TETRA TECH

Landfill Monitoring and Maintenance Program

RFP: 25-16

Prepared for:

City of Ann Arbor

301 E. Huron Street

Ann Arbor, MI 48104

Submitted by:

Tetra Tech

1136 Oak Valley Dr.

Suite 100

Ann Arbor, MI 48108

April 8, 2025

Approvals		
Michelle Park Contracts Manager/Authorized Negotiator		4/7/2025
Patti McCall Principal Hydrogeologist		
Alison Rauss Senior Project Scientist		4/7/2025

Prepared by:	Prepared for:
Tetra Tech	City of Ann Arbor
1136 Oak Valley Dr. Ste. 100 Ann Arbor, MI 48108	Public Works Unit 301 E. Huron Street Ann Arbor, MI 48104

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April 8, 2025

City of Ann Arbor
Procurement Unit,
301 E. Huron Street
Ann Arbor, MI 48104

Subject: RFP #25-16, Landfill Monitoring and Maintenance Program

Dear Procurement Unit,

Tetra Tech is pleased to submit this proposal to the City of Ann Arbor (City) to provide professional environmental services for the Landfill Monitoring and Maintenance Program, fiscal year 2026 and 2027 contract, with an option to extend for one or two additional years at the City's discretion.

The Tetra Tech Ann Arbor office is located less than 3 miles from the Ann Arbor Landfill (AALF). The AALF is a closed landfill consisting of two phases (Phase I and Phase II) subject to groundwater and wastewater sampling and landfill gas monitoring. Infrastructure at the AALF includes a methane gas recovery facility, owned by the City of Ann Arbor and operated by Monitoring Control and Compliance, Inc. (MCC), a methane gas recovery system on the northside of the landfill, a leachate collection system, and a hydraulic barrier system comprised of a slurry wall and purge wells. Our proximity to AALF, previous experience on the project and understanding of the systems enable us to respond in a timely manner in the event of an emergency. The Tetra Tech team has developed a strong working partnership with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) personnel assigned to this project.

Groundwater and landfill gas monitoring is required per the Natural Resources and Environmental Protection Act (NREPA), 1994 Public Act 451, as amended, and the rules promulgated under Part 115 and the offsite plume is monitored is accordance with rules promulgated under Part 201. Groundwater sampling is conducted to monitor landfill constituents, specifically volatile organic compounds (VOCs) and 1,4-dioxane that have been detected in the first encountered aquifer (upper aquifer) beneath the site. The groundwater sampling is performed in accordance with the AALF Revised Hydrogeologic Monitoring Plan (HMP), dated December 18, 2015, and the Hydrogeologic Monitoring Plan Amendment, dated June 1, 2018. In addition to NREPA and the rules promulgated under Part 115, landfill gas monitoring is conducted in accordance with the Addendum to the Gas Monitoring Plan revision dated May 1, 2008, and Gas Monitoring Plan Revisions, dated June 4, 2021. Wastewater sampling is completed at the site to demonstrate compliance with wastewater Industrial User Permit No. 20240615 dated June 10, 2024.

We understand that the City's primary objectives are:

- Implement the landfill monitoring and maintenance program to ensure the AALF is compliant with EGLE, NREPA 1994 Public Act 451, as amended, and the rules promulgated under Part 115 and Part 201 in the safest, sustainable, most efficient and cost-effective manner possible.
- Expeditiously address environmental issues that are an emergency or are less predictive in nature.
- Keep local and state officials and the public at large, informed of environmental conditions at the AALF.
- Provide creative solutions to completing remediation of the contaminant plumes offsite.
- Update the Capture Zone Analysis (CZA).

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Our practical approach to meet these objectives has been developed through our years of experience working on this and similar landfill projects. Key elements of our approach are as follows:

- Provide a program manager that has over 23 years of environmental experience and a project manager that has over 15 years of environmental experience, all of which have been spent implementing the landfill monitoring and maintenance program at the AALF in some capacity. Both are Ann Arbor residents, living one and two miles, respectively from the AALF.
- Utilize experienced, college professionals that are Hazardous Waste operations and Emergency Response (HAZWOPER) trained under Occupational Safety and Health Administration (OSHA) field personnel from our office, including many staff that have experience implementing the AALF monitoring and maintenance contract.
- Manage data in a geographic information system (GIS) for ease in reporting and presenting.
- Provide technical expertise in system and monitoring optimization to reduce costs.
- Provide sustainable approaches to problem-solving.

Tetra Tech has reviewed the Request for Proposal for Environmental Consulting Services for the Landfill Monitoring and Maintenance Program, fiscal year 2026 and 2027 with an option to extend for one or two additional years at the City's discretion (March 2025, RFP # 25-16), and the Addendum No. 1 released March 21, 2025. Tetra Tech understands the requirements described by the City of Ann Arbor and the details of our approach are provided in the following sections of this proposal:

A. Professional Qualifications

B. Past Involvement with Similar Projects

C. Proposed Work Plan

D. Fee Proposal (include in a separate sealed envelope clearly marked "Fee Proposal")

E. Authorized Negotiator

F. Attachments

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Appendices

A. PROFESSIONAL QUALIFICATIONS

Our technical excellence and practical landfill experience, combined with our site knowledge and history on the project uniquely qualifies us to continue to implement the AALF Monitoring and Maintenance Program. Information pertaining to our company, personnel, and experience is provided in the following sections.

A.1 Tetra Tech

Based in Pasadena, CA, Tetra Tech is a full-service engineering and science firm with more than 30,000 employees in 550 offices worldwide. We help our clients conceptualize and execute innovative solutions to their most difficult problems. We have seven offices in Michigan including Ann Arbor, Brighton, Detroit, East Lansing, Farmington Hills, Madison Heights, and Portage. Our largest Michigan office is in Ann Arbor with over 140 associates. Tetra Tech is incorporated in the State of California and our Corporate headquarters is at the following address:

3475 East Foothill Boulevard
Pasadena, California 91107-6024 USA 45610
Phone (626) 351-4664
Fax (626) 351-5291

Tetra Tech is licensed to operate in the State of Michigan. Personnel from the Ann Arbor Office will be implementing the monitoring and maintenance program and are located at the following address:

1136 Oak Valley Drive
Suite 100
Ann Arbor, Michigan 48108
Phone (734) 665-6000

A.2 Professional Personnel – AALF Project Team

Tetra Tech believes that the key to meeting the City of Ann Arbor's expectations is to build a project team that can continue to successfully meet the scope, schedule and budget for the project. Our proposed project team consists of experienced personnel from our Ann Arbor office. Our Ann Arbor personnel have extensive landfill monitoring and compliance reporting expertise in addition to remediation and specialized services. We have partnered with two drilling companies and two laboratories to meet the City's needs. An organizational chart and resumes of key staff are in **Attachment I**. Brief descriptions of the qualifications of key personnel and our teaming partners are provided below.

Patti McCall, CPG, PWS is a Principal Hydrogeologist and Professional Wetland Scientist with more than 23 years of environmental experience. Ms. McCall is responsible for implementation and management of the monitoring and maintenance program, creating sustainable problem-solving solutions, providing technical review of all data and reports, corresponding with regulatory agencies, attending meetings, conducting health and safety audits, managing tasks within budget and reviewing invoices for submittal to the City of Ann Arbor. Since the start of her environmental consulting career as a field geologist, she has worked on the AALF. In the eighteen years that she has been the project manager for the landfill and program manager for City of Ann Arbor projects at Tetra Tech, her team has optimized the north side methane collection system, successfully revised the gas monitoring and the hydrogeological monitoring plan to significantly reduce sampling plan requirements, designed and implemented a successful bioremediation pilot test to remediate volatile organic compounds, and designed and implemented a successful in-situ chemical oxidation (ISCO) pilot test to remediate a mixed plume of 1,4-dioxane and VOCs, all within existing budget.

Ms. McCall was integral to a team of engineers and scientists who successfully completed the CZA and the follow-up recommendations that were approved by EGLE and provided significant cost savings to the City. Additional experience includes historical review and completion of a report to document proper closure of Phase I, assistance with and final preparation of the offsite remedial action plan (RAP) including coordination with EGLE, Michigan Department of Transportation (MDOT) and Washtenaw County; completion of the United States Environmental Protection Agency (USEPA) greenhouse gas mandatory reporting requirements, completion of the Industrial User Permit (IUP) renewal application and completion of landfill cap repairs.

Alison Rauss is a Senior Project Scientist with over 15 years of environmental experience. Ms. Rauss has worked on this landfill project since 2007, beginning as a field staff with increasing responsibilities over the contract life. She will continue to serve as the project manager, coordinating the field investigations with staff and quarterly reporting requirements, completing invoice preparation, attending meetings and creating agendas and meeting minutes required for the monitoring and maintenance program. Ms. Rauss is also a GIS Specialist. She will continue to manage the AALF data within GIS and assist with coordinating special projects.

Rachel Fischer, Jenna Herrington, Tommy Maloney, and Camryn Cork will serve as our field team and will perform the groundwater, wastewater and landfill gas monitoring, as well as the supplemental activities relating to the environmental system operation and maintenance (O&M). All personnel are environmental professionals with extensive groundwater sampling experience using a variety of sampling techniques. These individuals will help prepare tables and figures and will assist with quarterly reporting and greenhouse gas reporting requirements. Ms. Fischer, Ms. Herrington and Mr. Maloney are currently working on the AALF project as field personnel, with Ms. Fischer leading the field efforts. Rachel Fischer and **Tyler Dolin** are also GIS Specialists.

Bridget Kiser is a Project Administrator with over 18 years of experience, 13 of which are with Tetra Tech. Ms. Kiser currently serves as the Project Administrator for all City of Ann Arbor projects, including the landfill program. She is responsible for financial report generation, invoice generation, procurement, annual health and safety management for subcontractors, accounts payable processing, report finalizing, and graphical design and power point finalizing for client presentations. Ms. Kiser is proficient and many software applications and will continue to serve as the Project Administrator. **Mike Haynes** is also a Project Administrator, proficient in many software applications. Mr. Haynes assists with printing the hard copy wastewater reports quarterly and provides additional backup support to Ms. Kiser when needed.

Zachary Pinkowski is an Environmental Scientist with two years of experience at Tetra Tech. Mr. Pinkowski will serve as a Waste Specialist on this project, possessing the appropriate waste handling and training for profiling and manifesting waste offsite. Should carbon waste from the north side methane collection system require removal or if an unknown project exists that requires removal to a state licensed facility for disposal, Mr. Pinkowski can assist.

Michelle Gillie, CIH, CPEA will continue to assist with health and safety; reviewing our site-specific AALF Health and Safety Plan annually for updates. She has over 35 of experience in the field of occupational and environmental health and safety; 29 years are with Tetra Tech. Ms. Gillie is board certified in the comprehensive practice of industrial hygiene since 1986. She has served as the health and safety manager or project manager specializing in hazardous waste management, indoor air quality investigations, asbestos and lead-based paint hazard management/abatement, program and plant health and safety compliance audits, accident investigations, general industrial hygiene services and health and safety training.

James Ross, PhD, PE is a Principal Engineer and a groundwater modeler with 22 years of experience. He was the technical lead on the most recent CZA update in 2019 and will be for the 2027 update. Dr. Ross has evaluated numerous contaminant plumes in groundwater/surface water creating conceptual and numerical models and assisting with meeting remediation objectives based on the models. He has also provided peer review of models, litigation support, statistical analysis and provided findings to regulatory agencies and other invested stakeholders.

Anna Rasmuson, PhD, PE, PG is a geological engineer and modeler with over 10 years of experience primarily in remediation, groundwater modeling and contaminant transport, evaluating plume transport, effectiveness of amendment injection strategies and modeling aquifers with pump test data. Dr. Rasmuson is proficient in MODFLOW, MODPATH, Groundwater vistas and numerous other software packages. She will be integral in the completion of the 2027 CZA update.

Patti McCall, CPG, PWS; David Beck, PG; Bryan Allen and Zachary Pinkowski are remediation specialists, having a vast experience in numerous amendments to soil and groundwater primarily in-situ. Ms. McCall has completed numerous large-scale site characterization and remediation project. Remedies include insitu bioremediation, insitu chemical oxidation (ISCO), fuel-targeted amendments, and heavy metal fixation among others. Mr. Beck is a Principal Hydrogeologist, with 23 years of experience in completing large-scale investigations of contaminants and designing and implementing remediation projects using a variety of remedies. These remedies include, but are not limited to ISCO, insitu bioremediation, insitu chemical reduction (ISCR), fixation of heavy metals insitu and soil vapor extraction (SVE) among others. Mr. Allen is a Senior Geologist with ten years of experience who has been instrumental in the design and implementation of ISCR and has assisted previously with special projects at the Ann Arbor landfill and with Gelman sentinel well installation. Mr. Pinkowski has provided implementation of ISCR, ISCO and fuel-targeted amendments. These personnel are added to the organizational chart with their individual titles; and their resumes are included in **Attachment I**.

Jim Walker, PE is civil engineer focusing the last 30 years on landfill design, permitting and construction on over 80 solid waste disposal facilities primarily in the Midwest and Northeast. Mr. Walker completed the AALF cap repairs on Phase I in 2023-2024, designing, implementing and providing construction oversight. Mr. Walker is included here for as a subject matter expert, should his skillset be required during the contract period.

All personnel except for Ms. Gillie, Dr. Ross, Dr. Rasmuson, Mr. Beck and Mr. Walker are in Ann Arbor. Mr. Beck is in Portage, Michigan and Mr. Walker is in Farmington Hills, Michigan. Ms. Gillie is in Pittsburgh, Pennsylvania. Dr. Ross is in Cleveland, Ohio, and Dr. Rasmuson is in Salt Lake City, Utah.

Teaming Partners – Drilling Capabilities

Tetra Tech is teaming with two drilling firms for this project, Stearns Drilling (Stearns) and Terra Probe Environmental, Inc. (Terra Probe).

Stearns is a small, local drilling business, that opened in 1977, providing primarily remediation and water supply drilling. The team has extensive experience at the AALF, having completed extraction well and maintenance injection well installations, well and formation rehabilitation, pump testing, pump maintenance and rebuilding, maintenance repairs and sludge removal in the leachate collection manholes. The current purge wells were installed by Stearns. They maintain extra pumps at their shop in Dutton, Michigan for the AALF. During each rehabilitation event, the current pump in use is removed, and a cleaned and tested pump from the shop is installed for optimal performance. The pump that was removed is cleaned, repaired if necessary, and tested and compared to pump curves for future use. Stearns personnel have a long history on the AALF and Patrick McClelland specifically has completed rehabilitation on the purge wells since 1994. Tetra Tech will continue to partner with Stearns for their maintenance capabilities on the extraction wells and leachate collection manholes; their institutional knowledge of the AALF's hydraulic system; the team's dedication to safety; their superior capabilities and problem-solving skills; and their ability to create cost savings opportunities for the City of Ann Arbor. A statement of qualifications for Stearns is included in **Attachment I**.

Terra Probe is an environmental drilling company located in Ottawa Lake, Michigan that has been providing drilling services for 31 years. Terra Probe specializes in hydraulic probing services and provides competitive mobilization costs and daily rates. If additional well installations or site characterization investigations are required, Terra Probe can complete the work. Terra Probe has completed well installation and soil borings at the AALF in support of remediation product pilot tests. Specifically, Terra Probe was contracted for completing the soil borings during the ISCO pilot test

completed in December 2015 and for geotechnical borings completed for closure of Phase I of the landfill. In addition to their drilling services, Terra Probe provides added safety with ground penetrating radar (GPR) capabilities for clearing soil boring locations. Terra Probe will be responsible for contacting MISSDIG prior to any drilling with the City of Ann Arbor. A statement of qualifications for Terra Probe is included in **Attachment I**.

Teaming Partners – Laboratories

Tetra Tech will continue to partner with the City of Ann Arbor Water Treatment Plant (WTP) laboratory for the wastewater analyses they are capable of analyzing within the facility, quarterly. This provides a cost saving on the landfill budget.

Analysis of 1,4-dioxane was competitively bid with three laboratories. Specifically, USEPA Method 522, which provides for a much lower detection limit, was requested of each laboratory. Of the three laboratories, two could complete the analysis. The remaining groundwater and wastewater parameters identified in the HMP and IUP were competitively bid with three laboratories. Tetra Tech will partner with Eurofins for the analyses the WTP will not complete. Eurofins has a service center in Farmington Hills, Michigan. They provide bottle order drop-off and sample pick-up for distribution to the appropriate laboratory. Tetra Tech has partnered with Eurofins and its predecessor companies for decades and has been able to obtain competitive pricing.

A.3 History and Qualifications of Tetra Tech

Tetra Tech was founded as a civil engineering firm by four graduates of the California Institute of Technology and has been based in Pasadena, California since 1966. Tetra Tech's select group of technical experts provided engineering services for waterways, harbors, and coastal areas. During these first decades, Tetra Tech completed projects that had global significance, from a groundbreaking tsunami wave study for the Atomic Energy Commission to master planning and designing coastal protection measures for Egypt's Nile River Delta.

During the 1980s, Tetra Tech met the expanding need for environmental remediation, which involved groundwater modeling, landfill closures, and restoring contaminated military and manufacturing facilities and sites. The firm completed highly visible projects on behalf of the Department of Defense, the Environmental Protection Agency, and other federal agencies, all of which launched the company to its place among the leading environmental and engineering firms in the United States.

In December 1991, Tetra Tech became a publicly traded enterprise. Since its initial public offering, the company has grown substantially, expanding its markets, services, and clientele through internal growth and international acquisitions. Today, Tetra Tech is a global leader in providing engineering and technical services. The company is acknowledged for its cutting-edge expertise in sophisticated environmental analysis, modeling, design, and for delivering this expertise effectively across an entire project life cycle.

GeoTrans, Inc. (now a Tetra Tech company), started an Ann Arbor office in 1999. GeoTrans was founded in 1979 and became part of Tetra Tech in 1988 as an acquisition. Over the years, GeoTrans has provided environmental and engineering services at some of the most complex sites across the United States including Love Canal, Savannah River, Nevada Test Site, Rocky Mountain Arsenal and several Department of Justice environmental trusts including the Nevada Environmental Response Trust. GeoTrans adopted the Tetra Tech name in 2013.

Our Ann Arbor office has a full-service environmental consulting group. Our projects include site investigations and characterization, hydrogeologic evaluations for water supply and wastewater discharges, soil and groundwater remediation design and implementation, landfill monitoring, property transaction support (Phase I and Phase II Environmental Site Assessments), wetland delineations and permitting, ecological services, waste management, demolition and construction oversight, and hazardous building materials assessment as described in the Project Descriptions in **Attachment II**.

The Ann Arbor Office has provided a wide range of environmental services to the City of Ann Arbor since 2007 when Tetra Tech was hired for the Ann Arbor Landfill Monitoring and Maintenance Program. Our technical excellence and practical landfill experience uniquely qualifies us to continue implementing the Ann Arbor Landfill Monitoring and Maintenance Program. Below is additional information on various services that Tetra Tech can provide.

Landfill Services

We have extensive experience in all phases of solid and liquid hazardous-waste programs including but not limited to design and implementation of field investigations; data analysis; development and application of groundwater flow and contaminant transport models; geosynthetic and clay landfill cap design and installation; leachate and gas extraction system design, installation and O&M; National Pollutant Discharge Elimination System (NPDES) permitting, monitoring and reporting; gas, leachate, and groundwater monitoring and reporting; evaluation of remedial alternatives; remediation system design, construction and O&M; and litigation support. Our extensive landfill experience has been summarized in a matrix included with project descriptions in **Attachment II.**

In addition to these capabilities, Tetra Tech staff in the Farmington Hills office, provides additional specialty services to the solid waste industry. These specialty services include gas collection and control systems (GCCS), leachate management, stormwater management and landfill engineering and design.

Broader Environmental Capabilities

Tetra Tech offers a full range of professional services related to environmental compliance, groundwater contaminant characterization, and remediation. Examples of our broader environmental capabilities are included below.

Capture Zone Evaluation

Tetra Tech is the author of USEPA guidance document EPA 600/R-08/003 *A Systematic Approach for Evaluation of Capture Zones and Pump and Treat Systems* published in 2008. In addition to writing this document, Tetra Tech has performed five case studies that are featured in the document and provided preliminary capture zone training sessions to all ten USEPA Regions and three State Agencies. Tetra Tech implemented this approach at the landfill in 2008 and successfully demonstrated to Michigan Department of Environmental Quality (the predecessor agency to EGLE), that capture is being maintained at the landfill boundary and one extraction well (PW-2R-01) was not necessary for containing the plumes. This resulted in an annual cost savings to the city.

Since the last update in 2019, PW-2R-22 was installed with a new acid injection well and the capacity of PW-3R-12 has reduced due to the formation. In addition, four monitoring wells were installed for 1,4-dioxane compliance. Our modeling team participated in the previous update and the model can easily be updated with these new inputs.

Groundwater Modeling

Tetra Tech has one of the largest, most experienced team of expert groundwater modelers in the country. Our staff has performed groundwater modeling services in many complex hydrogeologic situations, including the City of Ann Arbor's downgradient landfill plume, Department of Energy's (DOE) Nevada Test Site, Savannah River Site, and Love Canal. We have conducted numerous groundwater modeling projects to help delineate the nature/extent of contamination at hazardous waste sites and analyze the effectiveness of remedial actions. Our modeling results have been accepted by regulators and in judicial proceedings.

Site Characterization

Tetra Tech has the capability to conduct all aspects of a site characterization field program. This includes:

- Monitor well system design/installation
- Soil and groundwater sampling programs
- Aquifer testing and analysis

- Remedial pumping programs
- Field mapping
- Geophysical investigations

In addition, our staff members are trained to evaluate such design details as the best drilling methods, well materials selection, drilling protocols and procedures, well development, equipment cleaning and decontamination, health and safety issues, waste management, and quality assurance and quality control. Tetra Tech can fully staff field investigation programs with OSHA-certified personnel experienced with hazardous waste site investigation procedures and protocol from the Ann Arbor office.

Hazardous Waste Experience

Tetra Tech has extensive experience in all phases of field investigation for Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), often referred to as Superfund. This includes data collection, validation, and management and using tools that range from drilling and sampling to sophisticated computer modeling. Our goal is to help the client sort through the often conflicting priorities of cleaning up a hazardous waste site. Because of our experience, we know the measures necessary to meet cleanup goals and minimize costs. Our field investigations, provide information to help predict and control remediation costs. Several personnel in the Ann Arbor office are trained in the federal and state hazardous waste rules, including 49 CFR 172. 704 DOT Transportation of Hazardous Materials and 40 CFR 262. 34(a)(4) and (d), 40 CFR 264. 16 & 40 and CFR 265. 16 RCRA.

Tetra Tech has completed hundreds of ecological and human health risk assessment projects throughout the United States. We have used risk management techniques to minimize investigations and focus remedial alternatives development. We have also performed baseline risk assessments as part of RCRA and Superfund site characterization activities.

Our practical experience with investigating and remediating hazardous waste contamination is best demonstrated by manuals we have prepared for the EPA including the sampling below:

- *Elements for Effective Management of Operating Pump and Treat Systems (EPA 542-R-02-009), October 2002*
- *Cost-Effective Design of Pump and Treat Systems (EPA 542-R-05-09), April 2005*
- *Effective Contracting Approaches for Operating Pump and Treat Systems (EPA 542-R-05-009), April 2005*
- *O&M Report Template for Ground Water Remedies (With Emphasis on Pump-and-Treat Systems) (EPA 542-R-05-010), April 2005*
- *Synthesis Report on Five Dense, Nonaqueous Phase Liquid (DNAPL) Remediation Technologies (EPA 600-R-07-066), May 2007*
- *Options for Discharging Treated Water from Pump and Treat Systems (EPA 542-R-07-006), May 2007*
- *A Cost Comparison Framework for Use in Optimizing Groundwater Pump and Treat Systems (EPA 542-R-07-005), May 2007*
- *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (EPA 600-R-08-003), January 2008*
- *Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012*

Soil Remediation

Tetra Tech has a wide range of experience with design and implementation of soil vapor and dual vapor extraction systems across the country. Because of our expertise, we were selected by the USEPA to compile information and compose an overview report on the use of multi-phase extraction (MPE) technology for site remediation; this document is titled "*Multi-Phase Extraction: State-of-the-Practice*."

Tetra Tech is a leader in the design, installation, and operation of dual phase and soil vapor extraction (DP/SVE) systems. Our broad breadth of knowledge with a variety of DP/SVE systems allows us to select the right equipment for the job and to effectively troubleshoot, operate, and maintain existing systems.

Other innovative soil treatment technologies that Tetra Tech provides include:

- Bioventing
- Chemical Oxidation including Potassium Permanganate
- Thermal Treatment, including six phase heating
- Metals Fixation
- Soil Mixing for stabilization
- Electric resistive heating

Engineered Bioremediation, In-situ Chemical Oxidation or Reduction (ISCO/ISCR) Design and Implementation Experience

Tetra Tech has a wide range of experience with design and implementation of bioremediation systems across the country. There has been a significant increase in the use and application of bioremediation technology as USEPA and other regulatory agencies have come to recognize the limitations of conventional remediation technologies. The growing interest in innovative technologies has afforded us the opportunity to test and implement biological remediation techniques at numerous sites. Bioremediation technologies that we have employed and/or evaluated include aerobic and anaerobic biostimulation and bioaugmentation, methanotrophic co-metabolism, dual density convection wells, and phytoremediation. The Ann Arbor office has been extensively involved with anaerobic bioremediation of chlorinated solvents through our involvement in historic projects, including the MDEQ (now EGLE) Bachman Road Innovative Demonstration Project with the University of Michigan from 1996 through 2001 and the Visteon Connersville Full-Scale Biobarrier Remediation Program from 2002 to the present. Several other projects have been completed for confidential clients, CN Railway and the City of Ann Arbor in the last decade. Today, bioremediation options are regularly planned and implemented by the Ann Arbor office.

Several large scale ISCO or ISCR projects have also been designed and implemented from the Ann Arbor office. Contaminants of concern have ranged from heavy metals, including hexavalent chromium, nickel and lead; nonaqueous phase liquids (NAPL), volatile organic compounds to a mixed plume of 1,4-dioxane and vinyl chloride at the AALF.

Ecological Services

Tetra Tech has extensive experience in ecological services including wetland delineations, permitting, mitigation and mitigation monitoring as well as a wide range of ecological risk assessment capability. Our wetland experience has included diverse projects such as property transfers, renewable and traditional energy generation and distribution, and commercial, residential and industrial development as well as wetland construction for wastewater treatment, post-remediation and enforcement.

A team from the Tetra Tech office completed an alternative analysis and new construction building envelope to produce the least amount of wetland disturbance at a nuclear facility, in conjunction with the logistical, economic, environmental and project goals. A joint permit application was submitted and approved by both the MDEQ (in 2012) and the USACE (in 2016). Since the initial approval, the MDEQ/EGLE water resources permit has been applied for and approved twice by Tetra Tech. A new delineation, mitigation plan and joint permit application will begin in the summer of 2025 to maintain the nuclear facility's combined operating license. The USACE agreed to permit the project for 40 years rather than continual reapplications.

The Ann Arbor office received approval of a Baseline Ecological Risk Assessment (BERA) for an area facility by the State of Michigan and the USEPA Region V. This project represents one of only a small number of approved BERA's in Michigan.

In the fall of 2016, the Ann Arbor office completed two large scale remediation projects in wetlands. These required delineation, permitting, restoration and coordination with the various departments within MDEQ/EGLE. The Ann Arbor team was able to design and implement a plan to remove the hazardous material, restore and enhance the previously existing wetland function, enrich the wetland with higher quality species, create additional acreage and habitat while removing invasive species. One of the projects significantly increased the floodplain acreage along the Grand River, a vital aspect of the river system with increasing flooding due to climate change.

Over the last decade, the ecological resource team in Ann Arbor has grown significantly with Ms. McCall's leadership and has included largely renewable energy projects including wind, solar, geothermal, carbon sequestration and traditional energy grid system upgrades to substations, pipelines to residential homeowners and the utility scale plants. Tetra Tech was the owner's engineer for the demolition of three DTE coal-fired power plants and each required wetland delineations, ecological evaluations for threatened and endangered species and permitting for the demolition.

Green and Sustainable Remediation

Green and Sustainable Remediation (GSR) is the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of a cleanup. GSR evaluations typically seek to quantify specific metrics associated with the remedy such as energy use, greenhouse gas emissions, priority pollutant emissions, materials use, water consumption, waste generation, and others. Tetra Tech has developed, tested, and applied tools for quantifying these footprints, and has also developed frameworks for organizations to apply GSR at their sites. This has included:

- Spreadsheets for Environmental Footprint Analysis (SEFA) for USEPA – Tetra Tech developed SEFA for EPA in 2011 and made major improvements to the software in 2014 and 2019. SEFA can be used to calculate the environmental footprint of a remediation project using input based on energy, material, transportation, equipment, and water uses. This tool has been used by Tetra Tech and EPA at dozens of remediation sites around the country.
- GSR Framework Development for Army Sites – Under contract to the Army Corps of Engineers, Tetra Tech developed a framework for performing GSR evaluations at Army sites (qualitative and quantitative) and conducted 10 pilot GSR evaluations at Army sites in accordance with that framework. Quantitative aspects were performed using the SiteWise tool. Tetra Tech was contracted to further refine this methodology.
- Benchmarking of GSR Tools – Tetra Tech led a team project, funded by the Department of Defense Environmental Security Technology Certification Program (ESTCP) to benchmark specific tools for GSR (SiteWise and Sustainable Remediation Tool [SRT]) against Life-Cycle Analysis software (SimaPro). This project included six GSR case studies.
- Implementation and Pilot Testing of ASTM Standard Guide for Greener Cleanups – Under contract to USEPA, Tetra Tech pilot tested a newly develop ASTM Standard Guide for Greener Cleanups. The ASTM standard provides an approach for quantifying the environmental footprint of a remedy and prioritizing best management practices (BMPs) to reduce environmental impacts of that remedy. Tetra Tech demonstrated the application of the ASTM standard for remediation activities at the North Ridge Estates Asbestos Containing Material Site in Southern Oregon (BMPs only) and at the St. Maries Creosote Site in Northern Idaho (BMPs and quantitative footprint analysis).
- GSR Training - Tetra Tech conducted GSR training for the US Navy's Remediation Innovative Technology Seminar (RITS) series as well as to multiple Fortune-100 companies.

Tetra Tech has the staff, expertise, and resources to perform GSR evaluations and incorporate GSR principles as part of site remediation.

Property Transfer

Tetra Tech has extensive experience performing Phase I, II and III Environmental Site Assessments (ESAs) and Baseline Environmental Assessments (BEAs) for a variety of clients. Over the years, Tetra Tech staff has performed thousands of Phase I ESAs for private developers, lending institutions, school districts, municipalities, renewable energy developers,

telecommunications firms and industrial facilities. Phase Is are performed using the ASTM Standard (E1527-21) to assess whether a property may be impacted by hazardous materials as a result of historical or on-going site activities, or as a result of a hazardous materials release off-site that has migrated to the property. Tetra Tech often performs Phase I, Phase II ESAs, and BEAs working under accelerated property acquisition schedules.

Litigation Support

Tetra Tech's staff has the experience and credentials to present thorough scientific analysis of environmental data and provide expert testimony based on valid technical opinions. This includes all necessary services from depositions to the preparation of courtroom exhibits. We also have extensive experience with settlement negotiations. Staff members are knowledgeable about regulations and are experienced in interacting with government and legal personnel. In this way, we bridge the gap between complex scientific information and regulatory questions. Support services provided by our personnel include:

- Expert-witness testimony
- Technical analysis of data
- Consultation regarding technical analysis of other experts
- Preparation of cross examination/deposition of witnesses
- Development of graphic exhibits

Tetra Tech was retained by counsel for the City of Ann Arbor to examine the site-specific hydrogeology, observed distribution of 1,4-dioxane in groundwater, and existing computer models of the study area. The objective of this analysis was to determine whether a groundwater remediation system at a site would reduce observed groundwater impacts in a downgradient water supply well. Results of additional computer simulations by Tetra Tech indicated that 1,4-dioxane concentrations in the water supply well may not significantly decrease. Over the years, the City of Ann Arbor legal counsel have retained Tetra Tech to evaluate aspects of the 1,4-dioxane plume while in negotiation with Gelman.

Health and Safety Plans

Our employees are the foundation of Tetra Tech and priority is given to their protection at all offices and work sites. To ensure this protection, the company's health and safety (HAS) requirements are a vital and integral part of our work. Our company President has made HAS performance a core value and has authorized the company HAS director to lead the program development and implementation with 100% support for resources. The corporate HAS director provides weekly HAS updates on program or project issues, safety bulletins, performance statistics, and delegates local HAS duties to an office coordinator. All field employees receive HAZWOPER training (initial 40-hour, supervisory, and 8-hour annual refreshers) and participate in a medical surveillance program. Our key program elements include:

- Written OSHA Programs
- Health and Safety Audits
- Employee Training Programs
- Site Specific Health and Safety Plans
- Project Hazard Analyses/Job Safety Analysis
- Medical Surveillance
- Respiratory Protection / Personal Protective Equipment
- Incident Reporting and Investigation
- Incident Intervention and Medical Case Management
- Behavior Based Safety
- Air Monitoring Program
- Vehicle Safety Program

In addition, the Ann Arbor personnel are trained every two years in cardiopulmonary resuscitation and first aid. A copy of the prepared AALF HASP is available and will be provided if requested by the City. In addition, our Vehicle Accident Record from the last five years is also available at the City's request.

B. PAST INVOLVEMENT WITH SIMILAR PROJECTS

Tetra Tech's AALF proposed project team has specific experience and proven ability in implementing the AALF and other similar projects to client and regulator satisfaction, and within project budgets.

B.1 Specific Project Experience

Our proposed project team has specific project experience on the AALF Monitoring and Maintenance Program. Many of the proposed project team members have multiple years working on the AALF project at Tetra Tech and previous employment. A summary of select ongoing landfill experience in the Ann Arbor Office includes:

- Livingston County Landfill
- City of Petoskey Landfill
- City of Ann Arbor Landfill

Our Farmington Hills Office has extensive experience in landfill design, implementation and construction oversight as well as environmental monitoring and methane recovery systems. This is provided in the Summary of Landfill Experience provided in **Attachment II**.

B.2 Client References

Below are client references for projects that highlight Tetra Tech's landfill, remediation and site investigation capabilities for local units of government and commercial clients. Each reference is a current client, and a project description is included in **Attachment II**. Initial award dates represent the length of time Tetra Tech has worked with each client.

Firm/Agency Name:	Livingston County Drain Commissioner's Office
Address:	2300 E. Grand River Ave., Howell, MI 48843
Contact Person / Number:	Rob Spaulding / 517-546-0040
Project Title:	Livingston County Landfill Groundwater and Methane Monitoring
Initial Award Date:	2000 - ongoing

Firm/Agency Name:	City of Petoskey
Address:	101 East Lake Street, Petoskey, MI 49770
Contact Person / Number:	Martin J. Flynn, Water/Wastewater Supervisor 231-347-2500 ext. 1219
Project Title:	Petoskey Landfill
Initial Award Date	1986 - ongoing

Firm/Agency Name:	City of Saline
Address:	247 Monroe Street, Saline, MI 48176
Contact Person / Number:	Colleen O'Toole, Former City Manager / 312-753-8664

Firm/Agency Name:	City of Saline
Project Title:	Saline WWTP Improvements / Lagoon Closure
Initial Award Date	2020 - ongoing

Firm/Agency Name:	National Grid Renewables
Address:	1385 Crimson Lane, Yorkville, IL 60560
Contact Person / Number:	Amber Miller, Director, Permitting / 331-215-3406
Project Title:	Jackson County Solar – Environmental Services
Initial Award Date	2020 - ongoing

C. PROPOSED WORK PLAN

Tetra Tech has prepared a detailed work plan, required to accomplish the project objectives listed in Section II of the RFP. We have chosen several subcontractors to partner with to accomplish these objectives, including Stearns, Terra Probe, and Eurofins. Each firm is discussed in Section A.2 of this proposal. The following sections describe how Tetra Tech will accomplish the project objectives.

C.1 Work Plan

The work plan will be completed in accordance with the following:

- AALF Revised HMP dated December 18, 2015, and Hydrogeologic Monitoring Plan Amendment, dated June 1, 2018;
- AALF Addendum to Gas Plan Monitoring Revisions dated May 1, 2008, and Gas Monitoring Plan Revisions, dated June 4, 2021;
- NREPA, 1994 PA 451 as amended, and the rules promulgated under Part 115, specifically R 299.4433, which specifies Type II landfill explosive gas control and monitoring requirements;
- Part 201 of NREPA for the offsite contamination; and
- IUP 20240615 dated June 10, 2024.

Schedule and Scope of Work – Routine Monitoring and Maintenance

A schedule to complete the work plan has been provided as **Attachment III.** This schedule includes the tasks and their frequencies. Milestones are included for field tasks, reporting deadlines, deliverables, permit renewals and potential meetings, as well as other events that may require City of Ann Arbor personnel. Tetra Tech will continue to utilize staff that have been working on the AALF project already and who will not require a transition period to complete the routine monitoring and maintenance tasks. Tetra Tech dedicates staff to the project and when possible, introduce additional staff members to gain knowledge of the project and diversity their skill set. We maintain a field lead who is responsible for successfully completing the scope of work. A calendar of field, and reporting events for the routine monitoring and maintenance tasks is also included in **Attachment IV** along with the Scope of Work (SOW) tables. The SOW tables include the following information for each field task:

- Description and Work Objective Summary
- Method and Sequence Summary
- Sampling and Analysis
- Investigative Derived Waste Management and other Comments

Deliverables

The following deliverables will be produced within the required regulatory timeframe. Those documents without a regulatory requirement (meeting minutes, CZA Update, etc.) will be submitted as requested by the City.

- **Semi-Annual Groundwater Monitoring Reports (Task 1.5)**
  - Groundwater contour elevation flow maps
  - Isoconcentration maps
  - Analytical data summary tables
  - Hydraulic gradient across slurry wall evaluation
  - Submit to City and EGLE
- **Update of CZA (Task 1.7)**
  - Submit to City and evaluate the need for submittal to EGLE if changes to monitoring are recommended
- **Quarterly Landfill Gas Monitoring Reports (Task 2.2)**
  - Field data sheets
  - Summary of current and previous gas monitoring data
  - Submit to City and EGLE
- **Annual Michigan Air Emissions Reporting System (MAERS) Reports (Task 2.5)**
  - Task will be completed if required
- **Report Greenhouse Gas Emissions (GHG) Annually to USEPA (Task 2.6)**
  - Report electronically to USEPA site annually by ~April 1 (changes annually)
- **Quarterly Wastewater Monitoring Report (Task 3.4)**
  - Field data sheets/monthly discharge readings
  - Summary of current and previous wastewater monitoring data
  - Submit to City and EGLE
- **Renewal of Industrial User Permit in 2029 (Task 3.5)**
  - Prepare annual inspection, typically completed in November
  - Prepare and coordinate renewal of permit, due by December 2028
  - Submit to City
- **Annual Environmental System Maintenance Report (Task 4.3)**
  - Provide a summary of system maintenance annually to City
- **Landfill Health and Safety Plan (HASP) and Annual Updates to HASP (Task 5.2)**
  - Continue to update the HASP data with each quarterly event
  - Update document annually
- **Website (landfill SharePoint site) Deliverables (Task 5.4)**
  - Annual, quarterly and monthly reports
  - Meeting agendas and minutes
  - Regulatory correspondences
  - Project work plans
  - CZA Update when completed in fiscal year 2027
  - Submit GIS layers of landfill assets as requested
- **Meeting Documents (Tasks 1.6, 2.3, and 5.4)**
  - Agendas/meeting minutes
  - Graphical representations of analytical data

Non-Routine Task – CZA

In a continuing effort to improve the existing groundwater capture system, the previous groundwater model and 2019 update of the CZA will be evaluated/updated following increasing detections of 1,4-dioxane north of the landfill. The primary objectives are: 1) to determine if the previous groundwater model and update adequately represents site conditions with information obtained since the previous model calibration; 2) update the groundwater flow model and

associated CZA with new information; 3) identify if the current capture of the hydrologic system is capable of capturing the offsite increased 1,4-dioxane concentrations; 4) determine if the current hydrologic system is adequate to maintain full capture at the landfill boundary or if changes to pumping rates are recommended; and 5) provide recommendations based on the modeling. The evaluation will consider new information obtained since the previous CZA, such as:

- Lithology from one new extraction well (PW-2R-22) installed in 2022 that replaced the previous existing extraction wells (PW-2R-01).
- Lithology from four new monitoring wells from the 1,4-dioxane investigation (W-105-20, W-106-20, W-107-20, and W-108-20).
- Recent extraction rates for the extraction system and resulting water levels and/or drawdown that have been observed.
- Updated 1,4-dioxane and other contaminant data (i.e., contaminant distribution).

Adjustments will be made to model input values for re-calibration to incorporate the new information. Then, the updated model will be applied to simulate the capture zone for the current extraction system (using recent extraction rates) and for additional scenarios to be developed in conjunction with City of Ann Arbor. The updates to model calibration and the CZA will be documented in a technical memorandum. Updating the CZA will help inform City personnel on whether changes to the pumping regime are necessary to comply with Part 201 drinking water criteria for 1,4-dioxane.

C.2 City Staff Involvement

City staff involvement is necessary during key elements of the landfill monitoring and maintenance program. These include the following and City personnel are identified below:

- City of Ann Arbor WTP will receive and analyze select parameters, provide a report and provide sample bottles (4 times/year).
- Public Works Manager will review and certify four quarterly and one annual wastewater report (4 times/year).
- Annual onsite inspection by Wastewater Treatment Plant personnel in accordance with the IUP (4 hours/year).
- Regular meetings with the Solid Waste Manager and Environmental Services Manager to discuss the monitoring and maintenance program (virtual meetings for up to 1 hour/month).
- Maintenance assistance from Water Utilities personnel requirements due to meter issues (occurs periodically – approximately 2 incidents each year).
- Maintenance assistance from Field Operations on the Northside methane collection system; tasks include mowing, painting the fence (up to 8 hours a year), coordinated through the Environmental Services Manager
- Occasional assistance from field operations with moving soils or equipment, cutting trees, controlling poison ivy or mowing (up to 6 hours a year).
- Occasional meetings with EGLE, Solid Waste Manager and Environmental Services Manager for RAP or 1,4-dioxane investigation (8 hours/year).
- Occasional assistance from City of Ann Arbor Surveyor to re-survey wells that were cut due to heaving in the landfill (up to 8 hours a year).

City of Ann Arbor Team			
Alison Heatley	Solid Waste Manager	aheatley@a2gov.org	734-794-6350 ext. 43111
Erin Donnelly	Environmental Services Manager	edonnelly@a2gov.org	734-794-6000 ext. 43119
Paul Matthews	Public Works Manager	pmatthews@a2gov.org	734-794-6350 ext. 43386
LJ Melrose	Environmental Laboratory Supervisor	lmelrose@a2gov.org	734-794-6426

C.3 Additional Information

This section provides further details on key components of the monitoring and maintenance program, including well rehabilitation, carbon removal and regeneration that ensure the continued operation and success of contaminant removal. Tetra Tech's continued support with environmental issues within the City is also included.

Well Rehabilitation

The purge wells require rehabilitation of the extraction well and the surrounding formation to ensure that the pump continues to operate optimally ensuring the greatest recovery of groundwater possible for contaminant removal. The iron rich soils in the area produce an iron bacteria that can block the well screen and formation over time. In 2001, three wells were installed around each of the purge wells to facilitate the rehabilitation of each extraction well and formation. Since PW-3R-01 was replaced with PW-3R-12, it has required increased rehabilitation. Tetra Tech has developed a maintenance schedule to ensure the well screens and formations are functioning optimally. Both PW-1R-12 and PW-2R-22 are rehabilitated every other year, while PW-3R-12 requires rehabilitation every eight months.

To maintain specific capacity of the well, Tetra Tech began completing monthly procedures to reduce the iron bacteria buildup. Monthly muriatic acid has been added to each acid injection well surrounding the extraction well. Two gallons are added to each acid injection well surrounding PW-3R-12. One gallon is added to each acid injection well surrounding PW-1R-12 and PW-2R-22. The addition of the acid monthly has been beneficial in reducing more frequent rehabilitation and allowing recovery of the groundwater at optimal discharge rates for PW-1R-12 and PW-2R-22.

The CZA update will provide insight into whether the current target pumping rates are optimal and if a change in pumping rate is necessary or possible in any of the extraction wells.

Carbon Regeneration

Tetra Tech installed a program to ensure the carbon at the NSMCS is capturing contaminants but at a concentration that remains nonhazardous. In 2015, it was discovered that the carbon is remediating contaminants from the landfill in addition to the methane. Prior to the NSMCS becoming idle, monthly air measurements were recorded from the stack and quarterly, carbon samples were collected to determine if the carbon has become saturated. When regenerated carbon was added to the vessels last, the system was reconfigured to have the air flow only through one vessel, allowing Tetra Tech to switch to the second vessel when the first one became spent. Only one vessel was used before the system was idled. The second vessel still contains clean carbon. It is likely that the system can be decommissioned. The used vessel will require that the carbon is sent to a regeneration facility to be reused. The second vessel of carbon may have a use at another facility or sent to the regeneration facility. Decommissioning can be evaluated.

Sustainability and Environmental Commitment

Tetra Tech has a strong culture of sustainability and environmental commitment, and addressing the impacts of climate change is vital for our clients. We use science and engineering to develop innovative, sustainable solutions that support our clients in developing safe and resilient water supplies, net zero energy programs and biodiversity protection. We have a 1 Billion People Challenge, to improve the lives and livelihoods of 1 billion people by 2030 using the following metrics:

- Gallons of water treated, saved or reused
- Megawatts of renewable energy generated or transmitted
- Hectares of land and water ecosystems protected, managed or restored
- Metric tons of carbon dioxide equivalents avoided or captured
- Lives benefited from social and governance programs.

The most recent Tetra Tech Sustainability Report, produced on April 22, 2024, identified 625 million people's lives improved. Annually, we produce the publicly available Sustainability Report, and we engage our partners and supply

chain in our sustainability efforts. This includes building diversity in our supplier network. We engage with and mentor small businesses, especially those from historically marginalized communities through our *Small Business and Partnership Council*. We also expect our supply chain partners to operate to the highest ethical, social and environmentally responsible standards that are documented in our *Vendor Code of Conflict*.

Continued support

Under the landfill contract, Tetra Tech has assisted with the (RAP). This has included completing the document, presenting the RAP to the Remedial Action Team (RAT) who decides approval; coordinating and meeting with numerous EGLE staff assigned to the project; obtaining letters of intent to sign restrictive deed covenants from area residents and providing guidance to the City. In addition, remediation pilot tests have allowed for the potential to reduce the contaminant footprint. To complete these pilot tests, Tetra Tech has presented information to the Environmental Commission and the Park Advisory Committee and prepared information for area residents. Because there has not been an agreed upon solution to the restrictive deed covenant issue between EGLE, Washtenaw County and City of Ann Arbor, the RAP has not been approved. All potential residential parcels that would need to have their drinking water restricted, require a deed restriction on the property. This is not a realistic path forward due to the large number of parcels and the likely pushback from property owners. EGLE has adopted the RAP measures without the deed restriction resolved, because they understand the issue is untenable. If EGLE identifies a resolution, Tetra Tech can update the RAP with the latest data and resubmit the document.

Tetra Tech has provided support for additional projects within the City when called upon. This has included soil and groundwater sampling during road infrastructure projects; assisting with waste profiling and manifesting; assisting with soil segregation during infrastructure projects; completing sampling for USTs and removing them; completing Phase I and Phase II Environmental Site Assessments, Documentation of Due Care Compliance, hazardous building material surveys and geotechnical projects. We look forward to maintaining this level of assistance and professionalism with the next contract.

C.4 Cost Savings

Tetra Tech understands the requirements of the landfill and the importance of City personnel's time and their budget constraints. Further, we have an excellent working relationship with City personnel, EGLE and our teaming partners. Our long history on the project allows for a seamless transition to a new contract saving time and money for the City. Our knowledge of the landfill monitoring and maintenance tasks reduces our time on reporting requirements and City staff time on issues. Ms. McCall remains the primary point of contact; however, Ms. Rauss can also be contacted for assistance. Both have a long history on the landfill and working on numerous projects with the City of Ann Arbor and can be responsive to site issues given the office proximity to the landfill.

We strive to provide the best consulting we can in the most cost-effective manner. The time and materials nature of this contract and Tetra Tech's ability over the past several years to execute the scope of work efficiently, has resulted in surplus budget in several of the tasks. We have provided added benefit to the City by completing tasks under budget, optimizing existing programs and leveraging Tetra Tech's contracting terms to provide the lowest prices with our laboratories. This has allowed us to complete other tasks at the City's request. A summary of those cost savings is provided below:

- In the latest contract, Tetra Tech was able to use existing budget for the north side methane collection system to change the scope of the work. When the system was turned off, staff completed weekly site checks and gas sampling to determine if methane was migrating offsite. There has been no evidence of methane migrating the and the system remains off.
- The residential co-op methane monitoring previously completed every spring, was also discontinued in 2020. Since 1997, coordination with both cooperative housing units for five residences was completed every year. Tetra Tech staff, City personnel and cooperative maintenance personnel would enter the home to complete gas

monitoring in the basement. There had never been a detection of methane. While the actual effort for the sampling was not significant, coordinating all the homeowners and personnel was significant. This saves both money and City personnel time.

