Stabilization ☒ Storm Water Management

☒ Sediment Removal

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years:			
Designed	20	20	2
Construction Oversight	10	10	0
O & M	5	5	0
Closed	15	15	0
Used Treatment Train	7	7	1
2. Range of cost per project:			
Design Phase	$50,000-$100,000	$50,000-$100,000	$5,000-$15,000
Construction Phase	$100,000-$250,000	$100,000-$250,000	$0
O & M Phase	$10,000-$50,000	$10,000-$50,000	$0
Total Project Cost	$50,000-$500,000	$50,000-$500,000	$5,000 - $50,000
3. Number of the above projects that were:			
Below Budget	4	4	0
On Budget	21	21	2
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology:			
Licensed Environmental Engineers	2	2	0
Licensed Civil Engineers	1	1	0
Licensed Chemical Engineers	1	1	0
Geologists	0	0	1
Hydrogeologists	1	1	0
Licensed Surveyors	0	0	1
Licensed Electrical Engineers	0	0	1
Licensed Mechanical Engineers	0	0	1
Environmental Scientist	1	1	0
Biologists	0	0	1

*Provide explanation, including strategies implemented to fix the issue:

_____

ATTACHMENT I

PROJECT/PROGRAM STATEMENT - SCOPE OF WORK

DTMB-0427 (R 10/22)

PROJECT STATEMENT

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design and Construction Division
3111 West St. Joseph
Street
Lansing, Michigan 48909

FILE NUMBER Various		PROPOSAL DUE DATE Thursday, May 4, 2023, at 2:00 p.m., EASTERN
CLIENT AGENCY Various		
PROJECT NAME AND LOCATION 2023 Expanded Environmental Remediation Services ISID		
PROJECT ADDRESS (if applicable) Various		
CLIENT AGENCY CONTACT Various		TELEPHONE NUMBER Various
DTMB - DCD PROJECT DIRECTOR Sadi Rayyan		TELEPHONE NUMBER 517.719.2801

WALK-THROUGH INSPECTION DATE, TIME, AND LOCATION:
N/A

PROJECT DESCRIPTION/SERVICES REQUESTED

Provide professional environmental Indefinite-Service, Indefinite-Delivery (ISID) services for a variety of state or federally funded cleanup sites. The professional will be required to effectively perform tasks at assigned contaminated and/or hazardous waste sites through appropriate investigations and/or remedial/corrective action plans with the goal of bring the assigned sites to an acceptable closure in accordance with the applicable Part 201 or Part 213 of the Michigan Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and other relevant state and federal statutes and requirements. Activities may include environmental site assessments, investigations, feasibility studies, design, construction oversight and operation and maintenance (O&M) of remedial systems. The Professional is required to refer to State and Federal statutes, procedures, guidelines and the administration rules when providing the services or entering into contracts with sub-consultants/subcontractors to provide the services. . The Professional MUST upload their proposal to the State of Michigan Procurement website (SIGMA VSS). The Professional **must complete and submit the Professional Questionnaire, one or more of the Speciality Technology Questionnaire and an associated Experience Summary Form; the Position, Classification and Employee Billing Rate Information Form, to indicate the billing rates and the employees resumes relevant to the entire proposal for the proposal to be considered complete**. When the professional want to be considered for selection for more than one specialized technology, a separate set of specialized technology questionnaire and experience summary form, must be submitted for each technology that they are interested in providing design and construction oversight services. The State reserves the right not to award the contract(s) or award the contract(s) to one or more firms.

Please NOTE:

- Proposal responses MUST be uploaded to SIGMA VSS. Please enter the $1.00 as the bid amount.
- Firms should only submit one (1) attachment (being less than 6 MB) for proposal submission. The attachment is to be the technical and cost proposal combined.
- Do not wait until just before the 2:00 p.m. solicitation deadline to submit your proposal response. SIGMA VSS will not allow a proposal to be submitted after 2:00 p.m., even if a portion of the proposal response has been uploaded.

- If you experience issues or have questions regarding your electronic submission, you **must** contact the SIGMA Help Desk for assistance prior to the 2:00 p.m., solicitation deadline. You may contact the SIGMA Help Desk by telephone at 517.284.0540 or toll-free at 888.734.9749. You may also email the SIGMA Help Desk at sigma-procurement-helpdesk@michigan.gov
- Please email the Design and Construction Contract Specialists if you are having SIGMA VSS issues. Please include your SIGMA ticket number and any supporting documentation (i.e., screenshots) to Anne Watros (WatrosA@michigan.gov) **and** Don Klein (KleinD4@michigan.gov).
- You may be asked by our contract specialists to email your proposal. Emailed submissions will require DCD approval and will be handled on a case-by-case basis.
- Approved emailed submissions MUST be received prior to 2:00 p.m. deadline to be considered responsive and responsible.
- Responses should not be emailed to the Project Director.

NIGP CODES
90629; 91842; 91843; 92535; 92577; 92615; 92623; 92629; 92630; 92645; 92652; 92658; 92678; 92683; 92685; 92690; 92691; 92693; 92696; and 92673

DESIRED SCHEDULE OF WORK
Dependent on the assigned project

ACCEPTING RFP QUESTIONS UNTIL:
Please do not submit online questions via VSS. ALL questions should be emailed to Sadi Rayyan at rayyans@michigan.gov address no later than 12:00 p.m., Eastern on Wednesday, April 12, 2023

REFERENCE STANDARDS: This project will comply with all codes, standards, regulations, and workers' safety rules that are administered by federal agencies (EPA, OSHA, and DOT), state agencies (DHHS, EGLE, DNR, and MIOSHA), and any other local regulations and standards that may apply.

This form is required to be a part of the professional service contract. (Authority: 1984 PA 431)
Attachment(s)

Department of Technology, Management and Budget
2023 ISID Expanded Environmental Remediation RFP
Professional Environmental Consulting Services
Scope of Work

SUMMARY

The State of Michigan is requesting the services of Professional Services Contractor(s) (Professional) to provide high-quality environmental services to investigate, evaluate, design, and supervise the implementation of abatements/remedies at assigned sites of environmental contamination under Parts 201 and 213 of the Michigan Natural Resources and Environmental Protection Act (NREPA), 1994 P.A. 451, as amended; Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); and other relevant federal statutes and requirements. The State intends to form a primary list of firms with specialty technologies. The Professionals in the primary list must be able to perform tasks required by the remedial investigation (RI), feasibility study (FS), risk-based-corrective-action (RBCA), community relations environmental assessments, natural resource damages assessments, and other related tasks for passive/active monitoring. If the Professional chooses to be considered for one or more of the specialized technologies, the Professional must be able to perform tasks required for the design, bid specifications, construction oversight or remedial actions to bring the assigned site(s) into compliance with current state and federal environmental requirements.

To be selected, preference will be given to firms, in the State of Michigan, generally meeting the following requirements.

- Experience working at Parts 201 and 213 of NREPA 1994 P.A. 451, as amended sites.
- Experience working at CERCLA regulated sites.
- Experience in conducting effective environmental assessment, RI, and FS services.
- Experience with the development of human health and ecological risk assessments.
- Experience with the development of human health and ecological risk assessments.
- Experience with database development and management.
- Ability to perform sampling and provide technical review and Quality Assurance/Quality Control (QA/QC) of provided laboratory data.
- Ability to provide comprehensive professional services for the assigned projects.
- Accounting systems with capability to provide detailed cost documentation.
- Consideration will be given to the number and location of the satellite offices, record of past performance, and financial and technical resources.
- Experience with projects located in Michigan is preferred.

To be selected for a remediation technology, preference will be given to firms in the state of Michigan generally meeting the following requirements related to the services identified under **EXPERTISE IN REMEDIAL TECHNOLOGIES** in this document.

- Experience in conducting effective remediation system design and construction oversight services.
- Experience in preparation of specifications/construction documents.

- Ability to perform sampling and provide technical review and QA/QC of operation and maintenance (O&M) activities.
- The number and location of satellite offices, record of past performance, and financial and technical resources.
- Expertise with the selected treatment technologies, allowing for the appropriate design and successful implementation of the selected design.
- Experience with projects located in Michigan preferred.

Thousands of contaminated sites have been identified in Michigan. This includes sites appearing on the list of contaminated sites authorized by Part 213 and Part 201 of the NREPA 1994 PA 451, as amended. Major steps in resolving the contamination problems at these sites are RI, FS, remedial design, and construction oversight services. The State, through review and evaluation of the responses to this RFP, anticipates selecting one or more Professionals to perform remedial design services and construction oversight activities along with RI/FS services at selected sites of environmental contamination. The professional will be required to provide professional environmental services, technical staff, and support personnel for the ISID minor projects on an as-needed basis for various State/Client Agencies within the State of Michigan.

The executed contract will be for professional environmental services for an unspecified number of ISID projects. The scope of work for each assigned project will be defined at the time the project is awarded by the State to the Professional.
The professional environmental services required for each of these assigned projects requested by the Department may include any or all the Tasks included in the Phase 100 – Study through the Phase 900 – Operation and Maintenance Management (OM&M) as detailed in the attached SAMPLE contract.

SCOPE OF WORK

The professional environmental services to be performed at sites of environmental contamination may include but not be limited to:

1) geophysical studies.
2) hydrogeological investigations.
3) underground storage tank (UST) removal/closure.
4) sampling and analysis of hazardous materials and containers (waste piles, drums, tanks, etc.).
5) collection and analysis of soil, sediment, flora, fauna, water, and air samples.
6) evaluation of sample data.
7) risk-based corrective actions.
8) evaluation and development of disposal and remedial alternatives.
9) preparation of environmental impact statements.
10) remedial action design including development of plans/drawings and specifications.
11) natural resource damage assessments.
12) construction oversight or construction management services and
13) O&M of remediation and mitigation systems /oversight of O&M services.

While performing this work, the Professional may be required to develop site specific project work plans, health and safety plans (HASPs), QA/QC plans, and community relations plans.

In addition to these activities, the State may request the Professional to perform the following additional tasks, including but not limited to: professional assistance for assessing potential uncontrolled hazardous material sites; obtain any permits which are required for the performance of the work; conduct work in a timely manner; provide site security of the site materials and equipment; comply with the State Environmental Policy Act and local, State and Federal permit requirements prior to conducting remedial actions; provide enforcement support, such as documentation of facts and information about a site and expert testimony during enforcement proceedings; and provide other program development and management assistance for the State departments/agencies. This assistance may include review of plans, drawings, specifications, proposals, technical reports, and other work products associated with a hazardous substance/contaminated site where a release has occurred or is likely to occur; the assessment of environmental and public health risks; record searches; historical reviews; research on technical issues; and personnel training.

EXPERTISE IN REMEDIAL TECHNOLOGIES

To be selected, the Professional must provide sufficient information for verifying design and construction oversight expertise in one or more of the following remediation technologies. Please keep in mind that it will be desirable to utilize green/sustainable remediation or similar holistic approach to site planning, investigation, assessment of remedial alternatives, remedy selection, remedy design, and construction and implementation of the chosen remedy.

I. Excavation, Dewatering and Off-Site Disposal

Excavation, dewatering, on-site treatment of water, backfilling (with clean imported fill), providing asphalt/concrete/ permeable pavement cover, applied treatment train, sheet piling/soil retention, stabilization, storm water management, sediment removal.

II. Demolition

Pneumatic/hydraulic beakers, mechanical demo & dismantling, pressure/mechanical/chemical bursting, explosives, ball & crane, recycling, excavation/dewatering/sheet piling, backfilling (with clean imported fill), providing asphalt/concrete cover, asbestos/lead abatement experience.

III. Migration Control, Fluid Removal, and Containment

Slurry walls, purge well barriers, sheet piling, groundwater pump & treat, dual and multi-phase extraction, soil vapor extraction (SVE), impermeable capping (e.g., clay caps), natural source zone depletion (NSZD), monitored natural attenuation, sediment caps, constructed treatment wetlands.

IV. Landfills

Caps, leachate control/O&M, methane gas control (on-site and off-site).

V. Indoor Air/Vapor Intrusion

Indoor air sampling/abatement, supply and monitor air purifying units (APUs), vapor pin installation, soil gas well installation, vapor barrier installation, SVE Systems, monitoring systems, passive, and active sub-slab depressurization.

VI. In-Situ Physical/Chemical Treatment

SVE/air sparge, solidification/stabilization, chemical oxidation/injection, permeable reactive barriers, treatment blankets, environmental fracturing, groundwater circulating wells, directional wells, carbon substrate injections, electrokinetic-enhanced remediation; evapotranspiration covers.

VII. In-Situ Physical/Biological Treatment

Bioremediation, monitored natural attenuation, enhanced bioremediation (e.g., electrokinetic, propane sparging, enhanced reductive de-chlorination), bio-sparge, phytoremediation.

VIII. Ex-Situ Physical/Chemical Treatment

Air stripping, granular activated carbon (GAC), pump & treat, advanced oxidation, multi-phase extraction, catalytic oxidation.

IX. Ex-Situ Physical/Biological Treatment

Bioreactors, biopiles.

X. In-Situ and Ex-Situ Thermal Treatment

Thermal desorption, incineration, self-sustaining smoldering (star technologies), electrical resistance heating, thermal conduction heating, steam enhanced extraction.

XI. Per- and Polyfluoroalkyl Substances (PFAS) Treatment

Conventional water/wastewater treatment (activated carbon, ion exchange resin, membrane separation, incineration), sorption technology, advanced oxidation/reduction, others.

XII. Alternative Technologies/Post Remediation Strategies

Micro and Nanotechnologies, engineering controls, institutional controls, alternative land reuse, remediation process optimization, subsurface imaging technologies, risk management, Drones/Robots/Artificial Intelligence (AI)/Satellites for monitoring of remediation systems; others.

ASSIGNMENTS

Services will be requested for an assigned project and will be in accordance with a cost proposal submitted and approved at that time. The Professional is expected to have the costs of all required activities needed to complete the assignment.

Individual project assignments will be based on a written Statement of Objectives provided by the State and a proposal from the Professional to perform the scope of work. It is anticipated the assigned work will be completed before the expiration date of the Contract. However, assignments made during the period of the Contract may include work that will continue after the end date of the Contract period. A typical scope of work may address one or more of the following phases of the project:

I. Remedial investigation
II. Feasibility study
III. Remedial Design
IV. Construction Oversight
V. O&M of remediation systems/oversight of O&M services
VI. Long term monitoring

Any subsequent work may not be assigned until the results of the previous phase are realized and there is enough information to establish a new statement of objectives. At the sole discretion of the State, the State may assign subsequent work to the same Professional, if deemed necessary, and the firm performed well on the previous work. If the State determines there is an imminent endangerment of human health or the environment, design of an emergency abatement system may be assigned under the Contract.

For some federally funded projects, whether in part or whole, a complete and accurate EPA Optional Form 5700, commonly called an OF-60, will be required as part of the project proposal Any Contract augmentation must also be accompanied by an OF-60. All changes, whether increases or decreases, and even situations where the budget dollars remain the same but tasks within the different categories of the OF-60 have shifted, must be reflected by an accurate, updated OF-60. The only time a new OF-60 would not be necessary is when the total dollar amount stays the same and the fees and other categories on the OF-60 stay the same.

DISPOSAL OF WASTE

Any wastes generated during the performance of work under this Contract must be disposed of in conformance with all applicable state and federal laws, rules, and/or regulations. For all wastes being disposed under this Contract, it is the responsibility of the Professional to ensure compliance with this directive.

The Professional shall sign waste manifests on behalf of the State attesting to the accuracy and completeness of the manifest, when requested, at sites for which they are performing oversight. The State will retain generator status for these wastes. If necessary, the State will provide a letter to the Professional conveying this authority.

The Professional shall properly dispose of any samples they retain during site work upon written permission from the Agency Project Manager. Disposal of samples is not a billable expense but may be included in the Professional’s overhead.

ENVIRONMENTAL DRILLING

The Professional shall competitively bid environmental drilling work to at least three (3) drilling contractors for each drilling assignment unless the Professional can demonstrate to the Agency Project Manager's satisfaction that there is only one qualified firm who can adequately perform the work as specified. If the Professional determines the services of a specific drilling firm are required, the Professional must state those reasons in writing to the Agency Project Manager for concurrence. The written request will address cost effectiveness, time constraints, geologic situations, and drilling methodologies.

The format and process used for bidding will be in accordance with industry standards and based upon a method chosen by the Professional that is most advantageous to the State. The frequency of bidding necessary within one project assignment will be decided upon between the Professional and the Agency Project Manager. Copies of all bid documents will be provided to the Agency Project Manager. Costs incurred by the subcontractor for environmental drilling shall be billed to the State as a reimbursement.

Ineligible Costs - The Professional cannot bill the State for the drilling subcontractor's time to develop work plans, prepare bid specifications for work plans, or to attend site safety meetings.

Billing Rates - If a drilling subcontractor provides other technical services such as geophysical testing, then the Professional must submit billing rates, fees, resumes, wages, and salary ranges for that Subcontractor.

Downtime for Equipment and Supplies - The Agency Project Manager has the option to purchase supplies and equipment. If the State purchases equipment for use at a site, the State is responsible for that equipment and may need to compensate the Professional for downtime or demobilization costs if the equipment does not function properly. If the Professional furnishes supplies and equipment that do not function properly and causes downtime, the State will not compensate the Professional for the downtime. Also, the State will not reimburse the Professional for backup supplies and equipment. The State will only reimburse the Professional for supplies and equipment used at the site or that must be available as indicated specifically by the health and safety or work plan.

LABORATORIES

The Professional may be required to obtain samples, prepare them for shipping, ship, and pick up samples or any other activity associated with sample collection and interpretation as determined necessary by the Agency Project Manager.

All laboratory analyses shall be performed by the EGLE lab, unless the Agency Project Manager approves use of a current ISID Environmental Laboratory contract holder, an EPA - CLP lab, or another lab as deemed necessary by the State. If a private lab, other than an ISID State Contract Lab, is to be used to perform the analyses, prior written permission by the Agency Project Manager is required. The private lab must report data in a format consistent with the format used by the State and must include the same level of detail regarding QA/QC documentation and chain of custody records.

EQUIPMENT AND SUPPLY PURCHASES AND RENTAL PROCEDURES

Certain Agency procedures may apply to equipment, supplies, surveys, and other items as specified by the Project Director/Agency Project Manager and will be treated as reimbursements or Other Direct Costs (ODCs). Computers and computer related materials may be included as part of such procedures; however, prior written approval from the Department regarding computers and software must be secured.

If an item will be consumed or would be expected to be rendered unusable during the project assignment, then renting is not a viable alternative and purchasing the item is necessary. Examples of consumption are bags of cement and installed casing. Examples of items expected to be rendered unusable are Tyvek suits and disposable bailers. If the rental price or price of using the Professional's equipment exceeds the purchase price the item shall be purchased.

If renting is an option, the cost shall be based upon the expected time of usage of that service or equipment or supply. The rental charge or charge for the Professional's equipment shall include maintenance, calibration, parts replacement, and service charges for the equipment.
A table recording the costs incurred to date to rent equipment, or to use the Professional's equipment, shall be included in each monthly progress report. This table shall also include the purchase price for each piece of equipment. Each item required for the project shall be listed separately.

At the end of the project, the State has the OPTION to accept ownership of a purchased piece of equipment.

If an assignment must be modified to provide for additional scope of work, the cost effectiveness of purchasing, renting, or using the Professional's equipment must be determined for the additional work.

All deposit charges will be paid by the Professional and will not be reimbursed by the State.

HEALTH AND SAFETY PLANS (HASPs)

The nature of the work to be performed under this Contract is hazardous. In addition to HASP requirements noted in the Phase/Task section of the Contract the following will also apply:

The Professional shall satisfy **29 CFR 1910.120** and Section 24 of Act 154 PA 1974 as amended and corresponding rules and all federal, state, and local statutes, regulations, ordinances, etc., regarding health and safety **(40 CFR 35.6055(b)). Prior** to executing any work at the assigned site, the Professional shall develop and submit all HASPs for the site to the Agency Project Manager for review, acceptance, and inclusion into the work plan.

The Professional shall arrange for all its employees that will be working on a contaminated site to attend a health and safety training course, and/or a personnel protection course. The Professional is responsible for all costs related to the training. When requested by the State, the Professional must provide proof of completion of health and safety training for each employee working on a site prior to the employee entering the site for any purpose.

The Professional will ensure that employees and sub-consultant's/subcontractor's employees wear protective clothing and use equipment specified in the site HASP, at all times, that the employee is on the site.

Health and Safety Training and Medical Monitoring are not considered reimbursable items under this Contract. When working in any level of safety equipment, the level itself does not dictate additional costs, but the equipment costs above Level D are reimbursable.

INVOICING AND PAYMENT PROCEDURES

Documentation for payment will be submitted monthly per the requirements in the Contract. Project costs will be reimbursed to the Professional on an as-incurred basis in accordance with the terms of the Contract for Professional Services. Invoices received covering service periods for which the progress reports have not been received by the State will not be processed until the progress reports are received. These will be considered incomplete invoices.

Each invoice that includes labor will include a one-page summary sheet that lists by date the name of the individual providing the professional service, the individual's position/classification, hours worked that day, and hourly billing charge. Each invoice that includes reimbursable expenses will include a one-page summary with the following categories: *Meals, Lodging, Travel, Shipping, Equipment Rental, Field Supplies/Equipment Purchase, sub-consultants, and Miscellaneous*. Under Meals and Lodging categories, the date, name of the individual and total daily cost will be included. Under Travel category, the Professional will include the date, name of the individual, total mileage (above the allowed amount specified in the Contract), mileage rate, and total daily cost. Under Shipping, the Professional will include the date shipped, description of item shipped (e.g., tech memo, etc.) and the cost to ship the item. Under Equipment Rental, the Professional will include the range of dates equipment rented, description of equipment rented and rental cost. Under Field Supplies/Equipment Purchase and Miscellaneous categories, the Professional will include the date purchased, description and purpose of the item purchased and the cost. Under sub-consultants/subcontractors, the Professional will list the date of the sub-consultant/subcontractor work, name of the sub-consultant/subcontractor, description of work conducted, and the cost. The cost for each category will be totaled.

Contract Close-Out – Final payment shall be withheld until all deliverables have been received and accepted by the State. In addition, the Professional will be required to submit to the Agency Project Manager, an unconditional waiver, signed by an authorized representative of each sub-consulting/subcontracting firm, used on the project, indicating that they have been paid in-full by the Professional for all work performed.

LITIGATION SUPPORT

The Professional's personnel and the personnel of its sub-consultants/subcontractors will be required, if requested by the Agency Project Manager on behalf of EGLE's attorneys, to provide assistance to the State in the form of participation in legal actions against alleged responsible parties for violation of state and/or federal environmental law or the recovery of public expenditures regarding any of the operations the Professional or its sub-consultants/subcontractors are involved in under this Contract. This assistance may include, but is not limited, to the preparation of reports and assisting state and/or federal attorneys in preparation of the government's case, including the preparation and execution of interrogatories, affidavits, and testimony as a fact witness.

The State will reimburse the Professional for such assistance as described above at the contractually approved rates for the Professional's personnel at the time services are required. The Professional shall insert an identical obligation to provide such assistance in all sub-consultants/subcontractor agreements to perform work under this Contract. Failure to meet the requirement of this section shall be considered a breach of this Contract.

In addition, the Professional agrees that upon the Agency Project Manager request on behalf of the State attorney, that the Professional's personnel or the personnel of its sub-consultants/subcontractor will appear at trial as an expert witness. If expert testimony is requested, the Professional and State mutually agree while the State cannot, due to Section 2164 of the Revised Judicature Act, guarantee to pay the Professional's personnel any sum in excess of the current per day expert witness fee, the State attorney may ask the court to permit the State to pay the Professional's personnel for the appearance as an expert witness on behalf of the State, at a rate equal to the rate of the employee's contractually approved rates at the time services are required, for the actual time of court appearance plus travel time and standard expenses as defined in the Contract. To the extent that the court grants such a request, the Professional agrees to reimbursement at such rates.

1. If the Professional receives a subpoena or if an Assistant Attorney General assigned to the site requests information regarding one of the Professional's assignments, the Professional may release that information without the Agency Project Manager's prior written permission. However, the Professional must provide, in writing, to the Agency Project Manager a letter documenting what information has been released, to whom and when. Any other requests to release information continue to require the Agency Project Manager prior written permission. The party requesting the information has an obligation to pay for any copying costs. If the State requests duplicate copies, the State will reimburse the Professional for copying costs.

2. If a party other than the State requests the Professional provide testimony regarding an assignment for which they have performed work under this Contract, either through deposition or testimony in court, the State will NOT reimburse the Professional for that testimony. Depositions or testimony requested by parties other than the State are not covered by this Contract, and payment for a deposition or testimony may be prohibited by MCL 600.2164.

3. If a State Assistant Attorney General requests the Professional assist in preparation for litigation, i.e., answering interrogatories, preparing for trial via interviews, and discussions concerning the site, this time is reimbursable under this Contract.

PROJECT CONTROL REPORTS AND DELIVERABLES

1. Deliverables

   The Professional shall provide electronic copies of all final reports, plans, specifications, drawings, and other significant deliverables in Microsoft Word, Excel, and AutoCAD, as applicable, as well as in separate PDF format, provided on one (1) portable media device. In addition, the Professional shall provide one unbound, reproducible copy of each deliverable for each of the assigned projects, as requested or as specified in the assigned project scope of work. The Department/Agency will be responsible for obtaining access to the assigned sites, providing a map for the assigned sites, and where applicable, previous investigation/analytical results for work conducted at the assigned sites.

2. Project Control

   A. The Professional will carry out the assignments under this Contract under the direction of the Project Director and/or the Agency Project Manager.

B. The Professional will submit brief written monthly (or any other interval deemed necessary by the State) progress reports that outline: the work accomplished during the reporting period including basis for significant decisions; work to be accomplished during the subsequent reporting period; daily field activity logs; problems, encountered or anticipated; notification of any significant deviation from the approved work plans; and budget/expenditure information including: project budget, cumulative expenses, projected expenses, and explanations of budget deviations for each major task. Staff time and costs to correct errors, omissions, and deficiencies in the work are not reimbursable. The Agency Project Manager may adjust the frequency of reports depending upon the nature of the project or phase of a particular project.

3. Reports

All project reports required as deliverables to this Contract will begin with an Executive Summary. This will briefly outline the conditions encountered at the site, work performed at the site, conclusions drawn from this work, a list of the recommended alternatives for site remediation (where applicable), and a short description of any specifications prescribed by the report. The Executive Summary will be a synopsis of all information presented in the report and organized in logical manner to present an overview of the specific report. Each assignment will require specific reporting requirements. The following are examples of reports that may be required from the Professional:

A. Monthly progress reports.

B. Draft and Final Preliminary Site Investigation Work Plans and assessment reports

C. Draft and Final FS/RI Work Plans and reports

D. RI technical memoranda for groundwater sampling, soil gas sampling, surface water sampling, soil/sediment sampling, air quality sampling, and site hazards assessment. The technical memoranda should summarize the data and collection techniques and include an evaluation of the data.

E. Daily field logs which include equipment and supply charges and personnel on site. These shall be maintained and attached to the corresponding monthly-progress reports.

The following tasks may be required to produce reports/work products listed above:

- Community Relations
- FS (including Risk Assessment)
- Natural Resource Damage Assessment (NRDA)
- UST removal/closure and other Related Work
- Potentially Responsible Party (PRP) Identification
- Preliminary Site Investigation
- Risk-Based-Corrective-Action Activities
- RI and recommendations
- Baseline Environmental Assessments Review
- Contract Transition Tasks

All draft documents and communications with the State regarding guidance, input, acceptance, and approval shall be marked “DRAFT” and “Deliberative Process – FOIA Exempt”. Information so designated shall not be provided in response to a Freedom of Information Act (FOIA) request.

4. The Professional and/or its sub-consultants/subcontractors shall follow the current edition of ASTM Standard D 5299-92 (Standard Guide for Decommissioning Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities) and other guidance as provided by the State as a performance standard for monitoring well, soil boring, and vadose zone monitoring device abandonment.

5. The Professional and/or its sub-consultants/subcontractors shall enter a record in Wellogic or designated State database program, for each well installed or abandoned under this Contract. The State may choose to require submittal of a paper record for well construction diagrams and/or well abandonments in lieu of submitting an electronic record.

SELECTION CRITERIA

Responses to this RFP will be evaluated based upon the technical merit, conciseness, clarity, creativity. thoroughness of the proposal, understanding of the project, and contract requirements. In addition, the following specific factors will be evaluated as presented in the Professional’s submitted proposal for the primary list selection:

A. Technical Qualifications – 100 points
   1. Business Organization – 5 points possible
   2. Past Performance/Environmental Experience – 25 points possible
   3. Regulatory Knowledge – 15 points possible
   4. Personnel Staffing – 25 points possible
   5. Sub-consultants/subcontractors – 10 points possible
   6. Special Factors – 5 points possible
   7. Sampling and Laboratory Analysis Experience – 5 points possible
   8. Health and Safety – 5 points possible
   9. Quality Assurance/Quality Control – 5 points possible

B. Price Analysis – 100 points
   1. Professional Billing Rates – 75 points possible
   2. Billing Rate Increase – 25 points possible

Depending on available funding for cleanup activities, the State anticipates awarding contracts to one or more Professionals receiving the highest scores in the evaluation. The State reserves the right not to award the contract(s) or award contract(s) to one or more firms for the submitted proposals. The State may reject proposals in whole or in part and may waive any informality or technical defects if, in the judgment of the selection committee, the best interest of the State will be served.

Note: *In addition to the above selection criteria and to select the firm for a marked remediation technology, separate evaluations of qualifications and experience will also be conducted for each of the remedial technologies identified previously in this RFP.*

ATTACHMENT II

Professional Questionnaire

Professional Questionnaire
Department of Technology, Management and Budget
2023 ISID Expanded Environmental Remediation RFP
Professional Environmental Consulting Services

INSTRUCTIONS: This questionnaire aims to collect information regarding the Professonals general capability to provide the type of work requested in this RFP. Specialized technology specific information should be provided in the 'specialized technologies questionnaire' a sample of which is provided in Attachment IV. Professionals shall complete the following required information in the fillable form provided. A separate sheet may be used if additional space is needed. The Article number(s) relating to the additional information must be included on the separate sheet, if used. Professionals are to ensure all questions are answered completely and concisely to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name:_____

Business Organization Address:_____
Telephone and Fax:_____
Website and E-mail:_____
ISID Contract Contact Person Name & E-Mail:
Professional(s) SIGMA Vendor ID number(s): _____
If Applicable, state the branch office(s), partnering organization or other subordinate element(s) that will perform, or assist in performing, the work:_____

1.2 Check the appropriate operation status:
☐ Individual ☐ Association ☐ Partnership ☐ Corporation, or ☐ Combination – Explain:

_____

1.3 If operating as a corporation, include the state of incorporation (_____) and the date of incorporation (___).

1.4 Include a brief description of Professional's business history:_____

1.5 Professional(s) federal I.D. number: _____

ARTICLE 2: PRIOR EXPERIENCE

2.1 Identify the project types and professional services for which your firm is exceptionally qualified and experienced.

- ☐ Excavation, Dewatering and Off-Site Disposal
- ☐ Demolition
- ☐ Migration Control, Fluid Removal, and Containment
- ☐ Landfills
- ☐ Indoor Air/Vapor Intrusion
- ☐ In-Situ Physical/Chemical Treatment
- ☐ In-Site Physical/Biological Treatment
- ☐ Ex-Situ Physical Chemical Treatment
- ☐ Ex-Situ Physical/Biological Treatment

- ☐ In-Situ and Ex-Situ Thermal Treatment
- ☐ Per-and Polyfluoroalkyl Substances (PFAS) Treatment
- ☐ Alternative Technologies/Post Remediation Strategies

2.2 Provide client references and brief descriptions for at least three (3) projects in the last five years closely related to the work requested in this RFP. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided RI/FS services

Project 1 Reference Information:

Project Name:_____
Key Personnels: _____
Project Address:_____
Project City/State/Zip:_____
Owner/Client Contact Name and Telephone #:_____
Project 1 Description:_____

Project 2 Reference Information:

Project Name:_____
Key Personnels: _____
Project Address:_____
Project City/State/Zip:_____
Owner/Client Contact Name and Telephone #:_____
Project 2 Description:_____

Project 3 Reference Information:

Project Name:_____
Key Personnels:_____
Project Address:_____
Project City/State/Zip_____
Owner/Client Contact Name and Telephone #:_____
Project 3 Description:_____

2.3 A sample of field activity logs detailing a 1-week period (from one of the three (3) prior experience sites) and a weekly report provided? ☐Yes ☐No

ARTICLE 3: ENVIRONMENTAL EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas:

3.1 Remedial Investigations:_____

3.2 Sampling and Laboratory Analysis:_____

3.3 Feasibility Studies:_____

3.4 Site Closure:_____

3.5 Health and Safety:_____

3.6 UST Removal and Closure:_____

3.7 Quality Assurance/Quality Control:_____

ARTICLE 4: REGULATORY KNOWLEDGE

Include a brief description of your firm's professional experience in each of the following:

4.1 Michigan environmental statutes related to remedial investigation/action:_____

4.2 Federal regulations and environmental statutes related to remedial investigation/action:_____

ARTICLE 5: PERSONNEL STAFFING

5.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project provided? ☐Yes ☐No

5.2 Complete the following information regarding the personnel your firm considers key to the successful completion of the study or project scope of work:

Key Personnel 1
Name:_____ Job Title:_____
Labor Classification:_____ College Degree(s):_____
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 2
Name:_____ Job Title:_____
Labor Classification:_____ College Degree(s):_____
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 3
Name:_____ Job Title:_____
Labor Classification:_____ College Degree(s):_____
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 4
Name:_____ Job Title:_____
Labor Classification:_____ College Degree(s):_____
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 5
Name:_____ Job Title:_____
Labor Classification:_____ College Degree(s):_____
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☐No

5.3 Do the Professional Project Managers (PM) have at least three years experience as a PM? ☐Yes ☐No

5.4 Do the Professional PMs have a minimum of 10 years experience with similar projects? ☐Yes ☐No

5.5 Resumes for the key personnel provided? ☐Yes ☐No

ARTICLE 6: SUB-CONSULTANTS/SUBCONTRACTORS

6.1 Identify any consultants/subcontractors that will provide services, including engineering, well drilling, and geophysical testing services. *(Note: If any support must be provided by a consultant/subcontractor, the consultants/subcontractors must indicate their capability and willingness to conduct the work)*:

Sub-Consultant/Subcontractor 1
Business Name:
Address:
City/State/Zip:
Contact Name and Telephone #:
Description of Work to Be Conducted:
Letter of intent provided? ☐Yes ☐No

Sub-Consultant/Subcontractor 2
Business Name:
Address:
City/State/Zip:
Contact Name and Telephone #:
Description of Work to Be Conducted:
Letter of intent provided? ☐Yes ☐No

Sub-Consultant/Subcontractor 3
Business Name:
Address:
City/State/Zip:
Contact Name and Telephone #:
Description of Work to Be Conducted:
Letter of intent provided? ☐Yes ☐No

6.2 Are consultants/subcontractors trained in health and safety procedures, including participating in a medical monitoring program, and comply with 29 CFR Part 1910, as amended? ☐Yes ☐No

6.3 If a consultant/subcontractor is to be used for drilling, do they have a minimum of 5 years related experience? ☐Yes ☐No

6.4 Provide the following information and brief descriptions of at least three (3) projects in the last five years closely related to the work requested in this RFP for each consultant/subcontractor:

Project 1 Reference Information:
Project Name:
Key Personnels:
Project Address:
Project City/State/Zip:
Owner/Client Contact Name and Telephone #:
Project 1 Description:

Project 2 Reference Information:
Project Name:
Key Personnels:
Project Address:
Project City/State/Zip:
Owner/Client Contact Name and Telephone #:
Project 2 Description:

Project 3 Reference Information:
Project Name:
Key Personnels:
Project Address:

Project City/State/Zip: _____

Owner/Client Contact Name and Telephone #: _____

Project 3 Description: _____

ARTICLE 7: SPECIAL FACTORS

Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. (As examples: any awards or recognition received by the firm or individuals for similar work, special approaches or concepts developed by the firm appropriate to this project, financial capacity, etc. Respondents may say anything they wish in support of their qualifications).

_____

ATTACHMENT III

GUIDELINES FOR POSITION CLASSIFICATIONS

GUIDELINES FOR POSITION CLASSIFICATIONS

The Professionals are required to use the following guidelines as the basis for classification of personnel to be assigned under their contracts. Changes in the key personnel under the contract must be done by Contract Modification. In addition, the Professionals must provide with their modification requests the names, hourly billing rates, and resumes for the new **Key Personnel** to be added to the contracts. A Key Personnel is any staff member of the Professional who is essential for the successful completion of the Project scope of work and authorized to make decisions affecting the work at the sites under the contracts.

1. **PROFESSIONAL KEY PERSONNEL**

A. **Level 4** (P4) - Plans, conducts and supervises projects of major significance, necessitating proven managerial skills and knowledge of hazardous waste sites. Must demonstrate ability to originate and apply new and/or unique methods and procedures. Supplies technical advice and council to other professionals. Generally operates with wide latitude for independent action.

Typical Title: National Manager, Project Leader, Chief Engineer, or Scientist.

Qualifications and Experience:
Ph.D. degree with 10 years or more experience.
MS degree with 12 years or more experience.
BS degree with 14 years or more experience.

Experience Factors: Technical experience in discipline directly related to the requirements of this contract. Minimum of 4 years experience in supervising multidisciplinary professionals and general office management including budgetary requirements.

B. **Level 3** (P3) - Under general supervision of P4 Manager, plans, conducts and supervises assignments on a project-by-project basis. Estimates and schedules work to meet completion dates. Directs assistance, reviews progress and evaluates results; makes changes in methods, design or equipment are made where necessary. Responsible for safe and cost-effective approaches to achieve the objectives of the project.

Typical Title: Regional Team Leader, Project Engineer.

Qualifications and Experience:
Ph.D. degree with 4 to 10 years experience
MS degree with 6 to 12 years experience
BS degree with 8 to 14 years experience

Experience Factors: Technical experience in disciplines directly related to the requirements of this contract. Minimum of 4 years experience or equivalent. Must have demonstrated ability to manage group of interdisciplinary professionals.

2. PROFESSIONAL NON-KEY PERSONNEL

A. **Level 2** (P2) - Under supervision of a senior or project leader, carries out assignments associated with projects. Work assignments are varied and require some originality and ingenuity. Applies training of professional discipline to assigned projects and translates technical guidance and training received into usable data products and reports. Evaluates data associated with various watersheds for use in developing digital flood insurance map production and development of updated flood data.

Typical Title: Surveyor, Engineer, Construction Manager, Project Manager, Scientist, Analyst

Qualifications and Experience:
MS degree with 2 to 6 years experience.
BS degree with 3 to 8 years experience.

Experience Factors: Minimum of 2 years in area directly related to contract requirements.

B. **Level 1** (P1) - Entry level for professional classification; works under supervision of team or project leader. Gathers and correlates basic data and performs routine tasks and other duties as assigned. Makes recommendations on work assignments and on variables which affect field operations. Assists field operations as directed, including manual tasks of equipment setup and maintenance. Performs other duties as assigned.

Typical title: Junior Associate (Surveyor, Engineer, Scientist, Geologist, etc.)

Qualifications and Experience:
MS degree with 0 to 2 years experience.
BS degree with 0 to 3 years experience.

Experience Factor: None

3. TECHNICIAN NON-KEY PERSONNEL

A. **Level 3** (T3) - Performs non-routine and complex assignments. Works under general supervision of a surveyor, scientist or engineer. Performs experiments or tests which may require non-standard procedures and complex instrumentation. Records, computes and analyzes test data, prepares test reports. May supervise lower level technicians or trades personnel.

Typical Title: Senior Technician

Qualifications and Experience:
6 years or more experience.

Experience Factor: Related to scope of contract.

B. **Level 2** (T2) - Performs non-routine and complex tasks in addition to routine assignments. Works at the direction of the team or project leader. Gathers and correlates basic data and performs routine analyses. May also perform experiments or tests which may require non-standard procedures and complex instrumentation. May construct components or sub-assemblies or prototype models. May troubleshoot malfunctioning equipment and make simple repairs as authorized by team or project leader.

Typical Title: Senior Technician

Qualifications and Experience:
Two to six years experience or equivalent.

Experience Factor: Related to scope of contract.

C. **Level 1** (T1) - Entry level; performs simple, routine tasks under supervision as established in chain-of-command procedures. Performs routine maintenance and may install, set up or operate field equipment of moderate complexity. Provides a wide variety of support functions during field operations.

Typical Title: Junior Technician (field technician)

Qualifications and Experience:
0 to 2 years experience.

Experience Factor: None

4. TECHNICAL SUPPORT (TS) NON-KEY PERSONNEL

Performs project specific technical support work such as spreadsheet preparation, data entry, etc.

Typical Title: Project Assistant, Data Entry Clerk, etc.

Qualifications and Experience:
0 to 2 years or more

ATTACHMENT IV

Specialized Technology Questionnaire

Specialized Technology Questionnaire
Department of Technology, Management and Budget
2023 Expanded Environmental Remediation ISID RFP
Professional Environmental Consulting Services

Remediation Technology:

(submit one form for each specific technology below).
Note: The below list will be a drop-down form in the fillable form

- ☐ Excavation, Dewatering and Off-Site Disposal
- ☐ Demolition
- ☐ Migration Control, Fluid Removal, and Containment
- ☐ Landfills
- ☐ Indoor Air/Vapor Intrusion
- ☐ In-Situ Physical/Chemical Treatment
- ☐ In-Situ Physical/Biological Treatment
- ☐ Ex-Situ Physical/Chemical Treatment
- ☐ Ex-Situ Physical/Biological Treatment
- ☐ In-Situ and Ex-Situ Thermal Treatment
- ☐ Per- and Polyfluoroalkyl Substances (PFAS) Treatment
- ☐ Alternative Technologies/Post Remediation Strategies

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name:_____

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information

Project Name: _____

Project Address:_____

Key Personnel:_____

Project City / State / Zip:_____

Contact Name / Phone Number / Email Address:_____

Project Description:

Project 2 Reference Information

Project Name: _____

Project Address:_____

Key Personnel:_____

Project City / State / Zip:_____

Contact Name / Phone Number / Email Address:_____

Project Description

Project 3 Reference Information

Project Name: _____

Project Address:_____

Key Personnel:_____

Project City / State / Zip:_____

Contact Name / Phone Number / Email Address:_____

Project Description

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design:_____

3.2 Construction Oversight:_____

3.3 Remedial O&M:_____

3.4 Site Closure:_____

3.5 Soil Erosion and Sedimentation Control:_____

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☐Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology:

Key Personnel 1

Name:_____

Job Title:_____

Labor Classification:_____

College Degree(s):_____

Has this individual successfully completed 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up to date 8 hour HAZWOPER refresher training?

☐Yes ☐No

Key Personnel 2

Name:_____

Job Title:_____

Labor Classification:_____

College Degree(s):_____

Has this individual successfully completed 40-hour HAZWOPER training with an up to date 8-hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 3

Name:_____

Job Title:_____

Labor Classification:_____

College Degree(s):_____

Has this individual successfully completed 40-hour HAZWOPER training with an up to date 8-hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 4

Name:_____

Job Title:_____

Labor Classification:_____

College Degree(s):_____

Has this individual successfully completed 40-hour HAZWOPER training with an up to date 8-hour HAZWOPER refresher training? ☐Yes ☐No

Key Personnel 5

Name:_____

Job Title:_____

Labor Classification:_____

College Degree(s):_____

Has this individual successfully completed 40-hour HAZWOPER training with an up to date 8-hour HAZWOPER refresher training? ☐Yes ☐No

4.3 Do all the Professional Project Managers (PM) have at least three years experience as a PM?

☐Yes ☐No

4.4 Do all Professional PMs have a minimum of 10 years experience with similar projects?

☐Yes ☐No

4.5 Are resumes for all key personnel provided? ☐Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS

5.1 Specifically, identify any sub-consultants/subcontractors you plan to use for the successful completion of a project utilizing this technology *(Note: If any support must be provided by a sub-consultant/subcontractor, said sub-consultants/subcontractors must indicate their capability and willingness to carry out the work)*:

Sub-Consultant/Subcontractor 1
Business Name:_____
Address:_____
City/State/Zip:_____
Contact Name and Telephone #:_____
Description of Work to Be Conducted:_____
Letter of intent provided? ☐Yes ☐No

Sub-Consultant/Subcontractor 2
Business Name:_____
Address:_____
City/State/Zip:_____
Contact Name and Telephone #:_____
Description of Work to Be Conducted:_____
Letter of intent provided? ☐Yes ☐No

Sub-Consultant/Subcontractor 3
Business Name:_____
Address:_____
City/State/Zip:_____
Contact Name and Telephone #:_____
Description of Work to Be Conducted:_____
Letter of intent provided? ☐Yes ☐No

5.2 Are sub-consultants/subcontractors trained in health and safety procedures, including participating in a medical monitoring program, and comply with 29 CFR Part 1910, as amended? ☐Yes ☐No

5.3 If a sub-consultant/subcontractor is to be used for drilling, do they have a minimum of 5 years related experience? ☐Yes ☐No

5.4 Provide the following information and brief descriptions of at least three (3) projects in the last five years closely related to the work associated with this technology for each sub-consultant/subcontractor:

Sub Consultant / Subcontractor Project 1 Reference Information

Project Name: _____

Project Address:_____

Key Personnels:_____

Project City / State / Zip:_____

OwnerContact Name / Phone Number / Email Address:_____

Project Description:

Sub Consultant / Subcontractor Project 2 Reference Information

Project Name: _____

Project Address:_____

Key Personnels:_____

Project City / State / Zip:_____

Owner Contact Name / Phone Number / Email Address:_____

Project Description

Sub Consultant / Subcontractor Project 3 Reference Information

Project Name: _____

Project Address:_____

Key Personnels:_____

Project City / State / Zip:_____

Owner Contact Name / Phone Number / Email Address:_____

Project Description

ARTICLE 6: SPECIAL FACTORS

Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. that would pertain to this RFP. (As examples: any awards or recognition received by the firm or individuals for similar work, special approaches or concepts developed by the firm appropriate to this project, financial capacity, etc. Respondents may say anything they wish in support of their qualifications).

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design & Construction Division

Certification of a Michigan Based Business

(Information Required Prior to Contract Award for Application
of State Preference/Reciprocity Provisions)

To qualify as a Michigan business:

Vendor must have, during the 12 months immediately preceding this bid deadline:
or
If the business is newly established, for the period the business has been in existence, it has:

(Check all that apply):

- ☐ Filed a Michigan single business tax return showing a portion, or all the income tax base allocated or apportioned to the State of Michigan pursuant to the Michigan Single Business Tax Act, 1975 PA 228, MCL • ˜208.1 – 208.145: or

- ☐ Filed a Michigan income tax return showing income generated in or attributed to the State of Michigan; or

- ☐ Withheld Michigan income tax from compensation paid to the bidder's owners and remitted the tax to the Department of Treasury; or

I certify that **I have personal knowledge** of such filing or withholding, that it was more than a nominal filing for the purpose of gaining the status of a Michigan business, and that it indicates a significant business presence in the state, considering the size of the business and the nature of its activities.

I authorize the Michigan Department of Treasury to verify that the business has or has not met the criteria for a Michigan business indicated above and to disclose the verifying information to the procuring agency.

Bidder shall also indicate one of the following:

- ☐ Bidder qualifies as a Michigan business (provide zip code: _____)

- ☐ Bidder does not qualify as a Michigan business (provide name of State: _____).

- ☐ Principal place of business is outside the State of Michigan, however service/commodity provided by a location within the State of Michigan (provide zip code: _____)

Bidder: _____

_____
Authorized Agent Name (print or type)

_____
Authorized Agent Signature & Date

Fraudulent Certification as a Michigan business is prohibited by MCL 18.1268 § 268. A BUSINESS THAT PURPOSELY OR WILLFULLY SUBMITS A FALSE CERTIFICATION THAT IT IS A MICHIGAN BUSINESS OR FALSELY INDICATES THE STATE IN WHICH IT HAS ITS PRINCIPAL PLACE OF BUSINESS IS GUILTY OF A FELONY, PUNISHABLE BY A FINE OF NOT LESS THAN $25,000 and subject to debarment under MCL 18.264.

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design & Construction Division

Responsibility Certification

The bidder certifies to the best of its knowledge and belief that, within the past three (3) years, the bidder, an officer of the bidder, or an owner of a 25% or greater interest in the bidder:

(a) Has not been convicted of a criminal offense incident to the application for or performance of a contract or subcontract with the State of Michigan or any of its agencies, authorities, boards, commissions, or departments.

(b) Has not had a felony conviction in any state (including the State of Michigan).

(c) Has not been convicted of a criminal offense which negatively reflects on the bidder's business integrity, including but not limited to, embezzlement, theft, forgery, bribery, falsification, or destruction of records, receiving stolen property, negligent misrepresentation, price-fixing, bid rigging, or a violation of state or federal anti-trust statutes.

(d) Has not had a loss or suspension of a license or the right to do business or practice a profession, the loss or suspension of which indicates dishonesty, a lack of integrity, or a failure or refusal to perform in accordance with the ethical standards of the business or profession in question.

(e) Has not been terminated for cause by the Owner.

(f) Has not failed to pay any federal, state, or local taxes.

(g) Has not failed to comply with all requirements for foreign corporations.

(h) Has not been debarred from participation in the bid process pursuant to Section 264 of 1984 PA 431, as amended, MCL 18.1264, or debarred or suspended from consideration for award of contracts by any other State or any federal Agency.

(i) Has not been convicted of a criminal offense or other violation of other state or federal law, as determined by a court of competent jurisdiction or an administrative proceeding, which in the opinion of DTMB indicates that the bidder is unable to perform responsibly or which reflects a lack of integrity that could negatively impact or reflect upon the State of Michigan, including but not limited to, any of the following offenses under or violations of:

   i. The Natural Resources and Environmental Protection Act, 1994 PA 451, MCL 324.101 to 324.90106.
   ii. A persistent and knowing violation of the Michigan Consumer Protection Act, 1976 PA 331, MCL 445.901 to 445.922.

   iii. 1965 PA 166, MCL 408.551 to 408.558 (law relating to prevailing wages on state projects) and a finding that the bidder failed to pay the wages and/or fringe benefits due within the period required.

iv. Repeated or flagrant violations of 1978 PA 390 MCL 408.471 to 408.490 (law relating to payment of wages and fringe benefits).

v. A willful or persistent violation of the Michigan Occupational Health and Safety Act, 1974, PA 154, MCL 408.10001 to 408.1094, including: a criminal conviction, repeated willful violations that are final orders, repeated violations that are final orders, and failure to abate notices that are final orders.

vi. A violation of federal or state civil rights, equal rights, or non-discrimination laws, rules, or regulations.

vii. Been found in contempt of court by a Federal Court of Appeals for failure to correct an unfair labor practice as prohibited by Section 8 of Chapter 372 of the National Labor Relations Act, 29 U. s. C. 158 (1980 PA 278, as amended, MCL 423.321 et seq).

(j) Is NOT an Iran linked business as defined in MCL 129.312.

I understand that a false statement, misrepresentation, or concealment of material facts on this certification may be grounds for rejection of this proposal or termination of the award and may be grounds for debarment.

Bidder: _____ _____

Authorized Agent Name (print or type)

_____

Authorized Agent Signature & Date

☐ I am unable to certify to the above statements. My explanation is attached.

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design & Construction Division

ACKNOWLEDGMENT OF ADDENDUMS

PSC acknowledges receipt of Addenda: No. ___ dated: _____,

No. ___ dated: _____ No. ___ dated: _____

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design and Construction Division

REQUEST FOR PROPOSAL
ADDENDUM NO. 1

This form identifies an Addendum to a Request for Proposal for Professional Services, and incorporates interpretations or clarifications, modifications, and other information into the Request for Proposals. Addenda will be numbered by the Project Director and distributed through SIGMA Vendor VSS as an attachment.

TO: ALL PROPOSERS	DATE ISSUED April 13, 2023
PROJECT NAME 2023 Expanded Environmental Remediation ISID	FILE NUMBER N / A
PROJECT DIRECTOR Sadi Rayyan	PROPOSAL DUE DATE: May 4, 2023

ADDENDUM ITEMS: (attach additional sheets and drawings if required)

Please acknowledge receipt of this Addendum in your proposal.

Questions

The following questions have been compiled to clarify answers to questions in portions of the RFP package:

Q1. **Section III-1 states, "no mark-up of the sub-consultants' fees or billing rates will be allowed, including drilling, laboratories, remediation firms." Is this correct, that the winning consultant will be allowed to bill for overhead administrative, US mail regular shipping costs, paper copies, and hour billing rates, only, and no subcontractor mark-up?**

A1. *Yes. No mark-up will be allowed for subcontracted services or other allowable reimbursable expenses (i.e., equipment, PPE, travel expenses, etc.).*

Q2. **Are fillable forms going to be available for Attachment II (Professional Questionnaire – pg. 33 of RFP) and Attachment IV (Specialized Technology Questionnaire – pg. 44 of RFP)?**

A2. *Yes. The forms are posted under "Attachments" as Questionnaire Part I Fillable (2023).docx and QuestionnairePart II Fillable (2023).docx.*

Q3. **In Attachment II (Professional Questionnaire) should we include three (3) project references for each project type we are submitting for, or just three (3) project references in total?**

A3. *For Attachment II – Professional Questionnaire, three (3) project references in total. Three references per technology are to be provided on the Specialized Technology Questionnaires.*

Q4. In Attachment IV (Specialized Technology Questionnaire), it is requested to submit at least three (3) project references for each project type that we are submitting for. If three (3) references are requested in Attachment II for each project type, can these references be the same and referenced as such in our response document?

A4. See A3 above. For Attachment IV – Specialized Technology Questionnaire, submit three (3) project references for each selected technology.

Q5. Will the State allow firms to submit bids as both a prime contractor and as a supporting subcontractor for another prime contractor? If the answer to the previous question is yes, please confirm that there will not be any reduction in points during the evaluation phase if bidders use subcontractors that are also bidding as prime contractor.

A5. No.

Q6. The Summary section of the Scope of Work in the RFP indicates " Experience with projects located in Michigan is preferred", if project examples provided are not within Michigan will points be deducted?

A6. No.

Q7. Is the 6MB upload limit for total upload volume or per file? Is there a limit to the number of files that can be uploaded?

A7. The 6MB upload limit is per file. There's no limit to the number of files that can be uploaded but number of files should be as minimum as possible.

Q8. Page 26 "Environmental Drilling" indicates that "The Professional shall competitively bid environmental drilling work to at least three (3) drilling contractors for each drilling assignment". Is it necessary to present 3 drilling subcontractors in section 6.1 of the questionnaire? Can other subcontractors be considered in the future when proposing on future ISID projects or are they limited only to those subconsultants, and subcontractors presented as part of this proposal?

A8. No. Drilling subcontractors are not needed at this time but will be needed for future assignments. However, if a subcontractor or drilling contractor is to provide consulting services along with your staff, then their qualifications and billing rates should be presented. This requirement is intended for sub-consultant(s) who will supplement your services as a professional firm.

Q9. Section IV (Page 10) - The RFP requests separate hourly billing rates for all subcontractors. Does this also include other subs like drillers, demolition/excavation firms, landscapers etc.? Do these subconsultants also need to include rates for materials and equipment?

A9. See A8 above. This RFP is for professional services. Do not include subcontractors that provide non-professional services, such as drilling subcontractors.

Q10. Can a Professional Services Contractor submit an EER Contract proposal as the primary service provider and be listed as a sub-consultant on another PSC's contract proposal?

A10. No. See A5 above.

Q11. Based on the text in Section II Proposal Format – Part 1 – Technical Proposal Is a separate narrative for Part 1 required or is the Professional Questionnaire designed to address Part 1?

A11. Yes. You need to submit the completed questionnaires in addition to your written proposal as specified. However, some of the requirements in the RFP may not be applicable to this ISID RFP response. For each technology selected by your firm, you'll need to provide the necessary information to convince the committee members that you have the adequate resources and experience to complete an assigned project effectively and successfully under the checked technology.

Q12. Section 2.2 of the Professional Questionnaire requires "client references and brief descriptions for at least three (3) projects in the last five years closely related to the work requested in this RFP." Are three references required per each project type and service listed in the prior section? (Three references per technology will be provided in the Specialized Technology Questionnaires)

A12. See A3 above. Three references per technology to be provided under the Specialized Technology Questionnaires.

Q13. In the primary questionnaire Part 1, section 2.2 Project Reference and Section 5.2 Personnel, it asks for Project References and Key Personnel and then again in the questionnaire Part 2 for each of the technologies. Do you want the information in both places, or can it just be provided in Part II (section 4.2 and 5.4) with each of the Remediation Technologies?

A13. See A3 and A12 above. The Project References chosen for Part I might be different from the Project References chosen for each technology. Provide the requested information for each project reference.

Q14. Can a firm be qualified for an ISID Contract by submitting only Part I?

A14. No.

Q15. Are any terms of this (sample) contract negotiable, including, but not limited to, subjects of Indemnification, defend and hold harmless, and limitation of liability?

A15. No.

Q16. In the sample contract provided, it states, "During the Construction Administration Services Phase of the Project, the Professional is required to complete and submit, the on-site inspection record form, "DTMB-0452, The Professional's Inspection Record," for all on-site inspection visits to the Project site" Where can we find this form to review? It is not available on the DTMB Design & Construction Forms website.

A16. Attached.

Q17. Should the technical proposal and cost proposal be submitted via Sigma as one file or two separate files?

A17. One file. However, Part I and Part II should be clearly identified and separated from each other.

Q18. Will DTMB be amenable to receiving and negotiating modifications to the sample contract?

A18. No. See A15 above.

Q19. Could you please clarify what is meant by "chronological resumes" in section II-3 Personnel?

A19. List work experiences and achievements starting from the most recent one and following up with previous ones below.

Q20. If personnel for Part I and Part II overlap, would you prefer dividers that separate out staff for each technology, even if their resume is also included for Part I? In other words, there may be resumes in Part I and duplicated for a Technology in Part II.

A20. Include all resumes in a single appendix and provide the appendix in Part I.

Q21. On the Experience Summary forms, can the line items below be changed to be more appropriate to the task?

Designed
Construction Oversight
O & M
Closed
Used Treatment Train

A21. No.

Q22. Is a 2023 ISID Expanded Environmental Remediation Experience Summary Form needed for each box checked in the Components/Technics section of the form or is it just one form per Remediation Technology.

A22. One experience summary form per each selected technology.

Q23. Article 6 of the Part 1 Questionnaire requests information and project descriptions for drilling consultant/subcontractor. Do we need to include this information for subcontractors that provide non-professional services, such as drilling?

A23. No. See A9 above.

Q24. Section I-9 of the RFP ("Proposals") states "when uploading, your attachment(s) the attachment must be 6mb or less." This limit is not practical for bidder's submitting on many or all of the remedial technologies. Can bidder's proposal consist of more than one attachment, each being less then 6mb?

A24. Yes. See A7 above.

Q25. Scope of Work, Expertise in Remedial Technologies, item I. Excavation, Dewatering and Off-Site Disposal, applied treatment train. What is meant by applied treatment train? Please provide an example.

A25. A treatment train is a combination/sequence of treatment technologies, designed to address environmental contamination to maximize results. One example is to excavate contaminated soils and mix clean backfill with reagents to enhance remediation of residual contamination.

Q26. What does Special Factors include and how will points be awarded?

A26. As examples: any awards or recognition received by the firm or individuals for similar work, special approaches or concepts developed by the firm appropriate to this project, financial capacity, etc. Respondents may say anything they wish in support of their qualifications.

Q27. What are the Selection Criteria for Part II proposal for specific technologies?

A27. Pass or fail depending on qualifications and demonstrated experience (in design and construction oversight) related to the selected technology.

Q28. Can the project references provided with the Professional Questionnaire also be used for the Specialized Technology Questionnaires?

A28. Yes.

Q29. Both the Professional Questionnaire and the Specialized Technology Questionnaire call for an organizational chart. Can we submit one overall organizational chart?

A29. Yes.

Q30. Where information requested to be provided in the Technical Proposal overlaps with information requested in the questionnaires (i.e., section II-5 of the Technical Proposal calls for references with contact information and so does Article 2, section 2.2. of the Professional Questionnaire), should we provide this information in both places?

A30. Yes. See A13 above.

Q31. Will we be limited to subcontracting only to those subcontractors included in this RFP response?

A31. See A9 above.

Q32. Section III-2 A refers to a three-year contract duration, but the example table II-2-A in Section IV shows billing rates for five years. Do five years of billing rates need to be provided?

A32. Yes. The contract may be extended for two additional years, at the sole option and discretion of the State, after the expiration of the original three-year contract period.

End of Questions.

APPROVED BY:

PROJECT DIRECTOR DATE

DTMB-0452 (Rev 04/19)

PROFESSIONAL'S INSPECTION RECORD
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION

This form is required to verify visits by the professional service contractor on the job site. Complete this form and attach it to the appropriate payment voucher for services rendered. (Authority: 1984 PA 431)

PROFESSIONAL SERVICE CONTRACTOR			DATE
SIGMA CODING	AGENCY NUMBER	FILE NUMBER	CONTRACT NUMBER
PROJECT NAME			
DEPARTMENT/AGENCY			

DATE	PROFESSIONAL	PURPOSE OF VISIT	TRAVEL TIME	SITE TIME

FIELD REPRESENTATIVE OR CONTRACT ADMINISTRATOR	DATE
PROFESSIONAL SERVICE CONTRACTOR	DATE

APPENDIX 2

PROFESSIONAL'S PROPOSAL

resourceful. naturally.
engineering and environmental consultants

BARR

May 4, 2023

Sadi Rayyan
Department of Technology, Management and Budget
State Facilities Administration, Design and Construction Division
517-719-2801
RayyanS@michigan.gov

Re: Proposal to provide professional services for 2023 Indefinite Scope Indefinite Delivery (ISID) for Expanded Environmental Remediation Services Various Locations, Michigan

Dear Sadi Rayyan:

Barr Engineering Co. is pleased to submit our proposal and qualifications to the Department of Technology to provide professional environmental Indefinite-Service, Indefinite-Delivery (ISID) services for a variety of state and federally funded cleanup sites. We believe our team is best suited to provide these integrated services to the State of Michigan because of our:

- **Established relationships with Michigan stakeholders keep projects on track.** Barr's involvement with complex contaminated sites over the past two decades in Michigan means we have built relationships and demonstrated technical reliability with Michigan and federal regulators, including the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the U.S. Environmental Protection Agency, across district offices, divisions, and regions.
- **Breadth and depth of investigation and remediation experience helps projects succeed.** Our multidisciplinary teams have worked on hundreds of Michigan projects and are well-versed in supporting the technical and risk management needs of our clients as well as helping clients navigate the changing technical and regulatory landscape of investigation, remediation, and redevelopment at contaminated sites.
- **Collaborative consulting model means we work from your agenda, not ours.** At Barr, we pride ourselves on solving our client's problems as if they were our own. We'll bring to your projects the insights and expertise we've gained from our work on thousands of projects—and promise to do our best on your behalf.
- **Safety as a shared value means we will meet or exceed your safety goals.** Barr's employee owners have agreed on and are committed to workplace health and safety as a core shared value that requires our constant attention. It is our overarching goal to assure that all our coworkers, as well as other people affected by our work, are safe, and we demonstrated this commitment to safety by having zero recordable incidents in 2022.

We look forward to supporting the State of Michigan. If you have any questions, please contact me at tboom@barr.com or 616-970-6070.

Sincerely,

Tom Boom, PE
Vice President, Senior Environmental Engineer

proposal for

2023 Indefinite Scope Indefinite Delivery (ISID) for Expanded Environmental Remediation Services Various Locations, Michigan

prepared for

Department of Technology, Management and Budget

Submitted by Barr Engineering Co.
May 4, 2023

BARR

Contents

Part I – Technical Proposal

General information and project team

About Barr Engineering Co.

Incorporated in 1966, Barr is an employee-owned engineering and environmental consulting firm. Our nearly 1,000 employees in 12 offices across the Midwest and North America work together to help our clients develop, manage, and restore natural resources. Barr's project teams specialize in solving complex and technically challenging environmental and engineering problems. We frequently work with clients at all levels of the public sector as well as industries such as power, refining, mining, and manufacturing. Our work includes environmental investigation and remediation, engineering and design, environmental permitting and compliance, sustainability and resiliency, and water management.

Barr's experience with investigation, remediation, and redevelopment of contaminated sites began in the late 1970s. Through our work nationwide, we've addressed thousands of sites and have completed hundreds of contaminated-site redevelopment projects. Barr does much more than investigate and clean up contaminated sites. Moving a site towards redevelopment or closure requires a wide array of experts who are organized and work together. Our multidisciplinary teams are structured around the unique needs of each specific project.

We have a strong regional presence in Michigan with nearly 60 employees in our Ann Arbor office and nearly 50 in our Grand Rapids office; these will serve as the primary offices for work under this contract. In addition, we have several remote employees elsewhere in the state, providing a broader geographic range. With Barr, the Department of Environment, Great Lakes, and Energy (EGLE) will receive individual attention from a dedicated, Michigan-anchored project team while having access to the breadth and depth of our company-wide expertise. We can draw on this broad skill set and deep resource base to provide environmental services to EGLE, as demonstrated by our project experience and team qualifications, provided in the pages that follow.

Project team location and capacity

The more than 100 staff members in our Ann Arbor and Grand Rapids offices regularly work on projects throughout Michigan. We are able to staff projects from both of these offices and engage niche expert support from our other locations as needed.

Additionally, our work on projects in nearly every county of the Lower Peninsula (and many in the Upper Peninsula) provides us with the regional expertise needed to better understand localized site conditions. Our involvement on simple and complex Part 201 sites over the past two decades has allowed us to build relationships and credibility with EGLE staff members in district offices, on the

Technical and Program Support (TAPS) teams, and in the toxicology unit in Lansing. In fact, a majority of the contaminated sites our project teams work on are regulated by Part 201 and Part 213, so we frequently evaluate site data in the context of this regulatory framework—with an eye toward resolving issues and moving toward a regulatory endpoint. In addition, we have had success working with EGLE to achieve No Further Action (NFA) status for a wide range of sites.

Barr's Michigan locations

Barr has a demonstrated track record of successfully providing clients with a wide range of environmental services. Many of these client relationships have continued and grown over decades as Barr assists with complicated, long-term site characterization, feasibility studies, risk-based corrective action, natural resources damage assessments, redevelopment, and risk management. We also support our clients with short, relatively uncomplicated projects involving site assessment, sampling, or other finite project goals.

Our services include site characterization (geology, geotechnical, hydrology, and hydrogeology) and remedial investigation; risk assessments; groundwater, contaminant-transport, and stormwater flow modeling; environmental monitoring network design and operation; remediation planning, design, and construction oversight, including development of plans and specifications; operation and maintenance of remediation systems; and closure assistance. In addition, Barr continues to provide our clients with cutting-edge remedial and mitigation solutions to emerging contaminants like per- and polyfluoroalkyl substances (PFAS).

Per the question in Article II-I of the RFP, Barr, or any of its related business entities, has not defaulted on a contract or had a contract terminated for cause in the last five years. Additional organizational information about Barr is located in the *Primary Questionnaire* under ***Article 1: Business Organization***.

Individuals authorized to receive and sign a resulting contract and subsequent assignments include:
Tom Boom, PE, Vice President; 3005 Boardwalk Street, Suite 100, Ann Arbor, MI, 48108; tboom@barr.com; 616-970-6070
Chris Miron, PE, Vice President; 3033 Orchard Vista Drive SE, Suite 200, Grand Rapids, MI, 49546; cmiron@barr.com; 616.512.7022
Charlene McGue, Vice President; 3033 Orchard Vista Drive SE, Suite 200, Grand Rapids, MI, 49546; cmcgue@barr.com

Understanding of projects and tasks

Project understanding

Barr understands that EGLE intends to request contractors to provide high-quality environmental services for sites of environmental contamination. Pursuant to Part 201 and Part 213 of the Michigan Natural Resources and Environmental Protection Act (NREPA) Public Act 451 of 1994, as amended and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and other relevant state and federal statutes and requirements, the contractor will conduct environmental assessments (desktop and field investigations) to characterize contaminants of concern for the sites; evaluate relevant exposure pathways for the protection of human health and the environment; design and evaluate effective mitigation or remediation methods; develop construction plans and specifications; provide construction oversight; conduct operation and maintenance activities; and develop post remediation strategies.

Specific services and skills are discussed in the attached questionnaires as applicable to the scope of work included in this RFP. Additional information related to Barr's experience is detailed in the project examples found in Section 4.

Why choose Barr?

We believe that Barr is well-suited to serve the State of Michigan and can bring the best value for the following reasons:

Established relationships with Michigan stakeholders keep projects on track

Barr's involvement with complex contaminated sites over the past two decades in Michigan means we have built relationships and demonstrated technical reliability with both Michigan and federal regulators, including EGLE and the U.S. Environmental Protection Agency (EPA), across district offices and departments. Our key team members have worked with EGLE's Remediation and Redevelopment, Materials Management, and Water Resources divisions; the Materials Management Remediation Advisory Team; the Groundwater Modeling and Groundwater-surface Water Interface Technical and Program Support teams; and many district offices. Likewise, we have developed significant experience working on projects with complex stakeholder relationships, including property owners and the public.

Breadth and depth of investigation and remediation experience facilitate project success

We have a demonstrated track record of successfully completing a variety of small to large projects for public clients, where Barr's role often spans environmental, engineering, stakeholder coordination, and close engagement with our clients to understand their needs. Our multidisciplinary teams have worked on hundreds of Michigan projects and are well-versed in supporting the technical and risk management needs of our clients as well as helping clients navigate the changing technical and regulatory landscape of site investigation, remediation, and redevelopment at contaminated sites. Specifically, Barr's core team has honed the skills you need including remediation projects in river settings and on the shores of Great Lakes; 3D modeling and visualizations; groundwater modeling; groundwater-surface water interface compliance; geotechnical engineering; investigation and cleanup of PFAS and other emerging contaminants; coal combustion residual compliance and cleanup; subsurface barrier technologies near-surface water; wetland delineation, permitting, and mitigation; and more. Our team is passionate about helping clients solve their most

pressing problems and seeing the fruition of their work improve conditions for the environment and community. We are excited for the opportunity to serve as a partner on your projects.

In addition to our technical prowess, Barr focuses on the fundamentals by providing in-house data quality, data management, and data visualization services. Our data quality group reviews individual lab reports and works directly with analytical laboratories to understand details such as bias flags or quality control omissions as well as methodology choices. Our data management team maintains Barr's environmental database housing analytical and associated data for Barr's multitude of client sites. This database is maintained and customized for the needs of each specific project and site. Finally, Barr's expertise in GIS, CADD, 3D modeling, and other data visualization options provides our clients with a plethora of communication tools to effectively communicate projects to a wide audience of project stakeholders.

A collaborative consulting model means we work from your agenda, not ours

At Barr, we pride ourselves on solving our clients' problems as if they were our own. We'll bring to your projects the insights and expertise we've gained from our work on thousands of projects—and promise to do our best on your behalf. Our principles of good client service include meeting your needs, adding value, keeping our promises, and working safely. You need consultants you can count on to complete projects efficiently and without hassles. Because we work with you—rather than just for you—you can feel confident that we will work with you to develop realistic expectations and milestones; send you regular progress reports, including budget and schedule tracking; identify potential problems or scope changes early to help avoid unpleasant surprises; and provide a seamless project team, a consistent approach, and accurate results.

Safety as a shared value means we will meet or exceed your safety goals

Barr's employee owners have agreed on and are committed to workplace health and safety as a core shared value that requires our constant attention. It is our overarching goal to assure that all our coworkers, as well as people affected by our work, are safe. Our concern motivates us to strive continually for no incidents or injuries at work. Barr's commitment to safety stretches across our company and into every project. In addition to standard HAZWOPER safety training, we have more than six separate training programs for different site conditions and operations, including the SafeStart program, which has been successfully implemented company wide. Our track record speaks for itself—we've had zero OSHA-recordable injuries in 2022.

For specific examples of our work, please see **page 11**.

Personnel

A table of all personnel by classification that could be employed in a project under the contract is located in **Attachment D**. Below, we list key personnel, as defined in the "Guidelines for Position Classification," who would be essential for the successful completion of a project and authorized to make decisions affecting work at the sites under contract. Their full resumes are included in Attachment D. Staff we consider key to the successful completion of projects in each specified remediation technology are listed in each technology's respective questionnaire and resumes are also included in Attachment D. In addition, we provided resumes for additional personnel we believe will play a significant role in projects under the contract.

Barr intends to self-perform the majority of the work in this contract with our deep bench of engineers and scientists. Since professional services will be performed by Barr, we have not included subcontractors in our personnel. Examples of services we would subcontract are surveying, drilling, geophysical services, and laboratory analysis. We have long-term relationships with companies in each of these categories, which we would leverage for the benefit of EGLE projects.

Key personnel biographies

Classification: Level 4 (P4)

Years of experience: 21

Tom Boom, PE | Vice President, Senior Environmental Engineer

Ann Arbor, Michigan | Direct employee of Barr

Roles and responsibilities: Tom specializes in managing complex projects related to contaminated sites, including those that fall within the regulatory framework of Michigan's Part 201, Part 213, and Part 115 rules. A trusted advisor to clients, He provides risk management, site assessment, feasibility studies, remedial design, permitting, construction oversight, and monitoring, all while engaging multiple stakeholders. Tom has served as principal in charge, project manager, and technical lead for a variety of projects that involve due diligence reviews, groundwater and sediment transport modeling, hydrodynamic and hydraulic modeling, geotechnical modeling, habitat and wetland restoration, and structural monitoring.

Classification: Level 4 (P4)

Years of experience: 34

Chris Miron, PE | Vice President, Senior Chemical Engineer

Grand Rapids, Michigan | Direct employee of Barr

Roles and responsibilities: Chris works on projects involving engineering design and the implementation of environmental remediation, brownfield redevelopment, decommissioning and demolition, and water treatment. He performs, coordinates, and is responsible for quality assurance and quality control for engineering design activities. In addition, he leads project teams in managing and administering the construction, operation, and maintenance of treatment systems. His experience also includes working with clients to implement the requirements of mining permits under Michigan's Part 632 program and related air- and surface-water-discharge permits.

Classification: Level 4 (P4)

Years of experience: 35

Charlene McGue | Vice President, Senior Environmental Consultant
Grand Rapids, Michigan | Direct employee of Barr

Roles and responsibilities: Charlene develops comprehensive closure strategies and plans for sites with environmental contamination, including planning and implementing remedial investigations, risk assessments, interim response actions, remedial response actions, operation and maintenance, and monitoring. Her technical strengths include characterizing contaminated sites through environmental sampling of groundwater, soil, soil-gas, surface water, and sediment; evaluating environmental contamination under Michigan's land-use-based cleanup criteria; designing and evaluating aquifer tests; evaluating groundwater flow systems; and evaluating contaminant fate and transport including natural attenuation.

Classification: Level 4 (P4)

Years of experience: 27

Jamie Edelyn, PE | Senior Environmental Engineer
Grand Rapids, Michigan | Direct employee of Barr

Roles and responsibilities: Jamie frequently performs the engineering aspects of environmental projects and coordinates those tasks with other team members. This typically involves developing design plans and specifications, coordination and contracting with implementing contractors, leading project kick-off and progress meetings, and direction of work activities including office support for field personal performing oversight. Jamie works primarily in the design, testing, evaluation and construction of soil and groundwater treatment systems. He has also been involved with restoration activities following soil excavation activities, including wetland restoration activities.

Jamie has been involved with the design of a hydraulic barrier system, sealed storm sewer systems, groundwater extraction and interceptor trench system, treatment system operation and maintenance, transmission and discharge piping, and discharge/outfall devices. He has also been involved with field oversight of construction activities, including management and certification of construction.

Classification: Level 3 (P3)

Years of experience: 11

Michael Ellis, PE | Senior Environmental Engineer
Ann Arbor, Michigan | Direct employee of Barr

Roles and responsibilities: Mike works on complex environmental remediation projects involving multidisciplinary teams. His work focuses on evaluating remediation options by conducting feasibility studies and coordinating stakeholder collaboration; developing remedial action work plans; permitting; and designing and implementing remedial actions. He manages multidisciplinary project teams, works with regulatory agencies on timely permit approvals, provides hands-on construction management, and collaborates with contractors to facilitate successful project implementation.

Classification: Level 4 (P4)

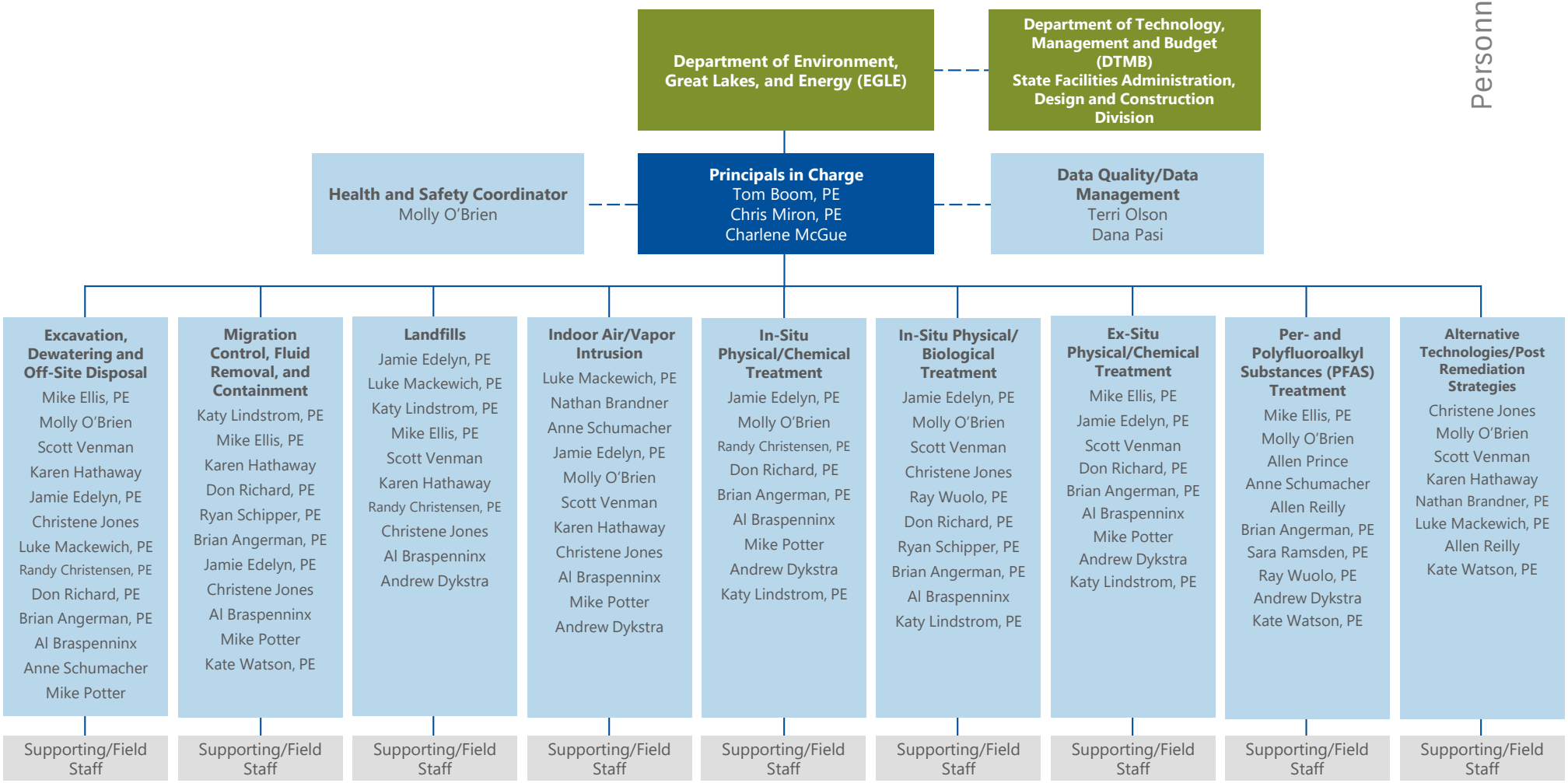
Years of experience: 28

Christene Jones | Senior Environmental Scientist
Ann Arbor, Michigan | Direct employee of Barr

Roles and responsibilities: Christene focuses on helping clients develop strategies to reach long-term goals, implementing these approaches, and facilitating negotiations to obtain consensus with regulatory agencies and other stakeholders. Her project work has included historical research, preparation of site-specific sampling plans, site assessment and investigation, and remediation planning and execution, primarily for sites in Michigan. She served on the Michigan Department of Environmental Quality's Part 201 Discussion Group (complexity subgroup, 2006–2007), facilitated the Effective Solubility work group (in 2008–2009), and served on Technical Advisory Group 2 to the Criteria Stakeholder Advisory group (2014). More recently, Christene participated in PFAS work group and industry meetings and provided guidance to Barr teams on Michigan PFAS regulations.

Detailed resumes for all of Barr's personnel are located in **Attachment D.**

Organizational chart



References

Examples of Barr's project experience with the remediation technologies and services requested in the RFP are presented on the following pages. This demonstrates we are well versed in the work and skills needed for projects that might fall under this contract for the State of Michigan. Summaries of the projects follow; reference contact information is provided in the primary and specialized technologies questionnaires.

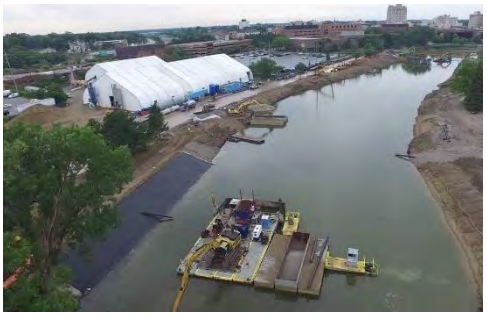
1. Investigation, feasibility study, remedial design, and implementation oversight at former a MGP site | **Confidential power client • Michigan**

Located in Flint, Michigan, a large former manufactured gas plant (MGP) site, regulated under Part 201, covers approximately eight acres and is owned by the client and other public entities. Parking lots, streets, sidewalks, parkland, large utilities, and structures including a pedestrian bridge, a 52-inch sanitary sewer, a river wall, and a dam—scheduled for removal by others—occupy the site.

Barr has been assisting this client since 1998 with remedial investigation activities, feasibility studies, designs, permitting, and remedial actions to mitigate risks and address exposure pathways at the site. One major aspect of the project recently completed by Barr was the remediation of river sediments adjacent to the site, which is the focus of this project summary.

Remedial investigations

Barr completed investigations in the upland areas and sediment to assess the nature and extent of MGP impacts and to evaluate the potential risk to human health and the environment. We used many investigative techniques to better understand the site, including rotosonic drilling, geophysical logging, laser-induced fluorescence (LIF) screening using TarGOST, cone penetrometer testing, nonaqueous-phase liquid mobility testing, aquifer testing, and bulk sediment and porewater sampling. Analytical sampling results were incorporated into a site-wide database, and Barr completed quality assurance/quality control (QA/QC) reviews to assess the validity of the analytical results. Barr used the investigation results to develop a 3D conceptual model of geology and MGP impacts as well as refine the groundwater-flow and contaminant-transport models that had previously been developed for the site. Refined modeling results identified impacts in the river sediment and groundwater venting to the river as exposure pathways that needed to be addressed.



Feasibility study

When the conceptual model suggested that MGP residuals could affect the river, Barr completed a detailed evaluation of potential remedial approaches for our client. Using the models, Barr evaluated the potential effectiveness of different remedies and estimated potential material quantities and remediation costs. Based on the results of these modeling efforts, including quantitative analysis of uncertainty, a combination of sediment removal (dredging)

with a multilayered sediment cap (capping) was the selected remedial option to mitigate current and potential future impacts to the river.

Stakeholder collaboration

The design, permitting, and implementation of the dredging and capping project had a high level of public scrutiny that required Barr, on behalf of our client, to facilitate monthly meetings and collaborate with multiple stakeholders, including federal and state regulatory agencies, the governor's office, the local municipality, and the university that owned portions of the property. Project design and implementation accounted for the multiple structures within the project area and multiple concepts being considered by others for dam removal. These variables required significant stakeholder coordination and communications and an iterative design approach. The proposed project design impacted a wetland present within the remediation area, so Barr worked with stakeholders to identify the most suitable method for wetland mitigation. Ultimately, wetland bank credits were purchased and a bankfull bench was incorporated into the river restoration design to mitigate wetland impacts that would occur during construction.

Protecting existing utilities

Multiple utilities exist in the project area, and their protection was critical to remedy success. Specifically, careful planning and controlled cap construction near the high-hazard dam and adjoining river wall were required. Barr reviewed previous dredging plans to understand sediment conditions in the vicinity, provided a safe offset, and designed a staged dredge and cap approach to maintain stability of the dam and wall, which required that adequate embedment be maintained. An active 52-inch sanitary sewer along the riverbank could have been compromised by the work. Barr coordinated a closed-circuit television (CCTV) inspection of the sewer during the investigation phase to evaluate the current condition. We assessed potential ground disturbance impacts and modified the dredge plan in some locations to accommodate the utility and designed a contingency plan for a bypass should unforeseen conditions arise. To protect utilities during construction, Barr coordinated installation of structural monitoring points throughout the project area that were surveyed by an automated total station daily to assess potential movement of critical utilities. The automated total station was set up to automatically communicate results and send alarms to the project team should unacceptable movement be detected. Additionally, existing storm sewer outfalls in the project area were modified to function with the restored riverbank and a section of storm sewer was lined to mitigate groundwater infiltration into the sewer that was observed during investigation activities.

Hydraulic engineering and river restoration

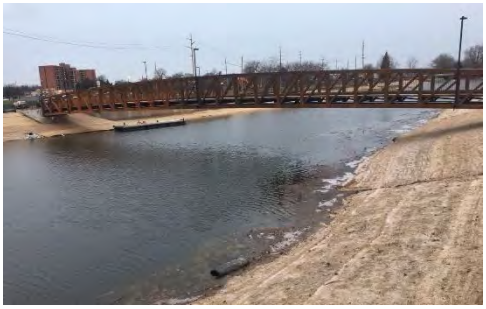
Detailed hydraulic modeling of the river was performed to evaluate design flow velocities, sediment transport, and flood levels using Delft3D and HEC-RAS modeling software. The modeling was used to inform the design of the restored channel, including channel geometry, necessary armoring, and vegetation. The restored channel bed is designed to prevent potential downcutting into deeper sediments and to resist lateral movement into adjacent urban development. In spite of these constraints, habitat features were incorporated to

improve floodplain connectivity, sediment transport, and habitat with the inclusion of Newberry riffles composed of cobble-sized rock and bankfull bench with an elevation designed to provide floodplain connectivity for future conditions. Although portions of the riverbank were armored, native vegetation was planted on the upper riverbanks and, following dam removal, the floodplain bench.

Permitting

The remedial action required multiple permits, and Barr worked with various federal (U.S. EPA Region 5, U.S. Army Corps of Engineers), state (Michigan's governor's office, Michigan Department of environmental Quality (MDEQ), and Michigan Department of Natural Resources), and local agencies (city and county) to obtain the applicable permits for the work. Throughout the design process, Barr conducted update meetings with regulatory agencies and stakeholders to provide design updates and receive direct feedback that allowed for an efficient permitting approval process. All permits were obtained in a timely manner that allowed work to proceed as planned. Barr also completed required applicable evaluations, such as a threatened and endangered species review, a wetland delineation, a waiver to dredge during fish spawning, and air permitting.

Odors and emissions



Odors and emissions were identified as a potential concern given the close proximity of the public to the remedial action. Barr performed air modeling with existing data to evaluate the potential for air emissions and odors during remedial activities. Modeling estimated that emission levels were not a concern, but odor levels could result in complaints. To reduce the potential for odors, Barr specified multiple mitigation measures including a fabric tension structure under negative pressure with air treatment over the sediment dewatering pad. Barr also developed a contingency plan for unexpected emission events. Additionally, Barr created and staffed a complaint hotline during implementation to communicate complaints among applicable stakeholders within minutes of receipt, evaluate site data to assess if the complaint was related to site activities, and determine if operational or monitoring adjustments were necessary.

Contractor selection and construction oversight

When the remedial design and permitting were approved by all stakeholders, Barr facilitated contractor procurement by developing specifications, soliciting bids, reviewing bids, and recommending a contractor to the client. During construction, Barr provided on-site construction quality assurance.

Sediment removal and capping activities were successfully completed within the projected budget and no stability issues have been identified in subsequent inspections.

2. Environmental assessments, response actions, and PFAS, VOC, and VI investigations for a manufacturing client | Confidential manufacturing client ● Michigan

Barr has provided various environmental investigation and characterization activities and response actions for more than 15 years for a client southeast of Grand Rapids, Michigan, that manufactures fire protection systems and operated a brass foundry in the 1960s and 1970s.

Previously implemented environmental response activities by Barr focused on the historical placement of foundry-related residuals as fill material and the former operation of a dry well system for certain process waste disposal. Foundry fill areas were addressed with the removal and off-site disposal of fill material identified in wetland areas and restoration of the wetland environment pursuant to an EGLE-approved cleanup plan. Containment of upland foundry-related fill materials was achieved through stabilization of a slope bordering the wetland area and capping of the bank area with a geosynthetic clay liner and clean imported soils. A groundwater monitoring network was designed and installed to demonstrate that venting groundwater emanating from the fill area was not adversely impacting the wetland environment.

The former dry well area was addressed through mass removal and off-site disposal of vadose zone soil, impacted saturated soils, and remaining below-grade piping. Resultant post-remediation soil and groundwater quality conditions in the immediate area of the former dry well were compliant with relevant cleanup goals established by EGLE. Barr compiled the site investigative data and reports from the interim response actions into the form of a NFA report and submitted the document to the MDEQ in 2011. The NFA report addressed the site and two adjoining properties for which Barr assisted with the negotiation of site access and restrictive covenants.

Ongoing environmental activities to achieve Part 201 closure for all identified site conditions fall under the general categories of: 1) assessment and monitoring activities to evaluate the nature and extent of PFAS in groundwater; 2) response activities to address PFAS in soil and groundwater; 3) response activities to address the VI pathway; 4) assessment of the plume of volatile organic compounds (VOCs) in groundwater south of the site due to the former dry well and establishment of institutional controls to prevent future exposures as necessary and appropriate; and 5) NFA preparation and engagement with EGLE.

The client asked Barr to sample groundwater at the site in 2018 from existing monitoring wells as a result of the state-wide initiative for target industries and known aqueous film forming foam (AFFF) testing areas. The results identified the presence of PFAS, and Barr subsequently installed a groundwater monitoring well network and collected groundwater samples in an attempt to define the extent of the groundwater plume and identify potential exposure pathways (i.e., groundwater venting to surface water). Groundwater monitoring results and historic site activities were used to

identify a PFAS source area, and a response action is being pursued to reduce the expansion of the downgradient groundwater plume and prevent further infiltration of PFAS from soil to groundwater at the site. A technology screening evaluation was conducted as a first step in the response action to assess options for addressing the source area. Results from the technology screening evaluation identified that a soil-bentonite cutoff wall around the source area and low-permeability cap throughout the area could mitigate the ongoing source of PFAS, and Barr is currently designing the selected source control technology. Design data collection activities were conducted to address data gaps identified in the technology screening evaluation and included subsurface investigations to further characterize a low-permeability clay layer that the cutoff wall would be tied into, geotechnical testing of soil samples collected during the subsurface investigation, and compatibility testing to evaluate potential soil-bentonite mixes for the cutoff wall and compatibility with site soils and groundwater. Results from design data collection activities are being used to pursue a preliminary design that is planned to be advanced to detailed design and construction.

Based on the proximity of the former dry well to the manufacturing building at the site, Barr completed a VI assessment in 2019 to evaluate the concentrations of VOCs in soil vapor beneath the building floor. Analysis of soil vapor samples showed the presence of VOCs, primarily trichloroethylene (TCE), at concentrations above EGLE-established screening levels for the VI pathway. Barr completed a VI pilot test in 2020 and used that data as a basis of design for a full-scale sub-slab depressurization system (SSDS). The SSDS was implemented in 2022 and was focused on an approximately 20,000-square-foot area of concern in the southern portion of the facility. The retrofitted design involved coring through the facility floor and venting extracted sub-slab vapors through the roof of the faculty. The SSDS system was powered by three fans, which provided sufficient vacuum to produce a differential pressure of at least 0.02 inches of water between the indoor air and the sub-slab over the area of concern. To achieve an approved site closure with EGLE, the client employed the recommended presumptive remedy (i.e., SSDS) in 2022, and Barr is completing routine post-installation monitoring to assess system effectiveness prior to submitting an NFA for the VI pathway.

Additional activities at the site include environmental assessment and delineation of VOCs in groundwater south of the manufacturing building onto adjacent undeveloped land and developed private property. Environmental drilling, groundwater monitoring well installations, and soil and groundwater sampling have been completed to assess the extent of off-site impacts. As part of the planned closure process, Barr will assist with the coordination and negotiation of restrictive covenants to prevent installation of potable wells for the provision of drinking water to limit risk to that exposure pathway.

3. Site closure, investigation, risk assessment, and remedial action at a former leather tannery | Confidential client **and City of Whitehall ● Whitehall, Michigan**

Barr's staff assisted the responsible party in developing a response plan and negotiating a consent judgment with the MDEQ in 2010 for the remediation and closure of a former tannery site to satisfy the requirements of Part 201.

Barr has performed several Interim Response Activities including design of a shoreline stabilization remedy for a portion of the property; design, installation and operation and maintenance of an air sparging system along the shoreline to intercept contaminants in site groundwater, which previously vented to the lake; risk-based mixing-zone evaluation; excavation of waste materials from a small shoreline wetland and restoration of the wetland; location of buried drum debris using geophysical methods and excavation of those materials; investigation of utility and sub-slab conditions in conjunction with demolition of the tannery facility; and removal of subsurface waste materials including tannery materials and metals impacted soils.

Barr assisted with the development and implementation of an alternative excavation-based remedy to remove tannery-related materials from former wastewater lagoons, wetlands, and upland areas to facilitate residential redevelopment of the site, which is located on a popular recreational lake. Activities included the removal of approximately 200,000 tons of material from the site, and design and restoration of a 5.37-acre wetland including 0.33 acres of new wetland as an emergent/open water wetland using a series of low-profile wetland berms to improve habitat diversity.

In 2017, Barr conducted porewater sampling to characterize baseline groundwater discharge during operation of the sparge system prior to shutting the system down, which was designed to reduce concentrations in groundwater to levels below the final acute value (FAV). Current activities include quarterly groundwater sampling and periodic requests for updates to the mixing zone-based groundwater/surface water interface criteria.

In addition, Barr is also helping the City of Whitehall support residential redevelopment of the waterfront property. We assisted with securing and managing brownfield funds, provided demolition specifications and oversight, and provided sitewide assessment of soil gas and field screening of lake sediments.

4. Phased excavations, pathway mitigations, and site closure at former industrial site | **Confidential client ● southern Michigan**

Barr has worked with a confidential industrial client since 1997 to investigate and remediate a manufactured gas plant (MGP) site located in southern Michigan along the Kalamazoo River. The first step in site investigation involved researching historical site operations and identifying potential source areas, including locations of dense non-aqueous-phase liquid (DNAPL). Phased upland remedial excavations were performed from 2005 through 2014 to remove source material. Excavations required sheet piling to protect adjacent infrastructure, dewatering, water treatment, cofferdams to complete excavations adjacent to the river, and demolishing and rebuilding river walls.

Upland excavations uncovered abandoned pipes leading from the MGP facilities to the river, prompting a sediment investigation. Several investigation techniques were used to evaluate sediments quality, including push cores, push probes, Tar-specific Green Optical Screening Tool (TarGOST), and rotosonic drilling. Investigation results indicated that DNAPL was present in the upper-most layer of sediment, located above a relatively shallow layer of cobble.

Barr worked with the MDEQ to negotiate a sediment remediation plan to remove DNAPL-containing sediment based on visual observations during the investigation. Barr performed bench testing of the tar-impacted sediment to identify amendments that could be used to enhance sediment dewatering and to better understand decant water and dewatered sediment chemistry. The chemistry data was used to secure approval from local landfills for sediment disposal and to evaluate decant water treatment and disposal options. The decant water disposal options were either discharged to the river through a National Pollutant Discharge Elimination System (NPDES) permit that was secured for the project to discharge treated water. Barr designed dredge prisms in 3D software to capture DNAPL and minimized risk to nearby buried utilities, river walls, and bridge structures. We prepared a specifications, construction drawings, and bidding package and worked with the client to evaluate bidders' experience, capability, safety record, and other factors.

We worked with federal, state, and local regulators to secure permits on an accelerated schedule for the remedial action. A threatened and endangered species survey was conducted to help minimize impacts to Indiana bats and slippershell mussels. A mussel survey was performed and encountered mussels were translocated upstream of the project area. The construction schedule was adjusted to minimize impacts to fish during the spawning season. When this could not be avoided, fish electroshocking occurred to successfully remove fish from the dredge area, followed by fish barriers installation upstream and downstream of the work zone to prevent them from reentering it.

Sediment removal was performed with both hydraulic and mechanical dredging techniques and dewatered using geotubes, gravity, or amendment addition depending on multiple factors. Sediment was stabilized prior to transporting and disposing it at a local landfill. Target sediment removal was confirmed through post-dredge surveying instead of chemical analysis of the remaining sediment surface, offering a significant cost savings to the client. The river was backfilled with material that provided clean substrate for marine habitat.

Completion of the sediment remediation work, in combination with previous upland excavations, allowed for pursuing a NFA determination for the site. Source removal completed by upland excavation work resulted in mitigation of downgradient groundwater impacts and a stable groundwater plume. A plume stability analysis was completed to support the NFA along with evaluation and mitigation of pathways such as vapor intrusion and direct contact. Source removal and mitigation of pathways allowed for a successful NFA determination which was approved by the MDEQ in 2015.

As required by the approved NFA for the site, a post-closure plan was developed for the site and included mitigation of future exposure risks associated with remaining upland impacted soil and groundwater impacts on several adjoining properties that comprised the site. Future exposure risks for the upland portions of the site are controlled through multiple institutional and engineering controls, including land/resource use restrictions (i.e., restrictive covenants) and a road right-of-way alternate institutional control, post-closure mitigation measures (e.g., exposure barrier maintenance), and surface cover inspections and monitoring on an annual basis**.**

5. Feasibility evaluation, pilot test, and design of groundwater treatment system |

Confidential manufacturing client ● Michigan

Historical manufacturing operations at a western Michigan site have impacted site groundwater with volatile and semi-volatile organic compounds, trace metals, and pharmaceutical compounds. The current remediation system at the site involves hydraulic containment, groundwater extraction, and disposal into deep injection wells on the site. The client was seeking a more cost-effective, long-term treatment solution.

Barr was hired to evaluate the feasibility of different treatment technologies based on their treatment efficacy, cost-effectiveness, and lifetime operational cost. As a result, Barr recommended pilot-testing a biologically active, granular activated carbon system (BAC) system for its ability to treat a wide range of organic contaminants. The pilot system also included pre-treatment to remove iron.

Barr coordinated with BAC vendors to select pilot equipment and implement a testing strategy to determine key operational parameters and monitor constituent removal. Barr operated the pilot test for five months and observed successful removal of all organic constituents of concern and most metals and pharmaceutical compounds.

Based on the success of the pilot study, Barr was authorized to proceed with full-scale design. The full-scale design included chemical addition, coagulation and flocculation, settling, mechanical filtration, and polishing with granular-activated carbon (GAC) units. The full-scale system will have the ability to be used as either a BAC or traditional GAC system to best meet effluent requirements. Treated water will be discharged to the local publicly owned treatment works.

Barr coordinated negotiations with both the local wastewater district and state regulators to make this change while determining that monitoring and other regulatory obligations were met.

6. Remedial action plan for a landfill | **Southeast Berrien County Landfill ● Niles, Michigan**

On behalf of a county landfill operator, Barr's Grand Rapids office developed a remedial action plan (RAP) under Michigan Part 115 and Part 201 to address the presence of volatile organic compounds and metals in off-site monitoring wells in a residential area. The RAP documented the measures to be taken in fulfillment of the landfill's obligations specified in a consent order with the MDEQ.

In developing the RAP, we completed certain elements of the remedial investigation, risk assessment, and assessment of corrective measures that the MDEQ did not accept from a previous consultant. We conducted a study to establish site-specific background criteria for metals and an investigation to complete the delineation of off-site contaminants in two aquifers underlying the residential area.

The landfill had been attempting to control off-site migration of contaminants in the uppermost aquifer for a number of years using an extensive system of groundwater purge wells located along the landfill property perimeter. However, the MDEQ was not satisfied that the system could achieve sufficient capture due to its design and the landfill's operation and maintenance program.

Barr's staff evaluated the system's ability to achieve capture in a thin aquifer along more than 3,000 feet of perimeter and determined where additional or replacement wells were required. We also determined that groundwater capture was required in a portion of a deeper aquifer. We designed and installed the deep system and the shallow system upgrades and developed a monitoring and operation plan to confirm and document that the systems are achieving complete capture as required under the RAP.

Barr's staff worked with the landfill representatives to improve communication with MDEQ staff and the public, including numerous adjacent property owners. We also assisted the landfill in fulfilling the final RAP requirements through negotiations for a combination of individual restrictive covenants and notices of aesthetic impact with adjacent property owners to address the residual off-site contamination. Barr's staff also developed an MDEQ-approved monitoring plan for land and resource use restrictions.

Barr now provides oversight of the landfill's monitoring program for groundwater and land and resource use restrictions. We have developed a relational database to manage the associated data, including previous data that have been collected over more than 20 years. We review quarterly and annual monitoring information and data and provide technical summaries and evaluations for each of the monitoring reports that are submitted by landfill representatives. Most recently, Barr assisted the landfill in responding to detections of high concentrations of methane in the neighboring residential area and completing a study to demonstrate that the landfill was not the source of that methane.

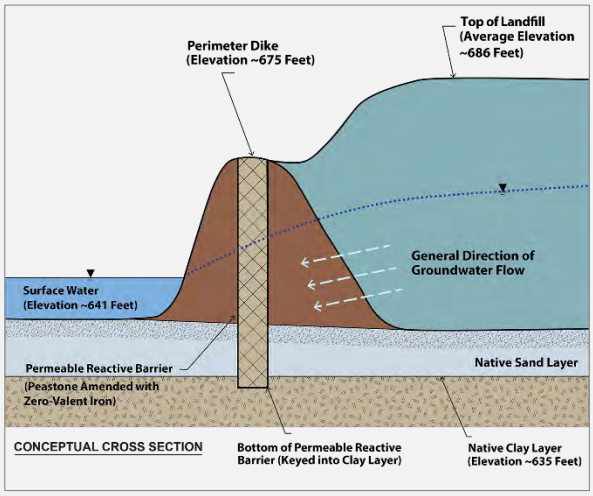
7. Former landfill characterization and feasibility study | **City of Lansing ● Lansing,** Michigan

In 2018, Barr began assisting the City of Lansing by conducting historical data compilation and review at a former municipal and solid waste landfill located in Lansing, Michigan. Barr compiled decades of investigation that had been completed at the site under Michigan's Part 201 program and developed a scope of work to further characterize groundwater impacts at the site. This characterization is made more complicated due to the surrounding sites likely contributing similar contaminants to the plume.

To further characterize site contaminants, Barr assisted the city by advancing Membrane Interface and Hydraulic Profiling Tooling (MIHPT) to depths up to 100 feet below ground surface to better define geologic and hydrogeologic factors at the site and to provide data to target proposed monitoring well locations and screened intervals for long-term contaminant plume monitoring.

Using the historical and newly collected data, Barr developed a 3D geologic model as part of an overall conceptual site model for the site. Barr is also assisting the city in developing a feasibility study for potential mitigation or remediation options to address the contaminate plume and source at the site.

8. Remedial action planning at two coal combustion residual (CCR) landfills | **Confidential energy client ● eastern United States**



Barr is assisting an energy client with remedial action planning for two CCR landfills constructed decades ago near bodies of water and involving elevated metal concentrations in groundwater. At the first site, a closed, unlined landfill is associated with elevated arsenic in groundwater, creating concern about water quality in the adjacent water body, and an existing pump-and-treat system has not been performing as planned. The second site is conceptually similar. The main differences are that the substance of concern is selenium, which behaves differently than arsenic in groundwater, and the status of the landfill (a portion of which is still operational).

Remedial options assessment

Starting with options assessments, Barr has evaluated air sparging, pumping and treating, installing reactive barriers, source removal, low-permeability landfill covers, and constructed treatment wetlands. Based on the options assessments, three remedial options for each landfill were further evaluated in a detailed feasibility study prior to selecting a remedial plan at each facility.

Detailed feasibility studies

Detailed feasibility studies were completed for both sites using data evaluation, groundwater flow and contaminant transport modeling, geochemical modeling, bench-scale and pilot-scale testing, and cost estimating.

For the first site, existing information was used to evaluate groundwater extraction and treatment and air sparging as potential remedial options. Bench-scale and accelerated column testing was completed to evaluate the treatability potential of zero-valent iron (ZVI), including the anticipated lifespan of a permeable reactive barrier (PRB). Column testing results were combined with groundwater modeling to assess flow through a PRB with plugging and fouling of a permeable material as geochemical reactions progress.

For the second site, existing information and additional site investigation data was used to evaluate a source removal option. Additionally, the feasibility study incorporated treatability testing of ion exchange resins for an ex-situ pump-and-treat system, groundwater flow modeling, and geochemical modeling to evaluate groundwater extraction and treatment and PRB options.

Remedial action plan

Following the detailed feasibility studies, a PRB amended with zero-valent iron (ZVI) and source removal and beneficial reuse of CCR materials were selected as long-term approaches to reducing arsenic and selenium concentrations in groundwater at the first and second sites, respectively. Barr is also evaluating an interim constructed treatment wetland to reduce selenium concentrations in groundwater while the CCR at the second site is being removed over years. Pilot-scale testing with site groundwater is underway to evaluate the treatment efficiencies of constructed treatment wetlands and provide input data for constructed treatment wetland design.

The proposed remedies were submitted to the state regulatory agency for review following close stakeholder engagement on these innovative remediation approaches.

9. Monitored natural attenuation evaluation and ICE system design for natural gas compressor/dehydration stations | **Confidential client • Michigan**

Barr provides environmental consulting services to a large-scale energy infrastructure company for easements and properties associated with its natural gas pipelines, compressor/dehydration stations, and gas storage fields in Michigan. One such service includes consulting services focused on achieving closure or NFA status for historical releases associated with the company's past operations.

We have implemented monitored natural attenuation as a long-term remediation option at several sites. Barr evaluates naturally occurring biological processes through semi-annual sampling of groundwater quality and physical characteristics that indicate natural attenuation of contaminant concentrations in groundwater to achieve remedial goals. Concentration trends are used to confirm findings and are confirmed periodically to evaluated risks to potential receptor.

Barr has also completed spill response activities at the site including excavation oversight and subsequent remedial activities, such as design and installation of an internal combustion engine soil vapor extraction and treatment system (ICE system) to address remaining impacts that could not be excavated following a release due to active infrastructure. The treatment system consisted of a single 8-cylinder ICE unit to draw soil vapors from two, 2-inch diameter, PVC wells installed within the release area. The SVE wells were connected to a common manifold that included valves to

isolate each well. The ICE unit used the engine intake to induce a vacuum on the SVE wells to extract soil vapors. The extracted vapors along with supplemental natural gas were used as the fuel source for the system. Operation of the ICE system reduced contaminant concentrations in recovered soil gas by more than 90 percent, overall, at asymptotic levels.

10. Vapor intrusion pathway (VI) investigation of former MGP site (under MI Part 201) | **Confidential client ● Michigan**

For this site, Barr focused on achieving Part 201 NFA status from EGLE for multiple pathways, including on-and off-site properties. During Barr's investigation, we assessed the nature and extent of a non-aqueous phase liquid (NAPL) and dissolved-phase contaminant plume through a series of monitoring well installations, soil borings, vertical-aquifer sample points, and multiple types of analytical testing.

Barr also worked with the client to develop a comprehensive VI work plan comprising several on-and off-site properties and stakeholders. The work plan included narrowing the list of VI constituents of concern (COCs) as well as developing site-specific VI cleanup criteria and ultimately a clearer path for demonstration of VI pathway compliance. The EGLE-approved VI investigation work plan included several rounds of sub-slab soil gas sampling for multiple VI COCs from beneath several on-site buildings. It also included the collection of dissolved phase samples, from the upper-most lens of groundwater, to rule out the potential off-site receptors (occupied buildings).

11. Design of infiltration gallery for a manufacturing client | Confidential manufacturing client ● **Michigan**

On behalf of a confidential manufacturing client, Barr designed an infiltration gallery to expedite aerobic cometabolic biodegradation of chlorinated aliphatic hydrocarbons in groundwater at a former industrial facility in Wyoming, Michigan. The infiltration gallery was designed to introduce oxygen to groundwater in an area upgradient of a groundwater-surface water interface (GSI) receptor to encourage methane-utilizing bacteria (methanotrophs) to cometabolically degrade chlorinated aliphatic hydrocarbons, primarily dichloroethylene (DCE), and vinyl chloride (VC) present in groundwater at the site. The infiltration gallery will use a portion of the stormwater/snow melt from the site building roof as a source of oxygenated water for the infiltration gallery in order to increase the dissolved oxygen of the groundwater in the upper five feet of the aquifer in the area where concentrations of DCE and VC exceed their GSI criteria. This approach will be employed in response to the failure of a reductive dehalogenation approach previously implemented at the site to drive the reduction of perchloroethylene beyond DCE and VC products. The design incorporated the existing roof drain system and distribution piping to convey stormwater/snow melt to groundwater upgradient of the GSI.

12. Wetland reconstruction for groundwater remediation | **Hasbro, Inc. ● Minnesota**

A slow-moving plume of chlorinated solvents extended from a former manufacturing plant toward a channel. Several treatment systems, including a passive barrier and a conventional pump-and-treat system were considered to prevent discharge of impacts to the surface water. However, such systems would be obtrusive and detrimental to existing wetlands. Barr designed a constructed wetland to enhance the already occurring natural attenuation. Performance monitoring was completed for four years and demonstrated that the wetland was operating according to design and meeting all surface water quality criteria. The established wetland performed according to design with limited required monitoring and maintenance. In addition to providing a permanent, successful, low-cost treatment system, the restored wetland also serves as a natural open space and park area for the community.

In addition to developing a plan to address the groundwater contamination, Barr developed a plan to promote the community's understanding of the project and generate public support. This included numerous public meetings to educate the public on the nature of the project and frequent communication through local outlets on project progress. As a result, the public supported the project.

13. Treatment system evaluation for natural gas storage and transmission infrastructure | **Confidential client ● Michigan**

Barr provides environmental consulting services to a large-scale energy infrastructure company for easements and properties associated with their natural gas pipelines, compressor/dehydration stations, and gas storage fields in Michigan. One such service includes consulting services focused on achieving closure or NFA status for historical releases associated with the company's past operations.

In support of closure or NFA status for properties with historical releases, Barr conducts a comprehensive review of the existing data and reevaluates closure strategies based on regulatory requirements. In several cases, this has involved evaluating the efficacy of legacy treatment systems in achieving closure conditions and implementing additional remedial activities. Barr has evaluated in-situ bioremediation treatment systems, including air sparge systems. We have conducted continued operation and maintenance of the systems to increase efficiency, system expansions and enhancement, and system decommissioning on achieving remedial goals.

14. Risk-based remedial actions at McCoy Creek Industrial Park | Confidential client ● **Buchanan, Michigan**

Barr's staff designed and implemented an agency-approved remedial action for a 110-acre industrial site along both sides of a scenic and recreational stream. The site's industrial history dated to the early 1900s. Environmental impacts on the property included foundry sand fill, oily discharges, process water discharges, an unlined caustic settling pond, and numerous pits, vaults,

and storage tanks. Releases of chlorinated hydrocarbons, petroleum hydrocarbons, PCBs, semi-volatiles, and metals occurred over many decades of industrial use.

Barr's staff characterized environmental impacts at the site, identified potential risks to current and future human and ecological receptors, and designed focused remedial actions to mitigate the identified risks. Assessment activities included a risk assessment, risk-based mixing-zone evaluation (including a stream study to evaluate background loading conditions that supported more favorable compliance criteria), and technical support for a variance from the water quality standard for mercury.

Response actions included removal of waste material from the former settling pond, the stream and its banks, focused groundwater extraction and treatment systems to mitigate venting of contaminated groundwater to the recreational stream, exposure barriers to prevent direct contact to contaminants along the stream, and focused excavations and legal restrictions to address vapor intrusion risks. We also designed, constructed, and operated source-control measures to address oily and caustic waste materials that were in and near the stream. Additionally, Barr's staff designed, constructed, and operated three area-specific groundwater treatment systems consisting of interceptor trenches constructed using single-pass trenching methods to mitigate contaminated groundwater venting into the stream.

15. Groundwater extraction and treatment system operation, maintenance, and monitoring | **Confidential client • Michigan**

Barr's Grand Rapids office provides operation, maintenance, and monitoring activities associated with a groundwater extraction and treatment system at a former manufacturing site. Groundwater is extracted from 12 groundwater extractions wells at a total rate of up to 150 gallons per minute and is treated using a tray-style air stripper prior to discharge under a NPDES permit.

A total of 69 monitoring wells and 18 piezometers are currently installed at the site to monitor groundwater conditions and evaluate capture and performance of the groundwater extraction and treatment system. Monitoring wells are screened within the shallow and deep zones of a glacial aquifer, as well as within a bedrock aquifer.

Barr conducted site investigation activities, including direct imaging, to identify additional potential source areas and completed a groundwater model that was used in the design of a system upgrade completed in 2019.

Barr assisted in the design and construction of the system upgrade, which included installation of eight additional extraction wells, upsizing transmission piping, replacing the column-style air stripper with a new tray-style air stripper, and replacing and upgrading electrical controls and associated programming.

In addition, Barr conducts semi-annual groundwater monitoring and reporting and performs continued site investigation activities to delineate and characterize additional source areas while evaluating long-term remedies to prevent off-site migration.

16. PFAS treatment during power plant decommissioning | **Confidential power client** • midwestern United States

A confidential power client began decommissioning a former power plant in 2019. The decommissioning activities required the dewatering of the facility's basement, but water generated from the process was found to be impacted with PFAS. After discovering the PFAS, the client turned to Barr to characterize the impacts and develop a treatment system that would allow decommissioning activities to continue.

Because Barr has a large bench of field staff with PFAS sampling experience, we were able to quickly mobilize to the site to collect samples to characterize impacts. We evaluated the sampling results, including quality assurance/quality control (QA/QC) reviews, to assess the potential sources of PFAS as well as treatment methods. During sampling, it was observed that water generated during dewatering had a pH higher than applicable discharge criteria, meaning that the pH would need to be mitigated before discharge. Barr completed an initial feasibility-level assessment of treatment methods for PFAS and pH, recommending that PFAS treatment use granular activated carbon and pH levels be mitigated using aeration. We then worked with a remediation contractor to complete bench and pilot-scale testing before providing turnkey design to allow for the timely employment of the treatment system. Barr led the implementation effort for the treatment system and collected samples to verify that the effluent water quality met project objectives.

Barr oversaw the operation of the treatment system during decommissioning activities. This included conducting routine sampling at various points in the treatment system, completing QA/QC reviews of each lab report, and evaluating the sample results to assess the remaining absorptive capacity of media and potential changes to the treatment system operations. Changes to the influent water quality during the project required modifying and supplementing the treatment processes that were initially prescribed, including implementing a carbon dioxide aeration system to mitigate an increase in the pH observed in the influent water. Barr also coordinated and oversaw the implementation of measures for the treatment system to operate through inclement weather and run for approximately 16 months when initial indications were that the system would only be needed for two to three months.

Approximately 26.5 million gallons of PFAS-impacted and high-pH water were treated by the treatment system. Throughout the duration of the project, monitoring results indicated that effluent water quality met the project objectives. Continual treatment of water generated from the dewatering activities allowed the decommissioning process to continue uninterrupted and the project was successfully completed in 2020.

17. PFAS-impacted drinking water response and treatment plant design | City of **Bemidji ● Minnesota**

Barr helped facilitate a granular activated carbon (GAC) accelerated column test and a single-pass ion exchange pilot test to evaluate the most effective PFAS treatment technology and to identify if iron and manganese removal would be needed to facilitate effective PFAS treatment. Barr also assisted the city in forming a technical advisory committee to consult with the MDH on the long-term approach to managing PFAS-impacted drinking water.

We ultimately designed a 2.2 million-gallons-per-day drinking water treatment plant consisting of greensand filtration for iron and manganese removal, followed by GAC treatment for PFAS removal. We prepared plans and technical specifications, cost estimates, and public bidding documents. Barr also helped obtain more than $20 million in bonding and related funding for the project. Our assistance included helping present the project to the Minnesota senate finance committee for inclusion in a state bonding bill.

Construction began in July 2020, and Barr provided full-time construction observation and administration services leading up to the plant's start-up in early 2021. Bemidji is now benefiting from water that is not only PFAS- and iron-free but also free of manganese, another contaminant of concern identified by the state.

18. Multi-site PFAS remedial investigation and remediation | **Confidential client ● Eastern** U.S.

PFAS have been detected in public water supplies and private wells at or near active and former manufacturing facilities owned by Saint-Gobain. At these sites in the eastern United States, a group of potentially responsible parties is working with local, state, and federal regulatory authorities. Barr is part of a collaborative consulting team conducting remedial investigations and feasibility studies. The team is evaluating potential release mechanisms from multiple facilities, including sampling and analyzing process streams, air emissions, and process wastewater. Site investigations involve soil, groundwater, surface water, and sediment sampling; interior building surveys; and review of historical and background materials. Barr is leading development and iterative refinement of complex site conceptual models that incorporate coupled air-dispersion, groundwater-flow, and fate-and-transport models. All work is being completed in accordance with strict quality assurance protocols. Interim remedial actions, including groundwater extraction and treatment and in-situ groundwater treatment, are being considered at several of the sites in tandem with investigations. Barr has conducted PFAS water-treatment bench- and pilot-testing, evaluated treatment-technology options such as granular activated carbon and ion exchange, and designed a full-scale pretreatment system. Our work has been closely coordinated with the potentially responsible parties and regulators addressing intense public interest in these sites.

19. Battle Creek Former MGP Site (Part 201 Facility ID: 13000369) | SEMCO Gas Company ● **Michigan**

Remedial actions (excavations of source material) were conducted at the site to meet the requirements of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, for a limited nonresidential site-specific NFA for the facility. The MGP operated from the late 1800s until gas production ceased in 1946. The site included the former MGP operations and the area around the former MGP operations that contain soil and/or groundwater impacts that were potentially affected by the MGP operations.

Barr assisted SEMCO with multiple remedial investigations at the site to characterize the nature and extent of MGP material (DNAPL, tar, and purifier box material) through field screening and laboratory analysis of soil and groundwater. Remedial excavations were conducted between 2007 and 2010 to reduce the volume of MGP material potentially contributing to dissolved-phase groundwater impacts and to address exposure risks. Nearly 25,000 tons of MGP related impacts were removed from the site; however, some impacts, including MGP material remain in place beneath the completed remedial excavations and in areas not excavated. An assessment of the remaining DNAPL, the majority of which is in the saturated zone, was completed by evaluating the stability of the dissolved-phase plume and state of the DNAPL in site soils. Each line of evidence assessed (laboratory testing of DNAPL saturation and mobility, total petroleum hydrocarbons concentrations, observations in monitoring wells, and dissolved-phase plume stability) supports the conclusion that the DNAPL bodies were stable and in a residual state. Therefore, the remaining residual DNAPL was left in place.

risks from the remaining impacts are controlled through multiple institutional and engineering controls, including restrictive covenants and a road right-of-way alternate institutional control, and post-closure mitigation measures (including surface cover materials) including monitoring on an annual basis.

A NFA submittal was approved by MDEQ in 2016.

20. Muskegon Heights former MGP site (Part 201 Facility ID: 61000408) | DTE Gas Co.

- **Michigan**

The former Muskegon Heights Manufactured Gas Plant (MGP; the site) included environmental investigation and remediation pursuant to Part 201, Environmental Remediation, of the Michigan Natural Resources and Environmental Protection Act (NREPA) of 1994 (Michigan Public Act 451), as amended. The former MGP was constructed in 1915/16 by Muskegon Heights Gas Company (MHGC), which became Muskegon Gas Company (MGC) in 1925. MGP operations took place from 1915 through 1927 at which point the site switched to natural gas distribution. MGP operations resumed in 1930 and were terminated in 1934 when the site was again used for natural gas distribution. Michigan Consolidated Gas Company (MichCon), now a part of DTE Energy, purchased MGC in 1938 and operated the site for natural gas distribution through the 1950s.

Records indicate that the former Muskegon Heights MGP used carbureted water gas and oil gas techniques for gas production. The buildings and surface infrastructure related to the former MGP were demolished in the 1950s and the former tar well and an area of impacted soils identified within the former reservoir were excavated and removed in 2014 by Horizon Environmental Corp (acquired by Barr in 2015). An additional excavation near the former reservoir area completed by Barr in January 2017 removed fill soils to a depth of four feet below grade.