- Cost savings realized at the end of the fiscal year 2021 allowed Tetra Tech to hire a contractor that hauled gravel in and graded the road between the two Phases of the landfill, reducing water on the road and potholes.
- Coordination with City personnel on other city projects has identified clay that would otherwise be hauled off for other uses. Instead, existing budget has allowed Tetra Tech to complete permeability testing on the clay to determine if it could be used as cap for landfill repairs. Purchase of clay at similar permeability is expensive. Coordination with parties on the other project under the existing project allowed for clay to be stockpiled on the site. A separate project was written by the city in late 2022 for a landfill cap reshaping in late 2023 – 2024 that prevented an eventual leachate outbreak due to settling.
- Upgrades to the landfill gas to energy system required coordination with the former landfill gas to energy contractor EPP/Aria and Horton's Plumbing to install a discharge line from the condensate sump to manhole MH-B. Tetra Tech was able to coordinate the scope of work with all the subcontractors, EPP/Aria and City personnel; provide oversight to ensure confined space entry was completed as discussed, safely and in accordance with OSHA requirements; provide design drawings for Phase II and include a portion of Horton's Plumbing invoice within our budget. This provided a large time and cost savings to City personnel.
- Tetra Tech has maintained an excellent working relationship with the landfill gas to energy operator as it has changed hands over the decades. If issues arise, Monitoring Control and Compliance, Inc. (MCC) and Tetra Tech can communicate to work out any issues.
- Tetra Tech coordinates with the City of Ann Arbor WTP laboratory to complete select wastewater analyses, reducing outside laboratory costs to the budget.
- Tetra Tech optimized the HMP and gas monitoring plans. When Tetra Tech took over the landfill, groundwater was sampled quarterly. A massive review of the well system resulted in abandoning approximately 30 wells, changing the sampling requirements by well and reducing the groundwater to semi-annual under a state approved plan. The gas monitoring must remain quarterly, per the Part 115 regulations; however, the number of sample locations was also able to be reduced significantly.
- Negotiating with the City of Ann Arbor WWTP for changes to the IUP at renewal has reduced the sampling locations and expense significantly.
- Cost savings have allowed Tetra Tech to complete additional work at the landfill that could directly impact cleanup.
    - In 2010-2011, savings realized in the budget allowed for the purchase of a remediation product and microbes to complete a bioremediation pilot test in Southeast Area (Bicentennial) Park.
    - In 2015-2016, savings realized by implementing semi-annual sampling ahead of a finalized and MDEQ (now EGLE) approved HMP provided funding for additional sampling following the in-situ chemical oxidation pilot testing.
- The CZA completed in 2008-2009 allowed for PW-2R-01 to be turned off until recently. Today, PW-2R-22 (PW-2R-22 replaced PW-2R-01 in 2022) is operating at ~17 gallons per minute (gpm), rather than 55-gpm previously.
- Tetra Tech completes the Federal Greenhouse Gas Database reporting annually with minimal assistance from City personnel. Tetra Tech coordinates directly with the landfill gas to energy site contractor (now MCC) to obtain maintenance and operating records needed.
- We are located 2.5 miles from the landfill allowing us to be very responsive to alarms or emergencies that arise. This also reduces expenses on the project including travel time for field work and meetings with the City or the public. We also do not charge mileage on the project.
- Our knowledge of the operation and maintenance allows us to combine efforts into scheduled events reducing our trips to the site, while optimizing systems.
- To be more sustainable, we created a Share Point during our first contract period. Several years ago, we discontinued paper copies of reports to the City except for the required wastewater reports in hard copy. We have also discontinued paper copies of reports to EGLE. Not only does this reduce paper, but it also reduces shipping costs and labor for producing reports.

- Tetra Tech is the author on the USEPA guidance document for completing CZA's and the original model was built by the primary author Rob Greenwald. Dr. Ross was the technical lead under that primary author for the 2019 update. Having the model, knowledge of how the model was calibrated and the data inputs, and the continuity of the team provides a large cost savings on the project.
- Tetra Tech has been involved in the Offsite RAP for the AALF and drafted the final document for MDEQ (now EGLE) approval, worked with area residents to obtain letters of intent to sign restrictive deed covenants and have worked closely with state regulators to obtain guidance and approval. The deed restriction issue is well understood by state regulators and EGLE has essentially accepted the RAP without final approval when the 1,4-dioxane drinking water standard decreased significantly. The number of property owners grew beyond 100, an untenable number for individual restrictions to drinking water. Our team has been committed to obtaining approval and have participated in several meetings with the stakeholders involved between 2012 and 2017 before exhausting all options with the state and county.
- Tetra Tech completed the 1,4-dioxane investigation work plan for the area north of Southeast Area (Bicentennial) Park in May 2016. We attended meetings with the MDEQ (now EGLE) and the Washtenaw County Water Resources Commissioner and obtained approval of the work plan. We executed the work plan in 2020. These wells are intended to be an early warning system for 1,4-dioxane detection. Updating the CZA will assist with understanding the current hydrologic regime and if changes are needed.
- Tetra Tech has developed a robust health and safety plan that is updated after each quarterly event.
- USEPA greenhouse gas emissions reporting. Our team has completed the initial reporting for the AALF and has worked through the historical data needed.
- Over the history of our time on the landfill, Tetra Tech has worked to optimize systems for the benefit of the public's safety and the City. Telemetry was installed in the north side methane collection system to reduce the potential for methane migration and the system alarming without Tetra Tech staff aware. When the system was inoperable, the telemetry contacted three separate people until the alarm was turned off via phone. Prior to this, the police department or area residents would contact various people to identify who was responsible.
- Tetra Tech is committed to optimizing processes and systems and will continue to seek cost saving opportunities.

D. FEE PROPOSAL

(SUBMITTED IN SEPARATE SEALED ENVELOPE)

The Fee Proposal has been included in a sealed envelope as **Attachment V** and will remain valid for at least 120 days from the due date of the proposal submittal. This includes a matrix of staff personnel and the hours per task required for the contract.

E. AUTHORIZED NEGOTIATOR

Michelle Park, Contracts Manager for Tetra Tech, will serve as the authorized negotiator. Ms. Park has reviewed the Standard Professional Services Agreement included in the RFP and accepts the terms and conditions as stated. If Tetra Tech is selected, Ms. Park will work with the City to execute the contract. She can be reached at (412) 921-4011 and michelle.park@tetratech.com.

F. CITY OF ANN ARBOR ATTACHMENTS

The following documents are included in **Attachment VI**:

Attachment A – Legal Status of Respondent

Attachment B – Non-Discrimination Ordinance Declaration of Compliance Form

Attachment C – Living Wage Declaration of Compliance Form

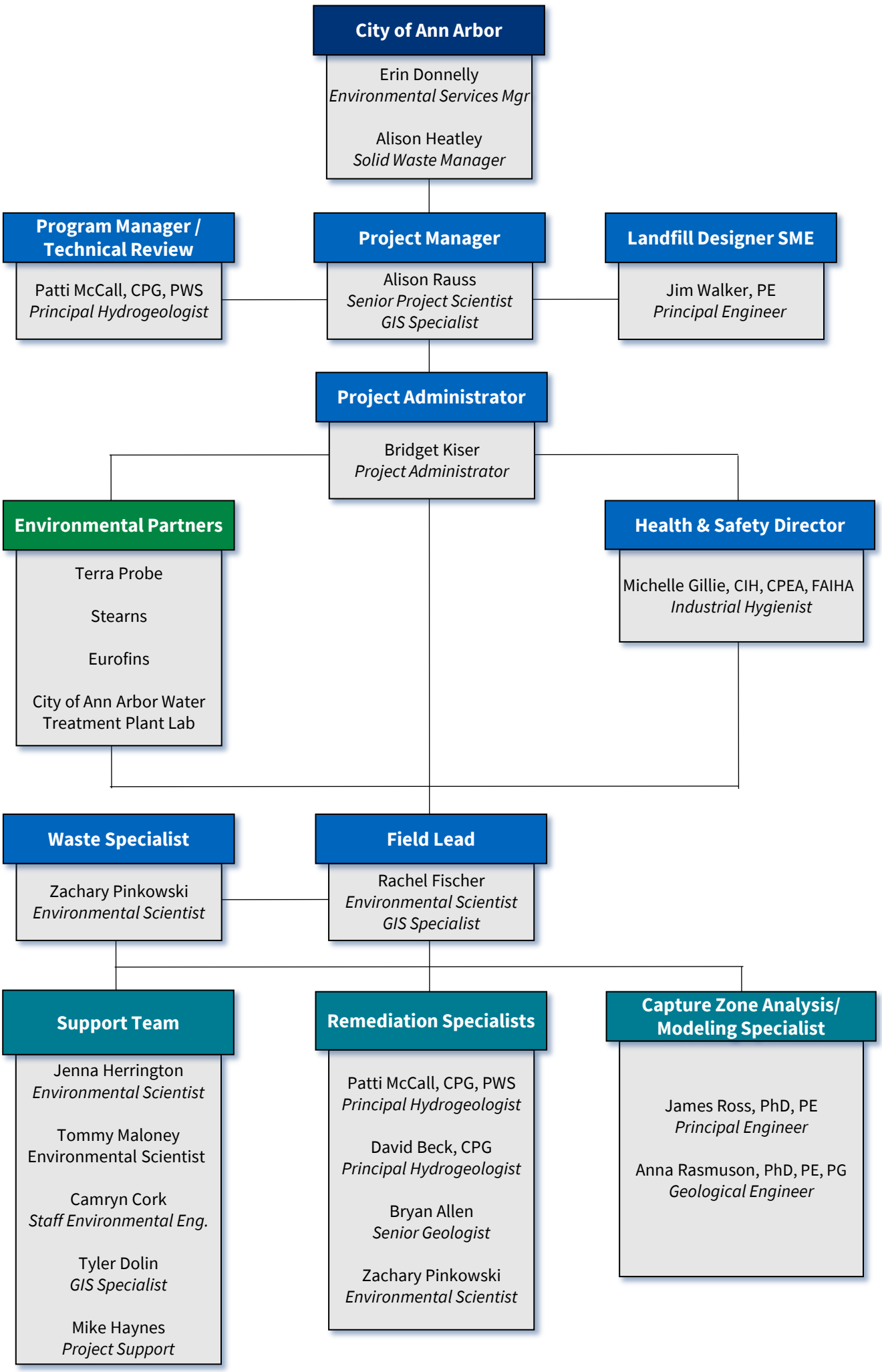
Attachment D – Vendor Conflict of Interest Disclosure Form

Attachment E – Non-Discrimination Ordinance Poster

Attachment F – Living Wage Ordinance Poster

Attachment I Professional Qualifications

ATTACHMENT I
PROFESSIONAL QUALIFICATIONS
Ann Arbor Landfill Monitoring and Maintenance FY 2026 RFP 25-16



TETRA TECH

Patti McCall, CPG, PWS
Principal Hydrogeologist
Professional Wetland Scientist

EXPERIENCE SUMMARY

Ms. McCall is a Professional Wetland Scientist and a Principal Hydrogeologist with over 20 years of experience. As a Professional Wetland Scientist, Ms. McCall has experience in wetland and waters of the U.S. delineation and mitigation, Michigan Department of Environment, Great Lakes, and Energy (EGLE) Part 303 Wetlands Protection, Part 301 Inland Lakes and Streams and Part 325 Great Lakes Bottomlands permitting in the State of Michigan and Section 404 USACE permitting in several states; in support of residential and industrial development, power plant construction and substations/switchyards and related infrastructure; dredging maintenance, petroleum and natural gas pipeline projects, solar energy developments, habitat assessments, biological risk assessments, sediment and surface water sampling, contaminant remediation in wetlands, wetland mitigation and monitoring, and environmental construction compliance. Ms. McCall has extensive experience serving as project manager, permitting specialist and technical support for numerous multi-discipline projects.

As a Principal Hydrogeologist Patti McCall has managed and completed site characterization, remediation, hydrogeological, geotechnical, landfill, regulatory compliance investigations, EGLE Part 201 and 213 investigations, Phase I and Phase II environmental site assessments (ESAs), baseline environmental assessments (BEAs) due care plans and prepared proposals. Additional responsibilities include but are not limited to; underground storage tank compliance activities; implementing landfill monitoring projects, groundwater sampling and methane monitoring, project budgeting and tracking. Ms. McCall has completed and certified United States Environmental Protection Agency (USEPA) greenhouse gas reporting for municipal landfills, and completed numerous reports including aquifer analyses, remedial and natural resources assessments. She has designed, implemented and supervised ongoing remediation projects, Phase I and II ESA's, groundwater monitoring, and completed reporting and presentations to the public, municipal boards, EGLE and clients.

RELEVANT EXPERIENCE

LANDFILL

Municipal Waste Landfill, City of Ann Arbor, Michigan – 2007 – ongoing. Program Manager and Principal Hydrogeologist responsible for overseeing the completion of sampling and reporting requirements for the Ann Arbor Landfill (AALF) including groundwater, wastewater and gas sampling events, methane collection system operations, database management and evaluation, wastewater discharge mass balance calculations, maintenance repairs and subcontractor coordination, budget tracking and task management. Ms. McCall is also responsible for coordinating with and attending meetings, when necessary, with EGLE and attending monthly project meetings with City of Ann Arbor personnel.

Other activities completed include landfill inspections, leachate outbreak investigations and landfill cap repair work plan preparation, installation and final reporting; an historical review and completion of a report to document proper closure of Phase I, completion of the USEPA greenhouse gas mandatory reporting requirements; completion of the Industrial User Permit (IUP) renewal application every five years including negotiation of reduced analytical sampling requirements and number of outfalls; optimization of the north side methane collection system, including the addition of a telemetry system, and maintaining flow through one carbon unit at a time; optimization of the biomass landfill gas to energy system; design and implementation of a bioremediation pilot test, and an in-situ chemical oxidation pilot test; completion of PFAS sampling of wastewater outfalls, 1,4-dioxane investigation, successful revision to the gas monitoring plan, and the

EDUCATION

B.S., Geology, Indiana University Northwest, Gary, Indiana, 1999

University of Minnesota Hydrogeology Field Camp 1998

B.S., Public Policy (Environmental Science), Indiana University, Bloomington, Indiana, 1993

REGISTRATIONS/ AFFILIATIONS

American Institute of Professional Geologists (AIPG)

Geological Society of America

Society of Wetland Scientists

Michigan Wetland Association

Huron River Watershed Council

Michigan Association of Environmental Professionals

TRAINING/CERTIFICATIONS

Certified Professional Geologist 11695, AIPG, 2014

Professional Wetland Scientist 2497, 2014

40-hour HAZWOPER Training 29 CFR 1910.120 OSHA, 2002

Annual 8-hour HAZWOPER Refresher 29 CFR 1910.120 (e)(8) OSHA 2003 - present.

Adult First Aid, CPR and AED certified 2007 by American Red Cross with annual refreshers from 2008 to present.

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

Twenty-three

YEARS WITHIN FIRM

Eighteen

CONTACT

patti.mccall@tetratech.com

hydrogeological monitoring plan significantly reducing the sampling plan requirements for both gas monitoring and groundwater monitoring. Two extraction wells and piping were replaced in 2012. In 2020, a 2-inch discharge line was upsized to a 6-inch line with horizontal directional drilling. Isolation valves were also installed to streamline demineralization. The third extraction well, piping and maintenance injection well were replaced in December 2022.

The City of Ann Arbor has been completing a Remedial Action Plan (RAP) for the offsite impacts that are under Part 201. Ms. McCall and her team have completed the RAP, presented findings to the Remediation Advisory Team at EGLE; coordinated with EGLE for a Legally Enforceable Agreement and obtained the Environmental License Agreement with the Michigan Department of Transportation and installed required markers; completed a revision of the hydrogeological monitoring plan that was approved and implemented in 2015, reducing the frequency of monitoring; completed and implemented a well abandonment plan in 2015 to reduce the number of wells significantly, and completed a drilling investigation to reduce the number of property owners requiring a restrictive deed covenant (RDC) on their property by 66%. Letters of intent to sign RDCs were obtained from the remaining properties except for one. In coordination with EGLE personnel Ms. McCall and the City of Ann Arbor began drafting a city ordinance to restrict the use of groundwater for drinking water purposes and provide a way to track impacted sites in the City. The Michigan Department of Transportation (MDOT) issued an Environmental License Agreement in September 2017, which restricts the use of groundwater and notifies workers of impacts in the MDOT right-of-way.

In 2016, EGLE temporarily reduced the drinking water criteria for 1,4-dioxane significantly from 85 to 7.2 micrograms per liter. This resulted is a lack of delineation north of the landfill. Ms. McCall designed a 1,4-dioxane delineation investigation plan in June 2016 and received EGLE approval in August 2016. The plan was implemented in the latter half of 2017 and the plume has been delineated with the new criteria. In 2019, EGLE requested additional groundwater sampling and additional wells were installed in 2020 to delineate the plume with the new criteria. The RAP is currently being updated to include changes associated with these changes to 1,4-dioxane drinking water criteria, PFAS and a final solution for the RDC or change in City ordinance. The MDOT ELA was re-permitted in 2023 to include the expanded area and markers were added.

Environmental Impact Studies for Solar, City of Ann Arbor, Michigan – Project manager responsible coordinating between the City and utility and for the team completing wetland delineation, threatened and endangered species qualitative habitat analysis, cultural review, Phase I ESA and subsequent work based on findings. The placement of the solar panels is on a portion of the Ann Arbor landfill, and on surrounding properties. Ms. McCall was assisting with the deed restriction for the landfill cap prior to the project being placed on hold.

PFAS Sampling, City of Ann Arbor, Michigan – Project manager and geologist responsible for coordination with City of Ann Arbor personnel to design and implement a perfluorinated alkylated substances (PFAS) sampling plan in 2017 for the influent at the wastewater treatment plant, water treatment plant and five wastewater outfall locations at the Ann Arbor Landfill. Samples were collected using PFAS-free materials and the data was analyzed for 24 PFAS compounds using method 537 modified, with stable isotope dilution. Data tables and flow rates were prepared for use by City of Ann Arbor personnel. A subsequent sampling was requested by City personnel for their compost and storm water retention ponds.

Capture Zone Analysis at Municipal Landfill, City of Ann Arbor, Michigan – Project manager and geologist on a team of scientists and engineers, who successfully updated the site conceptual model and completed a capture zone analysis of the existing extraction well configuration in 2010. Activities included updating the geological interpretation, installing observation wells and completing an aquifer analysis and numerical groundwater model. The results provided a significant cost savings to the City of Ann Arbor by allowing one extraction well to be turned off. A modification to the IUP was completed and approved by the City of Ann Arbor to reduce the sampling requirements of the extraction well. The CZA was updated in 2019 to include the regulatory changes in the 1,4-dioxane drinking water criteria, the replacement of two extraction wells, additional lithological data and recent analytical results.

Previous firm

Private Type II Landfill, Birch Run, Michigan – Senior scientist responsible for overseeing the completion of groundwater, gas and primary and secondary leachate sampling events on a quarterly basis, database management and evaluation, secondary leachate discharge volume calculations, maintenance repairs and subcontractor coordination, annual EGLE inspections, budgeting and task management and coordination with EGLE project manager, site supervisor and client.

Numerous Type II Landfills, Lower Michigan – Senior scientist responsible for statistical evaluations and tolerance limit calculations both site wide and intra well; assistance with completion of groundwater, gas and leachate sampling on a quarterly basis, database management and evaluation, budgeting and task management on numerous type II landfills.

ENVIRONMENTAL SITE CHARACTERIZATION, REMEDIATION AND PROPERTY TRANSFER

Traver Road, City of Ann Arbor, Michigan – Associate Hydrogeologist responsible for completing a Phase I ESA and Phase II ESA in support of the Greenbelt Program property purchase. The property contained stockpiled dredged materials adjacent to Traver Creek, requiring sampling. Low levels of contaminants present above the groundwater to surface water interface protection criteria required removal from the current location in the floodplain. A Baseline Environmental Assessment (BEA) and Documentation of Due Care Compliance were completed as well as a wetland delineation on a portion of the property to identify a location for the soil. A plan to locate and demarcate the location of the soils was developed with City personnel.

Leslie Science and Nature Center, City of Ann Arbor, Michigan – Principal Hydrogeologist responsible for planning and implementing a Phase II investigation and remediation. After identifying an unnatural depression in the woods, LSNC personnel contacted City personnel for guidance. Ms. McCall completed a site walk and participated in a meeting with City and LSNC personnel to discuss a plan forward. The property was bequeathed to the City in 1997 upon the death of Dr. and Mrs. Leslie who had used the property primarily for an orchard, a chemical laboratory and their private residence. Investigations on the site were completed in three phases and remediation was completed to excavate heavy metals from the depression in the woods. Arsenic concentrations in soil across the site are elevated, likely from herbicide application. Samples were selected and were analyzed for the relative bioavailability of the arsenic for absorption through ingestion. Site specific arsenic criteria were developed from this information approved by EGLE personnel. The Documentation of Due Care Compliance report was reviewed by EGLE and determined that the arsenic concentration onsite is safe for LSNC to continue programming onsite with no risk to the children.

A chlorinated plume was identified emanating from a concrete cap located northwest of the DTE Energy House. Initial soil results indicated that the plume was likely venting inside the building. As a result, access to the building was restricted immediately, vapor pins were installed for subslab concentrations and summa canisters were used to measure indoor air in the basement, upstairs and outside as ambient air. Review of the data indicated that concentrations were present in the basement in excess of acceptable concentrations. The floor was sealed to ensure pathways are not present for off-gassing of the VOCs and a mitigation system was installed in December 2019 to ensure the vapors are not entering the building. Monitoring occurred for over a year and a telemetry system was installed.

Changes in vapor intrusion screening levels in fall 2020 necessitated re-evaluation of onsite buildings and mercury in the indoor air of DTE Energy House. Mercury and all other contaminants are below applicable indoor air criteria. Additional monitoring was completed, and a Documentation of Due Care Compliance (DDCC) report was submitted to EGLE personnel in March 2022 and approved in November 2022. Tetra Tech implemented training on the DDCC requirements and the mitigation system operation and maintenance requirements.

In coordination with EGLE personnel, Ms. McCall and her team completed preparation of a Brownfield Plan submitted to Washtenaw County that was successfully awarded at $535,000. In addition, Ms. McCall has completed presentations to LSNC Board, Park Advisory Committee, combined stakeholders and met regularly to provide information to stakeholders including City of Ann Arbor and LSNC personnel, Washtenaw County Brownfield Authority, Washtenaw County Health Department, City Council, attorneys, LSNC consultants and EGLE.

Gelman / Pall Life Sciences Basement Sampling, City of Ann Arbor, Michigan – Associate Hydrogeologist responsible for completing an assessment to determine where shallow groundwater could be flooding into homeowners' basements, within the Gelman plume using documents produced by Gelman's consultant and publicly available information. The focus of the investigation is to allow residents the opportunity to have the water in their sumps sampled during wet conditions. Ms. McCall and her team developed a plan, survey and checklist for household products that could be present in the basement. A listening session was held to inform residents of the plan and letters were sent to homeowners who were identified in the plume area to complete an initial survey on past wet basements. The project relied on homeowners to contact Tetra Tech if wet conditions exist. The program began in the spring of 2020 and ended in summer 2022. Data collected from area homes that chose to participate indicated that the basement water did not contain 1,4-dioxane at detectable levels. Information was provided to each participating homeowner, City of Ann Arbor personnel, Washtenaw County Health Department and EGLE in a brief letter.

Gelman / Pall Life Sciences Sentinel Monitoring Well Determination and Installation, City of Ann Arbor, Michigan – Principal Hydrogeologist responsible for completing a phased approach to determining sentinel monitoring well locations to protect the City's drinking water supply. The focus of the investigation was the Dupont area and north, where a large volume of clay has been documented, and the plume is largely headed east. Ms. McCall and her team compiled data from various resources, entered the information into a 3-dimensional deterministic model and created slices of that model and interpretation at a listening session for the public and at a Coalition for Action on Remediation of 1,4-Dioxane (CARD) meeting. The model was evaluated by a third party and a letter report was drafted.

In 2022, Tetra Tech completed a bid selection process, identified a contractor and well installation locations. One exploratory borehole was completed to bedrock at 275 feet bgs, with vertical aquifer sampling completed every 5-8 feet within the aquifer.

Based on the results, two monitoring wells were installed in two separate aquifers. These wells will be used as sentinel locations for the public drinking water source and sampled quarterly to serve as an early warning system, should 1,4-dioxane be detected. City of Ann Arbor personnel are implementing the groundwater sampling program.

415 W. Washington Street, City of Ann Arbor, Michigan – 2011. Senior Geologist responsible for completing a Phase I ESA, Phase II ESA, Hazardous Building Material Survey and planning level remediation costs for the City of Ann Arbor's former location of the Parks and Recreation Department. The property is a LUST and contains infrastructure from a former Soil Vapor Extraction/Air Sparge (SVE/AS) system. Activities for the Phase II ESA included locating previous groundwater monitoring wells and sampling; a subsurface drilling investigation for soil sampling, temporary well installation for groundwater samples and installation of permanent groundwater wells. The completion of field activities required coordination between Downtown Development Authority, Republic Parking Systems, City of Ann Arbor Historic District representatives, numerous utility companies and several City of Ann Arbor personnel. A final presentation on remediation activities was provided to City personnel and planning level costs were prepared and updated annually.

Associate Hydrogeologist responsible for completing brownfield redevelopment application information, developing a Phase II ESA to update the site findings 8 years after the initial investigation and assisting City personnel and SmithGroup with reuse options of select building materials. Groundwater monitoring was completed on the existing network and additional monitoring wells have been installed. In 2021, Tetra Tech has completed a notice of migration for the parcel north, attended calls with the facilities board members and updated the owner regularly. In addition, Tetra Tech completed an investigation to the west and south, identifying a potential plume migrating onsite. Tetra Tech has been working with City, County and EGLE personnel to identify groundwater issues and a letter containing findings of the site investigation and next steps was provided to City administrators. Ms. McCall presented the environmental findings at the site to the Planning Commission for rezoning and redevelopment opportunities. Ms. McCall and her team drafted a brownfield plan with remediation options for approval by the Washtenaw County Brownfield Redevelopment Authority to pre-entitle the property for potential remediation efforts. The buildings have since been demolished.

Crest Road, City of Ann Arbor, Michigan – Associate Hydrogeologist responsible for completing a Phase II ESA. Historical documents were reviewed to develop a site investigation plan. Soil borings were completed, the data analyzed, and a report of findings completed.

PFAS Sediment Investigation, St. Clair County, Michigan – Associate Hydrogeologist responsible for attending stakeholder meetings and developing a sampling plan with EGLE and St. Clair County Drain Commissioner (SCCDC) for the Howe-Brandymore Drain. Area sampling from a landfill and upgradient Howe-Brandymore Drain water samples indicated PFAS in water above applicable criteria. The sampling plan was negotiated and approved by EGLE, and the sediment sampling was completed in 2020. The data was evaluated, and a letter report of findings completed for issuance to SCCDC and EGLE. The client is awaiting recommendations from EGLE before carrying out a dredging project.

Impacted Limestone Road Projects, City of Ann Arbor, Michigan – Associate Hydrogeologist responsible for designing and implementing a sampling plan across several ongoing road projects where an odorous limestone was being stockpiled and spread as road base. Samples were collected for laboratory analyses of VOCs, SVOCs, gas range organics (GRO) and diesel range organics (DRO) to determine if fuel was present in the limestone. Samples from two road projects (Longshore and Riverview) were submitted for fingerprinting analyses to determine the origin of the material; identifying it as a type of diesel motor fuel. The data was compared to Michigan's guidance to determine the potential mobility of the fuel in the ground. The findings indicated that the material was present at concentrations high enough to mobilize. This information was used to require the contractor to remove the material. Ms. McCall completed letters documenting progress, responded to the public, participated in decision meetings with City officials and contractors, and provided information for publication through the City's webpage. As a follow-up to this issue; Ms. McCall assisted City Engineers and Attorneys with drafting language for contracts to ensure contaminated material is not brought to sites.

Wastewater Treatment Plant Expansion Assistance, City of Saline, Michigan – 2021 – ongoing. Associate Hydrogeologist responsible for completing three Phase I ESAs to determine where to complete expansion of the WWTP. The undeveloped portions north and west of the WWTP operations, and two adjacent properties were investigated. Ms. McCall was responsible for attending City Council meetings, conveying the information and developing a Phase II ESA investigation. The Phase II ESA investigation was completed, findings were presented to City Council, EGLE, EPA and the City's legal counsel.

Additional assistance has been provided to the City of Saline to segregate a sidewalk and parking lot project in support of accessing the Salt Springs Park. This has included additional soil sampling, modeling lead concentrations in soil to determine the level of health and safety measures needed and hazard communication to be compliant with OSHA regulations. Coordination with the design engineers, waste profiling, completing specifications for the bid document and completing brownfield funding requirements for reimbursement have also been completed. Discussions with potential responsible parties for the contamination

is occurring for this and additional public good projects. Ms. McCall and her team had prepared a request to Washtenaw County Brownfield Redevelopment Authority to assist with the heavy metal impacted soil removal cost through the local brownfield revolving fund (LBRF). When PFAS contamination was identified, a request to increase the funding was submitted by Ms. McCall and approved.

Tetra Tech is the engineer of record on the WWTP expansion, designing, securing funding and providing oversight of the contractors during construction. As the project moved into WWTP expansion, Ms. McCall has provided additional assistance with bid document specs for the handling of soil and groundwater onsite, completed additional drilling investigations for characterizing soil for reuse and water for disposal and provided guidance on landfilling and treatment options.

In 2023, Ms. McCall and her team drafted a work plan to close the existing lagoon that was no longer needed. The plan was approved and implemented in the summer of 2024. Soil and riprap sampling above the clay liner was required for waste characterization, the clay liner was sampled and characterized for removal and demonstration below the clay liner was required to ensure the liner was intact. Following removal of the lagoon, a closure report was submitted and approved conditionally. Negotiations with EGLE in 2024 resulted in the need to install three monitoring wells and sample three quarters of groundwater data below applicable criteria for PFAS parameters to achieve final closure. Well installation is expected in spring 2026.

Confidential Client, Michigan – Associate Hydrogeologist responsible for reviewing historical data and developing a Phase II ESA investigation on a leased portion of a parcel for communications and utilities for sites in the Lower Peninsula of Michigan. The Phase II ESA was completed, soil data evaluated, and a letter report of findings provided to the client. In some instances, Baseline Environmental Assessments and Due Care Plans were completed. A site in mid-Michigan required a wetland delineation to ensure the siting was outside of a regulated wetland. Follow-up calls with the client are routinely completed to determine risk and identify potential next steps if requested.

SMART Terminal, Inkster, Michigan – Senior Geologist responsible for Part 213 closure activities for a leaking underground storage tank. Diesel distribution lines were severed during paving of the parking lot and diesel fuel was released. Immediate responses taken by the former firm to reduce the impact included dewatering to remediate the aquifer and completing a geological investigation with soil and groundwater sampling analysis of both diesel and gasoline parameters. An Initial Assessment Report was also completed by the former firm. Tetra Tech was hired to complete closure of the site, which included completing four quarters of seasonal sampling to demonstrate GSI compliance at two catch basins, completing a Final Assessment Report and Closure Report. The Closure Report was approved by EGLE in 2019.

Hoover / Greene Road Environmental Borings, City of Ann Arbor, Michigan – Associate Hydrogeologist responsible for designing a drilling investigation on five roads around Hoover and Greene Roads. The Part 201 database and other publicly available databases were consulted to determine if environmental sampling was required. Although no part 201 sites were identified, four locations were identified for environmental sampling based on site use. The remaining soil boring locations had lithology logged. The field activities were completed during University of Michigan graduation and the roads remained open; requiring a large amount of health and safety coordination and traffic control measures during the drilling investigation. Each soil boring was cleared with GPR prior to drilling. Arsenic and selenium concentrations were identified as elevated and likely naturally occurring. Based on this, soil sampling was completed on stockpiled material removed from the road to analyze for synthetic process leaching procedure (SPLP) to determine if the arsenic and selenium would leach under normal rainwater conditions. Each load was then decided on individual basis if it could be reused or if it had to be landfilled.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Hydrogeologist responsible for planning and implementing a drilling investigation for Phase II ESAs on two parcels in Dearborn, Michigan in 2016. The project was fast-tracked due to the sensitive timeline for the Phase I ESA that was also completed by Tetra Tech, and the impending property sale. Responsibilities included creating a Sampling Analysis Plan, Scope of Work and site-specific Health and Safety Plan prior to implementing the work. Soil boring locations were cleared using GPR technology and all borings were completed within three days with temporary monitoring well installation, in locations where groundwater was encountered. Laboratory turn-around time was expedited to determine if the client would proceed with the potential sale. Database management and analysis was expedited to meet the schedule. Additional investigation work was required on one parcel. Phase II ESA reports and Due Care Plans were written following the purchase determination. Responsibilities included managing field staff, communicating with the client, data analysis, EGLE rule interpretation, report writing, review and budget tracking.

Manufacturing Facilities, Confidential Client, Michigan – Associate Hydrogeologist responsible for implementing property transfer scope of work for an international client based in Michigan beginning in 2016. The client maintained ten manufacturing facilities in four countries and requested Phase I and II ESAs. Nine sites were completed for Phase I ESA and six sites were completed for Phase II ESA in three countries. The final site was removed from the portfolio. Responsibilities include project management, staff and subcontractor coordination, Phase II drilling investigation determination and implementation, data review, statistical analysis, report review and finalization; and communication with the client and the client's attorney, to explain findings

and next steps. Ms. McCall assisted with provided additional details as necessary during sale and the entire portfolio was successfully sold in 2019.

Canadian National Railway, Detroit, Michigan – Senior Hydrogeologist responsible for determining remediation options to achieve site closure; site activities include reviewing Freedom of Information Act (FOIA) documents and data from previous consultants, creating Areas of Concern, developing a sampling strategy; implementing a phased approach to delineating soil and groundwater impacts; identifying current underground infrastructure as possible sources of light non-aqueous phase liquid (LNAPL) conveyance using ground penetrating radar (GPR) and electromagnetic locating equipment, completing a statistical background metals analysis, completing test pits to identify an abandoned diesel fuel line, removing oil from site catch basins, completing a wetland assessment to determine groundwater to surface water interface (GSI) compliance and attending regular meetings with the client for progress updates as well as interacting with the state regulator. Ms. McCall coordinated and implemented a delineation plan to complete Laser Induced Fluorescence (LIF) as a verification tool for the location of the LNAPL plume. A focused feasibility study was prepared to provide remediation and closure plans for a variety of land use options. Excavation was completed to remove the LNAPL impacts, hotspot excavations and concentrations of soil above applicable criteria on and offsite. Activities required coordination with City of Detroit for right of entry access. A closure report was submitted and EGLE granted closure.

Additional activities were completed at the site to determine outstanding liabilities associated with a former leaking underground storage tank (LUST) located adjacent to the property. The LUST was located using GPR and found partially on the subject property. Limited excavations were proposed and implemented to reduce outstanding liability on the property.

Stone School Road, City of Ann Arbor, Michigan – Senior Geologist responsible for designing and implementing a soil and sediment characterization sampling plan prior to dredging and re-aligning a creek; and infrastructure and road improvements along Stone School Road in Ann Arbor. Sediment samples indicated that a portion of the sediment was impacted by petroleum products. Soil samples indicated that arsenic and selenium concentrations in the soil were above applicable residential criteria. A statistical analysis was completed. Ultimately, a demonstration was included in a letter report indicating that the soil analyzed was native and the concentrations of arsenic and selenium were naturally occurring. EGLE concurred with the findings.

As a result of this work, City of Ann Arbor personnel asked for a collection of existing background data from Washtenaw County, to support EGLE's Technical Assistance and Program Support (TAPS) team. This TAPS team is collecting background data to re-evaluate the state default background levels for each metal with regard to lithology type. An exhaustive search of County, City and land trust programs and personnel was completed, and a database was supplied to EGLE with arsenic and selenium concentrations, lithology and latitudinal and longitudinal coordinates.

721 N. Main Street, City of Ann Arbor, Michigan – Senior Geologist responsible for completing a Phase I ESA, Hazardous Building Material Survey and Due Care Plan for the City of Ann Arbor's former Fleet Facility and Maintenance Garage. The completion of the Phase I ESA and Due Care Plan required input from numerous City of Ann Arbor employees and coordination between SmithGroupJJR, Tetra Tech and City of Ann Arbor personnel in a time sensitive manner. An approved Due Care Plan was granted and was a requirement of one of the many funding sources for the proposed publicly accessible reuse of the property and required working closely with EGLE and City personnel to present the project as if proposed changes were implemented.

An adjacent property, previously fuel bulk storage with an open LUST, includes migrating LNAPL to the 721 N. Main property. Ms. McCall was asked to review data, provide guidance and attend meetings with City of Ann Arbor personnel, the adjacent landowner, EGLE representatives and consultants for the responsible party. To date, the consultants for the responsible party are working on additional investigation work and a work plan to remediate mobile LNAPL and direct contact impacts.

Millers Creek Sediment Assessment, City of Ann Arbor, Michigan – Senior Geologist responsible for developing a sampling plan for characterizing the removal of approximately 1,000 cubic yards of sediment from a creek. A significant cost savings was realized by sampling the creek for all potentially necessary parameters to be placed on hold with the laboratory, while sieve analyses were completed. Results of the sieve analysis indicated a sufficient percentage of sand grains to preclude quality analysis of the sediment for contaminants, reducing laboratory and potential disposal costs.

Municipal Waste Landfill, City of Ann Arbor, Michigan – Senior Geologist responsible for overseeing the completion of a bioremediation pilot test on a vinyl chloride plume. Responsibilities included coordination with state, county and city officials for permits and concurrence on injection of an emulsified vegetable oil remediation product. The pilot test required the installation of seven injections wells and an observation well to a depth of approximately 20 feet. A manifold system was used to inject EOS from 55-gallon drums followed by a water flush using the city's hydrant. Additional sampling required by EGLE included secondary metal releases and methane generation. Follow-up sampling to determine the success of the pilot test demonstrated complete dechlorination of vinyl chloride to ethene and significant mass removal.

In December 2015, three pilot tests were completed in Southeast Area Park to determine potential remediation options for the co-mingled plume of 1,4-dioxane and vinyl chloride. Two in-situ amendments; bioavailable absorbent media (BAM) and PeroxyChem Klozur® persulfate and PermeOx® Plus were used individually and as a combination of both solutions to determine if chemical oxidation is a viable remedial option. The pilot tests were completed within the influence of the capture zone analysis and groundwater sampling continued regularly through April 2016. Results indicate that both in-situ amendments are capable of oxidizing the contaminants and the BAM appears to have triggered a biological reaction that contributed to sustained reduction of contaminants. As a Senior Geologist and Project Manager, Ms. McCall was responsible for completing a work plan for EGLE approval, installing observation wells, researching options, implementing the scope of work, analyzing and interpreting data, and presenting the information to citizens, the client and peers (Battelle 2016). Ms. McCall and her team reviewed information from all pilot tests completed and provided recommendations for treatment options moving forward.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Geologist responsible for planning and completing an investigation into leaking oil lines from presses at an active manufacturing facility. The investigation included emptying a previously abandoned underground oil line and connecting sump locations, installing a mobile camera to determine the integrity of the pipe/sumps and presence of oil, pushing water through the line to determine which presses were connected to the previously abandoned pipeline system, finding connections and capping known locations, investigating the trench system of all presses and finally filling the abandoned line with flowable fill.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Geologist responsible for planning and implementing chemical oxidation injections as corrective action on a Resource Conservation and Recovery Act (RCRA) site to remediate heavy metals (chiefly hexavalent chromium and nickel) from the groundwater. The site was successfully remediated through interim actions, removing the need to implement large-scale infrastructure that would be necessary for a pump and treat system, originally planned for the corrective measure. Completing chemical oxidation created a cost savings for the client while attaining cleanup objectives in a shorter timeframe. Due to site and time constraints and the active nature of the facility, the work required a great deal of coordination between parties and production schedules. A closure report was submitted to EGLE and in August 2018, the area received Corrective Action Performance Standards Attained – Control Required; with a deed restriction on the property.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Project Geologist responsible for completing closure activities for six RCRA Solid Waste Management Units (SWMUs) including the excavation of three former sludge settling lagoons and a process underground storage tank. Appropriate demolition, restoration and soil erosion application permits were submitted and approved prior to work. Verification of soil remediation and groundwater samples were collected in accordance with *EGLE Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria.*

The remaining two SWMUs include a wastewater treatment plant (WWTP) that formerly conveyed electroplating waste and an oil/water decanting tank farm located adjacent to the WWTP. Selective demolition was completed on the WWTP to remove all piping, chemical tanks and sumps, including electrical conduit related to the former process. Restoration activities included the addition of a concrete drive for tanker trucks and a garage door and driveway for facility access. A natural gas line was installed to bring heat to the WWTP from the powerhouse.

Four aboveground storage tanks were removed during demolition. A drilling investigation was completed under the former oil/water decanting tank farm that identified hydraulic oil impacts in the soil. An excavation was completed to remove the soils above the thin native clay unit protecting the perched aquifer. A bioremediation product, Micro-Blaze^{R} was applied to the native clay to enhance biological degradation of the oil. Site characterization was completed to delineate the extent of the impact under the existing containment area and WWTP. Passive recovery and monthly LNAPL were completed demonstrating that LNAPL is not present. A Corrective Action Complete Report was submitted to EGLE in March 2015. In May 2015, EGLE granted the area as Corrective Action Performance Standards Attained – Control Required; with a deed restriction on the property.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Geologist responsible for completing closure activities for a RCRA SWMU that was a former construction debris landfill. Activities included soil erosion permit application submittal, excavation, wetland delineating and permitting, concrete roadway replacement, backfill and seeding and planting restoration activities. The landfill contained concentrations of trichloroethene (TCE) and daughter products above applicable criteria that migrated from the capped landfill, down a slope and into a wetland that serves as the groundwater surface water interface compliance point. Excavation occurred in three phases. The first phase required steel shoring to maintain structural integrity of a retaining wall and concrete roadway replacement in winter. The second phase required excavation along a slope to depths greater than 25 feet into clay. The third phase of excavation was within a wetland and required coordination with EGLE state wetland regulators and submittal and approval of a JPA.

Verification of soil remediation and groundwater samples were collected in accordance with *EGLE Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria.* Wetland restoration included backfilling with primarily clay to maintain the perched nature of the wetland and grading to pre-excavation elevations. The area was planted with an emergent wetland

seed mix and a dozen wetland shrubs were planted in the spring of 2012. Following approval of the Interim Measures Implementation Report from EGLE, final restoration activities were completed in November 2012 to remove exposed debris at the landfill surface and cap the inert landfill with topsoil. A No Further Action Report was submitted following a year of groundwater sampling. EGLE granted a Corrective Action Performance Standards Attained - Control Required; with a deed restriction on the property.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Project Geologist responsible for completing the excavation of PCB-containing sediment from an outfall discharge to a wetland. The project included coordinating with EGLE and USEPA, delineating the wetland, completing and obtaining a permit from EGLE for excavation and dewatering activities within the wetland, engineering two new outfall structures with oil water separators, and restoring the wetland. Verification of soil remediation and groundwater samples were collected in accordance with *EGLE Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria,* and a closure report was approved by EGLE.

East Stadium Boulevard Bridge Project, City of Ann Arbor, Michigan – Senior Geologist responsible for designing and implementing a soil characterization sampling plan prior to replacement of the East Stadium Boulevard Bridge and associated and nearby utility infrastructure. Responsibilities included reviewing nearby facility data, developing a sampling plan for infrastructure routes along the boulevard and the six earthen walls surrounding the bridge, conducting a site meeting for private, city and University of Michigan utilities prior to subsurface work, implementing a hand auger and direct push drilling plan, completing a statistical analysis of soil concentrations above applicable criteria, and preparing a letter report of findings and recommendations. The age of the fill material used to build the earthen walls surrounding the bridge and the past industrial uses in the area required an extensive sampling plan. Additional area information and statistical analysis were used to reduce the sampling parameters and coordination with local landfill operations prior to sampling implementation helped to reduce the overall number of samples required. Other responsibilities included preparing a Due Care Plan, estimating dewatering volumes, completing groundwater sampling and assisting with groundwater to surface water discharge needs.

Various Projects, City of Ann Arbor, Michigan – Senior Geologist responsible for additional 'on-call' environmental projects as needed for the City of Ann Arbor. During the contract period 2007 to 2012, the City of Ann Arbor personnel required environmental assistance with a variety of projects including: sampling and removal of a found underground storage tank during utility installation; sampling and site characterization assistance during utility installation for petroleum impacted groundwater; sampling and site characterization assistance during utility installation for suspected petroleum impacted soils; sampling and determining safety protocols for handling slag; sampling and completing a waste profile for railroad embankment soils; developing and implementing a soils sampling plan and coordinating with University of Michigan for impacts within the City-owned road right of way; sampling and site characterization assistance during water main replacement and road improvements for suspected petroleum impacted soils at several sites; soil sampling and site characterization for soil/debris pile removal during a water main installation project in an area park; and groundwater sampling and site characterization for an embankment improvement area near a railroad for suspected water contaminants.

During the contract period beginning in 2012 - 2017, the City of Ann Arbor personnel required environmental assistance with an additional number of projects including: sampling, field assistance with delineating impacts and completion of a waste profile for petroleum impacted soils encountered during utility installation; surface water sampling and completion of a waste profile for railroad embankment soils; underground storage tank removal and sampling; lab packing and waste removal; and sampling and characterization assistance with leaf sampling to determine if street swept leaves could be used for composting.

Gelman / Pall Life Sciences 1,4-dioxane plume, City of Ann Arbor, Michigan – Senior Project Geologist responsible for oversight, budget tracking and client coordination for a third-party review completed internally by Dr. Sutton. The site conceptual model completed for the Evergreen Area of the Pall Life Sciences (PLS) 1,4-dioxane contaminant plume by PLS's consultant Fishbeck, Thompson, Carr & Huber, Inc. (ftc&h) and MACTEC Engineering and Consulting was reviewed by Dr. Sutton. Ms. McCall and Dr. Sutton attended a meeting with PLS, ftc&h, MACTEC, City of Ann Arbor and Washtenaw County personnel to review ftc&h/MACTEC findings, Dr. Sutton's findings and provide recommendations for additional data needs moving forward. A summary letter of the meetings key findings was produced by Ms. McCall and Dr. Sutton for the City of Ann Arbor.

A follow-up discussion and third-party review was held five years later to determine whether the 1,4-dioxane plume has the potential to migrate to the City of Ann Arbor's drinking water source, Barton Pond. In addition to Ms. McCall and Dr. Sutton, personnel from the City of Ann Arbor, Washtenaw County, PLS and Fleis & Vanderbrink were present for the technical discussion. Dr. Sutton's findings and recommendations for additional data needs was produced for the City of Ann Arbor.

Previous firm

Sunoco Gas Station, Luna Pier, Michigan – Senior Scientist responsible for emergency response to a diesel fuel spill from a gas station to Lake Erie. The project required coordination with United States Coast Guard, USEPA Region V, numerous EGLE divisions, City of Luna Pier officials and the gas station owner (client). Ms. McCall provided direction and completed oversight of

field activities including investigation of the diesel fuel leak from pumps, through utilities to the wastewater treatment pump station and finally to Lake Erie. This included completing excavation, numerous infrastructure repairs and replacements; drilling activities to delineate free product; continuous vacuum pumping to maintain further releases offsite, jet-cleaning utilities to the Lake; installing a recovery trench and recovery wells and installing a mobile SVE system. Twice daily meetings were coordinated and lead by Ms. McCall to facilitate the cleanup with field personnel, subcontractors, USEPA's Superfund Technical Assessment & Response Team (START) contractor, regulatory personnel (state and federal) and City officials and wastewater treatment operators. When the client was unable to meet financial obligations, the USEPA exerted jurisdiction over the site and requested Ms. McCall's return to complete additional subsurface investigational work and data analysis due to her knowledge of the site.

Former Manufacturing Facility, Confidential Client, Michigan – Senior Scientist responsible for developing a sampling plan and implementing a Phase II site investigation for a former foam and plastic manufacturing facility that previously supported the automotive industry. The initial Phase II investigation included gathering soil and groundwater data through temporary monitoring wells. Following the initial Phase II investigation and data evaluation, a second mobilization to delineate impacts was completed. The data was evaluated, and recommendations were made for impacted areas. A BEA was completed to assist with the sale of the property and submitted to EGLE.

Retail Petroleum Market, Multiple Site Divestiture, Confidential Client, Southeast Michigan – Senior Scientist on a team responsible for completing a fast-track, real estate divestiture assessment of 26 locations in the metropolitan Detroit area. Each site assessment was completed within four weeks and all 26 sites were completed in a three-month timeframe, requiring management of multiple sites per team member. Each site assessment included placement and installation of an average of six soil borings and groundwater monitoring wells, soil sample and groundwater collection, data evaluation and site divestment assessment reporting. Site work was completed in accordance with the client specific health and safety requirements, which required project personnel to attend two 8-hour training sessions. The client's compressed schedule and project goals were achieved, and all work was completed without a health and safety incident.

Commercial Petroleum Multiple Phase I Environmental Site Assessments (ESAs), Confidential Client, Southeast Michigan – Senior Scientist on a team responsible for completing Phase I ESAs at 13 locations in the metropolitan Detroit area within a 30-day timeframe in accordance with the ASTM standard. In addition to specific site reporting tasks, Ms. McCall was responsible for completing a technical review of the 13 client-specific formatted Phase I ESA reports. Two levels of client review were completed prior to the report finalization. The client's compressed schedule and project goals were achieved.

Former Manufacturing Facility, Oceana County, Michigan – Senior Scientist responsible for completing a Phase II site investigation, BEA and Due Care Plan at a former manufacturing facility. The property was classified as a leaking underground storage tank (LUST) site, which was known by the client prior to purchase. A Category N BEA was completed on behalf of the purchaser to obtain liability protection for the existing contamination resulting from the LUST. A Due Care Plan was also developed and included with the BEA submittal.

Clawson Concrete (Edw. C. Levy Property), Detroit, Michigan – Senior Scientist responsible for planning and implementing scopes of work, coordinating with the client, and completing field activities including on and off-site characterization, notice of migration drafting, well installations, LNAPL recovery, monthly LNAPL checks, Part 213 semi-annual progress reports, biodegradation calculations, excavation planning and implementation, Final Assessment Report update and site closure activities. The site was granted closure with no further action required by EGLE.

Former Retail Gas Station, Romulus, Michigan – Senior Scientist responsible for completion of site characterization, soil and groundwater sampling, completion of a feasibility analysis of remedial options, and development and implementation of corrective actions including excavation oversight, dewatering activities and installation of an oxygen releasing compound (ORC) to complete bioremediation in the utility corridor where excavation was not feasible. A final report documenting site activities was submitted to EGLE. The project was completed for the State of Michigan through a Level-of-Effort (LOE) state contractor (MACTEC) project management program. A bid package was drafted and selection of trade contractors for the remedial activities was completed in accordance with EGLE requirements for the LOE contract.

Automotive Supplier Manufacturing Facility, Confidential Client, Rochester, Michigan – Senior Scientist responsible for planning and implementing the closure-in-place of three unregulated underground storage tanks (USTs) located beneath the active facility's interior floor. Soil sampling was completed around the USTs in accordance with *EGLE Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria* guidance. The facility maintained full production while the USTs were located, the concrete floor and steel tanks were accessed, the airspace inside the USTs were rendered inert and the USTs were cleaned before filling with concrete. To complete the project safely within the schedule and budget, continual coordination and

communication was required with plant personnel as well as innovative and evolving planning and implementation to ensure the facility's production schedule was not impacted.

Wayne State University, Detroit, Michigan – Staff geologist responsible for the coordination and completion of site characterization including collection of Shelby tubes, hydrogeologic evaluation and environmental assessment in accordance with Part 111 for a proposed RCRA TSDF.

Part 213 Investigations, Numerous Clients Michigan - Completion of EGLE Part 213 Leaking Underground Storage Tank Closure reports for sites with reported petroleum releases. Tasks completed included preparation of Interim Action Reports (IARs); supervision of UST removal activities; collection of verification of soil remediation samples; quarterly groundwater monitoring events and data evaluation, monthly LNAPL monitoring events, system operation and maintenance, development of corrective action plans, preparation of EGLE Part 213 Site Assessment, and preparation of Final Assessment Reports (FAR) for Tier I and II sites.

Phase I and II Environmental Site Assessments (ESA) - Numerous Clients, Michigan – Completion of Phase I and Phase II ESAs for residential, commercial and industrial clients within Southeast Michigan using ASTM standards and All Appropriate Inquiry (AAI) for site assessments. Additional scope of work for Phase I ESAs included wetland delineations where appropriate.

GEOTECHNICAL

Municipal Waste Landfill, City of Ann Arbor, Michigan – Senior Geologist responsible for overseeing the completion of a geotechnical and environmental investigation near the former maintenance building at the Ann Arbor Landfill in the summer of 2016. The building is slated for demolition and a new building for cart storage is scheduled to be built in its place. The objective of the drilling investigation was to determine if the soils met the geotechnical requirements for the proposed building if refuse was in the building footprint and what the groundwater concentrations in the area were. During the mobilization, it was determined that utilities were not marked, and a potential UST was located nearby. Ms. McCall was responsible for determining if the soil boring locations were clear from utilities and added an additional location near the potential UST to determine if impacts were observable with client approval. Additional responsibilities included coordination with subcontractors, review of the data, and coordination with the client, architectural firm and geotechnical experts to deliver a final letter report with building recommendations.

Fifth Avenue/Detroit Street and Liberty/First Street, City of Ann Arbor, Michigan – Senior Geologist responsible for overseeing the completion of geotechnical and environmental investigations in downtown Ann Arbor prior to road improvements and potential stormwater infiltration. The projects required coordination with the City of Ann Arbor to complete right-of-way permits and lane closures; Washtenaw County Environmental Health Division for drilling permits and with the Downtown Development Authority and Republic Parking Services to render parking spaces unavailable during drilling. A joint MISSDIG meeting was held with City of Ann Arbor utility personnel and various utility companies to determine the location and direction of utilities in the road. GPR was used to clear soil boring locations prior to drilling. In several instances, GPR identified additional underground infrastructure in the area and the locations were relocated with City utility personnel input. Following GPR, the upper five feet of each soil boring location was advanced by hand auger to ensure that utilities were not in the subsurface at each location. The scope of work required multiple mobilizations in order to accommodate City of Ann Arbor permit required time restrictions for working downtown, soil boring refusals, the 2016 election and a visit by the President of the United States that snarled area traffic. Each mobilization was coordinated with City of Ann Arbor personnel to ensure the appropriate permits and permissions were obtained. Safety was of the utmost importance during each mobilization of the project. Road signs were posted, and areas were cordoned off from the general public to limit potential hazards.

In addition to environmental sampling, Shelby Tubes were collected for permeability testing and a double ring infiltration test was completed on Liberty Street with assistance from City of Ann Arbor field personnel who excavated an area to five feet below ground surface. Drilling was completed with direct push technologies using a GeoProbe drilling rig. Field logs were completed and digitized using Bentley's gINT software for each soil boring location, including refusals. Digitized logs along with summaries of findings were provided to City personnel.

WATER SUPPLY

Previous Firm

Private Developers - Involved in several hydrogeological investigations to locate potable water for communities; including drilling oversight; collecting drinking water laboratory samples; completing aquifer pump and recovery tests; aquifer analysis and report preparation.

Gladwin Municipal Well Supply, Gladwin, MI – Staff Scientist responsible for drilling oversight for bedrock production well, completing both pump and recovery well tests, collecting drinking water laboratory samples and assisting project manager with aquifer analysis.

COMPLIANCE

Previous Firm

American Plastic Toys, City of Lansing, Michigan – Staff and Senior Scientist responsible for completing annual Tier II Superfund Amendment Reauthorization Act (SARA) reporting.

Various Firms, Southeast Michigan – Staff/Senior Scientist responsible for completing regulatory permitting for various clients in Southeast Michigan, including preparation of Spill Prevention Control Countermeasures (SPCC) and Storm Water Pollution Prevention Plans (SWPPP).

WETLAND AND ECOLOGICAL

Motor City Electric / DTE, Michigan 2024 – Ongoing. Project Manager and Permitting Specialist responsible for designing coal combustion residual removal prior to site development; design of a battery energy storage system (BESS) and associated substation. The project includes numerous lead disciplines completing civil and geotechnical engineering components for the site, stormwater permitting with the County and City, site development approval, soil erosion and sedimentation control (SESC) permitting with the City, Notice of Coverage permitting with the State of Michigan, soil sampling for thermal and electrical resistivities, permitting impacts to wetlands with EGLE and USACE. The project has included coordination with multiple stakeholders and required meetings with USACE, EGLE, City, County, client, electrical and structural engineering firm and the owner. Additional JPA amendments are in process for discharge to Slocum Canal for stormwater discharge and the County is nearing permit issuance of the stormwater and site design. The team is continuing to provide onsite surveying needs and as the project moves through construction, are providing construction oversight of the stormwater system.

BluEarth Renewables, Texas and Michigan 2024 – Ongoing. Project Manager and Permitting Specialist responsible for environmental services for a wind and solar project in Cochran County, Texas, and environmental constraints due diligence for a solar project in Michigan. The wind/solar project includes over 63,000-acres of private land and the solar project involved a 500-megwatt solar asset. Responsibilities included overseeing the execution of biological studies, constraints mapping, and regulatory permitting tasks essential for informing design and construction requirements. In Texas, Ms. McCall is coordinating comprehensive field surveys, including habitat assessments, aquatic resources evaluations, acoustic bat surveys, and avian and eagle use surveys, to identify sensitive environmental resources and potential constraints. Additional responsibilities included developing a constraints mapping strategy to assist in project siting and updated the regulatory compliance matrix to streamline permitting processes.

In Michigan, Ms. McCall has completed an environmental review of due diligence and environmental documents to assist in a potential purchase; including relaying information on 'yellow flag' and 'red flag' items for consideration. Ms. McCall's role ensures effective communication with the BluEarth team, adherence to project timelines, and compliance with local and federal regulations, ultimately supporting the successful advancement of both renewable projects.

Solar Energy Project, Confidential Solar Energy Company, Indiana 2023 – Ongoing. Permitting Specialist and Professional Wetland Scientist responsible for coordinating and completing a wetland and stream delineation and qualitative habitat analysis for a proposed 4,400-acre solar development in southern Indiana. Other responsibilities involve ongoing permitting and project support, ensuring compliance with environmental regulations and facilitating effective communication among stakeholders throughout the project lifecycle.

Blueprint for Coastal Wetlands, USFWS, Region 3 Midwest 2022 – Ongoing**.** Professional Wetland Scientist responsible for providing technical assistance to USFWS, practitioners and stakeholders, for creating a blueprint to restore coastal wetlands from the Saginaw Bay to Western Lake Erie. The project is defining goals, measurable objectives and actionable ways to improve coastal wetlands. The core group meets biweekly, with additional input from a working group of practitioners. Quarterly stakeholder meetings occur for additional feedback and course correction for the project flow.

River Rouge Decommissioning, DTE Energy, Michigan 2021 – Ongoing. Permitting Specialist and Wetland Scientist responsible for completing a wetland delineation, qualitative habitat analysis and permit matrix for the demolition contractor RFP. Additional responsibilities include reviewing existing permits; completing a USACE AJD walkdown and coordinating with EGLE. One offshore geotechnical JPA was submitted to complete soil borings in the river and permits were obtained from both USACE and EGLE. Further responsibilities include completing a JPA in support of the demolition and determining water flows for modifications to the NPDES permit activities associated with the decommissioning and demolition of an 840MW coal-fired power plant and attending numerous weekly meetings in support of the project. The Plant came online in 1956 and consisted of three units. The project team as the Owner's Engineer, has completed various surveys (environmental, site, geotechnical, and spatial), researched and assembled relevant record plant drawings, developed work scope packages consisting of specifications and drawings and compiled an RFP package.

St. Clair Decommissioning, DTE Energy, Michigan 2021 – 2024. Permitting Specialist and Wetland Scientist responsible for completing a wetland delineation, qualitative habitat analysis and permit matrix for the demolition contractor RFP for the decommissioning and demolition of a 1,547MW coal-fired power plant. The Plant consisted of seven units that came online between 1953 and 1969. The plant will cease electric power generation on May 31, 2022. Initial work scope development resulted in the need to separate assets and processes between St. Clair Power Plant and the adjacent Belle River Power Plant. Activities for this work included designing and installing a separate discharge line to the seal well and NERC fence installation to physically separate non-secure from secure areas. Both separation projects required wetland delineation, qualitative habitat and permitting impacts to wetlands and a drain crossing. A JPA was completed, submitted and implemented in 2023 and a permit from the St. Clair County Drain Commissioner was submitted and approved for the drain crossing. Additional local permit with East China Township has included electrical and plumbing taps into the water and sewer line. These required completing permitting applications, coordination with the local unit of government and the various contractors.

Trenton Channel Decommissioning, DTE Energy, Michigan 2020 – 2025. Permitting Specialist and Wetland Scientist responsible for completing a wetland delineation, qualitative habitat analysis and permit matrix for the demolition contractor RFP. Additional responsibilities include reviewing existing permits; completing a USACE and EGLE pre-application meeting, applying for and obtaining an offshore geotechnical JPA; demolition JPA; determining new water flows and removal of plant flows for a NPDES renewal permit associated with the decommissioning and demolition of the 550MW coal-fired power plant and attending weekly meetings. The Plant was built between 1924 and 1970 and consisted of nine steam turbine generator units. While eight units have been removed or are no longer in service, one unit remained in operation through May 2022 and much of the existing infrastructure for the other units are still standing. Within the span of a year, the project team, as the Owner's Engineer, worked to perform various surveys (environmental, site, geotechnical, and spatial), researched and assembled relevant record plant drawings and developed work scope packages consisting of specifications and drawings to compile in an RFP package. During RFP development, the team participated in weekly meetings and conducted several site visits to obtain a full appraisal of the scope of work. Currently a contractor has been selected and will be mobilizing for demolition activities. Construction support services will begin in April 2023, as will additional permitting support and contractor oversight.

Closed Landfill Site, Confidential Client, Michigan 2021 – Ongoing. Professional Wetland Scientist responsible for completing an EGLE joint permit application for proposed activities at the closed landfill, historically used for disposal of refuse associated with papermaking. Per- and polyfluoroalkyl substances (PFAS compounds) are present at the site at concentrations greater than the State of Michigan Generic Residential Cleanup Criteria. Ms. McCall is responsible for coordinating and managing the completion of annual spring and fall vegetation monitoring events within wetland restoration areas. Vegetation monitoring is ongoing.

Vault 44.01, Ohio 2024 – 2025. Permitting Specialist responsible for managing the preliminary development of Vault 44.01's Carbon Capture and Storage (CCS) project, which aims to construct and operate CO2 pipelines for four ethanol facilities in northeast Indiana and northwest Ohio. Primary responsibilities involved conducting a comprehensive Critical Issues Analysis (CIA) for two selected facilities in Leipsic and Marion, Ohio. This analysis included a high-level desktop review to identify potential environmental constraints, sensitive areas, and regulatory requirements within a 5-mile radius of each facility. Ms. McCall's team prepared detailed reports and matrices outlining potential permits, consultations, and approvals needed for the pipeline infrastructure, while also assessing biological, cultural, and archaeological resources. The CIA findings will guide route selection and development processes, ensuring compliance with local, state, and federal regulations as the project progresses toward its target in-service date.

Northstar Clean Energy, St. Clair County, Michigan 2023 – 2025. Permitting Specialist and Professional Wetland Scientist for coordinating and completing a wetland and stream delineation, qualitative habitat analysis and ultimately leading the permitting process for a 1,201-acre solar facility project in St. Clair County, Michigan, focusing on the layout that included reduction of impacts to wetlands and streams associated with the installation of access drives and collection lines. Responsibilities included coordinating the preparation of a JPA for submission to EGLE, which is forthcoming. Other

responsibilities included optimizing project layouts to minimize environmental impacts and facilitating communication with EGLE to expedite the permitting process. Ms. McCall also identified additional permitting requirements, such as SESC permits from the St. Clair County Drain Commissioner and coordinated with stakeholders to ensure all necessary documentation was prepared and submitted.

BKV Corporation, Colorado and Nebraska 2024. Permitting specialist responsible for providing regulatory support for BKV Operations' Carbon Capture and Sequestration (CCS) projects in Colorado and Nebraska. Responsibilities included preparing a Critical Issues Analysis (CIA) report for two prospective projects, which involved assessing environmental constraints, identifying permitting requirements, and developing permit matrices for each project. Ms. McCall facilitated consultations with regulatory agencies to refine the understanding of environmental and cultural survey needs and developed a comprehensive permit strategy to prioritize application steps, forecast timelines, and manage the permitting process effectively. The projects focus on capturing CO2 emissions from ethanol production facilities and transporting the gas via pipeline to injection wells for permanent sequestration. The team also prepared cost estimates for installation of the routing.

Silicon Ranch Corporation, Arizona 2024. Permitting Specialist responsible for managing the development support for Silicon Ranch Corporation's utility-scale solar project in Cochise County, Arizona. This involved overseeing a multi-phase project that included comprehensive land surveying, environmental due diligence, and geotechnical assessments across approximately 2,101 acres. Ms. McCall coordinated the execution of interdependent scopes of work: conducting initial land surveys using advanced techniques such as aerial LiDAR and topographic mapping, performing environmental assessments including Phase I Environmental Site Assessments and wetland delineations, and executing geohazard assessments to identify potential earth fissures. Other responsibilities included developing a detailed permitting plan, facilitating communication with regulatory agencies, and ensuring compliance with local, state, and federal regulations. Ms. McCall also provided ongoing support for rezoning applications and permitting processes, ultimately contributing to the successful planning and execution of the solar facility's development.

Freepoint Advanced Recycling Facility, Pennsylvania 2024. Permitting Specialist on a team, responsible for developing a comprehensive permitting plan that encompasses the review of federal, state, and local regulations in Pennsylvania, specifically for Schuylkill County, Mahanoy Township, and Mahanoy City. The permitting plan addressed hazardous materials programs, including the management of generation, transport, storage, and disposal of hazardous and recyclable materials, as well as non-hazardous waste handling. Additionally, the plan focused on water quality programs, which include discharge permits, stormwater controls, spill prevention measures, and soil erosion controls. The permitting plan outlines potential environmental and land use permits, regulatory triggers, issuing agencies, estimated applicability of each permit, and critical timing considerations with a summary of application requirements and next steps, ensuring compliance with all relevant laws and regulations.

Ford Romeo Engine Plant Decommissioning, Ford Motor Company, Michigan 2024. Permitting Specialist and Professional Wetland Scientist responsible for implementing a wetland delineation and EGLE Joint Permit Application for proposed activities related to soil borings for the decommissioning of the engine plant. A JPA was completed, submitted, and implemented in 2024.

Belle River, DTE Energy, Michigan 2024. Program Manager and Permitting Specialist responsible for completing a wetland delineation, qualitative habitat assessment and EGLE Joint Permit Application for proposed activities related to gas line integrity and installation of a pig launcher. Tetra Tech worked with DTE and their engineering design team to avoid and minimize impacts to the resources. Ms. McCall coordinated with and attended meetings between the client permitting specialist and the area EGLE wetland regulators through the MiEnviro pre-application process, to inform EGLE of the project resources, proposed development and avoidance and minimization strategies considered for natural resources. Tetra Tech completed the Joint Permit Application for structure installation with the least impacts possible. The permit was issued in March 2024.

Convergent Energy and Power, Michigan 2023 – 2024. Program Manager and Permitting Specialist responsible for assisting the client with a Critical Issues Analysis for numerous sites across Michigan. Responsible for consulting services to perform desktop due diligence, a permit matrix and constraints mapping for the potential development of BESS sites. Coordinated staff to identify environmental resources and land development issues that generally represent significant constraints to development.

Convergent Energy and Power, Michigan 2024 – ongoing. Project Manager and Permitting Specialist responsible for completing due diligence activities on a Lansing Board of Water and Light site in Delta Township for a BESS. Phase I and II ESAs were completed. Ms. McCall completed the special land use permit and coordinated with LBWL, CEP, and Delta Township personnel for completion of the permit and additional layout design requirements with the team. Ms. McCall attended planning commission meetings, and the SLUP is pending.

BlueWave Energy, Michigan 2023-2024. Program Manager responsible for detailed wetland delineation investigations and preparing comprehensive reports for multiple prospective solar development sites throughout Michigan. Responsibilities involved the systematic assessment of wetland boundaries and ecological functions, ensuring compliance with regulatory standards and providing critical data to inform project planning and design.

Apex Clean Energy, Multiple Sites, Midwest 2021 – 2024. Program Manager and Professional Wetland Scientist responsible for assisting the client with Phase I ESAs 1500-2500-acre sites in Michigan and Ohio. Additional assistance with asbestos survey of existing buildings prior to demolition was completed on one site.

Satellite Installation, Confidential Client, Michigan 2023. Permitting Specialist and Professional Wetland Scientist responsible for a comprehensive wetland delineation and preparing an EGLE Joint Permit Application for proposed impacts associated with the installation of satellite infrastructure. Collaborating closely with the client and their engineering design team, Tetra Tech employed best management practices to avoid and minimize impacts to wetland resources throughout the project. Our meticulous approach ensured that the Joint Permit Application was developed with a focus on achieving the least ecological disturbance possible. The permit was successfully issued in July 2023, facilitating the project's advancement while ensuring compliance with regulatory standards.

Menominee Gate Station, DTE Energy, Michigan 2023. Permitting Specialist responsible for preparation and submission of a Joint Permit Application for DTE's installation of a pig launcher and trap, along with the associated security fencing and access pathways within forested and emergent wetland areas. Collaborating closely with DTE and their engineering design team, Tetra Tech implemented strategies to avoid and minimize environmental impacts to sensitive resources throughout the project. Our comprehensive approach ensured that the Joint Permit Application was developed with a focus on achieving the least possible ecological disturbance. The permit was successfully issued in February 2024, facilitating the advancement of the project while adhering to regulatory requirements.

X-Elio Energy, Muncie, Indiana 2021 – 2022**.** Professional Wetland Scientist and Environmental Professional responsible for assisting with a proposed solar project, including delineation wetland and waters of the United States delineations, natural habitat assessments, completing technical reporting including wetland delineation reports, qualitative habitat analysis and Phase I ESA. Coordinated with USACE for site meeting to obtain a PJD.

Joy Road, DTE Energy, Michigan 2021-2022. Professional Wetland Scientist responsible for completing field surveys and a Joint Permit Application. DTE completed a new 5,000-linear foot gas installation along a forested wetland with stream crossings. Tetra Tech worked with DTE and their engineering design team to avoid and minimize impacts to the resources. Tetra Tech completed the Joint Permit Application for bore pits needed for horizontal directional drilling and the least impacts possible. The permit was issued in March 2022.

Blue Water Energy Center, DTE Energy, Michigan – Professional Wetland Scientist responsible for completing a Joint Permit Application and securing mitigation credits for the construction of the Blue Water Energy Center (BWEC) that will burn natural gas and utilize two steam turbine engines. The construction of the BWEC impacts 5.93 acres of emergent wetland. Mitigation was completed by purchasing credits through the State of Michigan's Mitigation Bank. Throughout the permitting process, Ms. McCall responded to EGLE requests and concerns raised by environmental organizations; including drafting two responses to letters received from environmental organizations. A follow-up rail off-loading area required a wetland delineation that was completed by Ms. McCall's team. The additional temporary impacts were added to the existing permit as an addendum and gained approval by EGLE. Two additional addendums were completed for a haul road and for the transmission line, which required negotiation for consideration of mitigation credits applied due to previous over-purchase.

Included in the impact area was the Sullivant's Milkweed, a state threatened species. Ms. McCall completed an application for and obtained an endangered species permit for relocating the species. Ms. McCall and her team coordinated with the subcontractor and oversaw the relocation of nearly 400 plants.

In addition to the wetland permitting responsibilities, Ms. McCall completed and obtained the St. Clair County Soil Erosion Permit and the State of Michigan's Notice of Coverage for impacts over 5 acres and renewed those permits. A wetland delineation and report were completed on an adjacent parcel for use in stockpiling excavated soils from the development. A grading plan was completed for the spoils pile. Ms. McCall has assisted DTE and the construction contractor with the St. Clair County Drain Commissioner's office to obtain the appropriate permits and participated in weekly calls in support of the ongoing needs of the project.

Construction activities began and additional needs were identified for the project, including extension of a railroad spur that included a temporary wetland impact. The permit was amended for this purpose. A haul road extension and transmission tower placement both required additional wetland delineation and EGLE coordination for an amended permit. The transmission tower

included impacts to regulated wetlands. Those wetlands required additional mitigation for which Ms. McCall was able to negotiate for use of previously over-purchased mitigation credits, saving time and money. Finally, a hydrostatic discharge permit was applied for and obtained after review of NPDES discharge options for the site.

Current site activities require additional stormwater management engineering, and construction of a maintenance road; both of which will require additional permitting support.

Capline Reversal Program, Marathon, Multi-state – Professional Wetland Scientist responsible for managing the completion of a four-state desktop assessment utilizing publicly available databases to assess the presence of historical, cultural and archaeological resources; federally and state threatened, endangered, proposed and special concern species; wetlands and water resources; natural resource areas; and public lands. Marathon will be reversing the flow of crude oil between Patoka, Illinois and St. James, Louisiana, requiring the uncovering and valve reversal/replacement at 30 locations. Results were summarized in tables and figures and shapefiles were provided.

Following the desktop assessment, two valves were identified for wetland delineation. Tetra Tech completed these delineations as well as additional locations surrounding these valves to determine alternative sites. Tetra Tech requested a JD from the Vicksburg, Mississippi United States Army Corps of Engineers (USACE) District, resulting in the need for a permit prior to beginning work. Tetra Tech also requested and obtained a PCN from the USACE New Orleans, Louisiana District. Finally, a site visit was requested and completed to determine locations for spoils piles, outside of wetlands and waterways, at a site in Tennessee.

National Grid Renewables, Numerous Sites, Michigan – Professional Wetland Scientist responsible for assisting the client manager with a portfolio of agricultural sites in Michigan proposed for solar development. Sites required Phase I and II ESAs, asbestos surveys, wetland and streams delineation, qualitative habitat analysis, project planning concurrence with EGLE; cultural resource surveys, DNR coordination for concurrence and technical reporting including Phase II ESAs, Due Care Plans, Ms. McCall coordinated with and attended meetings between the client permitting specialist and the area EGLE wetland regulators through the MiWaters/MiEnviro pre-application process, to inform EGLE of the project resources, proposed development and avoidance and minimization strategies considered for natural resources on each site. Water resource permitting, wetland bank mitigation coordination and public meeting support has been completed on select sites and is ongoing on others. Completed coordination with USFWS for emergent massassauga rattlesnake habitat preservation and individual take avoidance and minimization with best management practices and planning. Emergent bat surveys were completed to assist with tree felling out of season and specific species' surveys have been completed on other sites for avoidance planning.

AES, Multiple Solar Energy Sites, Michigan – Program Manager and Professional Wetland Scientist responsible for assisting the client with a Critical issues Analysis and environmental surveys as well as due diligence review of potential solar development purchase.

Midwest Solar, Multiple Sites, Michigan and Indiana – Professional Wetland Scientist responsible for assisting with a portfolio of projects, including wetland and waters of the United States delineations, natural habitat assessments, completing technical reporting including wetland delineation reports, fatal flaw analysis and critical issues analyses; identifying permitting needs at the federal, state and local levels, coordination with local permitting agencies and coordinating with EGLE personnel on wetland permitting needs.

MDOT, Ann Arbor, Michigan – Program Manager and Professional Wetland Scientist responsible for wetland delineation surveys in support of US-23 improvement work between M-14 and I-94 as well as additional lengths along I-94 for detours. The delineation included MDOT ROWs, interchanges and medians. Ms. McCall attends biweekly environmental-focused calls, and the field work requires adherence to strict MDOT safety requirements and delineation standards. A draft Environmental Assessment document was created in spring 2025 with Ms. McCall and her team contributing to the wetland and stream portions of the document, discussing impacts, functions and values of the resources. The project is ongoing.

Confidential Environmental Trust, Kalamazoo, Michigan – Professional Wetland Scientist responsible for overseeing the ecological resource aspects for the remediation of a Superfund site that requires excavation of PCB-containing materials and consolidation of the materials into an onsite landfill. The project will impact wetlands and require the relocation of approximately 1,000-feet of stream. Ms. McCall oversaw the completion of a site wetland delineation, qualitative habitat analysis and review of MNFI and IPaC findings. Additional responsibilities include participation in meetings with the engineering team for design assistance, completion of Joint Permit Applications, assistance with the Design Criteria Report, and coordination with City, EGLE, MDNR and USFWS personnel for site restoration requirements. Additional USFWS coordination for bat species was required for tree clearing in support of shoring installation necessary along the stream. The project is ongoing.

Confidential Environmental Trust, Saginaw, Michigan – Professional Wetland Scientist responsible for overseeing the ecological resource aspects for the remediation of LNAPL by installing a restrictive cap within a wetland and floodplain. Ms. McCall oversaw the completion of wetlands and waters of the United States delineation, a JPA for well installations and a second JPA for the remediation activities. The remedy for this project has been approved by EGLE personnel and the remediation JPA has been drafted and is under review by the Trust.

Confidential Environmental Trust, Baltimore, Maryland – Professional Wetland Scientist responsible for overseeing the completion of a wetland and waters of the United States delineation; and USACE and Maryland Department of Environmental Protection (MDEP) permitting requirements. The site is under remediation and a revetment along the surface water feature is required by the USEPA. Permit documents were prepared by the team and are under review by the Trust.

Confidential Solar Company, Multiple Sites, Michigan – Professional Wetland Scientist responsible for overseeing the completion of Phase I ESAs, desktop analyses, wetland delineations, qualitative habitat assessments, threatened and endangered species database information review and cultural desktop reviews. Ms. McCall was responsible for directing the team to complete the field and reporting tasks, technical review, client communication, invoicing and budgeting. Pre-application meetings are currently being coordinated, and agency coordination will be required.

Confidential Solar Company, Multiple Sites, Michigan – Professional Wetland Scientist responsible for overseeing the completion of Phase I ESAs, desktop analyses, wetland delineations, qualitative habitat assessments, threatened and endangered species database information review, permit matrices and completion of several reports. In addition, coordination with local units of government for client introduction was completed for multiple agencies and Ms. McCall was responsible for moderating the calls. Permitting at the state and local level is ongoing as is coordination with EGLE regulators for pre-application meetings.

Marion, Howell, Oceola and Genesee Utility Department (MHOG), Livingston County, Michigan – Professional Wetland Scientist responsible for completion of wetland and stream delineation and JPA in support of a water main installation in two areas of Livingston County. Combined the projects include several sections of horizontal directional drilling to accommodate resources, including under the Shiawassee River. Ms. McCall was responsible for coordinating with the engineering team to reduce impacts, determine alternative options for alignment where necessary and assist with restoration requirements. One project is permitted and the second is awaiting a permit from EGLE.

Gas Service Lines, DTE Energy, Michigan – Professional Wetland Scientist responsible for coordination with DTE personnel and team for completion of JPAs on several gas service line projects. In addition to the JPAs with EGLE, County soil erosion and sedimentation control permit applications and County Drain right-of-way permits were also completed where necessary. Ms. McCall provides technical review and client communication on these projects.

Fermi 2 General Service Water Dredging, DTE Energy, Michigan – Professional Wetland Scientist responsible for coordination with EGLE and Fermi 2 personnel; and completion of a Joint Permit Application for dredging necessary near the General Service Water Intake Canal at Fermi 2 to maintain plant operation. The sediment volume is permittable under a minor permit category and represents a shorter timeframe for permit approval.

Grosse Pointe Yacht Club, DTE Energy, Michigan – Professional Wetland Scientist responsible for coordination with USACE and EGLE to determine jurisdiction and permitting requirements for replacement of a 6-inch gas line that services the Grosse Pointe Yacht Club. The gas line crosses a canal in Lake St. Clair. Ms. McCall completed and was granted a permit from USACE in less than two weeks and determined that EGLE did not have jurisdiction under Part 325 Submerged Lands. The project also required a soil erosion and sedimentation plan and permit from Wayne County. Ms. McCall and her team completed the SESC plan, obtained engineering review, submitted plans and obtained the County permit.

Brady Road, Dearborn, DTE Energy, Michigan – Associate Geologist responsible for completing a soil erosion and sedimentation control plan in support of a gas line re-routing. The City of Dearborn requested the gas line be re-routed prior to their sanitary line replacement. The SESC plan was completed in two weeks to meet the City of Dearborn's schedule and required engineering review and coordination with DTE, the contractor and City of Dearborn. The SESC plan was submitted, and the project was placed on hold by City of Dearborn prior to plan approval.

Biogas support, DTE Energy, Wisconsin – Professional Wetland Scientist responsible for assisting the engineering team with corridor wetland delineations and Phase I ESA completion.

Green Infrastructure Support, Detroit Water and Sewerage Department, Michigan – Professional Wetland Scientist responsible for implementing wetland delineation investigations and reporting, coordination and site meetings with EGLE, oversight of geotechnical soil borings to evaluate lithology; assisting with overall conceptual wetland design planning and providing reviewing of planting success, maintenance needs and recommendations for existing sites.

Water Resource Recovery Facility, East Lansing, Michigan – Professional Wetland Scientist responsible for supporting the engineering team during groundwater dewatering necessary for the expansion of the WRRF. The WRRF is located within the Red Cedar River watershed and is surrounded by primarily forested, but also emergent floodplain wetlands. The dewatering was estimated to last up to one year. Ms. McCall was responsible for completing a groundwater monitoring plan that included installation of six piezometers in wetlands within the dewatering influence as demonstrated in the groundwater model, installation of one piezometer set as a control outside of the influence, collection of groundwater elevations from the piezometers, completion of a herpetofauna survey, collection of monthly tree measurements during the growing season, regular reporting to EGLE through the MiWaters database and determination of when irrigation may be necessary for the wetlands, if affected.

Dewatering was completed between December 2017 and September 2018. Monthly piezometer water levels were completed monthly between November 2017 and March 2018. Beginning in April 2018, measurements were collected weekly through September 2018 and monthly through December 2018. The area suffered drought conditions for two months of the summer. Static water level measurements, hydrographs and precipitation data were reported to EGLE monthly. Tree measurements were collected during the growing season between May and October 2018. A herpetofauna survey was completed in May and June 2018 that included dip-netting, a visual encounter survey, auditory detection surveys and incidental observations.

Results of the data collected during dewatering demonstrated that the wetlands were not impacted, and the ecosystem was thriving. The herpetofauna demonstrated the presence of four species of frogs and toads and two species of turtles during the dip-netting and visual encounter surveys. Several frogs were identified during the auditory survey and numerous frogs, tadpoles and a snake were documented as incidental observations.

The lithology and groundwater data demonstrated that the wetlands were surface water fed and relied on the fluctuations in the Red Cedar River for hydrology. A site visit was completed in October 2018 with EGLE personnel to inspect the health of the two wetland locations where piezometers were installed, and tree measurements were completed. The sites were found to be healthy and flourishing. Static water level measurements were recorded monthly through 2018 and the piezometers were abandoned in 2019 with EGLE approval.

Ranger Power, Solar Energy Company, Michigan – Professional Wetland Scientist responsible for implementing wetland and watercourse delineation of approximately 2,500 acres of primarily agricultural fields in November 2017. The project was completed within a week to accommodate the client's schedule and upcoming winter weather. GPS data was collected from the wetland and watercourse boundaries and provided in a GIS format for distribution. Final review of resource tables and Wetland Delineation Reports was completed.

Confidential Solar Energy Company, Illinois – Professional Wetland Scientist responsible for implementing a portfolio of projects that included due diligence investigations and reporting on 14 sites. Due diligence included completing a Wetland Delineation and reporting; Qualitative Habitat Analysis to determine the likelihood of threatened and endangered species habitat and reporting; and a Preliminary Cultural Resources Sensitivity Assessment and reporting that includes cultural/historical and archaeological desktop and site review. Desktop surveys were completed for each due diligence task prior to a site visit. Additional tasks include engagement with USACE for 'No Permit Required' and 'Preliminary Jurisdictional Determination' Letters; and engagement with the Illinois SHPO for review of cultural resources.

Confidential Solar Energy Company, Michigan – Professional Wetland Scientist responsible for implementing a portfolio of projects that included due diligence investigations and reporting on eight sites. Due diligence included completing a Phase 1 Environmental Site Assessment, reporting, updates and reliance letters; Wetland Delineation and reporting; Qualitative Habitat Analysis to determine the likelihood of threatened and endangered species habitat and reporting; and a Preliminary Cultural Resources Sensitivity Assessment and reporting that includes cultural/historical and archaeological desktop and site review. Desktop surveys were completed for each due diligence task prior to a site visit. Engagement with state regulators was included for permitting approvals.

Confidential Solar Energy Company, Michigan – Professional Wetland Scientist responsible for implementing a portfolio of projects that included rapid review of wetland and other natural resources on 48 properties ranging in size from 31 to 159 acres across the several counties in Michigan. The wetland transaction screens were completed to determine if sites were suitable for buildouts. A desktop survey was completed for each property prior to field investigation that included review of the federal and state databases: US Fish and Wildlife Services National Wetland Inventory (NWI), EGLE Final Wetland Inventory (FWI), Soil Survey Geographic Database (SSURGO) maps and USGS National Hydrography Dataset. An investigation was completed on

each site where suspect wetland areas were surveyed, and any other linear watercourse information was identified. Also included in the scope of work was information that would assist in determining if the site was suitable including topography, current land uses, dumping, debris, location of infrastructure (culverts, hydrants, etc.) and any other information that may be useful. The final product included figures documenting site findings. In select cases, wetland delineations were also completed.

St. Clair County Drain Commissioner's Office, Michigan – Professional Wetland Scientist responsible for reviewing a mitigation design implementation and providing a professional opinion including possible corrective action options. The mitigation requirement was due to an enforcement action of a private resident who mined peat from an emergent wetland and impacted a forested wetland. The Howe-Brandymore County Drain, which carries a large volume of water during storms, lies south of and adjacent to the property. Area homeowners downstream were continually flooded during large rain events. A consent agreement between EGLE, the private resident and the Drain Commissioner's Office was drafted to meet the requirements of the enforcement action by the private resident and allow flood storage into the property from the Howe-Brandymore Drain to alleviate flooding.

Review of the mitigation design indicated that the soil and hydrology of the site had been misinterpreted. Ms. McCall completed test pits on the site, a desktop study, communicated with EGLE enforcement and drafted two documents indicating that the site would be successful without modifications to the elevation in the basin. EGLE requested a water budget and demonstration that the site would be successful. Weekly surface water elevations were collected from across the site. EGLE reviewed the information provided by Ms. McCall in August 2015 and were largely in agreement with her findings and recommendations. A site meeting was held in September 2015 with stakeholders including EGLE to walk the site for potential modifications. A determination was made by EGLE to allow the site to progress with minimal modification to the elevation of the basin, providing a significant cost savings. EGLE completed an amendment to the Consent Agreement in January 2016, reflecting the minor modifications including a change in plantings to accommodate the elevation ranges. Plantings were completed in the spring of 2016 and the site progressed under the agreement that, if necessary, corrective action occurred in late 2017, following another full growing season when success could be reasonably documented.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior Hydrogeologist/Professional Wetland Scientist responsible for completing a JPA for remediation of heavy metals in soil. The area is the former sludge holding and drying lagoons for electroplating waste at a RCRA facility. A professional wetland delineation was completed in 2007 and updated in November 2013. Four acres of wetland were impacted during the shallow excavation. Excavation activities required extensive site coordination and construction sequencing to minimize the impacts to the larger natural resource and retain water from flowing into the excavation. Site restoration includes restoring the four acres and increasing the wetland footprint by another 0.75-acres by limiting backfill. This included expansion of the open water and emergent wetland. Seed mixes added include shrubs and trees allowing for a diverse habitat. Additional acreage, not required for remediation, was removed to enhance the existing wetland and to eradicate a large stand of the highly invasive *Phragmites australis*. The JPA was approved in November 2015 and excavation was completed in the winter of 2016-2017.

Macomb County Public Works, Ray Township, Michigan – Senior Hydrogeologist/Professional Wetland Scientist on a team of engineers and scientists reestablishing pre-settlement wetland functions for approximately 40 acres, stabilizing riverbank and establishing a forest canopy cover along the North Branch of the Clinton River corridor. The 40 acres chosen, have been agricultural fields in recent history but were wetlands historically. The project is a collaboration of Macomb County Public Works, Macomb County Planning and Economic Development, EGLE – Water Resources Division, US Fish and Wildlife Services, Huron-Clinton Metropolitan Authority (HCMA), Clinton River Watershed Council and Tetra Tech. Sites were chosen on based on highest likelihood of success. A design plan was implemented to reestablish wetland functions and implemented during the growing season of 2015. Ms. McCall completed a Quality Assurance Project Plan (QAPP) to determine how to assess the hydrology and wetland vegetation success. Slots were cut into PVC to create piezometers that were installed at the site. Tetra Tech staff taught HCMA personnel how to measure and record the data required per the QAPP to fulfill the reporting requirements of the grant.

Confidential Utility Company, Lower Peninsula, Michigan – Senior Geologist responsible for coordination and completion of several natural resource corridor assessments prior to utility pole replacement. The assessment included identifying locations and types of wetlands, streams, other sensitive areas or land uses, such as apiaries, farms, shooting ranges, etc. Depth and width of water crossings were documented and any other pertinent information that could be necessary for planning. The information was compiled in aerials using GIS and NWI information was included.

Canadian National Railway, Michigan – Senior Geologist on a team of scientists responsible for providing a GIS platform of CN's railways through Michigan's Lower Peninsula that includes locations of specific sensitive receptors. The database will provide end users the ability to determine what specific sensitive receptors are located along the rail line in the event of a derailment or spill. Information was obtained from the Michigan Natural Features Inventory (MNFI) for township, section and range information along the specific rail corridor that includes federal, and state threatened, endangered or special concern

species. The MNFI data, along with layers from NWI, Soil Survey Geographic Database (SSURGO) maps; State of Michigan mapped wetlands, Watershed boundaries, topography, protected properties (Tribal, state and federal public and private) and the CN Railway throughout Michigan marked with mileposts. Information provided through the Michigan State University Extension Well Viewer Program includes the location of all area mapped wells (household, irrigation, industrial, etc.) along with a database of the wells describing the depth, lithology, use, homeowner and construction. This work expanded to Ohio and Pennsylvania rail lines.

Mayberry Homes, Holt, Michigan – Senior Geologist responsible for completion of a wetland delineation on two lots using the United States Army Corps of Engineers (USACE) Manual to document the hydric soil indicators, wetland hydrology and plant communities. The project was accelerated to meet the client's schedule. The area was mapped by the State of Michigan's Final Wetland Inventory as containing forested wetland. Field findings and statistical analyses of the plant community indicated that the area was not a wetland. A letter report was provided to Mayberry Homes personnel for Township submittal. Mayberry Homes was able to obtain the necessary building permits and avoided a delay in the construction schedule.

Municipal Project, City of Lansing, Michigan – Senior Geologist responsible for coordination and completion of formal wetland delineation and stream identification activities along 5.25 +/- miles of a proposed non-motorized pathway in South Lansing. The pathway was proposed along a utility corridor to connect south Lansing to the Lansing River Trail for a total of 18.25 miles of non-motorized pathway that will eventually be connected to the Michigan State University campus. Ms. McCall oversaw field activities and coordinated and met with EGLE regulators for a pre-application meeting. The JPA was submitted in July and received approval in August 2013 to meet deadlines for federal funding requirements.

Municipal Project, Genoa Oceola Township, Michigan – Senior Geologist responsible for coordination and completion of formal wetland delineation and stream identification activities along 1.5+/- miles of a proposed sanitary sewer installation along Latson Road to connect two existing pump stations. The project was required to alleviate capacity issues along Grand River Avenue. In addition, Michigan Department of Transportation (MDOT) has a scheduled improvement project at the Latson Road interchange that would have required the relocation of the existing force main prior to the MDOT schedule. A JPA was submitted, and a permit granted for the regulated wetland and stream crossings in accordance with the accelerated schedule.

Canadian National Railway, Michigan – Senior Geologist on a team of scientists responsible for providing a GIS platform of CN's railways through Michigan's natural resources. The database will provide end users the ability to determine potential locations that require permitting or where mitigation banks are available in various watersheds. Layers include National Wetland Inventory (NWI) Cowardin types, National Wild and Scenic Rivers, SSURGO maps; State of Michigan mapped wetlands, Watershed boundaries, topography, Wetland mitigation banks and the CN Railway throughout Michigan marked with mileposts.

Confidential Client, Jackson, Michigan - Completed a site assessment for wetland locations in connection with the Grand River and provided assistance with determining test pit excavations on a former industrial property, to avoid wetland impacts in 2013. Following a remedial action plan and waste characterization for remediation, a formal wetland delineation was completed in April 2015. A JPA was completed following a pre-application meeting onsite with EGLE. Site restoration elements in the approved JPA included creation of 0.36-acres of mixed emergent, scrub shrub and forested wetland connected to a large forested and emergent riparian wetland system. The site restoration also removes invasive species and increases floodwater storage. Remediation activities began in the fall of 2016. During installation of the silt fence, additional waste was identified. A revision to the minor permit was completed and approved.

TransCanada, Ottawa and Kent Counties, Michigan – Senior Geologist on a team of scientists and engineers assisting with a 16.5-mile corridor wetland delineation and construction activities for removal and abandonment of a natural gas pipeline in Kent and Ottawa Counties. The project included evaluating workspaces to minimize wetland impacts, coordinating with USACE and EGLE for qualifying permit exemptions and facilitating both cultural and threatened and endangered species surveys to satisfy Federal Energy Regulatory Commission (FERC) requirements. A wetland delineation report was submitted to EGLE Wetland Identification Program, and an onsite meeting was held with EGLE wetland regulator. A pre-application meeting was held onsite to review changes in the project scope and determine the necessity of a JPA for stream impacts. The activities were exempt from the wetland permitting process.

Fermi 3 Permitting DTE Energy, Michigan – Senior geologist working with a team of scientists and engineers, responsible for assisting in alternative analysis and new construction building envelope options resulting in the least amount of wetland disturbance in conjunction with logistical, economic, environmental and project goals. Additional responsibilities included assistance with watershed analysis, planning and drafting a conceptual mitigation document, meetings with regulatory agencies, producing a Request for Additional Information document to the Combined Operating Licensing Application for submittal to the USACE and completing a Joint Permit Application (JPA) for EGLE and USACE submittal. The JPA was approved by EGLE in January 2012. The Nuclear Regulatory Commission permitted construction of the nuclear reactor in May 2015.

In accordance with the JPA process and to receive approval for a draft permit, mitigation was required for wetland impacts. An offsite parcel was necessary to achieve the mitigation acreage. After locating a suitable parcel, Ms. McCall was responsible for overseeing completion of a formal wetland delineation on a 210-acre agricultural field and regulatory concurrence using the state's Wetland Identification Program that included an onsite review by representatives from EGLE and USACE. Additional responsibilities included completion of geotechnical borings, direct push drilling and installation of piezometers, transducer installation, 12 weeks of water level gauging, stream gauging and transducer data download. Data was evaluated, and a report of findings was completed for use in determining the site's water budget for mitigation planning.

Automotive Manufacturing Facility, Confidential Client, Michigan – Senior project geologist responsible for coordination and completion of a formal wetland delineation and oversight and assistance of an approved screening level ecological risk assessment (SLERA) on the undeveloped portion of a 180-acre industrial property. Activities for the SLERA included sediment sampling with a mini-ponar, soil and surface water collection, database management, statistical analysis, reporting and coordination with both the state of Michigan and the USEPA Region V. A modified Baseline ERA Sampling Plan was submitted and approved by the state of Michigan. Specimens and soil were collected, and tissue sampling and analysis were completed. A bioaccumulation study, statistical analysis and final modified BERA were submitted and approved by USEPA and EGLE.

Municipal Project, Genesee County, Michigan – Senior project geologist responsible for coordination and completion of formal wetland delineation and stream identification activities along 5.5+/- miles of a proposed sanitary sewer alignment and completion of a Phase I ESA along the proposed corridor. Responsibilities also include alignment location and construction method recommendations for the project engineer in order to eliminate or minimize potential wetland or stream impacts; coordination with the state regulatory authority, attendance at a pre-application meeting with the state wetland regulator and completion of a JPA for the regulated wetland impacts. A permit was granted by EGLE in April 2012.

Golf Course Redevelopment, Ottawa Lake, Michigan – Senior project geologist responsible for completion of a wetland delineation and regulatory assessment within the state of Michigan's Wetland Protection Law. Four ponds on the property were proposed for either expansion or fill and a wetland connected to a county drain were identified. Attendance at an onsite pre-application meeting with EGLE personnel and changes in development planning resulted in a letter report to the state in lieu of a JPA providing the client significant cost and time savings.

Various Municipal and Commercial Projects, Southeast Michigan and Northwest Ohio – Senior project geologist responsible for coordination and completion of formal wetland delineations and assessment activities prior to construction activities. These delineations and assessments were necessary for determining building envelopes, construction and planning activities and regulatory requirements for both municipal and commercial developments ranging from bridge improvement and utility infrastructure improvements to golf course improvements.

Previous firm

Various Residential and Commercial Developments, Southeast Michigan – Senior scientist responsible for coordination and completion of formal wetland delineations throughout Livingston, Wayne, Ingham, Genesee, Oakland and St. Clair Counties in southeast Michigan. These delineations were required for both residential and commercial developments with properties ranging in size from less than an acre to greater than 100-acres. The majority of these delineations were reviewed and approved by EGLE as accurate.

Municipal Project, Sanilac County, Michigan – Senior scientist responsible for coordination and completion of formal wetland delineation and stream identification activities along 26+/- miles of a proposed water main alignment. Responsibilities also included alignment location and construction method recommendations for the project engineer in order to eliminate or minimize all potential wetland or stream impacts. The project was completed in two months; impacts were minimized to meet EGLE's general permit requirements and resulted in receipt of a permit within 30 days of submittal. The project fast-track was required to meet significant funding timelines.

Residential/Commercial Traditional Neighborhood Development, Howell and Fowlerville, Michigan – Senior scientist responsible for coordinating and completing annual wetland mitigation monitoring activities. Wetland mitigation included the creation of 1.41-acres of emergent wetland in addition to riffle and pool and meander stream construction along 800-feet of county drain. Monitoring activities included sampling along seven transects; data collection within 38 sample plots along the established transect lines; data analysis using the Floristic Quality Assessment; and statistical analysis to determine plant dominance, degree of wetness and diversity.

Lake Dredge, Brooklyn, Michigan – Senior scientist responsible for coordination with and attendance at an EGLE pre-application meeting to determine application needs and EGLE's concerns related to proposed lake dredging required for adequate boat access. Prior to the application process, access to open water of the lakefront property was dominated by aquatic bed wetland at shallow depths. Dredging of the aquatic bed was proposed. Responsibilities in addition to EGLE coordination, included preparation of an EGLE permit application detailing the project needs, alternatives analysis and design parameters.

Residential Development, Fenton Township, Michigan – Senior scientist responsible for coordinating and completing annual wetland mitigation monitoring activities. Wetland mitigation included the creation of 1.33-acres of emergent wetland at four separate locations within the development. Monitoring activities include qualitative sampling and data analysis using the Floristic Quality Assessment; and statistical analysis to determine plant dominance, degree of wetness and diversity within the four mitigation areas.

Residential Development, Burtchville Township, Michigan – Senior scientist responsible for completion of a formal wetland delineation required for resolution with EGLE and future sale of lots for residential development. Project specifics included delineation of a unique forested wetland system located on former lake beach and ridge land formations. The area was determined to represent a unique natural resource requiring additional protection from future development. The wetland delineation was approved by EGLE as accurate, and the owner received a wetland permit based on the delineation.

PUBLICATIONS AND PRESENTATIONS

McCall, P.J., Gillie, M.F., *Arsenic Oral Bioavailability and Site-Specific Direct Contact Criteria Development for Soils at a Former Orchard, Now City Park*; Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 25, 2022

McCall, P.J., Sweet, L.A., Rauss, A.D., *Update on In-Situ Groundwater Remediation of Heavy Metals at an Active Manufacturing Facility;* Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 25, 2016

McCall, P.J., Rauss, A.D., Naud, M., Warrow, A., Kinsman, L., *In-Situ Groundwater Remediation of a 1,4-Dioxane/Vinyl Chloride Mixed Plume Downgradient of a Municipal Landfill*; Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 23, 2016

McCall, P.J., Sweet, L.A., *In-Situ Groundwater Remediation of Heavy Metals at an Active Manufacturing Facility;* Remediation Workshop, Detroit, MI, September 9, 2015

McCall, P.J., Capodivacca, M., *Canadian National Railway Environmental Measures*; No-Spills Conference, Mt. Pleasant, MI, January 6, 2015

McCall, P.J., Rauss, A.D., Naud, M., Warrow, A., *In-Situ Groundwater Remediation of Vinyl Chloride Downgradient of a Municipal Landfill*; Ninth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 20, 2014

McCall, P.J., Rabideau, T.F., *Remediation Technologies*; No-Spills Conference, Traverse City, MI, January 7, 2014

McCall, P.J., Bagby, L.A., Blocker, J.E., *In-Situ Groundwater Remediation of Heavy Metals at an Active Manufacturing Facility;* Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 25, 2010

McCall, P.J., Moreira, N.F., Walter, L.M., Vasconcelos, C., McKenzie, J.A., *Role of Sulfide Oxidation in Dolomitization; Sediment and Pore-water Geochemistry of a Modern Hypersaline Lagoon System*. Geological Society of America

McCall, P.J., Szramek, K., Walter, L.M., *Arsenic Mobility in Groundwater/Surface Water Systems in Carbonate-rich Pleistocene Glacial Drift Aquifers (Michigan)*. Applied Geochemistry

McCall, P.J., Szramek, K., Walter, L.M., *Arsenic Sources and Sinks in a Surface Water/Groundwater System: Tracking Recharge to Discharge in Glacial Drift Deposits (Hell, Michigan)*. Geological Society of America Annual Conference

Moreira, N.F., McCall, P.J., Walter, L.M., *Hydrogeochemistry of a Modern Dolomite-forming Lagoon System (Cabo Frio-Rio de Janeiro, Brazil): Role of Sulfide Oxidation*. J.A. Goldschmidt Annual Conference

McCall, P.J., *Geochemistry of the Inland Steel Landfill Groundwater: A Preliminary Investigation*. Presented to Law Environmental Consulting Firm, Atlanta, Georgia

Capodivacca, M., T.F. Rabideau, P.J. McCall, A. D. Rauss, J. Peters, and B. Spiking, *New Tools for Real-Time Decision Making and Risk Management;* 17th Railroad Environmental Conference, Urbana, Illinois, 2015.