Barr assisted DTE with the preparation and submittal of three NFAs to MDEQ for the site, included the main parcel (353 East Broadway) where former MGP operations were located, and two downgradient areas, including the mid-plume area and Harris Park where the groundwater plume terminated prior to discharging to Little Black Creek. All three NFAs were approved by MDEQ in 2017 through 2019.

As required in the NFAs for the site, post-closure plans were developed for three discrete portions of the Site and included mitigation of future exposure risks associated with remaining impacts soil and groundwater impacts at the site. Future exposure risks are controlled through multiple institutional and engineering controls, including land/resource use restrictions (i.e., restrictive covenants) and a road right-of-way alternate institutional control, and post-closure mitigation measures (including minimal surface cover materials) including monitoring surface cover on an annual basis.

Part II – Cost Proposal

Billable rates

POSITION, CLASSIFICATION AND EMPLOYEE BILLING RATE INFORMATION
PROFESSIONAL SERVICES – 2023 ENVIRONMENTAL ISID

Firm Name: **Barr Engineering Co.**
Yearly Percentage Billing Rate Increase: **approximately 4%**

Name	Position[2]	Location	Classification[2]	Level	Billing Rate[1] (dollars)				
					2023	2024	2025	2026	2027
Jessica Abraham	Environmental Scientist	Grand Rapids	Engineer / Scientist / Specialist I	L1 (P1)	95	99	103	108	113
Brian Angerman**	Senior Environmental Engineer	Minneapolis	Vice President	L4 (P4)	210	219	228	238	248
Thomas Barfuss	Environmental Scientist	Grand Rapids	Engineer / Scientist / Specialist I	L1 (P1)	90	94	98	102	107
Shaughn Barnett	Ecologist	Ann Arbor	Engineer / Scientist / Specialist I	L2 (P2)	105	110	115	120	125
Diane Biehl	Environmental Scientist	Grand Rapids	Engineer / Scientist / Specialist II	L2 (P2)	120	125	130	136	142
Thomas Boom**	Vice President, Senior Environmental Engineer	Ann Arbor	Vice President	L4 (P4)	210	219	228	238	248
Lydia Bradley	Geologist	Grand Rapids	Engineer / Scientist / Specialist I	L1 (P1)	90	94	98	102	107
Nathan Brandner**	Senior Geologist	Grand Rapids	Engineer / Scientist / Specialist III	L4 (P4)	165	172	179	187	195
Alan Braspenninx	Senior Geoscientist	Grand Rapids	Engineer / Scientist / Specialist II	L3 (T3)	115	120	125	130	136
William Brodovich	Senior Ecologist	Ann Arbor	Engineer / Scientist / Specialist II	L3 (P3)	135	141	147	153	160
Randy Christensen*	Senior Civil Engineer	Ann Arbor	Engineer / Scientist / Specialist IV	L4 (P4)	180	188	196	204	213
Matthew Comben	Senior GIS Specialist	Ann Arbor	Engineer / Scientist / Specialist II	L2 (P2)	130	136	142	148	154

Name	Position[2]	Location	Classification[2]	Level	Billing Rate[1] (dollars)				
					2023	2024	2025	2026	2027
William Davidson	Senior Geoscientist	Grand Rapids	Engineer / Scientist / Specialist IV	L4 (P4)	175	182	190	198	206
Andrew Dykstra	Environmental Engineer	Ann Arbor	Engineer / Scientist / Specialist II	L2 (P2)	120	125	130	136	142
Jamie Edelyn**	Senior Environmental Engineer	Grand Rapids	Engineer / Scientist / Specialist III	L4 (P4)	165	172	179	187	195
Michael Ellis**	Senior Environmental Engineer	Ann Arbor	Engineer / Scientist / Specialist III	L3 (P3)	150	156	163	170	177
Kate Fiore	Environmental Engineer	Grand Rapids	Engineer / Scientist / Specialist I	L1 (P1)	110	115	120	125	130
Karen Hathaway**	Senior Toxicologist	Grand Rapids	Engineer / Scientist / Specialist IV	L3 (P3)	175	182	190	198	206
Craig Held	Senior Environmental Consultant	Ann Arbor	Consultant / Advisor	L4 (P4)	215	224	233	243	253
David Hibbs	Senior Civil Engineer	Ann Arbor	Engineer / Scientist / Specialist IV	L4 (P4)	190	198	206	215	224
Peter Hinck	Senior Water Resources Engineer	Grand Rapids	Engineer / Scientist / Specialist III	L3 (P3)	165	172	179	187	195
Christene Jones**	Senior Environmental Scientist	Ann Arbor	Engineer / Scientist / Specialist IV	L4 (P4)	190	198	206	215	224
Jeffery King	Senior Consultant	Grand Rapids	Consultant / Advisor	L4 (P4)	275	286	298	310	323
Brian Kwiatkoski	Senior Environmental Data Management Technician	Ann Arbor	Technician II	L1 (T2)	110	115	120	125	130
Kathleen Lindstrom**	Senior Environmental Engineer	Ann Arbor	Engineer / Scientist / Specialist IV	L4 (P4)	175	182	190	198	206
Colleen Long	Senior GIS Specialist	Grand Rapids	Engineer / Scientist / Specialist I	L2 (P2)	115	120	125	130	136
Matthew MacGregor	Senior Environmental Consultant	Grand Rapids	Consultant / Advisor	L4 (P4)	225	234	244	254	265
Luke Mackewich**	Senior Environmental Engineer	Ann Arbor	Engineer / Scientist / Specialist II	L3 (P3)	140	146	152	159	166
Alison McClear	Environmental Scientist	Ann Arbor	Engineer / Scientist / Specialist I	L1 (P1)	95	99	103	108	113

Name	Position[2]	Location	Classification[2]	Level	Billing Rate[1] (dollars)				
					2023	2024	2025	2026	2027
Charlene McGue**	Vice President, Senior Environmental Consultant	Grand Rapids	Vice President	L4 (P4)	200	208	217	226	236
Christopher Miron**	Vice President, Senior Chemical Engineer	Grand Rapids	Vice President	L4 (P4)	210	219	228	238	248
Ethan Morris	Environmental Scientist	Grand Rapids	Engineer / Scientist / Specialist I	L1 (P1)	100	104	109	114	119
Laurie Beth Nederveld	Senior Ecologist	Ann Arbor	Engineer / Scientist / Specialist III	L3 (P3)	155	162	169	176	184
Molly O'Brien**	Senior Environmental Consultant	Grand Rapids	Engineer / Scientist / Specialist III	L3 (P3)	155	162	169	176	184
Terri Olson	Senior Data Quality Specialist	Minneapolis	Engineer / Scientist / Specialist III	L3 (P3)	160	167	174	181	189
Wei-Shyuan Peng	Senior Groundwater Hydrologist	Grand Rapids	Engineer / Scientist / Specialist I	L2 (P2)	110	115	120	125	130
Dana Pasi	Senior Environmental Scientist	Minneapolis	Engineer / Scientist / Specialist III	L3 (P3)	145	151	158	165	172
Virginia Pennala	Senior Ecologist	Grand Rapids	Engineer / Scientist / Specialist III	L3 (P3)	145	151	158	165	172
Richard Phelps	Senior Environmental Data Management Specialist	Grand Rapids	Engineer / Scientist / Specialist II	L2 (P2)	120	125	130	136	142
Randall Phillips	Senior Ecologist	Grand Rapids	Engineer / Scientist / Specialist III	L3 (P3)	170	177	185	193	201
Jacquelyn Plowman	Geologist	Ann Arbor	Engineer / Scientist / Specialist I	L1 (P1)	105	110	115	120	125
Michael Potter	Senior Geoscientist	Grand Rapids	Engineer / Scientist / Specialist II	L3 (T3)	125	130	136	142	148
Allen Prince**	Environmental Engineer	Grand Rapids	Engineer / Scientist / Specialist II	L2 (P2)	125	130	136	142	148
Jose Ramirez	Field Technician	Grand Rapids	Technician I	L1 (T1)	50	52	55	58	61
Sara Ramsden**	Senior Environmental Engineer	Minneapolis	Vice President	L4 (P4)	200	208	217	226	236
Allen Reilly**	Senior Environmental Scientist	Grand Rapids	Consultant / Advisor	L4 (P4)	240	250	260	271	282

Name	Position[2]	Location	Classification[2]	Level	Billing Rate[1] (dollars)				
					2023	2024	2025	2026	2027
Don Richard**	Senior Civil Engineer	Minneapolis	Vice President	L4 (P4)	235	245	255	266	277
Tiffany Roy	Geologist	Grand Rapids	Engineer / Scientist / Specialist I	L2 (P2)	115	120	125	130	136
Amir Safi	Water Resources Engineer	Ann Arbor	Engineer / Scientist / Specialist III	L3 (P3)	155	162	169	176	184
James Sallee	Senior Regulatory Specialist	Ann Arbor	Engineer / Scientist / Specialist III	L3 (P3)	160	167	174	181	189
Sierra Samie	Environmental Engineer	Ann Arbor	Engineer / Scientist / Specialist I	L1 (P1)	110	115	120	125	130
Ryan Schipper**	Senior Water/Wastewater Engineer	Minneapolis	Engineer / Scientist / Specialist IV	L4 (P4)	185	193	201	210	219
Anne Schumacher**	Senior Geologist	Grand Rapids	Engineer / Scientist / Specialist II	L3 (P3)	130	136	142	148	154
Matthew Stone-Palmquist	Senior Landscape Architect/Senior Ecologist	Ann Arbor	Engineer / Scientist / Specialist IV	L4 (P4)	180	188	196	204	213
Isaac TerMolen	Environmental Field Technician	Grand Rapids	Technician I	L1 (T1)	75	78	82	86	90
Fran Thompson	Ecologist	Ann Arbor	Engineer / Scientist / Specialist II	L2 (P2)	120	125	130	136	142
Scott Venman**	Environmental Engineer	Ann Arbor	Engineer / Scientist / Specialist III	L3 (P3)	145	151	158	165	172
John Vigna	Senior Environmental Scientist	Grand Rapids	Engineer / Scientist / Specialist IV	L4 (P4)	180	188	196	204	213
Kate Watson	Senior Environmental Engineer	Grand Rapids	Engineer / Scientist / Specialist III	L3 (P3)	155	162	169	176	184
Ray Wuolo**	Senior Hydrogeologist	Minneapolis	Vice President	L4 (P4)	240	250	260	271	282

** Key Project Personnel

1. Litigation support services rates will include a 20% surcharge.
2. The employee's Position and Classification are based on current 2023 staff experience and skillsets. If staff are promoted over the course of this contract, their Position and Classification will change with an accompanying increase in their billing rate.

CLASSIFICATION, LEVEL AND BILLING RATE RANGE INFORMATION FOR NEW EMPLOYEES
PROFESSIONAL SERVICES – 2023 ENVIRONMENTAL ISID

Firm Name: **Barr Engineering Co.**

Barr has many open positions for new hires. We anticipate hiring new staff in 2023 and beyond. For new employees, their Classification and Level will dictate their billing rate range. We anticipate an approximate 4% increase to the billing rate ranges in years subsequent to 2023.

Classification	Level	Billing Rate Range – 2023
Vice President	L4 (P4)	$170–315
Consultant/Advisor	L4 (P4)	$205–300
Engineer/Scientist/Specialist IV	L4 (P4)	$175–200
Engineer/Scientist/Specialist III	L3 (P3)	$145–170
Engineer/Scientist/Specialist II	L2 (P2)	$120–140
Engineer/Scientist/Specialist I	L1 (P1)	$80–115
Technician IV	L3 (T3)	$155–200
Technician III	L3 (T3)	$125–150
Technician II	L2 (T2)	$95–120
Technician I	L1 (T1)	$70–90

Attachment A: Primary questionnaire

Questionnaire for Professional Environmental Consulting Services
Department of Technology, Management and Budget
2023 Indefinite-Service Indefinite-Delivery
Expanded Environmental Remediation Services

PRIMARY QUESTIONNAIRE – PART I

INSTRUCTIONS: This questionnaire aims to collect information regarding the Professonals general capability to provide the type of work requested in this RFP. Specialized technology specific information should be provided in the 'specialized technologies questionnaire' a sample of which is provided in Attachment IV. Professionals shall complete the following required information in the fillable form provided. A separate sheet may be used if additional space is needed. The Article number(s) relating to the additional information must be included on the separate sheet, if used. Professionals are to ensure all questions are answered completely and concisely to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.
Business Organization Address: 4300 MarketPointe Drive, Suite 200, Minneapolis, MN 55435
Telephone and Fax: 734-922-4400 Fax: 734-922-4401
Website and E-mail: barr.com; askbarr@barr.com
ISID Contract Contact Person Name & E-Mail:: Tom Boom; tboom@barr.com
Professional(s) SIGMA Vendor ID number(s):: VS0109084

If Applicable, state the branch office(s), partnering organization or other subordinate element(s) that will perform, or assist in performing, the work: The work will primarily be performed out of Barr's Ann Arbor (3005 Boardwalk Street, Suite 100, Ann Arbor, MI, 48108) and Grand Rapids (3033 Orchard Vista Drive SE, Suite 200, Grand Rapids, MI, 49546), Michigan, offices.

1.2 Check the appropriate operation status:
☐ Individual ☐ Association ☐ Partnership ☒ Corporation, or ☐ Combination – Explain: _____

1.3 If operating as a corporation, include the state of incorporation (Minnesota) and the date of incorporation (May 26, 1966).

1.4 Include a brief description of Professional's business history: Please see page 3 of Barr's proposal, under the "General information and project team" heading.

1.5 Professional(s) federal I.D. number: 41-0905995

ARTICLE 2: PRIOR EXPERIENCE

2.1 Identify the project types and professional services for which your firm is exceptionally qualified and experienced.
- ☒ Excavation, Dewatering and Off-Site Disposal
- ☐ Demolition
- ☒ Migration Control, Fluid Removal, and Containment

- ☒ Landfills
- ☒ Indoor Air/Vapor Intrusion
- ☒ In-Situ Physical/Chemical Treatment
- ☒ In-Site Physical/Biological Treatment
- ☒ Ex-Situ Physical Chemical Treatment
- ☐ Ex-Situ Physical/Biological Treatment
- ☐ In-Situ and Ex-Situ Thermal Treatment
- ☒ Per-and Polyfluoroalkyl Substances (PFAS) Treatment
- ☒ Alternative Technologies/Post Remediation Strategies

2.2 Provide client references and brief descriptions for at least three (3) projects in the last five years closely related to the work requested in this RFP. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided RI/FS services

Project 1 Reference Information:

Project Name: Investigation, feasibility study, remedial design, and implementation oversight at former a MGP site (project 1 in the technical proposal)
Key Personnels: Tom Boom, Mike Ellis, Katy Lindstrom, Luke Mackewich, Molly O'Brien, Chris Jones, Scott Venman, Don Richard
Project Address: Confidential
Project City/State/Zip: Flint, MI
Owner/Client Contact Name and Telephone #: Consumers Energy/Andrew Santini, 517-788-0174
Project 1 Description: See page 11 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Environmental assessments, response actions, and PFAS, VOC, and VI investigations for a manufacturing client (project 2 in the technical proposal)
Key Personnels: Anne Schumacher, Allen Prince, Jamie Edelyn, Chris Miron, Mike Ellis
Project Address: 210 N. Industrial Park Drive
Project City/State/Zip: Hastings, MI, 49058
Owner/Client Contact Name and Telephone #: The Viking Corporation/Stan St. John, 860-983-8967
Project 2 Description: See page 14 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Site closure, investigation, risk assessment, and remedial action at a former leather tannery (project 3 in the technical proposal)
Key Personnels: Jamie Edelyn, Karen Hathaway, Chris Miron
Project Address: 900 South Lake Street
Project City/State/Zip: Whitehall, MI, 49461
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 16 of Barr's technical proposal

2.3 A sample of field activity logs detailing a 1-week period (from one of the three (3) prior experience sites) and a weekly report provided? ☒Yes ☐No
Please see Attachment E, which includes field logs anonymized from one of the referenced prior experience sites. These logs were customized for implementation of sediment remediation at a former manufactured gas plant (information that has been changed is italicized), and field logs can be customized for any site.

ARTICLE 3: ENVIRONMENTAL EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas:

3.1 Remedial Investigations: Barr has conducted hundreds of comprehensive remedial investigations (RIs) on a wide variety of sites including sites being considered for redevelopment. Barr's approach to completing remedial investigations is to, when feasible, use a phased approach to minimize the expense and maximize the usefulness of the information collected. Barr has experienced field staff that have completed investigations using a wide variety of equipment and techniques, including various drilling methods; soil, groundwater, surface water, soil gas, indoor air, pore water, and sediment sampling; various downhole instrumentation; hydrogeological testing (e.g., slug testing, pump testing); and many more. Barr's experience with a wide variety of investigation equipment and methods allows us to consider all potential investigation techniques when scoping RIs and select the investigation methods best suited for the project. We also stress strong communication between Barr and our clients during RIs to keep our clients informed of preliminary findings and adjust the scope of RI activities if needed.

Barr also has capabilities to manage and evaluate data from RIs, so we can provide our clients with a summary of how RI results impact the site conceptual model and our remedial approach. These capabilities include 3D geological and contamination modeling, groundwater modeling, data management, and statistical analyses.

3.2 Sampling and Laboratory Analysis: Numerous staff members in each office are trained and experienced in a variety of sampling techniques, and many are certified to sample potentially dangerous or hazardous wastes (e.g., per- and polyfluoroalkyl substances (PFAS), volatile organic compounds, polychlorinated biphenyls [PCBs]). Barr maintains a comprehensive set of internal sampling standard operating procedures and regularly trains staff on these as well as the American Society for Testing and Materials (ASTM) and state and federal sampling procedures.

Our data quality group reviews individual lab reports and works directly with analytical laboratories to understand details such as bias flags or quality control omissions as well as methodology choices. They maintain Barr's environmental database housing analytical and associated data for Barr's multitude of client sites.This database is maintained and customized for the needs of each specific project and site.

We have experienced data quality staff that interact with analytical laboratories to verify that laboratory analysis is completed in accordance with project specifications. If issues arise at the laboratory regarding the sample media or prescribed procedures, our dedicated data quality staff are experienced with working through those issues with the laboratory and collaborating to find a way to complete the analyses while still meeting the project objectives.

3.3 Feasibility Studies: Barr has completed numerous feasibility studies (FSs) to evaluate remedial action alternatives using criteria such as cost, effectiveness, constructability, and regulatory acceptance to identify the remedial approach best suited for the site. Barr's familiarity with a variety of remedial technologies allows us to consider a wide variety of technologies during technology screening assessments and FSs and results in identification of the remediation technology best suited for the project over simply selecting a commonly used technology. We are accustomed to working with our clients to clarify their objectives for an FS and right-sizing the FS to the project's needs. For example, a more robust FS may be needed for a complex site with a lot of investigation data, but a more straightforward FS may be more suitable for a smaller site that has limited investigation data. We are intimately familiar with advancing an FS to a response action plan (RAP) and developing a preliminary design for regulatory review.

3.4 Site Closure: Barr has achieved site closure at multiple sites by receiving a No Further Action (NFA) determination from EGLE. We know how site closure requires consideration of all relevant pathways and how to adequately evaluate and remediate those pathways to achieve closure. Additionally, Barr has experience developing post-closure plans and implementing those plans to meet the requirements of an NFA determination.

3.5 Health and Safety: Barr develops project health and safety plans (PHASPs) for all sites with environmental impacts and uses PHASPs to provide guidelines, requirements, and procedures to protect the health and safety of on-site employees and subcontractors. Barr prepares PHASPs for on-site investigations, remedial action construction, or other field activities related to contamination. Barr's field staff are required to review a PHASP prior to fieldwork and complete daily field-level hazard assessments that are specific to the tasks they are performing on site that day. Our health and safety culture is something we're very committed to upholding. Please see the "Special Factors" section for more information on our safety record. Additionally, our field staff are encouraged to use their stop work authority if they believe any task they are performing is unsafe and use our health and safety resources to reevaluate the work and develop appropriate hazard mitigation measures.

3.6 UST Removal and Closure: Barr has assisted a wide variety of clients with UST and AST projects, from evaluating surprise orphan tanks to conducting site assessment and closure for a tank farm, and we can provide a suite of assessment and remediation services under Part 213. Our role in these projects typically involves assisting the client with project coordination, providing contractor oversight during the removal, conducting environmental assessment and documentation activities, regulatory reporting, and material management assistance. If contamination is encountered, Barr can provide site investigation and remediation support, including the development of conceptual site models and risk-based corrective action.

3.7 Quality Assurance/Quality Control: Barr's corporate structure and philosophy are consistent with many of the principles that have emerged from the quality movement. Self-managed teams, investments in training and education, a flat organizational structure, and employee trust have always been part of how we've done business for more than 50 years. These features allow us to meet client needs flexibly and dependably. Because our business philosophy emphasizes "doing whatever it takes" to meet our commitments to clients, our quality management program places more emphasis on achievement of the end result than on instructions for performing specific activities. Flexibility in our procedures is important because the details of how we deliver our services to our major clients may differ significantly. Our quality assurance program, therefore, includes a mixture of ongoing project oversight, quantitative and qualitative measures, and supporting activities that enhance our ability to consistently meet technical, cost, and scheduling requirements. Barr is experienced with developing project-specific Quality Assurance/Quality Control (QA/QC) plans. These plans can be for the entire project or focused on specific aspects of remediation (e.g., a QA/QC plan for excavation verification sampling).

Barr has developed a prototype quality management plan (QMP) that has been used since 1996 to develop project-specific quality management plans for clients that request them. Barr's QMPs are based on the ISO 9001 international standard for quality systems. QMPs are prepared for specific contracts or projects based on a standard format and prototype that reflect company-wide quality systems and are tailored to the specific needs of the project work. Each plan provides a documented standard for project quality and a mechanism for evaluating it. Included in the QMP are steps for planning, review, verification, and validation of performance on individual projects, as well as periodic evaluation of the overall quality system. The project quality system includes both routine inspection and checks of data and design, as well as project quality reviews at regular pre-determined intervals.

ARTICLE 4: REGULATORY KNOWLEDGE

Include a brief description of your firm's professional experience in each of the following:

4.1 Michigan environmental statutes related to remedial investigation/action: Barr's staff collectively have hundreds of years of experience working within Michigan's environmental regulations. Several of us were already working in the environmental field when the Natural Resources and Environmental Protection Act of 1994 was promulgated, meaning we've been working with those statutes since they were implemented. Our staff members have also served on Part 201 committees. A majority of the sites our project teams work on are regulated by either Part 31, Part 115, Part 201, and/or Part 213, so we regularly evaluate site data in the context of this regulatory framework—with an eye toward resolving issues and moving toward a regulatory endpoint. In addition, we have had success working with EGLE to achieve No Further Action status for a wide range of sites.

4.2 Federal regulations and environmental statutes related to remedial investigation/action: Barr's regulatory expertise covers a wide range of federal statutes that our scientists and engineers work with on a daily basis. Barr has worked on Resource Conservation Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund) sites since the 1980s. We're still working on some of these sites today, demonstrating our long-term relationships with our clients. This includes several sites in Michigan.

CERCLA authorizes the EPA to clean up contaminated sites and recover the costs from PRPs or to order them to clean up the sites themselves. CERCLA liability is "joint and several," which means that any party involved in contaminating a site can be held solely responsible, leaving it up to that party to find the other PRPs to share the costs. These cleanups are typically very costly, and Barr's team has helped clients successfully pursue cost-recovery actions from other PRPs.

Within CERCLA and the Clean Water Act, a natural resource damage assessment (NRDA) is the process by which federal, state, and tribal governments assess injury to natural resources due to the release of hazardous substances and obtain compensation for the public. We have helped clients conduct pre-assessments of the resources, evaluate environmental impacts, assess and clean up contaminated sites, and develop and implement mitigation plans.

Some examples of our work include:

- We recently completed a polychlorinated biphenyls (PCB) cleanup in Michigan working with the EPA under the Toxic Substances Control Act (TSCA) to perform a self-implementing cleanup and disposal. This project was completed within the allotted schedule and budget.

- Barr conducted a baseline risk assessment following EPA guidance for a Superfund site in Michigan. We identified exposed populations, isolated the chemicals of concern in soil and groundwater, and quantified potential on- and off-site risks. EPA risk managers used that information to evaluate the need for remediation, which included excavation and landfilling of wastes and treatment of groundwater. The site can now be redeveloped with some restrictions on groundwater use, protection of the remediation system, and continued management of contaminated materials.

- At a CERCLA project in Michigan, we implemented a time-critical removal action; conducted geophysical, geological, hydrologic, and hydrogeological investigations; and completed turn-key remediation. While concurrently investigating the site, Barr installed a removal-action system consisting of interim groundwater collection, treatment, and off-site disposal. Our deep knowledge of federal statutes and collaboration with the EPA were key to successfully completing this work under a tight deadline.

ARTICLE 5: PERSONNEL STAFFING

5.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project provided? ☒Yes ☐No

5.2 Complete the following information regarding the personnel your firm considers key to the successful completion of the study or project scope of work:

Key Personnel 1
Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3
Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4
Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5
Name: Michael Ellis, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Environmental Engineering, Michigan State University, 2011; BS, Civil Engineering (Environmental Concentration), Michigan State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6
Name: Christene Jones Job Title: Senior Environmental Scientist
Labor Classification: L4 (P4) College Degree(s): Resource Development, Michigan State University, 1993
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

5.3 Do the Professional Project Managers (PM) have at least three years experience as a PM? ☒Yes ☐No

5.4 Do the Professional PMs have a minimum of 10 years experience with similar projects? ☒Yes ☐No

5.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 6: SUB-CONSULTANTS/SUBCONTRACTORS

Section not applicable.

ARTICLE 7: SPECIAL FACTORS

Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. (As examples: any awards or recognition received by the firm or individuals for similar work, special approaches or concepts developed by the firm appropriate to this project, financial capacity, etc. Respondents may say anything they wish in support of their qualifications).

We believe that Barr is well qualified to support the State of Michigan for the following reasons:

Our collaborative consulting model results in excellent client service.
An important element of our client service program is our Client Account Relationship Evaluation (CARE) interviews. Feedback obtained during the CARE interviews is crucial to our continuous improvement, and the information received is shared with our project team for immediate action. Barr also regularly captures qualitative client feedback and testimonials. Here are a few representative statements of appreciation from our clients.

- "Usually, I rewrite the entire report we get from consultants. I only had a few comments and would normally have a lot on reports like this. Much better than the usual we get from consultants." — Comments from an industrial client on a report prepared by Barr
- "GREAT WORK, by the way, by you and your team. This really benefits our client because you bring credibility to the table. Feel free to use us as a reference if you end up proposing work of this nature in the future!" – Comments from a nationally known attorney on a confidential Barr project
- "Barr is a top-tier consultant and can provide a very high quality of work product. We go with Barr even when we don't need the highest quality because Barr is able to right size your level of effort based on project needs." – Industrial client for whom we work on multiple long-term environmental projects
- One client in the mining industry observed that our safety program is "top-notch" and asked, "How can I get my other consultants to do the same thing?"

Our creative approaches and use of cutting-edge technology results in efficiency and cost savings.

- Our use of 3D geological and environmental impact modeling software informs remedial investigations, supports feasibility studies, and supports communications with stakeholders.
- Barr has developed a core team of data experts to manage environmental data in a highly-customizable database allowing for accurate retention and dissemination of data in a multitude of formats and compared to applicable screening levels, criteria, or a variety of other comparisons.
- We have a team of chemists and analytical experts that have long-term experience in analytical testing, reporting, and quality control who review analytical reports, as appropriate, to understand potential concerns with the way analytical methods are chosen or completed and how reported data may need to be qualified. This team often works directly with the analytical laboratory to resolve concerns with the data.
- Barr's experience in conducting community-wide vapor intrusion screening, sampling, and mitigation has allowed us to develop innovative techniques to work with homeowners and other property stakeholders to minimize intrusive sampling and contact with property owners while collecting the necessary data to inform project needs.
- Our long-term experience working with risk-based corrective action has provided a wealth of experience to creatively approach human health and ecological risks at sites to achieve cost-effective solutions while remaining protective of future property users.

Broad participation at industry groups and conferences and with the EGLE means we're at the forefront of advancements in our professions.

- Our staff members have presented "Groundwater Modeling for Non-Modelers" as part of the EGLE's Remediation and Risk Management webinar series in 2022 and will again in 2023.
- Barr staff members have repeatedly served as EGLE trainers, including providing Groundwater Modeling Technical and Program Support Team training in 2014 and planned groundwater modeling training for 2023.
- Our staff members have presented at the Michigan Section of the American Institute of Professional Geologist's (AIPG's) annual environmental risk management workshops each year since 2013.
- Barr staff members have presented at numerous EGLE conferences including the PFAS Summit, the Michigan Environmental Compliance Conference, and previous remediation conferences.
- Our staff members are members of the Interstate Technology Regulatory Council (ITRC) Sediment Capping team and Microplastics teams.
- A Barr employee is on the ASTM Phase 1 committee, meaning that Barr is in front of changes to the standard.

Low turnover rate and deep bench means we have experienced staff available to complete projects efficiently.

- Barr has had exceptional staff retention, lower than the industry average, through the “Great Resignation.” Because Barr's turnover rate is about four times lower than the industry average, we can offer our clients project teams that will start the project and finish it—providing stability, continuity, and the benefits of accrued knowledge.
- In addition to the staff in our Michigan offices, Barr has a deep bench of environmental experts located in our other offices available to the State of Michigan when needed.
- We have 117 Michigan-licensed professional engineers company-wide.
- Our key staff members included in this proposal have been working under Part 201 (and before that Act 307) for the majority of their careers.

Excellent safety record demonstrates that our employees are trained, prepared, equipped, and supported to meet and exceed our clients’ health and safety objectives.

- Barr achieved zero OSHA-recordable injuries in 2022.
- Our safety record has been recognized multiple times for its safety excellence by the Minnesota Safety Council, the North Dakota Safety Council, and the Utah Safety Council.
- The following table includes our safety statistics for the past three years.

Year	Average number of employees	Exposure or employee hours*	Number of recordable cases	Incident rate of recordable cases	Number of lost workday cases	Incidence rate of lost workday cases	Number of lost workdays	Lost workday rate	EMR	Number of fatalities
2022	925	1,624,081	0	0.00	0	0.00	0	0.00	0.67	0
2021	880	1,519,245	0	0.00	0	0.00	0	0.00	0.70	0
2020	852	1,469,185	1	0.14	0	0.00	0	0.00	0.72	0

Attachment B: Specialized technologies questionnaires and experience summary forms

Specialized Technologies Questionnaire
for Professional Environmental Consulting Services
Department of Technology, Management and Budget
2023 Indefinite-Scope Indefinite-Delivery – Expanded Environmental Remediation Services

Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Excavation, Dewatering Off-Site Disposal

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Investigation, feasibility study, remedial design, and implementation oversight at former a MGP site (project 1 in the technical proposal)
Key Personnels: Tom Boom, Mike Ellis, Katy Lindstrom, Luke Mackewich, Terri Olson, Molly O'Brien, Chris Jones, Scott Venman
Project Address: Confidential
Project City/State/Zip: Flint, MI
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 1 Description: See page 11 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Site closure, investigation, risk assessment, and remedial action at a former leather tannery (project 3 in the technical proposal)
Key Personnels: Jamie Edelyn, Karen Hathaway, Chris Miron
Project Address: 900 South Lake Street
Project City/State/Zip: Whitehall, MI, 49461
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 16 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Phased excavations, pathway mitigations, and site closure at former industrial site (project 4 in the technical proposal)
Key Personnels: Chris Jones, Tom Boom, Mike Ellis
Project Address: 216 N. Eaton Street
Project City/State/Zip: Albion, MI, 49224
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 3 Description: See page 17 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Barr has extensive experience related to the remedial design of projects that use excavation, dewatering, and off-site disposal technologies. In the last 10 years, Barr has served as the design engineer on multiple manufactured gas plant (MGP) sites that have required excavation, dewatering, and off-site disposal as part of the overall remedial approach. Most of these MGPs were situated adjacent to rivers, and excavation activities occurred near or within the rivers (i.e., dredging), meaning the work generated saturated material that required dewatering to facilitate off-site disposal. Barr's remedial design experience includes developing remedial excavation extents based on site investigation data, including using results from 3D soil and contaminant models that Barr developed using observations from site investigations, and creating plans and specifications. We have experience designing excavations to mitigate impacts to existing infrastructure and, when necessary, developing measures (e.g., temporary sheet piling, retaining walls, phased excavations) that allow for the removal of targeted material adjacent to existing infrastructure. Barr also has experience developing 3D dredge prisms for in-water removal activities.

Many of the remedial excavations and dredge prisms we have designed included the removal of saturated material, and, in those instances, Barr designed measures to stabilize material for off-site disposal and manage decant water generated from dewatering saturated materials. Our experience includes developing plans and performance standards for temporary on-site treatment systems required to treat decant water, performing bench testing of stabilization materials, and specifying material management requirements.

3.2 Construction Oversight: Barr performs construction oversight, and acts as the owner's on-site engineer, for a vast majority of projects where we serve as the lead design engineer. Our experience includes verification sampling, directing excavation activities to remove additional source material, collaborating with contractors and performing construction engineering to remedy issues that come up during implementation, reviewing construction submittals from the implementing contractor, verification sampling of backfill materials, inspection and sampling of on-site treatment systems, coordinating public communications and outreach, implementing automated total station surveying systems to assess the movement of nearby infrastructure during construction, implementing air quality and noise monitoring plans to assess potential impacts from construction to surrounding public spaces, conducting and tracking various construction quality assurance testing, and coordinating restoration activities.

3.3 Remedial O&M: Barr's remedial O&M experience on excavation, dewatering, and off-site disposal projects mainly involves O&M performed during implementation as described in the construction oversight experience. Other O&M experience related to this technology includes periodically inspecting caps/protective covers and vegetation from restoration efforts.

3.4 Site Closure: Barr has implemented excavation, dewatering, and off-site disposal to achieve site closure at a number of sites in Michigan. An example of how this technology was used to achieve site closure is included in the *Phased excavations, pathway mitigations, and site closure* project example. In this project example, targeted excavations of upland source areas were performed along with remediation of river sediments to support pursuance of a No Further Action (NFA) determination. Source removal resulted in the mitigation of downgradient groundwater impacts and a stable groundwater plume. A plume stability analysis was combined with evaluations and mitigation measures of applicable pathways (e.g., direct contact, vapor intrusion) in the NFA report. The NFA was submitted to the Michigan Department of Environmental Quality (MDEQ) and was approved in 2015.

3.5 Soil Erosion and Sedimentation Control: Barr understands that soil erosion and sedimentation control is an important aspect of any project that involves earth disturbance activities. We have completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. We also have a number of Michigan staff that hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, which gives Barr the flexibility to use our own staff to perform periodic inspections of the soil erosion and sedimentation controls that are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Michael Ellis, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Environmental Engineering, Michigan State University, 2011; BS, Civil Engineering (Environmental Concentration), Michigan State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Molly O'Brien Job Title: Senior Environmental Consultant
Labor Classification: L3 (P3) College Degree(s): BS, Geological Engineering, Michigan Technological University, 2000
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Scott Venman Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): BSE, Chemical Engineering, University of Michigan, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 8

Name: Karen Hathaway Job Title: Senior Toxicologist
Labor Classification: L3 (P3) College Degree(s): MS, Environmental Toxicology, University of Wisconsin–Madison, 1990; BA, Biology, Kalamazoo College, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☒No–Completed 40-hour; pending 8-hour refresher.

Key Personnel 9

Name: Christene Jones Job Title: Senior Environmental Scientist
Labor Classification: L4 (P4) College Degree(s): BS, Resource Development, Michigan State University, 1993
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 10

Name: Luke Mackewich, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Civil Engineering, Wayne State University, 2011

BS, Civil Engineering, Wayne State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 11

Name: Randy Christensen, PE Job Title: Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Civil Engineering, Wayne State University, 1998
BS, Environmental Engineering, Michigan Technological University, 1992
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 12

Name: Don Richard, PE Job Title: Vice President, Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): PhD, Civil Engineering, University of Minnesota, 2004; MS, Civil Engineering, University of Wyoming, 1988; BS, Civil Engineering, University of Wyoming, 1986
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☒No–Completed 40-hour; pending 8-hour refresher.

Key Personnel 13

Name: Brian Angerman, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Environmental Engineering, University of Iowa, 1998
BS, Environmental Engineering, Michigan Technological University, 1996
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS

Section not applicable.

ARTICLE 6: SPECIAL FACTORS

Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.

Barr's Michigan staff includes geotechnical and structural engineers that can support the implementation of soil retention or structure stabilization methods needed to perform excavation activities adjacent to existing infrastructure. Our experience has been that the need to perform remedial excavations adjacent to existing infrastructure is common in environmental remediation projects, so having local geotechnical and structural engineering expertise has allowed Barr to advance remedial excavation designs in a timely manner even when adjacent infrastructure complicates the project.

Additionally, this expertise means Barr staff are familiar with real-time remote monitoring systems that can be used to evaluate potential impacts on infrastructure during implementation. We have experience calibrating, installing, monitoring, and maintaining instruments such as inclinometers, tilt meters, vibrating wire piezometers, survey prisms, and seismographs. This experience allows us to implement different types of monitoring equipment, depending on the project's needs, and conduct real-time remote monitoring of the instruments during construction so that we can quickly react to signs that construction is impacting existing infrastructure.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Excavation, Dewatering & Off-Site Disposal*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ Excavation ☒ Dewatering ☒ On-Site Treatment of Water ☒ Backfilling w/ Asphalt Cover

☒ Backfilling w/ Concrete Cover ☐ Backfilling w/ Permeable Pavement Cover ☒ Applied Treatment Train

☒ Sheet Piling / Soil Retention ☒ Stabilization ☒ Storm Water Management

☒ Sediment Removal

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	12+	12	0
Construction Oversight	12+	12	0
O & M	12+	12	0
Closed	3+	3	0
Used Treatment Train	2+	2	0
2. Range of cost per project (x$1,000)[1]:			
Design Phase	$10–2,100	$10–2,100	$0–290
Construction Phase	$20–2,400	$20–2,400	$0–460
O & M Phase	$0–7	$0–7	$0–12
Total Project Cost	$30–4,507	$30–4,507	$0–762
3. Number of the above projects that were[1]:			
Below Budget	3	3	3
On Budget	9	9	9
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	6+	6	0
Licensed Civil Engineers	5+	5	0
Licensed Chemical Engineers	2+	2	0
Geologists	7+	7	0
Hydrogeologists	2+	2	0
Licensed Surveyors	0+	0	0
Licensed Electrical Engineers	1+	1	0
Licensed Mechanical Engineers	3+	3	0
Environmental Science	4+	4	0
Biologists	0+	0	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

Specialized Technologies Questionnaire
for Professional Environmental Consulting Services
Department of Technology, Management and Budget
2023 Indefinite-Scope Indefinite-Delivery – Expanded Environmental Remediation Services

Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Migration Control Containment

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Investigation, feasibility study, remedial design, and implementation oversight at former a MGP site (project 1 in technical proposal)
Key Personnels: Tom Boom, Mike Ellis, Katy Lindstrom, Luke Mackewich, Terri Olson, Molly O'Brien, Chris Jones, Scott Venman
Project Address: Confidential
Project City/State/Zip: Flint, MI
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 1 Description: See page 11 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Site closure, investigation, risk assessment, and remedial action at former leather tannery (project 3 in the technical proposal)
Key Personnels: Jamie Edelyn, Karen Hathaway, Chris Miron
Project Address: 900 South Lake Street
Project City/State/Zip: Whitehall, MI, 49461
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 16 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Feasibility evaluation, pilot test, and design of groundwater treatment system (project 5 in the technical proposal)
Key Personnels: Don Richard, Allen Reilly, Allen Prince
Project Address: western Michigan
Project City/State/Zip: western Michigan
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 3 Description: See page 18 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Barr has experience designing a variety of migration control and containment measures including slurry walls, sheet pile walls, sediment caps, constructed treatment wetlands, groundwater pump and treat systems, soil vapor extraction systems, dual-phase extraction systems, and low-permeability caps. Our remedial design process can be tailored to meet the project needs but generally entails beginning with a screening of applicable technologies followed by a more detailed evaluation of feasible technologies. Barr's experience with a variety of migration control and containment measures allows us to consider all relevant technologies during the technology screening phase of the design. This helps ensure the technology selected is tailored to the project's needs, rather than defaulting to a technology that is commonly used or is most familiar to the design engineer.

3.2 Construction Oversight: Barr typically acts as the owner's engineer/on-site representative during the implementation of migration control and containment measures and has overseen the implementation of slurry walls, sheet pile walls, sediment caps, constructed treatment wetlands, groundwater pump and treat systems, soil vapor extraction systems, dual-phase extraction systems, and low-permeability caps. Barr's field staff are experienced with managing contractors, conducting quality assurance testing, documenting implementation procedures, and coordinating with the design team to remedy discrepancies or issues that occur during implementation.

3.3 Remedial O&M: Barr's experience includes long-term operation and maintenance on a majority of the migration control and containment measures where Barr served as the lead design engineer for soil vapor extraction systems, constructed treatment wetlands, sediment caps, low-permeability caps, and groundwater pump and treat systems.

3.4 Site Closure: Many of the migration control and containment measures Barr has implemented require long-term O&M due to the nature of the treatment technology; however, our experience includes using the initial monitoring data set to show that the treatment technology is operating as designed so that a more limited monitoring and maintenance program can be implemented long-term. This approach has worked well for Barr and our clients and has allowed for reduced monitoring efforts long-term, while still verifying that the treatment technology is functioning as designed.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. Several of our Michigan staff members hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, giving Barr the flexibility to use our own staff to perform periodic inspections of the soil erosion and sedimentation controls that are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Michael Ellis, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Environmental Engineering, Michigan State University, 2011; BS, Civil Engineering (Environmental Concentration), Michigan State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Katy Lindstrom, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Hydrologic Science and Engineering, Colorado School of Mines, 2009; BS, Environmental Engineering, Michigan Technological University, 2006
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Luke Mackewich, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Civil Engineering, Wayne State University, 2011
BS, Civil Engineering, Wayne State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Don Richard, PE Job Title: Vice President, Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): PhD, Civil Engineering, University of Minnesota, 2004; MS, Civil Engineering, University of Wyoming, 1988; BS, Civil Engineering, University of Wyoming, 1986
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☒No–Completed 40-hour; pending 8-hour refresher.

Key Personnel 8

Name: Ryan Schipper, PE Job Title: Vice Water/Wastewater Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Environmental Engineering, Colorado School of Mines, 2014; BS, Civil Engineering, Rose-Hulman Institute of Technology, 2007
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.
Mathematical models can be useful tools for site characterization, remedial design, and containment system optimization. Barr's groundwater modeling team has world-class technical expertise. We have an extraordinarily deep bench of computational hydrogeologists and geologists, all of whom have advanced degrees and work together to solve our clients' complex water problems. When circumstances warrant, Barr's staff can draw on a network of world-renowned experts in academia and government research to deliver cutting-edge solutions to complicated problems. Barr's expertise related to groundwater modeling has been showcased during two webinars hosted by EGLE (Groundwater Modeling for Non-Modelers and Groundwater Modeling for Non-Modelers – Application and Cast Studies) as part of the Remediation and Risk Management webinar series along with numerous other national conferences. Barr's expertise in various groundwater modeling programs, including MODFLOW, can allow for saturated and unsaturated flow modeling, developing local and regional-scale flow models, contaminant transport modeling, hydrogeological evaluations, integrated groundwater/surface water modeling, risk management evaluations for water withdrawals, and more.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Migration Control, Fluid Removal & Containment*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ Slurry Walls ☒ Purge Well Barriers ☒ Sheet Piling ☒ Groundwater Pump and Treat

☒ Dual and Multi-Phase Extraction SVE ☒ Impermeable Capping (e.g., Clay Caps)

☒ Natural Source Zone Depletion (NSZD) ☒ Monitored Neutral Attenuation

☒ Sediment Caps ☒ Constructed Treatment Wetlands

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	7+	7	0
Construction Oversight	5+	5	0
O & M	5+	5	0
Closed	0	0	0
Used Treatment Train	3+	3	0
2. Range of cost per project (x$1,000)[1]:			
Design Phase	$109-2,100	$109–2,100	$0–290
Construction Phase	$51–2,400	$51–2,400	$0–460
O & M Phase	$35–176	$35–176	$0–60
Total Project Cost	$336–4,535	$336–4,535	$0–810
3. Number of the above projects that were[1]:			
Below Budget	2+	2	0
On Budget	5+	5	0
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	6+	6	0
Licensed Civil Engineers	5+	5	0
Licensed Chemical Engineers	4+	4	0
Geologists	7+	7	0
Hydrogeologists	2+	2	0
Licensed Surveyors	0+	0	0
Licensed Electrical Engineers	1+	1	0
Licensed Mechanical Engineers	1+	1	0
Environmental Science	3+	3	0
Biologists	0+	0	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

Specialized Technologies Questionnaire
for Professional Environmental Consulting Services
Department of Technology, Management and Budget
2023 Indefinite-Scope Indefinite-Delivery – Expanded Environmental Remediation Services

Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Landfills

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Remedial action plan for a landfill (project 6 in the technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue
Project Address: 3200 Chamberlain Road
Project City/State/Zip: Niles, MI, 49107
Owner/Client Contact Name and Telephone #: Southeast Berrien County Landfill/Tyler Ganus – General Manager; 269-695-2000
Project 1 Description: See page 19 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Former landfill characterization and feasibility study (project 7 in the technical proposal)
Key Personnels: Scott Venman, Christene Jones, Terri Olson, Diane Biehl, Jamie Edelyn, Katy Lindstrom, Mike Ellis, Jackie Plowman
Project Address: Available on request
Project City/State/Zip: Lansing, MI 48906
Owner/Client Contact Name and Telephone #: Available on request
Project 2 Description: See page 20 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Remedial action planning at two CCR landfills (project 8 in the technical proposal)
Key Personnels: Katy Lindstrom, Tom Boom, Anne Schumacher, Chris Miron, Dana Pasi, Mike Ellis, Jamie Edelyn
Project Address: Confidential
Project City/State/Zip: Confidential
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 3 Description: See page 20 of Barr's proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Barr has extensive experience in remedial design for environmental impacts related to landfills. We design traditional "barrier" cap/covers, evapo-transpiration (ET) covers, natural and synthetic multi-layer liners (single, composite, double-composite), sheet pile and slurry wall cutoffs, groundwater control structures and systems, containment structures, erosion controls, vegetative cover, vapor-collection systems, and drains. Our remedial design process can be tailored to meet the project needs, but generally entails beginning with a screening of applicable technologies followed by a more detailed evaluation of feasible technologies. Barr's experience with a variety of remedial approaches allows us to consider all relevant technologies during the technology screening phase of the design, which helps ensure that the technology selected is tailored to the project's needs.

For example, Barr evaluated multiple technologies for two coal combustion residual landfills in Michigan, narrowing remedial options down to three for each site during the feasibility study phases. Pilot studies were completed to further vet the use of a permeable reactive barrier and constructed treatment wetlands to remove metals from groundwater. Additionally, the pilot study data will be used for remedial design. At a municipal solid waste landfill in Michigan, Barr screened monitored natural attenuation, pump and treat, in-well air stripping, air sparging, enhanced bioremediation, and a permeable reactive barrier as potential technologies to remediate chlorinated volatile organic compounds in groundwater. Pump and treat, air sparging and soil vapor extraction, and a permeable reactive barrier were further assessed in a feasibility study. Other examples of remedial design include designing a deep-groundwater extraction system combined with shallow-groundwater extraction system upgrades and designing building-specific vapor intrusion mitigation and monitoring systems for residential and commercial redevelopment on a former dump.

3.2 Construction Oversight: Barr performs construction oversight, and acts as the owner's on-site engineer, for a vast majority of projects where Barr serves as the lead design engineer. Our experience includes verification sampling, directing excavation and earthwork activities, collaborating with contractors and performing construction engineering to remedy issues that come up during implementation, reviewing construction submittals from the implementing contractor, verification sampling of backfill materials, inspection and sampling of on-site treatment systems, coordinating public communications and outreach, implementing automated total station surveying systems to assess the movement of nearby infrastructure during construction, implementing air quality and noise monitoring plans to assess potential impacts from construction to surrounding public

spaces, conducting and tracking various construction quality assurance testing, and coordinating restoration activities.

3.3 Remedial O&M: Remediation systems require skilled operation, routine maintenance, and periodic monitoring. Barr can perform operation and maintenance of systems to ensure that a remedial system operates properly over its life. We provide routine inspection of remedial systems, sampling of affected media to monitor the progress of the remedial action, design of additional remedial alternatives (when necessary), preparation of progress reports, and troubleshooting assistance if problems arise.

3.4 Site Closure: Barr provides final closure and cover design to private, municipal, and industrial clients to develop and execute integrated solutions for waste management. This includes understanding regulatory programs to plan for and execute landfill closure in accordance with state regulations. Barr also has experience with environmental remediation of both operating and closed landfills, providing the strategy and environmental/engineering support to bring sites to closure.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. We also have a number of Michigan staff that hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, giving Barr the flexibility to use our own staff to perform periodic inspections of the soil erosion and sedimentation controls that are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Katy Lindstrom, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Hydrologic Science and Engineering, Colorado School of Mines, 2009; BS, Environmental Engineering, Michigan Technological University, 2006
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Scott Venman Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): BSE, Chemical Engineering, University of Michigan, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Randy Christensen, PE Job Title: Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Civil Engineering, Wayne State University, 1998
BS, Environmental Engineering, Michigan Technological University, 1992
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.
Barr has long-term experience working with numerous state and federal agencies on a variety of contracts involving environmental work, similar to this ISID contract. Our work has included projects with state agencies in Minnesota, including a Remediation Master Contract for the Minnesota Pollution Control Agency's Closed Landfill Program (CLP), which oversees more than 100 closed landfills across Minnesota. Many of Barr's projects rely on a multidisciplinary team. Barr's breadth of landfill design experience and depth of bench across disciplines like environmental, civil, geotechnical, structural, electrical, and mechanical engineering means Barr can complete remedial design for even the most complex projects.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Landfills*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ Caps (plus Enhancements) ☒ Leachate Control/O&M ☒ Methane Gas Control (On-Site and Off-Site)

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	5+	5	0
Construction Oversight	1+	1	0
O & M	7+	7	0
Closed	1+	1	0
Used Treatment Train	1+	1	0
2. Range of cost per project (x$1,000)[1]:			
Design Phase	$25–260	$25–260	$8
Construction Phase	$50–70	$50–70	$0
O & M Phase	$20–200 per year	$20–200 per year	$0
Total Project Cost	$95–530	$95–530	$0–8
3. Number of the above projects that were[1]:			
Below Budget	0	0	0
On Budget	15+	15	1
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	4+	4	0
Licensed Civil Engineers	1+	1	0
Licensed Chemical Engineers	1+	1	0
Geologists	2+	2	0
Hydrogeologists	1+	1	0
Licensed Surveyors	0+	0	0
Licensed Electrical Engineers	1+	1	0
Licensed Mechanical Engineers	0+	0	0
Environmental Science	0+	0	0
Biologists	0+	0	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

Specialized Technologies Questionnaire
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Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Indoor Air/Vapor Intrusion

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Environmental assessments, response actions, and PFAS, VOC, and VI investigations for a manufacturing client (project 2 in the technical proposal)
Key Personnels: Anne Schumacher, Allen Prince, Jamie Edelyn
Project Address: Confidential
Project City/State/Zip: Hastings, MI, 49058
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 1 Description: See page 14 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Monitored natural attenuation evaluation for natural gas compressor/dehydration stations (project 9 in the technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue, Al Braspenninx
Project Address: 7677 230th Avenue
Project City/State/Zip: Reed City, MI 49677
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 21 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Vapor intrusion pathway (VI) investigation of former MGP site (under MI Part 201) (project 10 in the technical proposal)
Key Personnels: Nathan Brandner, Luke Mackewich
Project Address: Confidential
Project City/State/Zip: Confidential
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 3 Description: See page 22 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: We have worked on vapor intrusion projects in residential, commercial, and industrial settings. To evaluate the potential for vapor intrusion, Barr evaluates site conditions and available data to recommend appropriate sampling and analytical methods when more information is needed. We can define the extent of soil and groundwater source contamination and offer a full range of vapor intrusion sampling services (including soil gas, sub-slab vapor, indoor air, and outdoor air) to better understand potential vapor intrusion pathways and occupant exposure. We have experience with various buildings and site conditions and know how to collect valid samples using passive and active methods to obtain reliable and defensible data. We help clients interpret the data, examine multiple lines of evidence to understand the site and associated risks, and identify next steps. We also complete engineering design of SSDS and SVE systems.

3.2 Construction Oversight: Our multidisciplinary teams of engineers and scientists help our clients understand the physical, chemical, and biological processes at a site and identify the best options for mitigation or remediation. Barr recommends and designs mitigation systems to prevent vapors from entering buildings—often cost-effective sub-slab depressurization systems. However, other mitigation options can include passive barriers and venting, building pressurization, indoor air treatment, HVAC adjustments, and building sealing. In addition, Barr designs and executes site remediation through soil and groundwater source removal that can reduce vapor intrusion. Using screening-level human-health risk assessments, we can help select appropriate remediation technologies based on regulatory guidance for vapor intrusion and alternative evaluation studies.

3.3 Remedial O&M: Barr has completed operations and maintenance of SVE and SSDS systems.

3.4 Site Closure: Barr has prepared NFAs involving the indoor air pathway, and we've received closure letters for the vapor pathway.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. Several of our Michigan staff members hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, giving Barr the flexibility to use our own staff to perform periodic inspections of soil erosion and sedimentation controls which are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules,

and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Molly O'Brien Job Title: Senior Environmental Consultant
Labor Classification: L3 (P3) College Degree(s): BS, Geological Engineering, Michigan Technological University, 2000
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Scott Venman Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): BSE, Chemical Engineering, University of Michigan, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Nathan Brandner, PG Job Title: Senior Geologist
Labor Classification: L4 (P4) College Degree(s): MS, Geology, Western Michigan University, 2006 (Geophysics and Hydrogeology specialization); BS, Geology, Central Michigan University, 2003 (Environmental and Hydrogeology specialization)
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Luke Mackewich, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Civil Engineering, Wayne State University, 2011
BS, Civil Engineering, Wayne State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 8

Name: Anne Schumacher Job Title: Senior Geologist
Labor Classification: L3 (P3) College Degree(s): MS, Geology, University of Kentucky, 2013; BA, Geology, Albion College, 2008
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.
Barr's teams can help with all phases of vapor intrusion projects. Our senior leadership has been involved with vapor intrusion for many years, and our practitioners stay current through literature reviews, continuing education, and involvement with practice organizations. We've participated in the practice organization Interstate Technology & Regulatory Council (ITRC) for many years, including in the development of guidance documents on vapor intrusion, meaning we're on the cutting edge of technology.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Indoor Air/Vapor Intrusion*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ Indoor Air Sampling/Abatement ☒ Air Purifying Units (APUs) ☒ Vapor Pins/Gas Wells Installation

☒ Vapor Barrier Installation ☒ Soil Vapor Extraction (SVE) ☒ Monitoring Systems

☒ Passive/Active Sub-Slab Depressurization (SSD) ☒ Monitoring/Inspection of SSD Systems

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	10+	10	0
Construction Oversight	10+	10	0
O & M	2+	2	0
Closed	1+	1	0
Used Treatment Train	1+	0	0
2. Range of cost per project (x$1,000)[1]:			
Design Phase	$10–130	$10–130	$0
Construction Phase	$15–140	$15–140	$80
O & M Phase	$0–20	$0–20	$0
Total Project Cost	$25–290	$25–290	$0
3. Number of the above projects that were[1]:			
Below Budget	0+	0	0
On Budget	10+	10	0
Over Budget*	0+	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	5+	5	0
Licensed Civil Engineers	1+	1	0
Licensed Chemical Engineers	1+	1	0
Geologists	6+	6	0
Hydrogeologists	1+	1	0
Licensed Surveyors	0+	0	0
Licensed Electrical Engineers	1+	1	0
Licensed Mechanical Engineers	0+	0	0
Environmental Science	0+	0	0
Biologists	0+	0	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

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Part II

Select Remediation Technology below: (submit one form for each specific technology below)

In-Situ Physical/Chemical Treatment

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Site closure, investigation, risk assessment, and remedial action at a former leather tannery (project 3 in the technical proposal)
Key Personnels: Jamie Edelyn, Chris Miron, Charlene McGue, Al Braspenninx
Project Address: 900 South Lake Street
Project City/State/Zip: Whitehall, MI 49461
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 1 Description: See page 16 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Monitored natural attenuation evaluation and ICE system design for natural gas compressor/dehydration stations (project 9 in Barr's technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue, Al Braspenninx
Project Address: 7677 230th Avenue
Project City/State/Zip: Reed City, MI 49677
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 21 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Design of infiltration gallery for a manufacturing client (project 11 in the technical proposal)
Key Personnels: Chris Miron, Jamie Edelyn, Jamie Bankston, Randy Christensen
Project Address: 4047, 4147, and 4247 Eastern Avenue
Project City/State/Zip: Wyoming, MI 49508
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 3 Description: See page 22 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Barr has used in-situ chemical treatment at numerous sites with large impacted areas or sites where source removal is not feasible due to redevelopment on the property. We recognize that in-situ treatment can offer significant advantages over other technologies in certain scenarios, so we stress the importance of considering in-situ treatment methods in technology screening evaluations and feasibility studies. We have designed in-situ chemical treatment systems at sites that pose significant challenges, such as dense urban neighborhoods and protected waterways. Our designs stress adaptability and reliability in order to minimize the long-term maintenance required and allow for flexibility in modifying the sytems based on a project's needs. Barr has assisted clients with the design of soil vapor extraction (SVE) systems, air sparge systems using both vertical points and horizontal wells, permeable reactive barriers, zero-valent iron walls, and injection systems to add oxygen to groundwater and enhance aerobic biodegradation along with other in-situ chemical technologies. Our team of scientists and engineers have a variety of experience to draw from when developing remedial designs for in-situ treatment systems and are familiar with developing bid specifications and drawings. Our experience allows us to develop designs that are implementable and relatively low-maintenance, which results in lower upfront and long-term costs to our clients.

3.2 Construction Oversight: Barr has a deep bench of experienced field staff that can provide construction oversight to verify the remedial design is installed and constructed according to the project's plans and specifications. Our construction oversight experience includes both turn-key construction and client-representative oversight for a diverse list of construction projects over many years. Our experience with oversight of in-situ treatment projects has also included overseeing a wide variety of supplemental response actions such as earthwork, drilling, mechanical, electrical, and controls contractors, which gives us the know-how needed to offer comprehensive construction oversight services for in-situ treatment systems.

3.3 Remedial O&M: Barr staff are experienced with performing O&M on a variety of in-situ treatment systems as well as managing O&M that is performed by our client representative or other on-site staff. Our O&M experience includes verification sampling, maintaining mechanical equipment, troubleshooting issues, and documenting system performance as required by project objectives. Our experience includes performing O&M on systems that range in size from a small skid-mounted system to systems that span thousand of lineal feet and on systems with and without off-gas treatment. When appropriate, Barr can incorporate remote monitoring systems as part of O&M activities and can develop systems that provide automated alarms to notify the project

team when the system is down or not performing as designed. These capabilities can reduce the frequency of on-site visits required because system performance can be verified remotely.

3.4 Site Closure: Barr's experience with in-situ chemical treatment projects includes using the remediation achieved by these systems to support site closure. Our familiarity with accumulating and organizing O&M and verification sampling documentation allows us to quickly transition from long-term monitoring to site closure, once the site data indicates the remedial objectives have been achieved. Our staff are also familiar with decommissioning and abandonment of in-situ treatment systems, including developing plans and specifications for the work and providing demolition oversight.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. Several of our Michigan staff members hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, giving Barr the flexibility to use our own staff to perform periodic inspections of soil erosion and sedimentation controls which are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules, and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Molly O'Brien Job Title: Senior Environmental Consultant
Labor Classification: L3 (P3) College Degree(s): BS, Geological Engineering, Michigan Technological University, 2000
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001

Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Scott Venman Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): BSE, Chemical Engineering, University of Michigan, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Randy Christensen, PE Job Title: Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Civil Engineering, Wayne State University, 1998 BS, Environmental Engineering, Michigan Technological University, 1992
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 8

Name: Don Richard, PE Job Title: Vice President, Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): PhD, Civil Engineering, University of Minnesota, 2004; MS, Civil Engineering, University of Wyoming, 1988; BS, Civil Engineering, University of Wyoming, 1986
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☒ No–Completed 40-hour; pending 8-hour refresher.

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS

Section not applicable.