SPECIALIZED ECOLOGICAL TRAINING

"Michigan Rapid Assessment Method (MiRAM) Training 2015", Woldumar Nature Association, Lansing, MI, August 26-27, 2015 (16 hours)

"Hydric Soils," Michigan Wetlands Association, Hastings, Michigan, October 1-2, 2013 (16-hour)

"Army Corps of Engineers Wetland Delineation and Regional Supplement Training," Richard Chinn Environmental Training, Inc., 2011 (38-hour)

"Planning Hydrology, Vegetation, and Soils for Constructed Wetlands," Wetland Training Institute, Hickory Corners, Michigan, 2010 (40-hour)

"Botany," Matthaei Botanical Gardens, University of Michigan, 2009

"Exploring Michigan's Rare Wetlands," Michigan Department of Environmental Quality, 2009

"Identifying Woodland Wildflowers" The Stewardship Network, 2008

"Plant ID Course", Matthaei Botanical Gardens, University of Michigan, 2008

"Wetland Flora," Institute of Botanical Training, LLC, Hastings, Michigan, 2005 (32-hour)

"Asters and Goldenrods," Matthaei Botanical Gardens, University of Michigan, 2005

"Winter Botany," Matthaei Botanical Gardens, University of Michigan, 2004

"Spectacular Wildflowers," Matthaei Botanical Gardens, University of Michigan, 2004

"Fall Grasses," Matthaei Botanical Gardens, University of Michigan, 2004

"Spring Flora," Matthaei Botanical Gardens, University of Michigan, 2003

"Small Trees and Shrubs," Matthaei Botanical Gardens, University of Michigan, 2003

"Sedges," Matthaei Botanical Gardens, University of Michigan, 2003

"Orchids of Michigan," Matthaei Botanical Gardens, University of Michigan, 2003

"Michigan's Land and Water Permits Workshop," Michigan Department of Environmental Quality, 2003

"Wetland Delineation in Michigan," Matthaei Botanical Gardens, University of Michigan in cooperation with Michigan Department of Environmental Quality, US Department of Agriculture, Natural Resource Conservation Service, and the US Army Corps of Engineers, Detroit District, 2003 (40 hour)

SPECIALIZED TRAINING

"A-1i Stormwater Management Industrial Site Operator", Certificate number I-13447, EGLE, April 13, 2015

"Laser Induced Fluorescence Workshop: by Randy St. Germain, Dakota Technologies hosted by American Institute of Professional Geologists, June 18, 2013

"Power of Partnership" Conference by American Institute of Professional Geologists, June 19 and 20, 2013

"Green Infrastructure & Stormwater Management Series: Advocacy, Engineering and Plant Selection" The Huron Arbor Cluster of the Stewardship Network, October 2, 9 and 16, 2012

"Light Nonaqueous-Phase Liquids (LNAPLs): Science, Management and Technology" The Interstate Technology and Regulatory Council, October 16 and 17, 2012

"Light Non-Aqueous Phase Liquid (LNAPL) Workshop" Michigan Department of Environmental Quality and American Institute of Professional Geologists, June 20 and 21, 2012

Canadian National Railroad, On-Track-Safety, 2011 to present

"Access Beginning" Washtenaw Community College, 2009

"Access Intermediate" Washtenaw Community College, 2009

Project Management Training – Level 1 and 2, Tetra Tech, 2009

Tetra Tech Technical Writing Training Course, Tetra Tech, 2009

Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM, 2007

A Systemic Approach to Groundwater Capture Zone Analysis, U.S. Environmental Protection Agency, 2007

"Contractor - Local Government Workshop," EGLE, Land and Water Management Division, 2005

"2005 Consultant Workshop," EGLE, Land and Water Management Division, 2005

"Understanding and Accelerating Remediation of Contaminated Groundwater," Regenesis, 2004

ECOLOGICAL VOLUNTEER EXPERIENCE

Volunteer participant for many on-going projects including the following:

- Member of the Technical Advisory Committee (TAC) reviewing HRWC's Water Quality Monitoring Program offering input on the technical and scientific aspects of the program structure and goals, sampling strategy, site selection and analytical approach. (2014)
- Participant in the Annual Stream Measuring and Mapping of creeks and rivers in the watershed – Field collection of bank structure, channel and streambed data, patterns of flow, stream velocity and discharge calculations to provide overall ecological habitat quality (2007 to present).
- Stream gauging and water quality data collection – Captain of the biweekly assessments of Honey Creek, including stream flow gauging, and water chemistry and quality data collection. Data is used to determine e. coli concentrations and phosphate load carried by Honey Creek and the total maximum daily loading to the Huron River (2007 to present).
- Team Leader in the Annual Stonefly Collection – Collection of stoneflies from watershed streams in creeks annually in January used in assessing the health or degradation of the waterbody (2006 to present).
- Team Leader in the Semi-annual River Roundup – Collection of benthic macroinvertebrates in watershed streams and creeks used in assessing the ecological diversity and function of the macroinvertebrates in the stream or creek (2006 to present).
- Surveyor - Bioreserve Project: Rapid Ecological Assessment of Natural Areas in the Huron River Watershed – Field identification and assessment of the remaining natural, undeveloped lands in the watershed. Data collection included categorizing undeveloped land and surrounding areas by ecosystem, habitat and function, and prioritizing undeveloped property for field assessment and protection (2007 and 2008).
- Plant Expert in the Bioreserve Field Assessment of Natural Areas in the Huron River Watershed – Field assessment of wetlands, forests, grasslands and creeks for plant identification; vegetation structures, including tree size distributions, native vs. invasive species distribution; soil identification; signs of human disturbance; stream bank and water quality data. Data collected is scored to aid in determining the preservation ranking (2008).
- Participant in fundraising events and education awareness projects including Suds on the River and the Miller's Creek Film Festival (2007).

TETRA TECH

Alison Rauss
Senior Project Scientist

EXPERIENCE SUMMARY

Ms. Rauss has more than fifteen years of experience performing groundwater and soil sampling, database management, wetland delineations and permitting assistance, contractor oversight, Phase I Environmental Site Assessments (ESAs) and various aspects of report and proposal preparation. She is knowledgeable in Arc GIS and numerous field sampling and monitoring equipment. Ms. Rauss has worked on various projects including soil and groundwater remediation sites, landfill gas, groundwater and wastewater monitoring; and ecological risk assessment sites. Ms. Rauss has experience throughout Ohio and Indiana performing continuous watershed monitoring and sampling, following strict data management practices.

EDUCATION

MLA, Landscape Architecture
University of Michigan
Ann Arbor, Michigan

BS, Anthropology/Zoology
University of Michigan
Ann Arbor, Michigan

TRAINING/CERTIFICATIONS

8-Hour HAZWOPER Refresher, 29 CFR 1910.120 (e)(8) OSHA, 2010 to present

40-Hour HAZWOPER Training + 24-Hours of Field Training, 29 CFR 1910.120 OSHA, 2009

Adult First Aid, CPR, and AED certified, 2010 to present

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

Fifteen

YEARS WITHIN FIRM

Fifteen

RELEVANT EXPERIENCE

LANDFILL/WASTEWATER TREATMENT PLANT

Municipal Waste Landfill, Ann Arbor, Michigan – Senior Project Scientist responsible for overseeing completion of groundwater, wastewater and gas sampling events on a quarterly basis, methane collection system operations, database management, wastewater discharge mass balance calculations and preparation of quarterly reports. As a Staff Scientist, Ms. Rauss was the field lead responsible for all environmental sampling and reporting requirements at the landfill.

Other activities completed during the contract period include landfill inspections, a leachate outbreak investigation and landfill cap repair work plan preparation, installation and final report; assistance with the USEPA greenhouse gas mandatory reporting requirements, assistance with the Industrial User Permit (IUP) renewal application and negotiation of reduced sampling requirements and outfalls, assistance with the bioremediation pilot test and historical review and successful completion of a report to document proper closure of Phase I, which was granted in July 2012.

Ms. Rauss also provided assistance with the offsite Remedial Action Plan (RAP) preparation. Tasks related to the RAP submittal include assisting with presenting findings to the Remediation Advisory Team at MDEQ; assisting with a revision of the hydrogeological monitoring plan that was approved and implemented in 2015, reducing the frequency of monitoring; assisting with a well abandonment plan in 2015 to reduce the number of wells significantly, and assisting with coordinating a drilling investigation to reduce the number of property owners requiring a restrictive deed covenant (RDC) on their property by 66%. Letters of intent to sign RDCs were obtained from the remaining properties with the exception of one. City of Ann Arbor personnel are currently reviewing options for alternatives in lieu of RDC. LE personnel Tetra Tech and the City of Ann Arbor began drafting a city ordinance to restrict the use of groundwater for drinking water purposes and provide a way to track impacted sites in the City. The Michigan Department of Transportation (MDOT) issued an Environmental License Agreement in September 2017, which restricts the use of groundwater and notifies workers of impacts in the MDOT right-of-way.

In 2016, the MDEQ temporarily reduced the drinking water criteria for 1,4-dioxane significantly to 7.2 from 85 micrograms per liter. This resulted is a lack of delineation north of the landfill. A 1,4-dioxane delineation investigation plan was drafted for MDEQ approval in June 2016 by Tetra Tech that was approved in August 2016. The plan was implemented in the summer of 2017 and the plume has been delineated with the new criteria. In 2019, EGLE requested additional groundwater sampling and additional wells were installed in 2020 to delineate the plume with the new criteria. The RAP is currently being updated to include changes associated with these changes to 1,4-dioxane drinking water criteria, PFAS and a final solution for the RDC or change in City ordinance. The MDOT ELA was re-permitted in 2023 to include the expanded area and markers were added.

PFAS Sampling, City of Ann Arbor, Michigan – Senior Project Scientist responsible for collecting samples for PFAS for the drinking water at the water treatment plant, influent at the wastewater treatment plant and five wastewater outfall locations at the Ann Arbor Landfill. Samples were collected using PFAS-free materials and the data was analyzed for 24 PFAS materials using method 537 modified, with stable isotope dilution. Data tables and flow rates were prepared for use by City of Ann Arbor personnel.

Capture Zone Analysis at Municipal Waste Landfill, Ann Arbor, Michigan – Staff Scientist who assisted in aquifer analysis data collection for the Capture Zone Analysis that resulted in a significant cost savings to the city of Ann Arbor by allowing one

extraction well to be turned off. The field work consisted of three recovery tests, one pump test and a site wide evaluation of groundwater elevations in a non-pumping state. A modification to the IUP was completed and approved by the City of Ann Arbor to reduce the sampling requirements of the extraction well. he CZA was updated in 2019 to include the regulatory changes in the 1,4-dioxane drinking water criteria, the replacement of two extraction wells, additional lithological data and recent analytical results.

Livingston County Landfill, Howell, Michigan – Senior Project Scientist responsible for overseeing completion of groundwater and gas sampling events and associated reporting requirements. As a staff scientist responsible for performing methane monitoring and semi-annual groundwater sampling on a closed landfill.

Petoskey Landfill, Petoskey Michigan – Senior Project Scientist responsible for overseeing completion of annual groundwater and sampling events and associated reporting requirements. As a staff scientist responsible for performing groundwater sampling on a closed landfill.

Genoa Township WWTPs, Genoa Township, Michigan – Staff Scientist responsible for performing annual groundwater sampling, report and table preparation, and figure creation in GIS.

Hartland WWTP, Hartland, Michigan – Staff Scientist responsible for performing groundwater, surface water and soil sampling; and assisting in the preparation of reports and tables.

SITE CHARACTERIZATION AND REMEDIATION

Crest Road, Ann Arbor, Michigan – Senior Project Scientist responsible for assisting with a Phase II ESA. Historical documents were reviewed to develop a site investigation plan. Soil borings were completed, the data analyzed and a report of findings completed.

Confidential Client, Southeast Michigan – Senior Project Scientist responsible for assisting with review of historical data, developing a Phase II ESA investigation on a leased portion of a parcel for communications and utilities and Phase II ESA reporting.

Geotechnical and Environmental Contract, City of Ann Arbor, Michigan – Senior Project Scientist responsible for assisting with Liberty/First/Ashley and Detroit/Fifth Street road improvement projects including completion of lane closure, right-of-way and meter bag parking agreement applications for the City of Ann Arbor and non-potable well permit application for Washtenaw County Department of Public Health, Environmental Health Division; and quality control and quality assurance review of data and digitized soil boring logs.

415 W. Washington, Ann Arbor, MI – Project Scientist responsible for coordinating and completing Phase I and Phase II ESAs and planning estimates for remediation on the City of Ann Arbor's former location of the Parks and Recreation Department. The property is a leaking underground storage tank (LUST) site and contains infrastructure from a former soil vapor extraction/air sparge (SVE/AS) system. Activities for the Phase II ESA included locating previous groundwater monitoring wells and sampling, a subsurface drilling investigation for soil sampling, temporary well installation for groundwater samples and installation of permanent groundwater wells.

Senior Project Scientist responsible for assisting with brownfield redevelopment application information, developing a Phase II ESA to update the site findings 8 years after the initial investigation and assisting City personnel and SmithGroup with reuse options of select building materials. Groundwater monitoring was completed on the existing network and additional monitoring wells have been installed. Tetra Tech has completed a notice of migration for the parcel north, In addition, Tetra Tech completed an investigation to the west and south, identifying a potential plume migrating onsite. Tetra Tech has been working with City, County and EGLE personnel to identify groundwater issues and a letter containing findings of the site investigation and next steps was provided to City administrators. Tetra Tech assisted with drafting a brownfield plan with remediation options for approval by the Washtenaw County Brownfield Redevelopment Authority to pre-entitle the property. The buildings have since been demolished.

Wastewater Treatment Plant Expansion Assistance, City of Saline, Michigan – Senior Project Scientist responsible for assisting with Phase II ESA investigation reporting. Assisted with drafting a work plan to close the existing lagoon that was no longer needed. The plan was approved and implemented in the summer of 2024. Soil and riprap sampling above the clay liner was required for waste characterization, the clay liner was sampled and characterized for removal and demonstration below the clay liner was required to ensure the liner was intact. Following removal of the lagoon, a closure report was submitted and approved conditionally. Negotiations with EGLE in 2024 resulted in the need to install three monitoring wells and sample three quarters of groundwater data below applicable criteria for PFAS parameters to achieve final closure. Well installation is expected in spring 2026.

Automotive Manufacturing Facility, Confidential Client, Michigan – Staff and Project Scientist responsible for groundwater and soil sampling, data management in excel and GIS and assistance with the preparation of reports, tables and figures. Tasks completed for a variety of ongoing remediation projects including air sparge, soil vapor extraction and chemical oxidation.

Automotive Manufacturing Facility, Confidential Client, Michigan – Staff and Project Scientist responsible for completing monthly groundwater sampling and data analysis to monitor the effectiveness of chemical oxidation injections to remediate heavy metals (chiefly hexavalent chromium and nickel) from the groundwater. The site is successfully being remediated through interim actions, removing the need to implement large-scale infrastructure that would be necessary for a pump and treat system, originally planned for the corrective measure. Completing chemical oxidation has created a cost savings for the client while attaining cleanup objectives in a shorter timeframe. Due to site and time constraints and the active nature of the facility, the work has required a great deal of coordination between parties and production schedules.

Confidential Client, Michigan – Performed quarterly groundwater sampling using modified high-flow techniques to collect water samples for laboratory analysis of various parameters. A submersible pump was used to purge the well, and an MP20 water quality meter was used to collect and record water quality parameter readings.

Canadian National Railroad, Detroit, Michigan – Project Scientist responsible for assisting with surveying, preparation of reports and data tables during remediation activities for a LUST site with light non-aqueous phase liquid (LNAPL) impacts. After completing a Focused Feasibility Study, excavation activities were completed. A closure report was submitted and MDEQ granted closure.

Confidential Environmental Trusts, Michigan – Project Scientist and Senior Project Scientist responsible for assisting with tasks related to multiple sites in Michigan that are owned and managed by various Environmental Response Trusts. The sites generally have groundwater extraction and treatment systems that are operated by Tetra Tech staff. Responsible for assisting with monthly air and quarterly compliance reporting requirements, data review and environmental sampling coordination for field staff. Assisted with groundwater sampling events and aquifer analysis field activities.

Municipal Waste Landfill, Ann Arbor, Michigan – Project Scientist responsible for coordination of a bioremediation pilot test on a vinyl chloride plume, including attainment of city and county permits, project planning, meeting attendance with city personnel, subcontractor coordination, completion of additional groundwater sampling and methane monitoring as requested by the MDEQ both pre and post-injections, pre-injection genetic micro-organism sampling and bioaugmentation of the aquifer by injecting microbial organisms. A manifold system was used to inject EOS from 55 gallon drums followed by a water flush using the city's hydrant. Follow-up sampling to determine the success of the pilot test has demonstrated complete dechlorination of vinyl chloride to ethene and significant mass removal.

In December 2015, three pilot tests were completed in Southeast Area Park to determine potential remediation options for the co-mingled plume of 1,4-dioxane and vinyl chloride. Two in-situ amendments; bioavailable absorbent media (BAM) and PeroxyChem Klozur® persulfate and PermeOx® Plus were used individually and as a combination of both solutions to determine if chemical oxidation is a viable remedial option. The pilot tests were completed within the influence of the capture zone analysis and groundwater sampling continued regularly through April 2016. Results indicate that both in-situ amendments are capable of oxidizing the contaminants and the BAM appears to have triggered a biological reaction that is contributing to sustained reduction of contaminants. As a Project Scientist, Ms. Rauss was responsible for assisting with planning and coordinating the work, analyzing the data and presenting the information to the client. Ms. Rauss is currently assisting the project team in reviewing information from all pilot tests completed for the Ann Arbor landfill to provide recommendations for treatment moving forward.

St. Clair Boat Harbor, St. Clair, Michigan – Staff Scientist responsible for completing routine groundwater sampling using an innovative approach for enhanced bioremediation. Assisted with preparation of tables, figures and reports. Closure for this site was granted by the MDEQ in February 2011.

Visteon Systems, L.L.C., Connersville, Indiana – Staff Scientist responsible for performing quarterly groundwater sampling to monitor performance of in-situ groundwater bioremediation systems. Assisted with preparation of reports and data tables.

Ypsilanti Community Center, Ypsilanti, Michigan – Staff Scientist responsible for free product monitoring and groundwater sampling related to a former LUST. Site closure is pending filing of restrictive covenant by the township attorney.

ECOLOGICAL

Gas Service Lines, DTE Energy, Michigan – Senior Project Scientist responsible for assisting with completion of JPAs and soil erosion and sedimentation control permit applications (where necessary) on multiple gas service line projects.

Blue Water Energy Center, DTE Energy, Michigan – Senior Project Scientist responsible for assisting with completing a Joint Permit Application for the construction of the new facility that will burn natural gas and utilize steam turbine engines. The proposed construction of the New Generation Facility will impact 5.93 acres of emergent wetland. Mitigation was be completed through the purchase of credits from the State of Michigan's Mitigation Bank.

Confidential Environmental Trust, Kalamazoo, Michigan – Senior Project Scientist responsible for assisting with the completion of a site wetland delineation for submittal of JPA on a Superfund Site. The project will impact wetlands and require the relocation of approximately 1,000-feet of stream.

Confidential Renewable Energy Company, Michigan – Senior Project Scientist responsible for assisting with desktop surveys and deliverables on a project that included rapid review of wetland and other natural resources on 34 properties ranging in size from 31 to 159 acres across several counties in Michigan. The wetland transaction screens were completed to help determine

if sites were suitable for buildouts. A desktop survey was completed for each property prior to field investigation that included review of the federal and state databases: US Fish and Wildlife Services National Wetland Inventory (NWI), MDEQ Final Wetland Inventory (FWI), Soil Survey Geographic Database (SSURGO) maps and USGS National Hydrography Dataset. An investigation was completed on each site where suspect wetland areas were surveyed and any other linear watercourse information was identified. Also included in the scope of work was information that would assist in determining if the site was suitable including topography, current land uses, dumping, debris, location of infrastructure (culverts, hydrants, etc.) and any other information that may be useful. The final product included figures documenting site findings. In select cases, wetland delineations were also completed.

Confidential Solar Energy Company, Michigan – Senior Project Scientist responsible for assisting with GIS figures for a portfolio of projects that included due diligence investigations and reporting on eight sites. Due diligence included completing a Phase 1 Environmental Site Assessment and reporting; Wetland Delineation and reporting; Qualitative Habitat Analysis to determine the likelihood of threatened and endangered species habitat and reporting; and a Preliminary Cultural Resources Sensitivity Assessment and reporting that includes cultural/historical and archaeological desktop and site review. Desktop surveys were completed for each due diligence task prior to a site visit. It is expected that additional engagement with federal and state authorities will be required.

Confidential Client, Battle Creek, Michigan – Project Scientist responsible for completing weekly post-construction wind turbine mortality surveys for birds and bats. Field activities included walking transects within a pre-determined search plot and searching for bird and bat carcasses. If a specimen was discovered, identifying information was documented, photographs were taken and the carcass location was recorded using a handheld GPS unit.

Millers Creek Sediment Sampling, Ann Arbor, Michigan – Project Scientist responsible for coordinating physical and quality sampling analysis, completing stream sediment sampling and a letter of findings report completing physical analysis testing demonstrated primarily sand particles in the creek, saving the client additional funding that would have been used for extensive laboratory analysis for quality or contaminants.

Consumers Energy, Lower Peninsula, Michigan – Project Scientist on a team of scientists, responsible for several natural resource corridor assessments prior to utility pole replacement. The assessment included identifying locations and types of wetlands, streams, other sensitive areas or land uses, such as apiaries, farms, shooting ranges, etc. Depth and width of water crossings were documented and any other pertinent information that could be necessary for planning. Ms. Rauss assisted with compiling the information, including aerials and National Wetland Inventory (NWI) information in GIS for final production.

St. Clair County Drain Commissioner's Office, Michigan – Project Scientist responsible for assisting with review of the implementation of a mitigation design. The mitigation requirement is due to an enforcement action of a private resident who mined peat from an emergent wetland and impacted a forested wetland. The Howe-Brandymore County Drain, which carries a large volume of water during storms, lies south of and adjacent to the property. Area homeowners downstream were continually flooded during large rain events. A consent agreement between the MDEQ, the private resident and the Drain Commissioner's Office was drafted to meet the requirements of the enforcement action by the private resident and allow flood storage into the property from the Howe-Brandymore Drain to alleviate flooding. Ms. Rauss assisted with the completion of water budget calculations and graphics for the most recent 10 year precipitation and evaporation history.

Automotive Manufacturing Facility, Confidential Client, Michigan – Project Scientist responsible for assisting with the completion of a Joint Permit Application (JPA) for remediation of heavy metals in soil. The area is the former sludge holding and drying lagoons for electroplating waste at a RCRA facility. A professional wetland delineation was completed in 2007 and updated in November 2013. Four acres of wetland will be impacted during the shallow excavation. Excavation activities require extensive site coordination and construction sequencing to minimize the impacts to the larger natural resource and retain water from flowing into the excavation. Site restoration includes restoring the four acres and increasing the wetland footprint by another 0.75-acres by limiting backfill. This will include expansion of the open water and emergent wetland. Proposed seed mixes include shrubs and trees allowing for a diverse habitat. Additional acreage, not required for remediation, will be removed to enhance the existing wetland to eradicate a large stand of *Phragmites australis*; a highly invasive plant. The JPA was approved in November 2015 and excavation was completed in the winter of 2016-2017.

Confidential Client, Jackson, Michigan – Project Scientist responsible for assisting with a wetland site assessment along the Grand River. Following a remedial action plan and waste characterization for remediation, a formal wetland delineation was completed in April 2015. A JPA was completed following a pre-application meeting onsite with the MDEQ. Site restoration elements in the approved JPA included creation of 0.36-acres of mixed emergent, scrub shrub and forested wetland connected to a large forested and emergent riparian wetland system. The site restoration also removes invasive species and increases floodwater storage. Remediation activities began in the fall of 2016.

Confidential University, Michigan – Project Scientist responsible for completing sampling and analysis of city-treated potable municipal water and the University's domestic hot water supply for multiple parameters at several locations across a university and hospital campus. Samples were submitted for laboratory analysis and analyzed in the field using a HACH instrument, UV light meter, YSI meter and pH/temperature/conductivity meter. Responsible for coordinating sampling with university and hospital personnel. The study was to evaluate the characteristics of the treated municipal water in order to provide future recommendations for a water treatment approach that would reduce plumbing system component deterioration and failures.

Automotive Manufacturing Facility, Confidential Client, Michigan – Staff Scientist assisted on a formal wetland delineation, GPS survey and screening level ecological risk assessment (SLERA) on the undeveloped portion of a 180-acre industrial property. Activities for the SLERA included sediment sampling with a mini-ponar, soil and surface water collection, database management and reporting. The SLERA was accepted and a Baseline Ecological Risk was requested by the State for terrestrial mammals.

Enbridge Oil Release, Marshall, Michigan – Staff Scientist on the Submerged Oil Task Force. Responsible for field data management, assisted with entry and sampling of the sediment core samples collected along the Kalamazoo River.

Golf Course Redevelopment, Ottawa Lake, Michigan – Staff Scientist assisted with wetland delineation and regulatory assessment within the state of Michigan's Wetland Protection Law.

Municipal Project, Genesee County, Michigan – Staff Scientist assisted with completion of formal wetland delineation, stream identification and Phase I ESA activities along 5.5+/- miles of a proposed sanitary sewer alignment. Additional responsibilities included assisting with the Joint Permit Application, attendance at an onsite meeting with the state regulator and completing correction request figures. A permit was granted for the temporary wetland impacts in April 2012.

Trans Canada, Ottawa and Kent Counties, Michigan – Staff Scientist responsible for assisting a team of scientists with a 16.5-mile corridor wetland delineation and construction activities for pipeline removal and abandonment activities. The project included evaluating workspaces to minimize wetland impacts, coordinating with USACE and MDEQ for qualifying permit exemptions. A wetland delineation report was submitted to the MDEQ Wetland Identification Program and an onsite meeting was held with the MDEQ wetland regulator. A pre-application meeting was held onsite to review changes in the project scope and determine the necessity of a joint permit application for stream impacts. The activities were exempt from the wetland permitting process.

Canadian National Railway, Flat Rock, Michigan – Staff Scientist responsible for assisting with a wetland delineation and preparing a summary of findings on approximately 15 acres at a railroad switchyard. Additional activities included the preparation of a quick turn soil erosion and sedimentation control permit to avoid project delays. Project completed in September 2012.

Canadian National Railway, Michigan – Project Scientist responsible for working with a team of scientists to develop and prepare a reference tool in the form of a GIS based wetland atlas to assist in the identification of areas that may be classified as wetlands near rail lines. The database will provide end users the ability to determine potential locations that require permitting or where mitigation banks are available in various watersheds. Layers include National Wetland Inventory (NWI) Cowardin types, National Wild and Scenic Rivers, Soil Survey Geographic Database (SSURGO) maps; State of Michigan mapped wetlands, Watershed boundaries, topography, Wetland mitigation banks and the CN Railway throughout Michigan marked with mileposts. The current work is expected to expand to surrounding states where CN has rail lines.

Crop Protection Company, Indiana and Ohio – Intern responsible for performing watershed monitoring and sampling as part of an Ecological Monitoring Study of five stream sites for a five month period of continuous sampling. This included the completion of O&M on river and weather stations and water sampling and data management following strict EPA standards for "Good Laboratory Practices".

PROPERTY TRANSFER

Leslie Science and Nature Center, City of Ann Arbor, Michigan – Senior Project Scientist responsible for assisting with Phase II ESA reporting, BEA and Documentation of Due Care Compliance on a property that was formerly used as an orchard, a chemical laboratory and private residence.

Wastewater Treatment Plant Expansion Assistance, City of Saline, Michigan – Senior Project Scientist responsible for assisting with completion of three Phase I ESAs to aid with determining where to complete expansion of the WWTP. The undeveloped portions north and west of the WWTP operations, and two adjacent properties were investigated. Ms. Rauss assisted with the Phase I ESA reporting and assisted with developing a Phase II ESA investigation. The Phase II ESA investigation was completed, findings were presented to City Council, EGLE, EPA and the City's legal counsel.

Traver Road, Ann Arbor, Michigan – Senior Project Scientist responsible for assisting with a Baseline Environmental Assessment (BEA) and Documentation of Due Care Compliance in support of a Greenbelt Program property purchase. The property contained stockpiled dredged materials adjacent to Traver Creek, requiring sampling. Low levels of contaminants present above the groundwater to surface water interface protection criteria required removal from the current location in the floodplain. Tetra Tech also completed a Phase I ESA and Phase II ESA for the site and a wetland delineation on a portion of the property to identify a location for the soil is in progress. A plan to locate and demarcate the location of the soils is being developed.

Solar Companies, Multiple Clients, Midwest – Senior Project Scientist responsible for assisting with Phase I ESA and Phase II ESA reporting and figures for several agricultural sites.

Insurance Auto Auction Incorporated (Four Sites), Northern Indiana – Project Scientist responsible for managing four Phase I ESAs including interviews, on-site inspections, report preparation, client communication and budget tracking. The sites were completed at the same time saving the client additional site visit costs.

Ypsilanti Community Center, Ypsilanti, Michigan – Project Scientist responsible for completing a Phase I ESA including interviews, on-site inspections, and report preparation. Senior Project Scientist responsible for completing an updated Phase I ESA and coordinating a hazardous building materials assessment that were completed for the Community Center for Brownfield funding reimbursement requirements.

Automotive Manufacturing Facility, Confidential Client, Michigan – Project Scientist responsible for assisting with reporting documents for Phase II ESA reports and Due Care Plans related to a drilling investigation on two parcels in Dearborn, Michigan in 2016.

Community College, Port Huron, Michigan – Project Scientist responsible for completing a Phase I ESA including interviews, on-site inspections, and report preparation. Assisted with coordinating, planning and report writing the Phase II ESA. Based on the results of the Phase II ESA a Due Care Plan and Baseline Environmental Assessment were completed for the site.

City of Richmond, Richmond, Michigan – Staff Scientist responsible for assisting with a Phase I ESA including interviews, on-site inspections, and report preparation.

Phase I and II Environmental Site Assessments (ESA) - Numerous Clients, Michigan – Assistance with Phase I and Phase II ESA planning and completion for residential, rural, commercial and industrial clients within Southeast Michigan using ASTM standards and All Appropriate Inquiry (AAI) for site assessments.

COMPLIANCE

Canadian National Railway, Flat Rock, Michigan – Project Scientist responsible for completing regulatory Spill Prevention Control Countermeasures (SPCC) and Storm Water Pollution Prevention Plans (SWPPP) updates, including assessment and creation of procedures for new MDEQ visual assessment requirement for site.

Canadian National Railway, Flat Rock, Michigan – Project Scientist responsible for assisting with compiling resources and completing an application submittal for the MDEQ Clean Corporate Citizen (C3) program. C3 designation for the CN Flat Rock Yard and Maintenance Facility was granted in May 2016.

DATA MANAGEMENT

Broward County, Florida – Data Manager responsible for completing daily debris management and reporting according to FEMA guidelines for Hurricane Irma impacted municipalities in Broward County, Florida. Data management was performed from September 2017 through February 2018.

PUBLICATIONS AND PRESENTATIONS

McCall, P.J., Sweet, L.A., Rauss, A.D., *Update on In-Situ Groundwater Remediation of Heavy Metals in an Active Manufacturing Facility*; Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 25, 2016.

McCall, P.J., Rauss, A.D., Naud, M., Warrow, A., Kinsman, L., *In Situ Groundwater Remediation of a 1,4-Dioxane/Vinyl Chloride Mixed Plume Downgradient of a Municipal Landfill*; Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 23, 2016.

Capodivacca, M., T.F. Rabideau, P.J. McCall, A. D. Rauss, J. Peters, and B. Spiking, *New Tools for Real-Time Decision Making and Risk Management;* 17th Railroad Environmental Conference, Urbana, Illinois, 2015.

McCall, P.J., Rauss, A.D., Naud, M., Warrow, A., *In-Situ Groundwater Remediation of Vinyl Chloride Downgradient of a Municipal Landfill*; Ninth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 20, 2014.

SPECIALIZED TRAINING

Michigan Department of Environmental Quality – Industrial Storm Water Certified Operator Training, December 2014

Project Management Training – Level 2, Tetra Tech, August 2012

"Army Corps of Engineers Wetland Delineation and Regional Supplement Training," Richard Chinn Environmental Training, Inc., 2011

"Plant Identification Course," Dr. Robert Mohlenbrock, Michigan Wetlands Association, August 2010

"Botany," Matthaei Botanical Gardens, University of Michigan, 2009

"Plant ID Course", Matthaei Botanical Gardens, 2008

TETRA TECH

Rachel Fischer
Environmental Scientist

EXPERIENCE SUMMARY

Ms. Rachel Fischer is an Environmental Scientist II with Tetra Tech where she assists in field work tasks, such as wetland delineations, threatened and endangered (T&E) species surveys, vegetation surveys, qualitative habitat assessments, cultural surveys, groundwater sampling, surface water sampling, wastewater readings, monthly landfill inspections and Phase I Environmental Site Assessments (ESAs). Outside of field work, she has assisted with GIS analysis and mapping, wetland datasheet processing, T&E preliminary assessments, delineation report writing, photographic logs, and permitting, including creating permit matrices for development projects. Permitting experience includes Michigan Department of Environment, Great Lakes, and Energy (EGLE)/ U.S. Army Corps of Engineers (USACE) joint permit applications (JPA), soil erosion and sedimentation control (SESC) permits, and county drain permits. She is educated in wetland delineation methods and the use of GPS technologies for field surveys and assessments. Ms. Fischer has primarily worked in the Midwest on projects relating to wetlands, watersheds, and site remediation. She has experience in natural resources, ecology, wetland delineation, tree and plant identification, invasive species removal, watershed delineation, and interpreting field data into GIS to create effective data visualizations.

RELEVANT EXPERIENCE

WETLANDS AND ECOLOGICAL

Trenton Channel, River Rouge, and St. Clair Coal-Fired Power Plant Decommissioning Projects, DTE Energy, Michigan
Responsible for interpreting complex CADD drawings and georeferencing site features to develop and enhance GIS figures for the submission of permit applications to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the U.S. Army Corps of Engineers (USACE) concerning impacts to wetlands, streams, and the 100-year floodplain. Collaborated on multiple joint permit applications with USACE for various projects, including Battery Energy Storage Systems (BESS), solar energy initiatives, and hazardous waste remediation efforts. Provided ongoing project and permitting support, ensuring compliance with environmental regulations, and contributing to the successful advancement of sustainable development initiatives. (2023-Ongoing)

Marion, Howell, Oceola and Genesee Utility Department (MHOG), Livingston County, Michigan
Responsible for interpreting CAD drawings, georeferencing and digitizing features, and creating and editing GIS figures for the submission of an EGLE JPA in support of a water main installation in Livingston County. The project included several sections of horizontal directional drilling to accommodate resources, including under the Shiawassee River. Additional responsibilities included creating a wetland impact table and the preparation of detailed project and construction descriptions. (2025)

EDUCATION

B.S. Environmental Science with a Concentration in Natural Resource Conservation

Minor in Business Administration

Minor in Geographic Information Systems

University of Wisconsin Stout, Menomonie, Wisconsin

AFFILIATIONS

Michigan Wetlands Association 2023-Current

Tetra Tech Professional Women's Network 2023-Current

Tetra Tech GIS Community 2023-Current

TRAINING/CERTIFICATIONS

40-hour USACE Wetland Delineation Training, 2023

Adult First Aid/CPR/AED, American Red Cross, expires 2025

FISTA Chainsaw Safety Levels 1 and 2, 2022

OSHA 40-Hour Hazwoper Training, 2024

16-hour General Wetland Plants Identification, Michigan Wetlands Association, 2024

Construction Storm Water Operators Certificate, 2024

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

2

YEARS WITHIN TETRA TECH

2

Pumphouse Station 5, City of Kalamazoo, Michigan
Responsible for GPS technology integrated with tablet systems to collect comprehensive data on all trees and shrubs within the fenced station, including measurements of Diameter at Breast Height (DBH), tree height, condition assessments, and species identification during winter months. Developed a GIS field map to enhance spatial analysis and subsequently processed and manipulated the collected field data to generate informative figures and spreadsheets that effectively summarized the results. This work contributed to environmental assessments and informed decision-making for future development. (2025)

Confidential Client, Macomb County, Michigan
Ms. Fischer conducted a thorough investigation of the USGS NHD, HUC-10 watersheds, the National Land Cover Database (NLCD), and Macomb County drainage systems to identify an appropriate county drain for a stream functional uplift, aimed at offsetting the impacts of proposed activities. Ms. Fischer prepared and organized multiple GIS figures and KMZs, ensuring accurate representation and analysis of the data. This work supports environmental compliance and enhancing the ecological integrity of the project. (2025)

Vault 44.01, Ohio
Environmental Scientist tasked with conducting an extensive desktop review of potential environmental constraints, transforming findings into GIS visualizations to support the preliminary development of Vault 44.01's Carbon Capture and Storage (CCS) project, which aims to construct and operate CO2 pipelines for four ethanol facilities in northeast Indiana and northwest Ohio. Primary responsibilities assisting in preparing a comprehensive Critical Issues Analysis (CIA) for two selected facilities in Leipsic and Marion, Ohio. This analysis included a high-level desktop review to identify potential environmental constraints, sensitive areas, and regulatory requirements within a 5-mile radius of each facility. Ms. Fischer aided the team in preparing detailed reports and matrices outlining potential permits, consultations, and approvals needed for the pipeline infrastructure, while also assessing biological, cultural, and archaeological resources. The CIA findings will guide route selection and development processes, ensuring compliance with local, state, and federal regulations as the project progresses toward its target in-service date. (2024 – 2025)

Werth Road, Belle River Mills, Menominee Gate Station, Wixom Pole Yard, and Morton Substation, DTE Energy, Michigan
Responsible for interpreting CAD drawings, georeferencing and digitizing features, and creating and editing GIS figures for the submission of EGLE joint permit applications and SESC permit applications for various equipment installation or removal activities associated with utility projects, including gas line installation and pig launcher and trap installation. Ms. Fischer also assisted in calculating wetland, stream and floodplain impacts and preparing the joint permit applications for submittal to EGLE. (2023-2025)

MDOT, Ann Arbor and Muskegon, Michigan
Ms. Fischer prepared and organized a GIS field map by conducting a review of the National Wetlands Inventory, National Hydrography Dataset, FEMA Floodplain, and aerial imagery. Responsible for wetland delineation, qualitative habitat assessment and data collection for a proposed road expansion in Ann Arbor. A submeter GPS paired with a tablet was used in collecting field data. The wetland delineation was conducted along rights-of-way and intersections, adhering of strict MDOT safety requirements and delineation standards. Additional responsibilities included manipulation and exportation of GIS data. Ms. Fischer also worked on a wetland delineation report for an MDOT project in Muskegon. Ms. Fischer was responsible for reviewing the report and its sources and applying corrections. (2023-2025)

Northstar Clean Energy, St. Clair County, Michigan
Environmental Scientist responsible for completing multiple wetland and stream delineations, qualitative habitat analysis and ultimately assisting the permitting process for a 1,201-acre solar facility project in St. Clair County, Michigan, focusing on the layout that included reduction of impacts to wetlands and streams associated with the installation of access drives and collection lines. Responsibilities included preparation of a JPA for submission to EGLE, which is forthcoming. Other responsibilities included calculating impacts to wetlands and streams and creating effective GIS figures. (2023 – 2025)

Confidential Client; Coopersville, Manistee, Eaton Rapids, and Pellston, Michigan
Environmental Scientist responsible for leading field investigations for wetland and stream delineation, conducting qualitative habitat assessments and utilizing advanced GIS data collection techniques with submeter GPS technology integrated with tablet systems for potential solar site evaluations. Collaborated in the preparation of

comprehensive wetland delineation and qualitative habitat assessment reports for each site, ensuring thorough documentation and adherence to regulatory standards. (2024-2025)

Confidential Client; Northern Ohio
Responsible for conducting thorough verification of wetland boundaries, employing advanced submeter GPS technology integrated with tablet systems for precise data collection. Gathered DBH measurements for designated trees and executed the Ohio Rapid Assessment Method (ORAM) for comprehensive wetland classification. Developed detailed GIS field maps to enhance spatial analysis and facilitate data interpretation. Processed and reviewed field data using GIS software, ensuring accuracy and reliability in environmental assessments and contributing to informed decision-making in wetland management and conservation efforts. (2024)

Pipeline Injection Site Project; Confidential Client; Leipsic, Ohio
Responsible for wetland and stream delineation, qualitative habitat assessment and data collection using a submeter GPS paired with a tablet to collect field data. Ms. Fischer conducted a desktop analysis and aerial interpretation for identification of potential wetlands and waters; created a GIS field map; and processed and reviewed field data. Additional responsibilities included of completing a comprehensive desktop review of potential environmental constraints for the well pad areas and pipeline routes. This assessment involved evaluating various critical datasets, such as USFWS National Wetlands Inventory (NWI), U.S. Geological Survey (USGS) National Hydrography Dataset (NHD), FEMA floodplains, USGS Protected Areas database of the U.S. (PAD-US), the National Park Service (NPS) National Register of Historic Places (NRHP), the U.S. Environmental Protection Agency (EPA) EnviroMapper, and relevant easement databases. All identified constraints were compiled into a comprehensive memo for client review. (2024)

Freepoint Advanced Recycling Facility; Pennsylvania
Environmental Scientist tasked with conducting comprehensive research on necessary environmental permits to formulate a permitting plan that integrates the review of federal, state, and local regulations in Pennsylvania, specifically for Schuylkill County, Mahanoy Township, and Mahanoy City. The permitting plan addressed hazardous materials programs, including the management of generation, transport, storage, and disposal of hazardous and recyclable materials, as well as non-hazardous waste handling. Additionally, the plan focused on water quality programs, which include discharge permits, stormwater controls, spill prevention measures, and soil erosion controls. The permitting plan outlines potential environmental and land use permits, regulatory triggers, issuing agencies, estimated applicability of each permit, and critical timing considerations with a summary of application requirements and next steps, ensuring compliance with all relevant laws and regulations. (2024)

Interlake Maritime Services, Detour Village, Upper Peninsula Michigan
Responsible for wetland and stream delineation and data collection using a submeter GPS paired with a tablet to collect field data. Ms. Fischer conducted a desktop analysis and aerial interpretation for identification of potential wetlands and waters; created a GIS field map; processed and reviewed field data; and created GIS wetland delineation report figures for the client. (2024)

Monroe Power Plant, DTE Energy, Monroe, Michigan
Responsible for field leading a wetland and stream delineation, qualitative habitat assessment and GIS data collection for a potential mitigation site. Ms. Fischer also aided in the identification of potential roost trees and hibernacula for protected bat species during the onsite assessment; conducted a desktop analysis and aerial interpretation for identification of potential wetlands and waters; created a GIS field map; and processed and reviewed field data. (2024)

Ford Romeo Engine Plant Decommissioning, Ford Motor Company, Romeo, Michigan
Responsible for completing a wetland and stream delineation, qualitative habitat assessment and GIS data collection for a remediation site. Ms. Fischer also aided in the identification of potential roost trees and hibernacula for protected bat species during the onsite assessment. (2024)

Solar Energy Project, Confidential Solar Energy Company, Michigan
Responsible for reviewing previously delineated wetland and stream boundaries for a proposed solar energy site and surveying any adjustments to the boundaries based on current conditions through identification of wetland vegetation, hydrology, and hydric soils. Ms. Fischer prepared and organized a GIS field map by conducting a review of the National Wetlands Inventory, National Hydrography Dataset, Federal Emergency Management Agency (FEMA) Floodplain data, and aerial imagery. Additional responsibilities included review and updates to wetland

mapping, wetland jurisdictional status, and reporting in preparation for project design and permit submittal. Ms. Fischer processed and reviewed field data to send shapefiles and KMZ files to the client. She also created and updated wetland delineation report GIS figures. Project and permitting support are ongoing. (2023-2024)

Solar Energy Project, Confidential Solar Energy Company, Indiana
Responsible for wetland and stream delineation, qualitative habitat assessment and GIS data collection for a proposed 4,400-acre solar development. Ms. Fischer also aided in the identification of potential roost trees and hibernacula for protected bat species during the onsite assessment; conducted a desktop analysis and aerial interpretation for identification of potential wetlands and waters; created a GIS field map; and processed and reviewed field data. Permitting and project support are ongoing. (2023-2024)

Multiple Solar Energy Projects, Confidential Energy Companies, Michigan
Responsible for wetland and stream delineation and data collection for a proposed solar development using a submeter GPS paired with a tablet to collect field data. Ms. Fischer conducted a desktop analysis and aerial interpretation for identification of potential wetlands and waters; created a GIS field map; processed and reviewed field data; and created GIS wetland delineation report figures for the client. (2023-2024)

Multiple Solar and/or Battery Energy Storage System (BESS) Sites, Confidential Energy Companies, Michigan, Nebraska, Colorado, and Texas
Responsible for database search of the United States Protected Lands, National Park Service National Register of Historic Places, EGLE Environmental Mapper, FEMA Flood Maps, U.S. Fish and Wildlife Service National Wetlands Inventory, United States Geological Survey National Hydrography Dataset, and other sources. Ms. Fischer created all GIS figures containing the above information for all sites for a critical issues analysis; assisted in researching necessary permits for each site and creating a permit matrix; and assisted with writing a critical issues analysis report for each site. (2023-2024)

Vegetation Monitoring, Confidential Client, Kalamazoo, Michigan
Participated in vegetation surveys within wetland restoration areas at a closed landfill historically used for disposal of refuse associated with papermaking. Responsible for identification and count of all woody stems and invasive plant species within pre-established 2,500-ft² plots to calculate stem density and estimate survival percentage of desirable species. Additional responsibilities included technical writing a detailed qualitative assessment of the site, assemblance of a comparative photograph log, and plant density calculations into a floristic quality assessment for comparative analysis to previous years. Vegetation monitoring is ongoing. (2023-2024)

Fish Creek Solar, Roncelli and DTE Energy, Montcalm County, Michigan
Responsible for communicating with engineers to interpret and georeference CAD drawings, digitize features, and create and edit GIS figures for the submission of an EGLE joint permit application. Ms. Fischer also assisted in calculating floodplain and wetland impacts for the permit application. (2023)

Solar Energy Project, Confidential Solar Energy Company, Michigan
Responsible for creating and editing wetland and stream GIS figures for the wetland delineation report. Ms. Fischer also created and edited qualitative habitat assessment GIS figures; assisted in technical writing for the qualitative habitat assessment report; and located and organized properties that are part of the Farmland and Open Space Preservation Program to provide to the client. (2023)

Former Paper Company, Confidential Client, Kalamazoo, Michigan
Responsible for an onsite wetland delineation, qualitative habitat assessment and data collection using a submeter GPS paired with a tablet to collect field data. Additional responsibilities included manipulation and exportation of GIS data and GIS figure creation for the client. (2023)

Bauer-Challis Road Expansion Project, Livingston County, Road Commission
Ms. Fischer prepared and organized a GIS field map by conducting a review of the National Wetlands Inventory, National Hydrography Dataset, FEMA Floodplain, and aerial imagery. Responsible for wetland delineation, qualitative habitat assessment and data collection for a proposed road expansion. A submeter GPS paired with a tablet was used in collecting field data. The wetland delineation was conducted along rights-of-way and intersections, adhering of strict MDOT safety requirements and delineation standards. Additional responsibilities included manipulation and exportation of GIS data. (2023)

ECOLOGICAL EXPERIENCE WITH OTHER ORGANIZATIONS

University of Wisconsin Stout Representative for Rain Garden Collaboration with the City of Menomonie, WI (2021)
Collaborated with city stakeholders to define a project that addressed hyper eutrophication in Lake Menomin. Delineated a sub watershed, assessed vegetation and hydrology, identified soil characteristics, created maps using GIS by visualizing all characteristics and plans to install an effective rain garden.

Stanley Livingstone Game Reserve Intern, Victoria Falls, Zimbabwe (2021)
Identified invasive species for removal, observed and reported animal behavior, applied soil erosion control measures, completed weekly biological sampling for lab analysis and participated in community conservation development at a local school.

Mnarani Sea Turtle Aquarium Intern, Zanzibar, Tanzania (2021)
Observed and reported sea turtle behavior, treated sea turtles that had various medical conditions, identified and collected sea turtle nests, created innovative ways to upcycle plastics, and taught lessons at a local school about ecosystems and conservation.

Wisconsin Clear Waters: Trout Unlimited Volunteer (January 2020 – March 2022)
Identified, removed, and treated invasive plant species to restore streams.