ARTICLE 6: SPECIAL FACTORS

Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.

Barr has been involved with multiple projects to install perimeter air sparge systems using single pass trenching to install horizontal sparge wells with a riser pipe on one end to connect to the blower and a solid sloped pipe on the other end to act as a cleanout access. We have several Michigan-based staff with over 20 years of experience in the design and operation and maintenance of SVE and air sparge systems.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *In-Situ Physical/Chemical Treatment*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ SVE / Air Sparge ☒ Solidification / Stabilization ☒ Chemical Oxidation / Injection

☒ Permeable Reactive Barriers ☐ Environmental Fracturing ☐ Groundwater Circulating Wells

☐ Treatment Blankets ☒ Evapotranspiration Covers ☐ Directional Wells

☐ Carbon Substrate Injections ☐ Electrokinetic-enhanced Remediation ☒ Zero-Valent Iron Walls

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	7+	7	0
Construction Oversight	6+	6	0
O & M	6+	6	0
Closed	1+	1	0
Used Treatment Train	1+	1	0
2. Range of cost per project (x $1,000)[1]:			
Design Phase	$10–50	$10–50	0
Construction Phase	$15–30	$15–30	0
O & M Phase	$20–90	$20–90	0
Total Project Cost	$50–170	$50–170	0
3. Number of the above projects that were[1]:			
Below Budget	0	0	0
On Budget	6+	6	0
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	2+	2	0
Licensed Civil Engineers	1+	1	0
Licensed Chemical Engineers	2+	2	0
Geologists	3+	3	0
Hydrogeologists	1+	1	0
Licensed Surveyors	0	0	0
Licensed Electrical Engineers	0+	0	0
Licensed Mechanical Engineers	0+	0	0
Environmental Science	2+	2	0
Biologists	0+	0	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

Specialized Technologies Questionnaire
for Professional Environmental Consulting Services
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2023 Indefinite-Scope Indefinite-Delivery – Expanded Environmental Remediation Services

Part II

Select Remediation Technology below: (submit one form for each specific technology below)

In-Situ Physical/Biological Treatment

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Wetland reconstruction for groundwater remediation (project 12 in the technical proposal)
Key Personnels: Don Richard, Jamie Bankston
Project Address: Shoreline Drive
Project City/State/Zip: Mound/Minnesota/55364
Owner/Client Contact Name and Telephone #: Hasbro, Inc./Therom Grimm, 401-727-5621
Project 1 Description: See page 23 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Treatment system evaluation for natural gas storage and transmission infrastructure (project 13 in the technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue
Project Address: Various
Project City/State/Zip: Various/Michigan
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 23 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Monitored natural attenuation evaluation and ICE system design for natural gas compressor/dehydration stations (project 9 in the technical proposal)
Key Personnels: Charlene McGue, Molly OBrien
Project Address: Various
Project City/State/Zip: Various/Michigan
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 3 Description: See page 21 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: In-situ biological treatment systems can offer significant advantages over other treatment technologies in certain scenarios because they can use existing site features and reduce long-term O&M costs (e.g., if no chemical agents are required, long-term O&M costs will be reduced). We have designed in-situ biological treatment systems at sites that pose significant challenges, such as dense urban neighborhoods and protected waterways. Our designs stress adaptability and reliability in order to minimize the long-term maintenance required and allow for flexibility in modifying the systems based on a project's needs.

Adaptable remediation systems work well with, and sometimes take advantage of, the natural features of a site. Barr has experience with the design of cost-effective in-situ biological treatment technologies, including bio-sparge systems, phytoremediation, and monitored natural attenuation at a variety of sites. Similar to other in-situ treatment technologies, an important aspect of the remedial design is the consideration of verification and monitoring required to evaluate the performance of the remedial activity, and Barr staff members are familiar with developing monitoring plans that provide data to evaluate performance along with potential off-ramps that identify when monitoring can be reduced or stopped based on long-term system performance.

3.2 Construction Oversight: Barr has a deep bench of experienced field staff that can provide construction oversight to verify the remedial design is installed and constructed according to the project's plans and specifications. Our construction oversight experience includes both turn-key construction and client-representative oversight for a diverse list of construction projects over many years. Our experience with oversight of in-situ biological treatment projects has involved overseeing constructed wetlands, biosparge treatment system installations, and monitored natural attenuation at a variety of sites including natural gas compressor stations and manufacturing facilities. Barr's experience with oversight of in-situ treatment projects has also included overseeing a wide variety of supplemental response actions such as earthwork, drilling, mechanical, electrical, and controls contractors, giving us the knowledge needed to offer comprehensive construction oversight services for in-situ treatment systems.

3.3 Remedial O&M: Barr staff members are experienced with performing O&M on a variety of in-situ treatment systems as well as managing O&M that is performed by our client representative or other on-site staff. Our O&M experience includes verification sampling, maintaining mechanical equipment, troubleshooting issues, and documenting system performance as required by project objectives. There are some unique aspects to O&M for in-situ biological treatment projects, and Barr has a team of engineers and scientists that can fulfill

those requirements. For example, Barr has provided O&M at phytoremediation projects, such as harvesting of vegetation, removal of invasive species, and periodic controlled burns, and has provided O&M at constructed treatment wetland projects, such as monitoring wetland groundwater geochemistry and concentrations of contaminant and breakdown products. We also have experience conducting O&M on monitored natural attenuation projects that typically includes the continued sampling and upkeep of groundwater monitoring well networks, so that the long-term monitoring data set is consistent and complete.

3.4 Site Closure: Barr's experience with in-situ biological treatment projects includes using the remediation achieved by these systems to support site closure. Our familiarity with accumulating and organizing O&M and verification sampling documentation allows us to quickly transition from long-term monitoring to site closure, once the site data indicates the remedial objectives have been achieved. Our staff members are also familiar with decommissioning and abandonment of in-situ treatment systems, including developing plans and specifications for the work and providing demolition oversight.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. Several of our Michigan staff members hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, giving Barr the flexibility to use our own staff to perform periodic inspections of the soil erosion and sedimentation controls that are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Molly O'Brien Job Title: Senior Environmental Consultant
Labor Classification: L3 (P3) College Degree(s): BS, Geological Engineering, Michigan Technological University, 2000
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4
Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Ray Wuolo, PE Job Title: Vice President, Senior Hydrogeologist
Labor Classification: L4 (P4) College Degree(s): MS, Geological Engineering, South Dakota School of Mines & Technology, 1986; BS, Geological Engineering, Michigan Technological University, 1983
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Don Richard, PE Job Title: Vice President, Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): PhD, Civil Engineering, University of Minnesota, 2004; MS, Civil Engineering, University of Wyoming, 1988; BS, Civil Engineering, University of Wyoming, 1986
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☒ No–Completed 40-hour; pending 8-hour refresher.

Key Personnel 8

Name: Brian Angerman, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Environmental Engineering, University of Iowa, 1998 BS, Environmental Engineering, Michigan Technological University, 1996
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *In-Situ Physical/Biological Treatment*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ Bioremediation ☒ Monitored Natural Attenuation ☒ Phytoremediation ☒ Bio-Sparge

☐ Enhanced Bioremediation (e.g., Propane Sparging, Electrokinetic, Enhanced Reductive De-chlorination)

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	2+	2	0
Construction Oversight	2+	2	0
O & M	4+	4	0
Closed	2+	2	0
Used Treatment Train	1+	1	0
2. Range of cost per project (x $1,000)[1]:			
Design Phase	$2–50	$2–50	0
Construction Phase	$10–40	$10–40	0
O & M Phase	$20–50	$20–50	0
Total Project Cost	$50–150	$50–150	0
3. Number of the above projects that were[1]:			
Below Budget	0	0	0
On Budget	4+	4	0
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	3+	3	0
Licensed Civil Engineers	2+	2	0
Licensed Chemical Engineers	2+	2	0
Geologists	5+	5	0
Hydrogeologists	1+	1	0
Licensed Surveyors	0+	0	0
Licensed Electrical Engineers	0+	0	0
Licensed Mechanical Engineers	0+	0	0
Environmental Science	0+	0	0
Biologists	2+	2	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

Specialized Technologies Questionnaire
for Professional Environmental Consulting Services
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Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Ex-Situ Physical/Chemical Treatment

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: Groundwater extraction and treatment system operation, maintenance and monitoring (project 15 in technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue, Scott Alexander, Katy Lindstrom, Al Braspenninx
Project Address: 525 N 24th Street
Project City/State/Zip: Springfield, MI 49037
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 1 Description: See page 24 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Risk-based remedial actions at McCoy Creek Industrial Park (project 14 in the technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue, Chris Miron
Project Address: 3rd Street
Project City/State/Zip: Buchanan, MI 49107
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 23 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Remedial action plan for a landfill (project 6 in the technical proposal)
Key Personnels: Jamie Edelyn, Charlene McGue, Al Braspenninx
Project Address: 3200 Chamberlain Road
Project City/State/Zip: Niles, MI 49107
Owner/Client Contact Name and Telephone #: Southeast Berrien County Landfill/Tyler Ganus – General Manager, 269-695-2000
Project 3 Description: See page 19 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Ex-situ chemical treatment can be a advantageous treatment technology and has a long history of regulatory acceptance. Barr has experience designing a wide-variety of ex-situ chemical treatment systems, including various extraction (e.g., horizontal wells and vertical wells) and treatment methods (e.g., granular activated carbon, tray-style air strippers, pH adjustment, and specialty resins). Our varied experience allows us to consider different ex-situ technologies for each project, and select the technology that is best suited to meet the project objectives. Our designs stress adaptability and reliability in order to minimize long-term maintaince required and allow for flexibility in modifying the sytems based on project needs. Because ex-situ treatment technologies typically involve long term operation and monitoring, we design systems to minimize impacts to ongoing site operations, if applicable, and adjacent properties. Our team includes experienced water/wastewater treatment engineers that have designed treatment trains for wastewater of various quality, so we're confident that our team can work to find a treatment solution that fits the project needs. Barr's team of electrical and instrumentation/controls engineers can also assist on ex-situ treatment projects by programming system controls that allow for remote operation and monitoring of the system, reducing the number of site visits needed or time for on-site staff to perform routine checks of the sytem. Our design experience includes developing specifications and construction drawings that allow for successful implementation of the treatment system.

3.2 Construction Oversight: Barr has a deep bench of experienced field staff that can provide construction oversight to verify the remedial design is installed and constructed according to the project plans and specifications. Barr's construction oversight experience includes both turn-key construction and client representative oversight of a diverse list of construction projects over many years. Our construction oversight experience includes overseeing installation of extraction wells, tray-style air strippers, granular activated carbon treatment systems, associated tranmission piping and controls, and more. Our experience with oversight of ex-situ treatment projects has also included overseeing a wide variety of supplemental response actions such as earthwork, drilling, mechanical, electrical, and controls contractors which gives us the experience needed to offer comprehensive construction oversight services for ex-situ treatment systems.

3.3 Remedial O&M: It is typical for ex-situ treatment projects to have a long-term O&M component, and Barr has experienced staff to support this phase of the project. Our O&M experience includes verification sampling, maintaining mechanical equipment, troubleshooting issues, and documenting system performance as required

by project objectives. O&M of ex-situ treatment systems can also require special certifications, and Barr has multiple State of Michigan Certified Operators, including A-2d Air Stripper and B-3B Carbon Adsorption, to provide certified operators that can support long-term O&M. Because we have instrumentation and controls engineers on-staff, Barr can provide remote monitoring capabilities and automated alarms that send notifications when the system is not performing as designed. Our staff are accustomed to developing the remote monitoring program to meet project needs so we can tailor monitoring and notifications based on what our clients request.

3.4 Site Closure: Barr's experience with ex-situ chemical treatment projects includes using the remediation achieved by these systems to support site closure. Our familiarity with acumulating and organizing O&M and verification sampling documentation allows us to quickly transition from long-term monitoring to site closure once the site data indicates the remedial objectives have been achieved. Barr has completed decommissioning of several groundwater extraction and treatment systems, including abandonment of extraction wells, transmission piping, and treatment components, so we are able to support removal of system infrastructure once site closure has been achieved.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. We also have a number of Michigan staff that hold a current Construction Stormwater Operator/Soil Erosion Inspector certification which gives Barr the flexibility to use our own staff to perform periodic inspections of soil erosion and sedimentation controls which are required by permits. We have experience following through on the required permit inspections until vegetation has been restablished in accordance with applicable rules, and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Jamie Edelyn, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 1994
Successfully completed 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Katy Lindstrom, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Hydrologic Science and Engineering, Colorado School of Mines, 2009; BS, Environmental Engineering, Michigan Technological University, 2006
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Don Richard, PE Job Title: Vice President, Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): PhD, Civil Engineering, University of Minnesota, 2004; MS, Civil Engineering, University of Wyoming, 1988; BS, Civil Engineering, University of Wyoming, 1986
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☒No–Completed 40-hour; pending 8-hour refresher.

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.
Barr has been involved in design and long-term operation of multiple projects involving both horizontal and vertical extraction wells, and treatment technologies including both column and tray-style air strippers, granular activated carbon, ion exchange resins, and pH adjustment. Barr has several MI-based staff with over 20 years' experience design and operation and maintenance of groundwater extraction and treatment systems and multiple State of Michigan Certified Operators, including A-2d Air Stripper and B-3B Carbon Adsorption, to provide certified operators that can support long-term O&M.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: Ex-*Situ Physical/Chemical Treatment*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply)

☒ Air Stripping ☒ Granular Activated Carbon (GAC) ☒ Pump and Treat ☐ Advanced Oxidation

☒ Multi-Phase Extraction ☐ Catalytic Oxidation

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	7+	7	0
Construction Oversight	5+	5	0
O & M	8+	8	0
Closed	2+	2	0
Used Treatment Train	3+	3	0
2. Range of cost per project (x $1,000)[1]:			
Design Phase	$50–150	$50–150	0
Construction Phase	$10–260	$10–260	0
O & M Phase	$10–1,500	$10–1,500	0
Total Project Cost	$50–1,500	$50–1,500	0
3. Number of the above projects that were[1]:			
Below Budget	0	0	0
On Budget	7+	7	0
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	5+	5	0
Licensed Civil Engineers	1+	1	0
Licensed Chemical Engineers	1+	1	0
Geologists	4+	4	0
Hydrogeologists	1+	1	0
Licensed Surveyors	0+	0	0
Licensed Electrical Engineers	1+	1	0
Licensed Mechanical Engineers	0+	0	0
Environmental Science	1+	1	0
Biologists	0+	0	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

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Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Per- Polyfluoroalkyl Substances (PFAS) Treatment

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name: PFAS treatment during power plant decommissioning (project 16 in the technical proposal)
Key Personnels: Tom Boom, Mike Ellis
Project Address: Confidential
Project City/State/Zip: Michigan
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 1 Description: See page 25 of Barr's technical proposal

Project 2 Reference Information:

Project Name:PFAS-impacted drinking water response and treatment plant design (project 17 in the technical proposal)
Key Personnels: Katie Wolohan
Project Address:1351 5th Street NW, Bemidji, MN 56601
Project City/State/Zip: Bemidji, Minnesota
Owner/Client Contact Name and Telephone #: Craig Gray, 218-333-1851
Project 3 Description: See page 26 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Multi-site PFAS remedial investigation and remediation (project 18 in the technical proposal)
Key Personnels:Brian Angerman, Sara Ramsden, Ray Wuolo
Project Address: Confidential
Project City/State/Zip: Eastern U.S.
Owner/Client Contact Name and Telephone #: Provided on request due to client confidentiality
Project 2 Description: See page 26 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Barr has extensive experience related to PFAS treatment system remedial design that spans over two decades with projects in both municipal and industrial applications. In the last 10 years, Barr has served as the design engineer on multiple PFAS sites, which have included rapid emergency response treatment design, industrial wastewater treatment design, full-scale design of drinking water systems, and evaluation and mitigation of PFAS-impacted soils, groundwater, and sediment. We have an in-house water treatment lab that has been vital in designing effective PFAS water treatment designs. Barr has experience evaluating PFAS treatment technologies for various media including municipal wastewater, landfill leachate, biosolids, and mixed municipal solid waste (MSW), allowing us to consider all relevant technologies during the technology screening phase of the design. This helps ensure that the technology selected is tailored to the project's needs rather than defaulting to a technology that is commonly used or is most familiar to the design engineer. Barr also has remedial design experience on sites with PFAS-impacted groundwater, soils, and sediment.

3.2 Construction Oversight: Barr typically acts as the owner's engineer/on-site representative during implementation of PFAS treatment systems and has overseen implementation of installations for rapid emergency response, industrial, and municipal applications. As owner's engineer, our services include developing construction drawings and technical specifications to describe the work along with the instructions to bidders, bid form, and milestone schedule. Barr's field staff are experienced with managing contractors, conducting quality assurance testing, documenting implementation procedures, and coordinating with the design team to remedy discrepancies or issues that occur during implementation. Most of Barr's field staff are experienced with PFAS sampling procedures, which allows us to draw on a variety of field staff when performing verification sampling in accordance with standard PFAS sampling procedures. Our experience on these projects has enabled us to consider novel remediation and verification techniques, given the changing regulatory landscape for PFAS and limited options for waste disposal.

3.3 Remedial O&M: Barr's experience includes long-term operation and maintenance for a majority of the PFAS treatment and remediation technologies where Barr served as the lead design engineer, including drinking water and wastewater systems. Due to the currently available PFAS technologies, namely granular activated carbon (GAC) and ion exchange (IX), PFAS breakthrough is common. Barr has experience managing O&M of these systems and performing verification sampling to show that the treatment technology is operating as designed and evaluate potential breakthroughs of the media. Our team of engineers and

scientists are familiar with prioritizing data review for sites with ongoing water treatment, so potential breakthroughs of the system can be evaluated efficiently and replacement of treatment media, if necessary, can occur before there is a risk of effluent concentrations increasing above the project objectives.

3.4 Site Closure: Given the changing regulatory environment for PFAS, site closure of PFAS-impacted sites is not typical at this time. Barr's experience related to site closure for PFAS-impacted sites is associated with operating temporary treatment systems and decommissioning the treatment systems when the system is no longer needed. In these scenarios, Barr's has worked with our clients and the implementing contractor to plan the final phases of treatment such that the amount of PFAS-impacted waste remaining on-site is minimized. The remaining waste is typically spent treatment media, and Barr has worked with our clients to identify suitable disposal locations for that media and secure proper documentation for their records. We have also developed documentation and summary reports for treatment systems that summarize operations and include waste disposal documentation so our clients can quickly refer back to the information as needed.

3.5 Soil Erosion and Sedimentation Control: Barr has completed many soil erosion and sedimentation control permit applications and worked with local regulatory agencies to verify that all local requirements are met. Our experience also includes developing soil erosion and sedimentation control plans and technical specifications for construction. A number of our Michigan staff members hold a current Construction Stormwater Operator/Soil Erosion Inspector certification, giving Barr the flexibility to use our own staff to perform periodic inspections of the soil erosion and sedimentation controls that are required by permits. We have experience following through on the required permit inspections until vegetation has been reestablished in accordance with applicable rules and are familiar with coordinating with the local regulatory agency to close out the permit when those conditions are met.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Michael Ellis, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Environmental Engineering, Michigan State University, 2011; BS, Civil Engineering (Environmental Concentration), Michigan State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Molly O'Brien Job Title: Senior Environmental Consultant
Labor Classification: L3 (P3) College Degree(s): BS, Geological Engineering, Michigan Technological University, 2000
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Katy Lindstrom, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Hydrologic Science and Engineering, Colorado School of Mines, 2009; BS, Environmental Engineering, Michigan Technological University, 2006
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Allen Prince Job Title: Environmental Engineer
Labor Classification: L2 (P2) College Degree(s): BS, Environmental Engineering, Michigan Technological University, 2016
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 8

Name: Anne Schumacher Job Title: Senior Geologist
Labor Classification: L3 (P3) College Degree(s): MS, Geology, University of Kentucky, 2013; BA, Geology, Albion College, 2008
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 9

Name: Don Richard, PE Job Title: Vice President, Senior Civil Engineer
Labor Classification: L4 (P4) College Degree(s): PhD, Civil Engineering, University of Minnesota, 2004; MS, Civil Engineering, University of Wyoming, 1988; BS, Civil Engineering, University of Wyoming, 1986
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☒No–Completed 40-hour; pending 8-hour refresher.

Key Personnel 10

Name: Brian Angerman, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Environmental Engineering, University of Iowa, 1998 BS, Environmental Engineering, Michigan Technological University, 1996
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 11

Name: Sara Ramsden, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Environmental Engineering, University of Minnesota, 2006; BChE, Chemical Engineering (emphasis: environmental engineering, minor: English), University of Minnesota, 2002
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.
Barr received the Engineering Excellence Honor Award from the American Council of Engineering Companies of Minnesota (ACEC/MN) ACEC/MN in 2022 for the City of Bemidji PFAS Treatment Plant project (Project 2 above). We also recently completed a novel technical evaluation of commercially available PFAS treatment and destruction technologies for the Minnesota Pollution Control Agency (MPCA). Barr is an active contributor to the Interstate Technology and Regulatory Council (ITRC) and various state and federal PFAS regulatory groups meaning our team stays up to date on developing technology and regulatory developments related to PFAS.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Per- & Polyfluoroalkyl Substances (PFAS)*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply) ☒ Sampling ☒ Investigation ☒ Remediation ☒ Conventional Water/Wastewater Treatment (Activated Carbon, Ion Exchange Resin, Membrane Separation, Incineration) ☐ Sorption Technology ☐ Advanced Oxidation/Reduction ☐ Others.

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years:			
Designed	8	4	0
Construction Oversight	6	2	0
O & M	7	1	0
Closed	0	0	0
Used Treatment Train	3	1	0
2. Range of cost per project (x$1,000):			
Design Phase	$70–120	$70–120	$0
Construction Phase	$140	$140	$1,800
O & M Phase	$140	$140	$0
Total Project Cost	$130–2,200	$130–2,200	$0
3. Number of the above projects that were:			
Below Budget	2	2	0
On Budget	5	2	0
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	3+	3	0
Licensed Civil Engineers	2+	2	0
Licensed Chemical Engineers	3+	3	0
Geologists	9+	9	0
Hydrogeologists	2+	2	0
Licensed Surveyors	0	0	0
Licensed Electrical Engineers	2+	2	0
Licensed Mechanical Engineers	2+	2	0
Environmental Science	10+	10	0
Biologists	6+	6	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

Specialized Technologies Questionnaire
for Professional Environmental Consulting Services
Department of Technology, Management and Budget
2023 Indefinite-Scope Indefinite-Delivery – Expanded Environmental Remediation Services

Part II

Select Remediation Technology below: (submit one form for each specific technology below)

Alt Tech/Post Remediation Strategies

INSTRUCTIONS: Professionals shall complete the following required information in the form provided. A separate sheet may be used if additional space is needed. Professionals are to ensure all questions are answered completely in the most concise way possible to streamline the review process.

ARTICLE 1: BUSINESS ORGANIZATION

1.1 Business Organization Full Name: Barr Engineering Co.

ARTICLE 2: PRIOR EXPERIENCE

2.1 Provide a client reference and brief descriptions of at least three (3) projects in the last ten years related to the work associated with this technology. Name the currently employed key personnels assigned to each project. Emphasis shall be placed on recent work at sites of environmental contamination and on sites where the Professional has provided significant contributions:

Project 1 Reference Information:

Project Name:Battle Creek Former MGP Site (Part 201 Facility ID: 13000369) (project 19 in the technical proposal)
Key Personnels: Nathan Brandner, Christene Jones, Luke Mackewich
Project Address: 150 East Fountain Street
Project City/State/Zip: Battle Creek, MI
Owner/Client Contact Name and Telephone #: SEMCO Gas Company (SEMCO); Elisabeth Barr or Amanda Hoag, 810-887-3083
Project 1 Description: See page 27 of Barr's technical proposal

Project 2 Reference Information:

Project Name: Muskegon Heights Former MGP Site (Part 201 Facility ID: 61000408) (project 20 in Barr's technical proposal)
Key Personnels: James Edelyn, Nathan Brandner, Christene Jones, William Davidson
Project Address: 353 East Broadway
Project City/State/Zip: Muskegon Heights, MI
Owner/Client Contact Name and Telephone #: DTE Gas Co, Mike Brennan, (313) 235-0349
Project 2 Descriptio: See page 28 of Barr's technical proposal

Project 3 Reference Information:

Project Name: Phased excavations, pathway mitigations, and site closure at former industrial site (project 4 in the technical proposal)
Key Personnels: Christene Jones, Katy Lindstrom, Nathan Brandner
Project Address: 216 N. Eaton Street
Project City/State/Zip: Albion, MI
Owner/Client Contact Name and Telephone #: SEMCO Gas Company (SEMCO); Elisabeth Barr or Amanda Hoag, 810-887-3083
Project 3 Description: See page 17 of Barr's technical proposal

ARTICLE 3: REMEDIATION TECHNOLOGY EXPERIENCE

Include a brief description of your firm's professional experience in each of the following areas (as applicable to the technology):

3.1 Remedial Design: Barr has assisted clients with the design of post-remediation strategies for ongoing use and redevelopment of their Part 201 facilities. Our role has been to provide technical input to Barr's or our client's construction/design teams to prevent unintentional human exposure or migration of residual envirmental impacts. For example, we have provided recommendations and alternative design options to construction and design teams, including adaptive and dynamic residuals management plans for mitigating exacerbating and/or causing expoures.

3.2 Construction Oversight: Barr's construction oversight has included a diverse list of projects over many years, which have included assisting long-term clients with ongoing due care needs associated with residual impacts in soil and groundwater during property redevelopment following interim remediation efforts. Specifically, we have provided construction oversight and field screening at excavation sites with known/unknown residual impacts at depth to prevent impacted soils and groundwater from being relocated offsite w/o proper characterization.

3.3 Remedial O&M: Barr's experience related to ongoing operations and maintenance has included post-closure monitoring of soil, groundwater, and surface water and inspection of the effectiveness of engineering controls, including surface cover and exposure barriers.

3.4 Site Closure: Barr has helped clients achieve site closure at many different sites. We have worked collaboratively with EGLE to close exposure pathways and receive No Further Action (NFA) letters. These accomplishments are the products of our ability to characterize the impacts, identify complete pathways, mitigate them, and provide thorough reports to EGLE for approval.

3.5 Soil Erosion and Sedimentation Control: Many of Barr's remediation projects have included soil erosion and sedimentation control permits during and following remedial excavation projects. We have experience submitting applications for the SESC permits, as necessary. Barr has several Michigan-based staff who are construction stormwater inspection certified.

ARTICLE 4: PERSONNEL STAFFING

4.1 An organizational chart that includes each person on your project team and their identified roles for a typical assigned project utilizing this technology is provided? ☒Yes ☐No

4.2 Please fill out the following information regarding the personnel your firm considers key to the successful completion of project utilizing this technology

Key Personnel 1

Name: Molly O'Brien Job Title: Senior Environmental Consultant
Labor Classification: L3 (P3) College Degree(s): BS, Geological Engineering, Michigan Technological University, 2000
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 2

Name: Chris Miron, PE Job Title: Vice President, Senior Chemical Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Chemical Engineering, Michigan Technological University, 1988
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 3

Name: Tom Boom, PE Job Title: Vice President, Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): BS, Civil and Environmental Engineering, Michigan State University, 2001
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 4

Name: Katy Lindstrom, PE Job Title: Senior Environmental Engineer
Labor Classification: L4 (P4) College Degree(s): MS, Hydrologic Science and Engineering, Colorado School of Mines, 2009; BS, Environmental Engineering, Michigan Technological University, 2006
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 5

Name: Scott Venman Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): BSE, Chemical Engineering, University of Michigan, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 6

Name: Charlene McGue Job Title: Vice President, Senior Environmental Consultant
Labor Classification: L4 (P4) College Degree(s): MS, Geology/Geophysics, Ohio State University, 1988; BS, Geology, Ohio State University, 1982
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 7

Name: Christene Jones Job Title: Senior Environmental Scientist
Labor Classification: L4 (P4) College Degree(s): BS, Resource Development, Michigan State University, 1993
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 8

Name: Nathan Brandner, PG Job Title: Senior Geologist
Labor Classification: L4 (P4) College Degree(s): MS, Geology, Western Michigan University, 2006 (Geophysics and Hydrogeology specialization); BS, Geology, Central Michigan University, 2003 (Environmental and Hydrogeology specialization)
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 9

Name: Luke Mackewich, PE Job Title: Senior Environmental Engineer
Labor Classification: L3 (P3) College Degree(s): MS, Civil Engineering, Wayne State University, 2011 BS, Civil Engineering, Wayne State University, 2010
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☒Yes ☐No

Key Personnel 10

Name: Allen Reilly Job Title: Senior Environmental Scientist
Labor Classification: L4 (P4) College Degree(s): MES, Environmental Sciences, Yale University, 1989; BA, Biology, Carleton College, 1983
Successfully completed 40 hour HAZWOPER training with an up-to-date 8 hour HAZWOPER refresher training? ☐Yes ☒ No–Completed 40-hour; pending 8-hour refresher.

4.3 Do all the Professional Project Manager (PM) have at least three years experience as a PM? ☒Yes ☐No

4.4 Do all Professional PM have a minimum of 10 years experience with similar projects? ☒Yes ☐No

4.5 Resumes for the key personnel provided? ☒Yes ☐No

ARTICLE 5: SUB-CONSULTANTS/SUBCONTRACTORS
Section not applicable.

ARTICLE 6: SPECIAL FACTORS
Include a brief description of your firm's special qualifications such as awards, recognitions, innovations, etc. pertaining to this technology.
Barr has successfully implemented multiple post-remedial institutional and engineering controls at sites throughout Michigan and has worked with EGLE to receive approval for them. The variety of in-house disciplines at Barr allows us to look at post-remedial strategies through several lenses and choose the ones that make the most sense for the site, for the client, and for protection of human health and the environment.

2023 ISID Expanded Environmental Remediation Experience Summary

Remediation Technology: *Alternative Technologies/Post Remediation Strategies*

Professional's Name: Barr Engineering Co.

Components/Technics: (check all that apply) ☐ Micro and Nanotechnologies ☒ Engineering Controls ☒ Institutional Controls ☒ Alternative Land Reuse ☒ Remediation Process Optimization ☒ Subsurface Imaging Technologies ☒ Risk Management ☐ Drones/Robots/Artificial Intelligence (AI)/Satellites for Monitoring of Remediation Systems ☒ Others.

	Professional	MI Office(s)	Sub-Consultants
1. Number of projects applying this Technology in the past ten (10) years[1]:			
Designed	6+	6	0
Construction Oversight	6+	6	0
O & M	6+	6	0
Closed	6+	6	0
Used Treatment Train	0	0	0
2. Range of cost per project (x$1,000)[1]:			
Design Phase	$5–100	$5–100	0
Construction Phase	N/A	N/A	0
O & M Phase	$5–25	$5–25	0
Total Project Cost	$10–125	$10–125	0
3. Number of the above projects that were[1]:			
Below Budget	0	0	0
On Budget	6+	6	0
Over Budget*	0	0	0
4. Number of staff with more than five (5) years of experience in this technology[1]:			
Licensed Environmental Engineers	4+	4	0
Licensed Civil Engineers	4+	4	0
Licensed Chemical Engineers	2+	2	0
Geologists	6+	6	0
Hydrogeologists	4+	4	0
Licensed Surveyors	1+	0	0
Licensed Electrical Engineers	4+	4	0
Licensed Mechanical Engineers	2+	2	0
Environmental Science	2+	2	0
Biologists	2+	2	0

Note 1: Barr performs thousands of projects each year for our clients, and we have nearly 1,000 engineers and scientists in 12 locations across North America. Approximately 100 of those staff are in Michigan. Since we do not track our projects using the same terminology as listed in the table above, we have provided quantities based solely on our Michigan staff and our Michigan projects. The "Professional" column includes the same information as the "MI Office" column with a "+" sign to demonstrate that we have many more projects and staff that could be included in these areas because Barr works seamlessly across all of our offices to fit the skillsets and experience needed to the project and client. We are confident Barr has the experience needed to successfully complete EGLE's projects in this remediation technology.

*Provide explanation, including strategies implemented to fix the issue:

_____

Attachment C: Personnel list

Name	Title	Location	Classification
Jessica Abraham	Environmental Scientist	Grand Rapids	L1 (P1)
Brian Angerman**	Senior Environmental Engineer	Minneapolis	L4 (P4)
Thomas Barfuss	Environmental Scientist	Grand Rapids	L1 (P1)
Shaughn Barnett	Ecologist	Ann Arbor	L2 (P2)
Diane Biehl	Environmental Scientist	Grand Rapids	L2 (P2)
Thomas Boom**	Vice President, Senior Environmental Engineer	Ann Arbor	L4 (P4)
Lydia Bradley	Geologist	Grand Rapids	L1 (P1)
Nathan Brandner**	Senior Geologist	Grand Rapids	L4 (P4)
Alan Braspenninx	Senior Geoscientist	Grand Rapids	L3 (T3)
William Brodovich	Senior Ecologist	Ann Arbor	L3 (P3)
Randy Christensen	Senior Civil Engineer	Ann Arbor	L4 (P4)
Matthew Comben	Senior GIS Specialist	Ann Arbor	L2 (P2)
William Davidson	Senior Geoscientist	Grand Rapids	L4 (P4)
Andrew Dykstra	Environmental Engineer	Ann Arbor	L2 (P2)
Jamie Edelyn**	Senior Environmental Engineer	Grand Rapids	L4 (P4)
Michael Ellis**	Senior Environmental Engineer	Ann Arbor	L3 (P3)
Kate Fiore	Environmental Engineer	Grand Rapids	L1 (P1)
Karen Hathaway**	Senior Toxicologist	Grand Rapids	L3 (P3)
Craig Held	Senior Environmental Consultant	Ann Arbor	L4 (P4)
David Hibbs	Senior Civil Engineer	Ann Arbor	L4 (P4)
Peter Hinck	Senior Water Resources Engineer	Grand Rapids	L3 (P3)
Christene Jones**	Senior Environmental Scientist	Ann Arbor	L4 (P4)
Jeffery King	Senior Consultant	Grand Rapids	L4 (P4)
Brian Kwiatkoski	Senior Environmental Data Management Technician	Ann Arbor	L1 (T2)
Kathleen Lindstrom**	Senior Environmental Engineer	Ann Arbor	L4 (P4)
Colleen Long	Senior GIS Specialist	Grand Rapids	L2 (P2)
Matthew MacGregor	Senior Environmental Consultant	Grand Rapids	L4 (P4)
Luke Mackewich**	Senior Environmental Engineer	Ann Arbor	L3 (P3)
Alison McClear	Environmental Scientist	Ann Arbor	L1 (P1)
Charlene McGue**	Vice President, Senior Environmental Consultant	Grand Rapids	L4 (P4)
Christopher Miron**	Vice President, Senior Chemical Engineer	Grand Rapids	L4 (P4)
Ethan Morris	Environmental Scientist	Grand Rapids	L1 (P1)
Laurie Beth Nederveld	Senior Ecologist	Ann Arbor	L3 (P3)

Molly O'Brien**	Senior Environmental Consultant	Grand Rapids	L3 (P3)
Terri Olson	Senior Data Quality Specialist	Minneapolis	L3 (P3)
Wei-Shyuan Peng	Senior Groundwater Hydrologist	Grand Rapids	L2 (P2)
Dana Pasi	Senior Environmental Scientist	Minneapolis	L3 (P3)
Virginia Pennala	Senior Ecologist	Grand Rapids	L3 (P3)
Richard Phelps	Senior Environmental Data Management Specialist	Grand Rapids	L2 (P2)
Randall Phillips	Senior Ecologist	Grand Rapids	L3 (P3)
Jacquelyn Plowman	Geologist	Ann Arbor	L1 (P1)
Michael Potter	Senior Geoscientist	Grand Rapids	L3 (T3)
Allen Prince**	Environmental Engineer	Grand Rapids	L2 (P2)
Jose Ramirez	Field Technician	Grand Rapids	L1 (T1)
Sara Ramsden**	Senior Environmental Engineer	Minneapolis	L4 (P4)
Allen Reilly**	Senior Environmental Scientist	Grand Rapids	L4 (P4)
Don Richard**	Senior Civil Engineer	Minneapolis	L4 (P4)
Tiffany Roy	Geologist	Grand Rapids	L2 (P2)
Amir Safi	Water Resources Engineer	Ann Arbor	L3 (P3)
James Sallee	Senior Regulatory Specialist	Ann Arbor	L3 (P3)
Sierra Samie	Environmental Engineer	Ann Arbor	L1 (P1)
Ryan Schipper**	Senior Water/Wastewater Engineer	Minneapolis	L4 (P4)
Anne Schumacher**	Senior Geologist	Grand Rapids	L3 (P3)
Matthew Stone-Palmquist	Senior Landscape Architect/Senior Ecologist	Ann Arbor	L4 (P4)
Isaac TerMolen	Environmental Field Technician	Grand Rapids	L1 (T1)
Fran Thompson	Ecologist	Ann Arbor	L2 (P2)
Scott Venman**	Environmental Engineer	Ann Arbor	L3 (P3)
John Vigna	Senior Environmental Scientist	Grand Rapids	L4 (P4)
Kate Watson	Senior Environmental Engineer	Grand Rapids	L3 (P3)
Ray Wuolo**	Senior Hydrogeologist	Minneapolis	L4 (P4)

** Key Project Personnel

Attachment D: Resumes

Education

BS, Civil and Environmental Engineering, Michigan State University, 2001

Training/Certification

40-hour OSHA HAZWOPER

ASTM Risk-Based Corrective Action Applied at Petroleum Release Sites Course (2006)

Registration

Professional Engineer: Michigan, Illinois

THOMAS BOOM, PE

Vice President, Senior Environmental Engineer

Tom has over 21 years of experience investigating, designing, and implementing solutions for environmental engineering projects, ranging from simple to complex. He specializes in managing complex projects related to contaminated sites, including those that fall within the regulatory framework of Michigan's Part 201, Part 213, and Part 115 rules. A trusted advisor to clients, Tom provides risk management, site assessment, feasibility studies, remedial design, permitting, construction oversight, and monitoring, all while engaging multiple stakeholders. He has served as principal in charge, project manager, and technical lead for a variety of projects that involve due diligence reviews, groundwater and sediment transport modeling, hydrodynamic and hydraulic modeling, geotechnical modeling, habitat and wetland restoration, and structural monitoring.

Project Experience

- Serving as principal in charge for a remedial excavation at a Part 201 former manufactured gas plant (MGP) site in Michigan. Work included site investigation, risk evaluation, plans and specifications, and oversight of a risk based corrective action (RBCA) approved by EGLE. The RBCA included utility management and identification, installation of a soldier pile soil retention system, excavation of approximately 5,300 tons of impacted material, dewatering and offsite disposal of 11,800 gallons of impacted water, and backfilling with clean imported fill. (2022–present)
- Serving as principal in charge for vapor intrusion investigation, monitoring, and closure for chlorinated solvents under a residential building in accordance with an EGLE approved work plan. Work included a vapor extraction pilot test to evaluate remedial options. (2021–present)
- Serving as the principal in charge for remediation of a Part 201 site along the St. Clair River to facilitate redevelopment of the property. The redevelopment efforts required obtaining a Joint Permit from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the United States Army Corps of Engineers (USACE) which was facilitated by Barr. Barr designed mitigation measures required by the permit based on site plans to construct a seawall that would occupy a portion of the St. Clair River and developed a plan for remediating historical impacts as part of redevelopment activities. Both plans were submitted to EGLE and USACE with permit application documents, and a draft permit was obtained. Pre-construction sampling was completed by Barr which included soil, groundwater, and sediment sampling and results were summarized in a report submitted to EGLE. Ongoing work includes coordination with EGLE and USACE to obtain a final permit, construction implementation oversight, verification sampling, and developing a documentation report. (2022–present)
- Serving as principal in charge for evaluating temporary water storage options for a food processing facility in mid-Michigan in accordance with EGLE Part 22 Groundwater Quality rules. Options evaluated included

temporary above-ground storage tanks and ponds with engineered liners. Additionally provided environmental consulting regarding land application of wastewater as a treatment and disposal method. (2021–present)

- Serving as principal in charge of a project to treat groundwater impacted with per- and polyfluoroalkyl substances (PFAS) and high pH levels during the decommissioning of a former power plant in Michigan. Groundwater infiltrating the basement of the power plant needed to be removed on a near-continuous basis, but PFAS and high pH levels were discovered during decommissioning. Barr characterized the impacts and developed a treatment system that allowed decommissioning activities to continue. The recommended PFAS treatment was granular-activated carbon, and carbon-dioxide aeration was recommended for the high pH levels. Barr and a remediation contractor completed bench- and pilot-scale testing before providing turnkey design to allow for the timely employment of the treatment system. Barr led the implementation of the treatment system and collected samples to verify that the effluent water quality met project objectives. Approximately 26.5 million gallons of PFAS-impacted and high-pH water were treated by the treatment system over 18 months. (2019–2021)
- Serving as principal in charge of remedial action evaluations at two coal combustion residual (CCR) landfills in Michigan. The landfills were constructed decades ago near large bodies of water and involve elevated metals concentrations. Work at both sites included investigation, bench testing, options analyses, focused feasibility studies, and remedial action plans. At the first site, a closed, unlined landfill is associated with elevated arsenic in groundwater, creating concern about water quality in the adjacent water body. An existing pump-and-treatment system installed by others was not functioning optimally. The second site is an unlined, partially active landfill with elevated selenium in groundwater. The corrective actions Barr evaluated include monitored natural attenuation, air sparging, pumping and treating, installing reactive barriers, constructed wetland treatment, and source reduction related to the beneficial reuse of CCR. Ongoing work includes finalizing the remedial action plans, conducting detailed design, and construction. (2019–present)
- Serving as principal in charge of a due diligence project for a confidential wind farm partnership to evaluate potential environmental risks within an approximately 20,000-acre project area. The project began with the review of a Phase I prepared by others and coordination with the project stakeholders to pare down a list of parcels with potential environmental concerns from over 200 to about 25. The project continued with the development and execution of a Phase II investigation at eight of the parcels. The project was under a strict deadline and was completed in about a month. (2021)
- Serving as principal in charge and engineer of record (EOR) for the design and construction oversight of a large, combined industrial process water and stormwater ditch. The liner design for the ditch included a geomembrane liner covered with sand and rip-rap armor layers for

protection and a high-visibility fabric to act as a warning layer to equipment operators, should it be exposed during routine maintenance of the ditch. Barr also designed an underflow weir and electrical lighting along a portion of the ditch. The project was successfully constructed while allowing for continuous operation of plant discharge during construction. (2020)

- Serving as principal in charge to support abatement, dismantling, and decommissioning activities at five combustion turbine plants around Michigan. The work involved preparing a bidding package with specifications and construction drawings, assisting the client with bid evaluation, and providing construction support including quick-turnaround environmental sampling when potentially impacted materials were encountered during demolition. At each of the five sites, Barr completed a Phase I environmental site assessment (ESA) and subcontracted regulated material surveys. Based on the findings of the Phase Is, Barr completed Phase II investigations at two of the sites. This information was used to help the client identify risks and to develop construction specifications for worker safety. (2019–2020)
- Serving as project manager and EOR for the investigation, evaluation, design, permitting, and remediation of impacted river sediments adjacent to a former manufactured gas plant (MGP) site on the Flint River in Michigan. This complicated dredging, capping, and habitat restoration project occurred during the Flint water crisis. The project had significant schedule constraints and multiple stakeholders (including the University of Michigan, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Michigan Department of Environmental Quality (MDEQ, now Michigan Department of Environment, Great Lakes, and Energy, EGLE), Michigan Department of Natural Resources, state, county, city, and the river association) involved for most facets of the project. Tom served as primary contact for the client and stakeholders.

  He oversaw the multidisciplinary project team that included more than 200 Barr scientists and engineers performing sediment investigations; geological and groundwater modeling; hydraulic, geotechnical, structural, and civil engineering; odor- and emissions-mitigation design; permitting; and approximately nine months of construction oversight. Barr designed the remedial actions to be protective of human health and the river environment. The work included the removal and capping of impacted sediments while minimizing disruptions to the surrounding neighborhood. The project was successfully completed in 2018. Ongoing work includes groundwater monitoring, river elevation monitoring, and collaborating with the Flint River Restoration team lead by Genesee County. (2012–present)
- Serving as the EOR for the investigation, alternatives analyses, design, and remediation of impacted river sediments adjacent to a historical MGP site in mid-Michigan along the Kalamazoo River. The site was located in an urban setting with significant infrastructure considerations such as submerged and overhead utilities, river walls of varying construction and states of repair, and bridge structures. The sediment remedy consisted of

temporary utility relocation, mechanical and hydraulic dredging, river wall replacement, dewatering, and placement of a sediment cover. No post-remedy sediment analytical sampling was required as a result of Barr's negotiations with regulatory agencies. The site received a "no further action" designation from the MDEQ. (2013–2015)

- Serving as project manager for the investigation, design, and specification development for the remediation of impacted sediments within an industrial pond. The site was an operating production facility that included multiple hazards, large structures and buildings, and safety concerns. This was a fast-turn project due to a release at the pond, which was the main effluent discharge location for the plant, which could not operate with the pond out of service. The remedy included dredging the pond and an impermeable barrier. (2014)
- Serving as project manager for a jet-fuel-release response and remediation at a major international airport. The release shut down portions of the airport during the holidays, so immediate action was required to develop a conceptual site model for remediating potential acute hazards resulting from the release to reopen the airport. Barr led the environmental portion of the cleanup and worked with multiple contractors and stakeholders to assess, investigate, and remediate the release. Barr provided additional value by designing a water remediation system that primarily uses existing infrastructure and negotiating wastewater-discharge standards with the local municipality. The airport reopened and Barr continues to operate and maintain the treatment system. (2014–present)
- Serving as project manager and technical adviser for dredging and dewatering operations during a remedial action in response to a petroleum release on a river. Was on site the next day to provide immediate assistance to the client. Issues with the dredged-sediment material-handling process were slowing production. Potential remedies were communicated to the client that day, leading to follow-up work to evaluate dredging, dewatering, and material-handling alternatives by developing options tables and associated costs on an accelerated schedule. (2015)
- Serving as project manager from 2006–2011 for several large-scale, technically complex sites contaminated with petroleum hydrocarbons. Collectively, the projects have an approximate lifecycle cost greater than $8,000,000. Responsibilities included budget forecasting and management, database management, remedial alternatives evaluations, groundwater monitoring oversight, writing and reviewing a proposal and reports, and providing clients with strategic planning recommendations. Examples of this work include:
  - Designing an upgrade for an existing air sparge/soil vapor extraction (AS/SVE) system to increase source area mass removal at a site in Michigan. A separate bio-sparge system was designed to minimize groundwater impact to an on-site wetland. Upgrading the AS/SVE system included adding two SVE wells and 60 AS points in addition to

replacing the treatment-system trailer with upgraded operational equipment. The bio-sparge system included 40 bio-sparge points. Cost savings were realized during the project by developing a groundwater-sampling program to evaluate mass-flux discharge prior to installing the bio-sparge system. Petroleum-hydrocarbon discharge to the wetland has been minimized.

- Recommending shut off of an AS/SVE system at a site near Sears, Michigan, after monitoring results indicated that the system had reached a point of diminishing returns and it was no longer cost-effective to continue operating it. Performed a remedial alternatives evaluation that indicated that a source-area soil excavation and off-site disposal combined with mixing a chemical oxidant into the saturated soil was the preferred solution to remediate the site. Obtained an MDEQ Part 22 groundwater-discharge permit exemption to mix the chemical oxidant into saturated soil. Provided oversight of construction specifications and work plan.

- Serving as technical lead for the design of an innovative leachate-treatment system designed to treat leachate at a municipal landfill. The leachate-treatment system included two incised lagoons constructed with a double geosynthetic-liner system that were each designed to contain approximately 2,000,000 gallons of leachate and treat 36,000 gallons of leachate per day. The lagoons were designed to reduce biochemical and chemical oxygen demand and promote denitrification under anoxic conditions. Completed construction design drawings and construction specifications and oversaw the bid process. Lagoons were constructed and are operational. (2009–2010)

- Serving as project manager and technical lead for an MDEQ Part 213 site where the responsibilities included interaction with the client and state regulatory agency. Responsible for the design and installation of a source-area AS/SVE system after conducting a remedial alternatives analysis that included cost, system effectiveness, and limitations, and feasibility of implementation. Provided direct oversight and coordination of the remedial system design, construction specifications, procurement of subcontractor agreements, obtainment of an air-discharge permit, installation of the AS/SVE system, and reimbursement from the state agency. Air- and groundwater-sampling results indicated that the remaining mass at the site was reduced by approximately 90 percent since the system was implemented. (2006–2011)

Publications

Boom, T., M. Ellis and D. Richard. “Designing and implementing an urban river remediation.” Remediation. Volume 29, Issue 4, Autumn 2019: 93–105.

Education

BS, Chemical Engineering, Michigan Technological University, 1988

Training/Certification

40-Hour HAZWOPER Training and 8-Hour Annual Refresher Courses (29 CFR 1910)

24-Hour MSHA Surface Miner Training, Experienced Miner Training and 8-Hour Annual Refresher Courses (30 CFR Part 48)

Certified Storm Water Operator, Construction Sites, Michigan

Registration

Professional Engineer: Michigan, Ohio, Kentucky, Pennsylvania

Affiliations

American Institute of Chemical Engineers, Environmental Division

CHRISTOPHER A. MIRON, PE

Vice President, Senior Chemical Engineer

Chris has over 30 years of experience completing projects involving engineering design and the implementation of environmental remediation, brownfield redevelopment, decommissioning and demolition, and water treatment. Chris performs, coordinates, and is responsible for quality assurance and quality control for engineering design activities. In addition, he leads project teams in managing and administering the construction, operation, and maintenance of treatment systems.

Chris' primary expertise is in the design, testing, evaluation, and construction of soil, groundwater, air, and wastewater treatment systems. He also has experience with design and construction of passive and traditional barrier systems to prevent migration of impacted groundwater. Chris is regularly involved in initial evaluations of remedial options for sites with environmental contamination, bench- and pilot-scale testing of treatment technologies, and design and construction of treatment or remediation processes. He has worked as lead engineer in obtaining surface water, groundwater, and air discharge permits and has prepared feasibility studies, permit applications, and detailed design documents for several sites under the jurisdiction of the U.S. EPA Superfund program. Chris has also managed design and construction of environmental controls at sites in accordance with Michigan's Parts 201 and 213 and administrative agreements and covenants not to sue (CNTS) under Part 201.

He has led project teams in designing and constructing full-scale soil and groundwater treatment systems that employ technologies such as air stripping with and without air emission controls, steam stripping, adsorption, groundwater sparging, soil vapor extraction (SVE), soil flushing, in-situ biological degradation, and in-situ chemical oxidation. Chris has also designed and implemented engineering controls to support brownfield redevelopment projects, including soil-bentonite and grouted sheet pile groundwater flow barriers, vapor barriers, and sub-slab depressurization systems to mitigate intrusion of volatile organic compounds (VOCs) to indoor airspace, and sealed stormwater conveyances to prevent infiltration of contaminated groundwater to storm sewer systems. Chris has also developed protocols for and implemented bench- and/or pilot-scale testing of air and steam stripping, vacuum-enhanced steam stripping, adsorption, soil flushing, SVE, groundwater sparging, metals precipitation, chemical oxidation, and oil separation.

Project Experience

- *Grand Rapids Community College, Tassell M-TEC Facility, Grand Rapids, MI (2001-2004):* Leading a project team to complete environmental engineering and construction activities to support redevelopment of a former manufactured gas plant (MGP) disposal facility to construct a new vocational training center for a community college in Grand Rapids, Michigan. Chris' activities in relation to this project included developing and implementing cost allocation and tracking scenarios in support of

state grant funds obtained by the community college in support of the property redevelopment and obtaining EGLE (then MDEQ) affirmation of a baseline environmental assessment (BEA) for the property, and assisting in implementation of the necessary environmental controls to redevelop the property in a manner compliant with the requirements of Michigan's Part 201. Engineering controls employed during construction included sealed storm sewer systems, a polymeric vapor barrier underlying the building footprint to mitigate intrusion of volatile organic contaminants to indoor airspace, and a site-perimeter ambient-air monitoring program to control exposure to workers and residents of adjacent residential properties. Chris was responsible for interacting with the community college's design team to relate environmental requirements and make sure these requirements were implemented during construction. He also led a design and construction team to accomplish "turnkey" installation of the vapor barrier and certification of vapor barrier construction.

- *W.K. Kellogg Institute for Cereal Research, Battle Creek, MI (1995-2014):* Leading a project team in the implementation of requirements of a CNTS to facilitate redevelopment of a 15-acre site of environmental contamination in Battle Creek, Michigan. Also led a project team in concurrently implementing a separate administrative agreement for a corrective action to facilitate site redevelopment on the same property in response to a release from an underground storage tank (UST). Fulfillment of the requirements of these agreements included design and construction of a groundwater extraction and treatment system to preclude migration of impacted groundwater, development of a comprehensive residuals management plan and site health and safety plan for the redevelopment construction activities, and oversight of implementation of these plans at the site. We also worked with the MDEQ and the responsible party to ultimately achieve a monitored natural attenuation closure of the UST release under Michigan's Part 213.
- *Owosso Inn & Conference Center, Owosso, MI (1996-97):* Leading a team of design engineers in the development and implementation of environmental controls to facilitate redevelopment of a former industrial property in Owosso, Michigan, to construct a new hotel and conference center facility. Engineering activities at the site included development of detailed design documents and construction of a polymeric vapor barrier underlying the building to mitigate intrusion of volatile organic constituents to indoor airspace, a soil-bentonite slurry wall at the perimeter of the property to prevent migration of impacted groundwater, and a groundwater collection and treatment system to augment the slurry wall by creating an inward hydraulic gradient. He also participated in negotiations and communications with EGLE (at that time MDEQ) regarding investigation results, conceptual designs, detailed designs, estimated costs, and construction of the environmental controls.
- *CHEMCENTRAL NPL Site, Wyoming, MI (1991-1994):* Leading a team of engineers and environmental professionals in implementing engineering aspects of a remedial design and remedial action (RD/RA) work plan at a Superfund site. Consistent with the requirements of the work plan,

engineering activities at the site have involved pilot-scale testing of SVE, designing a full-scale system, and expanding an existing groundwater collection and treatment system. In addition, detailed performance modeling of an existing on-site regenerable vapor-phase activated-carbon adsorption system was performed. This modeling was based on ideal adsorbed solution theory and Polanyi theory and was used to demonstrate the effectiveness of the emission control device in treatment of off-gases from the SVE system. Also assisted with negotiations with the U.S. EPA regarding various aspects of the engineering design and implementation.

Education

MS, Geology/Geophysics, Ohio State University, 1988

BS, Geology, Ohio State University, 1982

Training/Certification

40-hour HAZWOPER Training (EPA 29 CFR 1910) and Annual 8-Hour Refresher Courses

CHARLENE A. McGUE

Vice President, Senior Environmental Consultant

Charlene has 35 years of experience in environmental science and consulting. She has extensive experience in the development of comprehensive closure strategies and plans for sites of environmental contamination including the planning and implementation of remedial investigations, risk assessments, interim response actions, remedial response actions including active remediation technology and engineering and institutional controls, operation and maintenance, and monitoring.

Charlene's technical strengths include characterizing contaminated sites through environmental sampling of groundwater, soil, soil-gas, surface water, and sediment; evaluating environmental contamination under Michigan's land-use-based cleanup criteria; design and evaluation of aquifer tests; evaluation of groundwater flow systems; and the evaluation of contaminant fate and transport including natural attenuation. She is experienced in the assessment of the vapor intrusion exposure pathway; the documentation of mixing zones to assess the groundwater/surface-water interface pathway; and the evaluation of light nonaqueous-phase liquid (LNAPL) recoverability. She is also experienced in the conceptual design of soil and groundwater remedial systems and free product recovery systems.

Charlene's knowledge of state and federal regulations such as Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and Michigan's NREPA 1994 P.A. 451 is valuable in planning investigations and risk assessments that support cleanup and closure within these programs.

Charlene is experienced in standard and innovative investigative techniques and has extensive hands-on field experience in all aspects of geophysical investigations. She is a specialist in the full range of geophysical methods applied to evaluate contaminants in the environment and to detect and map contaminant plumes, geologic features, buried structures, and waste materials.

Project Experience

- Serving as project manager, principal in charge, and senior hydrogeologist in the development and implementation of a Michigan Department of Environmental Quality (MDEQ) approved remedial action plan and site closure under Part 201 for a former 110-acre industrial area at McCoy Creek Industrial Park, Buchanan, Michigan. The site, which is located along both sides of a scenic and recreational stream in southwest Michigan, has a long industrial history that includes releases of chlorinated hydrocarbons, petroleum hydrocarbons, polychlorinated biphenyls (PCBs), semi-volatiles, and metals. The site is now a modern industrial park on municipal development authority property and includes machine services. The closure for a significant portion of the site is being upgraded for residential use, requiring additional assessment of the direct contact and vapor intrusion (VI) pathways. (Ongoing)

Responsibilities included:

- Developing and implementing work plans to characterize environmental impacts at the site and to evaluate the potential risks posed by these impacts in the context of current and planned future site use as an industrial park with a recreational green belt bordering the stream. Developed and directed the implementation of a response action plan (RAP) that addressed groundwater venting to the stream, recreational direct-contact exposures along the stream, LNAPL recovery, and potential vapor intrusion to indoor air exposures, as well as source control measures. Response actions to address venting groundwater included a mixing-zone evaluation and excavation and off-site disposal of source materials and construction and operation of a purge well barrier to prevent venting of groundwater exceeding mixing-zone-based criteria. An LNAPL assessment in accordance with ASTM methods was performed after closure to support discontinuing LNAPL recovery.
- Served as senior hydrogeologist in the design of a system of horizontal wells to control venting groundwater that exceeded mixing-zone-based criteria in three areas of the site. Submitted the documentation of remedial action plan implementation for the site in the form of a closure report and received approval from the Michigan Department of Environmental Quality (MDEQ).
- Most recently, reviewed system performance and site conditions to petition for shutdown of horizontal groundwater extraction wells and closure without further O&M and monitoring.