GEOLOGICAL

Ann Arbor Landfill, Ann Arbor, Michigan
Responsible for field leading monthly cap inspections, monthly wastewater readings, quarterly gas monitoring, gas to energy readings, semi-annual wastewater, and groundwater sampling. Collected data, photographs and samples and updated maintenance logs to complete quarterly reports to maintain the health of the landfill. (2024-Current)

Willow Run Airport, Ypsilanti, Michigan
Responsible for surface water sampling. Collected water samples, photographs, and sample locations. (2024)

CULTURAL RESOURCE AND ARCHAEOLOGY

Cultural Resource Surveys for numerous Solar Sites, National Grid Renewables and Confidential Renewable Energy Companies, Multiple Sites across Indiana, Illinois, and Michigan
Responsible for assisting with field surveys for cultural resources across agricultural sites for proposed solar development. Identified and mapped items relating to previous historical farmsteads and Native American tools. (2023-2024)

ENVIRONMENTAL SITE ASSESSMENTS

Confidential Client; Gibson County, Indiana
Responsible for field leading a Phase 1 ESA site walk to visually inspect, identify, and document recognized environmental conditions on agricultural sites in compliance with ASTM E2247-16. Compiled the site reconnaissance information and photographs in a report format and photolog. (2024)

Confidential Client; Coopersville, Prescott, Manistee, Saginaw, Gaylord, Eaton Rapids and Pellston, Michigan
Responsible for individually completing a Phase 1 ESA site walk to visually inspect, identify, and document recognized environmental for eleven different forested and agricultural sites across Michigan. Conducted site contact interviews to evaluate the subject property and its history. Compiled the site reconnaissance and site contact interview information in a report format. Created multiple GIS figures to show site location, subject property features, and location of recognized environmental conditions. (2024)

Apex Clean Energy; Coldwater, Michigan
Responsible for completing a Phase 1 ESA site walk to visually inspect, identify, and document recognized environmental conditions on agricultural sites in compliance with ASTM E2247-16. Compiled the site reconnaissance and site contact interview information in a report format. Created multiple GIS figures to show site location, subject property features, and location of recognized environmental conditions. (2024)

Michigan UM Holdings; Ann Arbor, Michigan

Responsible for completing a Phase 1 ESA site walk to visually inspect, identify, and document recognized environmental conditions on a forested site. Conducted site contact interview to evaluate the subject properties. Compiled the site reconnaissance and site contact interview information in a report format. Created multiple GIS figures for each site to show site location, subject property features, and location of recognized environmental conditions, controlled recognized environmental conditions, and historical recognized environmental conditions. (2024)

City of Ann Arbor, Michigan
Responsible for completing six separate Phase 1 ESA site walks to visually inspect, identify, and document recognized environmental conditions on both commercial and vacant sites. Conducted site contact interviews to evaluate the subject properties. Compiled the site reconnaissance and site contact interview information in a report format. Created multiple GIS figures for each site to show site location, subject property features, and location of recognized environmental conditions, controlled recognized environmental conditions, and historical recognized environmental conditions. (2023-2024)

BESS Site, Confidential Energy Company, Lansing, Michigan
Responsible for completing a Phase 1 ESA site walk to visually inspect, identify, and document recognized environmental conditions on an industrial site. Conducted site contact interviews to evaluate the subject property and its history. Compiled the site reconnaissance and site contact interview information in a report format. Created multiple GIS figures to show site location, subject property features, and location of recognized environmental conditions. (2023)

SPECIALIZED TRAINING

Rare Turtle Conservation in Michigan – Michigan Wetlands Association (January 2025)

Construction Storm Water Operators Certification (November 2024)

16-Hour General Wetlands Plant Identification – Michigan Wetlands Association (July 2024)

LiDAR – National Map Data & Tools – Michigan Wetlands Association (May 2024)

Wetlands Exemptions Overview – Environmental Great Lakes and Energy / Michigan Wetlands Association (May 2024)

Nature-Based Solutions for Shoreline Stabilization and Restoration – Michigan Wetlands Association (January 2024)

40-Hour Hazwoper Training – OSHA (January 2024)

Stream Identification – Environmental Great Lakes and Energy / Michigan Wetlands Association (October 2023)

USACE Wetland Delineation Training – Richard Chinn Environmental Training, Inc. (July 2023)

Stream Identification Webinar – Environmental, Great Lakes, and Energy (EGLE) / Michigan Wetlands Association (2023)

Antecedent Precipitation Webinar – Michigan Wetlands Association (2023)

Eastern Massasauga Rattlesnake: Biology, Habitat, Protections, and Best Management Practices Webinar – USFWS/Michigan Wetlands Association (2023)

Common Wetland Invasives Webinar – Michigan Wetlands Association (2023)

First Aid/CPR/AED Training – American Red Cross (April 2023)

Levels 1 and 2 Chainsaw Safety Training – Forest Industry Safety & Training Alliance, Inc. (January 2022)

TETRA TECH

Jenna Herrington
Environmental Scientist

EXPERIENCE SUMMARY

Jenna Herrington has been an environmental scientist at Tetra Tech for over two years, where she predominately completes field work tasks such as wetland delineations, threatened and endangered (T&E) species surveys, vegetation surveys, qualitative habitat assessments, soil borings, groundwater sampling and soil sampling. Outside of field work, she has assisted with wetland data sheet processing, T&E preliminary assessments, delineation report writing, photographic logs, constraints analysis and permitting, including creating permit matrices for development projects. Permitting experience includes Michigan Department of Environment, Great Lakes, and Energy (EGLE)/ U.S. Army Corps of Engineers (USACE) joint permits, soil erosion and sedimentation control (SESC) permits, and county drain permits. She is educated in wetland delineation methods and the use of GPS technologies for field surveys and assessments. She has experience in conservation biology, herpetology, and sustainable ecology/agriculture techniques and practices through undergraduate projects.

RELEVANT EXPERIENCE

GEOLOGICAL AND CHARACTERIZATION

Ann Arbor Landfill (AALF), City of Ann Arbor, Michigan

Ms. Herrington assists in routine groundwater sampling of wells downstream of the local landfill to monitor contaminants and flow. She is educated in equipment setup and sampling procedures, and how to properly collect, transport and ship groundwater samples. She regularly participates in monthly reporting of the wells and meters to ensure equipment is working correctly. Project support is ongoing. (2023-2025)

Groundwater Sampling, Ann Arbor Charter Township, Michigan

Ms. Herrington was the point of contact for numerous clients for corresponding site visits to perform routine sampling and monitoring of residents' groundwater. Additionally, she created field data sheets and an organized excel sheet to track on-going groundwater sampling. She was responsible for meeting with a client for a static water level reading of a pond and documenting the findings. (2023-2024)

Saline Wastewater Treatment Plant (WWTP), City of Saline, Michigan

Participated in soil and groundwater sampling on two separate occasions. Tasks included gathering equipment, corresponding with project manager and onsite contractors, documenting soil borings, and collecting and transporting samples. Additionally, she aided with a separate soil and concrete sampling task for potential contamination in a holding pond. Support is ongoing. (2023-2024)

Substation Project, Apex Clean Energy, Coldwater, Michigan

Ms. Herrington conducted a Phase I of an approximately 11.5-acre site for a potential substation development in Coldwater, Michigan. The site was undergoing developments and Jenna met with a site manager to further understand the stages of development and changes to the earth. (2024)

EDUCATION

B.S. Ecology, Evolution, & Organismal Diversity
Eastern Michigan University

REGISTRATIONS/ AFFILIATIONS

Michigan Wetlands Association
2022-Current

The Wildlife Society
2022-Current

TRAINING/CERTIFICATIONS

Construction Stormwater Operator Certification EGLE, 2025

8-Hour HAZWOPER Refresher part 1, 2025

Freshwater Mussel Identification Michigan Wetlands Association, 2024

40-hour USACE Wetland Delineation Training, 2023

OSHA 40-hour HAZWOPER, 2023

CPR & First Aid
American Red Cross, expires 2025

16-Hour Common Wetland Plant Identification Training. Michigan Wetlands Association, 2022

OFFICE

Ann Arbor, MI

YEARS OF EXPERIENCE

3

YEARS WITHIN TETRA TECH

2.5

Scarlett Middle School, Ann Arbor, Michigan

Ms. Herrington and two other colleagues were tasked with hand digging two 5' x 5' x 2.5' holes to collect samples from each excavated wall and floor. The site was a former foundry and being tested for heavy metals. Responsibilities included coordinating with geologists and the project manager to create an excavation plan for the route, digging, and sampling. In total, approximately 12,500 pounds of waste material were manually excavated from the site. (2024)

Trenton Coal-Powered Power Plant Decommissioning, Trenton, Michigan

Ms. Herrington collected and transported numerous sand and aggregate samples from various gravel pits in southeastern Michigan to aid with the decommissioning project. Clear communication and correspondence with the gravel pits, testing lab, and project manager were necessary to complete this task. (2024)

Stream Sampling, Ann Arbor, Michigan

Ms. Herrington corresponded and met with a scientist from the City of Ann Arbor to collect stream samples for a tributary that empties into Barton Pond. Once samples were collected, she transported the samples to a lab for analysis. (2024)

Soil Sampling, Jackson, Michigan

Ms. Herrington met with contractors onsite to complete excavation of a 12 x 12 area as a part of a Phase II Environmental Site Assessment for a potential solar development project. She collected 5 samples in total, 1 from each wall of the pit and 1 sample from the bottom of the pit. Jenna then filed out the Chain of Custody and transported the samples to the lab for analysis. (2024)

WETLANDS AND ECOLOGICAL

Willow Boulevard and A-Site Landfills, Georgia-Pacific, Kalamazoo, Michigan.

Ms. Herrington participated in a vegetation survey within wetland restoration areas at a closed landfill historically used for disposal of refuse associated with papermaking. Per- and polyfluoroalkyl substances (PFAS compounds) are present at the site at concentrations greater than the State of Michigan Generic Residential Cleanup Criteria. Jenna assisted with annual spring and fall vegetation monitoring Jenna assisted with annual spring and fall vegetation monitoring and created a comparison photographic log using current photos and photos from the previous survey. Spring Monitoring stem counts of woody species within ten pre-established 2,500-ft² plots to calculate stem density and estimate survival percentage of desirable species. Fall monitoring involved estimating percent cover of each species in each of 46 square-meter quadrats located along five transects. Jenna also assisted with data input for the Floristic Quality Assessment (FQA) results associated with the annual quantitative vegetation monitoring report. Project support is ongoing. (2022-2025)

Trenton, River Rouge, and St. Clair Coal-Fired Power Plant Decommissioning Projects, DTE, Michigan.

Responsible for assisting with wetland delineations and qualitative habitat analyses for two large coal-fired power plant facilities in preparation for decommissioning and demolition. Jenna mapped and flagged wetlands, streams and culverts using a GPS paired with a tablet and collected data using Wildnote software, which she later processed and created wetland data forms and photographic logs. Ms. Herrington also assisted in locating, flagging, and mapping the endangered native species Sullivant's milkweed (*Asclepias sullivantii)*. She also conducted research and corresponded with municipalities for obtaining a county SESC permit and assisted with multiple EGLE joint permit applications. In addition, she assisted in creating a permit matrix for one of the projects and helped draft an EGLE/USACE pre-application meeting request. Project and permitting support are ongoing. (2022-2025)

Multiple Solar Energy Projects, Confidential Client, Michigan

Ms. Herrington was responsible for drafting a wetland delineation and qualitative habitat assessment report for each of the four sites. Jenna obtained a Rare Species Review from Michigan Natural Features Inventory and a T&E Information Planning and Consultation list from USFWS for each site. She communicated with field staff to ensure all data was captured and communicated to the client. She additionally edited and finalized the data forms and assisted with the photographic log. (2024-2025)

Solar Energy Project, Confidential Renewable Energy Company, Michigan

Ms. Herrington drafted a proposal for wetland delineation associated with installation of a substation, solar panels, and ancillary facilities. Responsibilities included identifying potential wetland impacts for access routes and researching local jurisdictions to determine fees for the client. Additionally, she participated in a wetland delineation of the site over two mobilizations to review previously delineated wetland lines. She assisted with generating deliverable data and a wetland report for the client. Project support is ongoing. (2023-2025)

Wetland Delineation and Quality Assessment, Interlake Steamship Company, De Tour Village, Michigan

Ms. Herrington was tasked with a wetland delineation for a large property near the St. Mary's River and Lake Huron. Duties included generating a Health and Safety Plan (HASP), field work to delineate wetlands and assess their quality, editing data forms, and generating a photolog and a wetland delineation report. This site was predominately a wet meadow, with a small cedar swamp and upland forest. (2024)

Sanitary Sewer Line Replacement, DTE Energy, Northfield, Michigan

Ms. Herrington participated in a wetland delineation and qualitative habitat assessment (QHA) for a proposed sanitary sewer line replacement project. Survey123 and GPS were used to collect data. Once wetlands and streams were delineated within the route, she assisted with creating the EGLE/USACE Joint Permit Application (JPA) pre-application meeting request to EGLE. Additionally, she met with the project manager and EGLE on the site to review the proposed impact areas. She also assisted with the JPA and a draft permit has been issued for the project. (2024)

Muskegon River Bridge, Michigan Department of Transportation, Clare County, Michigan

Ms. Herrington assisted with a wetland delineation for a site along a railroad and rail bridge that crosses the Muskegon River. Duties included generating a HASP, field work, editing data forms, and generating a photolog and report of collected data. Additionally, Ms. Herrington and her coworker worked with the rail company to ensure safe work practices were applied. (2024)

Carbon Sequestration Projects, Confidential Company, Northwest Ohio

Ms. Herrington participated in a wetland and stream delineation and QHA of a forested area using a submeter GPS paired with a tablet to collect field data via Survey123. Afterwards, she edited and finalized field data forms. Additionally, Jenna assisted with drafting a critical issue analysis and permit matrix for each project. (2024)

Solar Projects, Confidential Company, Arkansas and Louisiana

Ms. Herrington created three cost price models (CMPs) and proposals for potential solar projects, two in Arkansas and one in Louisiana. Responsibilities included researching each project area's municipalities, as well as similar projects to compare hours to create accurate and thorough deliverables. (2024)

Solar Energy Project, Confidential Renewable Energy Company, Michigan

Ms. Herrington created the required health and safety forms. Responsibilities included researching local healthcare resources, desktop review of the project using a KMZ file, and preparing a hazard assessment. She participated in wetland delineation and collected stream data for this site. The project area consisted mainly of tiled crop fields. She collected points using a GPS/iPad combination and collected data for USACE wetland determination forms using Wildnote software. Additionally, she used Wildnote to collect data for qualitative habitat assessments. Lastly, she assisted in writing the final delineation report for the project. (2023-2024)

Solar Project, Confidential Company, Indiana

Ms. Herrington created the HASP for this project area. Responsibilities included researching local healthcare resources, preparing a hazard assessment, printing documents and implementing in the field, and ensuring forms were signed by all field staff prior to and post field work. Ms. Herrington joined with the Illinois office staff to do a wetland delineation and stream assessment of the site, consisting of 4,400 acres of agricultural and forested land. She also processed data forms collected via Wildnote from the site. Additionally, she created reference maps of areas she completed daily, and communicated clearly with the project manager to ensure the client's needs were met. (2023-2024)

Multiple Solar Energy Projects, Confidential Renewable Energy Company, Michigan

Ms. Herrington completed a wetland identification/delineation, QHA for T&E species, and collected stream data for 8 different sites for potential solar projects. Soil pits were not utilized for many of the sites, therefore vegetation and hydrology had to be highly analyzed for determining potential wetlands. The project areas consisted mainly of tiled agricultural fields. She collected points using a submeter GPS/iPad combo and collected data using Wildnote software. She then edited and exported the data forms and photos for the client. Project support is ongoing. (2023-2024)

Fish Creek Solar Farm, Roncelli and DTE Energy, Montcalm County, Michigan

Ms. Herrington created a permit matrix for this project area. She researched required permits and corresponded with municipalities to provide accurate data to the client. She also assisted with completing the EGLE JPA; she corresponded with colleagues to create an impact table and map of the project area to calculate impacts to wetlands, streams, and 100-year floodplain. Permitting support is ongoing. (2023-2024)

Solar Project, Confidential Renewable Energy Company, Indiana.

Ms. Herrington met with the Tetra Tech Minnesota eco team to delineate wetlands and streams and conduct a QHA for a potential solar site in Indiana. The project area was approximately 1,400 acres and consisted mainly of crop fields, pastures, and woodlots. Data points were collected via iPad using ArcGIS Survey123 software combined with a submeter GPS. (2023)

Solar Energy Project, Confidential Renewable Energy Company, Michigan

Assisted with assessing the existing permit matrix for a solar project. Responsibilities included corresponding with agencies and municipalities and researching required permits. Additionally, Ms. Herrington helped with drafting the proposal and the due diligence report designed to identify potential red-flag issues associated with the project. (2023)

Multiple Solar and/or Battery Energy Storage System (BESS) Projects, Confidential Company, Michigan, Colorado, and Nebraska

Ms. Herrington assisted with creating numerous critical issues analyses for potential solar development sites located in Michigan. Responsibilities included researching local municipalities and public databases such as U.S. Fish and Wildlife Service and U.S. Geological Survey for significant findings and regulations/permits, creating permit matrices, and creating a comprehensive summary describing the key potential development constraints for the sites. (2023-2024)

Belle River Mills Utility Project, DTE Energy, St. Clair County, Michigan

Ms. Herrington assisted in pulling the data together for a JPA of the site for proposed impacts to wetlands and streams and completed a wetland delineation. She also created a wetland delineation photographic log and processed data forms. The JPA has been submitted to EGLE after Tetra Tech worked diligently to minimize the proposed impacts to wetlands and waters. Permitting support is ongoing. (2023-2024)

Solar Energy Project, Confidential Renewable Energy Company, Illinois

This project is a potential solar site in Illinois. Ms. Herrington's responsibilities included researching T&E species for the site using federal and state databases, creating HASP forms, and creating wildnote data forms. While in the field, Jenna participated in a wetland delineation, QHA for T&E, and a Phase I Environmental Site Assessment (ESA). Post field work required uploading, editing, and exporting datasheets; generating a habitat assessment and wetland delineation report; and preparing a photographic log. (2023)

US-23 Improvement Project, Michigan Department of Transportation

Ms. Herrington created the HASP for this project area. Responsibilities included researching local healthcare resources, desktop review of the site using a KMZ file and preparing a hazard assessment. She delineated wetlands and streams along an eight-mile stretch of US-23 as well as several interchanges within the highway right-of-way. Highway safety measures such as signs and cones were implemented with every site visit. GPS points were collected using a submeter GPS and Field Maps software, and data forms were collected and reviewed using Wildnote software. Delineation flags were labeled and hung onsite to aid EGLE reviewers during the permit process. (2023)

Discovery Wind Project, Apex Clean Energy, McLean County, North Dakota

Ms. Herrington joined two other Tetra Tech office's ecological teams to complete a wetland delineation in the prairie pothole region for a potential wind project. The project area was approximately 28,000 acres, she was field lead for the first half of the mobilization; responsibilities included planning the route for the day, learning flora native and invasive to the region, coordinating equipment, training a colleague on how to utilize software, and collaborating with another field lead to ensure daily quota of wetlands was met. Additionally, she processed numerous data forms via Microsoft Excel. (2023)

Jackson and Lakeside Solar Energy Projects, National Grid Renewables, Michigan.

Ms. Herrington assisted in deploying and retrieving three acoustic audio units and their corresponding solar equipment. She also was tasked with retrieving, storing, and transferring the obtained data. Other responsibilities included creating a HASP, preliminary data collection and organization, wetland delineations and mapping of respective areas using a GPS and tablet, QHA, create a photographic log, finalizing wetland data forms, and contributed to the final delineation report. Project support is ongoing. (2022-2023)

Arbor Hills Landfill Culvert Replacement Project, GFL Environmental, Wayne County, Michigan

Ms. Herrington assisted in obtaining a county SESC permit, and county construction permit for the project. She helped prepare the permit applications, coordinated with the county, and delivered the applications and associated construction plans to the county offices. The proposed project involved the replacement of a culvert beneath a county road that was failing. The culvert replacement was necessary to maintain the integrity of the road and withstand heavy truck traffic entering the nearby landfill. (2022)

Solar Energy Projects, Confidential Solar Energy Company, Illinois and Ohio

Ms. Herrington assisted in creating multiple permit matrices for proposed roof-mounted and ground-mounted solar development sites in Illinois and Ohio. Tasks included researching potential permits and approvals required for each project at the federal, state, and local levels and contacting jurisdictional departments to determine permitting requirements and satisfy the client's permitting needs. (2022)

Wixom Pole Yard, DTE, Wixom, Michigan

Responsibilities included assisting with an onsite wetland delineation and QHA, which consisted of identifying and mapping wetlands, streams, and potential habitat for T&E species on the site. Ms. Herrington helped identify wetland vegetation, hydrology, and soils. She utilized a GPS unit paired with a tablet to delineate the boundaries of the wetlands. She also collected data on the tablet using Wildnote software, process wetland data forms and created a photographic log for the site. Additionally, she researched the permitting and ordinance requirements and created an EGLE pre-application meeting form for the site through the online MiEnviro portal. Lastly, she assisted with the proposal and JPA. (2022-2024)

Bluewater Energy Center, DTE, Michigan

Ms. Herrington participated in a wetland delineation and associated GPS mapping for proposed drainage improvements and a proposed maintenance road at the site. She assisted in identifying wetland vegetation, hydrology, and soils. She collected wetland delineation data on the tablet and later edited and finalized the wetland delineation data forms. Ms. Herrington also assisted with the JPA. Responsibilities included researching the adjacent property owners, drafting the text and letter of authorization, creating a photographic log, and corresponding with the engineers to determine impacts to wetlands. A permit was successfully received for the project. (2022-2023)

Road Expansion Project, Livingston County Road Commission, Livingston County, Michigan

Ms. Herrington assisted with a wetland delineation to identify an acceptable upland location for proposed compensating cut for 100-year floodplain impacts associated with road expansion project. Compensating cut is required by EGLE when over 300 cubic yards of fill is placed in a 100-year floodplain. She was responsible for flagging wetland delineation points and recording the points with a GPS and tablet. She also collected data on the tablet using Wildnote software. (2022)

Electric Substation Project, DTE Energy, Wayne County, Michigan

Ms. Herrington conducted research of native Michigan seed mixes and associated plant heights for use during onsite restoration after the proposed substation is built. The county requires plants in the road right-of-way to be maintained at a height of 2 feet or less. (2022)

Natural Gas Main Replacement Projects, DTE Energy, Wayne and Washtenaw Counties, Michigan

Assisted in obtaining two county SESC permits and participated in a wetland delineation with GPS mapping for two large natural gas main replacement projects. Jenna assisted with GPS data collection for the wetland delineations and helped draft the SESC permit applications. Jenna coordinated with the SESC agencies and delivered permit applications and associated plans. (2022)

Biodigestate Renewable Natural Gas Project, Confidential Energy Company, Michigan

Responsibilities included attending a virtual meeting with the client to understand how to use ambient sound survey equipment. She assisted in deploying and retrieving three ambient audio units and corresponding solar equipment in an agricultural site in western Michigan. The obtained data was stored and transferred to the client. (2022)

Culvert Replacement, Sagebrush Circle, Ann Arbor, Michigan

Ms. Herrington conducted a wetland delineation, flagged corresponding points for future surveying of the site, and measured various points within the stream. She collected and edited wetland data via Wildnote software. While onsite, she assisted a geologist in drilling two hard pan holes and reporting the findings. (2023)

OTHER WORK

Dawn Farms Collaborative, Ann Arbor, MI. As a part of her conservation biology course, Ms. Herrington joined with a community partner to research and implement new ideas that would help the farm achieve its goal of sustainable agriculture. During this, she reconstructed numerous livestock enclosures, removed undesired invasive species, and created a field guide of the horticulture growing at the farm.

Howell Nature Center, Howell, MI. Ms. Herrington volunteered for 8 months as a wildlife rehabilitator and caretaker for the rescued and resident animals.

Michigan Duck Rescue and Sanctuary, South Lyon, MI. Ms. Herrington has been volunteering at a waterfowl sanctuary/ rehabilitation center for 2 years.

TETRA TECH

Tommy Maloney
Environmental Scientist

EXPERIENCE SUMMARY

Mr. Maloney is an Environmental Scientist with two years of professional experience in water sampling, soil sampling, soil vapor sampling, methane monitoring, and landfill monitoring. He has developed specific skills including environmental drilling, core logging, well installation, and groundwater, soil and air sampling.

RELEVANT EXPERIENCE

ENVIRONMENTAL SAMPLING

Automotive Manufacturing Facility, Confidential Client, Michigan – Assisted in the recording and sampling of soil and soil lithology. Samples were collected, preserved and shipped in accordance with PFAS sampling guidance protocols.

Groundwater Sampling, Automotive Manufacturing Facility, Confidential Client, Michigan - Supervised the completion of a groundwater sampling event utilizing low-flow techniques. Samples were collected, preserved and shipped in accordance with PFAS sampling guidance protocols.

Municipal Waste Landfill, City of Ann Arbor, Michigan – Lead environmental scientist in the completion of monthly methane collection system maintenance and quarterly groundwater, wastewater and gas sampling.

Municipal Waste Landfill, Livingston County, Michigan - Lead environmental scientist in the completion of quarterly methane monitoring, and semi-annual groundwater sampling events.

SITE CHARACTERIZATION AND REMEDIATION

Additional Investigation, Confidential Client, Michigan – Utilized direct push techniques to drill and construct monitoring wells. Responsibilities included core description, soil screening with photoionization detector, supervision of well development with submersible pump, and supervision of investigation-derived waste handling. Prepared and completed groundwater sampling at 20 monitoring well locations using low-flow techniques.

Additional Remedial Investigation, Department of Environment, Great Lakes & Energy, Michigan – Prepared and completed groundwater sampling at 27 monitoring well locations including five nested mentoring wells housing a shallow, intermediate and deep well for each boring using low-flow techniques.

REPORTING

Mr. Maloney has experience with software such as Microsoft Word, Excel, PowerPoint as well as figure generating applications such as gINT and ArcGIS Pro.

EDUCATION

B.S. Environmental Science
Wayne State University
Detroit, Michigan, 2023

TRAINING/CERTIFICATIONS

40-hour HAZWOPER Refresher, 29 CFR 1910.120 (e)(8) OSHA 2023

8-hr OSHA HAZWOPER Refresher, 2024-Present

Adult First Aid, CPR, and AED 2024 to present

OFFICE

Ann Arbor, MI

YEARS OF EXPERIENCE

2

YEARS WITHIN TETRA TECH

2

CONTACT

Tommy.maloney@tetratech.com

TETRA TECH

Camryn Cork
Staff Environmental Engineer

EXPERIENCE SUMMARY

Ms. Cork is a Staff Environmental Engineer with 1 year of professional experience in site characterization and remediation, environmental sampling, 3D Modeling Software, and landfill monitoring. She has developed specific skills including environmental drilling, core logging, temporary well installation, monitoring well installation, and groundwater and soil sampling. She is proficient in the following computer programs: AutoCAD, gINT, and Microsoft Office suite (Word, Excel, PowerPoint and Access).

RELEVANT EXPERIENCE

SITE CHARACTERIZATION AND REMEDIATION

Phase II ESA, City of Saline, Saline, Michigan – Supervised environmental investigation at a municipally owned water treatment plant. Duties included environmental drilling, sampling and logging of core.

Phase II ESA, Confidential Automotive Manufacturing Facility, Michigan – Supervised the completion of environmental drilling and groundwater sampling. Duties included sampling, screening and describing soils.

ENVIRONMENTAL SAMPLING

Confidential Automotive Manufacturing Facility, Michigan – Environmental drilling and groundwater sampling.

Groundwater Sampling, Flint, Michigan - Supervised the completion of a groundwater sampling event utilizing low-flow techniques. Samples were collected, preserved and shipped in accordance with PFAS sampling guidance protocols.

Groundwater Sampling, Milan, Michigan – Groundwater sampling.

Core Logging, Passaic River, New Jersey – Core logging and sampling.

Soil Gas Sampling, Walbro Engine, Cass City, Michigan – Soil gas sampling from vapor pins.

2-D MODELING AND VISULIZATION

Cross Section for proposal – Development of 2-D deterministic model for monitoring well location study. Modeling efforts included the use of bore logs, static water levels, and surface topography elevation to portray extent of key lithologies.

EDUCATION

B.S. Environmental Engineering
Michigan State University
East Lansing, Michigan, 2023

TRAINING/CERTIFICATIONS

40-hour HAZWOPER Refresher, 29 CFR 1910.120 (e)(8) OSHA
2024 to present

8-hour HAZWOPER Refresher, 29 CFR 1910.120 (e)(8) OSHA
2025 to present

Adult First Aid, CPR, and AED
2024 to present

OFFICE

Ann Arbor, MI

YEARS OF EXPERIENCE

1

YEARS WITHIN FIRM

1

CONTACT

Camryn.Cork@tetratech.com

TETRA TECH

Tyler Dolin
Environmental Scientist

EXPERIENCE SUMMARY

Tyler Dolin is an Environmental Scientist with 10 years of experience in wetland identification and delineation, habitat assessment and management, botany, invasive species, permitting and Geographic Information Systems (GIS).

Current experience consists of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Joint Permit Application (JPA) preparation and submission, Phase I Environmental Site Assessment (ESA), wetland delineation, habitat assessment, and desktop and field GIS.

Previous experience focused on identification and management of Western Lake Erie Basin (WLEB) ecosystems through Early Detection Rapid Response (EDRR) protocols for invasive species and removal for restoration. Habitats were monitored for known invasive species, all Michigan watch list species and any threatened and endangered species that were present.

Additionally, Tyler conducted habitat assessments on Cooperative Weed Management Area (CWMA) lands, specifically Detroit River International Wildlife Refuge, for overall health and status with associated ecosystem management plans. Various management actions implemented included prescribed fire, mowing, discing, herbicide application and water level management to achieve desired habitat conditions.

Tyler completed permitting for Michigan EGLE Aquatic Nuisance Control (ANC) and federal Pesticide Use Proposals (PUPs) including application, submission, and reporting.

Tyler's GIS experience consists of ArcMap, ArcPro, Field Maps and Survey 123 software. Desktop projects include georeferencing imagery, spatial analysis, photo and lidar interpretation, contour creation, editing and final layout development. He can create domains and fields that are linked to a specific feature service for use in selectable lists in Field Maps for remote data collection as well as uploading Feature Services to ArcGIS Online for remote use in field operations. He has also developed file structure systems with protocols for GIS data organization.

RELEVANT EXPERIENCE

WETLANDS AND ECOLOGICAL

Mining Project, Confidential Client, Arizona

Responsible for creating permitting figures for a confidential mining client to assist in visualization of land acquisition targets, representation of project placement within client owned land, and representation of water resource features. Project support is ongoing. (2024-2025)

Carbon Storage Projects, Confidential Client, Colorado and Nebraska

Completed multiple Critical Issues Analyses for the proposed placement of carbon storage pipelines in Colorado and Nebraska. Tyler completed multiple figures including land cover, National Wetlands Inventory, National Hydrography Dataset, Federal Emergency Management Agency (FEMA) Floodplain, environmental hazards, Protected Areas Database of the United States and hydric soils. With these resources he was able to use GIS to coordinate with clients to achieve the optimum pipeline routes with minimal impact to the community and local resources. (2024)

EDUCATION

B.S. Environmental Science, Biology, University of Michigan-Dearborn

REGISTRATIONS/ AFFILIATIONS

Michigan Wetlands Association 2022-Present

The Wildlife Society 2018-Present

TRAINING/CERTIFICATIONS

EGLE Construction Stormwater Operator Certification, 2025

16-hour Wetland Grass Identification, Michigan Wetlands Association, 2023

8-hour Winter Woody Plant Identification, Michigan Wetlands Association, 2022

40-hour USACE Wetland Delineation Training, 2022

40-hour Wetland Plant Identification Course, US Fish and Wildlife Service, 2019

ArcGIS Pro Training, US Fish and Wildlife Service, 2018

Type II Wildland Firefighter, US Fish and Wildlife Service, 2018

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

10

YEARS WITHIN TETRA TECH

3

Habitat Assessment, Confidential Client, Bloomfield Hills, Michigan

Completed a detailed habitat assessment of a private parcel to verify the functionality of ecosystems, habitat, and species composition. Tyler conducted the field work, coordinated with the client, and completed a letter outlining the observations represented on the site. (2024)

Solar Development Project, Silicon Ranch Corporation, Arizona

Responsible for creating wetland and stream permitting figures for a large-scale solar development. Tyler worked with a team of permitting specialists, landscape designers and project managers to create figures displaying the resources on site for protection by the client. (2024)

Muskegon River Bridge Replacement, Michigan Department of Transportation, Clare County, Michigan

Field lead and wetland scientist responsible for wetland and stream delineations for replacement of a railroad bridge over the Muskegon River. Tyler completed desktop review of the site including aerial imagery, National Hydrography Dataset, FEMA floodplain, and National Wetlands Inventory before field work to identify potential features. Tyler led a team of wetland scientists who conducted field work, completed data quality checks, and completed a wetland report with GIS figures. Project support is ongoing. (2024-2025)

Development Project, Confidential Client, Rochester Hills, Michigan

Field lead and wetland scientist responsible for wetland and stream delineations at a potential development site in southeast Michigan. Tyler completed desktop review of the site including aerial imagery, National Hydrography Dataset, FEMA floodplain, and National Wetlands Inventory before field work to identify potential features. Tyler also completed a memo and reporting figures for the project with additional coordination with the client on wetland delineation procedures and wetland mitigation to ensure the project's success. Project support is ongoing. (2024-2025)

Monroe Power Plant, DTE Energy, Monroe County, Michigan

Field lead and wetland scientist responsible for delineation and assessment of site restoration potential with connection to essential ecosystem services. The purpose of the project was to assess how much of the area was a wetland or stream, and if the resources could still be considered a coastal wetland of the Great Lakes if reconnected with the removal of historical berms. Tyler conducted the field work for the project, completed reporting, and GIS figures for the associated reports. Project support is ongoing. (2024-2025)

Multiple Solar Projects, Confidential Renewable Energy Company, Michigan

Field lead and wetland scientist responsible for wetland delineations and qualitative habitat assessments at potential solar development sites in Michigan. Tyler led a team of wetlands scientists and biologists who conducted field work at multiple sites throughout southern Michigan. Tyler completed technical review of the GIS data, reporting, and associated GIS figures for the reports. (2024)

Bat Habitat Surveys, AES Clean Energy, Michigan

Responsible for conducting evening dusk emergence surveys using USFWS bat guidelines for Indiana bat (*Myotis sodalis*) and Northern long-eared bat (*Myotis septentrionalis*) at a proposed solar energy facility. Completed required field documentation and created associated GIS figures to assist documentation. (2024)

Solar Energy Project, DTE Energy, Michigan

Field lead and wetland scientist responsible for technical desktop review, wetland delineation, and reporting of a potential solar development site. Tyler completed desktop review of the site including aerial imagery, National Hydrography Dataset, FEMA floodplain, and National Wetlands Inventory before field work to identify potential features. Tyler led a team of wetland scientists and biologists who conducted field work, completed data quality checks, and completed a wetland report with GIS figures. Project support is ongoing. (2024-2025)

Ford Romeo Engine Plant Decommissioning, Ford Motor Company, Romeo, Michigan

Field lead and wetland scientist responsible for wetland delineation, desktop review, figures and permitting support. Tyler completed desktop review of the site including aerial imagery, National Hydrography Dataset, FEMA floodplain, and National Wetlands Inventory before field work to identify potential features. Tyler led a team of

wetland scientists who conducted field work, completed data quality checks, GIS figures for permitting and permitting support for the project. (2024)

Sanitary Sewer Replacement, Northfield Township, Michigan

Field lead for conducting wetland delineation, stream identification and qualitative habitat assessment (QHA) analysis for sewer line upgrades in Northfield township. Tyler completed desktop GIS analysis using aerial imagery, National Hydrography Dataset, FEMA floodplain, and National Wetlands Inventory before field work to identify potential features. Tyler led a team of wetland scientists and biologists who conducted field work, completed comprehensive reporting, GIS figures and permitting for the project. (2024)

Multiple Solar and/or Battery Energy Storage System (BESS) Projects, Confidential Renewable Energy Company, Michigan

Responsible for technical review of site locations for eight potential solar energy and/or BESS sites in Michigan using data from aerial imagery, National Hydrography Dataset, FEMA Floodplain, National Wetland Inventory, Michigan EGLE, and the protected lands database of the United States to determine potential constraints for project development. Tyler also prepared proposals, costing, and a Phase I ESA analysis for an additional site for the client. Project support is ongoing. (2023-2024)

State Park Wetland Verification Mapping, Michigan Department of Natural Resources

Field lead and wetland scientist responsible for the verification and mapping of wetlands within four state parks along Lake Michigan. The purpose of the project was to verify the presence or absence of wetlands within forested areas where hemlock wooly adelgid (HWA) has been or may be found as part of a program to treat and manage hemlock trees that are infested with HWA. Tyler conducted the field work, which involved verifying National Wetland Inventory (NWI) mapped wetlands based on vegetation and hydrology indicators, mapping upland areas, and collecting data regarding hemlock presence within and near verified wetland areas. Tyler performed field review of GIS data and tables for supervisor review. He successfully conducted field surveys in an efficient manner to provide the client cost and time savings. (2023)

Multiple Solar Energy Projects, Confidential Renewable Energy Company, Michigan

Field lead and wetland scientist responsible for wetland assessments at 11 potential solar development sites and wetland delineations at 5 potential solar development sites in Michigan. Tyler led a team of wetlands scientists and biologists who conducted field work at multiple sites throughout southern Michigan. Tyler completed technical review of GIS data for the project. (2023-2024)

US-23 Improvement Project, Michigan Department of Transportation

Wetland scientist responsible for leading wetland delineation surveys in support of proposed improvement work along US-23 between M-14 and I-94. Tyler coordinated and conducted wetland delineations along MDOT rights-of-way and interchanges, while adhering to strict MDOT safety requirements and wetland delineation standards. Tyler also created GIS figures for the project and coordinated data management with outside surveyors. EGLE plans to conduct an onsite review of the wetlands and streams with MDOT and Tetra Tech in the spring. Project support is ongoing. (2023-2025)

Solar Energy Project, Confidential Renewable Energy Client, Michigan and Illinois

Wetland scientist responsible for assisting with two solar energy projects; one in Illinois and one in Michigan. Tyler was the field lead for both the wetland delineations and qualitative habitat assessments and completed reporting for the associated tasks. Tyler also assisted with the preparation of a critical issues analysis and permit matrix for one of the projects to identify potential constraints and permits required including all GIS figures for the project. Tyler also assisted with Phase I ESAs for both projects. Project support is ongoing. (2023-2025)

Solar Energy Projects, Confidential Solar Energy Company, Michigan

Completed wetland delineation and natural resources surveys for a proposed solar site in Michigan. Tyler also completed reporting and GIS figures for the associated reports. Project and permitting support are ongoing. (2022-2024)

Solar Energy Project, Confidential Renewable Energy Company, Michigan

Field lead and wetland Scientist responsible for wetland delineation and qualitative habitat assessment field effort at a proposed solar energy site in southern Michigan. Tyler completed reporting and GIS figures for the wetland delineation and qualitative habitat assessment for the project. Project support is ongoing. (2023-2024)

Wetland Delineation, Confidential Client, Michigan

Field lead responsible for wetland delineation of a proposed development. Tyler also completed a proposal for the project, GIS figures for the client, and assisted the client in best construction practices to avoid wetland impacts. (2023)

Hoosier Solar Project, National Grid Renewables, Multiple Sites, Indiana

Responsible for wetland delineation and qualitative habitat analysis for the proposed solar development. Reviewed wetlands and streams for potential jurisdictional status and assisted with reporting. (2023)

Blue Water Energy Center, DTE Energy, St. Clair County, Michigan

Responsible for wetland delineation for expansion of the road entering Blue Water Energy Center, consisting of field GIS calibration, post delineation GIS figure creation, and technical review of the data. Tyler was also responsible for creating and editing GIS figures for the submission of EGLE/USACE permitting. A permit was received for the project. (2022-2023)

River Rouge and Trenton Channel Coal-Fired Power Plant Decommissioning Projects, DTE Energy, Wayne County, Michigan

Responsible for creating and editing GIS figures for the submission of EGLE/USACE permitting. Tyler also completed of a culvert survey and wetland delineation at the River Rouge Power Plant to aid in determination of USACE wetland jurisdictions. Tyler was also responsible for communication with project engineering staff for continual updates to the project design and associated permitting. Project and permitting support are ongoing. (2022-2024)

St. Clair Coal-Fired Power Plant Decommissioning Project, DTE Energy, St. Clair County, Michigan

Responsible for wetland delineation and quality habitat assessments, including GIS field map preparation and data processing and review. Tyler assisted with permitting matrices, a wetland delineation and qualitative habitat analysis report, GIS figures, and EGLE/USACE permitting. Tyler was also responsible for identifying and surveying state threatened Sullivant's milkweed *(Asclepias sullivantii),* flagging the species area for the client, and developing specific habitat preservation measures for the client. Tyler was also responsible for calculating impacts to surface water resources and developing GIS figures for the submission of EGLE/USACE permitting, and communication with project engineering staff for continual updates to the project design and associated permitting. Project and permitting support are ongoing. (2022-2024)

Lakeside Solar, National Grid Renewables, Muskegon County, Michigan

Responsible for wetland delineation, qualitative habitat assessments, and stream delineation for a 1,780-acre proposed solar energy project including an additional wetland verification of the initial field data in 2024. Tyler mapped wetlands and streams with a submeter GPS paired with a tablet and collected data on U.S. Army Corps of Engineers (USACE) wetland delineation forms using Wildnote and Survey 123 software. Tyler reviewed and processed the raw data and created GIS figures for inclusion in the associated delineation report. Project and permitting support are ongoing. (2022-2025)

Jackson Solar, National Grid Renewables, Jackson County, Michigan

Responsible for planning and assisting with the installation of bat acoustic monitoring devices at the proposed Jackson Solar site for monitoring of federally listed Northern Long Eared Bat *(Myotis septentrionalis)*, Indiana Bat *(Myotis sodalis)*, and Little Brown Bat *(Myotis lucifugus).* Tyler also assisted with the delineation of a stream which consisted of measuring the ordinary high-water mark and stream dimensions for inclusion in the Michigan Department of Environment, Great Lakes, and Energy (EGLE)/USACE permit application for wetland and stream impacts. Tyler processed GPS data and assisted with GIS figures for the client and the EGLE permit application. Project and permitting support are ongoing. (2022-2024)

Renewable Natural Gas Facility Installation, Confidential Energy Company, Kent County, Michigan

Responsible for installation and calibration of ambient sound monitoring equipment on an agricultural property for potential installation of a biodigestate renewable natural gas facility. Tyler performed post data analysis with Larson Davis Sound Level Meter Utility G4 program to ensure data quality and completed upload to reference server. (2022)

Closed Landfill Sites, Confidential Client, Kalamazoo County, Michigan

Responsible for the monitoring of regular vegetation plots within wetland restoration areas using a standard protocol and sub meter GPS. Spring monitoring involved stem counts of woody species within ten pre-established plots to calculate stem density and estimate survival percentage of desirable species. Invasive species cover was also estimated. Fall monitoring involved estimating percent cover of each species in each of 46 square-meter quadrats located along five transects. The data was compiled in a floristic quality assessment for comparative analysis to previous years. Vegetation monitoring is ongoing. (2022-2025)

Natural Gas Utility Upgrades, DTE Energy, Wayne County, Michigan

Responsible for creation of Soil Erosion and Sedimentation Control (SESC) GIS figures containing multiple land resource features and SESC measures to avoid impacts to nearby wetlands and streams for two large natural gas main replacement projects. Key features were digitized from client plans. Tyler also assisted with wetland delineation, GPS data collection, and SESC application submittal to the county. (2022)

Road Expansion Projects, Livingston County Road Commission, Livingston County, Michigan

Responsible for wetland delineation, qualitative habitat assessment and GIS data collection for a proposed road expansion project located in Livingston County. Tyler also completed identification of potential roost trees for protected bat species during the onsite assessment. Tyler mapped wetlands, streams, and potential roost trees using a submeter GPS paired with a tablet, collected data using Wildnote software, and assisted with data processing and GIS mapping. (2022)

ENVIRONMENTAL SITE ASSESSMENTS

Battery Energy Storage System (BESS) Project, Confidential Client, Michigan

Responsible for completing a Phase I analysis with a site walk of a rural upland agricultural site to assess the environmental conditions of the subject property for proposed solar development. Completed landowner interviews, environmental desktop analysis and data quality checks for field collected data. (2024)

Solar Energy Project, Confidential Client, Michigan

Responsible for completing a Phase I analysis with a site walk of all forested locations to assess the environmental conditions of the subject property for proposed solar development. Completed landowner interviews, environmental desktop analysis, drafting a final report and creation of associated GIS figures. (2024)

Solar Energy Project, Confidential Client, Ohio

Responsible for completing a Phase I analysis to assess the environmental condition of the subject property for proposed solar development. Completed landowner interviews, environmental desktop analysis, drafting a final report and creation of associated GIS figures. (2024)

Solar Energy Projects, Confidential Client, Michigan and Illinois

Responsible for completing two Phase I ESAs in Michigan and Illinois to assess the environmental condition of the subject property for proposed solar development. He completed landowner interviews, environmental desktop analysis, drafting a final report and creation of associated GIS figures. (2023-2024)

Solar and/or Battery Energy Storage System (BESS) Projects, Confidential Client, Michigan

Responsible for completing a Phase I ESA analysis to assess the environmental condition of the subject property. Completed landowner interviews, environmental desktop analysis, drafting a final report and creation of associated GIS figures. (2023-2024)

TETRA TECH

Bridget Kiser
Project Administrator

EXPERIENCE SUMMARY

Ms. Kiser is a Project Administrator with a versatile skill set developed over eighteen years of practical experience in the administrative field. She sets up administrative systems and provides administrative support in the areas of finance, contracts and compliance, permits, health and safety, information management, scheduling and editorial reviews of deliverables.

Responsibilities include the processing and preparing of project information and documents such as a/r and a/p invoice processing, financial report generation, new project set up, and budget tracking. Ms. Kiser is responsible for expense reporting, business travel arrangements, and producing graphic designs for conference and client presentations. She also assists with marketing pursuits to produce cohesive, well-organized proposals to ensure consistency with client defined requirements and internal branding.

EDUCATION

B.F.A, Siena Heights University, Cum Laude Honors, Adrian, Michigan, 2000

TRAINING/CERTIFICATIONS

Certified Administrative Professional, International Association of Administrative Professionals, 2013 - 2018

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

Eighteen

YEARS WITHIN FIRM

Thirteen

RELEVANT EXPERIENCE

PROJECT ADMINISTRATOR

Canadian National Railway – Previous Project Administrator responsible for completing financial tasks for numerous Tetra Tech offices and divisions for multiple CN sites. Ms. Kiser completes detailed reviews of financial information including budget tracking, weekly reports and monthly invoicing using client specific documentation. The client-specific documentation includes comprehensive data tracking of various tasks (soil boring numbers completed, number of lab samples completed by parameter, labor hours, etc.). Ms. Kiser has taken on lead responsibilities for a client implemented online project management system and acts as key contact between Tetra Tech and CN finance. She prepares and executes purchase orders and quarterly reports. She is responsible for maintaining and procuring all master services agreements for subcontractors, which includes annual health and safety review, insurance requirements and terms and conditions of contracts and is the liaison to corporate Tetra Tech offices for all contractual and financial documents.

Automotive Manufacturing Facility, Confidential Client, Michigan – Previous Project Administrator for a confidential client with responsibilities including document production, proofreading, formatting, and creating final work products for client and state required distribution. She also produces final electronic documents and uploads to client's secure website. Ms. Kiser provides data entry, data quality control and quality assurance; air permits recordkeeping and subcontractor invoice processing.

Confidential Solar Client, Michigan and Illinois – Project Administrator responsible for completing detailed financial review including budget tracking, weekly reporting and monthly invoicing for 20+ project site locations. She is responsible for ensuring that all project deliverables adhere to client specific file nomenclature and maintain a high level of reporting consistency. She also produces final electronic documents and uploads to client's secure ftp server.

Carrier Corporation – Provided administration support services for data entry and tracking for client specific project management software (ENFOS, Box Site).

Multiple Clients – Completes administrative review of deliverables including proofreading and formatting. Ensures that deliverables are finalized and distributed using client specific document processing standards.

Multiple Solar Energy Clients - assisted with permit research and development of permit matrices to identify potential permits and/or approvals at the federal, state, and local levels required for each project and critical issues analysis reporting to identify potential constraints related to land use and environmental resources.

OFFICE ADMINISTRATOR (2011 – 2022)

Tetra Tech Office, Ann Arbor, Michigan – Key liaison to corporate Accounting, Contracts and Human Resources Departments. Ms. Kiser was responsible for office-wide accounting functions, processing and maintenance of subcontractor invoices, procurement for office and project needs; assisting with new employee orientation; completing Federal and State required documentation for each employee, document production, shipping and supplies management. Ms. Kiser also assisted the Office Health and Safety coordinator with procurement of equipment and supplies along with scheduling and coordinating training courses for staff.

TETRA TECH

Michael Haynes
Project Accountant

EXPERIENCE SUMMARY

Mr. Haynes is a Project Accountant with over eighteen years of administrative and accounting experience. Responsibilities include generation and distribution of weekly financial reports for multiple projects, timesheet management, report production and the handling of all accounts payable and accounts receivable related tasks for multiple clients. He is proficient in Oracle, Microsoft Word, Excel, Access, PowerPoint and Outlook.

EDUCATION

Washtenaw Community College
A.S. Computer Systems Support/Programming
Ann Arbor, Michigan

TRAINING/CERTIFICATIONS

Certified/IRS registered Tax Professional

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

18

YEARS WITHIN FIRM

8

RELEVANT EXPERIENCE

PROJECT ACCOUNTANT

Municipal Waste Landfill, City of Ann Arbor, Michigan – Responsibilities include producing hard copy submittals of reports with emphasis on compliance with client specific needs.

Canadian National Railway, Multiple Locations – Mr. Haynes completes detailed review of financial information, including monthly invoicing using client specific documentation and entry into the client specific ENFOS software. He is responsible for maintaining and procuring all master services agreements for subcontractors as well as reviewing and processing all subcontractor invoices.

Automotive Manufacturing Facility, Confidential Client, Michigan – Responsibilities include the processing of accounts payable invoices and lab reports, report production, processing monthly invoices and submittal to client.

Multiple Clients – Mr. Haynes supports project managers with financial and administrative tasks as needed, including project setup, generation of financial reports, subcontractor invoicing, procurement entry, and document production ensuring client specifications are met.

Under Previous Association

Mr. Haynes has experience in monitoring accounts payable and accounts receivable transactions, reviewing payments and account balances, updating employee schedules and timekeeping, payroll administration, month end financial close out processes, client communications and financial report generation.

TETRA TECH

Zachary Pinkowski
Environmental Scientist

EXPERIENCE SUMMARY

Mr. Pinkowski has two and a half years experience as an environmental scientist. His experience and education encompass geology, hydrogeology, and environmental science. Mr. Pinkowski began his career in geology as an environmental science intern, updating figures, entering data, sampling, and performing contractor oversight and drilling events. Since joining Tetra Tech in 2022 after graduation, Mr. Pinkowski has rapidly gained experience in conducting environmental site investigations, performing remedial actions, groundwater monitoring, soil gas sampling, drilling techniques, and the operation and maintenance of remediation systems. He has produced detailed lithologic cross-sections, digital boring logs, water level and contaminant isoconcentration contour maps. Mr. Pinkowski has recently gained experience in project management and proposal/project costing.

Mr. Pinkowski's specific skills include gINT, Surfer, ArcMap, AutoCAD, Microsoft Office Suite and preparing tables, reports, and figures. He is familiar with several drilling and sampling techniques including hollow stem auger; rotosonic; hydraulic probe; split spoon; MIP; competent groundwater sampler experienced in a variety groundwater sampling methods including submersible pumps, bailers, and peristaltic pumps; competent sub slab and soil gas sampler.

EDUCATION

B.S. Environmental Science
Eastern Michigan University
Ypsilanti, MI, 2022

TRAINING/CERTIFICATIONS

OSHA 40-hour HAZWOPER, 2023

8-Hour HAZWOPER Refresher part 1, 2025

OFFICE

Ann Arbor, MI

YEARS OF EXPERIENCE

2

YEARS WITHIN TETRA TECH

2

RELEVANT EXPERIENCE

PHASE I AND PHASE II ENVIRONMENTAL SITE ASSESSMENTS (ESA)

Multiple Clients Assisted with Phase I and Phase II ESAs for commercial clients. The ESAs were completed under ASTM standards.

Phase II ESA, Confidential Client, MI. Environmental Scientist responsible for oversight of drilling subcontractors for an environmental investigation involving 29 surface soil samples using hand auger techniques; 11 temporary well installations using direct-push and auger techniques at rural property in MI. Responsibilities included soil core description, soil screening with photoionization detector and collection of soil and groundwater samples and writing draft report for Phase II ESA (2022-2023).

REMEDIATION IMPLEMENTATION

In-Situ Chemical Reduction of Chlorinated Compounds, Confidential Client, Saginaw, MI. Environmental Scientist assisted with execution of in-situ chemical reduction work plan to complete in-situ injections of ABC+ to perform chemical reduction of contaminants of concern (COCs) in groundwater. Responsibilities included managing subcontractors during in-situ injections, completion of baseline and post injection groundwater performance monitoring events (2022-2023).

In-Situ Chemical Oxidation of Chlorinated Compounds, Department of Environment, Great Lakes & Energy, Bangor, MI. Environmental Scientist assisted with execution of in-situ chemical oxidation work plan to complete in-situ injections of sodium persulfate activated by hydrogen persulfate to perform chemical oxidation of COCs in groundwater. Responsibilities included managing subcontractors during in-situ injections and writing draft report for injection event (2022-2023).

In-Situ Adsorption Barrier of PFAS, Department of Environment, Great Lakes & Energy, Kalamazoo, MI. Environmental Scientist assisted with execution of in-situ adsorption barrier work plan to complete in-situ injections of PlumeStop to perform adsorption of COCs in groundwater. Responsibilities included managing subcontractors during in-situ injections, post injection groundwater performance monitoring events, and writing draft report for injection event (2022-2023).

DRILLING AND CONSTRUCTION OVERSIGHT

Well Installation, Multiple Clients, Multiple States, USA. Successfully managed subcontractors during installation of monitoring, injection, and soil vapor wells ranging from 1 to 2 inch. These wells were installed with roto-sonic, direct push, and hollow stem auger. Described the soil cuttings/recovered core by USCS and performed development of the monitoring, injection, and recovery wells by submersible pump.

Removal of Impacted Soil, Confidential Client, Chicago Heights, IL. Provided oversight of loading PCB impacted soil into appropriate waste containers for transport and disposal to an appropriate landfill.

Manufacturing Facilities, Confidential Client, MI. Performed incremental sampling method for soil on and near former foundry property; responsibilities included using a Trimble to locate GPS sample locations and compiling sample points for a composite sample analyzed for Michigan metals and VOCs.

PUBLICATIONS

A. Cuellar, E. Bays**, Z. Pinkowski** – Fast Kinetics In Situ Chemical Oxidation Treatment of a PCE Source Area with Sodium Persulfate Activated with Hydrogen Peroxide – Thirteenth International Symposium on Remediation of Chlorinated and Recalcitrant Compounds, Denver, Colorado, June 2-6, 2024, sponsored by Battelle

TETRA TECH

Michelle F. Gillie, CIH, CSP, CPEA, FAIHA
Program Health & Safety Director / Associate Scientist

EXPERIENCE SUMMARY

Gillie has over 35 years of experience in the field of occupational and environmental health and safety, with more than 25 years in hazardous waste management. For 6 years, she served as the EPA Remedial Action Contract Region 3 Health and Safety Officer for Superfund Site preliminary assessments, investigations, and remedial actions. She conducted hazard assessments, developed health and safety plans, performed contractor oversight and environmental/occupational exposure monitoring for VOCs, PCBs, heavy metals, pesticides, and asbestos, participated in public hearings, and prepared investigation reports. She has provided EHS planning and study designs and led facility industrial hygiene investigations at hundreds of industrial client sites including heavy manufacturing, oil and gas, metal foundries, shipyards and environmental remediation site.

She serves as Tetra Tech Health and Safety Program Director for major confidential client environmental projects and a health and safety expert in remediation process design, investigation, remediation, and construction operations. She was a key member of the project team which won the 2017 Tetra Tech Safety Excellence Award. She has served as a member of the Tetra Tech Safety Council since 2001.

RELEVANT EXPERIENCE

Project Health & Safety Officer; Landfill Monitoring; Ann Arbor, MI. Since 2015, Ms. Gillie has developed the project Health and Safety Plan for landfill monitoring and maintenance activities that comply with internal and MIOSHA regulatory requirements. The site hazards include flammable methane gas and chlorinated hydrocarbons (including vinyl chloride) and 1,4-dioxane in groundwater. She also performed predictive modeling to assess the worst-case airborne vapor concentrations based on the maximum detected contaminant concentrations in groundwater.

Project Health and Safety Officer; OU-1 Site-Wide Activities; Former Allied Paper Mill Superfund Site, Kalamazoo, MI. Since 2013, Ms. Gillie has provided industrial hygiene planning and field support services for the groundwater recovery and treatment system, 30-acre landfill, and entire 89-acre site located along Portage Creek. Site activities included landfill gas monitoring and cap inspections, dam inspections, groundwater sampling, chemical tote and waste transport, drilling, excavation and sheet pile wall construction. Ms. Gillie prepared the project health and safety plans for the site and conducted worker exposure and ambient air sampling for PCBs, heavy metals, and respirable crystalline silica during various landfill operations.

Project Health and Safety Officer; Site-Wide Activities; BROS Landfill Superfund Site, Swedesboro, New Jersey. Provided health and safety planning for clean-up operations at a 30-acre former waste oil storage and recovery facility with impacted soil and groundwater in shallow and deep aquifers, and in adjacent wetlands. Site operations included groundwater and LNAPL level measurements in site monitoring and recovery wells, pond bathymetric data collection and pond sediment poling, coring, and sampling. Impacted offsite properties encompass 500 acres.

Project Health and Safety Officer; Site-Wide Activities; Cape May County Airport Industrial Park, Cape May, New Jersey. Provided industrial hygiene and environmental services for a WWII-era airport built by the U.S. Navy, which is being developed for aviation and business uses. The 996-acre site has 17 known Areas of Concern associated with underground storage tanks and industrial operations. The 12 industrial buildings were prioritized for redevelopment and were inspected for hazardous building materials including asbestos, lead, mold, PCBs, and stored chemical products/wastes including hexavalent chromium. Ms. Gillie prepared the project health and safety plan for the site investigations including subsurface vapor intrusion investigation in occupied buildings.

EDUCATION

M.S. Environmental Science (Industrial Hygiene/Toxicology) Drexel University

B.S. Medical Technology (Microbiology/Biochemistry) Pennsylvania State University

HONORS

2017 Tetra Tech Safety Excellence Award

2014 American Industrial Hygiene Association Fellow

1991 Alaska Governor's Health & Safety Award

TRAINING/CERTIFICATIONS

Certified Industrial Hygienist in Comprehensive Practice (No. 3285), American Board of Industrial Hygiene

Certified Professional Environmental Auditor, Health and Safety (No. 211), Board of Environmental Auditor Certifications

Certified Safety Professional, Comprehensive Practice (No. 35063), Board of Certified Safety Professionals

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

39

YEARS WITHIN TETRA TECH

29

TETRA TECH

James L. Ross, Ph.D., P.E.
Principal Engineer

EXPERIENCE SUMMARY

Dr. Ross possesses 22 years of consulting and academic experience in groundwater/surface water modeling, project management, litigation support, peer review, statistical analyses, applied probability theory, and optimization. Professional experience includes on- and off-site project work in multiple states in the US, the Cayman Islands, Germany, and Australia.

Dr. Ross' expertise is rooted in efficiently and effectively applying both simple and sophisticated computational and mathematical tools to practical environmental problems, as well as transparently and concisely presenting such analyses to clients, regulators, reviewers, and colleagues. He has successfully engineered solutions to environmental problems using groundwater and surface water models, uncertainty theory, optimization, computer coding, and cloud computing. As a modeler, he has developed conceptual and numerical models of groundwater flow and constituent (perchlorate, TCE, PCE, perchlorate, Cr6, 1,2,3-TCP, heat, salt, and PFOS/PFOA)

In addition to project experience, Dr. Ross is the brown bag seminar coordinator, where technical talks are organized and presented to the engineering personnel. In this capacity, Dr. Ross has peer-reviewed presentations, performed as moderator, and developed thematic talk series, including Office Projects Overview (to encourage collaboration) and Energy Sector Initiatives (to build upon existing technical and marketing endeavors). Dr. Ross is also a lecturer of an introduction to groundwater modeling short course that has been presented at multiple venues.

RELEVANT EXPERIENCE

Army Corps of Engineers, Utah – Partnered with USACE Hydrologic Engineering Center (HEC) to develop and annually refine conceptual model of groundwater flow and TCE transport at Tooele Army Depot Base in Utah, a Superfund Site. Model was used to evaluate remedial pumping alternatives for pumpt and treat system. The model was used to justify the cessation of the pump and treat system and switch to monitored natural attenuation. Conceptual model considerations included evaluations of TCE source areas properties, geology, and regional hydrology. From conceptual model, developed numerical model of groundwater flow and TCE plume development from numerous source areas. Calibrated numerical model using gradient and global search Parameter Estimation (PEST) tools. Developed probabilistic predictive model to evaluate likely future migration of the TCE plume relative to compliance boundaries; TCE concentrations along compliance boundaries calculated in term of probabilistic likelihoods. Documented model analyses and results in technical report. Presented summary of modeling analyses and results to Utah Department of Environmental Quality (UDEQ) and USEPA. Employed advanced data assimilation tool, the Ensemble Kalman Filter (EnKF), to combine model and observed TCE concentrations in order to characterize the present day TCE plume. Model identified by USACE Environmental and Munitions Center of Expertise as one of the best groundwater flow models in the nation.

Florida Power & Light, South Florida – Conceived, constructed, and calibrated a sub-regional variable density groundwater flow and salt/heat model of the Biscayne Aquifer in southeast Florida in support of a Consent Agreement between FPL and Miami Dade County Department of Environmental Resource Management (MDC-DERM) under a compressed schedule and public scrutiny. Aided in the conception of numerous alternative measures to mitigate the intrusion of hypersaline groundwater in the Biscayne Aquifer and used the groundwater model to simulate impacts of these alternatives. Aided in the evaluation of remedial alternatives and selection of the currently operating remediation measure (15 mgd groundwater extraction and deep injection). Lead annual updates to the conceptual and numerical models, applications of the model, and sensitivity analyses. Presented modeling results to stakeholders, including FPL management, South Florida Water Management District (SFWMD), MDC-DERM, and Florida Department of Environmental Quality (FDEP).

EDUCATION

Ph.D., Civil Engineering, University of Vermont, 2008

B.S. in Civil Engineering, Manhattan College, 2003

AREA OF EXPERTISE

Groundwater Modeling

Remediation Evaluations

Hydrogeology

Site Optimizations

Litigation Support

REGISTRATIONS/ AFFILIATIONS

Professional Engineer, Ohio (82426)

ECS Water Resource Group PFAS Modeling Initiative

TRAINING/CERTIFICATIONS

Fearless Entrepreneurs, 2022

EPA Project Management Training, 2019

FEFLOW Model Training, 2012

OFFICE

Atlanta, GA

YEARS OF EXPERIENCE

22

YEARS WITHIN FIRM

16

Carrier Corporation, San Gabriel Basin, California – Lead modeler in the QA of a FEFLOW model of groundwater flow in the Puente Valley Operable Unit. Groundwater flow model supports the understanding of mult-contsituent plume (1,4-dioxan is the primary constituent) movement historically and in future scenarios. Identified key model inaccuracies and areas for improvement. Converted FEFLOW model to MODFLOW 6 model for further model improvement and development. Aided in calibration of model, simulation of pump test, and capture zone analysis. Capture zone analysis evaluated different pumping alternatives to optimize pumping rates and locations to capture dissolve contaminant plume. Worked with USGS to test and evaluate beta version of groundwater flow path simulation tool with the MODFLOW 6 model. Developing model into a remedial design evaluation tool. Currently using model to evaluate contaminant plume movement and associated active and passive remediation scenarios.

City of Ann Arbor, Michigan – Technical lead for groundwater flow model update to evaluate capture zones of an existing pump and treat system that has had declining production at one of the recovery wells. Project included adding a steady-state calibration period based on recent pumping periods, updating the flow model calibration, evaluating capture zones for current pumping conditions, and recommending alternate pumping strategies to improve capture and enhance future remedy protectiveness.

Confidential Client, Northern California - Litigation support regarding impacts to public supply wells from historical pesticide (1,2,3-tcp and 1,2-dca) discharges to the subsurface. Integrated pertinent data within a GIS platform, evaluated available technical data, and refined the conceptual site model pertaining to historical and future contaminant fate and transport. Used data to develop a conceptual model of groundwater flow and contaminant transport in order to evaluate possible source locations.

Confidential Client, Florida – Evaluated available data to evaluate the inland migration of a hypersaline plume and associated capture of this plume via interceptor canals. ***Data analyses support expert testimony and exhibits.***

Florida Power & Light, South Florida – Analyzed effect of changes in hydrogeology beneath Biscayne Bay to modeled (MODFLOW) drawdowns in support of radial collector well (RCW) system to be used as a backup system for supplying cooling water for two new units of a nuclear power plant; QA of FPL consultant's calibration and prediction groundwater model; review of groundwater flow model report; review of National Park Service surface water model of Biscayne Bay evaluating impact of RCW on Bay salinity. ***Modeling and data analyses supported expert testimony and exhibits.***

Confidential Client Groundwater Flow and Multi-Species Transport Model, Bunker Hill Basin, California - Oversaw calibration of both short-term groundwater flow and combined groundwater flow and perchlorate/TCE transport models using PEST calibration software. Calibration included complex definition of spatially variable hydraulic conductivities and specification of unique hydrologic model calibration target conditions. Development of long-term groundwater flow and solute transport model, which necessarily included the identification and definition of contaminant sources; performed flow and transport model calibration. Developed predictive simulations of development of plumes originating from on-site sources in order to inform planning for future remedial actions and water blending measures. Produced figures and tables relevant to meetings with project managers. Contributing author and editor of model reports.

USEPA, Multiple CERCLA and RCRA Sites (landfill, refinery, manufacturing) in USA – Conducted extensive reviews of sites' investigation and remedy reports and data. Identified deficiencies in conceptual site models, remedial actions, and monitoring. Developed recommendations for improvement to existing remedial measures to aid in bringing sites to closure, including additional monitoring, data analyses, recommended remedial options. Drafted technical reports summarizing optimization review results and submitted to USEPA for review.

Ecology & Environment/Stantec, South Florida – Developed conceptual model of water and salt flows between nuclear power plant's cooling canals (surface water) and surrounding environment (groundwater, atmosphere, and surface water) in south Florida for 12-year period between late-2010 and late-2024. Converted conceptual model into spreadsheet-based model of daily changes in canal stage and salinity due to daily changes in flows between cooling canals and groundwater, adjacent surface water, and atmosphere (evaporation, precipitation). Developed empirical formula to estimate evaporation from a heated, hypersaline water body. Conducted statistical analyses to identify redundancies in and optimize the surface water, groundwater, and climatic monitoring network in and around the cooling canals. Documented model and results and presented to South Florida Water Management District (SFWMD). Model has been reviewed and received concurrence from both SFWMD and Miami Date County Department of Environmental Resource Management.

US Air Force, Ramstein Airbase, Germany – Performed update of a numerical groundwater flow and TCE/benzene transport model in complex aquifer, geologic, and public setting. Oversaw the incorporation of boring log information into an MVS geologic model, the translation of that geologic model into a numerical groundwater model skeleton, and the update/simulation of associated TCE and benzene transport models. Six models were developed overall, based on different assumptions of aquifer

and constituent properties. Collaborated with German hydrogeologists to develop calibration metrics and demonstrable model quality. Project was executed under a compressed schedule to meet client needs

Confidential Client, Northern Minnesota Mine. Provided peer review of MODFLOW-2005 flow model of proposed mine site constructed by client's consultant. Additionally, reviewed MODFLOW-NWT models of mining activities and mine closure simulated by client's consultant. Developed surrogate FEFLOW flow model of mine site as a part of QA role based on observed hydrogeology, topography, and geology. Calibrated FEFLOW model of mine site to measured water levels and predicted groundwater drawdowns resulting from open pit mining activities. Identified deficiencies in MODFLOW calibration and predictive models, as well as the data that supported them. Assisted in review of data and relevant literature and the design of additional field investigations to focus on delineation of faulting and factures. Drafted revised modeling plan to improve understanding of the proposed mine site and impact of mining on sub-regional hydrology.

Confidential Client, Northern Wisconsin Mine. Constructed and calibrated 3D groundwater flow and transport models of open pit copper/gold mine in Northern Wisconsin. Model was calibrated to past conditions and reconfigured to evaluate mine closure options.

Synergy Energy, Perth, Australia – Lead modeler for the development/extension of a 3D groundwater flow model for the assessment of groundwater resources in the Cardiff sub-basin, southeast of Perth in support of triennial reporting for Cardiff Sub-Basin. Developed a fit-for-purpose steady state and transient FEFLOW model, which was used to ascertain and quantify existing groundwater recharge and discharge points and flow between aquifers for current conditions. The model is also used to quantify potential changes to groundwater regimes due to abstractions and mine dewatering.

Nevada Gold Mine, Arturo Mines – Provided groundwater / surface water / geochemical / geologic model reviews for open pit gold mines. Provided a simplified and updated linkage model between the groundwater flow, surface water storage, and geochemistry.

Confidential Client, Southern California – Updated/calibrated a FEFLOW groundwater flow model. Simulated long-term transient model of groundwater flow in an area flow basin. Simulated operation of proposed extraction/injection alternatives and characterized associated capture zones using FEFLOW model. Conducted groundwater particle tracking analyses to illustrate effectiveness of groundwater captures, flow of contaminated water to municipal wells, and long-term migration of a contaminant plume.

Confidential Client, Southern California – Refined and calibrated groundwater and multi-constituent (TCE, PCE, Cr6, 1,2,3-TCP) transport model. Adjusted model parameters via manual trial and error process to improve the simulated match to both water levels, magnitudes of constituent concentration, and concentration trends. Assisted in presentation and documentation of model revision and results to client.

Cross Yarra Partnership, Melbourne, Australia – Lead modeler on the calibration of local and regional models used to evaluate effects of dewatering associated with the Melbourne Metro Tunnel project. Adjusted FEFLOW numerical groundwater flow model characteristics to more accurately simulate groundwater drawdown and rebound. Simulated the operating TCE plume mitigation system to understand the migration of a TCE groundwater plume in the vicinity of the Central Business District North metro station excavation.

Confidential Client, Florida - Constructed and calibrated predictive MS Excel-based water, salt and heat balance model of large (10 square mile) hypersaline surface water body to predict changes to water level and salinity that result from the additions and removal of water and canal sediment. Model also produced simulated relationships between evaporative losses, precipitation, radiation- and solar-based exchanges of heat, and seepage flows to calculate daily changes in water body stage, salinity, and temperature. Predictive model simulated changes in water level, salinity, and temperature in both deterministic and probabilistic framework in order to characterize uncertainty in expected changes to the surface water body. Wrote guidance document regarding the correct use of the model and interpretation of its output.

Confidential Client, Texas – Reviewed hundreds of boring logs associated with monitoring, injection, and extraction wells at USDOE Pantex Plant in Texas. Analyzed available hydraulic conductivity data in order to transform lithologic data in hydraulic conductivities for use in groundwater flow and RDX transport model. Developed and implemented EnKF model calibration tool to the calibrated the groundwater flow and RDX transport model in more efficient manner than traditional approaches. Resulting calibrated model employed to identify optimal locations for injection and extraction remedy wells.

Lockheed Martin Corporation, Western Florida – Conducted largest documented model calibration/update via Ensemble Kalman Filter on multiple occasions over the course of the project. Successfully improved model performance and quality via EnKF numerous times. Coded EnKF algorithms in Octave and Fortran and dovetailed these processors with groundwater

modeling software. Proposed and presented approach to Lockheed Martin Corporation management, peer reviewers, and EPA Region 4.

Florida Power & Light, South Florida – Assisted client with attained regulatory approval of a modification to a Site Certification Application (SCA) for Turkey Point Nuclear Power Plant site. Converted calibrated water and salt balance model of hypersaline cooling canal system (CCS) into predictive model to evaluate remedial alternatives for reducing hypersalinity to seawater salinity. Devised remedial alternative comprised of adding pumped Floridan aquifer water to CCS to reduce salinities. Calibrated MODFLOW groundwater flow model of Floridan Aquifer system to evaluate drawdown impacts associated with groundwater withdrawals. Employed calibrated model as a predictive tool to determine drawdowns at nearby permitted user wells due to withdrawal of 14 MGD from FPL Turkey Point site. SCA modification was approved by regulatory agency.

Georgia Water Plan, Georgia – Project manager for probabilistic analysis of watershed, lake and stream hydrology and water quality models. Produced uncertainty analyses for Lake Jackson water quality model (EFDC), Upper Ocmulgee Watershed hydrological model (LSPC) and stream water quality models (Dosag) of the Yellow, South, and Alcovy Rivers. Set up uncertainty analysis (model input, post-processors for model output) in order to evaluate likelihood of watershed impacts on downstream receiving water bodies. Calculated correlations between watershed, lake, and stream properties and resulting water quality. Crafted report on uncertainty analysis assumptions and results, including relevant figures and conclusions for all models analyzed.

East End Seaport, Cayman Islands – Constructed and calibrated cross-sectional SEAWAT variable density flow and transport model of East End, Grand Cayman Island to simulate current extent of saltwater wedge. Predicted changes to saltwater wedge extent due to construction of a mixed-use seaport. Wrote technical memorandum summarizing modeling analyses and results as a part of proposal to Cayman Islands Department of Environment.

Confidential Client, Wisconsin – Calibrated initial mine pre-excavation steady state flow model. Built and calibrated a transient flow model, predicated on within-zone kriging of hydraulic conductivity. Built revised pre- and post-excavation steady state groundwater flow models (FEFLOW). Calibrated transient and steady state flow models. Calibrated transient transport model. Produced relevant figures and plots for web conferences. Oversaw transition of model from FEFLOW to MODFLOW. Calibrated MODFLOW groundwater flow and multispecies transport models (sulfate and manganese). Evaluated constituent concentrations along an imposed compliance boundary in short- and long-term predictive simulations.

PUBLISHED AND PRESENTED WORK

Seminars, White Papers, and Peer-Reviewed Journals

1. Groundwater Modeling for Beginners [Short Course], 2024 MODFLOW and More Conference, Integrated Groundwater Modeling Center, Princeton University, June 2024.

2. Howard, L., J.L. Ross, M. Jarrett, M. Amos (2020) Calibration and uncertainty estimation using the ensemble Kalman filter with a large subsurface flow and transport model, Waste Management (WM) Conference 2020, March 2020.

3. Ross, J.L and P.F. Andersen (2018) The ensemble Kalman filter for groundwater plume characterization: a pilot study, Groundwater 56 (4): 571-579.

4. Andersen, P.F. and J.L. Ross (2017) Continuous improvement of a groundwater model over a 20 year period: lessons learned, Groundwater 56 (4): 580-586.

5. Ross, J.L and P.F. Andersen (2017) The ensemble Kalman filter for groundwater plume characterization: a pilot study, MODFLOW and More, Colorado School of Mines, Golden, Colorado, May 2017.

6. Andersen, P.F. and J.L. Ross (2017) Continuous improvement of a groundwater model over a 20 year period: lessons learned, MODFLOW and More, Colorado School of Mines, Golden, Colorado, May 2017.

7. Ross, J.L and P.F Andersen (2015) Use of a spreadsheet-based water/salt balance for data integration at a large cooling canal system, MODFLOW and More: Modeling a Complex World, Colorado School of Mines, Golden, Colorado, June 2015.

8. Ross, J.L and P.F. Andersen (2014) Evaluation of the effect of initial conditions on parameter estimation in a groundwater flow and transport model, 12th Symposium on Groundwater Hydrology, ASCE-EWRI World Environmental and Water Resources Congress, Portland, Oregon.

9. Andersen, P.F., J.P. Fenske, J.L. Ross, and R.M. Greenwald (2014) Evolution of a groundwater model over 20 years, 12th Symposium on Groundwater Hydrology, ASCE-EWRI World Environmental and Water Resources Congress, Portland, Oregon.

10. Andersen, P.F. and J.L. Ross (2013) Toward making better predictions with groundwater models, Proceedings of the Conference MODFLOW and More 2013: Translating Science into Practice, International Groundwater Modeling Center, Colorado School of Mines, Golden, Colorado.

11. Dokou, Z., J. Ross, and G. F. Pinder (2009) Optimal search strategy for the definition of a DNAPL source, prepared for Strategic Environmental Research and Development Program (SERDP).

12. Ross, J., M. Ozbek, and G. F. Pinder (2009) Aleatory and epistemic uncertainty in groundwater flow and transport simulation, Water Resources Research 45, W00B15, doi:10.1029/2007WR006799.

Presentations

1. MODFLOW and More Conference, “The ensemble Kalman filter for groundwater plume characterization: a pilot study,” Colorado School of Mines, Golden, Colorado, May 2017.

2. MODFLOW and More Conference “Continuous improvement of a groundwater model over a 20 year period: lessons learned,” Colorado School of Mines, Golden, Colorado, May 2017.

3. Technical Talk, “Recent Modeling of Containment and Recovery of Hypersaline Water at the FPL Turkey Point Power Plant,” (web conference), August 2016 (with Pete Andersen and Scott Simpson).

4. MODFLOW and More: Modeling a Complex World, “Use of a spreadsheet-based water/salt balance for data integration at a large cooling canal system,” Colorado School of Mines, Golden, Colorado, June 2015.

5. Technical Talk, “Technical Analyses for Permitting of a Backup Water Supply for a Nuclear Power Plant and a Water Balance for a Large Cooling Canal System,” (web conference), March 2014 (with Pete Andersen).

6. Technical Talk, “Ensemble Kalman Filtering Analysis: LMC-Tallevast Groundwater Flow Model,” (web conference), August 2013 (with Dave Skipp).

7. MODFLOW and More Conference, “Toward making better predictions with groundwater models,” Colorado School of Mines, Golden, Colorado, June 2013.

8. Technical Talk, “Cloud Servers as a Solution to Short-Term, High-Volume Computing Needs,” (web conference), March 2012 (with Scott Simpson).

9. Ground Water Summit and Ground Water Protection Council Spring Meeting, “Predictions of TCE Plume Expansion Using Calibration-Constrained Monte Carlo Analysis,” Westin Tabor Center, Denver, CO, April 2010 (with Greg Council).

10. Technology Transfer, “Uncertainty Analysis in Environmental Modeling,” (web conference), February 2010 (with Greg Council and Rex Bryan).

11. Technical Talk, “Application of Uncertainty Analysis and PEST to Improve Groundwater Model Predictions – Tooele Army Depot,” GeoTrans, Roswell, GA (web conference), November 2009 (with Greg Council).

TETRA TECH

Anna Rasmuson, PhD, PE, PG
Geological Engineer

EXPERIENCE SUMMARY

Dr. Rasmuson is a Geological Engineer with ten years of experience in consulting and academia with a focus on remediation and groundwater modeling. She has supported work in multiple states in the US on a variety of development and remediation projects. Her modeling experience includes simulating groundwater travel times, pumping-induced drawdown, plume degradation, and colloid transport. She is skilled with MODOFLOW, MODPATH, RT3D, and MT3D. She has prepared numerous technical documents for regulatory agencies and private clients. Dr. Rasmuson has extensive experience parameterizing and enhancing groundwater models using field and experimental data.

Dr. Rasmuson is an expert in colloid transport through granular and fractured aquifers. Her educational background includes original research at the University of Utah that resulted in a dissertation, titled *Advancements in Colloid Filtration: How Pore-Scale Physiochemical Heterogeneity Affects Pathogen and Engineered Nanoparticle Transport.* She is first author for several peer-reviewed journal articles.

RELEVANT EXPERIENCE

Capture Remedy Design; Confidential Client; British Columbia, Groundwater Modeler. Groundwater model used to design selenium impacted groundwater remedy design for an active coal mine. As groundwater modeler, calibrated MODFLOW-USG model using PEST and designed capture remedy system to intercept impacted groundwater. Performed sensitivity analysis using PEST to determine which parameters model was most sensitive to. Evaluated groundwater pathways using MP3DU to determine travel times and capture zones. Ran predictive simulations to evaluate impacts to stream flows and groundwater flux after lining the streambed and installing additional extraction wells.

IRZ Pilot Study Transport Model; Confidential Client; British Columbia; Groundwater Modeler. Converted preexisting MODFLOW-USG flow model to MODFLOW 6 in order to simulated ethanol transport for proposed pilot study. Calibrated transport model using groundwater monitoring well data obtained from a chloride tracer study. Conducted predictive scenario runs to simulate plume transport under conditions with and without decay. Evaluated impacts of pumping downgradient and upgradient of injection point. Performed sensitivity runs to evaluate model sensitivity to porosity, dispersivity, hydraulic conductivity, and recharge. Prepared figures showing simulated plumes at various times using ArcGIS Pro. Prepared technical memorandum summarizing model calibration and predictive runs.

Saturated Rock Fill Remedy Design; Confidential Client; British Columbia; Groundwater Modeler. Calibrated MODFLOW6 model to fit aquifer pump test results and measured heads. Evaluated impacts to streamflow and water quality for various pumping/reinjection configurations. Prepared cone of depression figures using ArcGIS Pro.

Tracer Viability Study; Union Mine Landfill; El Dorado County, California. Project Hydrogeologist. Purpose of project was to evaluate chloride sources in groundwater at a site with a landfill constructed over a forming mining site in a fractured aquifer. Prepared tracer

EDUCATION

Ph.D. Geological Engineering, University of Utah, Salt Lake City, UT, 2019

B.S. Geoscience with physics minor, University of Utah, Salt Lake City, UT, 2013

AREAS OF EXPERTISE

Hydrogeology, Remediation, Groundwater Modeling, Contaminant Transport, Tracer Studies

TRAINING/CERTIFICATIONS

Licensed Professional Engineer in Utah

Licensed Professional Geologist in Utah

HAZWOPER 40 hr training

SOFTWARE

GMS Packages (MODFLOW, MODFLOW-USG SEEP2D, MODPATH, MT3D, RT3D), Groundwater Vistas, FEFLOW, PEST, VS3DTI, Fortran, Projects and Access Database, AutoCAD Civil 3D, AQTESOLVE, and ArcGIS Pro.

REGISTRATIONS/ AFFILIATIONS

Rocky Mountain Association of Environmental and Engineering Professionals 2024

OFFICE

Salt Lake City, Utah

YEARS OF EXPERIENCE

10

YEARS WITHIN TETRA TECH

5.5

study work plan to distinguish chlorate sources from historical mining and active landfill operations. Reviewed historical borelogs and Site reports. Modeled groundwater travel times using two-dimensional model. Coordinated field efforts to conduct point-dilution tests and injection tests to verify tracer test viability. Prepared Tracer Study Recommendations Report summarizing site hydrogeology and geochemistry.

Groundwater Flow and Transport Model; Savannah River Nuclear Site; South Carolina. Groundwater Modeler. Project included evaluation and update to existing model and simulation of predictive remedial design scenarios. Created solids model using borehole data and calibrated groundwater flow model using pumping rates from remediation and production wells and monitoring well data using MODFLOW. Created groundwater flow paths using MODPATH to demonstrate groundwater source transport potential in relation to pumping wells. Evaluated contaminant plume migration for various remediation scenarios using MT3D, including additional extraction wells, trench systems, and broad area treatment application.

Vadose Zone Model; HF Sinclaire; Spokane, Washington. Groundwater Modeler. Project included a release from a gas pipeline. As groundwater modeler, simulated vadose zone transport time for spill to reach the underlying water table using VS2DTI. Successfully demonstrated to regulators that release did not pose an environmental risk to groundwater receptors.

Eagle Pass Production Well Feasibility Study; Eagle Pass Water Works System; Kinney County, Texas. Project Hydrogeologist. Feasibility study for new production well to support the city of Eagle Pass, Texas. Evaluated potential well sites for a production well for municipal water supply. Evaluated aquifer characteristics from existing borelogs and hydrogeologic reports. Modeled drawdown impacts to surrounding private wells and surface water features using regional groundwater MODFLOW model.

Expert Witness Testimony; Confidential Client, Huntsville Utah. Project Engineer. Evaluated groundwater flow paths and nutrient fate and transport for a litigation case involving a salt storage yard located upgradient of agricultural operations. Prepared Piper diagrams to evaluate groundwater source end members. Calculated 2D groundwater travel times to estimate transport potential. Evaluated groundwater analytical data and prepared an expert witness testimony report that was used for litigation purposes.

Lock and Dam 25; US Army Corps of Engineers, Winfield, Missouri. Project Engineer. Groundwater pumping model for a proposed lock on the Mississippi River. Project involved modeling drawdown in response to pumping using MODFLOW-USG. Refined 3D model layers in GMS using knowledge of aquifer properties and borehole data and modeled effects of weepholes and pumping wells using CLN well package. Performed sensitivity analyses to assess effects of hydraulic conductivity of model layers, well borehole diameters, and starting head elevations. Post-processed model outputs using ArcGIS and Access Database to evaluate simulated head contours, well fluxes, zone budget flows.

Variable Density Groundwater Model; Florida Power & Light; South Florida. Project Engineer. Project included a sub-regional variable density groundwater flow and salt/heat model of a hypersaline plume in the Biscayne Aquifer. Analyzed groundwater flow paths using MODPATH. Performed data analysis for aerial and monitoring data and post-processed simulated salinity concentrations from PEST model.

Groundwater Tracer Study; Former Manufacturing Facility; Southern Nevada. Project Hydrogeologist. Tracer study using fluorescent dyes to determine whether bioremediation substrate was reaching the targeted contaminant plume. Simulated groundwater travel times using RT3D and MODFLOW and developed field sampling plan to validate model results. Designed tracer concentrations based on modeling results to avoid impacting nearby surface water features.

Groundwater Model Evaluation; Carrier Corporation; Los Angeles, California. Groundwater Modeler. Evaluated capture zones of remediation wells using FEFLOW software. Ran particle tracing simulations in FEFLOW to evaluate efficacy and limitations of existing model. Evaluated groundwater flow paths using MODFLOW 6 PRT package.

TCE Plume Model; US Army Corps of Engineers; Utah. Project Engineer. Long-term groundwater model for TCE Plume at Tooele Army Depot Base. Analyzed groundwater monitoring data and post-processed PEST model outputs to predict TCE plume migration towards compliance boundaries and potential downgradient receptors.

Dewatering Design; McWane Ductile; Provo, Utah. Project Hydrogeologist. Project included dewatering design for planned construction of an approximately 50,000 square foot warehouse building. As project hydrogeologist,

performed pump tests and simulated groundwater drawdown using AQTESOLVE. Utilized simulated and field data to calculate hydraulic conductivity of subsurface materials and develop a dewatering schedule.

Pathogen Transport Characterization; Kewaunee County, Wisconsin. Research Scientist. Collaborated with Wisconsin USDA to investigate drinking water contamination in private wells. Characterized subsurface geology and simulated pathogen transport through a fractured aquifer using custom Fortran models. Conducted bench-scale column tests using soils collected from Wisconsin subsurface to validate model results. Published findings in peer-reviewed scientific journal.

Colloid Transport Study; Notre Dame University, Indiana. Research Scientist. Collaborated with Notre Dame researchers to conduct field-scale transport study evaluating travel times of nano- to micro-sized particles. Evaluated travel times and attachment distribution using custom Fortran model. Published findings in peer-reviewed scientific journal.

PUBLICATIONS

Rasmuson, A., Pazmino, E., Assemi, S., Johnson, W. P. (2017). Contribution of Nano- to Microscale Roughness to Heterogeneity: Closing the Gap between Unfavorable and Favorable Colloid Attachment Conditions. Environmental Science & Technology, 51(4), 2151-2160. doi:10.1021/acs.est.6b05911

Rasmuson, A., VanNess, K. Ron, C., Johnson, W.P. (2019). Hydrodynamic versus surface interaction impacts of roughness in closing the gap between favorable and unfavorable colloid transport conditions. Environmental Science and Technology, 53(5). doi:10.1021/acs.est.8b06162

Rasmuson A., Erickson, B., Borchardt, M, Spencer, S., Johnson, W. P. (2020). Pathogen Prevalence in Fractured versus Granular Aquifers and the Role of Forward Flow Stagnation Zones on Pore-Scale Delivery to Surfaces. Environmental Science & Technology 54 (1), 137-145. doi: 10.1021/acs.est.9b03274

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TETRA TECH

David R. Beck, PG
Principal Hydrogeologist

EXPERIENCE SUMMARY

Mr. Beck is a Principal Hydrogeologist with 23 years of professional environmental consulting experience applying hydrogeological principles to environmental investigations, remediation design and implementation, and site closure. Mr. Beck is a Professional Geologist in Illinois, Indiana and Kentucky. His experience includes completing large-scale investigations at sites with a wide range of contaminants including chlorinated solvents, heavy metals, refined petroleum products and polychlorinated biphenyls. Mr. Beck has experience in methane and groundwater monitoring at landfill sites and landfill gas recovery system operation and maintenance (O&M). Mr. Beck has designed and implemented remedies such as soil flushing to recover dense non-aqueous phase liquid (DNAPL), soil excavation and off-site disposal, soil vapor extraction (SVE), dual-phase extraction (DPE), chemical oxidation, in-situ bioremediation (ISB) and in-situ chemical reduction (ISCR) of various hydrocarbons and chlorinated solvents in groundwater, and ISCR and fixation for hexavalent chromium and other metals. Mr. Beck is experienced in supporting manufacturing facility closures, including site characterization (above and below grade), cleaning, decommissioning and mothballing activities.

Mr. Beck has extensive knowledge of State regulatory programs throughout the Midwest and Federal regulations, including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Resource Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA). Mr. Beck has represented a variety of clients in direct negotiations with State and Environmental Protection Agency (USEPA) Region 5, Michigan, Indiana, Ohio and various local stakeholders and affected landowners.

Mr. Beck has managed international Phase I Environmental Site Assessment (ESA) portfolios for commercial/industrial clients in divestitures and acquisitions. Mr. Beck serves as the Tetra Tech Program Manager for a major national retail owner/manager/operator and international chemical company. Mr. Beck has successfully managed investigation projects in excess of $1M and remediation projects in excess $4M. Mr. Beck serves as the field operations lead on the $50M Superfund cleanup project. In addition to client management and interfacing with regulatory agencies, Mr. Beck excels in assembling multi-disciplinary Tetra Tech project teams consisting of local, regional and national professionals; development and tracking of scopes of work, budgets and schedules; technical writing, and training and mentoring staff.

EDUCATION

M.S.,Geology
Western Michigan University (2003)

B.S., Geology
Michigan State University (2001)

REGISTRATIONS/ AFFILIATIONS

Licensed Professional Geologist, Indiana, No. 2294, IC 25-17.6 and IAC Title 305, since 2009

Professional Geologist, Kentucky, No. 2529, KRS 322A and 201 KAR 31, since 2011

Licensed Professional Geologist, Illinois, No. 196.001489, 225 ILCS 745, since 2019

40-Hour HAZWOPER /8-Hour Supervisor Training + 8 hour Refreshers ,29 CFR 1910.120 OSHA, since 2002

RCRA/DOT Hazardous Waste/Materials Management, 40 CFR 260-279, 49 CFR 105-110 and 171-180, since 2011

OFFICE

Portage, Michigan

YEARS OF EXPERIENCE

23

YEARS WITH TETRA TECH

21

RELEVANT EXPERIENCE

EXCAVATION, DEWATERING AND OFF-SITE DISPOSAL

Soil Pile Remediation, Charter Township of Ypsilanti, Ypsilanti, MI. Managed the site investigation and mitigation of a soil stockpile approximately 50,000 cubic yards in size and impacted with arsenic. The investigation indicated that the arsenic was naturally occurring in the area from which the soil was taken. Characterization and statistical analysis of the soil stockpile indicated only a few hotspots were present. Negotiations with the state regulatory agency resulted in two hotspots being delineated and 90 cubic yards of soil disposed in a landfill. The remainder of the soil stockpile was deemed clean by the State of Michigan. (2005-2006)

Visteon – Tuscaloosa Facility, Visteon Corporation, Tuscaloosa, AL. Provided project coordination and management for decommissioning, cleaning and removal of diisocyanate tanks and process lines. The project

included disposition coordination of remaining chemicals to another user to recover some costs and avoid disposal. Process lines were flushed, and tasks were cleaned using a non-hazardous solvent by a subcontractor. Coordinated disposal of decontamination waste. (2012).

Luick Quality Gage and Tool, Nottingham Real Estate Group, LLC, Muncie, IN. Currently serves as project manager and technical lead in developing a site-wide remediation program that includes removal of hexavalent chromium-impacted soils, removal of impacted building materials, building demolition, removal of wastewater structures that potentially serve as preferential migration pathways and groundwater remediation using chemical reduction and fixation to support a final planned remedy of natural attenuation. In 2017, interim actions were implemented to demolish the building and remediate site soils to commercial/industrial direct contact screening levels. Within 12 months of the completion of soil interim actions, hexavalent chromium concentrations in groundwater decreased from 30,000 µg/L to 7,300 µg/L. Groundwater interim actions were implemented in August 2018, which include zero-valent iron (ZVI) permeable reactive barriers around the perimeter of the plume core and a combination of ferrous sulfate and ZVI in the core of the plume. Mr. Beck works closely with the client's legal counsel to ensure all work is approved by insurers and serves as the primary point of contact with IDEM. (2014 – present)

Confidential Site, Confidential Manufacturing Client, Jefferson, OH. Technical lead on an abbreviated feasibility study prepared as part of the proposal process to address TCE-impacted soil and groundwater at the site. Upon award, served as the project technical lead for indoor air and soil vapor sampling at the site and the source area excavation within the facility. The excavation was completed in an area that was extremely space-limited (approximately 50-foot by 50-foot and a minimum overhead clearance of 7 feet). The excavation was completed to a depth of approximately 10.5 feet and resulted in 900 tons of soil waste. Through discussions with Ohio Environmental Protection Agency (OEPA) and Waste Management, Tetra Tech was able to reclassify the waste as non-hazardous, resulting in a savings to the client of $120,000. A doubling of focus on health and safety was used on the project due to the limited accessibility and use of heavy equipment. Health and Safety meetings were held at the beginning and end of every shift and a safety talk was informally conducted during most work breaks. The excavation was successfully completed with no injuries and to the satisfaction of the site owner and the pending purchaser. (2016-2017)

Superfund Site, Environmental Custodial Trust, Kalamazoo, MI. Serves as the Construction Quality Assurance and Quality Control Manager and Field Operation Lead on this CERLCA remediation project to excavate and consolidate 1.3M CY of paper residuals and PCB-impacted material. (2017-2019).

Superfund Site, Environmental Custodial Trust, Kalamazoo, MI. Served as the technical lead for a pre-design investigation to delineate paper residuals and PCBs to support the design of an excavation and consolidation remedy that is estimated to consist of 1.3M CY of material. (2017-2019).

DEMOLITION

Various Indoor Air Quality Sites, Various Locations, MI. Performed asbestos air monitoring and analysis (NIOSH 7400 Method) during remediation activities including floor tile removal, glove-bag abatement and full enclosure abatement. Projects include multi and single dormitory renovation programs at several colleges and universities, K-12 building renovation programs and commercial/industrial building renovation programs. Conducted indoor air quality and industrial hygiene investigations in private residences, manufacturing facilities, and office buildings for lead, volatile organics and mold. (2001-2005)

General Motors, Pontiac, MI. Conducted an asbestos building inspection at a mixed-use manufacturing, testing, office building in accordance with GM specification and requirement. This work required use of an aerial lift to reach high bay area within the facility. Coordinated labeling of materials with plant and union personnel following receipt of analytical data. (2006)

Medical Rehabilitation Centers, Midwest. Managed and completed site inspections at 4 sites in Illinois and 6 sites in Indiana that were residential health care facilities. Select facilities required an evaluation of asbestos-containing building materials and building systems evaluations. (2007).

Office Building, Army Corps of Engineers, Grand Rapids, MI. Provided senior review and management of field inspectors completing an asbestos survey of office and maintenance buildings, in accordance with National Emissions Standards for Hazardous Air Pollutants (NESHAP) and Asbestos Hazard Emergency Response Act (AHERA) protocols. (2007)

Due Diligence Support, Simon Property Group, National. Program Manager for ACM, lead and hazardous material inspections and Phase I/II ESAs/investigations completed to support major proposed site renovations at retail centers/malls nationally. The scopes of work typically include preparation of preliminary abatement costs, abatement specification and contractor abatement bidding administration and review. (2011-present).

Luick Quality Gage and Tool, Nottingham Real Estate Group, LLC, Muncie, IN. Currently serves as project manager and technical lead in developing a site-wide remediation program that includes removal of hexavalent chromium-impacted soils, removal of impacted building materials, building demolition, removal of wastewater structures that potentially serve as preferential migration pathways and groundwater remediation using chemical reduction and fixation to support a final planned remedy of natural attenuation. In 2017, interim actions were implemented to demolish the building and remediate site soils to commercial/industrial direct contact screening levels. Within 12 months of the completion of soil interim actions, hexavalent chromium concentrations in groundwater decreased from 30,000 µg/L to 7,300 µg/L. Groundwater interim actions were implemented in August 2018, which include zero-valent iron (ZVI) permeable reactive barriers around the perimeter of the plume core and a combination of ferrous sulfate and ZVI in the core of the plume. Mr. Beck works closely with the client's legal counsel to ensure all work is approved by insurers and serves as the primary point of contact with IDEM. (2014 – present)

MIGRATION CONTROL, FLUID REMOVAL, AND CONTAINMENT

Lincoln Fields Cooperative Water Association Superfund Site, USEPA, Mansfield, OH. Performed Remediation System Evaluation (RSEs) at this Ohio EPA lead site that included a pump and treat of TCE-contaminated groundwater that impacted a municipal well. Conducted a site inspection, interviews with the performing contractor, and evaluation of historical operation, maintenance (O&M) and monitoring data. Prepared a detailed report that provided specific recommendations to improve existing remedy and optimize operation, maintenance O&M and monitoring of the existing remedy. (2014)

LANDFILLS

Livingston County Landfill, Livingston County, Howell, MI. Provide senior technical oversight for post-closure monitoring at this former municipal landfill, in accordance with State of Michigan Part 115 rules, including groundwater monitoring, methane monitoring, and control. Evaluated options to mitigate off-site methane migration in the area of an active landfill gas recovery system. The proposed mitigation to expand the recovery system using existing infrastructure (passive vents) successfully reduced landfill gas. Currently advising Livingston County on sampling and management of emerging compounds in groundwater including PFAS and 1,4-Dioxane. (2003-present)

INDOOR AIR/VAPOR INTRUSION

Former Manufacturing Facility, Confidential Client, Kalamazoo, MI. Conducted an investigative soil vapor survey for chlorinated solvents using direct push methods in and around a former electrical component manufacturing building. The Geoprobe® Post Run Tubing (PRT) System was used to collect the soil vapor samples from various depths ranging from 3 to 25 feet below surface grade. The PRT System allows for the collection of soil vapor samples at the desired depth without cross-contamination. Samples were collected with a vacuum pump attached to a vacuum box which contained a Tedlar sample bag. The vacuum box was used to inflate the sample bag by lowering the pressure outside of the sample bag. Each Tedlar sample bag was immediately transferred to a mobile laboratory for analysis of VOCs by USEPA Method 8260. The analytical results were used to produce isoconcentration maps for key VOCs for various depth intervals, thereby identifying two principal source areas. Prepared a Limit Site Closure Plan. (2005-2006).

Northernaire/Kysor Superfund Site, City of Cadillac, Cadillac, MI. Prepare a closure work plan for closure of a soil vapor extraction system at the Kysor Industrial Superfund site. During preparation, existing data suggested that no further closure sampling was warranted, and a closure report was submitted to the USEPA and MDEQ instead of a work plan. The USEPA and MDEQ ultimately approved closure and decommissioning of the system without any additional field work, saving the City the costs for preparation of two separate work plans and closure documents and executing additional field work, approximately $10,000 to $15,000 in savings. Completed a remedial system evaluation to identify potential cost savings and propose a closure strategy for the pump and treat system. Supported the preparation of a closure document for the Northernaire portion of the site. (2005-present)

Former Visteon – Connersville Site, Visteon Corporation, Connersville, IN. Performed field oversight for the remedial investigation, which included the installation and sampling of over 50 soil borings and 40 monitoring wells to determine the vertical and horizontal extent of the chemicals of concern. Soil borings and wells were installed using direct-push, hollow stem auger and sonic drilling techniques to depths of 120 feet below surface grade. The plume was determined to be approximately 9,000 feet long, 1,100 feet wide and ranged between 25 and 75 feet thick. Prepared a generalized geologic cross-section and groundwater model to aid the design of a pilot test system. Hydraulic properties of the formation were characterized by evaluating aquifer material grain size, an 8-hour pumping test and a bromide tracer test. Assisted in the development of a work plan for conducting quarterly low-flow (minimal drawdown) groundwater sampling. Coordinated quarterly groundwater sampling and hydraulic monitoring for remedial system performance analysis. Assisted the development of a well-rehabilitation program. Performed trend analysis of data and data management. Coordinated the completion of quarterly compliance and residential monitoring and reporting. Prepared a sampling and analysis plan (SAP) for vapor intrusion determination in accordance with the IDEM Draft Vapor Intrusion Pilot Program Guidance. Conducted soil gas sampling to assess for vapor intrusion into surrounding homes. Provided Visteon Corporation with property transfer (Phase I/II ESA) support for the facility. The City of Connersville took over the environmental liability in 2010 and retained Tetra Tech at the request of Visteon and IDEM.