- Serving as principal in charge and senior hydrogeologist in the development and implementation of a response activity plan (ReAP) for remedial investigation of a former fill area adjacent to the McCoy Creek Industrial Park, Buchanan, Michigan. Investigation activities included an evaluation localized drainage and groundwater seeps to the nearby creek, passive soil gas sampling to identify potential hot spots in the fill, follow-up investigation of hot spots, and groundwater sampling to evaluate groundwater/ surface water interface pathway. Prepared a remedial investigation, conceptual site model, and risk evaluation report to support a No Further Action (NFA) report for EGLE approval. (2020–present)
- Serving as project manager, principal in charge, and senior hydrogeologist for remedial investigation, risk assessment, feasibility studies, and remedial design for cleanup and closure under Part 201 of Michigan's NREPA 1994 P.A. 451, as amended, at a former tannery site in Whitehall, Michigan. The tannery was located on a popular recreational lake. Designed and implemented several focused investigations of soil, groundwater, and wetland sediment quality in support of a site-specific risk assessment. Directed the performance of several interim response activities, including design of a shoreline stabilization remedy for a portion of the property; design, installation, and operation of an air-sparging system along the shoreline to strip volatile organic compounds (VOCs) and promote precipitation of dissolved arsenic contaminants in

groundwater that previously vented to the lake; excavation of waste water sludge from several filled lagoons and two extensive wetlands (removal of approximately 200,000 tons of material); restoration of the wetlands; location of buried drum debris using geophysical methods and excavation of those materials; investigation of utility and sub-slab conditions in conjunction with demolition of the tannery facility; and removal of subsurface waste materials, including tannery waste and impacted soils. Also developed an MDEQ-approved closure for the site to facilitate residential redevelopment. (Ongoing)

- Serving as project manager, principal in charge, and senior hydrogeologist for remedial investigation to delineate source areas and plumes containing chlorinated VOCs and follow-up work to design the expansion of an operating groundwater capture system at a former heavy equipment manufacturing facility in Michigan. The investigation activities included vertical aquifer profiling, passive soil gas sampling, and installation and sampling of soil gas wells to delineate the plume and evaluate the VI pathway for potential off-site residential receptors. A suspected source area was investigated, using direct push methods and an Ultra-Violet Optical Screening Tool (UVOST) laser induced fluorescence (LIF) system to map non-aqueous phase petroleum hydrocarbons contained in chlorinated solvent hydrocarbons. The source characterization information is currently being evaluated to develop a plan for source excavation and Barr recently designed an expansion of the groundwater capture system to include eight additional purge wells. Barr operates and maintains the groundwater capture system which includes removal of chlorinated VOCs using an air stripper. (Ongoing)
- Serving as the senior scientist responsible for preparing and implementing project plans for a RCRA facility investigation (RFI) for a confidential client in Michigan. The work included collecting and evaluating the existing environmental and site history information to design the scope of the RFI. This included preparing an existing conditions report, quality assurance project plan (QAPP), sampling and analysis plan, health and safety plan, and project management plan. The RFI work plan included development of an agreement with the MDEQ to expedite the project through corrective measures by allowing review of the RFI results and completion of a risk assessment and preparation of a corrective measures implementation plan without separate report submittals. The corrective measures implementation plan is currently being implemented and includes a right-of-way alternative institutional control, a demonstration of groundwater under control, and an assessment of the vapor intrusion pathway including response activities to excavate source materials and implement engineering controls to mitigate potential VI exposures via sub slab depressurization and HVAC controls. (Ongoing)
- Working with a county landfill operator in Michigan to develop an MDEQ-approved RAP under Parts 115 and 201. The RAP was prepared in partial fulfillment of the landfill's obligations specified in a consent order with the MDEQ to address the detection of volatile organic compounds and metals in off-site monitoring wells in a residential area. RAP development

included completion of certain elements of the remedial investigation, risk assessment, and assessment of corrective measures that the MDEQ did not accept from a previous consultant. This work included design and implementation of a study to establish site-specific background criteria for metals and investigation to complete the delineation of off-site contaminants in two aquifers underlying the residential area. The landfill had been attempting to control off-site migration of contaminants in the uppermost aquifer using an extensive system of groundwater purge wells located along the landfill property perimeter. Directed the evaluation of the system's ability to achieve capture in a thin aquifer along more than 3,000 feet of perimeter. Oversaw the subsequent system upgrades and developed a monitoring and operational plan to assure and document that the system achieves complete capture as required under the RAP. Also worked with the landfill representatives to improve communication with MDEQ and the public and assisted the landfill in fulfilling the final RAP requirements through negotiations for a combination of individual restrictive covenants and a local "notice ordinance" to address the residual off-site contamination. Follow-up work is ongoing to evaluate potential off-site migration of methane into the adjacent residential area, including the use of isotopic analyses to identify the source of the methane detected in the residential area. (2008–2016 with ongoing O&M and monitoring)

- Serving as the lead hydrogeologist and project manager for an investigation into the release of chloride brine from a series of lagoons to the underlying aquifer for a food-processing operation in Michigan. The investigation successfully mapped the plume using geophysical techniques. A long-term interim RAP was developed based on these results and groundwater monitoring is ongoing to document plume stability. (Ongoing)
- Performing a supplemental remedial investigation to determine if groundwater impacted by chlorinated organic constituents (including trichloroethylene) is venting to a wetland/bayou located downgradient of two former manufacturing facilities in Spring Lake, Michigan. Based on contaminant concentrations adjacent to the wetland, the MDEQ was requiring that the former manufacturers implement remedial response actions to protect the wetland. The investigation included the installation of several piezometer nests within the wetland to evaluate hydraulic conditions. Results of the investigation demonstrated that impacted groundwater in the underlying aquifer does not vent to the wetland due to the presence of a peat aquitard. Results of the study showed that groundwater flows beneath the wetland to the Grand River, a less sensitive receptor having a much greater capacity for mixing. Assisted the manufacturer in applying for a mixing-zone determination and follow up groundwater monitoring to demonstrate that active remedial response is not necessary to address venting groundwater. (2007–2015)

Education

BS, Environmental Engineering, Michigan Technological University, 1994

Training/Certification

Risk-Based Corrective Action Applied at Petroleum Release Sites (ASTM Standard ES 1739)

40-hour HAZWOPER Training (EPA 29 CFR 1910) and Annual 8-Hour Refresher Courses

Registration

Professional Engineer: Michigan

State of Michigan Certified Operator (A-2d – Air Stripper and B-3b – Carbon Adsorption)

JAMES N. EDELYN, PE

Senior Environmental Engineer

Jamie has 25 years of experience in a variety of environmental and engineering projects. He frequently performs the engineering aspects of environmental projects and coordinates those tasks with other team members. This typically involves developing design plans and specifications, coordinating and contracting with implementing contractors, leading project kick-off and progress meetings, and directing work activities including office support for field personnel performing oversight.

Jamie works primarily in the design, testing, evaluation, and construction of soil and groundwater treatment systems that typically employ physical and chemical separation processes. He has also been involved with restoration activities following soil excavation activities, including wetland restoration.

Jamie has been involved with the design of a hydraulic barrier system, sealed storm sewer systems, groundwater extraction and interceptor trench system, treatment system operation and maintenance, transmission and discharge piping, discharge/outfall devices, and vapor intrusion mitigation systems. He has also been involved with field oversight of construction activities, including management and certification of construction.

Project Experience

- Preparing a response activity plan (ReAP) outlining a scope of work for additional remedial investigation activities in a former fill area at a former industrial park in Buchanan, Michigan. Investigation activities included an evaluation of surface features to evaluate localized drainage and groundwater seeps to a nearby surface water body, passive soil gas sampling to identify potential "hot spots," follow-up soil borings to evaluate "hot spot" areas, and groundwater investigation to evaluate groundwater/ surface water interface pathway. On completion of the additional investigation activities, assisted with the completion of a remedial investigation, conceptual site model, and risk evaluation report outlining proposed next steps to be implemented, documented, and submitted as a No Further Action (NFA) report for EGLE approval. (2020–present)
- Design, contracting, and construction oversight of a sub-slab depressurization system (SSDS) to mitigate vapor intrusion within an existing manufacturing facility in Hastings, Michigan. The SSDS system consisted of the installation of eight vapor extraction points connected to three blower units rated at 200 CFM of airflow at 0-inches of water column. (2020–2022)
- Design and construction oversight of an SSDS and vapor barrier system to mitigate vapor intrusion implemented during construction of a new 12-story hotel in Grand Rapids, Michigan. The SSDS included installation of 6-inch diameter perforated piping over an approximately 10,000 square foot area and riser piping to the roof where it was connected to a blower rated at 250 CFM of airflow at 5-inches of water column. (2019-2021)

- Assisting with the development and implementation of excavation-based remedy to remove tannery-related materials from former wastewater lagoons, wetlands, and upland areas at a former leather tannery site in Michigan. Activities included the removal of approximately 200,000 tons of material from the site. Assisted with design and restoration of a 5.37-acre wetland and 0.33 acres of new wetland as an emergent/open water wetland using a series of low-profile wetland berms to improve habitat diversity. Current activities include quarterly groundwater sampling and periodic requests for updates to the mixing zone-based groundwater/surface water interface criteria. (2009–present)
- Assisting with development and implementation of excavation-based remedy of PCB-impacted soils within an expedited timeframe to facilitate redevelopment of an abandoned industrial site into a retail complex. Assisted in preparation of a self-implementing PCB cleanup work plan that was submitted to U.S. EPA Region 5. PCB remediation activities were completed within a few months to facilitate construction of the retail complex. (2008–2010)
- Preparing an assessment of corrective measures (ACM) for a county-owned landfill operator in Michigan. As part of the ACM, the on-site extraction and treatment system was evaluated based on the ability to achieve capture along more than 3,000 feet of the site perimeter. Work included the design and installation of system upgrades and development of monitoring and operating plans. Assisted in the development of a RAP for the site. Ongoing support of monitoring program (2007–present)
- Completing a groundwater extraction, treatment, and re-injection system at a former industrial park in Buchanan, Michigan. Work included the preparation of design and bid specifications and procurement of system components for three separate groundwater extraction trenches installed to a depth of twenty-five feet. Provided oversight of construction activities to assure compliance with the specifications. The objective of the system was to mitigate venting of groundwater with an elevated pH as well as groundwater containing barium, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs) to a nearby surface-water body. Extracted groundwater from each of the trenches was routed to a treatment building and returned to injection wells located hydraulically upgradient of the extraction devices. Groundwater treatment was accomplished using several treatment technologies, depending on the specific constituents that were removed from the extracted groundwater. Extracted groundwater from the area of barium impact was treated using a specialty ion exchange resin to remove barium and subsequently treated utilizing granular activated carbon (GAC) adsorption to remove VOCs. Extracted groundwater from the VOC-impacted area was treated via GAC adsorption to remove VOCs. Oversaw operation and maintenance of the system to ensure performance objectives and standards were met and subsequently oversaw system decommissioning after operation was no longer required. (2004 –2021)

Education

MS, Environmental Engineering, Michigan State University, 2011

BS, Civil Engineering (Environmental Concentration), Michigan State University, 2010

Registration

Professional Engineer: Michigan

Training/Certification

OSHA 40-hour HAZWOPER certification, including annual eight-hour refreshers

Certified EGLE Construction Stormwater Operator/Soil Erosion Inspector

MICHAEL J. ELLIS, PE

Senior Environmental Engineer

Mike has more than 11 years of experience working on complex environmental remediation projects involving multidisciplinary teams. His work focuses on evaluating remediation options by conducting feasibility studies and coordinating stakeholder collaboration; developing remedial action work plans; permitting; and designing and implementing remedial actions. He manages multidisciplinary project teams, works with regulatory agencies on timely permit approvals, provides hands-on construction management, and collaborates with contractors to facilitate successful project implementation.

Project Experience

- Serving as the project manager in the evaluation of due care compliance for a Superfund/Michigan PFAS Action Response Team (MPART) site in southeast Michigan. Results from previous investigations completed as part of the property acquisition, along with more recent investigations by the Environmental Protection Agency (EPA), indicate concentrations of chlorinated solvents in groundwater greater than volatilization to indoor air screening levels, and Barr's role on the project has been to further evaluate the volatilization to indoor air pathway for existing structures that are used by operating businesses on the property. A review of historic site data was conducted to complete a site-specific volatilization to indoor air screening criteria request to the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Ongoing work includes assessing recent sub-slab soil gas and indoor air results to site-specific criteria and developing an approach for documenting due care compliance. (2023–present)
- Serving as the project manager in the evaluation of remedial alternatives and design of a remedial action to control an ongoing source of per- and polyfluoroalkyl substances (PFAS) to groundwater from a former fire-fighting foam testing area at a Part 201 site. Remedial alternatives evaluated included assessing cutoff wall options around the source area and low-permeability cap options that would limit infiltration within the source area. Results of the evaluation indicated a soil/bentonite wall with a geomembrane cap would control the ongoing source of PFAS to groundwater at the site. Design data collection activities were completed to gather additional information needed in the design, and information was used to develop a Response Action Plan for implementing the project. Ongoing work includes remediation design, permitting, and construction. (2022–present)
- Serving as the project manager for remediation of Part 201 site along the St. Clair River to facilitate redevelopment of the property. The redevelopment efforts required obtaining a Joint Permit from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the United States Army Corps of Engineers (USACE) which was facilitated by Barr. Barr designed mitigation measures required by the permit based on site plans to construct a seawall that would occupy a portion of the St.

Clair River and developed a plan for remediating historical impacts as part of redevelopment activities. Both plans were submitted to EGLE and USACE with permit application documents, and a draft permit was obtained. Pre-construction sampling was completed by Barr which included soil, groundwater, and sediment sampling and results were summarized in a report submitted to EGLE. Ongoing work includes coordination with EGLE and USACE to obtain a final permit, construction implementation oversight, verification sampling, and developing a documentation report. (2022–present)

- Serving as a senior technical advisor in the closure of test basins used in a previous pilot-study to mitigate per- and polyfluoroalkyl substances (PFAS) impacts in groundwater at a former paper mill and Part 201 site. Work included development of a work plan for review and approval by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), coordinating with contractors to assess constructability of closure actions, and development of technical specifications and a bid package for the work. Ongoing work includes background sampling, construction implementation oversight, and verification sampling. (2022–present)
- Serving as the project manager in the evaluation and source removal design of per- and polyfluoroalkyl substances (PFAS) at a manufacturing facility in Michigan. The industrial discharge from the manufacturing facility was identified as a source of PFAS to the receiving municipal wastewater treatment plant through a state-led sampling initiative, and the facility was requested to further evaluate and reduce its loading of PFAS to the receiving municipal wastewater treatment plant. Barr's role included reviewing current and historical processes at the facility, along with historical sampling results, to develop a targeted evaluation of the source of PFAS. Through targeted sampling and implementation of temporary flow monitoring devices, a primary source of PFAS, estimated to contribute approximately 95 percent of the PFAS mass loading in the effluent, was identified. Barr worked with the facility to develop a source removal scope that would remove a significant mass of PFAS while minimizing downtime for the facility, however, the facility ceased operations and was decommissioned prior to source removal activities being implemented. (2021–2023)
- Evaluating alternative vapor intrusion (VI) mitigation efforts for multiple buildings at a Part 201 site where groundwater is impacted with volatile organic compounds. Due to site-specific constraints, traditional VI mitigation efforts (e.g., sub-slab depressurization) were not appropriate for multiple buildings at the site. Alternative VI mitigation measures were evaluated and a work plan for implementing alternative VI mitigation measures for select buildings on-site was submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Barr coordinated with EGLE to achieve approval of the work plan, and ongoing work includes procuring contractors to implement the prescribed measures, construction implementation oversight, verification sampling, and developing a documentation report. (2022–present)

- Leading multidisciplinary teams, and serving as the project manager of select projects, in the evaluation of alternatives to address impacted groundwater from coal combustion residual (CRR) landfills. Work included investigation, bench testing, options analyses, focused feasibility studies, and remedial action plans. Corrective actions Barr evaluated include monitored natural attenuation, air sparging, pumping and treating, installing reactive barriers, constructed wetland treatment, and source reduction related to the beneficial reuse of CCR. Ongoing work includes finalizing the remedial action plans, conducting detailed design, and construction. (2019–present)
- Leading a multidisciplinary team in the evaluation of remedial alternatives to mitigate oil sheens and polychlorinated biphenyls (PCBs) in sediments in a former cargo ship slip on the Great Lakes. Investigations were conducted to assess the magnitude and extent of impacted sediments, including a study to evaluate the generation of oil sheens from ebullition throughout the slip. Information from investigation activities was used to develop a conceptual site model and establish remediation objectives based on state and federal guidelines. A feasibility study was conducted, following Interstate Technology Regulatory Council guidelines, to assess a remediation method best suited for accomplishing the remediation objectives. Ongoing work includes design data collection, remediation design, a remediation work plan, and construction. (2021–present)
- Serving as the primary field engineer for a large-scale earthwork project that entailed making improvements to a former quarry so it could accept coal combustion residual (CRR) waste. Mike's role on the project included reviewing contractor submittals; serving as the primary construction quality inspector; detailed review of as-built drawings and survey data; reviewing and tracking construction quality assurance testing; coordinating with the implementing contractor when testing results did not align with project requirements; conducting on-site inspections of the work to assess potential deficiencies; and resolving construction issues with the owner and implementing contractor. (2020–present)
- Serving as a project engineer and primary field engineer for the design and construction oversight of a large, combined industrial process water and stormwater ditch. The liner design for the ditch included a geomembrane liner covered with sand and rip-rap armor layers for protection and a high-visibility fabric to act as a warning layer to equipment operators, should it be exposed during routine maintenance of the ditch. The design also included an underflow weir and electrical lighting along a portion of the ditch. Mike's role included development of technical specifications; serving as the primary construction quality inspector; reviewing and tracking construction quality assurance testing; conducting on-site inspections; and resolving construction issues with the owner and implementing contractor. The project was successfully constructed while allowing for continuous operation of plant discharge during construction. (2020)
- Serving as the project manager in the evaluation, design, and implementation of a water treatment system that was used to treat per-

and polyfluoroalkyl substances (PFAS) and high pH levels during decommissioning of a former power plant in Michigan. Groundwater infiltrating the basement of the power plant needed to be removed on a near-continuous basis, but PFAS and high pH levels were discovered during decommissioning. Barr characterized the impacts and developed a treatment system that allowed decommissioning activities to continue. The recommended PFAS treatment was granular-activated carbon, and carbon-dioxide aeration was recommended for the high pH levels. Barr and a remediation contractor completed bench- and pilot-scale testing before providing turnkey design to allow for the timely employment of the treatment system. Barr led the implementation of the treatment system and collected samples to verify that the effluent water quality met project objectives. Approximately 26.5 million gallons of PFAS-impacted and high-pH water was treated by the treatment system over 18 months. (2019–2021)

- Evaluating solid-phase per- and polyfluoroalkyl substances (PFAS) impacts from a former manufacturing process and designing a remediation method to facilitate redevelopment of the building. Historical operations at the site resulted in residual, solid-phase PFAS impacts on interior building components such as the concrete floor, steel beams, walls, and ceilings. Impacts were evaluated collection of wipe and solid-phase samples and results were used to develop potential remediation approaches to mitigating impacts in the interior of the building. Mike led a bench-scale testing effort at the facility to evaluate the proposed remediation approaches, including detailed documentation of methods and results. Results from the study identified a suitable remediation approach for mitigating solid-phase impacts in the building that was approved by the regulatory agency. Ongoing work includes the development of technical specifications for construction and implementation. (2019–present)
- Leading a multidisciplinary team in the evaluation, design, permitting, and implementation of a sediments remediation project adjacent to a former manufactured gas plant (MGP) and Part 201 site on the Flint River in Michigan. The design included a wetland mitigation strategy; hydraulic, geotechnical, and groundwater modeling; water treatment; structural engineering and development of a structural monitoring plan; riverbank armoring and stabilization; restoration of greenspace and park infrastructure; and an odor- and emissions-mitigation plan. Mike participated in collaboration efforts with project stakeholders, including the U.S. Environmental Protection Agency; U.S. Army Corps of Engineers; Michigan Department of Environment, Great Lakes, and Energy (EGLE); Michigan Department of Natural Resources (MDNR); and state, county, and city officials. Through collaborative efforts, he led the design team in developing a design for the Joint Permit Application that was agreeable to the applicable regulatory agencies, which facilitated a timely permit approval process.

  Mike served as owner's engineer during the project's construction and as the main point of contact with the primary contractor. He facilitated

collaboration with the contractor, allowing for successful implementation of the project. In 2019, EGLE issued a certificate of project completion for the project. (sediments remediation project: primarily 2016–2018; other aspects of the project: 2011–present)

- Leading a multidisciplinary team in the evaluation, design, and remediation of impacted river sediments adjacent to a historical MGP and Part 201 site along the Kalamazoo River in mid-Michigan. He participated in collaboration efforts between project stakeholders, including U.S. Environmental Protection Agency; U.S. Army Corps of Engineers; EGLE; MDNR; and state, county, and city officials, which resulted in a timely permit approval process.

  Mike served as owner's engineer during construction of the project and the main point of contact with the primary contractor. Collaboration with the contractor allowed for successful implementation of the project. The site received a No Further Action designation from EGLE, due in part to this remediation effort. (sediments remediation project: primarily 2014–2015; other aspects of the project: 2011–2016)

- Mike's other work at Barr has included:
  - Coordinating wetland delineation and threatened and endangered species reviews for proposed construction projects.
  - Leading Joint Permit and Soil Erosion and Sedimentation Control permit applications.
  - Collaborating with project stakeholders to secure required permits and approvals.
  - Reviewing contractor submittals during remedial actions.
  - Coordinating with contractors to make field adjustments to designs based on site conditions.
  - Developing cost estimates for remedial actions and life cycle costs for long-term remediation projects.
  - Assisting with the development of feasibility studies to evaluate remedial alternatives.
  - Supporting the development of remedial action work plans sent to EGLE.
  - Developing technical specifications and construction plans.

Publications

Boom, T., Ellis, M., and Richard, D. "Designing and implementing an urban river remediation." *Remediation*. Volume 29, Issue 4, Autumn 2019: 93–105.

Kostić, T., Ellis, M., Williams, M., Stedtfeld, T., Kaneene, J., Stedtfeld, R., and Hashsham, S. "Thirty-minute screening of antibiotic resistance genes in bacterial isolates with minimal sample preparation in self-dispensing 64 and 384 assay cards." *Applied Microbiology and Biotechnol*ogy. 99, 7711–7722 (2015).

Presentations

Ellis, M., BinAhmed-Menzies, S., Boom, T., and Carney, L., 2023. "An Evaluation of Microplastics as Vectors for Contaminants in Sediments" Presentation at the 2023 Battelle Sediments Conference.

Ellis, M., Vermace, B., Lund, E., McCabe, A., and Wolohan, K., 2023. "PFAS-Impacted Solids: How Lessons Learned from the Wastewater Industry Can Apply to Sediments Projects" Poster at the 2023 Battelle Sediments Conference.

Ellis, M., Helminski, T., 2022. "The Integrated Toolbox Needed to Respond to PFAS Investigation Requests" Webinar presentation for the Michigan Chemistry Council.

Ellis, M., 2022. "Characterizing and Mitigating PFAS at Manufacturing Facilities" Presentation at the 2022 Michigan Water Environment Association Annual Conference.

Ellis, M., 2022. "Characterizing and Mitigating PFAS at Manufacturing Facilities" Presentation at the 2022 Michigan Environmental Compliance Conference.

Ellis, M., Boom, T., and Santini, D., 2019. "Sediment Cap Design, Modeling, and Construction at a Former MGP Site" Presentation at the 2019 Great Lakes Remediation and Redevelopment Conference.

Ellis, M., Boom, T., and Santini, A., 2019. "Construction Quality Assurance during Environmental Dredging and Capping Projects" Poster at the 2019 Battelle Sediments Conference.

Kolstad, D., Ellis, M., Boom, T., Collins, J., and Welch, M., 2019. "Sediment Cap Design, Modeling, and Construction" Presentation at the 2019 Battelle Sediments Conference.

Ellis, M., Partch, G., Boom, T., and Jones, C., 2015. "Designing Dredge Prisms to Remove Impacted Sediments While Protecting Infrastructure" Presentation at the 2015 Midwest Chapter Western Dredging Association Conference.

Education

BS, Resource Development, Michigan State University, 1993

Training/Certification

40-hour HAZWOPER certification (1995), 8-hour annual updates

CHRISTENE JONES

Senior Environmental Scientist

Christene has nearly 30 years of experience in the areas of site assessment, investigation, remediation, risk assessment, and Michigan regulations. She focuses on helping clients develop strategies to reach long-term goals, implementing these approaches, and facilitating negotiations to obtain consensus from regulatory agencies. Christene's project work has included historical research, preparation of site-specific sampling plans, site assessment and investigation, and remediation planning and execution, primarily for sites in Michigan. She served on the Michigan Department of Environmental Quality's Part 201 Discussion Group (complexity subgroup, 2006–2007), facilitated the Effective Solubility work group (in 2008–2009), and served on Technical Advisory Group 2 to the Criteria Stakeholder Advisory group (2014). More recently, Christene participated in per- and polyfluoroalkyl substances (PFAS) work group and industry meetings and provided guidance to Barr teams on Michigan PFAS regulations.

Project Experience

- Overseeing and conducting tasks for enhanced Phase I ESAs for two industrial properties for a confidential client. In addition to meeting the ASTM standard, the scope of work included evaluating information obtained from the client's in-house chemical use, spill, and waste databases. (2022–present)
- Developing a strategy for approaching a client's role as a potentially responsible party in a Great Lakes Legacy Act sediment remediation project. Led a team to evaluate data and multiple lines of evidence, recommended a path forward, developed a suggested allocation method, and prepared an allocation position to communicate to the third-party allocator. (2015–present)
- Preparing an approach to evaluating chlorinated solvent groundwater contamination at a municipal landfill site with co-mingled plumes, with the objective of moving to a remedial design. Providing senior-level guidance through site investigation and preparation of a focused feasibility study evaluation. (2018–present)
- Identifying publicly available information sources in several states, leading a team, and identifying potential sources of PFAS impacts by accessing and evaluating publicly available information. Summarized findings to support legal team needs in preparing for litigation and identified the status of PFAS regulations to support project work. (2021–2022)
- For multiple known or suspected PFAS sites, reviewing publicly available information to identify known and potential PFAS sources, release and transport mechanisms, exposure pathways, and available analytical data. Preparing simplified conceptual site models, including tabulated data, reference links, and figures, to support the client and its attorneys in preparing for litigation. (2018–present)

- Providing regulatory guidance for an aqueous film-forming foam (AFFF) release site adjacent to a Great Lake and evaluating potentially applicable Rule 57 Water Quality Values and Part 201 criteria for this PFAS-impacted site at which potential perfluorooctanesulfonic acid (PFOS) impacts to surface water were the primary concern. (2018)
- Leading an effort to assess air permitting requirements and build consensus on a monitoring program for a sediment remedial action at a high-profile site in Flint, Michigan. Tasks included leading discussions among our client, the primary property owner, and MDEQ representatives; assisting in public and stakeholder outreach meetings; and providing oversight to the team developing and implementing the construction noise, odor, and air monitoring plan. (2016–2017)
- Providing project and task management services and application of Part 201 and associated rules to various sites, including former manufactured gas plant (MGP) sites, petroleum release sites, solvent release sites, and sites impacted by coal and/or metals. Tasks included data evaluation, project planning, work plan preparation, investigation, remediation, verification sampling, hazardous materials abatement and building demolition coordination, reporting (monitoring reports through remedial action plans and closure reports), statistical sampling planning and implementation, site-specific criteria calculations, due care evaluation, risk assessment, mitigation (including mitigation of acute conditions at the groundwater–surface-water interface), and negotiations with regulators. (multiple projects, multiple years)
- Serving as project manager or principal in charge for several former manufactured gas plant (MGP) sites regulated under Part 201 in Michigan. (multiple projects, multiple years) Project work included:
    - Outlining an approach to meet a client's long-term goal of reaching "no further action" status at its sites, including identification of interim objectives, phased tasks, a timeline, and anticipated costs.
    - Directing implementation of site investigation and remediation tasks based on anticipated impact of remedial effort, budget allowances, schedule drivers, and stakeholder priorities.
    - Planning and directing river investigation tasks and facilitating subsequent negotiations with MDEQ to build consensus on a limited sediment remediation with no post-dredge sampling.
    - Preparing a multiple-lines-of-evidence approach to defining the boundaries of a Part 201 facility in a historically industrial area. MDEQ's agreement to the proposed boundaries was instrumental in mitigating exposure pathways, negotiating deed restrictions, and moving the site toward an end point.
    - Planning and directing activities to address specific site issues, including documenting the absence of evidence of dense, nonaqueous-phase liquid, preparing a mixing-zone determination request, obtaining joint permits for conducting work within and along rivers, obtaining groundwater-discharge permit exemptions to support

injection of remedial-excavation dewatering liquids, and preparing restrictive covenants.

- Conducting peer review of environmental due diligence for a paper mill site that operated for more than 100 years and where the buyer intended to continue its use in paper mill operations. The property is located on a section of the Kalamazoo River that is a Superfund site due to PCB contamination resulting from other historic paper mills in the area. Served as the primary peer reviewer for all appropriate inquiry, Phase II site assessment, and two baseline environmental assessments (category N and category S). The MDEQ approved both BEAs, and the property transaction took place as scheduled. (2006–2007)
- Completing or reviewing more than 50 baseline environmental assessments (BEAs), in accordance with Part 201 and associated rules and guidelines, including multiple Section 7a compliance analyses. Completion of the BEAs included interpretation and evaluation of analytical data, evaluating proposed property uses, determining methods for distinguishing potential future contamination from existing contamination, working with interested parties (property owners, operators, developers, bank loan officers, and attorneys) to meet BEA requirements, communications with regulatory agency representatives, and generation of reports and associated forms for MDEQ-submittal. (multiple projects, multiple years)
- Completing or overseeing over 50 Phase I environmental site assessments in accordance with ASTM practices (and more recently All Appropriate Inquiry), including site walkthroughs, interviews, historical research, evaluation of site conditions, report generation, and discussion of data interpretation with clients. (multiple projects, multiple years)
- Managing Phase II environmental site assessments for approximately 50 properties, including sites impacted by petroleum products, metals, solvents, fertilizers, and pesticides. Responsibilities typically include evaluating recognized environmental conditions or other concerns, preparing a site-specific sampling plan, coordination and oversight of field activities, evaluation of analytical data, and completion of associated reporting. (multiple projects, multiple years)
- Managing remedial investigation at a 40-acre former industrial dump site in western Michigan. This solvent-impacted site is on a peninsula created by a meandering river, and site cleanup was driven by the groundwater–surface-water interface pathway. Responsibilities involved monitoring groundwater, data evaluation and reporting, historical research (interviews, aerial photograph review, and agency- and client-file review) to document soil cleanup conducted 20 years prior, preparation of a verification soil sampling plan, identifying and evaluating long-term options for the site, working with state regulators to obtain approval to shut down the groundwater remediation system, strategy discussions with client's team, working with the local municipality and attorneys to mitigate exposures through activity, and use limitations to allow the property to be used as a community park and trail. (2003–2007)

- Completing tasks related to a due diligence evaluation of an 80-acre property with 100 years of industrial history. Tasks included completion of an expedited Phase I site assessment, additional research, Phase II investigation and risk assessment discussions with the purchaser, financing entity, various attorneys and environmental consultants. (2006)
- Assessing risk at a property historically used as an unlicensed landfill. Work included drafting a combination due care/asbestos operations and maintenance plan in coordination with a firm specializing in asbestos issues. (2003–2004)
- Conducting an environmental assessment of an airport fueling facility, including site walkthrough, interviews, evaluation of reported releases, subsurface investigation of areas of suspected impact, vapor survey of subsurface structures, and findings/recommendations reporting. (2004)
- Preparing a flow chart outlining investigation and remediation activities, research and decision-making tasks, points at which MDEQ approval is needed, significant deliverables, and monitoring events. The project plan covered tasks for a five-year period for a petroleum-impacted site. This approach kept the project efforts focused on reaching long-term goals, improved communications with MDEQ, and allowed more budget control. (2003)
- Assessing risk at numerous former MGP sites. Activities included evaluating data, completing Section 20107a compliance analyses, evaluating data in relation to proposed site activities and applicable exposure pathways, and completing reporting. (multiple projects, multiple years)
- Working on a team conducting expedited Phase I assessments of more than 200 lease properties along a railway corridor. Developed a simple form to simplify site reconnaissance activities and allow identified issues to be prioritized across the group of sites. (2002)
- Providing on-site oversight services during hazardous materials removal and building demolition activities at a site in Flint, Michigan. Hazardous materials removed from the building included various asbestos-containing materials, paint with PCBs, presumed PCB-containing light ballasts, and various other materials requiring special handling. (2002)
- Preparing site-specific spill prevention, control and countermeasure (SPCC) plans, and pollution incident prevention (PIP) plans for properties using, handling, and/or storing petroleum products or other polluting materials. Included direction of site evaluation, evaluation of existing spill prevention and response mechanisms, identification of areas in which improvements are needed, and working with client to establish a plan that was feasible to implement. (multiple projects, multiple years)
- Evaluating due care obligations for a combined Part 201/213 site, including filing notices, preparing a due care plan, calculating site-specific criteria, completing a soil gas investigation of the indoor air pathway, and statistical sampling and associated evaluation. (multiple projects, multiple years)

- Completing a fast-track baseline environmental assessment on behalf of the purchaser of a known Part 201 site impacted with solvent and petroleum contamination, including two phases of free product. Worked with the purchaser, lessee, loan officer, and attorney to meet tight reporting deadlines and to deliver a report outlining feasible, site-specific approaches. (2000)
- Managing approximately 75 leaking underground storage tank (LUST) sites in accordance with Part 213 (of Act 451 of 1994, as amended) and the MDEQ's Risk-Based Corrective Action guidelines. Responsibilities included creating and implementing site-specific sampling plans, coordinating and supervising field activities, evaluating laboratory data, conducting risk assessments, coordinating and supervising remediation activities (remedial excavation, bioaugmentation, biostimulation, natural attenuation), developing property restrictions, and performing Tier II analysis and/or monitoring activities. (multiple projects, multiple years)
- Preparing Environmental Impact Statements for two properties in Michigan, including research, conducting interviews, and report preparation. One property is located in a small community and was agricultural land proposed for use as a gasoline station and car wash operation. The other property, located in the metro-Detroit area, was a gasoline station being proposed for expansion. (1999)

Education

MS, Environmental Engineering, University of Iowa, 1998

BS, Environmental Engineering, Michigan Technological University, 1996

Training/Certification

40-hour HAZWOPER Training (EPA 29 CFR 1910) and Annual 8-Hour Refresher Courses

Registration

Professional Engineer: Minnesota, Michigan, Iowa, New York, New Hampshire.

Iowa Certified Groundwater Professional

BRIAN ANGERMAN, PE

Vice President, Senior Environmental Engineer

Brian has 24 years of experience and a master's degree in environmental engineering. His work at Barr has involved investigating and designing soil- and water-treatment systems, and operating remediation systems.

Project Experience

- Serving as project principal for investigation of multiple sites with per- and polyfluoroalkyl substances (PFAS) impacts. Led a team of geologists, hydrogeologists, and groundwater modeling in characterizing the extent, transport, and ultimate remediation of PFAS impacts. (2017–ongoing)
- Serving as principal in charge for design and construction management of an air-sparging system to mitigate dissolved phase contaminations at a major Midwestern refining facility. (2015–ongoing)
- Serving as project manager and principal in charge for remediation-systems operation at a major Midwestern refinery. Remediation systems include three soil-vapor extraction systems, two air-sparge systems, and a groundwater-interceptor trench. (2001–ongoing)
- Serving a project principal for an industrial wastewater bench and pilot study for the removal of PFAS compounds. Led a team of engineers and scientists to develop a phased approach for treatment of a difficult chemical matrix and to ultimately allow for PFAS removal. (2018–2020)
- Designing and overseeing the contracts for and implementation of soil- and groundwater-remediation systems at a former petroleum-storage and-transport facility. The remediation system included dual-phase recovery; soil-vapor extraction with off-gas treatment; air sparging of groundwater; and water treatment by means of an air stripper. Serving as project manager and later project principal for system operations and maintenance, as well as enhancement of the system, including an air-sparging system. (2000–2020)
- Serving as principal in charge for multiple geotechnical investigations at a major Midwestern refining facility. (2015–2018)
- Serving as project manager for investigation and remediation of a soil and groundwater TCE (trichloroethylene) plume. Remediation included soil and groundwater removal, and overall responsibilities included regulatory negotiations. (2015–2016)
- Managing the design of a new groundwater recovery and treatment system for containment and treatment of a sulfolane plume. The system included recovery wells, aeration pond, greensand filter, and granular activated carbon (GAC) vessels. Responsibilities also included operation and monitoring support and regulatory reporting. (2013–2016)
- Managing the design of modification to an existing groundwater treatment system to remove sulfolane. The design included addition of a sand filter to remove solids and GAC system to remove sulfolane.

Responsibilities also included operation and monitoring support and regulatory reporting. (2011–2016)

- Serving as project manager for design and construction oversight for upgrades to a French drain–type collection system at a major Midwestern refinery. Work included installation of a sheet pile wall, a new piping system, and electrical system upgrades. (2013–2014)
- Serving as project manager for design of a groundwater treatment system using GAC to remove sulfolane. (2013–2014)
- Managing the design of a full-scale air-sparge pilot-test system to calculate degradation of recalcitrant contaminants. (2011–2014)
- Managing the pilot testing and design of a point-of-entry treatment system using GAC to remove sulfolane. (2011–2012)
- Serving as project manager for Barr's emergency-response assistance to a large-scale crude-oil pipeline release. Work includes oversight of field activities, groundwater-monitoring program, and remediation-system design. (2009–2010)
- Serving as project manager for evaluation of a groundwater-interceptor system at a Midwestern chemical facility. Work included evaluation of system performance through groundwater monitoring and data evaluation. (2009)
- Serving as project manager for the design, installation, and operation of a dual-phase groundwater and soil-vapor recovery system at a major Midwestern refinery. (2006–2007)
- Serving as project manager for regulatory closure of a former tank-farm area contaminated with lead-impacted soil. The lead-impacted material was solidified with Portland cement. (2003–2004)
- Performing and managing a NESHAP sample program for a major Midwestern refinery. Responsibilities included inspecting process piping to determine sample locations. (1999–2001)
- Serving as field engineer for stormwater-basin construction, including sewer piping, liner installation, and a contaminant cap. (1999–2000)
- Developing plans and specifications for the Suburban Hennepin Regional Park District for redesigning the filtration system for a sand-bottom swimming pond at the Lake Minnetonka Regional Park. (1999)
- Serving as a project engineer for a downstream-users study for Devils Lake, North Dakota, for the St. Paul District Corps of Engineers. The study determined the effects on industries and water treatment plants of pumping floodwaters from Devils Lake (whose water contains high levels of dissolved solids) into the Sheyenne River, which ultimately flows into the Red River of the North. Interviewed operators of the water treatment plants to determine the effects that water from Devils Lake would have on their treatment systems; also interviewed representatives from industries drawing water from the Sheyenne River and Red River to determine the effects that changed water quality would have on their processes. (1999)

- Working with a refining company to determine whether the drinking-water system at a Minnesota facility was in compliance with the Safe Drinking Water Act. Presented findings of the study in a report. Also prepared a study that reviewed flows to the client's stormwater ponds. (1998–1999)
- During graduate school, Brian worked as both a research and teaching assistant. His responsibilities included investigating the formation of disinfection by-products, as well as examining chlorine decay in water-distribution systems. (1996–1998)
- Brian completed three internships in the environmental department of a Midwestern refinery. His work involved arranging for laboratories to analyze waste in order to determine its characteristics; managing the hazardous-waste pad; and coordinating the proper disposal of refinery wastes. In addition, he monitored the performance of the wastewater treatment facility to help ensure compliance with the refinery's NPDES permits. (1993–1995)

Publications

Valentine, R.L., P.J. Vikesland, B.D. Angerman, S.A. Hackett, M. Shoup, and S. Slattenow. 2000. *The Role of the Pipe-Water Interface in the Formation of Disinfection By-Products and the Loss of Disinfectants in Drinking Water*. AWWARF Press: Denver, CO.

Valentine, R.L., B. Angerman, S. Hackett, P. Vikesland, and S. Slattenow. 1999. Characterization of disinfectant decay and DBP formation in the presence of water distribution system deposits. *Proceedings of the AWWA Water Technology Conference*.

Posters

"Small batch treatment of PFAS-impacted industrial wastewater." 2022. Battelle Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds: Palm Springs, CA.

Education

MS, Geology, Western Michigan University, 2006 (Geophysics and Hydrogeology specialization)

BS, Geology, Central Michigan University, 2003 (Environmental and Hydrogeology specialization)

Training/Certification

OSHA 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) Training, Michigan State Police, 2003

OSHA and 8-hour HAZWOPER Refresher, March 2023

ASTM Technical and Professional Training: Environmental Site Assessments for Commercial Real Estate, March 2013

Annual Phase I Refresher provided by Barr, March 2023

Registration

Professional Geologist (PG): Minnesota, United States of America (active license)

Professional Geoscientist (P.Geo): Saskatchewan, Canada (active license)

NATHAN J. BRANDNER, PG

Senior Geologist

Nathan is a geologist with approximately 17 years of experience and a master's degree in geology from Western Michigan University (2006). His experience includes environmental site investigation and characterization, specializing in the development of complex and dynamic conceptual site models for advancing environmentally impacted sites toward closure. He manages a wide variety of projects in Michigan and Canada and has experience with multiple sampling techniques, including soil, soil vapor, groundwater, geochemical, and geophysical investigation techniques. Over the past seven years, Nathan has also managed several hydrogeological investigations throughout Saskatchewan, Canada to support underground potash mines with the management of their surface mine tailings and regulatory monitoring and compliance obligations. He also assists clients with stakeholder collaboration, including interactions and negotiations with attorneys and regulators in the United States and Canada.

Project Experience

Environmental Site Assessment and Environmental Due Diligence

- Providing environmental site assistance at several underground mining facilities in central Saskatchewan, Canada. Work has included assessing the extent of brine impacts in surrounding groundwater and surface water, including the completion of geophysical surveying with electromagnetic survey equipment (Geophex GEM2), sample collection, identification of preferential flow paths, and the development of a conceptual site model. Work also included identification of background/ambient conditions versus brine-impacted soil groundwater through geochemical data plots (Piper/Stiff diagrams). Work has also included assisting Barr's civil and geotechnical engineering teams with design basis investigations for tailings management expansion projects, including hydrogeological field investigations and groundwater modeling to inform feasibility and final design recommendations. (2017–present)
- Providing guidance and support to a public university in west Michigan, including management of the university's portfolio of real estate holdings with documented historical soil and groundwater impacts (i.e., Part 201 facilities). Services to the university have included pre-acquisition environmental due diligence, including conducting Phase I and Phase II investigations, preparation of baseline environmental site assessments (BEA)s, and providing direction regarding due care requirements as cleanup criteria change and/or property uses change over time. Barr has also routinely provided support during redevelopment construction projects where large volumes of historical impacts (i.e., residual impacts) require property management and characterization prior to offsite disposal. (2016–Present)
- Providing Phase I environmental assessment and Phase II investigation services for multiple properties in Missouri, Kansas, Indiana, Michigan, Minnesota, Ohio, North Dakota, and Wisconsin. Work included completing

property research and summarizing the results and reporting results per ASTM E1527-05, ES1527-13, E2600-10, and E 2247-08. (2008–present)

- Providing project management for several Part 201 former manufactured gas plant (MGP) sites throughout southern and western Michigan. Work has included planning and completing several site investigations (source area characterization); plume stability analyses; groundwater and surface water characterization; remedial excavation; building demolition; soil, soil vapor, groundwater, and porewater sampling; subcontractor procurement and management; conceptual site model development; mixing zones; and no further action submittals, and post remediation/closure monitoring Work including project collaboration with Kalamazoo and Grand Rapids MDEQ (now EGLE) Remediation and Redevelopment Division (RRD) district staff on behalf of Barr's clients to support their Part 201 project submittals (e.g., remedial investigation and response activity work plans, interim response activity, no further action). Following EGLE approvals of no further action approvals for multiple potential exposure pathways (e.g., vapor intrusion, direct contact, drinking water, groundwater surface water interface, and volatile soil inhalation/ particulate inhalation) these projects included post closure plan (PCP) requirements, including ongoing groundwater monitoring, surface cover inspections to ensure ongoing maintenance of engineering controls (i.e., clean fill cover, pavement, etc.), and annual submittals of post closure documentation requirements. (2007–Present)

Geophysical Investigation

- Providing electromagnetic surveys (Geonics EM-31, EM-34, and magnetic susceptibility) surveys at a Fortune 500 manufacturing facility in Iowa in 2017. Work included assessing a legacy industrial landfill and ancillary structures suspected for buried metallic waste and potential groundwater leachate. (2017)
- Providing electromagnetic survey (Geonics EM-31 and EM-38) services for oilfield brine-plume delineation at a brine disposal well site in North Dakota. Planned and conducted field survey (data collection), post-processing of the investigation data, data interpretations, and reporting. (2015)
- Providing geophysics and groundwater sampling assistance for investigation of a contaminated waste site in Michigan. Assisted with underwater-electrical-resistivity survey (Supersting) and an over-water electromagnetic (Geophex GEM2) survey. Assisted with electromagnetic survey (NanoTEM), seismic refraction, multi-channel analysis of surface waves (MASW), and random energy micro tremor (REMI) surveys. (2006–2008)
- Providing geophysical survey assistance for a heavy-metal-contaminated (sediment) site near St. Paul, Minnesota. Assisted with over-water GPR and electromagnetic (Geophex GEM2) surveys. Also assisted with logistics of over-water survey, run-off point source (storm sewer) surveys, and reviewing and providing feedback for final report. (2006)

Publications

Brandner, N.J. 2006. Field studies of hydrophobic filter pack performance in free product monitoring and recovery. Master's thesis. Western Michigan University.

Brandner, et. al. Tailings Management Handbook-A Life Cycle Approach, Society for Mining, Metallurgy & Exploration (SME), Edited by Kimberly Finke Morrison, 2022 ISBN 978-0-87335-490-5.

Education

BS, Geology, Grand Valley State University, 2002

Training/Certification

HAZWOPER Health and Safety Training Course (EPA 29 CFR 1910)

HAZWOPER 40-hour, 8-hour supervisory, and annual 8-hour refresher courses

Industrial Commercial Wastewater Treatment Classifications: A-1d, A-1f, A-2d

Part 91, Soil Erosion and Sedimentation Control Certification

USDOT/IATA Shipping and/or Transportation of Hazardous Materials Training

AL BRASPENNINX

Senior Geoscientist

Al has 22 years of experience in environmental investigations and consulting. His project experience includes developing, constructing, and operating remedial systems; geotechnical evaluations; hydrogeologic site investigations; underground storage tank investigations; vapor intrusion pathway evaluations; and soil remediation projects. His broad experience in site remediation includes serving as the lead field geologist on numerous groundwater remediation projects that involved the treatment and containment of petroleum hydrocarbons. His remediation technology experience includes bioremediation, Fenton's reagent, air sparging, soil-vapor extraction, air-stripping systems, groundwater recovery and treatment systems, and free-phase liquid recovery systems.

His extensive field experience includes soil sampling and logging and well installations using Geoprobes, hollow-stem augers, mud and air rotary drilling, and sonic drilling methods. Al is experienced with permanent and temporary well installation, vertical profiling of aquifers, aquifer testing, soil permeability testing, well development, sediment sampling, vapor pin and well installation, soil-gas sampling, indoor air sampling, groundwater sampling using low-flow and standard methods, and low-level mercury sampling. He is proficient in the collection and analysis of groundwater and soil field data using PIDs, multi-gas meters, peristaltic and bladder pumps, submersible pumps, draeger tubes, geophysical equipment, mini-trolls, pneumatic slug tests equipment, multi-parameter flow through cells, and Hach analytical kits.

Project Experience

- Providing emergency sampling-response assistance along petroleum-pipelines. Activities included field screening of soils, collecting soil and surface water samples, mapping and documentation of site conditions, and assisting in preparation of a documentation report. (2016–2023)
- Overseeing geotechnical drilling (soil classification) for wind-turbine foundations in Michigan and Ohio. Also collected electrical resistivity samples at potential foundation locations. (2016–2023)
- Serving as the site leader for soil and groundwater remediation for a confidential clients in Michigan. Responsible for the oversight of several contractors during the removal and off-site disposal of soil impacted with petroleum hydrocarbons and/or metals. Duties included daily progress reports and meetings with the client, delineation of impacted soil while on-site, and collection of confirmation soil samples. (2005–2023)
- Serving as on-site geologist for hydrogeologic investigations at several sites in Michigan. Investigations for soil, groundwater, and surface-water impact were completed using various instruments. Al was responsible for acting as the supervisor to oversee drilling contractors; collecting soil, groundwater, and surface-water samples; installing monitoring wells; and completing a report of all findings. (2002–2023)

- Assisting in the design and acting as the construction manager for an air sparge treatment system. The project consisted of 50 air sparge wells, a treatment trailer that housed two air sparge blowers, and an air sparge network to deliver air through a system of manifolds to the wells. Responsible for the system's overall construction and operation, including responding to system shutdowns, monthly collection of system readings, evaluating treatment system performance, and reporting. (2002–2012)

Education

MS, Civil Engineering, Wayne State University, 1998

BS, Environmental Engineering, Michigan Technological University, 1992

Training/Certification

OSHA 40-hour HAZWOPER

OSHA 10-hour Construction Safety & Health

Registration

Professional Engineer: Michigan

Software

AutoCAD

RANDY CHRISTENSEN, PE

Senior Civil Engineer

Randy has nearly 30 years of experience providing environmental and civil engineering consulting services. His experience includes the management of large and complex industrial projects, specifically in the manufacturing and chemical sectors. He also has extensive experience with site investigations and remediation; remedial action plans; environmental due diligence; environmental compliance (RCRA, CERCLA); landfill design, permitting, and construction quality assurance (CQA); geotechnical investigations, site redevelopment, Phase I and II environmental site assessments (ESAs); design, permitting, and construction oversight for decentralized wastewater treatment systems; and project management.

Prior to joining Barr, Randy served in roles such as project manager, project engineering, and staff engineering at various Michigan consulting firms.

Project Experience

- Serving as project manager for a coal-fired power plant coal-combustion-residual (CCR) bottom-ash basin (BAB) closure project. Responsibilities included responding to the owners request for quotation (RFQ) including costing the design and construction oversite; developing a closure strategy and preparing construction drawings for the BAB closure; developing construction specifications for closure; and managing the project scope, schedule, and budget. Additional responsibilities included assembling a multidisciplinary team to implement design, specification, and construction oversite as well as serving as liaison to the regulatory agencies and other stakeholders. The BAB was constructed with sheet pile walls. The liquid level within the basin served as support to the sheet pile walls. Therefore, it was critical for the successful implementation of the project to develop of strategy to empty the ponds while maintaining the integrity of the sheet pile walls (2022–2023).
- Serving as the project manager for an ongoing RCRA facility investigation at three inactive, former automobile manufacturing facilities in Lansing, Michigan, under a voluntary corrective action agreement with the U.S. EPA Region V. Responsibilities included developing and implementing an extensive RFI site investigation, developing interim corrective measures, and performing pre-design efforts to confirm a final remedy selection for the site. He also coordinated between project stakeholders, including EPA, the Michigan Department of Environment, Great Lakes, and Energy (EGLE), City of Lansing, Lansing Township, and the Lansing Board of Water and Light, and developed and implemented an RFI work plan that included an extensive on-site soil and groundwater investigation. The RFI investigation involved the completion of over 500 shallow and deep soil borings and vertical aquifer profile (VAP) borings; laser-induced fluorescence (LIF) borings to delineate light nonaqueous phase liquid (LNAPL); soil gas sampling; installation of over 100 monitoring wells including long-term monitoring wells; LNAPL monitoring wells and system performance monitoring wells; completion of a comprehensive LNAPL mobility and

natural source zone depletion (NSZD) assessment; an extensive plume stability assessment; and completion of storm sewer sampling at site outfalls. The result of the investigation led to the installation and operation of a propane-enhanced biosparge remediation system to treat a 1,4-dioxane plume located approximately 70 feet below grade. (2013–2019)

- Serving as the certified project manager for ongoing work at an active chemical distribution facility in Grand Rapids, Michigan, which is under a U.S. EPA Record of Decision and Unilateral Administrative Order issued in 1984. Work involved managing the ongoing remediation system as well as operation, maintenance, and monitoring (OMM), compliance monitoring, and reporting for the site for seven years. He also served as the primary liaison between the client and stakeholders and helped to successfully implement an in-depth vapor intrusion (VI) exposure pathway evaluation, which included evaluating risk at three off-site properties and installing over 150 sub-slab monitoring points. (2014–2020)
- Serving as the certified project manager for ongoing work at an active chemical distribution facility in Romulus, Michigan, under a court-ordered consent judgment with the U.S. EPA Region V that was issued in 1982. Managed the ongoing remediation system OMM, VI pathway evaluations, compliance monitoring, and reporting for the site for seven years. He also led discussions with EPA and EGLE on renegotiating the consent judgment to bring it in line with more than 35 years of remedial projects and to adopt modern cleanup criteria. (2014–2020)
- Serving as the project engineer for a hydrogeologic investigation of the approximately 180-acre Alice Springs Campground in Ionia, Michigan. The investigation included soil borings and installation of piezometer wells to determine the geologic profile of the soils and seasonal groundwater elevations and was followed by a wetland delineation. As the project engineer, responsibilities included designing a recreation campground that consisted of 425 drive-in sites, a lodge building, volleyball and basketball courts, and an on-site sewage disposal system around the wetlands. Also responsible for the design, approval, and CQA of an on-site sewage disposal system, which involved sighting the system, sizing, and infrastructure design and layout. Other work involved completing geotechnical soil borings and obtaining permits through EGLE, the Michigan Department of Transportation (MDOT), the county road commission, the health department, and the township planning commission. Phase I of the campground opened in 2008. (2004–2008)
- Serving as the project engineer and lead field technician for the investigation and remediation of a former Type I sanitary landfill in Howell, Michigan. Coordinated investigation activities and agency submittals to receive conditional closure on a closed Type I construction and demolition (C&D) debris landfill located outside city limits. Investigation activities included sighting and installing groundwater monitoring wells, sample collection, data analysis, and preparation of the investigative report and subsequent EGLE approvals. Additional activities included soil and groundwater sampling as well as horizontal and vertical delineation of the

original landfill extents. Led preparation and submittal of a remedial action plan (RAP) to the state for approval, including supporting documentation such as data, tables, and drawings. As part of the RAP, a 30-year quarterly groundwater monitoring program was proposed, which involved the collection of groundwater samples from a list of over 50 groundwater monitoring wells. Responsibilities included managing the sample collection, reviewing analytical data for comparison to EGLE Part 201 criteria, and documenting natural attenuation and preparing quarterly reports for EGLE. (2001–2011)

- Completing numerous Phase I ESAs for residential, commercial, and industrial projects. Phase I ESAs included visual inspections, interviews, reviews of historical sources, government records, and commonly known or reasonably attainable information, identification of contaminants of concern, and review of data gaps. (2001–2011)
- Completing numerous Phase II ESAs and involvement in implementing efficient intrusive investigation programs to determine the type and extent of each constituent of concern. Phase II programs included soil, sediment, surface water, and sampling analysis; waste characterization; underground storage tank investigation; wetlands assessment and/or delineation; ecological site assessments; and regulatory agency research and assistance. (2001–2011)
- Assisting with the completion of a due diligence assessment at the Grand Traverse Resort, including a Phase I ESA, structural condition assessment, assessment of enclosure and architectural components, assessment of mechanical and electrical components, assessment of waste generation, hazardous waste generation, storage and disposal, and reporting activities of the resort. Tasks included report preparation, cost estimates for building repairs and repair or replacement of mechanical and electrical components; identification of environmental conditions, waste handling issues, and reporting issues; and remedial actions to address releases at the site. (2001–2011)
- Assisting with the completion of a hydrogeologic investigation, geotechnical investigation, and sampling and analysis of existing wastewater flows and preparation of conceptual design drawings, preliminary construction cost estimates, final design, and construction management for a 180,000 gallon-per-day wastewater treatment plant for the Little River Band of Ottawa Indians. The plant consisted of two sequential batch reactors, lime stabilization, equalization tanks, and a groundwater discharge. The structures are primarily reinforced concrete with a metal building enclosure. (2001–2011)
- Serving as the project manager and lead engineer providing complete engineering and site development services for an attached 12-unit condominium development in Brighton Township, Michigan. Services included topographic mapping of the property and road and building layouts. This also included assessment of soil conditions for foundation construction, slope stability, and utility and roadway construction. Worked with the client and the township to receive approvals for the development.

Designed the stormwater management system and soil erosion and control measures required to comply with local and county requirements. Completed as-built drawings for submittal to regulatory agencies. (2001–2005)

- Designing, permitting, and providing construction oversight for decentralized on-site wastewater treatment systems. Responsible for site evaluation, design, regulatory approval, and construction oversite of over 100 decentralized wastewater disposal systems serving both residential and commercial residences. Other responsibilities included surveying, geotechnical evaluation of on-site soils, and annual maintenance and troubleshooting. (1997–2001)
- Serving as the lead project engineer, from bidding through construction, final report, and EGLE certification of a new landfill cell installation. The project involved providing CQA for the installation of 305,000 cubic feet of compacted clay liner, 980,000 cubic feet of sand drainage layer, 655,000 square feet of HDPE geomembrane liner, 327,000 square feet of geosynthetic clay liner, and 655,000 square feet of geocomposite. Responsibilities included preparing cost estimates, liaising with oversite agencies, arranging laboratory testing, interpreting laboratory analysis for compliance, and preparing the construction certification report for submittal to EGLE. (1992–1997)
- Serving as the lead project engineer and lead field technician for a leachate transmission forcemain project for a Type III construction and demolition (C&D) landfill. The project involved the installation and testing of over 5,000 lineal feet of 8-inch HDPE leachate forcemain, installation of 12 HDPE manholes, installation of a 30,000-gallon leachate storage tank, and installation and start-up of 9 leachate extraction wells with level control systems, high alarm systems, and flow meters. Responsibilities included preparing CQA cost estimates, serving as a liaison between the client and regulatory agencies, arranging laboratory testing and interpreting laboratory analysis for compliance, providing CQA oversight, and preparing the construction certification report. (1992–1997)
- Conducting CQA for site clearing and installation of 115 lineal feet of metal sheet pile wall, landfill slope repair, installation of a drainage system, and placement of vegetative soil material for a hazardous waste landfill slope repair and erosion control project. (1992–1997)
- Preparing contract plans and specifications, construction cost estimates, and construction documentation support for a municipal solid waste ash monofill project. Responsible for field CQA, which included 8,600 linear feet of leachate detection and collection system piping, 400,000 cubic yards of compacted clay soil, 1,012,000 cubic feet of geosynthetic clay liner, sampling and analysis of liner system components, and movement and placement of 325,000 cubic yards of incinerator ash. Also served as primary liaison between regulatory agencies and the client. (1992–1997)

Education

BSE, Environmental Engineering, University of Michigan, 2019

Training/Certification

40-Hour HAZWOPER

Registration

Engineer in Training: Michigan

Software

MATLAB, Python, Fortran, ArcGIS

ANDREW DYKSTRA, EIT

Environmental Engineer

Andrew joined Barr in 2019 with a degree in environmental engineering from the University of Michigan. He has experience with construction oversight; soil, groundwater, process water, soil vapor, and indoor air sampling; spill response; engineering design development and review; remote site monitoring; bench-scale and pilot-scale test design and operation; permit writing; engineering and construction cost estimating; developing site conceptual models, option alternatives, feasibility studies, and remedial action plans; and ecological restoration.

Project Experience

- Participating on a team for the evaluation of remedial alternatives and design of a remedial action to control an ongoing source of per- and polyfluoroalkyl substances (PFAS) to groundwater from a former fire-fighting foam testing area at a Part 201 site. Remedial alternatives evaluated included assessing cutoff wall options around the source area and low-permeability cap options that would limit infiltration within the source area. Results of the evaluation indicated a soil/bentonite wall with a geomembrane cap would control the ongoing source of PFAS to groundwater at the site. Design data collection activities were completed to gather additional information needed in the design, and information was used to develop a Response Action Plan for implementing the project. Ongoing work includes remediation design, permitting, and construction. (2022–ongoing)
- Performing spill response at various crude oil and natural gas pipelines and processing facilities across Michigan, including delineation using field screening methods, directing remedial excavations, collecting confirmation samples, developing post-remediation hydrogeologic investigation workplans, and preparing closure reports for releases. (2022–ongoing)
- Serving as the field engineer for a team providing environmental permitting and compliance and geotechnical monitoring for the restoration of several sections of municipal raw water tunnels in Detroit, Michigan. Activities included drafting and acquiring permits for multiple sites, including EGLE Act 399 Water Supply System permits, soil erosion and sedimentation control permits, and Great Lakes Water Authority Special Discharge permits, and installing, maintaining, and monitoring geotechnical instrumentation and telemetric systems. (2020–ongoing)
- Participating on a team that created remedial action plans for coal-ash landfills in Michigan, including developing site conceptual models, performing options evaluations, and designing and operating bench-scale and pilot-scale tests of potential treatment technologies to address groundwater impacts at the sites. Data collection efforts for the projects included drilling oversight and monitoring well installation, performing slug testing and pumping tests, and installing and operating remote groundwater monitoring systems as part of a hydrogeologic investigation.

Bench-scale and pilot scale testing was performed to evaluate treatment technologies including a zero-valent iron amended permeable reactive barrier, a groundwater extraction and treatment system utilizing ion-exchange resin, and a sub-surface flow constructed treatment wetland, and testing activities included designing and operating continuously stirred batch reactors, flow-through columns, and treatment wetland test cells. Ongoing work includes pilot-scale testing, finalizing the remedial action plans, conducting detailed design, and construction. (2019–ongoing)

- Performing site investigations at various MGP sites in Michigan. Tasks included low-flow groundwater sampling, performing free-product recovery at NAPL wells, and maintaining and operating remote groundwater elevation monitoring systems. (multiple projects, 2019–ongoing)
- Participating on a team to perform an indoor air investigation and provide operation and maintenance of an oil-water separator remediation system to address a jet fuel release at a major commercial airport in the Midwest. (2019– ongoing)
- Participating on a team for the evaluation and source removal design of per- and polyfluoroalkyl substances (PFAS) in the wastewater stream at a manufacturing facility in Michigan. Activities included reviewing current and historical processes at the facility, along with historical sampling results, to develop a targeted evaluation of the source of PFAS. Through targeted sampling and implementation of temporary flow monitoring devices, a primary source of PFAS, estimated to contribute approximately 95 percent of the PFAS mass loading in the effluent, was identified. Barr worked with the facility to develop a source removal scope that would remove a significant mass of PFAS while minimizing downtime for the facility, however, the facility ceased operations and was decommissioned prior to source removal activities being implemented. (2021–2023)
- Participating on a team that designed, performed bench testing for, implemented, and maintained a granular activated carbon (GAC) treatment system to treat PFAS-impacted water during the decommissioning of a power plant. (2019–2020)

Education

MS, Environmental Toxicology, University of Wisconsin–Madison, 1990

BA, Biology, Kalamazoo College, 1988

KAREN M. HATHAWAY

Senior Toxicologist

Karen has more than 30 years of experience with risk assessment, risk management, and environmental compliance. She develops site-specific cleanup criteria and assesses liability, vapor intrusion, and human health risks. She also prepares risk management, no further action (NFA), and closure plans and performs due diligence.

Karen has experience with many environmental remediation programs, including the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA, or Superfund), Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), and Part 201 of Michigan's National Resource and Environmental Protection Act (Act 451).

Project Experience

- Preparing a site-specific risk assessment to assess potential trespasser exposures to cover soils at a closed landfill. The assessment included the derivation of site-specific trespasser soil values following state-specified methods, a comparison of analytical results for individual soil samples to the site-specific trespasser soil values, and an evaluation of cumulative risks. The results of the site-specific risk assessment were used to evaluate the need for remedial actions at the site and the extent of those remedial actions. Contaminants included dioxins, furans, and carcinogenic polycyclic aromatic hydrocarbons. (2022)
- Preparing risk evaluations, baseline environmental assessments, and risk management (due care) plans for residential and nonresidential sites to identify remedial needs and ongoing obligations for owners of environmentally impaired properties. These projects range in size and scope from small property transactions to large, industrial remediations. When insufficient data is available to make a risk determination, she makes specific recommendations to collect the necessary data. (2018–2022)
- Conducting vapor intrusion assessments for manufacturing buildings on sites contaminated with chlorinated volatile organic compounds, including trichloroethylene and tetrachloroethylene. The assessments include evaluating existing soil, groundwater, soil gas, and indoor air data relative to agency screening levels, identifying data gaps, and developing closure strategies. (2018–2022)
- Preparing an investigative strategy utilizing incremental sampling methodology (ISM) to characterize a former orchard property contaminated with arsenic and lead from pesticide use. The ISM sampling results substantially reduced the area requiring remediation and demonstrated that the 70-acre property was suitable for residential development following focused remediation. (2018–2019)
- Preparing a risk management plan for the residential development of a property that operated as a leather tannery for more than 130 years. The plan included an evaluation of known environmental impairments to the

property and exposure pathways of concern for the intended residential use. The plan also described the response activities, notifications, precautions, and land use restrictions needed to protect construction workers and future residents. (2017)

- Preparing a baseline screening level risk assessment of soil conditions at a large manufacturing facility being redeveloped for residential use. The risk assessment included a screening level human health risk assessment of 10 sites of concern and a screening level ecological risk assessment for one area of concern. The human health and ecological assessments followed USEPA and state risk-based guidance. (2015–2017)
- Preparing risk management plans for seven natural gas facilities including former oil fields converted to natural gas storage fields. The plans addressed historical environmental impact (e.g., elevated chemical concentrations and visible evidence of oil residuals, staining, stressed vegetation) identified at the former oil fields and active oil and gas production plants. Karen developed criteria based on site-specific exposures to document that there were no unacceptable health risks to the public and workers. The plans also documented the steps the client should take to prevent exacerbation of the existing environmental impacts. (2015)
- Conducting an environmental risk evaluation for a large chemical manufacturing facility pursuant to the Resource Conservation and Recovery Act (RCRA) corrective action program. This work included assessing human health risks resulting from exposures to impacted soil, groundwater, and air, as well as aquatic risks in an adjacent river. The risk assessment identified the media requiring remediation to be protective of human health and the environment. The risk assessment also satisfied the requirements of both the RCRA corrective action program and Part 201. (2014)
- Assessing environmental conditions for recreational uses of a 1,500-acre urban park through a cooperative agreement with the U.S. Environmental Protection Agency (USEPA). A large portion of the park coincided with an oilfield, and certain areas of the park property had been used for dumping. Karen established baseline conditions in planned recreational areas (such as playgrounds) and used the results to characterize risk management (due care) obligations. (2006–2007)

Education

MS, Hydrologic Science and Engineering, Colorado School of Mines, 2009

BS, Environmental Engineering, Michigan Technological University, 2006

Training/Certification

40-Hour HAZWOPER Training and 8-Hour Annual Refresher Courses

24-Hour MSHA Surface Miner Training, New Miner Training and

8-Hour Annual Refresher Courses

Registration

Environmental Engineer: Michigan

KATY LINDSTROM, PE

Senior Environmental Engineer

Katy has over 14 years of experience helping clients assess and remediate contaminated sites, achieve environmental compliance, and address groundwater management issues in Michigan and throughout North America. In particular, Katy has experience characterizing and mitigating risks at the groundwater/surface-water interface in accordance with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Part 201 rules. She specializes in groundwater flow and contaminant fate and transport modeling and has experience designing and managing investigations to characterize geology and hydrogeology.

Project Experience

- Managing a Barr team and leading the design of a subsurface groundwater cutoff wall to limit the flow of groundwater to a proposed open-pit mining operation in northern Michigan and mitigate potential impacts to wetlands in accordance with EGLE Part 303 wetland regulations. (2022–2023)
- For a confidential sand and gravel mining company in southeastern Michigan, currently managing a Barr team that is performing services to support expansion planning. Expansion planning includes both the expansion of existing mine facilities and new greenfield developments. Barr's work includes baseline characterization of environmental resources, impact assessments, hydrogeological evaluations (including numerical groundwater flow modeling), reporting, and permitting assistance. (2022–2023)
- Managing a Barr team that is evaluating temporary water storage options for a food processing facility in mid-Michigan in accordance with EGLE Part 22 Groundwater Quality rules. Options evaluated included temporary above-ground storage tanks and ponds with engineered liners. Additionally provided environmental consulting regarding land application of wastewater as a treatment and disposal method. (2021–2022)
- Managing a Barr team and serving as the hydrogeology technical lead for two separate coal combustion residual (CCR) facilities that are undergoing remedial action planning to address groundwater impacts related to CCR disposal in historical, unlined ash ponds near surface water bodies. Provided technical and regulatory consulting for these complex projects, including communications with EGLE staff in three divisions (Material Management Division, Water Resources Division, and Remediation and Redevelopment Division), two district offices, three Technical and Program Support Teams, and the Remediation Advisory Team to build consensus as the projects advanced and streamline remedial action plan approval. Multiple remedial options were evaluated, and remedial action plans are currently under development for both facilities. Remedies are expected to include source removal, constructed treatment wetlands, and a permeable reactive barrier. (2019–present)

- Serving as project manager for evaluation of potential modifications to an existing irrigation system for a university campus in southeastern Michigan. Replacement of irrigation water was provided by a combination of municipal and well water with expansion of the use of well water, and options for irrigation demand reduction through sustainable landscape design were evaluated and preliminary cost estimates were developed. (2018–2019)
- Managing a Barr team for the investigation, design, and potential future remediation of a historical manufactured gas plant (MGP) site in mid-Michigan with an active gas station currently occupying the property. Katy's role on the project has included risk management, an evaluation of liability for the commingled MGP and gas station plumes, evaluating mobility of non-aqueous phase liquid, and assessing and mitigating vapor intrusion. Three-dimensional modeling was used as a tool for optimizing site characterization data to guide additional investigation activities, convey characterization results, and quantitatively evaluate remedial alternatives, which provided the client a method for guiding business decisions based on interpolated site data. (2017–present)
- Managing a Barr team and serving as the hydrogeology technical lead for an integrated groundwater/surface-water model of a subaqueous tailings disposal facility at a mining facility in Michigan. Conducted hydrogeologic evaluation, developed a conceptual site model, directed groundwater model and contaminant fate and transport model development, calibration, and uncertainty analysis, and conducted communication with the client and regulators. Provides ongoing support for operations, environmental compliance, and closure planning. (2017–present)
- Developing and calibrating a groundwater flow model using MODFLOW to simulate seepage and to predict potential impacts to groundwater and a nearby river from fly ash disposal basins at a coal-fired power plant in Minnesota. Model calibration was accomplished using the automated inverse-optimization program PEST. (2016)
- Assisting an industrial client with risk management evaluations related to various water withdrawals from both a shallow, unconsolidated aquifer and a deeper, semi-confined bedrock aquifer near a shallow groundwater contamination plume. Work included screening-level groundwater flow modeling, developing and implementing monitoring programs with in-well data-logging water-level sensors, well location siting, and water appropriations registration. (2016)
- Serving as a technical lead for the investigation, evaluation, design, permitting, and remediation of impacted river sediments adjacent to a former MGP site on the Flint River in Michigan. The project had significant schedule constraints and multiple stakeholders involved for most facets of the project. Served a key role in communicating with the client and stakeholders. Oversaw the technical teams for geological and groundwater modeling and design of an engineered sediment cap. The project was successfully substantially completed in 2017 with restoration work continuing in 2018. (2015–present)

- Performing analysis of steady-state and transient air pressure data collected during high-purge-volume sampling of sub-slab soil gas for evaluation of and mitigation system design for the vapor intrusion pathway for a large building on a former manufacturing facility. (2013, 2017)
- Designing a numerical model of variably saturated flow and reactive contaminant transport to assess migration of per- and polyfluoroalkyl substances (PFAS) through a thick vadose zone. (2011)
- Performing unsaturated flow modeling for wetting front analyses in collapsible soils at windpower sites, including coupled subsurface unsaturated-flow models and surface-hydrology models. (2009–2019)
- Performing hydrogeological fieldwork and designing numerical groundwater flow and contaminant fate and transport models in support of investigation and remediation of former manufactured-gas-plant sites in Michigan and Illinois. Modeling efforts included the screening of remedial options through predictive contaminant fate and transport simulations, assessment of impacts to a nearby water supply well, and predictions of mass flux to a surface water body in support of evaluation of the groundwater/surface-water interface pathway. (2009–2016)
- Groundwater-flow modeling to estimate potential water quality impacts for a proposed mining project in northern Minnesota. Modeling efforts included assisting with the development of a regional-scale groundwater flow model and calibration of two local-scale models focused on the mine pit and tailings disposal areas. Following calibration, predictive simulations were completed to estimate groundwater inflow rates to mine pits and seepage loss from a tailings basin over time. The model results were used to develop two integrated surface water/groundwater models for the proposed project area. (2009–2015)
- Conducting field aquifer tests including slug tests and multi- and single-well pumping tests and providing data analysis and reporting of aquifer test results. (2009–2010)
- Providing hydrogeological fieldwork for an investigation at a former cement-kiln-dust (CKD) site, including performing and analyzing slug and single-well pumping tests to characterize near-shore aquifer hydraulic properties in fractured limestone bedrock. (2009)
- Completing water-balance modeling for a proposed mining project in northern Minnesota using WATBUD, a water-balance model developed by the Minnesota Department of Natural Resources. (2009)
- Modeling unsaturated water flow beneath a tailings basin pond to estimate tailings saturation conditions and support assumptions for water-quality modeling to estimate constituent release from tailings material. (2009)
- Assisting clients with environmental compliance at the groundwater/surface-water interface in accordance with EGLE Part 201 rules. Through a combination of hydrogeologic data collection and groundwater-flow modeling to assess the groundwater/surface-water

interface, completed mixing-zone determination requests for three different sites in Michigan to establish site-specific criteria and one successful "de minimis" determination to demonstrate negligible water-quality impacts after groundwater mixing with surface water. (2008–present)

- Directing remedial investigation activities and remedial excavations at former manufactured-gas-plant sites in Michigan in accordance with EGLE Part 201 rules. Additionally, assessed the soil-vapor intrusion to indoor air pathways. (2008–2013)

Presentations

Lindstrom, K.A., and Christensen C., 2021. "Groundwater Modeling for Non-Modelers." Remediation and Risk Management Webinar Series hosted by EGLE in partnership with the American Institute of Professional Geologists (AIPG), and the Michigan Association of Environmental Professionals.

Lindstrom, K.A., Boom, T.R., Marini, K.A., Mohr, J.A., and Dahlstrom, D.J., 2019. "Modeling and Uncertainty Analysis for Remedy Selection and Design to Address Groundwater Discharging to Surface Water." Presentation at the Tenth International Conference on the Remediation and Management of Contaminated Sediments.

Lindstrom, K.A., Boom, T.R., Marini, K.A., Mohr, J.A., and Dahlstrom, D.J., 2019. "Modeling and Uncertainty Analysis for Remedy Selection and Design to Address Groundwater Discharging to Surface Water." Presentation at the 2019 National Groundwater Association Groundwater Summit.

Boom, T.R., Lindstrom, K.A., and Santini, A., 2017. "Considerations and Tools to Select and Design a Sediment Response Action at a Former Manufactured Gas Plant" Presentation at the 7th Annual AIPG Michigan Section Technical Workshop – Environmental Risk Management: Characterization's Role in Remedy Selection.

Marini, K.A., Lindstrom, K.A., Dahlstrom, D.J., and Mohr, J.A., 2017. "Using Uncertainty Analysis for Groundwater Flow and Transport Modeling to Inform Remedial Design and Monitoring." Poster presentation at MODFLOW & More 2017.

Lindstrom, K.A., Morris, M.A., Boom, T.R., and Jones, C.A. 2015. "Developing a quantitative decision-making tool with three-dimensional modeling of site investigation data." Presentation at the 5th Annual AIPG Michigan Section Technical Workshop – Site Characterization.

Mohr, J.A., Lindstrom, K.A., Dahlstrom, D.J., and Mechenich, M.F. 2012. "Using groundwater models to guide investigation and evaluation of remedial options at former manufactured gas plant sites." Poster presentation at The Fourth International Symposium and Exhibition on the Redevelopment of Manufactured Gas Plant Sites.

Education

MS, Civil Engineering, Wayne State University, 2011

BS, Civil Engineering, Wayne State University, 2010

Training/Certification

OSHA HAZWOPER 40-Hour Training

ASTM Phase I Environmental Site Assessments for Commercial Real Estate

Red Cross Adult First Aid/CPR/AED Training

Michigan Industrial/Commercial Waste Treatment Plant Operator (A-1a, A-1h)

Michigan Storm Water Management Operator – Construction Site (A-1j)

Registration

Professional Engineer: Michigan

LUKE A. MACKEWICH, PE

Senior Environmental Engineer

Luke has over 11 years of experience and a master's degree in civil engineering from Wayne State University. His work experience has included environmental due diligence, baseline environmental assessments (BEAs), due care plans, spill response, environmental sampling, odor and air quality monitoring, environmental permitting, field compliance inspections, and providing construction oversight for remediation and construction projects.

Project Experience

- Providing project management for remedial excavation at a Part 201 former manufactured gas plant (MGP) site in Michigan. Work included utility management and identification, installation of soldier pile soil retention system, excavation of approximately 5,300 tons of impacted material, dewatering and offsite disposal of 11,800 gallons of impacted water, backfilling with clean imported fill and stormwater management. Luke's role included development of the remedial plans and specifications, permitting, contractor bid evaluation and selection, technical support and management during construction, budget tracking, and summary reporting. (2022–present)
- Serving as a task manager for vapor intrusion investigation for chlorinated solvents under a residential building under an EGLE approved work plan and overseeing a vapor extraction pilot test to evaluate remedial options. (2022–present)
- Managing a team assisting a Class II landfill owner in Michigan with environmental compliance. Activities included evaluating available air monitoring systems (methane and hydrogen sulfide), installation of near real-time air quality monitors along the property boundary and in the community, source identification and back trajectory modeling, data quality assurance review of generated data, ongoing operations and maintenance, and regulatory reporting. (2021–present)
- Providing emergency spill response assistance to jet fuel releases at a major commercial airport in the Midwest. Activities included field screening of soils, excavation oversight, collecting soil and groundwater samples, overseeing installation of horizontal recovery wells, performing a vapor intrusion to indoor air investigation, supplying and monitoring temporary air purifying units, performing a soil-vapor extraction pilot test, coordinating project team security clearance, construction oversight of the implementation of the remedial action plan, monitoring well abandonment, ongoing operations and maintenance and project reporting. The site received a certificate of completion from state regulators in 2021. (2014–present)
- Serving as task manager and project manager for the vapor intrusion pathway to indoor air evaluations at three Part 201 MGP sites across Michigan. Tasks included assisting in creating on and off-site vapor intrusion (VI) conceptual models, drafting work plans for EGLE approval, obtaining site-specific VI criteria, proposing sampling locations, assisting

in contracting, providing construction oversight of soil gas well and sub-slab vapor pin installation, performing building surveys, coordinating sampling events, performing soil gas and indoor air sampling, reviewing analytical data and comparing results to applicable criteria, writing quarterly monitoring reports, and writing pathway evaluations and No Further Action Reports (NFA). All three MGP sites have received the NFA designation from EGLE for the VI pathway. (2013–2022)

- Serving as project engineer for a utility replacement project along a public right of way and adjacent to known Part 201 sites. Tasks included performing environmental due diligence, updating the project due care plan, waste characterization sampling, developing a soil and groundwater management plan, and construction observation. (2021–2022)
- Assisting with developing a response activity plan (ResAp) to address remaining exposure pathways at a former MGP site in Michigan. Response included additional environmental investigation and the generation of a human health risk assessment (HHRA) to address site specific soil volatilization to ambient air. (2019–2022)
- Conducting and overseeing multiple Phase I environmental assessments for combustion turbine sites being decommissioned across Michigan. Planned follow-up Phase II investigation scopes, drafted work plans and cost estimates, subcontracted with drillers, and wrote investigation reports. Luke also performed regulated waste surveys of the properties in preparation of developing bid documents for demolition. (2019–2020)
- Performing multiple Phase I assessments for a parking structure expansion project in Grand Rapids, Michigan. The work involved planning the follow up Phase II investigation scope, drafting work plan and cost estimate, subcontracting with drillers, and writing the baseline environmental assessment (BEA) and due care plans based on findings. (2018–2019)
- Providing construction and environmental compliance observation and documentation of horizontal directional drilling (HDD) operations along multiple natural gas pipelines across Michigan and Ohio. (2017–2018)
- Serving as task lead and project manager for a team assisting a Class II landfill owner in Michigan with environmental compliance. Activities include on-site perimeter and community odor monitoring for nuisance and objectionable odors from site operations. (2016–2022)
- Assisting in site investigation and reporting of a Leaking Underground Storage Tank (LUST) site regulated under Michigan Part 213. Tasks included soil borings and sampling, monitoring well installation and sampling, soil-gas well installation and sampling, and assisting in drafting site restrictive covenant and closure reports. (2015–2017)
- Assisting with the Phase I site assessment of an animal feed manufacturing facility in Battle Creek, Michigan. Work included performing a site visit and helping prepare the report. After identifying potential recognized environmental conditions in the Phase I, he performed a limited Phase II site investigation that included soil and grab groundwater sampling as well as prepared a report on the findings. (2014)

- Assisting with the Phase I site assessment of saltwater disposal wells in North Dakota and Montana. Luke performed site visits and helped prepare the report. (2014)
- Conducting a desktop environmental review along road right of ways for potential environmental impacts that could be encountered during future utility work. (multiple projects, 2013–2020)
- Assisting with river and sediment investigations at various MGP sites throughout Michigan. Tasks included visual riverbank inspections, poling of sediments, and the collection of samples via hand auger and vibracore units. (multiple projects, 2013–2016)
- Overseeing discharges of hydrotest water generated in newly constructed petroleum pipelines and storage tanks in Michigan as a Michigan-certified Industrial/Commercial Waste Treatment Plant Operator (A-1a). (2013–2016)
- Assisting with several Phase I site assessments of a lime manufacturing facility and its associated residual solid waste landfills in northern Ohio. He performed site visits, conducted interviews, and reviewed records and prepared reports. After identifying potential recognized environmental conditions in the Phase I, he helped prepare a Phase II work plan for the site. (2013)
- Drafting and submitting Soil Erosion and Sedimentation Control (SESC) permit applications for various clients across Michigan. Managing and performing SESC inspections and compliance of environmental permits. (Multiple projects, 2011–present)
- Performing site investigations at various MGP sites in Michigan. Tasks included low-flow groundwater sampling; performing free-product recovery at NAPL wells; and collecting soil samples through the use of Geoprobe, hollow-stem auger, hand auger, and roto sonic borings. (multiple projects, 2011–2019)
- Providing construction oversight for a large remediation project at a former manufactured gas plant (MGP) site. Tasks included overseeing excavation of MGP-impacted materials, collecting soil samples, overseeing construction of a water-tight storm-sewer-system, overseeing construction of a low-permeable clay barrier, and installing soil-erosion control measures. (2011–2012)

Presentations

Mackewich, L., and Brandner, N., 2022. "Successfully navigating the vapor intrusion pathway evaluation in Michigan." Presentation at the Detroit Regional Chamber of Commerce – Environmental & Energy Session

Mackewich, L., 2021. "Combustion Turbine Plant Decommissioning" Presentation at the MEA Energy Association - Environmental Leadership Learning Conference

Education

BS, Geological Engineering, Michigan Technological University, 2000

Training/Certification

ASTM E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

National Groundwater Association: Groundwater/Surface Water Interactions

40-hour HAZWOPER Training (EPA 29 CFR 1910) and Annual 8-Hour Refresher Courses

8-Hour HAZWOPER Supervisor

10-Hour OSHA Construction Safety and Health

American Red Cross CPR/First Aid/AED

USDOT/IATA Shipping and/or Transportation of Hazardous Materials Training

Registration

Engineer in Training

MOLLY L. O'BRIEN

Senior Environmental Consultant

Molly has more than 20 years of experience providing environmental evaluation and design of remediation alternatives, geophysical and hydrogeological investigations and surveys, brownfield redevelopment, and assistance with state and federal regulations such as RCRA, Part 201, and Part 213 as applied to various commercial and industrial clients throughout Michigan. Molly provides site and facility investigations, risk assessments, feasibility studies, remedial alternatives evaluations of soil and groundwater, remedial design and implementation, groundwater flow and modeling, contaminant transport modeling, laboratory data evaluation and management, and health and safety management.

Molly's hydrogeological investigation skills and experience include soil sampling/logging using Geoprobe, hollow stem augers, mud/air rotary drilling, and sonic drilling methods; monitoring well installation and sampling; geophysical testing consisting of EM31, EM38, EM61, GPR, well logging, seismic and magnetometers; and underground storage tank (UST) removal and remediation oversight. She also has extensive experience with real-time field data collection and analysis of air and soil samples for mercury using the Lumex mercury vapor analyzer.

Her management skills and experience include design and implementation of large remediation projects for industrial clients as well as transactional and due diligence for large national commercial and industrial clients.

Project Experience

- Serving as project manager for a brownfield redevelopment in the City of Wyoming, Michigan, on behalf of the property owner and in coordination with the Brownfield Redevelopment Authority. The brownfield zone included a large razed industrial property. Responsible for preparation of a project scope and budget to support a plan that is administratively complete yet flexible enough to allow for the site-specific nuances that each brownfield project brings. Met with numerous investors, developers, and property owner to discuss how site conditions might impact their specific project. Designed vapor mitigation and soil management protocol for various redevelopment options. (2021–2023)
- Conducting and managing soil and groundwater investigation at 10,000-acre concentrated animal feeding operation. PFAS impacts were identified, and additional work included preparing and implementing due care compliance activities including soil management and treatment of PFAS impacted groundwater. (2021–2023)
- Developing a long-term monitoring plan for per- and polyfluoroalkyl substances (PFAS) in groundwater in New England. Work included conducting historical area-wide analysis for potential PFAS sources. (2018–2019)

- Conducting and managing Phase I ESAs for forestland and rural properties upwards of 40,000 acres for uses such as wind and solar farms and agricultural property redevelopment. Implemented GIS-based data review to streamline field assessment and reporting. (2017–2023)
- Designing and implementing investigation and remediation of arsenic impacted soils at an 80-acre former orchard. Incremental sampling methodology was implemented for site characterization and impacted soils were excavated and disposed offsite within the in coordination with Brownfield Redevelopment authority. Molly developed a No Further Action report, and the property was redeveloped for residential use. (2017-2020)
- Preparing and implementing project plans for a RCRA facility investigation (RFI) in Michigan. Work included evaluating the existing environmental and site history information, overseeing field implementation of the RFI, and evaluating sample data. (2014–2013)
- Conducting and managing Phase I and Phase II environmental site assessments (ESAs) for clients throughout the United States. Tasks included writing reports and compiling due diligence research, developing sampling and investigation plans, and creating reporting tables comparing analytical results to Part 201 cleanup criteria and Part 213 risk-based screening levels, vapor-intrusion screening levels, and waste characterization values. Compiled real-time data using GIS-based collection systems. (2012–2023)
- Performing groundwater modeling for feasibility studies for the Montmorency-Oscoda-Alpena landfill in Atlanta, Michigan. Work included evaluating over fifteen years of site investigation data and developing hydrogeological models for predicting fate and transport of petroleum hydrocarbons and inorganic compounds. The predictive modeling results were used to evaluate the feasibility of proposed remedial activities. (2005–2006)
- Preparing plans and specifications for the removal of large, underground storage tanks (UST) for a large residential remodeling project in Grand Rapids, Michigan. Work included oversight of UST excavation, on-site safety management of tenants, soil excavation, and site restoration activities to assure compliance with specifications and documentation and reporting of all removal activities. (2005)
- Designing and implementing investigation and remediation of mercury-impacted soil and surfaces at over 30 natural gas compressor stations, dehydration plants, and metering facilities in Michigan. Using a combination of a Jerome and Lumex (portable gas chromatograph) mercury vapor analyzers (MVA), Molly completed field investigations of surface and subsurface soils and interior building surfaces. The Lumex MVA obtained laboratory-quality data and enabled field screening during remediation activities eliminating multiple mobilizations and laboratory analysis costs as well as reducing remediation time. (2002–2004)

- Preparing feasibility studies for several natural gas storage and processing facilities in Michigan. Work included compiling and evaluating historic site investigation data and developing hydrogeological models for predicting fate and transport of petroleum hydrocarbons, chlorinated volatiles, and inorganic compounds. The predictive modeling results were used to develop remedial action plans. (2002–2011)
- Serving as on-site geologist for several hydrogeologic investigations. Investigations for soil, groundwater, and surface water impact were completed utilizing various instruments. Work included overseeing drilling contractors; collecting soil, groundwater, and surface water samples; installing monitoring wells, and completing a report of all findings. (2001–2011)
- Managing large, soil and groundwater remediation projects (>5,000 CY) at active natural gas facilities and oil production fields in Michigan. Work included designing soil excavation and dewatering systems, preparing safety plans for working around high-pressure natural gas pipelines, removing asbestos-containing pipeline and other utilities, and developing closure sampling strategy. As the site leader, Molly oversaw several contractors during biocell installation, biocell decommissioning, soil removal and disposal, and closure sampling. (2001–2011)
- Developing and performing the geophysical investigation in support of a remedial investigation/feasibility study of animal by-product rendering facility in Illinois. Surface electromagnetic (EM) and magnetics surveys were completed to identify the lateral extent of disposal areas and to screen for the potential presence of a groundwater contaminant plume. The resulting data were used to map the additional investigations at the location and test waste-disposal pits. (1999)
- Developing and performing geophysical investigations in support of remedial investigation and identification of abandoned underground storage tanks and underground utilities in Illinois. Surface electromagnetic (EM) and ground-penetrating radar (GPR) surveys were completed to identify the lateral extent of disturbed soil and abandoned utilities and tanks. The resulting data were used to place sample location for additional investigations and identify USTs for removal. (1999)

Education

BS, Geology, Grand Valley State University, 1987

Training/Certification

HAZWOPER Health and Safety Training Course (EPA 29 CFR 1919)

OSHA 40-hour, 8-hour supervisory, and annual 8-hour refresher courses

Affiliations

Association of Ground Water Scientists and Engineers (National Well Water Association)

MICHAEL POTTER

Senior Geoscientist

Michael has more than 30 years of experience with projects involving hydrogeological investigations, construction management of remedial systems, phased environmental assessments and ground water monitoring programs. He manages large remedial construction projects as well as field work such as monitoring of well placement, drilling, and installation; soil and ground water sampling; elevation surveying; ground water flow evaluation; tank removals; impoundment closures; and sampling of soil, water, and hazardous wastes.

Michael has participated in remedial investigations and feasibility studies under the U.S. EPA ARCS Program and has a thorough knowledge of procedures required by the U.S. EPA in well installation, soil and surface sediment sampling; groundwater and surface water sampling; soil vapor testing; and the documentation procedures in recording, shipping, and tracking these samples.

Michael is proficient with most field equipment including flame ionization detectors, photoionization detectors, Troxler Nuclear densometers, multigas monitors, and other instruments used in groundwater analyses.

Project Experience

- Serving as construction manager for a large-scale ($2.4 million) air sparge and soil vapor extraction system. Project consisted of five horizontal galleries and 27 vertical wells encompassing the riverfront boundary of a chemical manufacturing facility. Project included a stand-alone building that housed the sparge and extraction pumps, valving, and treatment equipment. Provided on-going operation and maintenance of the treatment system. (1994–Present)
- Leading a multidisciplinary team in the implementation of a sediments remediation project adjacent to a former manufactured gas plant (MGP) and Part 201 site on the Flint River in Michigan. The project included a wetland mitigation strategy; hydraulic, geotechnical, and groundwater modeling; water treatment; structural engineering and development of a structural monitoring plan; riverbank armoring and stabilization; restoration of greenspace and park infrastructure; and an odor- and emissions-mitigation plan. Mike participated in collaboration efforts with project stakeholders, including the U.S. Environmental Protection Agency; U.S. Army Corps of Engineers; Michigan Department of Environment, Great Lakes, and Energy (EGLE); Michigan Department of Natural Resources (MDNR); and state, county, and city officials.

  Mike served as owner's engineer during the project's construction and as the main point of contact with the primary contractor. He facilitated collaboration with the contractor, allowing for successful implementation of the project. In 2019, EGLE issued a certificate of project completion for the project. (2016–2019)

- Assisting with the development and implementation of excavation-based remedy to remove tannery-related materials from former wastewater lagoons, wetlands, and upland areas at a former leather tannery site in Michigan. Activities included the removal of approximately 200,000 tons of material from the site. Assisted with design and restoration of a 5.37-acre wetland and 0.33 acres of new wetland as an emergent/open water wetland using a series of low-profile wetland berms to improve habitat diversity. (2009–2019)
- Serving as construction manager for a soil-bentonite slurry wall and vapor barrier at a hotel conference center. Wall constructed to control migration of impacted groundwater from the site. Project also included the installation of a polymeric vapor barrier under the building to mitigate potential vapor intrusions into the building. (1994–2000)
- Serving as on-site geologist supervising soil sampling and monitoring well installation for a remediation investigation at an Ohio Superfund site. Responsible for descriptions and collection of soil and rock samples; health and safety monitoring; and overall quality of the subsurface field investigation. (1994–2000)
- Serving as site leader for solid-waste removal at a solvent disposal facility. Project involved removal of 300,000 gallons of solvent waste from 26 above-ground storage tanks; 900 drums of solid and semi-solid paint; resin and paint wastes; 20,000 gallons of dilute wastewater; laboratory wastes and reagents; and gas cylinders. Completed under direct U.S. EPA oversight with all waste removed within four months at a cost 40 percent lower than U.S. EPA estimates and 15% less than Horizon's initial estimate. (1998)
- Providing oversight and quality assurance for a large soil-solidification remediation project at a Wisconsin coal tar site. (1987–1994)
- Serving as owner's representative and engineer during reconstruction of a large earth dam in Michigan. Dam consisted of a sand base, clay face, and concrete spillway. Responsible for density testing of soils, field testing of concrete, and compliance to design's plans and specifications. (1987–1994)
- Serving as project manager for combined geotechnical and environmental investigations for a fast-food retailer in Michigan. Project included Phase I and Phase II investigations. (1987–1994)
- Providing evaluation, startup, and operation of water filtration plants in three cities along the Nile River. Plants designed to 7.5 million gallon-per-day capacity and included alum coagulation, followed by sedimentation, filtration, and chlorination. (1987–1990)

Education

BS, Environmental Engineering, Michigan Technological University, 2016

Training/Certification

ASTM Phase 1 Training

HAZWHOPER 40-hour

Registration

Engineer in Training

Software

Siemens UGNX, MATLAB, Java, C++, Microsoft Visio, HEC-RAS/HMS, EPANET, ArcGIS

Affiliations

South Dakota Engineering Society (National Society of Professional Engineers)

ALLEN PRINCE, EIT

Environmental Engineer

Allen joined Barr in 2018 with two years of civil engineering experience and a degree in environmental engineering from Michigan Technological University. Allen has experience with project management, engineering design development and review, environmental sampling, stakeholder coordination, construction inspections and oversight, data evaluation, report preparation, and financial capacity analysis.

Project Experience

- Designing an ex-situ remediation system for a site impacted by PFAS as a result of historical manufacturing operations. (2023–present)
- Supporting the design and installation of a vapor intrusion and sub-slab depressurization system. (2019–2020, 2022, 2022–Present)
- Working with a team to develop and field-verify an operations and maintenance manual for a PFAS treatment system designed to treat all site-generated wastewater from a large industrial client. (2022)
- Designing, constructing, and implementing a pilot-scale groundwater treatment system to aid in full-scale, in-situ remedial system design intended to support power plant decommissioning. (2020–2021)
- Designing an ex-situ remediation system to treat groundwater impacted by BTEX as a result of historical manufacturing activities. (2020–2021)
- Performing PFAS sampling for drinking water wells (2020) and for soils for an agricultural client. (2021)
- Providing environmental spill response and management for a power distribution client. (2019)
- Performing on-site sampling of contaminated groundwater. (2019)
- Performing GPS-guided push probe soil sampling with concurrent soil classification and photoionization detector readings of site soils. (2019)
- Characterizing mine tailings-basin water. (2019)
- Participating on a team designing, constructing, and implementing a biologically active GAC system to treat BTEX-contaminated groundwater. (2018–2019)

Education

MS, Environmental Engineering, University of Minnesota, 2006

BChE, Chemical Engineering (emphasis: environmental engineering, minor: English), University of Minnesota, 2002

Training/Certification

HAZWOPER

Registration

Professional Engineer: Michigan, Illinois, Minnesota, New York, Washington

SARA RAMSDEN, PE

Vice President, Senior Environmental Engineer

Sara Ramsden has more than 18 years of experience with environmental engineering and a master's degree in environmental engineering from the University of Minnesota. Sara's experience includes managing contaminated site investigation and remediation projects, including work in site investigations, remedial action coordination, remedial design and operation, and brownfields redevelopment. She specializes in addressing legacy environmental issues at high-profile contaminated sites with multiple stakeholders.

Project Experience

- Serving as project principal on a large-scale drinking water sampling and treatment project involving the presence of per- and polyfluoroalkyl substances (PFAS) at a project in the midwestern United States since 2021. The project involves collecting samples from private wells and public water supplies, coordinating the installation of point-of-entry treatment (POET) systems that use activated carbon for PFAS treatment at private wells, and providing an alternate water supply to a public water system. To date, samples have been collected from approximately 170 private wells and 16 public water systems, and POETs have been installed at approximately 60 properties with private wells. Barr has conducted PFAS-water-treatment modeling to predict breakthrough of the activated carbon in the POET systems and is working with a local municipality, our client, and regulators to install new municipal wells as an alternate water supply measure. As part of the sampling effort, Barr staff communicates with private well owners and public water system owners and operators regarding sampling and results, obtained access agreements, scheduled sampling appointments, and coordinates with the POET system vendor that installs the treatment systems. (2021–ongoing)
- Serving as project manager and directing Barr's work on a wide-ranging, multi-media remedial investigation, feasibility study, and interim response action involving the presence of PFAS at a project in the eastern United States. PFAS has been detected in the public water supply and private wells in the project area. The project involves a complex group of potentially responsible parties working with local, state, and federal regulatory authorities to address PFAS issues across multiple sites located in the same municipality. Extensive soil and groundwater investigations are ongoing in support of federal and state remedial investigation and feasibility study (RI/FS) processes. Interim remedial actions, including groundwater extraction for hydraulic control and treatment with activated and stormwater system cleaning, are being implemented concurrently with the investigation work. Barr has conducted PFAS-water-treatment pilot-testing at the site and has evaluated water treatment options, including granular activated carbon and ion exchange. Barr serves as the lead consultant for developing and refining a complex site conceptual model through iterative efforts, including complex groundwater flow modeling. The work has been closely coordinated between the potentially

responsible parties and regulatory authorities as they work to address a significant public interest in the project. (2017–ongoing)

- Serving as project manager on a fast-track, complex vapor intrusion investigation and mitigation project in Minnesota for a confidential client since 2010 and project principal since 2021. Assisted with MPCA Superfund staff negotiations to shut down a remedial groundwater pump-out system that had operated for 25 years at the site. Since 2013, the project involved the collection of samples to analyze for the presence of trichloroethene (TCE) including soil gas and groundwater samples from public rights-of-way using direct-push technology, sub-slab soil gas samples from beneath over 300 homes and buildings, and collection of indoor and outdoor air samples from certain buildings. Sub-slab depressurization systems for vapor intrusion mitigation have been installed in approximately 180 buildings. As part of the sub-slab sampling effort, Barr staff communicated with property owners and building occupants regarding sampling in the homes or buildings, obtained access agreements, and scheduled sampling appointments. Responsibilities included overall project management, including coordination of up to 50 Barr staff members, communications with the client, regulatory agencies, and other project stakeholders, and response action implementation reporting. (2010–ongoing)
- Serving as project manager since 2010 and project principal since 2021 for a former wood-treating Superfund site with complex legacy issues in Fridley, Minnesota. Work includes coordinating groundwater monitoring associated with an onsite contaminated soil vault with slurry walls, preparing biennial monitoring reports, and negotiating and communicating with MPCA Superfund staff. Coordinated several redevelopment projects at the site with current property owners and with Metropolitan Council Environmental Services (MCES) and their environmental consultant regarding the rehabilitation of a sewer interceptor that runs through the site. (2010– ongoing)
- Managing the project team that assisted the city of Minneapolis with a groundwater monitoring program during a construction dewatering project on city property that is adjacent to several Superfund sites with chlorinated volatile organic compound (VOC) groundwater impacts. Work included preparation of a groundwater monitoring work plan, coordination of weekly sampling events, and communications with MPCA and Minnesota Department of Health staff. (2018–2019)
- Assisting with remedial investigation planning at a former sawmill and lumber manufacturing facility with historic releases of hazardous substances, including petroleum products and methane impacts in soil gas in south-central Washington. Work included review of previous investigations reports associated with the site and an adjacent landfill, remedial investigation work plan drafting, and communications with the client and current property owner. (2014–2016)
- Assisting with remedial action planning for contaminated soils management at a former wood-treating Superfund site in Brooklyn Center, Minnesota. Tasks included assisting with feasibility studies and

cost estimating. Work also included response action design including assisting with plans and specifications for a large, contaminated soil excavation, consolidation, and restoration project in wetland soils adjacent to a lake. (2009–2016)

- Managing the project team that assists the city of New Brighton with one of the largest and most complex brownfield redevelopments in Minnesota. The redevelopment involves 15 properties in the 90-acre northwest-quadrant area adjoining I-694 and I-35W. The properties include nine petroleum-release sites, a former refinery and Superfund site, two former municipal dumps with landfill gas concerns, and other concerns related to past solvent and chemical use. Primary work included planning and coordinating construction observation for the excavation of petroleum-impacted soils for a lined stormwater pond, excavation and consolidation of approximately 185,000 cubic yards of dump materials, and installation of a passive landfill gas collection and cover system in support of a dump closure project. Responsibilities included assisting with Phase I site assessments and Phase II investigations, preparing response action plans, preparing plans and specifications, coordinating response action field work and monitoring programs, preparing response action implementation reports, and communication with the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup Program (VIC) and the Petroleum Brownfields program. (2008–2013)
- Managing a remedial action in support of a redevelopment project at a former dump in Elko New Market, Minnesota, by the Scott County Community Development Agency. Project responsibilities included coordination of Phase II investigations and remedial excavation observation; response action plan preparation; Metropolitan Council and Minnesota Department of Employment and Economic Development (DEED) cleanup grant application assistance; and multi-party coordination with the project client, developers, contractors, and the MPCA VIC program. Successfully secured over $300,000 in cleanup grant funding for the project from the Metropolitan Council and DEED. (2010–2012)
- Serving as project manager for assisting the city of Inver Grove Heights, Minnesota, with environmental concerns encountered during road construction. Work included review of Phase I site assessments, coordination of Phase II investigations and construction observation of petroleum-contaminated soil and dump material excavation, and response action plan preparation. Coordinated with MnDOT, MPCA, and civil engineering consultant. (2007–2009)

Presentations

"Stakeholder Engagement with a Personal Approach: A Large-Scale Vapor Intrusion Assessment Success Story." 2022. Battelle Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds: Palm Springs, CA.

"Unique Management Challenges for Emerging Contaminants on High-profile Sites". 2019. Great Lakes Environmental Remediation & Redevelopment Conference: Lansing, MI

Education

MES, Environmental Sciences, Yale University, 1989

BA, Biology, Carleton College, 1983

ALLEN J. REILLY, JR.

Senior Environmental Scientist

Allen has 35 years of experience helping clients develop innovative compliance strategies to address a wide range of state and federal environmental regulations. He specializes in developing comprehensive remedial plans that accommodate often overlapping requirements of state and federal environmental response laws. He has prepared risk assessments and developed remedial action plans to address conditions at a wide variety of complex commercial and industrial sites regulated under CERCLA, RCRA, and Michigan's Environmental Response Act (Part 201). Using his training in both scientific and regulatory matters, Allen is adept at reconciling the quantitative and legal aspects of environmental risk assessment and works effectively with regulatory agencies. Prior to joining Barr, Allen served as director of environmental risk management for Horizon Environmental Corporation of Grand Rapids, Michigan.

Allen works extensively and successfully with both municipal and private sector clients to overcome regulatory and legal barriers to facilitate redevelopment of old industrial sites. He uses risk assessment techniques to integrate public health objectives into development goals, resulting in remedial activities that are cost-effective and tailored to the planned land use.

Project Experience

PFAS

- Advising numerous clients on how to navigate the evolving regulatory requirements associated with this emerging contaminant class, including conducting assessments of their facilities to identify the potential for these chemicals to be present, evaluating options for removal/substitution of the chemicals in their processes and management of residuals, and evaluating the potential for PFAS to be present in discharges from their facility under the industrial pretreatment and/or NPDES programs and identifying options for mitigation. (2018–Present)
- Structuring and implementing investigations to characterize environmental media to assess the presence/absence of these chemicals when releases are suspected. His work has also included assessing the implications of remedial strategy on identifying the presence of PFAS on mature sites of contamination and development of cost-effective strategies for managing the risk. (2018–Present)
- Providing technical input on one of the largest PFAS sites in the U.S. (as measured by number of private residential wells impacted). Work scope included litigation support and assistance in evaluating and deploying POET systems to address drinking water exposures. (2018–Present)
- Securing on behalf of a client NSF certification of the first whole house POET systems to meet ANSI requirements for PFAS removal. (2019)

Brownfield redevelopment

- Conducting a risk assessment for industrial redevelopment for a confidential client in Ohio. Demonstrated to the client, city, and county that a large tract of industrialized property on the waterfront could be redeveloped into a world headquarters. The risk assessment was used to establish risk-based cleanup criteria that reflected the planned land use. These criteria were used in an iterative fashion during site development planning to evaluate various remedial options ranging from institutional controls and exposure barriers to excavation and active groundwater remediation. Elements of the proposed development were incorporated in the final remedy for the site as cost-effective exposure controls. Integrating the risk assessment with the site development planning helped save significant time and money for both the remediation and site development. (2015)
- Serving as technical lead for the preparation of a risk assessment of a former manufactured gas plant (MGP) site in a downtown area for a confidential client in Michigan. This public utility wished to remediate the MGP site to allow the municipality to move ahead with development of a retail mall. The areas of concern addressed by the risk assessment included on- and off-site soils, groundwater, and surface water. The objective of the risk assessment was to establish risk-based cleanup criteria that could support the city's planned commercial use of the property. The methodology developed to evaluate risks and establish cleanup criteria was also used to quantify the degree of risk reduction achieved by various combinations of remedial alternatives to arrive at the most cost-effective final remedy. A limited industrial remedial action plan achieved the necessary degree of risk reduction through a combination of active remediation and exposure controls. (2013)

Remedial investigations, feasibility studies, and remedial actions

- Developing and implementing a remedial strategy under Part 201 to address historical releases at an active leather tannery on a popular recreational lake for Whitehall Leather Company in Whitehall, Michigan. Led a multidisciplinary team in the focused investigations of soil, groundwater, and sediment quality to support a site-specific evaluation of the risks from the site to human health and the environment. The remedial action plan proposed a limited industrial closure and consisted of a combination of active remediation (shoreline stabilization and horizontal well system along the shoreline to intercept contaminants in site groundwater venting into the lake) and exposure controls (deed and access restrictions). (2001–2015)

RCRA permitting, closure, and corrective actions

- Assisting with a RCRA corrective action at a large pharmaceutical manufacturing facility in Michigan. This facility was required to address historical releases at its site under both federal RCRA corrective action requirements and Michigan Part 201. Negotiated with the Michigan Department of Environmental Quality (MDEQ) and U.S. EPA to reduce the number of SWMUs at the site from 14 to 7 and developed and

implemented a single, site-wide compliance strategy designed to address the overlapping corrective action requirements imposed by these two sets of regulations. The project also required development and implementation of a risk assessment framework to characterize the potential human health and ecological risks posed by manufactured products and isolated intermediates that were not represented on standard environmental scans and for which risk-based criteria were not available. The framework successfully reduced the scope of the assessment from over 300 compounds down to eight API based on surrogacy approach that evaluated the production volume, manufacturing history, a conceptual site model that considered release mechanisms and migration/transport pathways, as well as the toxicity, fate, and transport characteristics of the compounds. (1989–Present)

- Providing technical and strategic counsel to a Fortune 100 company for a RCRA corrective action at a 525-acre research and development site in Ohio. Assisted with the negotiation of an administrative order on consent with the Ohio EPA to address its corrective action obligations at its primary R&D facility. Identified and recategorized SWMUs, developed a risk-based investigative strategy, reviewed the SOWs used by the Ohio EPA, and provided preliminary development of risk-based criteria for the site. (2016)

Environmental site assessment, due diligence, and transactional analysis

- Completed due diligence on a 5,000-acre CAFO in northern Michigan where PFAS were identified in soil and groundwater due to historical land application of biosolids. Worked with the client, MPART, MDARD, and EGLE to develop a due care plan that demonstrated that the farm operations could be safely conducted at the site. The plan included consideration of the potential for indirect exposure pathways, including crop and livestock uptake. The processing operation represented one element of historical mining, ore processing and refining operations, and constituted a small fraction of a much larger site of environmental contamination. Sampling and analysis of soil, surface water, sediments, and groundwater were completed to establish "baseline" environmental conditions at the facility. Potential financial liabilities associated with the environmental issues were estimated. Subsequent to completion of initial due diligence efforts, provided technical support in drafting of legal agreements in support of the acquisition and in support of an administrative agreement and covenant not to sue (AA/CNTS) between the client and the state of Michigan. Technical support also included a compliance analysis plan, which contained an evaluation of our client's "due care" obligations pursuant to Part 201 and specified activities that would be completed by the client to fulfill these obligations. (2021–Present)
- Developed and implemented a due diligence protocol to evaluate environmental condition on multiple sites for a large public. The objective of the protocol was to establish a high-quality, uniform, timely, and cost-effective method for identifying and quantifying potential environmental liability with enough precision to allow critical acquisition or lease

decisions to be made by the university. The protocol, which employed a phased approach in investigating potential environmental liability at the properties, reflected the university's conservative tolerance for risk. To date, over 50 properties have been evaluated using the protocol. Several previously owned properties have also been investigated and remediated to standards specified in the protocol. The protocol and timely response have provided the client with a smooth transition while acquiring and developing properties for their expansion. (2018–Present)

Litigation support

- Providing expert testimony and litigation support for a various clients involved in cases in Michigan on topics relating to risk assessment, data validation and usability, and chemical fate and transport. (2018–Present)

Allen served on Michigan's Environmental Advisory Council from 2004–2007. The EAC was a body chartered by the director of the MDEQ to review and provide guidance on environmental policy matters across programs. He has been involved in several state and local initiatives to expedite cleanup in Michigan and remove regulatory obstacles to urban redevelopment. Allen has provided technical assistance to the MDEQ in the development of land use-based remediation criteria for industrial and commercial sites. From 2006 to 2008, he participated in Phase I and Phase II discussion groups tasked by the MDEQ with developing reform proposals for the Part 201 program. In 2010, Allen provided technical input to the Michigan legislature on the development of the final Part 201 reform legislation, which was passed into law in December 2010.

Prior to his career in consulting, Allen was awarded a fellowship by the U.S. EPA to analyze policy at the Office of Marine and Estuarine Protection in Washington, D.C., on a combined sewer overflow abatement strategy.

Education

PhD, Civil Engineering, University of Minnesota, 2004

MS, Civil Engineering, University of Wyoming, 1988

BS, Civil Engineering, University of Wyoming, 1986

Registration

Civil Engineer: Michigan, Minnesota, Iowa

Affiliations

American Society of Civil Engineers, National Groundwater Association, Water Environment Federation

DON E. RICHARD, PHD, PE

Vice President, Senior Civil Engineer

Don is Barr's senior technical advisor for the sediment and water/wastewater treatment practice groups. He has 35 years of experience treating wastewater and impacted groundwater from a variety of sources and managing numerous site investigation and remediation projects for soil, sediment, and groundwater to enhance and restore natural environments or to promote redevelopment.

Don completed his PhD at the University of Minnesota in civil engineering with an environmental emphasis, while continuing to serve clients on a variety of wastewater and remediation projects. The primary focus of his research was the biological transformation of inorganic and organic contaminants during the natural remediation of groundwater at a former manufactured gas plant site.

Project Experience

Examples of Don's assessment and remediation project work include:

- Serving as principal in charge for Barr's project team in a coordinated effort to restore a portion of the St. Louis River estuary area of concern within the Great Lakes. Working with consultants representing local, state, and federal governments, along with private industry, Barr completed a multi-phase investigation of river sediments and developed a detailed hydraulic and sediment transport model for a major portion of the estuary using DELFT 3D. With the conceptual model for the site complete, Barr led the effort for a detailed feasibility study of potential alternatives for restoration of the area. Following selection of a preferred alternative and the development of a cooperative agreement for the project, Barr has worked closely with the partnership group that is implementing this multi-year restoration project. (2010–Present)
- Serving as principal in charge for the investigation and remediation of river sediments adjacent to a historical MGP site in Michigan. A phased investigation program was used to delineate the extent of residual MGP constituents and groundwater modeling was conducted to evaluate potential long-term trends in surface water and groundwater quality. Barr completed the detailed design and permitting for this project, assisted with contractor selection, and provided on-site oversight of this work, which included removal of approximately 81,000 cubic yards of sediment, placement of a sediment cap, removal and replacement of numerous structures—including a pedestrian bridge—and installation of a groundwater control system and long-term monitoring equipment. (2014–2018)
- Serving as principal in charge and technical advisor for an evaluation of sulfur emissions from a natural, tidally influenced marine wetland affecting ambient air emission monitoring near a West Coast refinery. Barr's evaluation showed that the majority of the monitoring results were from

natural sources, which significantly reduced potential fines for the facility. (2015–2016)

- Serving for 12 years as project manager, senior design engineer, and principal in charge for environmental services at a RCRA-permitted steel-manufacturing facility. Work at this site included investigation of lake sediments, development of a corrective measures plan, and removal of approximately 12,000 cubic yards of material for dewatering and off-site disposal. Originally contemplated as a natural resources damage assessment (NRDA) by the local regulatory agencies, this work was completed under the terms of the RCRA facility permit. Other work at this site included a corrective-measures study, corrective-measures implementation, and continuing operations of the corrective measures systems as well as sampling, reporting, and assistance with RCRA permit re-issuance. The corrective measures included limited removal of hot spot soils, covering of solid waste management units to facilitate continued industrial use (billet storage) for the facility, and pilot testing, installation, and operation of two groundwater pump-and-treatment systems to capture metals-contaminated groundwater. Additional work has included storm water control systems to limit infiltration to groundwater. (2001–2013)
- Serving as principal in charge for numerous projects involving petroleum-release response actions for a regional pipeline company in North Dakota, Minnesota, Wisconsin, Michigan, and Illinois. This work included documenting impacts, performing remedial assessments, conducting and managing contaminated soil excavation and coordinating disposal, installing and operating soil and groundwater remediation systems (e.g., soil vapor extraction and air sparging) and conducting follow-up groundwater monitoring and reporting. (2004–2012)
- Serving as principal in charge for all of Barr's services related to a crude oil release into a river in Michigan. Almost 10 percent of Barr's total staff assisted in this emergency response. Our portion of the response focused on the removal of oil and contaminated soil from the release site and the adjacent wetland and creek as well as coordination of waste management and disposal operations. Barr coordinated our work with over 2,000 people from more than a dozen consultants, remediation contractors, and regulatory agencies. (2010)
- Serving as principal in charge of work to accelerate the remediation and closure of an MGP site in Illinois. This work included a value-engineering study of the existing groundwater-treatment operations, additional site investigation, a treatability study to evaluate the effectiveness of chemical-biological oxidation, groundwater modeling to evaluate the long-term benefits of in-situ treatment operations, and full-scale injection of chemical oxidants to accelerate remediation and closure. (2002–2010)
- Serving as principal in charge and senior technical consultant for the implementation of an in-situ treatment program that used calcium polysulfide to chemically reduce hexavalent chromium in vadose zone soil

to below state-wide standards for protection of human health and the environment. (2003–2006)

- Serving as project manager and senior design engineer for a wetland restoration/ remediation project. This project at a Minnesota Superfund site is the first reconstructed wetland to be designed, permitted, and constructed to biologically treat chlorinated solvents in a groundwater plume passively discharging to a lake. Managing this multi-disciplined project included presentations at numerous public meetings to educate regulators and public officials on the natural processes occurring within the wetland. Barr also provided turnkey construction services on this project and long-term monitoring. (1999–2002)
- Serving as senior project technical resource for an ongoing evaluation of potential ecological risks to wetland receptors and potential impacts to human health via fish consumption from a small lake near an NPL-listed former wood-treating facility. Activities completed include development of a food-chain model to screen potential impacts to ecological receptors (mallards, red fox, and red-tailed hawk) within the wetland and development of the sampling and analysis plan for the fish-tissue study. (1998–2002)
- Serving as senior project manager for the remediation of a former MGP in Wisconsin where Barr worked in collaboration with the Gas Technology Institute to demonstrate in situ bioventing to remediate MGP-contaminated soils. After completing the bioventing operations, Barr also assisted with the removal of former MGP-related structures and residual coal-tar impacts to facilitate the expansion of an existing substation. (1994–2007)
- Serving as project manager and senior design engineer for removal of coal-tar-impacted sediments from the Boone River in Iowa. This project included design, permitting, and construction oversight. The work consisted of constructing four sheetpile cofferdams, sediment dewatering and excavation within the cofferdams, reconstruction of a low-head dam, and stream-bank stabilization and restoration. (1991–2002)
- Serving as senior project manager, design engineer, and technical advisor to an Iowa utility managing restoration of numerous MGP sites including two CERCLA sites, regulated by EPA Region VII. This work included research to evaluate natural remediation of groundwater at MGP sites using biological processes. (1989–2001) Other work experience at these MGP sites over 13 years included:
  - Senior project manager and design engineer for the construction and initial operation of a full-scale facility for demonstration of IGT's MGP-REM land treatment technology.
  - Senior project manager for concurrent removal action and remedial investigation at a former NPL-listed MGP site. The removal action included excavation of unsaturated soil for co-burning and thermal desorption.

- Experience with all aspects of site investigation and remediation for a former MGP on the NPL list, including:
  - Coordinating the site characterization.
  - Assisting with groundwater contaminant transport modeling for negotiation of institutional controls, and site-specific cleanup standards.
  - Coordinating the excavation and test-burn of contaminated soil at an electrical generating facility.
  - Providing project management, design and of removal actions for contaminated soils, including innovative techniques for removing contaminated soil from beneath the groundwater.
  - Providing project management and senior engineering review for the remedial design, remedial-action work plan, and in-situ bioremediation field study.

Don's wastewater treatment experience includes:

- Serving as senior technical resource for evaluation of passive and active treatment of mine influenced waters from two former zinc mining operations. Treatment alternatives that have been evaluated include active physical-chemical processes and passive biological processes (wetlands). (2018–Present)
- Serving as project manager for solids-handling operations associated with the operation of a chemical treatment system for the removal of phosphorus from stormwater. Alum added to the storm water removed phosphorus to levels below 0.1 mg/L and resulted in an alum sludge that was temporarily captured in an existing wetland during a full-scale treatability test. The project included removal of the phosphorus laden sludge and the development of a plan for long-term sludge management. (2018–Present)
- Serving as principal in charge and senior technical resources for maintenance and improvement projects to the wastewater operations for a major manufacturing facility in the Midwest. Projects have included the design and installation of improvements to filtration, disinfection, and chemical handling processes. Evaluations included assessment of nutrient loading and optimization of nutrient removal processes. (2018–2023)
- Serving as a principal in charge and senior technical resource for the evaluation, pilot testing, preliminary design, and permitting of wastewater treatment operations to minimize environmental impacts from a new non-ferrous mining operation in northern Minnesota. This work has included coordination with water modeling operations for the project and potential fate and transformation of chemicals in surface and groundwater. The work has also included scoping and coordination of pilot- and bench-scale testing, modeling of potential treatment technologies, preliminary layout of the facilities, development of initial operating scenarios, and development of cost estimates for capital and operating expenses to assess long-term financial assurance requirements for the project. The

treatment system will include a combination of membrane treatment and chemical precipitation to remove inorganic constituents from mining operations. (2004–2022)

- Serving as a technical resource for field-scale testing of an enhanced biological treatment system to address high concentrations of nitrate in agricultural runoff entering a surface water used as a source of drinking water. Working with a local research university, Barr assisted the municipality (our client) to obtain funding for research into enhanced denitrification of the early spring agricultural runoff. (2018–2020)
- Serving as principal and senior technical resource for the evaluation of alternative treatment technologies for groundwater impacted by historical chemical manufacturing operations. The results of the evaluation suggested that on-site treatment may be more cost-effective than the current disposal options in use. Pilot testing of a fixed-film biological treatment system was implemented in 2019 and the full-scale design has been completed. (2016–2020)
- Serving as principal in charge and senior technical resource for the evaluation of short-term and long-term mitigation of mine-influenced water at a former taconite processing facility. The evaluation considered both active and passive treatment technologies with a preference for long-term, sustainable treatment operations. The work included bench-scale testing of several permeable reactive barrier treatment technologies as well as engineered, passive wetland systems. Pilot-scale testing of five different permeable reactive treatment technologies was also completed. (2013–2019)
- Serving as a technical resource in the evaluation, bench-scale testing, design, and installation of a new treatment system for removal of perfluorinated compounds from industrial process water. The treatment system will include chemical precipitation followed by granular activated carbon adsorption treatment processes. (2017–2018)
- Serving as a senior technical resource for evaluation, bench-testing and design of a treatment process to neutralize waste sulfuric acid. Working with our client, Barr evaluated the potential treatment process and tested the residual solid and liquid waste streams from this process. The proposed neutralization system has the potential to significantly reduce waste management costs. (2018)
- Serving as principal and senior technical resource for the evaluation, pilot-testing, design, start-up and operation of an acid recycling system for a manufacturing facility. The system included neutralization, chemical precipitation and then ion exchange to regenerate the acid for reuse. (2014–2017)
- Serving as a principal in charge and senior technical resource for the evaluation of passive and active treatment processes for selenium in mine-influenced waters at two separate facilities. Barr evaluated the overall water management plans for these facilities to identify operational changes to minimize release of selenium. (2010)

- Serving as principal in charge for the evaluation of potential passive and active treatment alternatives for metal-impacted mine water discharged from the Soudan Underground Mine State Park in northeastern Minnesota. (2006–2008)
- Serving as senior technical resource for bench-scale testing and preparation of a feasibility study to evaluate remedial measures for groundwater affected by high pH and metals at a former cement-processing facility, including assisting with the design and installation of groundwater recovery systems. (2004–2006)
- Serving as senior technical advisor for the evaluation of biological fouling issues at a municipal wastewater treatment facility that was accepting a significant flow and organic waste load from a meat-processing facility. Issues addressed included fouling of fixed film media due to overloading of soluble organic wastes to the trickling-filter system, and high concentrations of nitrogen and sulfur in the effluent. (2002–2003)
- Serving as a senior technical resource for evaluation of treatment technologies, pilot testing, design, and installation of a chemical precipitation process to remove arsenic from a refinery wastewater in a northern climate. The treatment process included chemical oxidation and extended reaction times prior to gravity separation of iron/arsenic precipitates. (2002)
- Serving as senior technical advisor and design engineer for two wastewater-treatment systems removing high concentrations of sulfate from agricultural and mine-processing wastewater, using anoxic, fixed-film biological treatment processes. The fixed bed bioreactors combined with supplemental carbon provided in either solid or liquid form to promote the growth of sulfate-reducing bacteria. Sulfides generated from this process are removed by precipitation and adsorption. (2002)

Publications

Boom, T., Ellis, M., Richard, D. 2019. Designing and implementing an urban river remediation. *Remediation* 29:4, doi:10.1002/rem.21622.