Performed oversight and O&M and data analysis for bioaugmentation pilot study to determine if complete dechlorination of TCE to ethene was possible at the site, evaluate sodium lactate and emulsified vegetable oil as electron donors and to establish key design criteria for a full-scale remedy. Completed a work plan for a biobarrier remediation program, which included donor delivery system design, monitoring program design, and development of an implementation schedule. (2003-2009)

ALAC Garment Services, Confidential Client, Anderson, IN. Served as a sub-consultant to a local environmental consultant to assist with completion of a screening level ecological risk assessment (SLERA) and preliminary remedial planning at this former dry cleaner site with a PCE and daughter products groundwater plume that discharged to the surface in seeps and to a nearby river. (2012-2013)

Former Visteon – Connersville Site, City of Connersville, Connersville, IN. Served as Project Manager responsible for coordination of remediation and routine monitoring on this 10-year contract to complete the IDEM-approved Remedial Action Plan for a chlorinated solvent source area and the 9,000-foot long and 1,100-foot-wide groundwater plume. Project included reporting to IDEM and insurance carrier, groundwater remediation maintenance injections, development of strategies for site closure and field implementation of the approved remediation action plan. Served as the primary point of contact with the client, IDEM and insurance carrier. Negotiated No Further Actions (NFAs) for 1) arsenic impacts to site soils; 2) all USTs and LUSTs on the site; 3) TCE soil impacts in secondary source area using approved non-default groundwater cleanup standard in IDEM risk equations to demonstrate migration to groundwater will not exceed the non-default standard; 4) lead soil impact area by using institutional controls and demonstration that groundwater was not impacted; and shut down of a SVE system after 24 months of operation and conversion of 7 of 32 SVE wells to passive vent. These NFAs were negotiated without any additional characterization or remediation and saved the project well in excess of $100K. Completed a vapor intrusion evaluation of the site that included subslab vapor grab sampling and 24-hour indoor air sampling. Negotiated non-default indoor air action levels with IDEM using recent USEPA publications as the basis.

Served as the project technical lead for the groundwater remediation using enhanced reductive dechlorination with emulsified vegetable oil as the electron donor in the biozone (three closely spaced biobarriers in the source area) and three downgradient passive biobarriers. Lead design for groundwater remedies and subsequent maintenance injections. Over 400 injection wells were used to apply greater than 1M pounds of EVO and 1,050 Liters of Dehalococcoides (DHC) containing culture to the treatment areas to create biologically active zones. Over 330K pounds of EVO of the 1M pounds have been added to maintain treatment in the biologically active zones since 2007. Complete reductive dechlorination of TCE to ethene has been documented in each of the biobarriers and in the source area treatment zone. In 2018, IDEM approved the decommissioning and abandonment of 545 site monitoring and injection wells and transition of the project to long-term monitoring (LTM). Mr. Beck negotiated a list of only 12 wells to remain on the site for a LTM program. Conditional closure and implementation of the first LTM project in the State of Indiana on a site of this scale is expected within the next 12 months. Secured 12-year contract to implement LTM program. (2010-present)

IN-SITU PHYSICAL/CHEMICAL TREATMENT

Treasure Island, U.S. Department of the Navy, San Francisco, CA. Served as the technical lead on a feasibility study addendum for the Treasure Island Site 24 in San Francisco Bay. The area is reverting to civilian use and residual hotspots of chlorinated solvents remain at the site following several years of in situ bioremediation of chlorinated solvents by another contractor. Several alternative remedial approaches were evaluated, including combine in situ bioremediation (ISB) and chemical reduction (ISCR) with a more aggressive injection protocol, air sparge (AS)/SVE using horizontal wells due to site accessibility issues, and source area treatment using excavation or SVE. The Navy approved the addendum and concurred with Tetra Tech recommended alternative, ISB/ISCR. (2010-2013)

Cabot-Koppers Superfund Site, Beazer East, Inc. Gainesville, FL. Performed pilot test field oversight and optimization for in situ geochemical stabilization (ISGS) of creosote DNAPL in a low permeability formation at this former wood-treating facility. The ISGS approach involves the injection of enhanced sodium permanganate reagent to stabilize and oxidize residual DNAPLs. A pilot test of the ISGS remedy was designed and implemented within the most highly DNAPL-impacted area of the total 4-acre former process area. Over 19,000 gallons of reagent were successfully injected into moderate to low permeability deposits at depths of up to 65 feet below land surface. Free-phase DNAPL was successfully stabilized with up to 95% reduction in DNAPL mobility. The full-scale implementation of the ISGS remedy was completed in September 2015. (2014-2015).

Luick Quality Gage and Tool, Nottingham Real Estate Group, LLC, Muncie, IN. Currently serves as project manager and technical lead in developing a site-wide remediation program that includes removal of hexavalent chromium-impacted soils, removal of impacted building materials, building demolition, removal of wastewater structures that potentially serve as preferential migration pathways and groundwater remediation using chemical reduction and fixation to support a final planned remedy of natural attenuation. In 2017, interim actions were implemented to demolish the building and remediate site soils to commercial/industrial direct contact screening levels. Within 12 months of the completion of soil interim actions, hexavalent chromium concentrations in groundwater decreased from 30,000 µg/L to 7,300 µg/L. Groundwater interim actions were implemented in August 2018, which include zero-valent iron (ZVI) permeable reactive barriers around the perimeter of the plume core and a combination of ferrous sulfate and ZVI in the core of the plume. Mr. Beck works closely with the client's legal counsel to ensure all work is approved by insurers and serves as the primary point of contact with IDEM. (2014 – present)

Ramstein Air Base, Air Force Center for Engineering and the Environment, Ramstein, Germany. Served as a technical advisor on a chemical oxidation pilot test design to treat chlorinated solvents in groundwater. Provided technical advice on oxidant product and quantities; system operation, shutdown and post-shutdown procedures; and the pilot test monitoring program. (2016-2017)

Electroplating Services Emergency Response, USEPA, Madison Heights, MI. Technical lead for the design and implementation of an in -situ groundwater remedy to treat hexavalent chromium, TCE, cyanide, and PFAS. The design included injected permeable reactive barriers using a combination of slurry and soluble reagents to promote chemical and biological reduction, precipitation, and sorption. Preliminary results indicate that hexavalent chromium has been reduced to below the Michigan Part 201 groundwater-surface water interface criteria, the governing ARAR for the site, in the downgradient area where contaminants were previously daylighting to the surface. (2019-2021)

IN-SITU PHYSICAL/BIOLOGICAL TREATMENT

Automotive Manufacturing Facility, Confidential Client, Saline, MI. Designed and conducted a DPE pilot test. Lead designer of full-scale multi-phase extraction (MPE) system and field oversight for system installation. Designed and conducted a SVE pilot test and a AS/SVE pilot test. Implemented an enhanced reductive dechlorination pilot test and completed data evaluation and reporting. Lead design of enhance desorption and chemical oxidation pilot test and a carbon dioxide supersaturated water injection pilot test in a source area with toluene free product. (2008-2012)

Treasure Island, U.S. Department of the Navy, San Francisco, CA. Served as the technical lead on a feasibility study addendum for the Treasure Island Site 24 in San Francisco Bay. The area is reverting to civilian use and residual hotspots of chlorinated solvents remain at the site following several years of in situ bioremediation of chlorinated solvents by another contractor. Several alternative remedial approaches were evaluated, including combine in situ bioremediation (ISB) and chemical reduction (ISCR) with a more aggressive injection protocol, air

sparge (AS)/SVE using horizontal wells due to site accessibility issues, and source area treatment using excavation or SVE. The Navy approved the addendum and concurred with Tetra Tech recommended alternative, ISB/ISCR. (2010-2013)

Visteon – Canovanas Facility, Visteon Corporation, Canovanas, Puerto Rico. Served as project manager on this project. Lead designer of groundwater remedy using enhanced reductive dechlorination with emulsified vegetable oil product as the electron donor. Design targeted key areas where residual chlorinated solvent impacts remain in groundwater. Direct-push drilling techniques and temporary injection wells were used to deliver 16,800 pounds to the target intervals. Low permeability of the water-bearing unit resulted in the remedy design being modified to permeable reactive barriers (PRBs) using mulch and emulsified vegetable oil. Currently, Mr. Beck is leading negotiations with Puerto Rico Environmental Quality Board (EQB), with the support of the new property owner, to close the site with institutional control and natural attenuation. (2010-2015)

Former RCA Manufacturing Facility, Confidential Manufacturing Client, Indianapolis, IN. Lead designer of a full-scale source area treatment system using enhanced reductive dechlorination. Site has both TCE and TCA in groundwater at concentrations over 400 mg/L (ppm). Field Services Lead responsible for coordination with site manager and site tenants during installation of an asphalt cap, remediation injection wells and implementation of the groundwater remedy. Coordinated 2 shifts of 2 field staff 24 hours a day for three 10-day work periods. Coordinated security for nighttime coverage in the high-risk urban area. (2010-2015)

Confidential Site, Confidential Client, Whippany, NJ. Technical lead in design for a pilot test and technical advisor for the full-scale enhanced reductive dechlorination pilot test to treat low-level TCE and daughter products using emulsified vegetable oil to treat a fine-grained, stratified overburden aquifer overlying weathered bedrock. (2012-2016)

Electroplating Services Emergency Response, USEPA, Madison Heights, MI. Technical lead for the design and implementation of an in -situ groundwater remedy to treat hexavalent chromium, TCE, cyanide, and PFAS. The design included injected permeable reactive barriers using a combination of slurry and soluble reagents to promote chemical and biological reduction, precipitation, and sorption. Preliminary results indicate that hexavalent chromium has been reduced to below the Michigan Part 201 groundwater-surface water interface criteria, the governing ARAR for the site, in the downgradient area where contaminants were previously daylighting to the surface. (2019-2021)

ALTERNATIVE TECHNOLOGIES/POST REMEDIATION STRATEGIES

Natural Gas Compressor and Meter Stations, TransCanada – Columbia Gas, Multiple Sites, KY. Served as the project manager and professional geologist on several active and former compressor and meter station sites where remediation was completed in the 1990s but residual contaminants above current screening levels were left in place. In 2017, the State of Kentucky requested that the client take additional measures at these facilities. Mr. Beck coordinated for the completion of HHRA at two facilities. One facility was granted a NFA based on the demonstration that residual levels do not exceed acceptable risk levels if a management in place strategy were employed and site use was restricted to commercial/industrial. The other facility had one area that exceeded acceptable risk, which required additional fencing to restrict access. This facility was granted a NFA based on implemented engineering control and using a management in place strategy with site use restricted to commercial/industrial. (2017-2018)

A former compressor station exhibited arsenic and iron concentrations in creek sediment samples collected in the 1990s above human and ecological screening levels. Mr. Beck coordinated the resampling of the creek to replicate the 1990 sampling, which exhibited similar results. Mr. Beck's data evaluation and research indicated that the local geology was the primary source of the elevated arsenic and iron. The State of Kentucky agreed with Mr. Beck's assessment and issued a Notice of Completion Option C (Restoration).

ADDITIONAL RELEVANT PROJECTS

Confidential Site, Confidential Client, Akron, OH. Completed installation and low-flow groundwater sampling of monitoring wells in bedrock aquifer using a combination of hollow-stem auger and air rotary. Conducted wetland sampling to determine if sediments had been impacted by run-off from upgradient areas. Performed a site investigation and in-place closure of three 10,000-gallon USTs. (2006-2007)

Confidential Site, Confidential Client, Calvert City, KY. Completed a pilot test work plan for soil washing as a remediation option at a Superfund Site. Completed the soil washing pilot test on the site, which included well hydraulic testing, system modification design and specifications, tracer testing and data evaluation. (2006-2007)

Former Visteon – Connersville Site, Closure and Disposition Support, Visteon Corporation, Connersville, IN. Lead project professional on the preparation of a manufacturing site use history that examined the property from site development to closure, including manufacturing processes throughout the facility history. Provided support to facility personnel for file consolidation, permit review, waste characterization, etc. (2007-2009)

Due Diligence Support, Visteon Corporation, North America. Managed and served at the Environmental Professional for all North American Phase I ESAs for Visteon Corporation's acquisitions and dispositions. In total, Phase I ESAs have been completed at 7 facilities in Mexico and 9 facilities in the United States. Limited site research has been completed for several facilities in Canada. (2008-2012)

Detroit Arsenal, US Army Corps of Engineers, Detroit, MI. Conducted sampling of concrete manholes in support of upgrades to electrical distribution lines. Confined space entry procedures were followed to access sample locations near the base of the manholes. (2009)

Jackson Drop Forge, Confidential Client and BASF Corporation, Jackson, MI. Served as Project Manager for the remedial design and implementation at this complex site that involves at least three responsible parties, a third-party property owner, residual adjoining properties and wetland/waters of the United States (WOTUS) considerations. Tetra Tech was retained by two of the responsible parties in a cost-share agreement for the site. Supervised the completion of a series of trenches to characterize and map waste and make a general determination on the providence of the waste. Mapping was completed in real-time using geographic information system devices. Waste included sealants, caulks, and bituminous/elastomeric materials containing BTEX, PCBs and asbestos, and remedy required consideration of TSCA PCB regulations. Technical lead on the completion of a feasibility study, remedial action plan and remedial design to address waste products and led a presentation to a State of Michigan regulatory review board during which a path to closure was verbally negotiated between the clients and the agency. Remediation was completed in 2016 with final restoration and plantings completed in 2017. A No Further Action Report was submitted and approved by the MDEQ in 2017. Mr Beck attended two negotiation meeting with the MDEQ to discuss the components of the NFA and language to be included in the NFA letter from the MDEQ. NFA letter was issued in October 2017. Mr. Beck received a letter of commendation and recommendation from BASF for Tetra Tech's work on this project. (2009-2013)

Luick Quality Gage and Tool, Nottingham Real Estate Group, LLC, Muncie, IN. Served as project manager on this former tool and die facility that used chromic acid as part of historical operations. The project is funded through insurance recovery from five insurers. Completed a soil and groundwater investigation that delineated hexavalent chromium in a single mobilization using Triad-like approach of sampling with near real-time results directing additional investigation (step-outs and step-ins). Investigation and delineation was completed in a matter of weeks. The previous consultant had worked on the site for two years and failed to delineate the site. The investigation also identified building materials that were impacted with hazardous levels of chromium (primarily hexavalent) that would require special characterization and risk assessment. (2014 – 2016)

TETRA TECH

Bryan Allen
Senior Geologist

EXPERIENCE SUMMARY

Mr. Bryan Allen is a Senior Geologist with ten years of experience in environmental consulting, specializing in site characterization and remediation of soil and groundwater impacted by petroleum and chlorinated solvents. He has successfully led Phase I and II Environmental Site Assessments and is skilled in monitoring well installation, groundwater and soil sampling, landfill gas monitoring, and sub-slab vapor pin sampling.

His expertise includes hydrogeological and geochemical site characterization, as well as conducting Baseline Environmental Assessments for property transfers involving industrial, commercial, and municipal clients. Proficient in software such as ArcMap, AutoCAD, gINT, and Surfer, Mr. Allen effectively analyzes data and plans projects.

His experience encompasses proposal writing, fieldwork planning, and employing various methods of environmental and geotechnical drilling and sampling. He is adept at installing groundwater monitoring wells and interpreting environmental data, as well as writing technical reports to communicate findings to stakeholders.

As a key team member, Mr. Allen contributes to diverse projects for commercial, private industrial, and government clients, demonstrating a commitment to delivering high-quality results and advancing environmental protection initiatives. His comprehensive skill set makes him a valuable asset to any project team.

RELEVANT EXPERIENCE

Remediation Design and Implementation

Investigation and Remediation for the development of Corrective Measures, Confidential Client, Flint, Michigan. Completed a remedial site investigation for chlorinated VOC and PFAS impacts, develop a remediation design, and an implementation work plan. Completed the subsequent Implementation of an in Situ Chemical Reduction Treatment of TCE and Daughter Product by Hydrogenolysis and Beta-Elimination Pathways. Reporting requirements included annual and semi-annual reports, groundwater elevation contour plots, and groundwater sampling results. (2021 - Present)

In Situ Chemical Reduction Treatment of TCE and Daughter Product by Hydrogenolysis and Beta-Elimination Pathways Confidential Client, Saginaw, MI. Performed an in Situ Chemical Reduction Treatment of TCE, cis-1,2-dichloroethene, and vinyl chloride in shallow groundwater by hydrogenolysis and beta-elimination pathways. Collaborated with project team to complete a remedial site investigation for impacts, develop a remediation design, and an implementation work plan. (2021 - Present)

Pre-Design and Investigation phase of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site Confidential Client, Dayton, Ohio. Performed a hydrogeologic investigation using a membrane interface hydraulic profiling tool (MIHPT) coupled with groundwater data to the characterization of site hydrogeology

EDUCATION

MS Course Work in Geology (emphasis on hydrogeology and geomorphology)
Portland State University, 2019

BA, Geology
Portland State University, Portland, Oregon, 2016

AREA OF EXPERTISE

Site Characterization

Due Diligence

REGISTRATIONS/ AFFILIATIONS

Michigan Association of Environmental Professionals

American Institute of Professional Geologists

Associate of Engineering & Environmental Geologists

Geological Society of America

TRAINING/CERTIFICATIONS

Registered Geologist #G2512. Oregon State Board of Geologist Examiners, 2024 to present

40-hour and 8-hour HAZWOPER Refresher, 29 CFR 1910.120 (e)(8) OSHA, 2016 to present

8-Hour Management and Supervisor Training Course, 29 CFR 1910.120(e)(4) OSHA, 2024

Standard First Aid, Adult CPR/AED, 2023

OFFICE

Ann Arbor, Michigan

YEARS OF EXPERIENCE

10

YEARS WITHIN TETRA TECH

5

and trichloroethylene (TCE) contaminant mass distribution in an approximately 360-acre comingled volatile organic compound (VOC) groundwater plume. (2022 – 2023).

Landfill

Industrial Waste Landfill, Confidential Client, Kalamazoo, Michigan. Completion of quarterly groundwater and gas sampling events at three closed landfills. Completion of annual cap inspection and repairs. (2019 – Present)

Municipal Waste Landfill, Davison, Michigan. Project Geologist responsible for managing project scope, schedule, budget and providing contractor oversight for landfill cap improvements on 20-acres. Responsibilities developing pre-bid design schedule, verified work complied with design plans and specifications, and facilitated communication with key stake holders on construction progress. (2020)

Municipal Waste Landfill, City of Ann Arbor, Michigan. Project Geologist responsible for the installation of a large diameter purge well discharge conveyance line via horizontal directional drilling. Managed several sub-contractors on-site at same time. Oversaw excavation, drilling, and installation of conveyance line. Managed several unanticipated conditions and adapted with design modifications. (2020)

Site Characterization and Remediation

EGLE, Jackson District. Project Manager investigating a portfolio of former gas stations, on behalf of the State of Michigan as an EGLE contractor, with past releases of petroleum products from UST systems. Project included seeking site closure through updating and evaluating current conditions and determining risk assessment. (2023-2024)

EGLE, Ypsilanti, Michigan. Project Manager investigating former dry cleaner with past releases of chlorinated solvents to address State of Michigan objectives for mitigation and mass removal. Completed a hydrogeological investigation, developed a conceptual site model and remedial alternatives evaluation, and supported the design and work plan for a SVE and raised depressurized floor system. (2023-2024)

Confidential Client, Michigan. Project Geologist managing a Phase II ESA investigation at a commercial site prior to redevelopment to evaluate potential environmental impacts including vapor intrusion. Responsibilities included planning and managing field investigations and reporting. Delineated the extent of impacts through soil borings, monitoring wells, and assessing vapor intrusion through soil gas high-volume sampling. (2023-2024)

Confidential Exercise Equipment Manufacturer, Multiple Sites, Washington and North Carolina. Project Geologist responsible for completing Phase I ESA and reports at five manufacturing and warehouse facilities. Coordinated with field staff conducting site inspection and interview. (2020)

Confidential Automotive Company, Arlington Heights, Illinois. Project Geologist responsible for completing Phase I ESA and report at car dealership. Managed field staff conducting site inspection and interview. (2020)

Confidential Automotive Company, Van Nuys, California. Project Geologist responsible for completing Phase I ESA and reports at six car dealerships. Performed site inspection and interview. (2019)

Confidential Automotive Company, Phoenix, Arizona. Project Geologist responsible for completing Phase I ESA at car dealership. Performed site inspection and interview. (2020)

Confidential Automotive Company, Beeville, Texas. Project Geologist responsible for completing Phase I ESA and report at car dealership. Managed field staff conducting site inspection and interview. (2020)

Private Individual, Lexington, Michigan. Project Geologist responsible for completing Phase I ESA compliant with ASTM E 1527-13 at one site totaling 35-acres. (2020)

Confidential Automotive Company, Arlington Heights, Illinois. Project Geologist responsible for developing Phase II ESA scope of work, developing regulatory framework, and completing report at car dealership. (2020)

Confidential Telecommunications Company, Adrian, Michigan. Project Geologist responsible for completion of an environmental investigation involving 5 direct-push soil borings and sampling for an arsenic and selenium investigation. (2020)

Monitoring Well Installation, City of Ann Arbor, Ann Arbor, Michigan. Project Geologist responsible for the installation and sampling of four monitoring wells in support of a 1,4-dioxane delineation investigation. Responsibilities included soil logging, well development, and completing summary report. (2020)

PFAS Sediment Investigation, Confidential Client, Michigan. Project Geologist responsible for completion of an environmental investigation and sampling of sediment along a 5-mile segment of a municipal drain in Michigan. Oversaw the sampling event and the adherence to PFAS sampling protocols by the sampling team. (2020)

PFAS and Residual Delineation, Confidential Client, Michigan. Project Geologist responsible for the sampling of PFAS, vertical delineation of residuals, and mapping of surface water at a closed industrial waste landfill site in Michigan. Oversaw the sampling event and the adherence to PFAS sampling protocols. (2020)

PFAS Groundwater Investigation, Confidential Client, Michigan. Project Geologist responsible for the sampling of groundwater at a closed industrial waste landfill site in Michigan. Oversaw the sampling event and the adherence to PFAS sampling protocols by the sampling team. (2020)

Monitoring Well Abandonment, Confidential Client, Adrian, Michigan. Project Geologist responsible for the abandonment of 18 groundwater monitoring wells and completed letter report summarizing abandonment. (2020)

Monitoring Well Abandonment, Confidential Client, Gaylord, Michigan. Project Geologist responsible for the abandonment of 21 groundwater monitoring wells part of a network of on-property wells no longer needed to monitor total inorganic nitrogen and total dissolved solids. Responsible for coordinating subcontractor and scope of work. (2020)

Sampling

Groundwater Sampling, Automotive Manufacturing Facility, Confidential Client, Michigan. Provided support to the Senior Project Scientist sampling groundwater monitoring wells using low-flow techniques and a multiparameter meter. (2020 – Present)

Groundwater Sampling, Automotive Manufacturing Facility, Confidential Client, Michigan. Project Geologist responsible for gauging and collection of 50 groundwater samples from the 45 existing site monitoring wells and 6 surface water samples in support of establishing current site conditions and confirm the concentrations of constituents of concern. (2020)

Groundwater Sampling, Confidential Client, Gaylord, Michigan. Project Geologist responsible for gauging and collection of groundwater samples from 35 existing site monitoring wells following low flow sampling procedures. (2020 – Present)

TETRA TECH

James G. Walker, PE
Senior Client Manager

EXPERIENCE SUMMARY

Mr. Jim Walker has over 45 years of experience in civil and environmental engineering design, including 30 years of involvement with the design, permitting, and construction of over 80 solid waste disposal facilities throughout the Midwest and Northeast. This experience includes detailed design and permitting of fourteen landfill expansion projects numerous permit alterations and modifications.

Recently he designed five exposed geomembrane covers landfills using a variety of geomembranes for odor control and leachate management. His GCCS design experience includes the preparation of GCCS construction plans and bid documents for 27 projects at six sites, as well as the management and certification of 22 GCCS projects. For SWACO, Mr. Walker has managed two dozen GCCS-related projects. In 2018, Mr. Walker co-presented with Matt Reardon, Environmental Manager at SWACO, a presentation entitled, “Case Study: Successful Mitigation of Landfill Gas Migration at a Closed Landfill with Saturated Waste” at the 2018 Global Waste Symposium which described the success of a GCCS project at the Model Landfill.

Mr. Walker also serves as Tetra Tech’s lead solid waste geotechnical review engineer and has prepared construction plans, specifications, bid and contract documents, phasing plans, operational plans, closure and post-closure plans, airspace evaluations, project development cost estimates, gas collection and control system (GCCS) plans, hydrogeologic investigations, environmental assessments, geotechnical investigations including slope stability, settlement evaluations, and mine spoil investigations, construction quality assurance monitoring, pond closure plans, groundwater monitoring plans, National Pollutant Discharge Elimination System (NPDES) permit applications, Spill Prevention Control and Countermeasure (SPCC) plans, and Stormwater Pollution Prevention Plans (SWPPPs). He has also prepared leachate recirculation plans for eight sites, soil and erosion control plans, and airspace management plans.

Mr. Walker has prepared detailed construction plans and contract documents for over 100 solid waste landfill cell construction, GCCS, and cap projects ranging in cost from $100,000 to over $6,000,000. He has also certified construction of over 40 landfill construction projects in Ohio, Michigan, and Kentucky.

Education

MS Coursework, Civil Engineering, Michigan State University

BS Civil Engineering, University of Michigan, 1976

Area of Expertise

Solid Waste Facility Design, Permitting, and Construction

Landfill Planning and Design

GCCS Design and CQA

Leachate Management

Registrations/Affiliations

Licensed Professional Engineer in Ohio and Michigan

Training/Certifications

OSHA 40-hr. HAZWOPER Training

OSHA 8-hr.

Office

Farmington Hills, MI

Years of Experience

48 years

Years with Firm

18 years

Contact

James.walker@tetratech.com

RELEVANT EXPERIENCE

GCCS Design and CQA

- Project manager for SWACO Franklin County Sanitary Landfill and Model Landfill GCCS design and CQA projects dating back to 2013.
- Project manager for Republic Services Whitefeather Landfill and Oakland Heights Landfill GCCS design and CQA projects dating back to 2012. Work included GCCS construction plans, bid documents, and phasing plans.
- Project manager for Tunnel Hill Landfill GCCS design and CQA projects in New Lexington, Ohio dating back to 2015.

- Project manager for four Sunny Farms landfills in Fostoria, OH. Worked on GCCS design and CQA projects dating back to 2017.
- Prepared Explosive Gas Monitoring Plans for SWACO and Waste Management landfills in Ohio.

Landfill Design and Permitting

- Prepared 25-acre LLDPE FML and Versacap temporary caps in 2019 for improved leachate management.
- Prepared 30-acre Closure Turf temporary cap design with upgraded gas collection and stormwater management upgrades for odor control in 2017.
- Prepared EVOH Cap and stormwater designs for multiple projects at Bridgeton Landfill from 2013 to the present for mitigation of a subsurface reaction (total project costs exceed $150M).
- Prepared remedial cap and final cap design for subsurface reaction event at Middletown Landfill in Tennessee.
- Prepared Rule 13 requests to Ohio EPA for SWACO's Model Landfill in preparation for GCCS construction projects involving disturbance of the final cap.
- Designed and permitted alternative final caps at five solid waste landfills with savings of $15,000 per acre. Prepared construction plans for seven alternative final cap projects involving approximately 120 acres of construction.
- Project manager/lead engineer for Countywide Recycling and Disposal Facility 19.4-acre alternate final cap design with PTI alterations. PTI alterations submitted to and approved by Ohio EPA resulted in over $800,000 in construction cost savings to clients and construction was completed in 2015.
- Technical lead engineer for Mahoning Landfill lateral and vertical expansion in New Springfield, Ohio. Prepared design for PTI plans, calculations, CQA Plans, and specifications for the project. The project was approved by Ohio EPA in 2015.
- Project manager for Exposed geomembrane cap and stormwater improvement designs at Bridgeton Landfill in ST. Louis, MO. from 2013 to present to mitigate a subsurface reaction event.
- Technical lead designer for Central Kentucky Landfill expansion. Prepared expansion design, stability analyses, stormwater design modeling, technical specifications, CQA Plan, and narrative attachment documents.
- Project manager for Countywide Recycling and Disposal Facility remediation unit design team from 2006 to 2009. Completed design of temporary cap with sub-cap drainage and gas management system to accommodate seepage resulting from aluminum waste reaction to satisfy USEPA Orders. The project team received an award from USEPA for this project. Subsequently in 2010, prepared PTI modification design to bifurcate the operational unit from the remediation unit to satisfy Ohio EPA Director's Orders and allow for continued licensing of the facility.
- Project manager for Ten Year Design Demonstration (BAT Update) Submittals at three sites in Ohio. Prepared the summary for submittal to Ohio EPA and coordinated the appropriate design revisions to meet the current OAC 3745- 27-08 rules.
- Project manager for 18 million lateral and vertical expansion of a 400-acre landfill approved in 2011. Permit application included hydrogeologic investigation, environmental assessment, design plans, engineering calculations, closure and post-closure plan, and construction quality assurance plan.
- Prepared construction drawings, quantities, and specifications for numerous cells, cap, and stormwater management construction projects. Managed shear strength testing and submitted certified geotechnical reports. This background enables Mr. Walker to select optimal designs where the required shear strength is significant such as final caps with stormwater infiltration.

- Technical manager for 84 million cubic yard expansion of American Landfill in Waynesburg, Ohio approved by Ohio EPA in 2006. The design included significant wetland permitting to maximize airspace, reinforced perimeter berms, a slurry wall, and a separatory liner over two existing units, a 160-acre lateral expansion between the two existing units and on the east and west sides. Provided expert testimony for a permit appeal public hearing in 2009. Prepared construction plans, specifications, quantities, and bid documents for the initial expansion cell constructed and approved in 2007. Developed detailed 5-year phasing plans for expansion with the design of access roads, stormwater management components, gas management controls, and airspace phasing. Coordinated shear strength testing and submitted a certified report to Ohio EPA for initial three expansion cells from 2007 to 2012.
- Prepared construction plans, specifications, quantities, and bid documents and assisted in the bid process and construction for Cells 5, 6A, 6B, 7A, 7B, 8, 9, 10NE, 10NW, and 10 South at Brent Run Landfill in Montrose, Michigan from 2002 to 2012. Also prepared permit modification for the facility in 2005 in preparation to maximize benefits of future expansion. Coordinated the project team, reviewed technical aspects of the package, initiated, and maintained dialogue with the Michigan Department of Environmental Quality (MDEQ) to streamline the design process, and delivered the project under budget within a tight timeframe to meet the cell construction schedule. In 2007, prepared vertical expansion with raised perimeter berms for a 1.2 million cubic yard expansion.
- Prepared temporary final cap design with the gas collection, under cap leachate management, access road, and stormwater drainage improvements in landfills in Tennessee (2010) and Missouri (2013) to mitigate elevated temperatures from reactive waste. Projects included obtaining preparing an equivalency design submittal and obtaining regulatory approval for a PTI modification to replace the final cap soil barrier with a GCL. Also conducted a forensic evaluation of a final cap failure designed and certified by others.
- Prepared final cap construction plans, specifications, quantities, and contract documents for the construction of 17.7 acres of final cap at Brent Run Landfill and 6.6 acres of final cap at Whitefeather Landfill in Michigan in 2006 and 2007. The preliminary design for each project involved an evaluation of areas that would be filled and ready to receive the final cap and a determination of remaining airspace and grades to fill before the construction of the cap. Work included coordination and oversight for shear strength testing of the construction materials to demonstrate adequate slope stability and soil erodibility testing to satisfy acceptable soil erosion loss criteria.
- Prepared GCCS construction plans for three projects in 2012 – 2013 and certified construction of each project.
- Lead technical engineer for lateral and vertical landfill expansion of Mahoning Landfill in northeast Ohio completed in 2009 and currently under review by Ohio EPA. Also prepared cell construction plans, PTI alterations, phasing plans, slope stability analyses, and shear strength testing for construction materials.
- Project Manager for lateral and vertical landfill expansion. Expansion provided 10,500,000 cubic yards of additional capacity in southeastern Michigan approved by MDEQ in 2006. Prepared an additional 18,800,000 cubic yard lateral expansion with a new hydrogeologic investigation for the same facility approved in 2011.
- Project manager and lead technical director for a landfill permit modification package for the Brent Run Landfill. Coordinated the project team, reviewed technical aspects of the package, initiated, and maintained dialogue with the Michigan Department of Environmental Quality (MDEQ) to streamline the design process, and delivered the project under budget within a relatively tight timeframe. The project was approved by the MDEQ in 2005.

- Project manager/lead design engineer for 170-acre lateral and 88-acre vertical expansion for an Ohio solid waste landfill adding 72,000,000 cubic yards of airspace to the facility. Provided expert testimony for the ERAC permit appeal board which was decided in favor of the client.
- Project manager/lead design engineer for initial 67-acre Greenfield design permit to install the application for solid waste landfill, approved by Ohio EPA in 1993. Permit was the first issued in the State of Ohio, under Best Available Technology rules. The project included the design of a sedimentation pond designed for a 25% probable maximum flood and the preparation of a Type III dam construction permit application for submittal to Ohio DNR.
- Prepared expansion permit to install application for 100-acre solid waste landfill facility near Columbus, Ohio, approved by Ohio EPA. Submittal included slope stability analysis to address seismic zone location restriction demonstration concerns.
- Project manager/lead design engineer for a 60-acre Greenfield solid waste landfill permit to install the application in Dayton, Ohio, approved by Ohio EPA. One of the first sites in Ohio permitted for 3:1 final slopes in a seismic zone. The design included a groundwater control system designed using a groundwater model to evaluate the potential hydrostatic uplift effects on the liner. Design plans included detailed entrance facility and phasing plans of site development, access roads, temporary drainage structures, and disposal volumes. Permit documents included: construction and operation plans, CQA plans, closure and post-closure plans, contingency plans, hazardous waste prevention plans, stormwater pollution prevention plans, and dam construction permits for the sedimentation basin.
- Prepared design and construction permit application for a 105-acre vertical expansion of a solid waste landfill, approved by the Michigan DEQ in 2004.
- Prepared design and construction permit application for 100-acre expansion of a solid waste landfill in Sanilac, Michigan, approved by the Michigan DEQ. The facility was designed with a single composite liner and piggyback GCL/HDPE FML slope cap over the existing facility.
- Project manager for vertical expansion of a 148-acre municipal solid waste landfill in Wayne County, Michigan, approved by the Michigan DEQ. Prepared design and construction permit application for an 80-acre, double-composite-lined Greenfield site solid waste landfill, approved by the Michigan DEQ.
- Project manager/principal engineer for two vertical expansions over a 77-acre solid waste landfill in Wayne County, Michigan, approved by the Michigan DEQ.
- Project manager/design engineer for a 40-acre vertical expansion of an existing Type II solid waste landfill site near Charlevoix, Michigan, approved by the Michigan DEQ.

Landfill Planning and Development

- Prepared conceptual design of expansions along with airspace estimates and project development costs for three sites owned by Republic Services in Michigan. Prepared options analysis of nine alternative expansion scenarios for other existing Michigan landfills along with airspace estimate and project development costs.
- Prepared annual consumed airspace, remaining airspace, soil balance, and project construction cost estimates for six facilities owned by Republic Services in Ohio and Michigan for use by the owner from 2001 to 2012. Phasing plans included proposed GCCS facilities for the last three years.
- Prepared six alternative expansion scenarios along with airspace estimates and project development costs for Republic Services. The owner used analysis to purchase land for selected expansion. Expansion was subsequently designed and approved.

Landfill Construction and Certification

- Certified construction of 23 GCCS construction projects in Ohio and Michigan.

- Certified construction of Cells 5A, 5B and 5C at Countywide RDF. Projects included the use of tire chips for leachate collection in Cell 5A and temporary leachate sump in Cell 5C.
- Project manager for closure of ELDA Landfill, Cincinnati, Ohio including closure plan, soil sampling plan, construction plans and documents, and oversight of CQA personnel.
- Managed cell construction drawings and specifications, preparation for numerous municipal and private solid waste landfills, and four double-composite lined cells at a type II landfill in central Michigan. Negotiated alternatives for leachate collection with MDEQ, which reduced cost and saved airspace. Certified construction of four cells.
- Certifying Engineer for construction of groundwater control system and single composite lined cell at Eagle Valley Landfill in Michigan. Negotiated alternate liner design with MDEQ to account for soil that did not meet classification specifications.
- Designed and oversaw the construction of a leachate management system for an existing solid waste landfill facility including extraction pumps, a 15,000-gallon double-walled storage tank, double-walled force main piping, and a truck loading pad with spill control drainage.
- Certifying engineer for construction of double-lined 2.75-acre solid waste landfill cell constructed at MSW facility in Lexington, Kentucky.

Leachate Management

- Prepared leachate recirculation plans and supporting calculations for eight solid waste landfills in Michigan and Ohio.
- Developed flexible leachate collection system design for Michigan sites that allows for the most cost-effective use of drainage material, piping, and geocomposite. Specification of the granular layer varies depending on the extent of the geocomposite constructed.
- Prepared design of leachate storage tank and coordinated construction of above-ground storage tank, pumps, pump controllers, piping, valving, and truck loading pad for three solid waste landfills. Systems were designed with the flexibility to pump from the storage tank to leachate recirculation or a truck loading pad for offsite disposal.

Rule and Policy Development

- Participated extensively in the Ohio solid waste industry group's involvement in the review, research, and comments of draft solid waste rules between 2000 and 2003, issued final in 2003. Worked on design issues with Ohio EPA that were subsequently incorporated into guidance documents. Currently working with NSWMA to provide comments on the 2020 new rule package.
- Participated in the shredded tire leachate collection system demonstration conducted at an Ohio landfill and reviewed and provided comments for the final report.
- Worked with MDEQ to establish guidance for final grade slopes and soil erosion evaluation of solid waste landfills.
- Extensive communication with regulatory agencies on the Owner's behalf and served as an expert witness on four landfills.

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STEARNS DRILLING

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(616) 698-7770

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STEARNS DRILLING

Introduction:

Virgil Stearns opened Stearns Drilling in 1977. Virgil worked in the drilling business for many years before opening Stearns Drilling. Virgil set a course for success.

We are a small business located in Dutton, Michigan.

We work as far south as Texas and Louisiana. We work on the east coast and as far west as Utah.

We provide:

Environmental Drilling Services

Geotechnical Drilling Services

Water Well Services

Sonic Drilling

Well Rehabilitation / Services

Geothermal Drilling

Our main service area is the Midwest States surrounding the Great Lakes.

We are insured with commercial general liability, automobile liability, worker's compensation, employer's liability, contractor's equipment coverage and pollution liability.

At Stearns Drilling, we work consistently to improve and expand our services. We work with our customers to provide drilling methods that meet your specifications. We use dependable, cost effective drilling solutions for routine jobs and work towards innovative solutions for unusual jobs. We strive for a high standard of quality service and a safe working environment on each job.

Experience:

Joe Stearns is the company President. Joe began working at Stearns Drilling in 1978 and brings many years of experience to your projects.

Joe works to make your project run smoothly.

Roland Clapp studied Geology and began working in the industry in 1986.

Basil Stein is our general manager beginning in 2024. He brings previous managerial experience and other valuable skills to the team.

Other management staff contribute many years of support experience to keep the jobs running smoothly.

Our experience helps provide the right people and equipment to complete your job. We offer advice and recommendations based on experience to successfully complete each drilling project.

Our drillers complete many different projects under many geological conditions with a wide range of project specifications.

Stearns Drilling is committed to working with our customers using our combined experience to achieve your project goals.

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Licenses & Memberships:

STEARNS DRILLING

Licenses:

Licenses are not required by all States for the work that we do. Stearns Drilling does hold these licenses:

- Michigan Water Well Drilling Contractor # 41 -1095
- Ohio Registered Private Water Systems Contractor # 02349
- Indiana Water Well Drilling Pump Installer: # 1104, 1581, 1582, 1109, 1184, 954, 2976 WD
- Kentucky # 0235-0279-00
- Louisiana WWC-760
- Texas # 58845 M
- New York NYRD10982
- Geothermal Vertical Loop Installer # 27211 1109

Memberships:

Michigan Ground Water Association

National Groundwater Association

National Drilling Association

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Health & Safety:

Commitment:

Stearns Drilling is committed to the health & safety or our employees and a safe site work area.

We provide required safety gear for our employees.

Training:

Our field employees receive training that includes the 40-hour HAZWOPER course and an annual 8-hour refresher course (OSHA 29 CFR 1910.120).

Additional education for our employees includes, confined space entry, emergency first aid and adult CPR, fall protection, ladder safety…

We hold monthly safety meetings covering a variety of other safety subjects. We complete many site specific training courses required by the owners of the sites where we work.

Surveillance:

Each employee has an annual medical physical. The field crews have a doctor's approval for work requiring a respirator. We complete respirator fit tests.

Stearns Drilling operates a drug free workplace. Our testing program is as mandated by Federal Motor Carrier Regulations. Employees are tested regularly and randomly.

If an employee tests positive, disciplinary action is taken. Field safety audits are completed randomly.

Equipment:

Our drill rigs are equipped with either a safety brake system or safety switches.

Equipment is consistently maintained. We inspect service vehicles as required by the Federal Motor Carrier Safety Regulations.

We maintain our equipment so that it is in good working order for your project.

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Services:

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Our main service areas are:

Environmental Drilling

Geotechnical Drilling

Water Supply Drilling

Water Supply Service & Repair

Geothermal Drilling

Environmental Drilling:

Our environmental drilling services include:

- Hollow and Solid Stem Auger
- Sonic or Rotosonic
- Direct Mud / Air Rotary
- Drive Casing
- Angle Hole
- Rock Coring
- Aquifer / Pump Testing
- Direct Push
- Well / Pump Installation
- Continuous samplers, Vertical Aquifer Samplers
- Sampling Pumps
- Chemical Remediation Injecting
- Electrode Resistivity Heating

Geotechnical Drilling:

Our environmental drilling services include:

- Hollow and Solid Stem Auger
- Split-spoon, N counts, SPT
- Shelby-tube
- Pitcher Sampling
- Piston Sampling
- GUS (Gregory Undisturbed Sampler)
- Rock Coring, N & H sized, conventional & wireline
- Liner Sampling (Brass, Aluminum...)
- Grouting
- Inclinometers
- Vibrating wire piezometers
- Anodes / Cathodic Protection

Water Supply Drilling:

- Specialty water well drilling where there is an environmental concern
- Direct Mud / Air Rotary
- Aquifer Testing
- Well Rehabilitation - Physical & Chemical
- Submersible Pump Testing & Cleaning
- Sieve Testing, Filter Pack & Screen Sizing
- Constant Pressure / Variable Frequency Drives
- Irrigation Wells
- Well abandonment
- Residential, Commercial & Municipal Wells

Water Supply Service & Repair:

We diagnose well problems and provide repair services.

Geothermal Drilling:

We install vertical loops for Geothermal systems. We are certified by the International Ground Source Heat Pump Association (IGSHPA).

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Drill Rigs / Units:

STEARNS DRILLING

CME 95

Hollow Stem Auger / Rotary Drill

Turns up to 12.25” ID x ~18” OD Hollow stem augers

30,000 ft./# torque

Mud / Rotary / Rock coring

CME 1050

ATV Hollow Stem Auger / Rotary Drill

Turns up to 12 1/4" ID Augers ~18" OD 24,000 ft. #torque, Vertical or Angle Drilling, Mud / Air Rotary / Rock Coring

Versa Sonic

Collects a 4" soil core, 6", 8" & 10" tooling—50K Oscillator force Frequency 0-150 Hz, Rotation 0-308 rpm, Rotation torque 7,000#, 300 cfm @ 200 psi air, 75 gpm Bean pump, Moyno 3L8

CME-55LCX

This low-clearance, high torque drill has a Cummins turbocharged 130 hp diesel engine and up to 12,100 foot pounds rotary torque. The quick disconnect mast is 12’ 1” tall. It has a rubber-track, remote control carrier and zero turn radius. SPT auto hammer

Geoprobe 6620DT

66" Stroke, GH60 Hammer, 47,000# pulling force, Dual Tube, Ground Water Sampling, 1" & 2" wells, Up to 6.25" hollow augers, up to 3,000 ft./# torque, Collect SPT split-spoons w/ auto hammer, 153" tall

CME 55

Hollow Stem Auger / Rotary Drill, ATV Zero turn radius, Turns up to 10.25” ID x ~15” OD Hollow stem augers, 7,700 ft./# torque, 800 rpm Mud / Rotary / Rock coring, Vertical or angle drill

Geoprobe 7822DT V3

78" Stroke, GH63 Hammer, 48,000# pulling force, Dual Tube, Ground Water Sampling, 1"- 4" wells, Up to 7.25" hollow augers, up to 4,000 ft./# torque, On board 3L4 Moyno pump, Advanced self diagnostic controls, 187" tall, 70” wide, 2-speed auger head, emergency stop buttons

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Drilling Since 1977

Drill Rigs / Units:

STEARNS DRILLING

Pulstar 12000

Pump Hoist / Well Service / Rehabilitation Unit - 6,000# single line, 12,000# double line, pulling capacity. Derrick tilts back 11' past vertical, max 50' height. Low-speed approx. 70 FPM @ 2,500 PSI. High-speed approx 140 FPM @ 2,500 PSI. Sand line operates at higher speeds to quickly clear well sediment, automated strokes

CME LC60

Rubber track, zero turn, Low clearance requires 10', Hollow Auger / Mud /Air Rotary -Turns up to 12.25" ID Augers ~18" OD -8,250 ft. # torque, Vertical or Angle Drilling - Rock Coring

Semco 6000

Pump Hoist / Well Service / Rehabilitation Unit - 6,000# single line, 12,000# double line, or 16,000# triple line pulling capacity, Derrick tilts back 13.5' past vertical. Sand line operates at higher speeds (450 fpm) than the winch lines to quickly clear well sediment, the Walking beam = automated strokes

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Support Services & Equipment:

STEARNS DRILLING

Support Services:

- 1" to 4" HDPE pipe fusion;
- Aquifer Testing and data logging;
- Submersible pump cleaning and testing
- Trenching;
- Underground hookups;
- Sieve analyses;
- Process pipe pigging;

Off Road Support

Support Equipment:

Stearns Drilling has a lot of support equipment. Just some of that equipment is shown here.

We own ATV supply haulers, a variety of trucks and skid steer loaders with various attachments. Portable steam cleaners, grout machines, generators, welders, air compressors, surge blocks, injection tools, and more ensure that we can provide the equipment that you need. If we don't have equipment, we may rent equipment for specific needs

Our supply barns keep bagged material clean and dry.

Our forklifts help us load efficiently for your job.

Other Equipment:

- Continuous samplers CME, MC5, MC7;
- SimulProbe
- Push ahead vertical aquifer assembly;
- Screened auger
- Concrete core machines;
- N & H sized wireline rock core barrels
- Single and straddle inflatable packers;
- Pitcher Sampler;
- Piston Sampler;
- GUS Sampler;
- 2" submersible sampling pumps;
- Portable Tri-pod drilling;
- Confined Space Entry gear;
- SCBA, Level B gear;
- Hand augers;
- Welders ...

Pitcher Sampler

Push Ahead Vertical Aquifer Sampler

6974 Hammond SE
Dutton, MI 49316
(616) 698-7770

Please contact us: Joe@StearnsDrilling.com , Roland@StearnsDrilling.com, Basil@StearnsDrilling.com

Drilling Since 1977

STEARNS DRILLING

6974 Hammond SE
Dutton, MI 49316
(616) 698-7770

Please contact us: Joe@StearnsDrilling.com , Roland@StearnsDrilling.com, Basil@StearnsDrilling.com

Patrick M. McClelland
Driller, Crew Chief
Stearns Drilling
6974 Hammond SE
Dutton, MI 49316
(616) 698-7770

Mr. McClelland has worked in the drilling industry since about 1987. He drills using air rotary, mud rotary and hollow stem auger drilling methods. His abilities include installing pumps and well rehabilitation. He successfully installs ground water monitoring wells, recovery wells, soil vapor extraction wells, air sparging wells and much more.

Mr. McClelland completed environmental and utility construction projects using the horizontal/directional drilling method.

Before joining Stearns Drilling, Mr. McClelland worked for other environmental and water well supply drilling companies from 1987 to 1994. He worked on a wide range of drilling projects at sites throughout Michigan.

Mr. McClelland works on projects involving solid waste landfills, hazardous waste sites, industrial and private plants, underground storage tank sites and commercial, municipal and private water supply sites.

Mr. McClelland is a graduate of Owosso High School in Owosso, Michigan.

Mr. McClelland's ability exceeds routine soil boring and monitoring well drilling and construction. His experience includes all aspects of environmental drilling from small well installation to well treatment and rehabilitation.

Mr. McClelland operates several different drill rigs and is knowledgeable regarding the capability of each.

He is especially gifted in well service work. Well rehabilitation and well systems repair are strength service areas for Pat.

Mr. McClelland successfully completes projects throughout Michigan and the Great Lakes Region under a wide range of geologic conditions from relatively easy to difficult drilling.

Regardless of the requirements of a specific project, Mr. McClelland's talent and experience are a valued asset to all our clients.

Shane Clapp
Helper
Stearns Drilling
6974 Hammond SE
Dutton, MI 49316
(616) 698-7770

Mr. Clapp has worked in the drilling industry since about 2022. He works using sonic, mud rotary and hollow stem auger drilling methods. His experience includes installing pumps and well rehabilitation. He successfully installs ground water monitoring wells, recovery wells, soil vapor extraction wells, air sparging wells and much more.

Before joining Stearns Drilling, Mr. Clapp graduated from Lakeshore High School, served honorably as a US Marine, and attended Grand Valley State University.

Mr. Clapp's exceptional work ethic is a contribution to all aspects of environmental or geotechnical drilling, well treatment and rehabilitation projects.

Mr. Clapp successfully completes projects throughout Michigan and the Great Lakes Region under a wide range of geologic conditions, from easy to difficult drilling.

Regardless of the requirements of a specific project, Mr. Clapp's talent and experience are a valued asset to all our clients.

Dennis L. Cooper
Driller's Helper
Stearns Drilling
6974 Hammond SE
Dutton, MI 49316
(616) 698-7770

Mr. Cooper has been employed by Stearns Drilling since 1990. His experience includes drilling environmental and geotechnical soil borings, constructing many types of wells, dam sites and more. The wells consist of many different styles and construction materials.

Prior to joining Stearns Drilling, Mr. Cooper worked as a finish grinder for a metal fabrication company. He has experience operating a variety of heavy equipment including ceiling cranes, paint rigs and tractors. Mr. Cooper also has foreman experience.

Mr. Cooper is a graduate of Oceana High School.

Mr. Cooper works on projects involving landfills, industrial and private plants, underground storage tank sites, dams and many others.