Bankston, J., Blodgett, J., Karthikeyan, S., and Richard, D. 2013. Chlorinated solvent treatment wetland. *Remediation* 23, no. 4 (2013), 59–69, doi:10.1002/rem.21366.

Natural Remediation of Manufactured Gas Plant Residuals in a Shallow Aquifer. Ph.D. Thesis, University of Minnesota, July 2004.

Aerated Biofiltration for Simultaneous Removal of Iron and Polycyclic Aromatic Hydrocarbons (PAHs) from Groundwater. *Water Environment Research*, November/December 2001.

A Stochastic Model for the Design of Evaporation Basins for Oil Shale Retort Water. Master's Thesis, University of Wyoming, 1988.

Education

MS, Environmental Engineering, Colorado School of Mines, 2014

BS, Civil Engineering, Rose-Hulman Institute of Technology, 2007

Training/Certification

40-Hour OSHA HAZWOPER training, MSHA – Part 48

Registration

Professional Engineer: Colorado, Michigan, Utah

RYAN J. SCHIPPER, PE

Senior Water/Wastewater Engineer

Ryan joined Barr in 2022 with 15 years of experience in active and passive water treatment projects. He has served in numerous roles including as subject matter expert, senior technical reviewer, program and project manager, and team leader. Ryan's projects have involved wastewater treatment for mining, oil and gas, manufacturing, waste management, and site remediation programs throughout the world. His active water treatment projects have involved alternative evaluations, treatability studies, preliminary design, cost estimates, detailed design, construction oversight, and start-up support. Ryan's passive water treatment projects have involved evaluation, design, construction, and operational support for pilot and full-scale treatment systems. Prior to joining Barr, Ryan served as a senior engineer based out of Denver for a global consulting firm.

Project Experience

Water Treatment for the Mining Industry

- Serving as the project manager and lead for an alternatives evaluation and detailed design of a lime high-density sludge-treatment system for highly impacted acid-mine drainage at a gold mine in Sonora, Mexico. Design included capability for treated water reuse and direct discharge to the environment. Procurement support was provided and construction in 2022 under an accelerated schedule. (2019–2022)
- Serving as technical expert for projects involving the treatment of super-natant water from a tailings facility at San Rafael Mine in Peru. Projects included trade-off studies, onsite pilot testing, feasibility and detailed designs for long-term treatment alternatives, including a tailings pond as part of the overall process for settling and solids removal. The primary metals of concern included copper, zinc, lead, and manganese. (2019–2022)
- Providing an alternatives evaluation for the management and treatment of mine impacted water after closure of a mine in Yukon, Canada. Conceptual designs were provided, and onsite treatability testing was planned to evaluate passive removal rates for arsenic. (2018–2022)
- Serving as the project manager for an alternatives evaluation and conceptual designs for site-wide water management of waste rock dump seepages both during mine operation and after mine closure at Phoenix Mine in Nevada. The project included evaporation technologies and resource recovery considerations. (2022)
- Serving as technical expert for an alternative analysis and feasibility design, including water treatment of multiple mine-impacted water sources at Iscaycruz Mine in Peru. Passive and active alternatives were evaluated for the treatment of metals. (2020–2022)
- Serving as technical expert for an alternatives evaluation and prefeasibility design, including passive and active treatment technologies for the management of mine-impacted waters after closure at Rosaura Mine in

Peru. Treatment processes evaluated included lime precipitation, settling, manganese dioxide media, passive oxidation, wetlands, and manganese removal beds. (2020–2022)

- Serving as lead for a treatment alternatives analysis and prefeasibility study, including removal of molybdenum and manganese from multiple seepage streams (passive and active), at Highland Valley Copper Mine in British Columbia. (2022)
- Serving as the engineering lead for an evaluation and conceptual designs, including active and passive treatment options at a closed mine in Arizona. Evaluated existing evaporation ponds with salt build-up, and new sustainable systems with a focus on passive technologies. (2022)
- Serving as the technical expert for a full-scale design and operations support for a five-gpm passive treatment system, including collection systems, a biochemical reactor, and wetland/infiltration areas for a confidential mine site in Colorado. The passive system is treating uranium from approximately three to four 4mg/L in the influent to 0.06 mg/L at the discharge of the biochemical reactor. (2016–2022)
- Providing onsite construction support for a semi-passive biological system for the treatment of metal-laden acid mine drainage at a mine site in Arizona. The system included piping from two adit bulkheads, a biochemical reactor, an aerobic polishing cell (wetland), an infiltration area, recirculation system, and a remote monitoring system. The system provides successful treatment for metals and acidity. Sampling, reporting, and long-term operational services were also (2008–2022).
- Providing an alternatives evaluation and prefeasibility designs for treatment of multiple mine-impacted seeps at Paracota Mine in Peru. Passive technologies were evaluated for pH adjustment and the removal of sulfate and metals, including aluminum, cobalt, iron, manganese, and nickel. (2020–2021)
- Performing an evaluation of two existing passive treatment wetlands, alternatives analysis, and prefeasibility designs for retrofits and new systems for the treatment of sulfate and metals, including iron, manganese, lead, and zinc, at Orcopampa Mine in Peru. (2021)
- Serving as the engineering lead for an alternatives evaluation, treatability testing, and designs for the management of multiple mine-impacted waters including tailings storage pond water, pit dewatering water, and camp sewage wastewater at gold mines in Surinam. Served as engineer of record for the detailed design of a passive treatment facility for the camp wastewater treatment system. (2019–2021)
- Providing preliminary designs with capital and operating cost estimates for a passive system to treat mine-impacted water at La Granja Mine in Peru. The passive treatment system included anoxic limestone drains, settling pond, BCR, and aerobic wetlands. (2019–2021)
- Providing review of facility operations and development of a streamlined operations and maintenance (O&M) manual for the water treatment facility at Grey Eagle Mine in California. Reviewed oxidation, pH

adjustment, clarification, filtration, and solids management processes. (2019–2020)

- Providing an evaluation and conceptual designs for passive and hybrid closure options at an active copper mine in Chile. Alternatives included flushing limestone beds, settling ponds, manganese removal beds, biochemical reactors, and wetlands for the removal of sulfate and metals. (2018–2020)
- Performing a prefeasibility alternatives evaluation, including treatment for sulfate and metals (copper, iron, manganese, lead, and selenium), for Antamina Mine in Peru. Processes included in the alternatives included lime HDS, acid addition, nanofiltration, barium precipitation, and solids management in the tailings facility. (2019–2020)
- Providing technical support for the design and construction of a passive treatment system, which manages of up to 1200 gpm of mining impacted water from a closed mine adit in California. The passive treatment system included a stepped oxidation channel, settling pond, vegetated wetland, and a manganese removal bed for the treatment of iron, arsenic, and manganese to below the drinking water standards. (2014–2020)
- Serving as the engineering lead for evaluation of management and treatment options for mine impacted water at the Red Chris Mine in British Columbia. Conceptual designs were provided for the selected alternative including lime precipitation. (2019)
- Serving as the project manager for an alternatives evaluation and conceptual designs for the management of highly concentrated reverse-osmosis brine at a mine site in Washington. Evaluations included technologies for further brine concentration including a wide range of evaporation and membrane technologies as well as crystallization. Siting studies were performed and the feasibility for onsite and offsite repositories was evaluated. (2017–2018)
- Supporting a water treatment alternatives evaluation and feasibility level design for the proposed Back Forty Mine project in Michigan. Process is expected to include chemical precipitation, reverse osmosis, and brine and sludge management. (2017–2018)
- Serving as the engineering lead for a water treatment alternatives evaluation for the White Pine North project in Michigan. Cost estimates were provided for the selected alternative which included chemical precipitation, microfiltration, ion exchange, activated carbon, reverse osmosis and brine management. (2018)
- Completing a retrofit design to re-purpose existing tanks and equipment for the purposes of providing lime softening treatment of mine-impacted waters for a mine in the Minnesota Mesabi Iron Range. Provided on-site start-up support for the treatment system which met the treatment objectives. (2016–2017)
- Providing support for the water balance, water treatment alternatives evaluation, trade-off studies, and cost estimating for a feasibility study for Copperwood Mine in Michigan. (2017)

- Serving as project engineer for the design of a passive biochemical reactor to treat mining influenced water for the removal of sulfate, iron, and arsenic at a mine site in British Columbia. The system has been successfully treating water since its construction in 2012. Operational support and treatment analysis were provided as late as 2017. (2011–2017)
- Providing alternatives evaluation for the treatment of mining-impacted water with consideration for regulated parameters and treating to background concentrations at Skouries Mine in Greece. Treatment technologies included coagulation/flocculation, filtration, sludge dewatering, microfiltration, and reverse osmosis systems. (2016)
- Managing a multidisciplinary team to provide an alternatives evaluation and feasibility study for site-wide stormwater management at a confidential mine and cement plant in California. Coordinated multiple offices and guided detailed design for stormwater components, including lined ponds, pumps, pipelines, and connections to water treatment systems. Continued support was provided through construction. (2014–2016)
- Serving as the project manager for bench and pilot testing, including metals, nitrate, and total dissolved solids (TDS) removal for the Fort Knox Mine in Alaska. A pilot trailer was constructed for the preferred process (two-stage chemical precipitation, including solids removal and reverse osmosis) and was shipped to the site and met all treatment goals during operation. (2015–2016)
- Serving as project engineer for the design of a passive system (biochemical reactor, sulfide polishing cell, and aerobic polishing) to treat mining influenced water for the removal of sulfate, iron, and arsenic at a confidential mine site in British Columbia. The system has been successfully treating water since its construction in 2012. Operational support and treatment analysis were be provided. (2010–2015)
- Providing technology review and alternatives analysis for arsenic treatment systems, including passive, semi-passive, and conventional arsenic removal technologies, at Brush Creek Mine in California. (2014–2015)
- Providing feasibility and conceptual design for multiple treatment systems at closed mines in Kentucky. Treatment systems included settling ponds for total suspended solids (TSS) removal, aerobic wetlands for iron and aluminum removal, and limestone beds for manganese removal. (2013–2014)
- Providing demonstration testing and full-scale conceptual design for the treatment of selenium by in-situ carbon amendments in a pit lake at a mine in British Columbia. (2013–2014)
- Serving as lead engineer for a bench-scale study to evaluate the treatment of mining influenced water at a confidential mine site in Colorado. Two sources of water were evaluated for comingled treatment. The testing confirmed the feasibility of using a passive bioreactor for the treatment of

selenium, uranium, and radium. Greater than 98 percent uranium, selenium, and radium removal was achieved. (2013–2014)

- Serving as project engineer for the design of surface water treatment ponds for TSS removal at a confidential mine site in New Zealand. Bench testing results with different polymers and associated settling rates were analyzed for final polymer selection and pond sizing. (2012–2013)
- Managing field testing to develop process requirements for the treatment of acid mine drainage from a waste rock dump at Kisladag Gold Mine in Turkey. Preliminary designs were provided for the treatment process, which included pH adjustment with lime, co-precipitation with iron, flocculation, clarification, and dewatering using geotubes. (2012–2013)
- Providing onsite design and construction support for a passive system to treat metal-laden acid-mine drainage at a flow rate of 10 gpm at Golinsky Mine in California. The system included conveyance piping from an adit bulkhead, flow control systems, a biochemical reactor, and an infiltration gallery. The system has been successfully treating mining influenced waters (99% metal removal) since its construction. (2010–2013)
- Serving as project manager for the evaluation of a semi-passive biotreatment system designed to treat mining-influenced water at a mine site in Washington. The treatment system includes an interceptor trench, three bioreactor tanks in series, and an infiltration gallery. Recommendations and retrofit construction drawings were provided resolving performance issues (hydraulic and nutrient feed). (2009–2013)
- Serving as project manager for the construction of a pilot treatment system housed in a 45-foot semi-trailer for the purposes of treating mine-impacted water in Colorado. The pilot treatment system included pre-filtration, reverse osmosis, anaerobic immobilized cell bed bioreactors, and activated carbon filtration. (2011–2012)
- Providing onsite startup support for a previously decommissioned water treatment plant at a mine site in Indonesia. The plant is designed to remove metals from mining influenced water through an oxidation and chemical precipitation process. (2011–2012)
- Managing laboratory testing to identify polymers that were capable of meeting total suspended solids, metals limits, and aquatic toxicity goals at a confidential coal mine at Alberta. The testing results served as the basis for retrofits design to the polymer addition systems. (2012)
- Serving as task lead for design of a treatment system for the removal of selenium for Consol Energy in West Virginia. The system included carbon and phosphorus addition, two anaerobic bioreactors in series, filtration, granular activated carbon, and ancillary equipment. The system was successful at removing selenium to the treatment goals. (2011)
- Developing a bench-scale testing program for the treatment of groundwater impacted by uranium tailings and assisted in the oversight of testing activities for the Moab UMTRA project in Utah. Bench testing was performed by students at Mesa State College in Grand Junction Colorado. Contaminants of concern included uranium and ammonia. The project was

successful at bulk removal of uranium and ammonia, and recommendations for a preferred treatment option were provided. (2010–2011)

- Performing bench testing for the treatment of groundwater at a proposed gypsum mine. The bench testing was conducted at an analytical laboratory in Moscow, Russia, and treatment consisted of oxidation, pH adjustment, alkalinity addition, flocculation, and filtration. The bench-scale testing was successful at removing manganese, iron, strontium, and calcium to fishery guidelines. (2010–2011)
- Operating a pilot treatment system for the removal of selenium from a mining influenced water in British Columbia. The treatment system included anaerobic immobilized cell beds for the removal of selenium and aerobic immobilized cell beds for nutrient polishing. The system was successful with bulk removal of selenium and polishing. (2011)
- Providing onsite operation and testing of a pilot treatment system for the removal of arsenic, iron, and manganese at Empire Mine in California. The pilot treatment system included oxidation, pH adjustment, microfiltration, and solids dewatering processes. The testing was performed at four gallons per minute (gpm) over a period of two months and was successful at meeting all discharge requirements (arsenic, iron, and manganese). (2010–2011)
- Providing onsite construction, start-up, and operations support for a passive treatment system at Teck Coal's coal mine in Alberta, Canada. The system included seep collection from the toe of a waste rock dump, conveyance piping, flow control structures, a biochemical reactor, and water level control structures. The contaminants of concern included selenium and nitrate which were successfully removed by the treatment system. (2011)
- Serving as an engineer for pilot testing of a biochemical reactor, aerobic wetlands, and a chitin reactor to treat mining impacted water at a remote site at 11,000 feet elevation in Colorado. The pilot biochemical reactor was equipped with autosamplers and satellite communication to allow year-round monitoring. The pilot reactor was in operation for two years and achieved metal removal rates as high as 99 percent. (2011–2010)
- Providing design support for a passive biochemical reactor that provides treatment of mine impacted waters at La Sal Mine, an abandoned uranium mine on Bureau of Land Management property in Utah. (2007–2008)

Water Treatment at Industrial Sites

- Serving as project manager for the characterization of water sources and seeps from a former coal-processing facility in Kentucky. Evaluated short-term and long-term treatment options to comply with discharge requirements. (2021–2022)
- Serving as project manager for an alternatives evaluation and conceptual designs of a passive treatment system for the treatment of coal-ash leachate for American Electric Power in Virginia. Selected technologies for the treatment of selenium including biochemical reactors, gravel packed

bed, and slow sand filtration were successfully tested in an onsite pilot which provided design loading and removal rates for further implementation. (2020–2022)

- Evaluating and auditing an existing groundwater treatment plant, including multimedia filtration, granular activated carbon, and backwash management systems, for Bofors Nobel in Michigan. Retrofit designs for process optimization and implementation were provided. (2020–2022)
- Providing publicly owned treatment works (POTW) permitting and a mass-loading analysis for water treatment residuals from a process water system including filtration, softening, and iron removal processes, for Hoosier Energy in Illinois. (2021)
- Serving as subject matter expert for technology screening, bench and field testing, and evaluation of uranium treatment technologies for implementation at an existing groundwater and seep treatment system for nitrate removal at Rocky Flats Solar Pond in Colorado. Several treatment technologies were evaluated as both pretreatment and polishing treatment to the existing system. Alternatives were developed including complete capital, operations, and life cycle costs. (2016–2021)
- Supporting surface water and groundwater treatment efforts for per- and polyfluoroalkyl substances (PFAS) remediation at a power transformer site in Indiana, where firefighting foams were used. (2020)
- Serving as project manager for an alternative analysis of bolt-on systems, retrofits, and other operational improvements to a biological wastewater treatment system at Michigan Sugar. Conceptual designs were developed, and support provided for the procurement of temporary treatment systems as a stop gap measure. (2018–2019)
- Serving as project manager for the design, construction, operation, and evaluation of four side-by-side pilot systems for the removal of perchlorate from groundwater for a confidential project in Michigan. The four onsite pilot systems were operated for over 90 days and with over one million gallons treated to less than 0.05 ug/L. (2016–2018)
- Served as project manager for the evaluation and audit a wastewater treatment plant at French Paper's pulp and paper facility in Michigan for compliance with BOD, TSS, and total copper. The treatment system included an API separator, and two separate biological treatment trains (a continuous flow SBR and a UNOX system), and solids dewatering and management systems. (2019)
- Evaluating treatment alternatives for the removal of phosphorus to ultra-low limits from a wastewater stream consisting of cooling water blowdown at a power production facility for Milwaukee Regional Medical Center in Wisconsin. (2017)
- Providing evaluation, design, and start-up support for a 25-gpm groundwater pump and treat system for the removal of 1,4 dioxane, perchlorate, VOCs, and nitrosamines in California. The treatment system incorporated filtration, ion exchange, steam regeneration, and activated carbon systems. (2013–2015)

- Providing design, construction, and start-up support for a 10-gpm thermal evaporator system designed to treat rail-car-cleaning wash water, which has a highly variable water quality, for American Railcar Industries in Arkansas. (2015)
- Providing an alternatives analysis and design of biological treatment systems to remove nutrients and total suspended solids from dairy wastewater with aerobic and anaerobic processes at a cheese-production facility in New Mexico. (2014–2015)
- Evaluating an existing treatment system for the remediation of seepage water at a former glass-grinding-facility disposal site in Tennessee. Full-scale pilot testing was performed, and detailed designs and construction support were provided for a cost-saving system reduced pumping and conveyance and pH adjustment with CO2. (2014–2015)
- Developing slug-management plans in conjunction with the facility stakeholders for compliance with National Pollutant Discharge Elimination System (NPDES) discharge permit requirements for Coca-Cola in Ohio. (2015)
- Providing design and construction support for an existing treatment plant retrofit for Coca-Cola in Michigan. Project included new and retrofitted tanks, chemical feed systems, mixers, and pumps. (2014)
- Providing an alternatives analysis and conceptual design followed by a detailed design for the treatment of TSS from coal-pile runoff using equalization, flocculation with polymer, and pond settling processes at a coal power plant in Michigan. (2013–2014)
- Providing start-up and commissioning support for a pilot system designed to treat process wastewater at a shampoo-production facility in Kentucky. The pilot system included aerobic/anaerobic biological treatment, microfiltration, and reverse osmosis unit operations. (2014)
- Providing a design for the replacement of aging infrastructure and specifically addressing the deterioration of an in-ground oil/water separator at Western Refining's El Paso Refinery. The system provides treatment for 2.6 mgd of oily-water wastewater. (2012)
- Performing treatability testing on contaminated groundwater at Jaxport Armor's facility in Jacksonville, Florida. Provided a conceptual design for a recommended treatment plant included oxidation, solids separation, solids dewatering, and ion exchange systems. (2012)
- Characterizing leachate from an ash landfill and coal stockpile runoff pond to evaluate options for the treatment of manganese, pH, and TSS at a coal power plant in Virginia. Performed treatability testing that included oxidation, pH adjustment, flocculation, and filtration. Provided design and start-up for a full-scale chemical precipitation plant to treat up to 0.5 million gallons per day (mgd). (2009–2011)
- Providing design and construction support for a skimming system for the recovery of oil from a wastewater stream at an ammonium nitrate facility

in Wyoming. Oil collected is sold as a commercial product, and system payback was achieved in approximately 18 months. (2011)

- Providing a conceptual design for the management and treatment of stormwater runoff from taconite and limestone stockpiles at the Duluth Docks Taconite Facility in Duluth, Minnesota. The project included stormwater collection, polymer addition, and settling ponds to achieve NPDES permit requirements. (2010)
- Providing conceptual design, including clean and wastewater treatment, at a pet food factory in Melton Mowbray, United Kingdom. The treatment included reverse osmosis with pre-treatment for boiler feed, Microfiltration for factory process water, and dissolved air floatation followed by a membrane bioreactor for wastewater treatment. (2010)
- Providing designs and construction support for a system involving oil and water separation and discharge water conveyance at Rockypoint Oil Field in Wyoming. The project included two treatment trains with a combined flow of up to 4.5 mgd. (2008)

Water Treatment for Solid Waste Facilities

- Serving as project manager for a confidential study identifying fate and analysis of PFAS from multiple sources including two landfills which were discharged to a POTW. (2015–2022)
- Serving as engineering lead for an evaluation of feasible treatment methods including costs for the removal of PFAS compounds from multiple leachate streams that are currently being treated at a centralized facility for Yatala Wastewater Treatment Plant in Brisbane, Australia. (2019–2021)
- Evaluating an existing sequencing batch reactor for leachate treatment for Alexandria Landfill in Sydney, Australia. The assessment included influent and effluent characterization, third party review of conceptual designs for a new facility, and an evaluation of alternative management options. Alternative management options included various discharge strategies and comingled treatment. After analysis, a revised conceptual design was provided. (2019–2021)
- Performing an alternatives evaluation for the treatment of leachate from Horokiwi Landfill, a closed landfill that has been re-purposed as a recreational park in New Zealand. Passive technologies including oxidation, vegetated wetland and a manganese removal bed were tested at the site and were successful at removing ammonia, iron, and manganese. (2019–2020)
- Supporting a confidential project involving treatment evaluations and testing for residuals generated from PFAS treatment processes. The treatment residuals were associated with complex leachate streams and testing included PFAS binding, and solidification options. (2018)
- Providing evaluation and conceptual design of a wetland system for the treatment of ammonia from a landfill leachate seep with inflows to a

shallow lake that was being developed as a public park with sport fishing in Tennessee. (2018)

- Providing an alternatives evaluation for multiple waste management landfills and transfer stations in northern California, including treatment options for contact waters, leachate, and composting wastewater. (2018)
- Evaluating multiple treatment vendor submissions for the treatment of landfill leachate for ammonia and TDS removal for Shoal Bay Landfill in Darwin, Australia. Proposed systems included passive, active biological, reverse osmosis, and brine management. (2016)
- Performing a root cause and corrective action analysis for corrosion and scaling issues at Smiths Creek Landfill's leachate treatment plant in Michigan. (2015)
- Serving as project manager for an alternatives evaluation including the treatment of PFAS from a concentrated leachate stream for a confidential landfill. Conceptual designs and cost estimates were developed for options including evaporation, reverse osmosis, biological, and ion exchange processes. (2014)
- Evaluating an underperforming wetland treatment system intended for ammonia removal prior to discharge at a confidential landfill in Alabama. Leachate treatment options were developed to the conceptual level including costs and were compared based on overall treatment efficiency, capital and operations costs, reliability, and safety considerations. Treatment options included sequencing batch reactors, membrane bioreactors, reverse osmosis, and evaporation. (2014)
- Serving as project manager for the evaluation of POTW surcharges and identification of treatment opportunities for cost savings for a confidential landfill in Alabama. Treatment alternatives identified included passive wetlands, sequencing batch reactor (SBR), membrane bioreactor (MBR), moving bed biofilm reactor (MBBR), and reverse osmosis (RO). (2014)
- Performing feasibility analysis and bench testing for ammonia removal from leachate impacted stormwater. Ion exchange, and zeolite media were evaluated, bench testing was performed, and costs were developed for the recommended full-scale system at a confidential landfill in Indiana. A treatment campaign was initiated with discharge to surface water. (2014)
- Serving as project manager for design, construction, and operation of a passive biological pilot system for the treatment of leachate prior to surface water discharge at Milner Landfill in Colorado. Permitting support was provided for the full-scale system with discharge of treated water to a surface stream. (2010–2013)
- Providing design and testing of a bench-scale biological system for the treatment of pH, ammonia, and trace metals for a confidential landfill in Michigan. The complete system included a pH adjustment step, active aeration, a passive biochemical reactor, and a passive wetland system. Conceptual designs and cost estimates for a full-scale system were provided. (2012–2013)

- Evaluating multiple treatment alternatives to reduce TSS concentrations in stormwater runoff that exceeded permissible discharge concentrations for CWM Lake Charles Hazardous Waste Landfill in Louisiana. Evaluation criteria included cost estimates, and treatment efficiencies. Recommended changes included replacement of submersible pump with a floating pump and reconfiguring the deck-mounted pumps with flexible floating intakes. CWM implemented the recommendations and no further TSS discharge exceedances have been reported. (2007–2008)

Publications/Presentations

Schipper, Ryan, Barbara Nielsen, Leonard Santisteban and Cameron Beul. 2019. "Voluntary Reclamation and Remediation of a Former Vanadium Mine. Society for Mining Metallurgy and Exploration." Denver, CO.

Minchow, Kristina, Bridgette Hendricks, and Ryan Schipper. 2018. "Lime Treatment: Advantages of a Proven Technology and Competing Alternatives." Mine Water Solutions. Vancouver, Canada.

Schipper, Ryan, Eric Blumenstein, Tom Rutkowski and Barbara Nielsen. 2014. "Bench Scale Biochemical Reactor Treatment of Uranium, Radium, and Selenium." Society for Mining, Metallurgy & Exploration. Salt Lake City, NV.

Blumenstein, Eric, Ryan Schipper and Jim Gusek. 2013. "The Construction and Initial Results of a Demonstration Passive Treatment System for Removing Sulfate at a Site on Vancouver Island, British Columbia." Annual Meeting of the American Society for Mining and Reclamation. Laramie, WY.

Schipper, Ryan and Tom Rutkowski. 2012. "Three-year Pilot Case Study of Biochemical Reactor Treatment of Selenium." Annual Meeting of the American Society for Mining and Reclamation. Tupelo, MS.

Gusek, James, Ryan Schipper, Joel Kelsey, and Brad Shipley. 2011. "Biochemical Reactor Module Construction, Golinsky Mine, CA." Annual Meeting of the American Society for Mining and Reclamation. Bismarck, ND.

Education

MS, Geology, University of Kentucky, 2013

BA, Geology, Albion College, 2008

Training/Certification

40-Hour HAZWOPER Certification, including annual eight-hour refreshers

Registration

Professional Geologist: Kentucky

ANNE M. SCHUMACHER

Senior Geologist

Anne has 11 years of experience as a geologist, including six years of experience working on complex environmental assessment and remediation projects. Building on her extensive groundwater and soil sampling, construction oversight, and geotechnical and environmental drilling experience, her current work primarily focuses on successful project execution and management of a variety of environmental focus areas, including per- and polyfluoroalkyl substances (PFAS) and vapor intrusion (VI). She manages multidisciplinary project teams to collaborate with client partners to assess and remediate contaminated sites in accordance with Michigan Department of Environment, Great Lakes, and Energy (EGLE) Part 201 rules. Anne specializes in the management of environmental drilling investigations, including groundwater monitoring well construction and development, analysis of groundwater quality data, and source assessment and delineation.

Project Experience

- Serving as the project manager for the supplemental PFAS source and delineation investigation at a former paper mill operation. Work included development of an investigative work plan to further refine existing source knowledge by installation of a network of nested groundwater monitoring wells to assess PFAS distribution laterally and vertically, coordinating with a variety of project-related stakeholders and regulatory agencies, and developing a comprehensive investigative documentation report. (2022–present)
- Serving as the task manager and project manager for nature and extent delineation of PFAS in groundwater at a former fire-fighting foam testing area for a manufacturing facility and subsequent development of long-term groundwater monitoring and plume stability analysis. Work included installation of temporary and permanent monitoring wells through environmental drilling techniques, groundwater sampling plan development, and analysis of groundwater flow in relation to a nearby river. (2020–present)
- Developing geologic cross sections to assist with fate and transport analysis for PFAS in groundwater in New England. Work included geological interpretations and area-wide analysis for potential PFAS sources. (2020)
- Serving as the task manager and project manager in the evaluation of the volatilization to indoor air pathway (VIAP) and subsequent design, construction, and implementation of a VI mitigation system for a Part 201 large manufacturing facility. The VIAP evaluation included iterative sub-slab soil vapor sampling to identify the sub-slab source of volatile organic compounds (VOCs) and completion of a VI pilot test for collection of basis of design data to gather additional information needed for the design of the active VI mitigation system. Additional activities included management and oversight of the sub-slab depressurization system (SSDS) installation

and post-installation monitoring activities. Ongoing work includes VI sampling to ensure SSDS effectiveness and the future development and submission of a No Further Action (NFA) report to EGLE for review. (2018–present)

- Serving as the senior field technician, task manager, and project manager for a manufacturing client in Michigan. Completed work included environmental site assessments (ESAs) in the form of a Phase I and Phase II to assess environmental risks associated with a historical degreaser operation utilizing trichloroethylene (TCE). Ongoing work includes evaluation of the VIAP and subsequent design, construction, and implementation of a VI mitigation system. (2018–present)
- Serving as the senior field lead, task manager, and project manager for a three-parcel former aerospace instrumentation facility with multiple active pathway investigations. Previous work included low-flow sampling of groundwater for plume stability assessment for chlorinated solvents. Ongoing work includes implementation of iterative sub-slab soil vapor and indoor air sampling for multiple properties to delineate sub-slab soil vapor and indoor air exceedances to established VIAP criteria, preparation for and development of an active VI mitigation system for construction and implementation at up to two parcels with large-scale, active manufacturing facilities, and coordination with multiple stakeholders including operators, legal counsel, and the former owner/responsible party. (2016–present)
- Serving as the task manager and senior field technician for a Part 201 former manufactured gas plant in Michigan. Work has included oversight of sonic drilling to bedrock to delineate presence of dense non-aqueous-phase liquid (DNAPL), completion of annual plume stability analysis and evaluation, assisting with the completion of mixing-zone determination requests through a combination of hydrogeologic data collection and groundwater-flow modeling to assess the groundwater/surface-water interface (GSI) to establish site-specific criteria, oversight of direct push environmental sampling to delineate remaining DNAPL source material, and assisting with the development and submission of an on-site NFA report. (2016–present)
- Serving as the task manager and senior field technician for another Part 201 former manufactured gas plant in Michigan. Work included development of annual sampling plans, development of work plans, contractor bid evaluation for well network operations and maintenance, coordination with analytical laboratories, and groundwater sampling. (2016–2021)
- Anne's other work at Barr has included:
  - Performing soil logging and bulk sample collection for wind turbine foundation design, road testing, and construction. These investigations were completed using various drilling techniques including air and mud rotary, and hollow-stem and solid-stem auger.

- Providing environmental drilling and groundwater sampling support at former manufactured gas plants and other impacted sites. These activities include soil characterization and contamination delineation, low-flow groundwater sampling, and temporary and permanent monitoring well installations.
- Conducting groundwater contaminant migration analysis for light non-aqueous-phase liquid (LNAPL) and DNAPL.
- Performing environmental investigations for delineating contaminants of concern.
- Conducting surveying for monitoring well top of casing and ground surface elevations.
- Developing site characterizations, risk assessments, remedial strategies, and corrective action plans.
- Developing geologic cross-sections to visualize and interpret subsurface contamination and pathways.
- Performing environmental compliance activities and inspections for pipeline construction.

- Prior to joining Barr, Anne served as a geologist for Rhino Energy, LLC, a mining and metals company (2010–2015). Responsibilities included:
  - Logging core samples for stratigraphic correlation across properties and developing geologic maps for use during mining.
  - Directing three core-drilling crews for company-wide coal exploration.
  - Producing monthly and weekly technical reports summarizing exploration activities and deliverables.
  - Producing reserve reports at all surface and underground mines annually to comply with U.S. Securities and Exchange Commission (SEC) standards.
  - Analyzing problematic mining zones and making recommendations to improve safety and productivity.
  - Implementing a greenhouse gas monitoring program based on EPA regulations and managing quarterly sampling at active mines.
- Anne also previously served as a field hydrogeologist for the Bureau of Land Management (2008). Responsibilities included:
  - Collecting water samples and monitoring field equipment, managing databases with water quality measurements, and installation of piezometers.
  - Surveying quarry boundaries using mobile GPS and GIS mapping platforms.
  - Performing geologic reviews of oil and gas permit applications to make sure aquifers were protected during drilling.
  - Assisting with onsite environmental inspections of abandoned mines.

Education

BSE, Chemical Engineering, University of Michigan, 2010

Training/Certification

Engineer in Training: Michigan

40-hour HAZWOPER training

SCOTT VENMAN

Senior Environmental Engineer

Scott has over 12 years of environmental consulting experience providing due diligence, environmental health and safety, and multimedia compliance and permitting services. His work includes planning, implementation, statistical data analysis, data interpretation, and reporting. Scott has investigative experience in a variety of media, such as groundwater, soil, sediment, soil gas, and indoor air. He has also performed permitting and reporting for a variety of state and federal programs. In addition, Scott manages projects to achieve goals within schedule and budgetary constraints. His varied skillset and experience provide him with an unusually broad perspective of compliance factors in evaluating client facilities and processes.

Project Experience

- Managing a TSCA PCB remediation project at a client's natural gas compressor station facility. The project began with a review and compilation of historical remediation completed in the 1980s and data collected up to 2022, development of a remediation workplan for EPA approval, contractor bid assistance, and oversight of the remedial implementation (2023).
- Managing a project completing periodic sampling, historical data organization, and additional investigation to pursue a no further action (NFA) status for a client's former manufactured gas plant site. The project included review and compilation of over two decades of investigation and remedial activities as well as coordination and communication with Michigan Department of Environment, Great Lakes, and Energy (EGLE) personnel to develop a path toward NFA at the site. (2017–present)
- Managing a project in developing lines of evidence for a client involved in a confidential mediation process to allocate the cost of a remedy for a Great Lakes Area of Concern project. The project involves negotiation and coordination with the client, municipal representatives, client counsel, the mediator, and Environmental Protection Agency (EPA) project administrators. (2015–present)
- Managing a due diligence project for a client's wind farm partnership to evaluate potential environmental risks within a 20,000-acre project area. The project began with a review of a Phase I prepared by others and coordinating with the project stakeholders to pare down the list of parcels with potential environmental concerns from over 200 to approximately 25. The project continued with development and execution of a Phase II investigation at eight of the parcels. The project was under a strict deadline and was completed in about a month. (2020)
- Performing operational site evaluations at two facilities for a client's management team to develop reports to aid in long-term management of the facilities and historical contamination liability. The evaluations consisted of reviewing dozens of reports for each facility; compiling historical information; reviewing historical photography and maps;

performing site reconnaissance; interviewing long-time employees; and preparing reports for each facility to concisely present the gathered information. (2016)

- Managing tasks for a multiple line of evidence evaluation of evaluate contaminant liability from a client's former manufactured gas plant and a collocated gasoline station. Tasks included research to determine location of contaminant plumes relative to current and former site features, an evaluation of over 20 years of analytical results to distinguish trends in contaminant degradation, and key distinguishing parameters (2015–2017)
- Serving as the designer and task manager for a client's statewide underground storage tank (UST) removal and aboveground storage tank (AST) replacement program. Work included (2013–2014):
  - Developing initial scope, proposal, and budgets for the program.
  - Creating a client-standard design and 12 initial site-specific designs.
  - Performing fuel-use analysis and tracking to determine optimal AST replacement sizing.
  - Facilitating communication between site users, the client project team, and contractors.
  - Coordinating and performing construction and demolition oversight.
- Conducting Phase I and Phase II ESAs for clients throughout Michigan, Kentucky, Missouri, and Ohio. Tasks included writing reports and compiling due diligence research; developing sampling and investigation plans; and creating reporting tables comparing analytical results to Part 201 cleanup criteria and Part 213 risk-based screening levels, vapor-intrusion screening levels, and waste characterization values. (2010–present)
- Completing baseline environmental assessments and due care plans to mitigate client risks and aid in maintaining liability protection for clients whose properties are contaminated with hazardous materials. (2010–present)
- Performing screening and sampling of surface and subsurface soil, water, sediment, indoor air, and soil gas including (2010–present):
  - Soil identification, sampling, and field screening for impacted materials.
  - Oversight of monitoring well installation and decommissioning.
  - Groundwater sampling, including low-flow methods.
  - Soil-gas sampling including onsite leak detection methods.
  - Remediation oversight, documentation, and verification sampling.
- Assisting with the verification and design of direct contact barriers including randomized sample plan design and execution, statistical analysis of existing soil contaminate levels for barrier suitability, and engineered barrier construction oversight. (2010–present)

Education

BS, Chemical Engineering, Georgia Institute of Technology, 2002

Training/Certification

OSHA HAZWOPER 40-Hour

ASTM E1527-13 Standard Practice for Environmental Site Assessments: Phase I & Phase II Environmental Site Assessment Processes

Registration

Professional Engineer: Michigan

KATE WATSON, PE

Senior Environmental Engineer

Kate has more than 17 years of experience investigating, analyzing alternatives for, and implementing remedial action at contaminated sites. Her expertise spans multiple media including sediment, groundwater, and vapor in regulatory frameworks such as CERCLA, TSCA, RCRA, and Michigan Part 201. Before joining Barr, Kate worked at another consulting firm as a senior engineer and project manager and has also worked as a systems engineer for Lockheed Martin Aeronautics.

Project Experience

- Assistant project manager and a senior engineer for remedial design and remedial action on a 22-mile reach of the Kalamazoo River in Michigan with PCB-contaminated sediment. The scope of the project included design, subcontractor evaluation and selection, construction oversight, and construction management to implement the risk-based corrective action specified by the CERCLA ROD. The remedy consisted of excavation of sediment (some of which required disposal under TSCA regulations), sediment dewatering and stabilization, backfilling, transport, and off-site disposal. (2020–2022)

  Her responsibilities included:

  - Coordinating multidisciplinary teams including civil designers, environmental and geotechnical engineers, biologists, construction managers, and field staff to develop design drawings and specifications.
  - Technical and editorial review of basis of design report, RFP, and site-specific project work plans for $30M CERCLA remedial action under EPA and EGLE oversight.
  - Developing proposals and cost estimates for remedial action implementation oversight and engineering support.
  - Reviewing invoices and billing documentation to meet client-specific requirements.
  - Preparing construction work plans through cooperative “workgroups” with EPA and EGLE to expedite preparation and agency approval.
  - Coordinating post-dredge sediment sampling events and data evaluation.
  - Developing Focused Feasibility Study to evaluate sediment capping versus dredging for a 9-acre hot spot.
- Project engineer and project manager for a Region 5 EPA CERCLA site undergoing a monitored natural attenuation demonstration for chlorinated ethenes and chlorobenzene in groundwater. The scope of the project included long-term O&M (groundwater monitoring); preparation of a Focused Feasibility Study; a vapor intrusion risk assessment; sampling of groundwater, soil vapor, sub-slab, and indoor air along with QA/QC review and analysis of the data generated; verification of institutional controls; and annual monitoring reports to EPA. (2005–2022)

Her responsibilities included:

- Leading vapor intrusion risk investigation, including coordinating with property owners; selection and oversight of subcontractor to install soil gas wells, and installing vapor pins.
- Evaluating groundwater, soil vapor, sub-slab, and indoor air analytical data.
- Preparing site strategies and communications with EPA.
- Developing annual scopes, budgets, and proposals as well as resourcing and leading the multidisciplinary project team including engineers, groundwater modelers, GIS specialists, and field staff.
- Leading preparation of and reviewing annual monitoring and institutional controls verification reports.
- Leading preparation of a CERCLA-focused feasibility study that evaluated monitored natural attenuation, SVE, and enhanced bioremediation as potential risk-based corrective action alternatives.
- Performing BIOCHLOR groundwater modeling to support that constituents would not migrate beyond site boundaries during the MNA demonstration.

- Performing soil vapor, sub-slab (vapor pin), and indoor air sampling in accordance with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) standard operating procedures at the Spartan Chemical Superfund Site in Grand Rapids, MI. (2019)
- Developing technology screening, alternative evaluations, comparative analysis, and cost estimations for CERCLA Feasibility Studies for two operable units of a former chemical manufacturing Superfund site with the emerging contaminant N-nitrosodimethylamine (NDMA). The feasibility studies evaluated remedial technologies including permeable reactive barriers, on-site containment, soil capping, dense aqueous phase liquid (DAPL) pump and treat, soil excavation and stabilization, SVE/air sparge, multi-phase extraction, and wastewater treatment including granular activated carbon (GAC). (2016–2018)
- Screening technologies and evaluating and comparatively analyzing alternatives for a CERCLA Feasibility Study in other areas of the Kalamazoo River Superfund Site in Michigan. Ms. Watson also prepared a technical memo for regulators comparing methods and conclusions from two hydrodynamic models (HEC-RAS and Delft3D). (2016–2018)
- Evaluating groundwater metals concentrations to determine potential connection with historical operations at a former manufactured gas plant site. The evaluation included aerial and vertical distribution, individual well concentration trends (using MAROS), background concentrations, geographical distribution of metals concentrations versus historical MGP contaminant concentrations and free product, and metals concentrations versus geochemical parameters. She also evaluated BTEX and PAH plume trends and mass using MAROS. (2015)

Education

MS, Geological Engineering, South Dakota School of Mines & Technology, 1986

BS, Geological Engineering, Michigan Technological University, 1983

Training/Certification

HAZWOPER
MSHA (above-ground)

Registration

Professional Engineer: Minnesota, Missouri, Michigan, Idaho, Alberta

Professional Geologist: Wyoming; Minnesota; Missouri; Kansas; Alberta

Affiliations

Association of Ground Water Scientists and Engineers

National Ground Water Association

Minnesota Ground Water Association

American Institute of Professional Geologists

Geological Sciences Curriculum Advisory and ABET Accreditation Committee, South Dakota School of Mines and Technology

Journal of Ground Water—Associate Reviewer (1995-1997)

RAY WUOLO, PE, PG, P.Eng., P.Geol.

Vice President, Senior Hydrogeologist

Ray has more than 35 years of experience characterizing and investigating groundwater flow and groundwater contamination. He is an expert in computer modeling of groundwater flow and contaminant transport, aquifer testing, well design, pump-and-treat system design, and automated inverse calibration methods. At Barr, he has technical and project management experience in hydrogeologic site evaluation, mining hydrogeology, aquifer remediation, environmental chemistry, landfill permitting, and environmental impact statements.

Project Experience

Groundwater Flow and Contaminant Transport Modeling

- Applying groundwater flow and solute transport models to more than 80 contaminated sites throughout the U.S. using the Single Layer Analytic Element Model (SLAEM), the Multi-Layer Analytic Element Model (MLAEM), the U.S. Geological Survey Modular Finite-Difference Model (MODFLOW), the solute transport codes MT3D and RT3D, and the inverse optimization model PEST. Used the models to characterize groundwater flow, determine contaminant migration, assess risk, and evaluate remedial designs. Sites include:
  - former coal gasification sites
  - petroleum refineries
  - operating and closed municipal landfills
  - Resource Conservation and Recovery Act (RCRA) permitted facilities
  - U.S. EPA National Priority List sites
  - soda ash, taconite, and lead mines
  - paper mills
  - former wood treating sites
  - electrical generating facilities
  - former and operating chemical plants
  - manufacturing and processing facilities
  - PFAS CERCLA and non-CERCLA release sites
- Designing aquifer tests to obtain groundwater flow parameters for the design of pump-and-treat well systems in unconsolidated (surficial) aquifers, bedrock aquifers, fractured rock aquifers, and multi-aquifer remedial systems. Analyzed test results by analytical methods and by reproducing aquifer tests using numerical models and automated inverse optimization methods. (1986–ongoing)
- Serving as lead hydrogeologist for remedial investigations and feasibility studies of petroleum refineries, municipal landfills, industrial landfills, ash landfills, demolition landfills, RCRA-permitted facilities, chemical facilities,

manufacturing facilities, lead mines and smelters, former wood treating and coal gasification sites, paper mills, and numerous other sites. (1988–ongoing)

- Managing the remedial investigations and feasibility studies for numerous groundwater and soil contamination sites, including sites contaminated with metals, PCBs, petroleum, and chlorinated solvents. Performed detailed analyses on contaminant transport, LNAPL and DNAPL remediation. (1990–ongoing)
- Overseeing the development of a groundwater flow model of the 3M Cordova, Illinois, facility to maintain capture of PFAS compounds while reducing overall pumping rates to achieve 3M's world-wide corporate goal of water use consumption reductions. (2017–2022)
- Providing high-level strategic guidance to management team and legal counsel of a large apparel manufacturer at the onset of discovery of extensive PFOS contamination in soil and groundwater near landfill areas in Grand Rapids, Michigan. (2017–2018)
- Leading a team of chemists, hydrogeologists, and air modelers in characterizing the extent, fate, and transport of perfluorooctanoic acid (PFOA) and associated per- and polyfluoroalkyl substances (PFAS) compounds for Saint-Gobain Performance Plastics (SGPP) at locations in Bennington, Vermont; Merrimac, New Hampshire; and Hoosick Falls, New York. (2016–2019)
- EIS preparation on behalf of Scott County, Minnesota, for the evaluation of an open-pit aggregate mine within the flood plain of a river. (2016)
- Leading the development of a water availability study for the 11-county Twin Cities metropolitan area on behalf of the Metropolitan Council, including the development of a regional groundwater flow model to assess long-term water supply options of individual communities. (2009–2018)
- For the City of Woodbury, using the South Washington County groundwater model to assist in identifying locations for future city wells and well fields that could reduce the potential for capturing areas of higher PFOA and PFOS groundwater contamination migrating from the north. (2008–2012)
- EAW and DEIS for Rollag aggregate mine expansion (Aggregate Industries, MN) (2006)
- Developing a model of PFOA and PFOS fate-and-transport in groundwater for the Minnesota Pollution Control Agency in Washington County, Minnesota. The model was used to evaluate PFOA and PFOS migration from the Washington County Landfill and a former 3M disposal site in Oakdale. The model identified the role of the Platteville Formation in spreading PFOA and PFOS from Washington County Landfill to Raleigh Creek. The MPCA and MDH used these results to guide an investigation of Raleigh Creek that disclosed surface water as an important mechanism for movement of PFOA and PFOS in Washington County. (2005–2007)

- EAW and DEIS for PolyMet Mining's NorthMet copper-nickel mine, Minnesota. (2005)
- Providing expert opinion and solute-transport modeling analyses for the City of Sullivan, Missouri and their counsel. The city well field is contaminated by TCE from one or more sources, including a former manufacturing facility. (2005)
- EIS groundwater study and water-appropriations-permit application for mine pit and steel mill on Minnesota Iron Range (Essar Steel Minnesota) (2005)
- Managing the hydrogeologic characterization and groundwater remedial design of large petroleum and product contamination problems at refineries and an international airport where product and dissolved plumes entered unconsolidated deposits and fractured bedrock. (2005–2007)
- Conducting a hydrogeologic investigation of TCE contamination and designing a groundwater remediation system for the former General Mills research facility on East Hennepin Avenue in Minneapolis. The projected included well design, aquifer testing, and groundwater modeling. (1996–2002)
- For the City of Inver Grove Heights, performing annual reviews of groundwater monitoring data as part of the host city oversight role. Identified and explained elevated concentrations of PFAS compounds detected in downgradient monitoring wells from the landfill. (2002–ongoing)
- Groundwater modeling in support of a permit to mine and a water-appropriations permit for a coal mine near Gascoyne, North Dakota. (2002)
- Performing hydrogeologic analyses at numerous electric generating facilities for ash disposal, NPDES permitting, power-plant siting, ash-basin dewatering, expansion, and contaminant remediation. (2001)
- Mine tailings contamination studies, Silver Bow Phosphate Mine, Butte, MT (2000–2006)
- Tailings and mine dewatering studies, confidential trona mining client, Wyoming. (1999)
- Dewatering studies for Kraemer & Sons Burnsville Quarry, Minnesota. (1998–ongoing)
- At the Waukegan coke plant site in Illinois, developing groundwater flow models for simulation and design of large-scale pumping-injection recirculation cells to reduce levels of ammonia and pentachlorophenol, as well as to predict the effectiveness of monitored natural attenuation. (1998–2010)
- Developing a multi-aquifer groundwater flow model for a petroleum refinery and using the model to calculate contaminant flux rates to a nearby river and to evaluate several remedial alternatives. (1998–2002)

- Developing a groundwater flow and advective transport model to identify the cause of contamination of irrigation wells near a paper mill in Washington. The modeling results showed that the paper mill was not the contamination source. These findings were a key component in the paper mill's litigation defense. (1998–2000)
- For MnDOT, serving as principal and project manager for groundwater and solute transport modeling of a former fuel loading site in Wright County, Minnesota. (1997)
- Managing development of a groundwater flow and solute transport model of a National Priority List site with dissolved arsenic in groundwater for the U.S. Environmental Protection Agency. Used the model to quantify the risk to the environment from the site. (1996)
- Developing a large-scale groundwater flow model of a soda ash mine near Green River, Wyoming, and using the model to design a contaminated groundwater interceptor system. The results of the modeling study were instrumental in obtaining approval of the design from the Wyoming Department of Environmental Quality. (1995–2010)
- Managing the hydrogeologic characterization and evaluated the migration of tar at and around former coal tar pits at a demolished coking facility. (1995–1997)
- Overseeing groundwater evaluations and groundwater flow modeling for remedial design at MGP facilities in Dubuque, Iowa. (1995)
- Managing projects at two sites that characterized the hydrogeology in the vicinity of coal yards and ash landfills for Northern States Power Company. The studies were used to evaluate and quantify impacts to nearby rivers and to assess the technical feasibility of innovative landfill designs. Key to these studies was the development of groundwater flow models that could predict contaminant movement and account for high levels of hydrogeologic complexity. (1993–1995)
- Conducting a remedial investigation of the American Iron & Supply scrap yard along the Mississippi River corridor in north Minneapolis. The investigation included the installation of soil borings, monitoring wells, groundwater sampling, and evaluation of groundwater flow paths. (1991–1994)
- EIS groundwater modeling for Laurentian Mine, Gilbert, Minnesota. (1991)
- Performing hydrogeologic characterization and remedial design at large former wood-treating facilities that involved characterization, containment, and remediation of dissolved phase organic contaminants, as well as LNAPL and DNAPL phases. (1990–2000)
- Mine-waste remediation studies, Doe Run Company, Viburnum, Missouri. (1990–1996)
- Investigating and assisting in the remedial design of sites contaminated with dense non-aqueous phase liquids (DNAPLs), including solvent-contaminated sites, coal tar sites, and former wood treating sites. (1989–2000)

Groundwater/Surface Water Interaction

- Providing litigation support and expert analysis to the City of Minneapolis and the Minneapolis Park and Recreation Board on unpermitted apartment basement dewatering and discharge to lakes. (2018–2020)
- Serving as a groundwater technical expert to SRF Consultants and the Minnesota Department of Transportation (MnDOT) in the development of a draft EIS for Highway 41 river crossing alternative evaluations near Chaska, Minnesota. This project involves evaluating the groundwater effects of several alternative routes on a calcareous fen that is owned and protect by the MDNR. (2010)
- Developing a custom, highly complex groundwater–surface-water model for Washington County, Minnesota, to predict the effects of several proposed new municipal wells on groundwater and a state-designated trout stream in the rapidly growing Woodbury-Afton area. The region's complex geology, which includes eight layers of aquifers and aquitards, made this project especially challenging, as did the need to join two computer models that operated on vastly different scales (one in hours and days, the other in years and centuries). Results of the final model indicated that pumping of the new wells would have minimal impact on groundwater resources and the special-status creek. (2004-2006)
- Conducted dye tracing studies in fractured dolomite bedrock to evaluate the effects of permanent dewatering structures on springs. (2001)

Expert Testimony/Opinion

- Developing expert opinions, expert reports and depositional interrogatories for litigant (Fusibond, Inc.) in toxic tort and TCE contamination near an industrial park in DuPage County, Illinois, NO. 04 C 2405, Ann Muniz and Ed Muniz, et al. v. Rexnord Corporation, et al. (2010–2011)
- Expert opinion and report on dispute of differing hydrogeologic conditions and well construction issues at TCE contaminated site in North Carolina for Foster Wheeler Environmental Corp. v. Roy F. Weston, Inc. Federal District Court Civil No. 00-3778. (2001-2002)Developing expert opinions, expert reports, and rebuttal testimony for administrative hearings on behalf of North Dakota Pipeline Company (Enbridge) Certificate of Need for Sandpiper Pipeline in Minnesota (MPUC Docket No. PL-6668, 2014-2015). Provided testimony as an expert on groundwater and petroleum fate and transport in surface water and groundwater. (2015–2020)
- Expert testimony on groundwater flow interaction with streams in the Matter of the Alteration of a Cross-Section of Spring Creek by Elden and Dorothy Brant Without a Permit from the Commissioner of Natural Resources, OAH Docket No. 12-2000-124962, State of Minnesota, Office of Administrative Hearings. (1999)
- Expert testimony on groundwater flow between lakes and wetland in City of Mound v. Timothy Becker, et al., Hennepin County Administrative Hearing MU200-7. (1997)

- Deposition concerning groundwater flow and solute transport modeling related to trichloroethylene contamination of groundwater in AM International, Inc. v. Commercial Union Insurance Company, et al., Circuit Court of Cook County, Illinois, No. 89 CH 11602. (1995)

Dewatering and Seepage Design

- Serving as Barr's technical expert on a complex dewatering project for Highway 100 in Brooklyn Center for which MnDOT and Joslyn Manufacturing Company and working together to ensure that groundwater contamination from an existing superfund site does not enter MnDOT's dewatering facilities during and after construction. (2012)
- For MnDOT, serving as a technical advisor and independent consultant for the TH 55/62 interchange dewatering project. Portions of this project were under litigation due to potential effects of dewatering on nearby Camp Coldwater Spring. (2010)
- For Metropolitan Council Environmental Services, developing regional and local models of the Blue Lake Wastewater Treatment Plant and the Shakopee Quarry for the purposes of predicting the effects on groundwater levels of the closure of the quarry's mining operations and to design dewatering systems for the plant. (1998–2000)
- Performed groundwater modeling for Aggregate Industry's Shakopee quarry using analytic element models and MODFLOW for the purpose of evaluating alternatives to increased dewatering. Examined the effects of various options on the Savage Fen wetland complex, Boiling Springs, and Deans Lake. (1997)

Regional Groundwater Modeling

- Lead the development of the groundwater flow model of the 11-County Twin Cities Metropolitan Area for the Metropolitan Council. The purpose of this model is to manage the groundwater resources in the Twin Cities and to evaluate issues of groundwater sustainability 2011–2016)
- Managing the delineation of source-water protection areas using groundwater models for approximately one-half of the population of the State of Idaho as a contractor for the Idaho Dept. of Environmental Quality (1999–2000)
- Conducting a comprehensive three-year study of groundwater resources for the Yakima Indian Nation in Washington for purposes of preparing a water resources management plan. The study involved the development of a multi-aquifer groundwater flow model encompassing a 600-square-mile agricultural area on the Yakima Reservation. This modeling project was one of the largest ever undertaken using the groundwater model MLAEM. (1991–1994)

Solution and Borehole Mining

- Designing a horizontal-well solution mining pilot project in southwestern Wyoming to mine trona (sodium carbonate). Project involves bench-scale kinetic testing of incongruent dissolution of trona at various barren liquor temperatures and with various additives; development of a moving-

boundary cavity development/mining model to predict cavity formation, heat transfer, dissolution, and optimum flow rates; evaluation of drilling methods and controls; evaluation of options for natural and forced evaporation; and hydrogeologic monitoring and permitting. (2014)

- Leading the hydrogeologic evaluation, groundwater modeling, and UIC Class V injection permitting of a pilot borehole mining system for manganese in northern Minnesota. Assisting public hearings and environmental task force meetings. (2011–2014)

Ray was associate editor of Ground Water for three years and continues to provide periodic peer reviews for submitted manuscripts dealing with aquifer and pumping test analyses, groundwater flow modeling, inverse calibration methodologies, and capture-zone analyses. He provided technical peer review of water-resources proposal for the Legislative Citizens Commission on Minnesota Resources (LCCMR). He was also an adjunct professor of geology at the University of St. Thomas in St. Paul for six years, where he taught senior-level hydrogeology classes.

Prior to joining Barr, Ray was a hydrogeologist and project manager with another consulting firm. He was also a hydrologic aid with the U.S. Geological Survey, where he specialized in groundwater-surface water interaction and the study of arsenic adsorption.

Publications/Presentations

Wuolo, R.W., 2020, Sea level rise in the Twin Cities? The slow-motion groundwater flood has arrived. Minnesota Geological Survey presentation, March 2020.

Janzen, A., E. Christianson, D. Dahlstrom, E. Edwalds, and R. Wuolo, 2019. Identification and Characterization of the Air Deposition Pathway to PFAS Groundwater Contamination, 12th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Battelle, May 31-June 4, 2020.

Wuolo, R.W., 2019. Per and Polyfluoroalkyl Substances: Making informed decisions about PFAS, Midwest Environmental Compliance Conference, April 23-24, 2019, Kansas City, MO.

Wuolo, R.W., 2019. Modeling fate and transport of PFAS, a case study on the how and the why, Merging Contaminant Seminar, an Advanced Understanding of PFAS, September 26, 2019, Madison, WI.

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Wuolo, R.W., 2018. Earthquakes and groundwater: how each affects the other, Society of Mining Engineers, Wyoming Chapter, April 12, 2018, Rock Springs, WY.

Christianson, E.G., Dahlstrom, D.J., Janzen, A.K, Carter, J.T.V, and Wuolo, R.W., 2017. Strategies for simulating the complete transport pathways of atmospherically dispersed contaminants. MODFLOW & More 2017 Conference Proceedings. IGWMC: Golden, CO, 238-241.

Wuolo, R.W., 2013. Groundwater models as inputs into ecosystem services models – evaluating uncertainty, (invited speaker), Minnesota Ground Water Association conference "The Economics of Groundwater Management", St. Paul, MN, November 13, 2013.

Wuolo, R.W., 2013. Model for managing groundwater use in the Twin Cities metropolitan area, American Water Works Association, Minnesota Chapter annual conference, September 11-13th, 2013, Duluth, MN.

Carter, J.T., J.M. Sullivan, and R.W. Wuolo, 2011. Using a Numerical Model to Assess Groundwater Remediation Effectiveness at a Former Manufactured Gas Plant Site, MGP 2012 Conference, November 2011, Chicago, IL.

Wuolo, R.W., 2009. Predicting response of baseflow in Valley Creek to proposed pumping in Woodbury, MN (invited speaker), Minnesota Ground Water Association conference on Connecting with Groundwater, May 7, 2009, St. Paul, MN.

Wuolo, R.W., 2008. Tools for predicting groundwater sustainability (invited speaker), University of Minnesota Workshop: Groundwater Sustainability: Towards a Common Understanding, November 12, 2008, St. Paul, MN.

Wuolo, R.W., 2007. The life hydraulic: fluid ethics amid uncertainty (invited speaker), Minnesota Ground Water Association conference on Addressing Ground-Water Issues for the Next Generation, November 13, 2007, St. Paul, MN.

Wuolo, R. W. 2007. A deterministic modeling approach for estimating recharge in south Washington County, Minnesota Ground Water Association conference on Methods for Solving Complex Ground-Water Problems, St. Paul, MN, April 19, 2007.

Wuolo, R.W. 2007. Regional water planning: the challenge of predicting sustainability, City Engineers Association of Minnesota, Annual Meeting, St. Paul, MN, January 2007.

Wuolo, R.W. 2006. A surface-water – groundwater model to evaluate aquifer sustainability in Washington County, MN – Invited Paper, 39th Annual Meeting of Geological Society of America, May 2005.

Wuolo, R.W. 2006. Modeling the effects of community septic mounds, Minnesota Society of Professional Soil Scientists, St. Cloud, MN, Annual Meeting, December, 2006.

Wuolo, R.W. and D.J.DeJoode. 2006. Hydrogeology and ecology of the Seminary Fen Wetland Complex, Minnesota Association of Wetland Professionals.

Wuolo, R.W,, A. Goebel, and C. Weckwerth. 2005. A Surface-Water – Groundwater Model To Evaluate Aquifer Sustainability In Washington County, Minnesota, Invited Paper, North Central Geol. Soc. Amer. Conf., Minneapolis, May 18-20, 2005.

Wuolo, R.W. and S.E. Roberston. 2004. Cheaper than dirt – Is groundwater too inexpensive? Minnesota Groundwater Assn., 23 N. 2.

Wuolo, R.W. 2002. How trout streams can limited groundwater use in southeast Minnesota, presented to Amer. Water Works Assn. annual meeting, Rochester, MN, March 27, 2002.

Wuolo, R.W. 2001. Let no good deed go unpunished – anatomy of hydrogeology on trial, presented to Amer. Institute of Hydrologists, St. Paul, MN. April 15, 2001

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Wuolo, R.W. and A.M. Djerrari. 1999. Protecting Boiling Springs and the Savage Fen Wetland Complex from ourselves, Proceedings of the 44th Annual Midwest Ground Water Conference, October 13-15, 1999, St. Paul, MN.

Djerrari, A.M. and R.W. Wuolo. 1999. Developing model-independent hydrogeologic coverages of the Twin Cities Metropolitan Area for groundwater protection modeling, Proceedings of the 44th Annual Midwest Ground Water Conference, October 13-15, 1999, St. Paul, MN.

Wuolo, R.W., 1998. How the protection of a calcareous fen is affecting limestone quarry operations in the Minnesota River Valley, presented at AIME Minnesota Section annual meeting: New Directions for the Mineral Industry, Minneapolis, MN, October 1998.

Wuolo, R.W., 1996. Using the Dakota County regional groundwater model for the analysis of wellhead protection areas, well interference effects, and wetland impact assessment, presented at the Minnesota Chapter of the Amer. Water Works Assn., St. Cloud, MN.

Wuolo, R.W., 1996. The Dakota County regional groundwater model, Minnesota Ground Water Assn. Annual meeting, April 14, 1996, St. Paul, MN.

Dahlstrom, D.J. and R.W. Wuolo. 1996. Application of regional groundwater models to wellhead protection area delineation - an example from Bloomington, presented at the Minnesota Groundwater Protection Conference, Minneapolis, MN.

Wuolo, R.W. 1995. Regional groundwater modeling: an effective tool for fen management plan development. the 28th Annual Water Resources Conference, University of Minnesota, October 24, 1995.

Armstrong, S., C. Aulbach, T. Becenti, N. Campbell, S. Crane, J. Hendry, J. Jennings, E. Kandl, R. Ray, T. Repasky, T. Ring, P. Shields, O. Strack, J. Wittman, R. Wuolo. 1995. A multi-disciplinary study of groundwater in Toppenish Creek Basin, Yakima Indian Reservation. Presented at the first symposium on the Hydrogeology of Washington State, Evergreen State College, Olympia, WA, August 28-30, 1995.

Dahlstrom, D.J., J.C. Greer, R.W. Wuolo, and M.D. Fairbrother. 1995. Groundwater flow model parameter estimation using MODFLOW for an unconfined, stratified drift aquifer (invited paper). Proceedings of 1995 Spring Meeting, American Geophysical Union, EOS, p. S148-149.

Fairbrother, M.D., R.W. Wuolo, and R.E. Duncan. 1995. The Multi-Layer Analytic Element Model (MLAEM) as an effective tool for the development of a fen management plan. Proceedings of Advances in Model Use and Development, in Water Resources, 1995 American Water Resources Association Annual Meeting and Symposium (in press).

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Attachment E: Field activity log and weekly report example

Sediment Remediation – Daily Update

Project, Client: *Confidential, Confidential*

Date: 05/01/YYYY

Weather: High 40s to low 60s with periods of heavy rain

On Site Personnel

Barr: Mike Ellis and Mike Potter

***Subcontractor*:** Project Manager (1); Site Superintendent (3); QC Manager (1); Health and Safety Office (1); Laborers (2); Operators (3)

Subcontractors: None

Other Visitors: Property owner was on site to discuss location of the site perimeter fence between the Pedestrian Bridge and Dam.

Safety

Contractor went over a site overview and overall objectives of the project. They discussed the importance of communication, especially in the early stages of the project when employees that have not worked together are still learning each other's work styles and habits. They discussed that everyone has stop work authority and should use it if they see something unsafe or do not think they can complete their job safely. Contractor has a separate meeting with union laborers hired on for the project to complete paperwork and get them more familiar with Contractor's safety program.

Barr discussed what Barr's role will be on site and discussed that communication between Barr and Contractor's team will be needed for Barr to be able to complete observation and sampling activities safely. Barr discussed procedures for public inquiries and that all public inquiries should be directed to Barr. Barr went over the resources that are available for the public to get more information on the project and handed out a Fact Sheet to meeting attendees for reference.

General Site Work Completed

1. A pre-construction video survey of site conditions was completed.
2. Two office trailers were setup.

3. Fence posts were installed along most of the Work Area boundary on the east side of the river.
4. Existing drums on site were moved from near the shed in Owner's parking lot to southern edge of the lot.
5. A topographic survey of existing conditions in the upland areas was started.
6. Materials including AquaBlok, erosion control blanket, silt fence, geotextile fabric, Rusmar Foam, erosion control logs, and oil boom were delivered.
7. Equipment including a compressor, three connex storage containers, a foam machine for Rusmar Foam, skidsteer, trencher, generator, three portable toilets, and traffic control signage were delivered.
8. Subcontractor continued installation of air filters in surrounding buildings.
9. Barr completed an SESC inspection in response to receiving >0.5 inches of rain in a 24 hour period.

Samples Taken

1. None

Work Planned for Next Day

1. Continue to receive and stage equipment and materials.
2. Prepare subgrade for the dewatering pad.
3. Continue installation of air filters in surrounding buildings.
4. Install soil erosion and sedimentation control devices.
5. Initiate construction of waste water treatment plant.
6. Initiate construction of the unloading platform.
7. Install the dewatering pad liner.
8. Install sanitary sewer monitoring devices.

Deviations from Plans and/or Specifications

1. None

External Communications

1. Barr contacted Property Stakeholder to discuss the location of the temporary fence between the Pedestrian Bridge and Dam fence location in this area. Property Stakeholder agreed on the final alignment of the fence installation. The fence contractor, Subcontractor, asked Property Stakeholder about University-owned utilities in the area. He mentioned that Barr has detailed drawings of utilities in the area, but he would coordinate with someone from their facilities group to come out in the morning to discuss locations of University owned utility lines. Barr communicated utility locations shown on the Construction Drawings with the Contractor. Property Stakeholder also asked about update meetings and Barr informed him that Barr and Owner are still working on setting those up.

2. Barr talked with adjacent Property Stakeholder regarding who should be the primary contact if anything arises during construction and if the adjacent property stakeholder has complaints about odors. Adjacent property stakeholder provided contact information.

Additional Comments

1. Contractor communicated that they would like additional trees removed to facilitate construction activities. These trees include two pine trees and three saplings/shrubs on Property Owner property near the western extent of the Pedestrian Bridge, one tree on Property Owner property near the southwest corner of Parking Lot, three trees on City property in the northwest corner of the Work Area, and one tree on Owner's property (trimming only) on the southwest corner of Owner's parking lot. Barr is working with applicable landowners to discuss the additional removal, and, if applicable, will perform nest surveys and coordinate the additional removal with the U.S. Fish and Wildlife Services.

Photos [*redacted]*

Sediment Remediation – Daily Update

Project, Client: *Confidential, Confidential*

Date: 05/02/YYYY

Weather: High 40s to low 50s, mostly cloudy with light rain throughout the day

On Site Personnel

Barr: Mike Potter

***Contractor*:** Project Manager (1); Site Superintendent (2); QC Manager (1); Health and Safety Office (1); Laborers (2); Operators (3)

Subcontractors: Fence installer and surveyor.

Other Visitors: Property Owner on site to discuss additional trees to be removed for the haul road.

Safety

Contractor discussed hazards associated with setup and mobilization tasks during the morning safety meeting.

General Site Work Completed

1. Subcontractor continued installing fence posts and a temporary chain link fence along the Work Area boundary.
2. Subcontractor continued to make progress on the pre-work topographic/bathymetric survey of existing conditions.
3. Installation of erosion control devices continued.
4. A pre-construction video survey of the west side of the site was completed.
5. A third construction trailer was delivered and setup.
6. Received aggregate for the dewatering and material handling area and continued to grade the subgrade for the area.
7. Subcontractor performed site security duties during non-working hours.

8. Materials including AquaBlok and erosion control products were delivered.

Samples Taken

1. None

Work Planned for Next Day

1. Continue grading subgrade for the dewatering and material handling area.
2. Continue installation of soil erosion and sedimentation control devices.
3. Continue with installation of fence posts and chain link fence.
4. Construct temporary access point to the Recreation Center loading dock at the southwest corner of Parking Lot.

Deviations from Plans and/or Specifications

1. None

External Communications

1. Barr contacted Property Stakeholder to discuss the access point from Parking Lot A to the Building loading dock. Property Stakeholder asked for an existing tree, which is in the middle of the access road, to be moved. Barr communicated that this would need to be done after the nest survey is completed on Monday, 5/8.

Additional Comments

1. None

Photos [*redacted]*

Sediment Remediation – Daily Update

Project, Client: *Confidential, Confidential*

Date: 05/03/YYYY

Weather: 40s to low 60s, clear skies

On Site Personnel

Barr: Mike Ellis, Tom Boom

***Contractor*:** Project Manager (1); Site Superintendent (2); QC Manager (1); Health and Safety Office (1); Laborers (2); Operators (3)

Subcontractors: Fence installer and surveyor.

Other Visitors: Property Stakeholder with the University was on site to discuss the access ramp from Parking Lot to the Building loading dock.

Client contact (Owner) was on site for a weekly update meeting and site walk.

Safety

Contractor discussed the importance of signing in and out at the site and reporting any injuries or illness to their site safety officer so they can be addressed appropriately.

General Site Work Completed

1. Subcontractor continued installing fence posts and a temporary chain link fence along the Work Area boundary.
2. Subcontractor continued to make progress on the pre-work topographic/bathymetric survey of existing conditions.
3. Installation of erosion control devices continued.
4. Aggregate was imported for the dewatering and material handling area and the area was graded.
5. Contractor constructed a gravel access ramp in the southwest corner of Parking Lot to allow trucks to access the Building loading dock while Road is closed.

6. Contractor removed sections of curb from Owner's parking lot to prepare area for installation of a temporary fabric structure covering imported materials.

7. Subcontractor performed site security duties during non-working hours.

Samples Taken

1. None

Work Planned for Next Day

1. Continue grading subgrade for the dewatering and material handling area.

2. Continue installation of soil erosion and sedimentation control devices.

3. Continue with installation of fence posts and chain link fence.

4. Close Road off to public and setup vehicle and pedestrian detour signs.

Deviations from Plans and/or Specifications

1. Barr and Contractor discussed alternatives to placing a temporary sidewalk on the north side of Road because it would be difficult to install a temporary sidewalk there due to the existing slope. Barr will evaluate modifying the signage in the area to have pedestrians cross to the south side of Road and coordinate with the Property Owner to get approval.

External Communications

1. Barr contacted Property Stakeholder to notify him that Road would be closed starting the morning of 5/4. He said he is okay with that.

Additional Comments

1. Contractor discussed needing to move the shed in Owner's parking lot to erect the tension fabric structure for imported materials. Barr began cleaning out the shed and coordinating removal of additional materials from the shed.

2. A weekly meeting was conducted between Barr, Owner, and Contractor.

3. Barr and Contractor discussed potential methods to monitor the temporary structure for negative pressure. Contractor will do some additional research and communicate to Barr what methods they find.

4. Barr completed a drum count of existing drums on site.

Photos [*redacted*]

Sediment Remediation – Daily Update

Project, Client: *Confidential, Confidential*

Date: 05/04/YYYY

Weather: 40s, cloudy with light rain throughout the day

On Site Personnel

Barr: Mike Ellis, Mike Potter, Joey Barker

***Contractor*:** Project Manager (1); Site Superintendent (2); QC Manager (1); Health and Safety Office (1); Laborers (2); Operators (3)

Subcontractors: Fence installer, surveyor.

Other Visitors: None

Safety

Contractor discussed pinch points and being aware of putting yourself in a situation that would make you susceptible to getting stuck in a pinch point as they planned to unload a lot of equipment and materials throughout the day. Contractor also discussed the importance of operators maintaining three points of contact when getting into their machine.

General Site Work Completed

1. Subcontractor continued installing fence posts and a temporary chain link fence along the Work Area boundary. Fence gates were installed to close Road south of the Adjacent Property entrance and at Drive and Drive. Fence installation on the eastern side of the river was completed. Fence installation is not complete on the western riverbank but a temporary fence was placed at the western end of the Pedestrian Bridge to detour pedestrians around the bridge.
2. Subcontractor continued to make progress on the pre-work topographic/bathymetric survey of existing conditions.
3. Installation of erosion control devices continued.
4. Aggregate was imported for the dewatering and material handling area and the area was graded and compacted.

5. Contractor removed asphalt and began staging aggregate in the eastern extent of Owner parking lot to prepare for installation of the temporary structure housing imported materials.

6. Contractor received a loader; backhoe; two 2,000 gallon fuel cells; components for the air handling units; and counter weights for excavators.

7. Subcontractor performed site security duties during non-working hours.

8. Barr sorted through materials in the shed on Owner parking lot and separated material into what can be disposed of versus removed.

9. Subcontractor posts within Owner parking lot.

10. Subcontractor was on site to evaluate damage to vegetation caused by recent drilling activities. Subcontractor did not perform the restoration as planned due to the forecasted rains but will perform the restoration next week, likely on 5/9.

Samples Taken

1. Turbidity samples collected at four locations as described below (all samples were collected from the western riverbank using a grab sample pole, turbidity results shown in parenthesis):
    a. Location 1 – just downstream of the Bridge (12.8 NTU)
    b. Location 2 –downstream of the storm sewer channel adjacent to outfall #3 (17.7 NTU)

Work Planned for Next Day

1. Continue grading subgrade for the dewatering and material handling area.

2. Continue to grade material storage area.

3. Continue installation of soil erosion and sedimentation control devices.

4. Widen gravel access ramp in Parking Lot.

5. Continue pre-construction survey.

Deviations from Plans and/or Specifications

1. None

External Communications

1. Property Owner Stakeholder contacted Mike Potter to notify him that the bags of oil boom were blocking the access ramp in Parking Lot. This information was relayed to Contractor and the bags were moved.

Additional Comments

1. None

Photos [redacted]

Sediment Remediation – Daily Update

Project, Client: *Confidential, Confidential*

Date: 05/05/YYYY

Weather: 40s to low 50s, mostly cloudy

On Site Personnel

Barr: Mike Potter

***Contractor*:** Project Manager (1); Site Superintendent (3); QC Manager (1); Health and Safety Office (1); Laborers (2); Operators (3)

Subcontractors: *Surveyor, electrician.*

Other Visitors: None

Safety

Contractor conducted a daily safety meeting at the beginning of the day and discussed planned activities, potential hazards, and mitigation measures. The focus of the discussion was again on pinch points as Contractor continues to receive a lot of material and equipment.

General Site Work Completed

1. Installation of erosion control devices continued.
2. Aggregate was imported for the dewatering and material handling area and progress was made constructing a berm along the perimeter of the dewatering pad.
3. An excavator with breaker attachment was used to break up curbs and asphalt in the eastern area of Owner's parking lot.
4. Sheet piling, a 500 gallon fuel cell, generator, and welding supplies were delivered.
5. The tree adjacent to the gravel access ramp from Parking Lot was relocated north so that the gravel access ramp could be widened. Barr inspected the tree for nests prior to the relocation and no nests were observed. After the tree was moved Contractor widened the access ramp to facilitate deliveries to the Building loading dock.

6. Began work constructing the temporary sidewalk on the west side of the river.
7. Subcontractor completed the pre-construction bathymetric/topographic survey.
8. Subcontractor was on site to continue the hook up of power to the work trailer.
9. Subcontractor performed site security duties during non-working hours.

Samples Taken

1. None

Work Planned for Next Day

1. Continue grading subgrade for the dewatering and material handling area.
2. Continue removal of asphalt and concrete curb in the eastern area of Owner parking lot to prepare for material staging area.
3. Continue installation of soil erosion and sedimentation control devices.
4. Continue installation of air filters.

Deviations from Plans and/or Specifications

1. Owner made the decision to not restore the four light posts in Owner parking lot. Owner informed Barr that the lights were customer owned before Owner bought and demolished the Former building and no electric was supplied to the lights after service was disconnected to the building, so Owner decided to remove and dispose of the lights.

External Communications

1. None

Additional Comments

1. None

Photos [redacted]

resourceful. naturally.
engineering and environmental consultants

BARR

Meeting Notes

Weekly Construction Progress Meeting

5/10/YYYY
10:00 – 11:00 AM

Attendees: *[list attendees]*

A summary of the meeting discussion is below. Action items based on meeting discussions are noted in bold.

Safety

- A first aid station was recently set up at the site.
- Fire extinguishers, emergency contact lists, and hospital routes were installed inside each of the work trailers.
- *Contractor* will have a person staff the main entrance gate to regulate who enters the site per requirements of the Specifications.

Project Updates

- *Property Owner* gave *subcontractor* a list of buildings they would like to have additional filters installed in and that list was passed on to *Contractor*. ***Contractor* will share that list with *Owner* and Barr.**
- *Subcontractor* is working on a temporary re-route of the fiber optic line with the *Property Owner* and the proposed re-route over the river is to string the line across *Road* bridge using utility poles. ***Contractor* has a map of the proposed re-route and will share with *Owner* and Barr.**
- *Contractor* will place bin blocks around the perimeter of the dewatering pad, two high, to function as a containment berm.
- Installation of the Work Area security fence, including privacy screening, should be completed this week.
- Video survey of storm and sanitary sewers should begin this week.
- Barr is talking with the MDEQ about what an acceptable location of the upstream Work Area barrier will be and what permit is needed to install the barrier. **Barr will communicate the results of the discussion with *Contractor*.**

Permit Updates

- *Contractor* is working on getting a hydrant permit through the *City*.
- Barr expects to receive the Joint Permit this week.
- Barr is continuing to work on the permit to discharge treated water to the City's sanitary sewer system, and it's looking less likely that discharge to the river through a NPDES permit will be used as a disposal method.

Two Week Look Ahead Project Schedule

- Next week will include constructing temporary unloading platforms, asphalting dewatering and material handling areas, constructing the wastewater treatment plant, setup of structural monitoring equipment, and beginning erection of the temporary fabric structures.

Submittals

- Survey plan should be updated this week and revised plan will be sent to Barr for review.
- Quality control testing for the geomembrane liner installation will be submitted to Barr this week.
- *Contractor* will continue using NGVD29 datum consistent with Barr drawings.

Pedestrian Bridge

- *Contractor* is continuing to work on a budgetary cost estimate for bridge removal and statement of qualifications for bridge removal and construction work.

Requests for Information

- Barr and *Contractor* verified outfall dimensions in question for storm sewer outfalls within the Work Area.
- *Contractor* will complete installation of slope monitoring points this week.
- *Contractor* submitted an alternative design for the subdrainage system sump, and **Barr and *Contractor* will setup a separate meeting to discuss that design.**

Survey Updates

- *Contractor* will submit the pre-construction survey soon.
- ***Contractor* will send e-mail to Barr requesting a point file for the dredge surface.**

Additional Discussion

- **Barr will send *Contractor* an e-mail requesting a cost estimate for additional odor controls, plastic sheeting in front of loading dock bays and secondary vestibule, to install on the *Owner* Building.**
- *Contractor* has not contacted the City to discuss their methods of operating the *Dam*, but will include Barr on the discussions when they do.

Attachment F: Certification of a Michigan based business

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design & Construction Division

Certification of a Michigan Based Business

(Information Required Prior to Contract Award for Application
of State Preference/Reciprocity Provisions)

To qualify as a Michigan business:

Vendor must have, during the 12 months immediately preceding this bid deadline:
or
If the business is newly established, for the period the business has been in existence, it has:

(Check all that apply):

- ☐ Filed a Michigan single business tax return showing a portion, or all the income tax base allocated or apportioned to the State of Michigan pursuant to the Michigan Single Business Tax Act, 1975 PA 228, MCL • ˜208.1 – 208.145: or
- ☒ Filed a Michigan income tax return showing income generated in or attributed to the State of Michigan; or
- ☒ Withheld Michigan income tax from compensation paid to the bidder's owners and remitted the tax to the Department of Treasury; or

I certify that **I have personal knowledge** of such filing or withholding, that it was more than a nominal filing for the purpose of gaining the status of a Michigan business, and that it indicates a significant business presence in the state, considering the size of the business and the nature of its activities.

I authorize the Michigan Department of Treasury to verify that the business has or has not met the criteria for a Michigan business indicated above and to disclose the verifying information to the procuring agency.

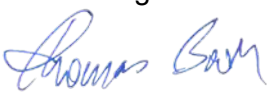
Bidder shall also indicate one of the following:

- ☐ Bidder qualifies as a Michigan business (provide zip code: _____)
- ☐ Bidder does not qualify as a Michigan business (provide name of State: _____).
- ☒ Principal place of business is outside the State of Michigan, however service/commodity provided by a location within the State of Michigan (provide zip code: 48108)

Bidder: Barr Engineering Co.

Thomas Boom, Vice President

Authorized Agent Name (print or type)



4/27/2023

Authorized Agent Signature & Date

Fraudulent Certification as a Michigan business is prohibited by MCL 18.1268 § 268. A BUSINESS THAT PURPOSELY OR WILLFULLY SUBMITS A FALSE CERTIFICATION THAT IT IS A MICHIGAN BUSINESS OR FALSELY INDICATES THE STATE IN WHICH IT HAS ITS PRINCIPAL PLACE OF BUSINESS IS GUILTY OF A FELONY, PUNISHABLE BY A FINE OF NOT LESS THAN $25,000 and subject to debarment under MCL 18.264.

Attachment G: Responsibility certification

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design & Construction Division

Responsibility Certification

The bidder certifies to the best of its knowledge and belief that, within the past three (3) years, the bidder, an officer of the bidder, or an owner of a 25% or greater interest in the bidder:

(a) Has not been convicted of a criminal offense incident to the application for or performance of a contract or subcontract with the State of Michigan or any of its agencies, authorities, boards, commissions, or departments.

(b) Has not had a felony conviction in any state (including the State of Michigan).

(c) Has not been convicted of a criminal offense which negatively reflects on the bidder's business integrity, including but not limited to, embezzlement, theft, forgery, bribery, falsification, or destruction of records, receiving stolen property, negligent misrepresentation, price-fixing, bid rigging, or a violation of state or federal anti-trust statutes.

(d) Has not had a loss or suspension of a license or the right to do business or practice a profession, the loss or suspension of which indicates dishonesty, a lack of integrity, or a failure or refusal to perform in accordance with the ethical standards of the business or profession in question.

(e) Has not been terminated for cause by the Owner.

(f) Has not failed to pay any federal, state, or local taxes.

(g) Has not failed to comply with all requirements for foreign corporations.

(h) Has not been debarred from participation in the bid process pursuant to Section 264 of 1984 PA 431, as amended, MCL 18.1264, or debarred or suspended from consideration for award of contracts by any other State or any federal Agency.

(i) Has not been convicted of a criminal offense or other violation of other state or federal law, as determined by a court of competent jurisdiction or an administrative proceeding, which in the opinion of DTMB indicates that the bidder is unable to perform responsibly or which reflects a lack of integrity that could negatively impact or reflect upon the State of Michigan, including but not limited to, any of the following offenses under or violations of:

i. The Natural Resources and Environmental Protection Act, 1994 PA 451, MCL 324.101 to 324.90106.
ii. A persistent and knowing violation of the Michigan Consumer Protection Act, 1976 PA 331, MCL 445.901 to 445.922.

iii. 1965 PA 166, MCL 408.551 to 408.558 (law relating to prevailing wages on state projects) and a finding that the bidder failed to pay the wages and/or fringe benefits due within the period required.

iv. Repeated or flagrant violations of 1978 PA 390 MCL 408.471 to 408.490 (law relating to payment of wages and fringe benefits).

v. A willful or persistent violation of the Michigan Occupational Health and Safety Act, 1974, PA 154, MCL 408.10001 to 408.1094, including: a criminal conviction, repeated willful violations that are final orders, repeated violations that are final orders, and failure to abate notices that are final orders.

vi. A violation of federal or state civil rights, equal rights, or non-discrimination laws, rules, or regulations.

vii. Been found in contempt of court by a Federal Court of Appeals for failure to correct an unfair labor practice as prohibited by Section 8 of Chapter 372 of the National Labor Relations Act, 29 U. s. C. 158 (1980 PA 278, as amended, MCL 423.321 et seq).

(j) Is NOT an Iran linked business as defined in MCL 129.312.

I understand that a false statement, misrepresentation, or concealment of material facts on this certification may be grounds for rejection of this proposal or termination of the award and may be grounds for debarment.

Bidder: Barr Engineering Co.

Thomas Boom, Vice President
Authorized Agent Name (print or type)

 4-27-2023
Authorized Agent Signature & Date

☐ I am unable to certify to the above statements. My explanation is attached.

Attachment H: Acknowledgment of addendums

DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
State Facilities Administration
Design & Construction Division

ACKNOWLEDGMENT OF ADDENDUMS

PSC acknowledges receipt of Addenda: No. 1_ dated: April 13, 2023,

No. ___ dated: _____ No. ___ dated: _____

APPENDIX 3

CERTIFICATION FORMS

(See pages 304 - 308 of contract)

APPENDIX 4

OVERHEAD ITEMS ALLOWED FOR THE PROFESSIONAL SERVICES CONTRACTOR FIRM'S HOURLY BILLING RATE CALCULATION

The following instructions are to be used by the Professional Services Contractor firms to determine the hourly billing rate to use on State of Michigan Projects.

The Professional's Consultant must submit a separate hourly billing rate for the professional consultant services they will provide for State of Michigan Projects. A moderate mark-up of the Professional's Consultant services hourly billing rates will be allowed.

The Department will reimburse the Professional for the actual cost of printing and reproduction of the Contract Bidding Documents, soil borings, surveys and any required laboratory testing services and use of field equipment. **No mark-up of these Project costs will be allowed if services are performed in house.**

2023 HOURLY BILLING RATE
Based on 2022 Expenses

OVERHEAD ITEMS ALLOWED FOR THE PROFESSIONAL SERVICES CONTRACTOR FIRM'S HOURLY BILLING RATE CALCULATION

SALARIES:	**EMPLOYEE BENEFITS:**	**INSURANCE:**
Principals (Not Project Related)	Hospitalization	Professional Liability Insurance
Clerical / Secretarial	Employer's Federal Insurance Contributions Act (FICA)Tax	Flight and Commercial Vehicle
Technical (Not Project Related)	Unemployment Insurance	Valuable Papers
Temporary Help Tax	Federal Unemployment	Office Liability
Technical Training	Disability	Office Theft
Recruiting Expenses	Worker's Compensation	Premises Insurance
	Vacation	Key – Personnel Insurance
	Holidays	Professional Liability Insurance
	Sick Pay	
	Medical Payments	
	Pension Funds	
	Insurance - Life	
	Retirement Plans	

TAXES:	**SERVICES (PROFESSIONAL)**	**EQUIPMENT RENTALS:**
Franchise Taxes	Accounting	Computers
Occupancy Tax	Legal	Typewriter
Unincorporated Business Tax	Employment Fees	Bookkeeping
Single Business Tax	Computer Services Bond)	Dictating
Property Tax	Research	Printing
Income Tax	Project / Contract Bond	Furniture and Fixtures
		Instruments

OFFICE FACILITIES:

Rents and Related Expenses
Utilities
Cleaning and Repair

LOSSES:

Bad Debts (net)

Uncollectible Fee
Thefts (not covered by Project / Contract)
Forgeries (not covered by Project / Contract)

FINANCIAL:

Depreciation

SUPPLIES:

Postage

Drafting Room Supplies

General Office Supplies
Library
Maps and Charts
Magazine Subscriptions

PRINTING AND DUPLICATION:

Specifications (other than Contract Bidding documents)
Drawings (other than Contract Bidding documents)
Xerox / Reproduction
Photographs

SERVICES (NONPROFESSIONAL):

Telephone and Telegram

Messenger Services

TRAVEL:

All Project – Related Travel*

MISCELLANEOUS:

Professional Organization Dues for Principals and Employees
Licensing Fees

III-2-A. Position, Classification and Employee Billing Rate Information

Firm Name **XYZ, Inc.**

Yearly Hourly Billing Rate Increase **≈4%**

Position/Classification	Year 2023	Year 2024	Year 2025	Year 2026
Principal/Project Manager**	$100.00	$105.00	$110.00	$116.00
Senior Architect	$100.00	$105.00	$110.00	$116.00
Quality Control/Assurance	$100.00	$105.00	$110.00	$116.00
Licensed Surveyor**	$90.00	$95.00	$99.00	$104.00
Project Engineer**	$90.00	$95.00	$99.00	$104.00
Mechanical Engineer**	$90.00	$95.00	$99.00	$104.00
Sr. Structural Engineer	$80.00	$84.00	$88.00	$92.00
Electrical Engineer	$80.00	$84.00	$88.00	$92.00
Scientist/Surveyor	$65.00	$68.00	$71.00	$75.00
Staff Engineer	$65.00	$68.00	$71.00	$75.00
Staff geologist	$65.00	$68.00	$71.00	$75.00
CAD Operator	$75.00	$79.00	$83.00	$87.00
Technician	$65.00	$68.00	$71.00	$75.00
Field Technician	$50.00	$53.00	$56.00	$59.00
Technical Support	$35.00	$37.00	$39.00	$41.00

*Billing Rate will be in accordance with the attached guideline page for instructions regarding the "Overhead Items used for Professional Billing Rate Calculation," and the "Sample Standard Contract for Professional Services," Article 5, Compensation Text.

** Key Project Personnel

III-2-B. Fee with Anticipated Hours and Billing Rate

	POSITION/ CLASSIFICATION	TOTAL HOURS	BILLING RATE	TOTAL
	Principal/Project Manager	30	100.00	3,000.00
	Senior Architect	17	100.00	1,700.00
	Licensed Surveyor	9	90.00	810.00
	Project Engineer	8	90.00	720.00
	Mech. Engineer.	8	90.00	720.00
	Sr. Structural Engineer	8	80.00	640.00
	Electrical Engineer	22	80.00	1,760.00
	Draftsperson	40	35.00	1,400.00
	Quality Control	2	100.00	200.00
	CAD Operator	42	35.00	1,470.00
	SUBTOTAL	186		$10,667.50

III-2C. Authorized Reimbursables -- Sub-consultants, Testing and Expenses

***Firm's Mark-Up Percentage:_____**

PHASE	NAME OF FIRM	DESCRIPTION OF SERVICES PROVIDED	TOTAL AMOUNT* (Including mark-up)
Phase 400	Forrest T. Arrea, Landscape Architect, Howell, Michigan	Design of Stormwater Management Rain Garden	500.00
Phase 500	XYZ Productions, Inc. Lansing, Michigan	Printing and reproduction of bidding documents	500.00
Phase 500	Forrest T. Arrea, Landscape Architect, Howell, Michigan	Design of Stormwater Management Rain Garden	500.00
	SUBTOTAL		$ 1,500.00

III-2D. Total, Summarized by Phase

PHASE	Phase 300	Phase 400	Phase 500	Phase 600	Phase 700	TOTAL
Professional Fee	1,597.50	2,820.00	3,970.00	1,120.00	1,160.00	10,667.50
Reimbursable Expenses	0.00	750.00	1,250.00	0.00	500.00	1,500.00
SUB-TOTAL	1,597.50	3,570.00	5,220.00	1,120.00	1,660.00	
TOTAL CONTRACT AMOUNT						$ 12,167.50

DEPARTMENT OF TECHNOLOGY, MANAGEMENT & BUDGET,
VEHICLE AND TRAVEL SERVICES
SCHEDULE OF TRAVEL RATES FOR CLASSIFIED AND UNCLASSIFIED EMPLOYEES
Effective January 1, 2023

MICHIGAN SELECT CITIES*

	Individual	Group Meeting (pre-arranged and approved)
Lodging**	$85.00	
Breakfast	$11.75	$14.75
Lunch	$11.75	$14.75
Dinner	$28.00	$31.00

MICHIGAN IN-STATE ALL OTHER

	Individual	Group Meeting (pre-arranged and approved)
Lodging**	$85.00	
Breakfast	$9.75	$12.75
Lunch	$9.75	$12.75
Dinner	$22.00	$25.00

Lodging	$51.00
Breakfast	$9.75
Lunch	$9.75
Dinner	$22.00
Per Diem Total	**$92.50**

OUT-OF-STATE SELECT CITIES*

	Individual	Group Meeting (pre-arranged and approved)
Lodging**	Contact Conlin Travel	
Breakfast	$15.00	$18.00
Lunch	$15.00	$18.00
Dinner	$29.00	$32.00

OUT-OF-STATE ALL OTHER

	Individual	Group Meeting (pre-arranged and approved)
Lodging**	Contact Conlin Travel	
Breakfast	$11.75	$14.75
Lunch	$11.75	$14.75
Dinner	$27.00	$30.00

Lodging	$51.00
Breakfast	$11.75
Lunch	$11.75
Dinner	$27.00
Per Diem Total	**$101.50**

Incidental Costs Per Day (with overnight stay) $5.00

Mileage Rates	**Current**
Premium Rate	$0.655 per mile
Standard Rate	$0.440 per mile

* See Select Cities Listing
** Lodging available at State rate, or call Conlin Travel at 877-654-2179 or www.somtravel.com

SELECT CITY LIST
SCHEDULE OF TRAVEL RATES FOR CLASSIFIED AND UNCLASSIFIED EMPLOYEES
Effective January 1, 2023

Michigan Select Cities/Counties		
	CITIES	**COUNTIES**
	Ann Arbor, Auburn Hills, Beaver Island, Detroit, Grand Rapids, Holland, Leland, Mackinac Island, Petoskey, Pontiac, South Haven, Traverse City	Grand Traverse, Oakland, Wayne
Out of State Select Cities/Counties		
STATE	**CITIES**	**COUNTIES**
Alaska	All locations	
Arizona	Phoenix, Scottsdale, Sedona	
California	Arcata, Edwards AFB, Eureka, Los Angeles, Mammoth Lakes, McKinleyville, Mill Valley, Monterey, Novato, Palm Springs, San Diego, San Francisco, San Rafael, Santa Barbara, Santa Monica, South Lake Tahoe, Truckee, Yosemite National Park	Los Angeles, Mendocino, Orange, Ventura
Colorado	Aspen, Breckenridge, Grand Lake, Silverthorne, Steamboat Springs, Telluride, Vail	
Connecticut	Bridgeport, Danbury	
District of Columbia	Washington DC (See also Maryland & Virginia)	
Florida	Boca Raton, Delray Beach, Fort Lauderdale, Jupiter, Key West, Miami	
Georgia	Brunswick, Jekyll Island	
Hawaii	All locations	
Idaho	Ketchum, Sun Valley	
Illinois	Chicago	Cook, Lake
Kentucky	Kenton	
Louisiana	New Orleans	
Maine	Bar Harbor, Kennebunk, Kittery, Rockport, Sandford	
Maryland	Baltimore City, Ocean City	Montgomery, Prince George
Massachusetts	Boston, Burlington, Cambridge, Martha's Vineyard, Woburn	Suffolk
Minnesota	Duluth, Minneapolis, St. Paul	Hennepin, Ramsey
Nevada	Las Vegas	
New Mexico	Santa Fe	
New York	Bronx, Brooklyn, Lake Placid, Manhattan, Melville, New Rochelle, Queens, Riverhead, Ronkonkoma, Staten Island, Tarrytown, White Plaines	Suffolk
Ohio	Cincinnati	
Pennsylvania	Pittsburgh	Bucks
Puerto Rico	All locations	
Rhode Island	Bristol, Jamestown, Middletown, Newport, Providence	Newport
Texas	Austin, Dallas, Houston, L.B. Johnson Space Center	
Utah	Park City	Summit
Vermont	Manchester, Montpelier, Stowe	Lamoille
Virginia	Alexandria, Fairfax, Falls Church	Arlington, Fairfax
Washington	Port Angeles, Port Townsend, Seattle	
Wyoming	Jackson, Pinedale	

APPENDIX 5

CERTIFICATES OF INSURANCE

CERTIFICATE OF LIABILITY INSURANCE

1/1/2024

DATE (MM/DD/YYYY) 8/2/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000 kcasu@lockton.com	**CONTACT NAME:** **PHONE (A/C, No, Ext):** **FAX (A/C, No):** **E-MAIL ADDRESS:**
INSURED 1516042 BARR ENGINEERING MICHIGAN LLC BARR ENGINEERING CO. 3005 BOARDWALK STREET, SUITE 100 ANN ARBOR MI 48103	**INSURER(S) AFFORDING COVERAGE** — **NAIC #** **INSURER A :** American Casualty Company of Reading, PA — 20427 **INSURER B :** Transportation Insurance Company — 20494 **INSURER C :** The Continental Insurance Company — 35289 **INSURER D :** Continental Casualty Company — 20443 **INSURER E :** **INSURER F :**

COVERAGES **CERTIFICATE NUMBER:** 19366776 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR X CONT. LIAB/XCU X ND/OH/WA/WY STOP GAP GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT X LOC OTHER:	Y	Y	7017884292	1/1/2023	1/1/2024	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG 	$ 1,000,000 $ 1,000,000 $ 15,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $
B	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY / SCHEDULED AUTOS HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY	Y	Y	7017882395	1/1/2023	1/1/2024	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) 	$ 1,000,000 $ XXXXXXX $ XXXXXXX $ XXXXXXX $ XXXXXXX
C	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED X RETENTION $ $0	Y	Y	7017886821	1/1/2023	1/1/2024	EACH OCCURRENCE AGGREGATE 	$ $10,000,000 $ $10,000,000 $ XXXXXXX
B B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N: N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	7017886706 (AOS) 7017890612 (CA)	1/1/2023 1/1/2023	1/1/2024 1/1/2024	X PER STATUTE / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
D	PROFESSIONAL LIABILITY INCL.POLLUTION INCIDENT	N	Y	EEH008220528	11/1/2022	1/1/2024	CLAIMS MADE & REPORTED $5,000,000 PER CLAIM/AGG	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

THIS CERTIFICATE SUPERSEDES ALL PREVIOUSLY ISSUED CERTIFICATES FOR THIS HOLDER, APPLICABLE TO THE CARRIERS LISTED AND THE POLICY TERM(S) REFERENCED.

RE: PROJECT: MSA CONTRACT #2023 ENVIRONMENTAL EXPANDED REMEDIATION ISID SERVICES #1008.

SEE ATTACHED

CERTIFICATE HOLDER

19366776
STATE OF MICHIGAN
3111 W. ST. JOSEPH STREET
LANSING, MI 48917

CANCELLATION See Attachments

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Joseph M Agnello

STATE OF MICHIGAN, ITS DEPARTMENTS, DIVISIONS, AGENCIES, OFFICES, COMMISSIONS, OFFICERS, EMPLOYEES, AND AGENTS ARE ADDITIONAL INSUREDS ON GENERAL LIABILITY, AUTOMOBILE LIABILITY, UMBRELLA LIABILITY AND POLLUTION LIABILITY, AS REQUIRED BY WRITTEN CONTRACT AND SUBJECT TO THE TERMS AND CONDITIONS OF THE POLICY. INSURANCE IS PRIMARY AND NON-CONTRIBUTORY. WAIVER OF SUBROGATION IN FAVOR OF THE ADDITIONAL INSUREDS APPLIES ON GENERAL LIABILITY, AUTOMOBILE LIABILITY, UMBRELLA LIABILITY AND WORKERS COMPENSATION, AS REQUIRED BY WRITTEN CONTRACT AND WHERE ALLOWED BY LAW. COVERAGE IS SUBJECT TO THE TERMS AND CONDITIONS OF THE POLICY. 30 DAY NOTICE OF CANCELLATION (EXCLUDING NON-PAYMENT) APPLIES IN FAVOR OF CERTIFICATE HOLDER. THE UMBRELLA LIABILITY IS CONSIDERED FOLLOW FORM OVER THE GENERAL LIABILITY, AUTO LIABILITY AND EMPLOYERS LIABILITY SUBJECT TO THE POLICY TERMS, CONDITIONS AND EXCLUSIONS.

CNA PARAMOUNT

Blanket Additional Insured - Owners, Lessees or Contractors - with Products-Completed Operations Coverage Endorsement

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

It is understood and agreed as follows:

I. **WHO IS AN INSURED** is amended to include as an **Insured** any person or organization whom you are required by **written contract** to add as an additional insured on this **coverage part**, but only with respect to liability for **bodily injury**, **property damage** or **personal and advertising injury** caused in whole or in part by your acts or omissions, or the acts or omissions of those acting on your behalf:

A. in the performance of your ongoing operations subject to such **written contract**; or

B. in the performance of **your work** subject to such **written contract**, but only with respect to **bodily injury** or **property damage** included in the **products-completed operations hazard**, and only if:

1. the **written contract** requires you to provide the additional insured such coverage; and

2. this **coverage part** provides such coverage.

II. But if the **written contract** requires:

A. additional insured coverage under the 11-85 edition, 10-93 edition, or 10-01 edition of CG2010, or under the 1001 edition of CG2037; or

B. additional insured coverage with "arising out of" language; or

C. additional insured coverage to the greatest extent permissible by law;

then paragraph **I.** above is deleted in its entirety and replaced by the following:

WHO IS AN INSURED is amended to include as an **Insured** any person or organization whom you are required by **written contract** to add as an additional insured on this **coverage part**, but only with respect to liability for **bodily injury**, **property damage** or **personal and advertising injury** arising out of **your work** that is subject to such **written contract**.

II. Subject always to the terms and conditions of this policy, including the limits of insurance, the Insurer will not provide such additional insured with:

A. coverage broader than required by the **written contract**; or

B. a higher limit of insurance than required by the **written contract**.

IV. The insurance granted by this endorsement to the additional insured does not apply to **bodily injury**, **property damage**, or **personal and advertising injury** arising out of:

A. the rendering of, or the failure to render, any professional architectural, engineering, or surveying services, including:

1. the preparing, approving, or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; and

2. supervisory, inspection, architectural or engineering activities; or

B. any premises or work for which the additional insured is specifically listed as an additional insured on another endorsement attached to this **coverage part**.

V. Under **COMMERCIAL GENERAL LIABILITY CONDITIONS,** the Condition entitled **Other Insurance** is amended to add the following, which supersedes any provision to the contrary in this Condition or elsewhere in this **coverage part**:

CNA PARAMOUNT

Blanket Additional Insured - Owners, Lessees or Contractors - with Products-Completed Operations Coverage Endorsement

Primary and Noncontributory Insurance

With respect to other insurance available to the additional insured under which the additional insured is a named insured, this insurance is primary to and will not seek contribution from such other insurance, provided that a **written contract** requires the insurance provided by this policy to be:

1. primary and non-contributing with other insurance available to the additional insured; or
2. primary and to not seek contribution from any other insurance available to the additional insured. But except as specified above, this insurance will be excess of all other insurance available to the additional insured.

VI. Solely with respect to the insurance granted by this endorsement, the section entitled **COMMERCIAL GENERAL LIABILITY CONDITIONS** is amended as follows:

The Condition entitled **Duties In The Event of Occurrence, Offense, Claim or Suit** is amended with the addition of the following:

Any additional insured pursuant to this endorsement will as soon as practicable:

1. give the Insurer written notice of any **claim**, or any **occurrence** or offense which may result in a **claim**;
2. send the Insurer copies of all legal papers received, and otherwise cooperate with the Insurer in the investigation, defense, or settlement of the **claim**; and
3. make available any other insurance, and tender the defense and indemnity of any **claim** to any other insurer or self-insurer, whose policy or program applies to a loss that the Insurer covers under this **coverage part**. However, if the **written contract** requires this insurance to be primary and non-contributory, this paragraph **3.** does not apply to insurance on which the additional insured is a named insured.

The Insurer has no duty to defend or indemnify an additional insured under this endorsement until the Insurer receives written notice of a **claim** from the additional insured.

VII. Solely with respect to the insurance granted by this endorsement, the section entitled **DEFINITIONS** is amended to add the following definition:

Written contract means a written contract or written agreement that requires you to make a person or organization an additional insured on this **coverage part**, provided the contract or agreement:

A. is currently in effect or becomes effective during the term of this policy; and

B. was executed prior to:

   1. the **bodily injury** or **property damage**; or

   2. the offense that caused the **personal and advertising injury**;

   for which the additional insured seeks coverage.

Any coverage granted by this endorsement shall apply solely to the extent permissible by law. All other terms and conditions of the Policy remain unchanged.

This endorsement, which forms a part of and is for attachment to the Policy issued by the designated Insurers, takes effect on the effective date of said Policy at the hour stated in said Policy, unless another effective date is shown below, and expires concurrently with said Policy.

CONTRACTORS EXTENDED COVERAGE ENDORSEMENT - BUSINESS AUTO PLUS
THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

I. LIABILITY COVERAGE

A. Who Is An Insured

The following is added to **Section II, Paragraph A.1., Who Is An Insured**:

1. a. Any incorporated entity of which the Named Insured owns a majority of the voting stock on the date of inception of this Coverage Form; provided that,

b. The insurance afforded by this provision **A.1.** does not apply to any such entity that is an **insured** under any other liability "policy" providing **auto** coverage.

2. Any organization you newly acquire or form, other than a limited liability company, partnership or joint venture, and over which you maintain majority ownership interest.

The insurance afforded by this provision **A.2.**:

a. Is effective on the acquisition or formation date, and is afforded only until the end of the policy period of this Coverage Form, or the next anniversary of its inception date, whichever is earlier.

b. Does not apply to:

1. **Bodily injury** or **property damage** caused by an **accident** that occurred before you acquired or formed the organization; or

2. Any such organization that is an **insured** under any other liability "policy" providing **auto** coverage.

3. Any person or organization that you are required by a written contract to name as an additional insured is an **insured** but only with respect to their legal liability for acts or omissions of a person, who qualifies as an **insured** under **SECTION II – WHO IS AN INSURED** and for whom Liability Coverage is afforded under this policy. If required by written contract, this insurance will be primary and non-contributory to insurance on which the additional insured is a Named Insured.

4. An **employee** of yours is an **insured** while operating an **auto** hired or rented under a contract or agreement in that **employee's** name, with your permission, while performing duties related to the conduct of your business.

"Policy", as used in this provision **A. Who Is An Insured,** includes those policies that were in force on the inception date of this Coverage Form but:

1. Which are no longer in force; or

2. Whose limits have been exhausted.

Form No: CNA63359XX (04-2012)	Policy No:7017882395
Endorsement Effective Date:	Policy Effective Date:1/1/2023

Business Auto Policy

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US (WAIVER OF SUBROGATION) – AUTOMATIC WHEN REQUIRED BY WRITTEN CONTRACT OR AGREEMENT

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM

BUSINESS AUTO COVERAGE FORM

MOTOR CARRIER COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

The **Transfer Of Rights Of Recovery Against Others To Us** Condition does not apply to any person(s) or organization(s) for whom you are required to waive subrogation with respect to the coverage provided under this Coverage Form, but only to the extent that subrogation is waived:

A. Under a written contact or agreement with such person(s) or organization(s); and

B. Prior to the **"accident"** or the **"loss."**

by the indemnitee at the Insurer's request will be paid as **defense costs**. Such payments will not be deemed to be **damages** for **personal and advertising injury** and will not reduce the limits of insurance.

C. This **PERSONAL AND ADVERTISING INJURY - LIMITED CONTRACTUAL LIABILITY** Provision does not apply if **Coverage B –Personal and Advertising Injury Liability** is excluded by another endorsement attached to this **Coverage Part.**

This **PERSONAL AND ADVERTISING INJURY - CONTRACTUAL LIABILITY** Provision does not apply to any person or organization who otherwise qualifies as an additional insured on this **Coverage Part.**

22. PROPERTY DAMAGE – ELEVATORS

A. Under **COVERAGES**, **Coverage A – Bodily Injury and Property Damage Liability**, the paragraph entitled **Exclusions** is amended such that the **Damage to Your Product** Exclusion and subparagraphs **(3)**, **(4)** and **(6)** of the **Damage to Property** Exclusion do not apply to **property damage** that results from the use of elevators.

B. Solely for the purpose of the coverage provided by this **PROPERTY DAMAGE – ELEVATORS** Provision, the **Other Insurance** conditions is amended to add the following paragraph:

This insurance is excess over any of the other insurance, whether primary, excess, contingent or on any other basis that is Property insurance covering property of others damaged from the use of elevators.

23. RETIRED PARTNERS, MEMBERS, DIRECTORS AND EMPLOYEES

WHO IS INSURED is amended to include as **Insureds** natural persons who are retired partners, members, directors or employees, but only for **bodily injury**, **property damage** or **personal and advertising injury** that results from services performed for the **Named Insured** under the **Named Insured's** direct supervision. All limitations that apply to **employees** and **volunteer workers** also apply to anyone qualifying as an **Insured** under this Provision.

24. SUPPLEMENTARY PAYMENTS

The section entitled **SUPPLEMENTARY PAYMENTS – COVERAGES A AND B** is amended as follows:

A. Paragraph **1.b.** is amended to delete the $250 limit shown for the cost of bail bonds and replace it with a $5,000. limit; and

B. Paragraph **1.d.** is amended to delete the limit of $250 shown for daily loss of earnings and replace it with a $1,000. limit.

25. UNINTENTIONAL FAILURE TO DISCLOSE HAZARDS

If the **Named Insured** unintentionally fails to disclose all existing hazards at the inception date of the **Named Insured's Coverage Part**, the Insurer will not deny coverage under this **Coverage Part** because of such failure.

26. WAIVER OF SUBROGATION - BLANKET

Under **CONDITIONS**, the condition entitled **Transfer Of Rights Of Recovery Against Others To Us** is amended to add the following:

The Insurer waives any right of recovery the Insurer may have against any person or organization because of payments the Insurer makes for injury or damage arising out of:

1. the **Named Insured's** ongoing operations; or

2. **your work** included in the **products-completed operations hazard.**

However, this waiver applies only when the **Named Insured** has agreed in writing to waive such rights of recovery in a written contract or written agreement, and only if such contract or agreement:

1. is in effect or becomes effective during the term of this **Coverage Part**; and

2. was executed prior to the **bodily injury**, **property damage** or **personal and advertising injury** giving rise to the **claim**.

27. WRAP-UP EXTENSION: OCIP, CCIP, OR CONSOLIDATED (WRAP-UP) INSURANCE PROGRAMS

Note: The following provision does not apply to any public construction project in the state of Oklahoma, nor to any construction project in the state of Alaska, that is not permitted to be insured under a **consolidated (wrap-up) insurance program** by applicable state statute or regulation.

If the endorsement **EXCLUSION – CONSTRUCTION WRAP-UP** is attached to this policy, or another exclusionary endorsement pertaining to Owner Controlled Insurance Programs (O.C.I.P.) or Contractor Controlled Insurance Programs (C.C.I.P.) is attached, then the following changes apply:

A. The following wording is added to the above-referenced endorsement:

With respect to a **consolidated (wrap-up) insurance program** project in which the **Named Insured** is or was involved, this exclusion does not apply to those sums the **Named Insured** become legally obligated to pay as **damages** because of:

1. **Bodily injury**, **property damage**, or **personal or advertising injury** that occurs during the **Named Insured's** ongoing operations at the project, or during such operations of anyone acting on the **Named Insured's** behalf; nor

2. **Bodily injury** or **property damage** included within the **products-completed operations hazard** that arises out of those portions of the project that are not **residential structures.**

B. Condition **4. Other Insurance** is amended to add the following subparagraph **4.b.(1)(c)**: This insurance is excess over:

(c) Any of the other insurance whether primary, excess, contingent or any other basis that is insurance available to the **Named Insured** as a result of the **Named Insured** being a participant in a **consolidated (wrap-up) insurance program**, but only as respects the **Named Insured's** involvement in that **consolidated (wrap-up) insurance program.**

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C. DEFINITIONS is amended to add the following definitions:

Consolidated (wrap-up) insurance program means a construction, erection or demolition project for which the prime contractor/project manager or owner of the construction project has secured general liability insurance covering some or all of the contractors or subcontractors involved in the project, such as an Owner Controlled Insurance Program (O.C.I.P.) or Contractor Controlled Insurance Program (C.C.I.P.).

Residential structure means any structure where 30% or more of the square foot area is used or is intended to be used for human residency, including but not limited to:

1. single or multifamily housing, apartments, condominiums, townhouses, co-operatives or planned unit developments; and

2. the common areas and structures appurtenant to the structures in paragraph **1.** (including pools, hot tubs, detached garages, guest houses or any similar structures).

However, when there is no individual ownership of units, **residential structure** does not include military housing, college/university housing or dormitories, long term care facilities, hotels or motels. **Residential structure** also does not include hospitals or prisons.

Workers Compensation And Employers Liability Insurance
Policy Endorsement

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.

This agreement shall not operate directly or indirectly to benefit anyone not named in the Schedule.

Any person or organization for which the employer has agreed by written contract, executed prior to loss, may execute a waiver of subrogation. However, for purposes of work performed by the employer in Missouri, this waiver of subrogation does not apply to any construction group of classifications as designated by the waiver of right to recover from others (subrogation) rule in our manual.

Schedule

Any Person or Organization on whose behalf you are required to obtain this waiver of our right to recover from under a written contract or agreement.
The premium charge for the endorsement is reflected in the Schedule of Operations.

All other terms and conditions of the policy remain unchanged.

This endorsement, which forms a part of and is for attachment to the policy issued by the designated Insurers, takes effect on the Policy Effective Date of said policy at the hour stated in said policy, unless another effective date (the Endorsement Effective Date) is shown below, and expires concurrently with said policy unless another expiration date is shown below.

APPENDIX 6

FFEDERAL PROVISIONS ADDENDUM

(If your project is funded fully or in part by federal funds, this appendix applies)

STATE OF MICHIGAN
PROCUREMENT
Michigan.gov/MiProcurement

FEDERAL PROVISIONS ADDENDUM

This addendum applies to purchases that will be paid for in whole or in part with funds obtained from the federal government. The provisions below are required, and the language is not negotiable. If any provision below conflicts with the State's terms and conditions, including any attachments, schedules, or exhibits to the State's Contract, the provisions below take priority to the extent a provision is required by federal law; otherwise, the order of precedence set forth in the Contract applies. Hyperlinks are provided for convenience only; broken hyperlinks will not relieve Contractor from compliance with the law.

1. Equal Employment Opportunity

If this Contract is a "**federally assisted construction contract**" as defined in 41 CFR Part 60-1.3, and except as otherwise may be provided under 41 CFR Part 60, then during performance of this Contract, the Contractor agrees as follows:

a. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

c. The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

d. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

e. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

f. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

g. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

h. The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided*, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

2. Davis-Bacon Act (Prevailing Wage)

If this Contract is a **prime construction contract** in excess of $2,000, the Contractor (and its Subcontractors) must comply with the Davis-Bacon Act (40 USC 3141-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"), and during performance of this Contract the Contractor agrees as follows:

a. All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.

b. Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.

c. Additionally, contractors are required to pay wages not less than once a week.

3. Copeland "Anti-Kickback" Act

If this Contract is a contract for construction or repair work in excess of $2,000 where the Davis-Bacon Act applies, the Contractor must comply with the Copeland "Anti-Kickback" Act (40 USC 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work

Financed in Whole or in Part by Loans or Grants from the United States"), which prohibits the Contractor and subrecipients from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled, and during performance of this Contract the Contractor agrees as follows:

a. **Contractor**. The Contractor shall comply with 18 U.S.C. §874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

b. **Subcontracts**. The Contractor or Subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA or the applicable federal awarding agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

c. **Breach**. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and Subcontractor as provided in 29 C.F.R. § 5.12.

4. Contract Work Hours and Safety Standards Act

If the Contract is **in excess of $100,000** and **involves the employment of mechanics or laborers**, the Contractor must comply with 40 USC 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5), as applicable, and during performance of this Contract the Contractor agrees as follows:

a. **Overtime requirements**. No Contractor or Subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than 1 ½ times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

b. **Violation; liability for unpaid wages; liquidated damages**. In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

c. **Withholding for unpaid wages and liquidated damages**. The State shall upon its own action or upon written request of an authorized representative of the

Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

d. Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

5. Rights to Inventions Made Under a Contract or Agreement

If the Contract is funded by a federal "funding agreement" as defined under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

6. Clean Air Act and the Federal Water Pollution Control Act

If this Contract is **in excess of $150,000,** the Contractor must comply with all applicable standards, orders, and regulations issued under the Clean Air Act (42 USC 7401-7671q) and the Federal Water Pollution Control Act (33 USC 1251-1387), and during performance of this Contract the Contractor agrees as follows:

Clean Air Act

1. The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
2. The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
3. The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

Federal Water Pollution Control Act

1. The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
2. The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
3. The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

7. Debarment and Suspension

A "contract award" (see 2 CFR 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (51 FR 6370; February 21, 1986) and 12689 (54 FR 34131; August 18, 1989), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

a. This Contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the Contractor is required to verify that none of the Contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

b. The Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

c. This certification is a material representation of fact relied upon by the State. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to the State, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

d. The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

8. Byrd Anti-Lobbying Amendment

Contractors who apply or bid for an award of **$100,000 or more** shall file the required certification in *Exhibit 1 – Byrd Anti-Lobbying Certification* below. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any

person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

9. Procurement of Recovered Materials

Under 2 CFR 200.322, Contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

a. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired:

i. Competitively within a timeframe providing for compliance with the contract performance schedule;

ii. Meeting contract performance requirements; or

iii. At a reasonable price.

b. Information about this requirement, along with the list of EPA- designated items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive- procurement-guideline-cpg-program.

c. The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

10. Additional FEMA Contract Provisions.

The following provisions apply to purchases that will be paid for in whole or in part with funds obtained from the Federal Emergency Management Agency (FEMA):

a. Access to Records. The following access to records requirements apply to this contract:

i. The Contractor agrees to provide the State, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

ii. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

iii. The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

In compliance with the Disaster Recovery Act of 2018, the State and the Contractor acknowledge and agree that no language in this contract is intended to prohibit

audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

b. Changes.
See the provisions regarding modifications or change notice in the Contract Terms.

c. DHS Seal Logo and Flags.
The Contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

d. Compliance with Federal Law, Regulations, and Executive Orders.
This is an acknowledgement that FEMA financial assistance will be used to fund all or a portion of the contract. The Contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives.

e. No Obligation by Federal Government.
The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the State, Contractor, or any other party pertaining to any matter resulting from the Contract."

f. Program Fraud and False or Fraudulent Statements or Related Acts
The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract.

EXHIBIT 1
BYRD ANTI-LOBBYING CERTIFICATION

Contractor must complete this certification if the purchase will be paid for in whole or in part with funds obtained from the federal government and the purchase is greater than $100,000.

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

   This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor, enter contractor name here, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

_____

Signature of Contractor's Authorized Official

_____

Name and Title of Contractor's Authorized Official

_____

Date

APPENDIX TO
FEDERAL PROVISIONS ADDENDUM

§ 200.322 Domestic Preferences for Procurements

(a) As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.

(b) For purposes of this section:

(1) “Produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

(2) “Manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

FEDERAL STATE and LOCAL FISCAL RECOVERY FUNDS (SLFRF) PROJECT SPECIFIC REQUIREMENTS

The funding being used for this project is Federal State and Local Fiscal Recovery Funds (SLFRF). As a result, additional provisions apply and are included in this Attachment.

Each primary contracted contractor with the DTMB must register with the Federal System for Award Management (SAM) must register prior to contract execution. The SAM website is https://sam.gov/content/home. The direct hyperlink for SAM.gov registration is https://sam.gov/content/entity-registration

As of April 4, 2022, the Federal government will use a Unique Entity Identifier (UEI) created in SAM.gov as the official subrecipient identifier. All primary contracted contractors with the DTMB will be required to maintain an active registration on SAM.gov. To receive payment, all primary contracted vendors need to have a Unique Entity Identifier (UEI) number and have the UEI entered in their SIGMA account. Information on the UEI and sign up can be obtained at: https://www.gsa.gov/about-us/organization/federal-acquisition-service/office-of-systems-management/integrated-award-environment-iae/iae-systems-information-kit/unique-entity-identifier-update

Contractor is to fill in and provide the following documentation for use in SLFRF reporting prior to Contract Execution for use in the reporting requirements:

Contractor's UEI

_____

Contractor's Full Legal Name

_____

Primary Point-of-Contact Email Address

_____

Business Address

_____

City Business is located

_____

State Business is located

_____

US Zip Code + 4 digits

_____