Mr. Cooper successfully completes projects throughout Michigan and the Great Lakes Region under a wide range of geologic conditions from relatively easy to difficult drilling.

Regardless of the requirements of a specific project, Mr. Cooper's skill and experience are a valued asset to all our clients.

Experience:

Sonic drills
Hollow auger drills

Darryl R. Krause
Driller, Crew Chief
Stearns Drilling
6974 Hammond SE
Dutton, MI 49316
(616) 698-7770

Mr. Krause has been employed by Stearns Drilling since 1987. His experience includes drilling environmental and geotechnical soil borings, constructing monitoring wells, soil vapor recovery wells, ground water extraction or purge wells, landfill venting wells and much more. These wells consist of many different styles and construction materials.

Mr. Krause completes environmental and utility construction projects using the horizontal/directional drilling method.

Before joining Stearns Drilling, Mr. Krause worked as a truck/tank maintenance technician.

He is a graduate of Riverview High School. His technical training includes vocational building trades. In addition to normal OSHA health and safety training, Mr. Krause completed his training for confined space entry.

Mr. Krause's ability exceeds routine soil boring and monitoring well drilling. His experience includes all aspects of drilling and monitoring and recovery well installation and construction. Mr. Krause frequently uses his general building and construction talents to enhance the service he provides to our customers.

Mr. Krause works on projects involving solid waste landfills, hazardous waste landfills, pits, ponds, lagoons, industrial and private plants, underground storage tank sites and many others.

Mr. Krause successfully completes projects throughout Michigan and the Great Lakes Region under a wide range of geologic conditions from relatively easy to difficult drilling.

Regardless of the requirements of a specific project, Mr. Krause's skill and experience are a valued asset to all our clients.

Licensed in:
Indiana

Terra Probe Environmental, Inc.
Statement of Qualifications

Company Background
Terra Probe Environmental, Inc. is a fully insured environmental company specializing in direct push services for the collection of soil, groundwater, and soil vapor samples. The company was founded in 1994 to specialize exclusively in hydraulic probing services. Not an investigation or remediation services company, Terra Probe Environmental is dedicated to assisting firms who offer those environmental services to their customers.

Terra Probe Environmental, Inc. has assisted in soil and groundwater investigations for commercial properties, major oil companies, RCRA facilities, and Superfund Sites. Furthermore, Terra Probe Environmental, Inc. has performed sampling for the risk-based closure of sites under Ohio and Michigan Brownfield Programs.

Equipment & Services
Terra Probe Environmental, Inc. owns and operates the following equipment:

Seven 6600 Series Geoprobe Rigs
Seven (7) Track Mounted 6610/20DT Geoprobe Units

Two Specialty limited Access Geoprobe Rigs– Depths to 16'
One (1) John Deere Tractor 4x4 Geoprobe Unit
One (1) Hand Cart & Power Pack Geoprobe Unit

Two VacMaster Units
The VacMaster units are used to clear holes to safely avoid utilities. The air lance delivers
100 SCFM @ 100 PSI and the vacuum unit does 100 SCFM @ 15" Hg.
Two (2) Trailer Mounted VacMaster 1000 Units

Private Utility Locating Services
GPR EZ-MALA Locator
EM TX1O transmitter and a RD7000 Receiver (radio detection)
Underground pipe and cable locater prior to drilling activities
GPR a 20x20 area over the boring location to look for anomalies
Fischer Magnetometer

Terra Probe Environmental, Inc.
Statement of Qualifications

SELECTED COMPLETED PROJECTS

Superfund Sites
Terra Probe Environmental, Inc. has performed work at several Superfund Sites located throughout Michigan and Ohio. At these Superfund Sites we have installed air injection probes, collected soil gas, collected soil samples, collected water samples, and installed mini-wells.

Automotive Companies
Terra Probe Environmental, Inc. has worked at several of the "Big Three" automotive plants. At these plants we have performed soil sampling for the purpose of expanding new buildings, cleaning old spills, or defining a contamination plume.

State of Michigan Work
Terra Probe Environmental, Inc. has performed work under the State of Michigan funded sites. Work at these sites has included up to 1 month of work at different locations throughout the state. Usually water sampling is performed to define the extent of chlorinated solvent plumes. We drilled for the soil heating project in Owosso, Michigan.

Military Bases
Terra Probe Environmental, Inc. has worked at the Dayton Air Force Base collecting water samples for a TCE plume. Continuous water samples and soil samples were collected to a depth of 50 feet. We have also worked at the Naval Base located in Chicago, Illinois. Soil samples were collected during four weeks of work. We have also performed work at the air base in Oscoda, Michigan and Wurtsmith Air Force Base located north of Detroit, Michigan.

High Profile Community & Public Relations Work
Terra Probe Environmental, Inc. performed work in a residential neighborhood next to a former refinery. The USEPA and the state environmental agency required sampling to be performed at over 150 locations in the neighborhood. The project included a pre-meeting with state regulators, journalists, the community, and the company. These same people followed during the sampling event. Our client was extremely happy with the results leading to Terra Probe Environmental winning a job worth $200,000.

Gas Stations
Terra Probe Environmental has worked for several of the large oil companies at their current or former gas stations. We are experienced in private locating and critical zone drilling.

Terra Probe Environmental, Inc.
Statement of Qualifications

Key Personnel

Name	Position	Experience
Steve Oberle	President & Operator & Locator	31 years experience
Pat Hogan	Probe Operator & Utility Locator	18 years Experience
Doug Perry	Probe Operator & Mechanic	15 years Experience
Jason Shaffer	Probe Operator	14 years Experience
Floyd Kanavel	Probe Operator	13 years Experience
Scott Seals	Probe Operator	10 years Experience
Steven Shenofsky	Probe Operator	7 years Experience
Troy Shenofsky	Probe Operator	6 years Experience
Derek McNally	Probe Operator	2 years Experience
Matt Machniak	Probe Operator	1 year Experience
Kaden Steele	Probe Operator	1 year Experience

If you have any questions, please feel free to contact Amanda Perry, Project Coordinator at 734-854-7703 or terraprobeenv@frontier.com.

Attachment II Past Involvement with Similar Projects

ATTACHMENT II
SUMMARY OF LANDFILL EXPERIENCE
Ann Arbor Landfill Monitoring and Maintenance Program FY2026-2027 RFP 25-16

Tasks Performed	Ann Arbor Tetra Tech Office									Other Tetra Tech Offices																								
	Livingston County Landfill	Petoskey Landfill	Manistique Landfill	City of Ann Arbor Landfill	Carleton Farms Landfill*	Venice Park Landfill*	Richfield Landfill*	Republic Services - Tayban Landfill*	Cove Landfill*[1]	Oak Avenue Landfill, Joppa, MD	Koppers, Grenada, MS	Hidden Glenn Landfill, Napa, CA	Hwy FF/NN Landfill Ripon, WI	Coopermill Road LF Zanesville, OH	L&D Landfill	Cinnaminson Landfill	PST Landfill, Harwood, MD	Harmony Grove Landfill, Dover , PA	Hunting Ridge Landfill, Hurlock, MD	Dauphin Meadows Landfill, Washington Township, PA	Kin-Buc Landfill, Edison, NJ	Arbor Hills Landfill	Brent Run Landfill	Carleton Farms Landfill	Forest Lawn Landfill	Riverview Land Preserve	Rolling Hills Landfill	Elk Run Landfill	Dafter Sanitary Landfill	Wexford County Landfill	Marquette County SWMA	Holcim Type III Landfill
Groundwater Monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X							
Groundwater Plume Delineation and Characterization			X	X							X		X	X	X	X	X	X	X		X												
Groundwater Capture and Treatment				X											X	X	X	X		X	X												X
Landfill Gas Monitoring	X	X		X				X	X	X		X	X		X	X	X		X						X	X					X	
Fugitive Landfill Gas Delineation and Characterization	X									X			X				X		X													
Fugitive Landfill Gas Mitigation	X			X									X				X																
Landfill Gas to Energy/Design																						X	X	X	X	X					X	
Landfill Gas Blower/Flare Services																						X	X	X	X		X				X	
USEPA Greenhouse Gas Reporting Assistance	X			X											X	X										X						
Leachate Characterization	X			X					X	X			X	X	X		X	X		X	X					X					X	
Leachate Monitoring	X			X				X	X	X			X	X	X		X	X		X	X					X					X	
Leachate Treatment										X							X	X		X	X					X					X	
Leachate Management System										X							X	X		X	X	X		X		X					X	
NPDES Permits/Stormwater Mangement System										X	X						X		X				X	X	X	X					X	
General Permitting				X					X	X		X					X	X	X	X	X	X				X					X	
Refuse Delineation			X	X					X			X	X		X							X										
Cap Design			X								X	X	X		X								X	X	X	X		X	X	X		X
Cap Improvements	X			X						X		X	X		X		X	X	X								X				X
Cap Installation											X	X	X									X										
Erosion Control Vegetative Cover	X			X						X	X	X	X		X		X	X	X		X	X	X			X		X	X	X		X
Cap Inspection	X	X		X						X	X	X	X	X	X							X	X			X		X	X	X		X
Modeling - Groundwater				X									X		X	X																
Modeling- Infiltration (HELP)										X	X				X																	
Regulatory Compliance				X						X							X	X	X	X	X	X	X		X	X					X	
Due Diligence				X																		X	x			X		X	X	X		X
Financial Planning and Review				X																	X	X	x			X	X	X	X	X		X
Landfill Siting, Permitting, Design																						X	X	X	X	X		X	X	X	X	X
Landfill Closure/Post-Closure				X						X											X	X	X	X		X		X	X	X		X
Litigation Support															X	X																

1. Additional activites include wetland delineation, hydrogeological investigation, environmental assessement, cell expansion permitting
*Work completed by TetraTech key employees at a previous firm.

TETRA TECH

Ann Arbor Landfill
Environmental Monitoring and Maintenance

KEY FEATURES

- Optimized the landfill gas mitigation system.
- Updated the conceptual site model by completing an approved capture zone analysis to evaluate the effectiveness of the groundwater control system, resulting in $100,000 a year savings for six years.
- Developed a Michigan Department of Environment, Great Lakes, and Energy (EGLE)-approved reduction in the frequency and the number of gas wells in the monitoring plan in 2009 and 2021.
- Developed an EGLE-approved reduction in the sampling number and frequency in the Hydrogeological Monitoring Plan (HMP) that included approval of abandoning 32% of the wells in the monitoring network.
- Completed federal greenhouse gas emissions reporting since EPA's program began in 2010.
- Maintained the operation, maintenance and monitoring landfill program since 2007.

PROJECT DESCRIPTION

Tetra Tech is responsible for providing environmental monitoring and maintenance at the Ann Arbor Landfill which includes groundwater sampling of 1,4-dioxane and vinyl chloride offsite, landfill gas monitoring and wastewater sampling. Reporting is completed quarterly, maintenance on the methane system and mass calculations for the wastewater permit are completed monthly. Tetra Tech has completed the city's wastewater permit application to allow discharge to the sanitary sewer in 2009, 2014, 2016 revision, 2019 and 2024; and reduced sampling locations and parameters. Tetra Tech previously maintained the landfill gas mitigation system along the northern boundary of the landfill, including monthly inspections, quarterly extraction well inspections, flow adjustments and carbon waste sampling and removal when necessary.

CLIENT

City of Ann Arbor

LOCATION

Ann Arbor, MI

DURATION

2007 - current

PROJECT TEAM

Patti McCall, CPG, PWS

Alison Rauss

Mike Savale

Rachel Fischer

Jenna Herrington

REFERENCES

Erin Donnelly
Landfill Environmental Services Manager
301 E. Huron Street
Ann Arbor, MI 48107-8647
734.794.6000 ext. 43119
edonnnelly@a2gov.org

Alison Heatley
Assistant Manager, Public Works
4251 Stone School Road
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734.794.6350
aheatley@a2gov.org

Christina Gomes
(Landfill PM 2018 – 2021)
4251 Stone School Road
Ann Arbor, MI 48108
734.794.6400
cgomes@a2gov.org

Anne Warrow
(Landfill PM 2007 – 2018)
Former Project Manager
301 E. Huron Street
Ann Arbor, MI 48107-8647
734.794.6410 ext. 43639
awarrow@a2gov.org

Two plumes migrated from the site before the existing slurry wall was installed. As a result, the City has been working on an off-site RAP and requested Tetra Tech review and finalize the former consultant's work product. The RAP was submitted to the agency in 2013 and cannot be approved without deed restrictions in place for the homeowners offsite, however EGLE has allowed for Tetra Tech to implement changes to the HMP and complete well abandonments that reduced the number of well locations significantly.

Tetra Tech completed a capture zone evaluation of the extraction wells in the landfill and updated the site's conceptual model. The evaluation resulted in the recommendation to remove one extraction well from the system, saving the city 50-gpm flow to the sanitary sewer and more than $100,000 a year in charges for approximately six years. It also allowed for focused groundwater recovery of vinyl chloride from Southeast Area Park. The extraction well remained as part of the contingency plan and remained operational throughout. Changes in the state criteria and issues with another extraction well prompted the use of the extraction well again in 2016 at a greatly reduced rate to ensure continued recovery and capture of the plume.

Tetra Tech completed closure on Phase I, drafted restrictive deed covenant documents and obtained signatures from area citizens; completed a leachate outbreak work plan, completed repairs and submitted letter reports to the state; coordinated with state regulators on behalf of the City, coordinated meetings with other landfill subcontractors and has been completing federal greenhouse gas reporting requirements annually, since inception. That reporting includes collecting monthly measurements of the biomass gas to energy system onsite. Tetra Tech completed installation of condensate discharge lines from the landfill gas to energy system, through Phase II to a leachate collection manhole. As part of the ongoing maintenance, Tetra Tech completes monthly landfill inspections March – October every year and identifies repairs that are needed. Several cap repairs have been completed, a drainage ditch was regraded, and stone replacement was completed on the road between the two landfill phases.

Tetra Tech coordinated with the state and local agencies to design and implement a bioremediation pilot test in 2010 that reduced vinyl chloride to non-detect. In 2015, Tetra Tech coordinate with state and local agencies to design and implement three pilot tests to determine if insitu chemical oxidation could reduce both 1,4-dioxane and vinyl chloride. The application included injection of a persulfate peroxide blend and a bioavailable media. In both pilot tests, the local community was informed, weekly monitoring occurred for a month after, and letter reports of findings were drafted for distribution to EGLE.

In 2016, EGLE reduced the drinking water criteria for 1,4-dioxane significantly to 7.2 from 85 micrograms per liter. This resulted in a lack of delineation north of the landfill. A 1,4-dioxane delineation investigation plan was drafted for EGLE approval in June 2016 by Tetra Tech that was approved in August 2016. The plan was implemented in the latter half of 2017 and the plume has been delineated with the new criteria. Changes to the hydrogeologic monitoring plan were developed and implemented with EGLE approval. This included installation of four additional sentinel monitoring wells to delineate the plume.

Tetra Tech completed a re-design of the landfill gas to energy system as an option in the future for the City to provide electricity to the Wheeler Service Center. This is a large facility housing the City's fleet of vehicles, maintenance personnel and fueling operations. Tetra Tech also completed a feasibility study to determine if an electric vehicle fleet could be supported on the methane generation from the landfill. The findings indicated that it could be supported, however the cost for infrastructure installation reduced the rate of return.

In 2022, Tetra Tech began a pilot project to understand if the northside methane collection system needed to remain on. The system was installed in 2005 to ensure that methane was captured at the landfill boundary, pulled into the system and sent through a carbon filter. The system is aging and requires a new blower and other additional components. The evaluation was launched to determine if the capital costs would be needed. The system was turned off and additional methane monitoring was completed to determine if methane was migrating offsite for several months. The north methane system has remained off. Since the north methane system has been turned off methane has not been detected north of the landfill.

TETRA TECH

City of Petoskey Landfill Services

KEY FEATURES

- Performed Michigan Department of Environment, Great Lakes, and Energy (EGLE) approved Hydrogeologic Study and Phase I Hydrogeologic Investigations.
- Assisted City with clay cap and cover design including seed, grading, erosion controls, and gas vent installation.
- Continue to complete groundwater monitoring as required under closure agreement.
- Established a good working relationship with the state agency (EGLE).

CLIENT

City of Petoskey

LOCATION

Petoskey, Michigan

DURATION

Ongoing

PROJECT TEAM

Lesa Richardson

Alison Rauss

Zach Pinkowski

Tommy Maloney

REFERENCES

Martin J. Flynn
City of Petskey
Water/Wastewater Supervisor
Ph: 231-347-2500

PROJECT DESCRIPTION

The 20-acre site operated from the 1960's until 1980. Tetra Tech has provided environmental and engineering services at the former City of Petoskey Landfill since 1986. Following the closure of the landfill in 1989, Tetra Tech assisted the city with the design of the clay cap, the grading and seeding plans, and installation of methane gas vents.

Under EGLE (formerly the Michigan Department of Environmental Quality) direction, Tetra Tech assisted with completing the first site investigation using a phased approach to determine the extent of groundwater and surface water impact from landfill leachate. Tetra Tech completed monitoring well installation and soil borings to define the extent of impact and to address all potential receptors including several private drinking water supply wells and nearby Bear River. Results successfully demonstrated that neither residential well owners nor Bear River were affected by landfill leachate.

Tetra Tech continues to perform routine groundwater monitoring; cap, cover, and gas vent inspections; and, associated reporting to EGLE.

TETRA TECH

Livingston County Landfill
Offsite Landfill Gas Delineation & Mitigation and Routine Monitoring

CLIENT

Livingston County Drain Commission

LOCATION

Livingston County, Michigan

DURATION

2000 - present

PROJECT TEAM

Alison Rauss

David Beck, CPG

Tommy Maloney

REFERENCES

Robert Spaulding
DPW Coordinator
Ph: 517-545-9609

KEY FEATURES

- Performed off-site methane gas delineation.
- Developed a state agency approved phased approach to mitigating the off-site gas.
- Assisted County in responding to public concerns over health and safety issues.
- Completed all tasks on time and under proposed budget.
- Established a good working relationship with the state agency Michigan Department of Environment, Great Lakes, and Energy (EGLE).

PROJECT DESCRIPTION

The Livingston County Landfill was operated as a sanitary landfill from 1972 until its closure in 1989. The landfill area is approximately 20 acres and the waste has an average thickness of 40 feet. Tetra Tech has provided landfill-related consulting services to Livingston County since 2000.

Tetra Tech successfully performed offsite methane gas delineation and an evaluation of potential interim measures for mitigating the offsite methane gas. A phased mitigation approach was chosen and approved by EGLE (formerly the Michigan Department of Environmental Quality). Tetra Tech assisted the County with Public outreach and education regarding the offsite methane near the landfill. Tetra Tech conducted basement inspections, assisted with preparation for public meetings and a biannual newsletter.

Eighteen additional passive gas vents were constructed across the landfill, which was determined to be isolated from the original trench and passive vent system. The passive vents were constructed in a manner which would

ease their conversion to active vents, if needed. The passive system did not sufficiently mitigate the migration of landfill gas. As a result, from April to May 2001, Tetra Tech designed a small-scale soil vapor extraction (SVE) system to assist with off-site methane gas recovery and conducted a pilot test to determine the radii of influence and appropriate flow rates for key converted vents. By 2003, two small-scale SVE systems were installed along the property lines. The SVE systems have successfully mitigated all the off-site landfill gas and continue to operate today as a control measure. Additional passive vents were added in 2004 to help channel landfill gas through each vent to prevent damage to the vegetative cover. Tetra Tech conducts quarterly methane monitoring and prepares quarterly methane monitoring reports for submittal to EGLE.

In 2010, Tetra Tech began completing the USEPA required greenhouse gas emission reporting and based on volume, the landfill was able to exit the program after five years.

Tetra Tech completes semi-annual groundwater monitoring and reporting, as well as semi-annual landfill cap inspections and reporting. Tetra Tech prepared an Assessment Monitoring Program and Response Action Plan in accordance with Rule 441 & 442 of Part 115 in response to ongoing groundwater issues, which was approved by the state agency without revision. Recently, Tetra Tech has begun assessing the existing groundwater monitoring well network for the presence of PFAS.

TETRA TECH

City of Saline
Site Characterization and Lagoon Closure

CLIENT

City of Saline

LOCATION

Michigan

DURATION

2020 - ongoing

PROJECT TEAM

Patti McCall, PWS, CPG

Michelle Gillie, CIH, CSP, CPEA

Alison Rauss

Bryan Allen

REFERENCES

Colleen O'Toole
Former City Manager
City of Saline
Ph: 312-753-8664
Colleen.a.otoole@gmail.com

KEY FEATURES

- Conducted Phase I Environmental Site Assessments (ESAs) on the City owned wastewater treatment plant (WWTP) property and two adjacent parcels that were considered for expansion of the WWTP.
- Completed Phase I ESA reports, for each property, summarizing the results and identifying recognized environmental condition (REC) findings.
- During the Phase I ESA process it was determined that a nearby, former industrial property was potential impacting the City's property.
- Completed a Phase II ESA drilling investigation with soil and groundwater sampling to investigate the RECs identified in the Phase I ESAs.
- Completed additional soil borings specific to a proposed City sidewalk expansion and City owned Salt Springs Park parking lot.
- Completed waste profiling, coordination with landfill and manifesting soils to an appropriate facility.
- Coordinated with Washtenaw County Redevelopment Authority (WCBRA), prepared a local brownfield revolving fund (LBRF) application, and received funding for the sidewalk project.
- Developed Lagoon Closure Work Plan, lagoon closure sampling and Lagoon Closure Report for removal of the earthen storage basin.

PROJECT DESCRIPTION

Tetra Tech has completed many environmental tasks in support of the City of Saline's WWTP.

Phase I ESAs

Tetra Tech completed desktop review and field surveys associated with Phase I ESAs for the City of Saline WWTP and two adjacent properties in Saline, Michigan. Phase I ESAs are performed in general conformance with ASTM Practice E 1527-13 entitled "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" (ASTM Standard), and the EPA Rule entitled, "Standards and Practices for All Appropriate Inquiries; Final Rule" (AAI Rule), 40 CFR Part 312. The Phase I ESA for each property involved a records review, site reconnaissance, interviews with the current owners and occupants of the subject property and local government agencies, and preparation of a report identifying RECs on the subject property. Tetra Tech personnel attended City Council meetings to keep the Council and public up to date on the findings.

Phase II ESAs and Salt Springs Park Parking Lot Support

The Phase I findings indicated the need for a Phase II ESA, which was completed in 2021 that included groundwater and soil sampling. Based on communication with City of Saline personnel, additional soil borings were completed during the Phase II ESA mobilizations to specifically target a proposed sidewalk extension project and Salt Springs Park parking lot that was located within the Phase II ESA project area. The borings were completed to determine if contamination were present in these locations that would impact the construction or be hazardous to workers completing the construction tasks. Initial findings indicated that lead modeling was needed under OSHA's lead exposure requirements for workers to ensure their safety. Tetra Tech's industrial hygienist modeled the data and determined that the site was safe for non-HAZWOPER trained personnel provided they received hazard communication on lead safety, which was provided by Tetra Tech.

The soil data in the parking lot and sidewalk project was evaluated by Tetra Tech waste specialists to determine if it required disposal. In coordination with the local landfill, Tetra Tech completed the waste profile and was able to obtain approval for disposal. Tetra Tech worked with the City of Saline Engineer and their engineering consultant to draft specification documents for handling the soil and waste. These documents and the lead exposure risk information were added to the Request for Proposals for the project. Tetra Tech assisted the engineering consultant with manifesting waste offsite and coordinated daily loads with the landfill.

Tetra Tech completed a funding request on behalf of the City of Saline for an LBRF grant to assist with the additional costs for engineering, environmental investigation and waste disposal. The WCBRA was able to grant an initial $50,000 with the potential for additional funding should it be necessary. Tetra Tech completed the reimbursement filings for reimbursement and attended WCBRA meetings to present the requested information.

Lagoon Closure

Tetra Tech is the engineer of record for the WWTP improvements and helped secured state funds for the project. As part of the site work, a former lagoon required closure. Tetra Tech developed a lagoon closure work plan for removal and closure of the existing earthen storage basin at the WWTP that was approved by EGLE. Prior to upgrades, monitoring wells, groundwater and soil sampling were completed around the lagoon and in support of soil removal, should it be necessary during the upgrade project.

Removal of vegetation, soil, concrete, riprap and the clay liner in the lagoon were completed as part of the work plan and summarized in the Lagoon Closure Report. Conditional closure for the lagoon was granted by EGLE, however EGLE requested additional post lagoon closure sampling of the monitoring wells for per- and polyfluoroalkyl substances (PFAS). During the sampling, low-level concentrations of PFAS were identified throughout the site. Additional assistance with a sampling program and coordination with area waste disposal facilities was completed. When the construction is complete near the former lagoon, replacement monitoring wells will be installed to complete the additional sampling for closure required by EGLE.

TETRA TECH

Environmental Surveys and Permitting

CLIENT

National Grid Renewables

LOCATION

Michigan

DURATION

January 2018 - ongoing

PROJECT TEAM

Patti McCall, PWS, CPG
Adam Holven
Kimberly Gorman
Megan Davis, PWS
Grant Kvendru
Bryan Allen
Tyler Dolin
Rachel Fischer
Jenna Herrington
Bree Rice

REFERENCES

Amber Miller
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National Grid Renewables
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Aurora, IL 60504
amiller@nationalgridrenewables.com

KEY FEATURES

- Conducted environmental field surveys for a solar energy project in south-central Michigan, including a Phase I Environmental Site Assessment (ESA) and archeological survey, wetlands and waters delineation, natural resources inventory, and qualitative habitat assessment.
- Completed a Phase II ESA drilling investigation, soil and groundwater sampling, pre-demolition building material sampling for asbestos and lead and reporting.
- Provided a wetland delineation report that included details regarding site observations, features surveyed, hydric soils, wetland determination forms, photographs, and GPS data.
- Consulted and coordinated with the U.S. Fish and Wildlife Service (USFWS), Michigan Department of Natural Resources (MDNR), and Michigan Natural Features Inventory (MNFI) regarding threatened and endangered species and identified best management practices to protect species.
- Completed an Eastern Massassauga Rattlesnake survey.
- Conducted a pre-application meeting with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to discuss potential permitting requirements and are currently working on a Joint Permit Application (JPA) for wetland and water impacts.
- Provided local permitting support and local township and county planning support at public hearings.
- Completed a JPA and Discharge Request; obtained a water resources permit.
- Coordinated with EGLE for conservation easement credits.
- Completed a Documentation of Due Care Compliance Document.
- Provided hazardous communication to the construction team.

PROJECT DESCRIPTION

Tetra Tech completed desktop review and field surveys associated with a Phase I ESA, wetland and waters delineation, natural resources inventory and qualitative habitat assessment for Jackson Solar, LLC in Jackson County, Michigan. The Phase I involved a records review, site reconnaissance, interviews with the current owners and occupants of the subject property and local government agencies, and preparation of a report identifying RECs on the subject property. The Phase I findings indicated the need for a Phase II ESA completed in summer 2021 that included groundwater and soil sampling and a pre-demolition survey for asbestos and lead containing material that was subsequently completed.

Following the Phase II an isolated excavation was completed in 2024 with Tetra Tech oversight and soil sampling to ensure the impacted soil was removed. Tetra Tech provided hazardous communication for site workers due to naturally occurring elevated concentrations of arsenic in the soil. In addition, Tetra Tech drafted a Documentation of Due Care Compliance document following site remediation.

The wetland and waters delineation, natural resources inventory and qualitative habitat assessment involved a desktop analysis of publicly available data from federal and state governmental agencies. Following the desktop work, Tetra Tech conducted an on-site wetland delineation based on methods described in the 1987 U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual and the Northcentral and Northeast Regional Supplement including completion of USACE Wetland Determination Data Forms. Natural resource communities (non-agricultural areas) were identified and described based on general observations of dominant plant communities. The site visit included locating wetlands, stream features, and natural resource areas using a Trimble GPS with sub-meter accuracy. GPS data was provided to the client in shapefiles and a KMZ file. Tetra Tech prepared a wetland delineation report including methodology, details regarding site observations and features surveyed, and a determination of EGLE regulatory status.

Upon completion of the wetlands and waters delineation report, a pre-application meeting with the EGLE Water Resources Division (WRD) Jackson District Office was conducted to determine the regulatory status of the wetlands and water resources identified during the delineation, review preliminary design drawings and determine the need for a wetland or inland lakes and streams permit, and to provide information regarding the permit process, should it be necessary. Tetra Tech completed a JPA for wetlands and waters impacts after working through a combined permit for ITC and Jackson Solar, LLC impacts. The permit was issued in 2023, after coordinating with and acquiring mitigation bank credits.

Tetra Tech submitted letters to the USFWS and MDNR for review and comment regarding federally and state protected species that may be affected by the project. A bat acoustic survey was completed by Tetra Tech and an Eastern Massassauga Rattlesnake survey was completed onsite by a local herpetologist, providing findings and best management practices for working safely around the federally threatened species. Tetra Tech completed extensive coordination with USFWS to ensure the safety and monitoring of EMR during both construction and operation of the facility in perpetuity.

Tetra Tech has also provided permitting assistance with the Jackson County Drain Commissioner for review and approval of the stormwater management plans. In addition, Tetra Tech personnel provided technical assistance at Planning Commission public hearings. Site preparation began in 2024, and construction in 2025. Tetra Tech will provide wetland monitoring assistance after site restoration occurs in wetland impact areas.

TETRA TECH

Allied Paper (Kalamazoo River) Superfund Site Interim Remedial Measures, O&M, Remedy Design, and Remedial Action

CLIENT

Allied Paper Superfund Site

LOCATION

Kalamazoo River, MI

DURATION

2013-present

PROJECT TEAM

David Beck
David Wilson
Roger Woolsey
Jim Walker
Patti McCall
Megan Davis
Rachel Fischer
Michelle Gillie

REFERENCES

Available upon request

KEY FEATURES

- Performed Operation and Maintenance (O&M) on a groundwater recovery and treatment system installed around a temporary consolidation area containing waste comprised of polychlorinated biphenyl (PCB)-containing paper residuals from the Time-critical Removal Action (TCRA).
- Completed monitoring and reporting to support discharge permit to the local publicly owned treatment works (POTW).
- Constructed a sheet pile wall approximately 900 feet in length as an interim remedy to stabilize a steep stream bank containing a former settling basin, containing 100,000 cubic yards (CY) of waste. The sheet pile was needed to prevent a catastrophic release to the previously remediated creek.
- Completed a pre-design investigation to delineation constituents of concern in upland areas, including paper residuals, PCBs, metals, semi-volatile organic compounds, dioxins, and furans, and per- and polyfluoroalkyl substances (PFAS). Pre-design investigation also characterized geotechnical properties of the waste materials and subsurface conditions needed to complete geotechnical modeling and design a new consolidation area (landfill).
- Completed a dewatering pilot test to identify optimal dewatering methods for the site and materials. Completed a consolidation test to similar material that was settling and continued dewatering following material consolidation to inform construction sequencing.
- Prepared a remedial design (RD) that included the following:
    - Excavation of 1,300,000 CY of waste from former paper mill operational area and neighboring commercial and residential properties
    - Consolidation of waste and construction of a landfill with an engineered cap and landfill gas recovery system
    - Restoration of an urbanized stream to natural conditions
    - Construction of a permanent heavy traffic stream crossing
- Coordinated with Federal, State, and local stakeholders on excavation and restoration plans and multiple permits.

- Directed and performed construction quality assurance and three years of remedial action implementation prior to transition to another responsible party, which included excavation of approximately 600,000 CY waste and placement of approximately 550,000 CY of waste into a consolidation area.
- Continued supporting the environmental custodial trust for portion of Site that did not transition to other responsible party, including updating the remedial design and remedial implementation planning to coordinate work with ongoing remedial actions.
- Completed a wetland delineation and Joint Permit Application for impacts to wetlands identified in the waste areas. This included coordination with various stakeholders and a pre-application meeting for the consolidation phase. Currently, Tetra Tech is completing a Joint Permit Application for the additional remediation design and implementation south of Portage Creek that is anticipated to begin in summer 2025.

PROJECT DESCRIPTION

The Allied Paper Site, Operable Unit 1 (OU-1) of the Kalamazoo River Superfund Site was listed on the National Priorities List (NPL) in August 1990 and consists of former disposal areas, former paper mill properties, and contaminated sediments, banks, and floodplains of Portage Creek. OU-1 is located on 89 acres within the City of Kalamazoo, Michigan. The primary sources of contaminants in OU-1 were two paper mills that either discharged contaminated wastewater directly to Portage Creek, or to impoundment area (millponds) and settling lagoons. A TCRA was completed at OU-1 between 1990 and 2004, to minimize exposure to polychlorinated biphenyls (PCBs) and stop the ongoing release of PCBs from the Former Bryant Mill Pond Area to Portage Creek and the Kalamazoo River.

The Site was placed into an environmental custodial trust because of a bankruptcy in 2010. Tetra Tech was retained by the environmental custodial trust in 2013 to manage O&M activities and advance the Site to remedial action.

TETRA TECH

Owner's Engineer Large-Scale Decommissioning, Decontamination, Demolition & Reclamation

DTE Trenton Channel (Coal-Fired) Power Plant

Former DTE Trenton Channel Power Plant

KEY FEATURES

- Prepared Decommissioning, Decontamination, Demolition & Reclamation (DDD&R) Project Specifications and Design Drawings
- Delineated Wetlands and Completed Qualitative Habitat Assessments
- Submitted Joint Application Permit for Wetland Impacts and Documents for Purchase of Wetland Bank Credits
- Surveyed Structures for Regulated Wastes and other Hazardous Materials including but not limited to Asbestos, Polychlorinated Biphenyls (PCBs), Mercury, Lead, and Chlorofluorocarbons (CFCs)
- Completed Geophysical Surveys to Identify Underground Features
- Characterized Wastewater Treatment Pond Sediments and assisted with National Pollutant Discharge Elimination System Permit (NPDES) Compliance and Closeout Processes and Reporting
- Designed Temporary Facilities including Construction Power, Water Hydrants and Construction Trailers/Offices
- Provided Engineering Review and Comment of Contractor Submittals and Potential Change Order Requests
- Conducted 3rd-Party Asbestos Abatement Oversight and conducted state required Final Visual and Air Clearances as well as Perimeter Air Monitoring for Asbestos and Airborne Particulates
- Maintained Teams and ProCore Data Management Systems
- Conducted Regular Team Meetings and Created Meeting Notes

CLIENT

Detroit Electric Company

Anthony Bragadin, anthony.bragadin@dteenergy.com, 734.365.3305

LOCATION

Trenton, Michigan

DURATION

September 2020 - Ongoing

COST

$5.6M

PROJECT TEAM

Philip Spalding, Program Manager

Lesa Richardson, Project Manager

Amy Funck, Project Administrator

Jeri Decator, Civil Engineer

Patti McCall, Permitting Specialist

Austin Sash, Environmental Engineer

Cody Knowlton, Hazardous Materials Specialist

Moussa Sissoko, Structural Engineer

Chris Patselas, Mechanical Engineer

Ken Temme, Demolition Expert

Lincoln Steele, Geophysical Engineer

John Christiansen, Wastewater Engineer

Bill Paison, Electrical Engineer

REFERENCES

Anthony Bragadin, anthony.bragadin@dteenergy.com, 734.365.3305

PROJECT DESCRIPTION

Tetra Tech's Owner's Engineer (OE) contract with DTE consists of DDD&R related activities at three coal-fired power plants in the Greater Detroit Area of Southeastern Michigan. The Trenton Channel Power Plant (TCHPP) was the first power plant DTE requested Tetra Tech to provide OE support. The 563 megawatt power plant was initially constructed in the 1920s and was idled in 2022. It consisted of one boiler installed in the 1970s and four decommissioned boilers dating to the 1950s. As of April 2025, all structures had been removed, and final grading activities had commenced.

DDD&R Planning

Tetra Tech researched available documents to provide a common operating picture for the OE and DTE team, to better characterize the site and develop the scope for the contractor's demolition. Tetra Tech completed the wetland delineation surveys, drone mounted photogrammetry surveys, geophysical surveys, and a regulated materials survey of the full plant building and all peripheral buildings, as well as thousands of linear feet of coal conveyance structures. Tetra Tech prepared the Request for Interest (RFI) document and drawings for DTE in January 2021, and assisted DTE by guiding interested contractors' representatives through site tours to discuss the plant and site. Tetra Tech assisted DTE with selecting qualified contracting firms to participate in the Request for Proposal (RFP) process in the fall of 2021.

The RFP that Tetra Tech developed included a drawing set of site plans, underground utility plans, final grading plans, and cofferdam and bulkheading design; a set of demolition technical specifications; detailed structure and building descriptions; and environmental documents to direct contractors to remediate NPDES ponds as well as and how to manage expected waste and wastewater.

Implementation

Throughout the implementation of DDD&R activities Tetra Tech provided a multidiscipline team that could quickly respond to the challenges of deconstructing a 100-year-old power plant. Tetra Tech's Engineers and Subject Matter Experts reviewed and provided comment on Contractor Submittals and Potential Change Orders and attended site walk-downs and collaboration meetings to problem solve and provide safe and environmentally compliant solutions to challenges as they arose. Our Project Management Team lead weekly progress meetings, responded to Contractor Requests for Information, conducted periodic site inspections and managed Microsoft Teams and Pro Core data management systems.

Tetra Tech provided 3rd-Party Asbestos Abatement Oversight Monitoring and conducted state required Final Visual and Air Clearances as well as Perimeter Air Monitoring for Asbestos and Airborne Particulates.

Project Close-Out

As DDD&R activities end in 2025, Tetra Tech is confirming wastewater pond cleanup, supporting the close-out of the NPDES permit, optimizing the final grading plan to save cost and archiving project documents.

TETRA TECH

415 West Washington Street

CLIENT

City of Ann Arbor

LOCATION

Ann Arbor, MI

DURATION

2013, 2021-2023

PROJECT TEAM

Patti McCall
Alison Rauss
Bryan Allen
Bridget Kiser

REFERENCES

Derek Delacourt
City of Ann Arbor
301 E. Huron Street
P.O. Box 8647
Ann Arbor, MI 48107-8647
734-794-6000 ext. 43902

KEY FEATURES

- Completed a Phase I Environmental Site Assessment (ESA) 2013.
- Completed Phase II ESA, 2013; 2021 - 2022.
- Completed a Hazardous Material Survey of Onsite Structures 2013.
- Completed permitting with Washtenaw County Health Department for groundwater wells and for working in the drain easement.
- Developed planning level cost estimates for remediation of:
    - Asbestos and lead based paint abatement
    - Lab packing and disposal of miscellaneous inventoried drums and containers
    - Soil and groundwater
- Completed and was awarded Washtenaw County Brownfield Redevelopment Authority (WCBRA) application for funding, for additional Phase II ESA sampling in 2021, including offsite investigation.
- Attended WCBRA meetings, provided updates and requested reimbursements.
- Presented Phase II ESA findings to the City of Ann Arbor Planning Commission 2023.
- Completed a remediation plan and Brownfield Funding request for remediation of the site 2023.
- Began participating on behalf of the City of Ann Arbor, in biweekly meetings with regulators for neighborhood investigation progress, including Michigan Department of Environment, Great Lakes and Energy (EGLE), Michigan Department of Human Health Services (MDHHS), and Washtenaw County Health Department (WCHD) 2023.

PROJECT DESCRIPTION

Tetra Tech completed an environmental investigation to determine if the subject property contained recognized environmental conditions (RECs) prior to potential site reuse and redevelopment. The environmental investigation

consisted of a Phase I ESA, a Phase II ESA, a hazardous materials survey and development of planning level cost estimates for remediation.

The City of Ann Arbor (City) property at 415 West Washington was historically used by a milling company and as Washtenaw County Road Commission service yard. It was then used as a City owned and occupied Parks and Recreation municipal maintenance yard before the buildings were left vacant and the lot used for parking.

Underground storage tanks were previously removed from the site. Investigation and remediation efforts were taken to remove soil contamination. Concentrations were reduced, but not below residential cleanup criteria and site closure was never obtained. A remediation system including pump and treat, and air sparge was installed onsite, but has not been operated since the early 2000s. Phase II ESA findings also confirm a second plume of TCE on the property that likely has offsite contributions.

A hazardous materials survey of onsite structures was completed in 2013. The hazardous materials survey consisted of asbestos sampling, lead based paint sampling and a comprehensive inventory of other hazardous materials on the property that could be reused, recycled or may require special handling for removal prior to building demolition. Tetra Tech provided remediation options and planning level costs for remediation of the onsite soil and groundwater impacts; asbestos and lead based paint abatement; and hazardous materials inventory laboratory packing and disposal.

In 2021, the City of Ann Arbor requested assistance with updating the previous environmental findings and current conditions of the site. The City of Ann Arbor was interested in removing a blighted building, potentially redeveloping with some units for low-income housing, remediating the soil and groundwater impacts and closing the LUST, and treating the TCE plume onsite. Tetra Tech developed a scope of work to locate and sample each existing monitoring well, evaluate the data, identify data gaps and implement a drilling investigation.

Tetra Tech completed an application for the WCBRA to secure grant funding for the Phase II ESA drilling investigation. The project was awarded the requested amount and a drilling investigation was completed in November 2021. A notice of migration was filed with the State of Michigan for the LUST impacts migrating offsite. Additional investigation work was completed on behalf of the property owner across the street.

In May 2022 a drilling investigation with groundwater sampling was completed in the area surrounding the 415 W. Washington property to further delineate groundwater impacts. Groundwater sampling indicated there is a trichloroethene (TCE) plume on the property with the potential for an offsite, upgradient contributing source.

In two of the locations, TCE exceeded state criteria, raising concerns of potential indoor air issues for residents in the neighborhood. Based on this, EGLE personnel (or the responsible party's consultant) collected air quality data from properties west and southwest of the 415 W. Washington Street property. Samples collected were subslab soil gas samples from vapor pins or indoor air quality. EGLE is continuing the indoor air quality investigation and EGLE or the responsible party are installing air purifying units and sub slab depressurization systems where impacts are identified.

In 2023, Tetra Tech personnel began attending monthly update meetings for the investigation updates for the nearby responsible party of TCE in the area. The monthly meetings are with personnel from EGLE, WCHD and MDHHS.

The property is still planned for redevelopment and City of Ann Arbor is actively identifying developers who will implement the remediation plan completed by Tetra Tech. In 2024, the buildings were demolished, removing the blight and making way for potential remediation and redevelopment of the property.

TETRA TECH

City of Ann Arbor Geotechnical Borings

KEY FEATURES

- Collected soil samples for environmental and geotechnical analyses:
  - Former maintenance building at the Ann Arbor Landfill in support of new construction
  - Liberty/First/Ashley Streets in support of a road improvement project with potential green infrastructure components
  - Detroit/Fifth Streets in support of a road improvement project with potential green infrastructure components
- Completed necessary permits and utility locates necessary for each project (including joint MISSDIG meetings, Washtenaw County drilling permits, Downtown Development Authority (DDA) and Republic Parking Services (RPS) meter bag agreements, City of Ann Arbor lane closure and right-of-way permits).
- Provided client with summary of findings and digitized soil boring logs and analytical laboratory results.

CLIENT

City of Ann Arbor

LOCATION

Ann Arbor, MI

DURATION

2016

PROJECT TEAM

Patti McCall

Alison Rauss

Michael Savale

REFERENCES

Anne Warrow
City of Ann Arbor
301 E. Huron Street
P.O. Box 8647
Ann Arbor, MI 48107-8647
734-794-6410 ext. 43639

Jennifer Nelson (Former City of Ann Arbor Project Manager)

PROJECT DESCRIPTION

Tetra Tech has been providing consulting services to the City of Ann Arbor since 2007. Tetra Tech was awarded a contract to support the City of Ann Arbor in the completion of geotechnical and soil borings in 2016. The geotechnical work completed under this contract included three projects; one at the Ann Arbor Landfill and two in downtown Ann Arbor.

Former Maintenance Building (Ann Arbor Landfill)

Three soil borings at the former maintenance building were advanced to depths up to 20.5 feet to determine existing site conditions and facilitate structural design of a future cart storage facility. Soil boring locations were marked in the field prior to drilling by Stantec.

Soil samples were collected for completion of moisture content and compression testing at each location. A one-inch temporary well was installed in one of the boring locations to collect a sample for groundwater environmental analysis and to determine if a historical underground storage tank had impacted the area. Field logs were completed and digitized using Bentley's gINT software for all locations. A geotechnical letter report including findings and recommendations, digitized logs, and analytical data were provided to City of Ann Arbor and Stantec personnel.

Downtown Ann Arbor Projects

Coordination with DDA/RPS provided working space by rendering specific parking spaces unavailable during each day of activity. The first day, a joint MISSDIG meeting was completed with City of Ann Arbor and local MISSDIG utility personnel based on the proposed boring locations for the project bundle of Liberty/First/Ashley Streets and Detroit/Fifth Streets. In coordination with City personnel, soil borings were located to avoid underground infrastructure and to minimize traffic disruption. Ground penetrating radar (GPR) was used to provide an additional level of safety after locations were cleared by City and MISSDIG utility personnel. In several instances, GPR identified additional underground infrastructure in the area and the locations were relocated with City utility personnel input. Following GPR, the upper five feet of each soil boring location was advanced by hand auger to ensure that utilities were not in the subsurface at each location.

The scope of work required multiple mobilizations to accommodate City of Ann Arbor permit required time restrictions for working downtown, soil boring refusals, the 2016 election and the addition of the double ring infiltration test. Field work also occurred during a visit by the President of the United States, which snarled area traffic and delayed subcontractors' arrival. Each mobilization was coordinated with City of Ann Arbor personnel to ensure the appropriate permits and permissions were obtained. Safety was of the utmost importance during each mobilization of the project. Road signs were posted, and areas were cordoned off from the general public to limit potential hazards.

Drilling was completed with direct push technologies using a GeoProbe drilling rig. Field logs were completed and digitized using Bentley's gINT software for each soil boring location, including refusals. Digitized logs along with summaries of findings were provided to City personnel. Below are details specific to each project area.

Liberty/First/Ashley Streets

Three soil boring locations were completed for geotechnical and environmental sampling analyses to a depth of up to 20 feet. A one-inch temporary well was installed in two of the boring locations to collect groundwater for a suite of parameters. Soil was collected for environmental laboratory analyses. Two Shelby Tubes were collected adjacent to two of the boring locations and submitted for permeability analysis. A double ring infiltration field test was completed in a test pit on the north side of Liberty Street, east of First Street by MTC.

Detroit/Fifth Streets

Five soil borings (two refusals) were completed for environmental samples analyses to a depth of up 20 feet. Groundwater was not encountered in these soil borings, but three soil samples were collected for a suite of parameters.

TETRA TECH

Ann Arbor Landfill Capture Zone Analysis

CLIENT

City of Ann Arbor

LOCATION

Ann Arbor, MI

DURATION

2008 - 2010

PROJECT TEAM

Patti McCall, CPG, PWS

Alison Rauss

REFERENCES

Anne Warrow
City of Ann Arbor
301 E. Huron Street
P.O. Box 8647
Ann Arbor, MI 48107-8647
734-794-6410 ext. 43639

KEY FEATURES

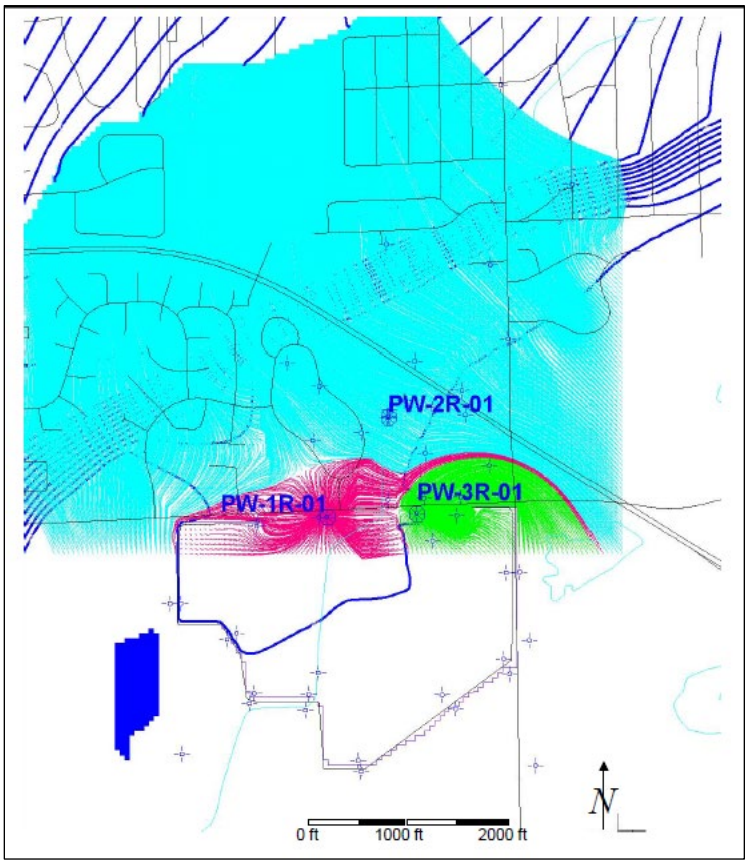
- Concluded the extraction wells at the landfill boundary provide full capture and can at a significant rate reduction.
- The remaining off-site extraction well was working against the two landfill extraction wells.
- The off-site extraction well was turned off to increase the mass removal of vinyl chloride by the landfill extraction wells.
- Provided a considerable cost savings to the city by reducing their discharge volume by 46%.

PROJECT DESCRIPTION

Tetra Tech successfully completed a Capture Zone Analysis and Conceptual Site Model for the City of Ann Arbor's closed municipal landfill to determine if the three extraction wells were effective at capturing and removing contaminants from the groundwater and if not, provide suggestions to optimize capture. The current slurry wall and extraction well configuration have been in place since 2000, pumping 120-gallons of water a minute to the sanitary and at a significant cost to the city. The city has monitored two separate plumes off-site since the early 1990s; 1,4-dioxane that was below applicable criteria and vinyl chloride that was above applicable criteria.

Tetra Tech updated the geological interpretation of the area with historical documents. Based on this information, soil borings were advanced, and observation wells were installed prior to a step-wise recovery test on the three purge wells. Aquifer analyses were completed on each well and water quality data was analyzed. The data gathered during these activities were used to construct a numerical model. Results of the modeling suggest that the two extraction wells at the landfill boundary provide full capture at their current pumping rates and could continue to provide full capture with a significant reduction in the discharge rate.

Modeling also suggested that the extraction well located in the park across the street has such a large expanse that the well is working at cross-purposes to the other two extraction wells. Additionally, the well is pulling back a 1,4-dioxane plume that migrated from the property many years prior that is below applicable criteria.

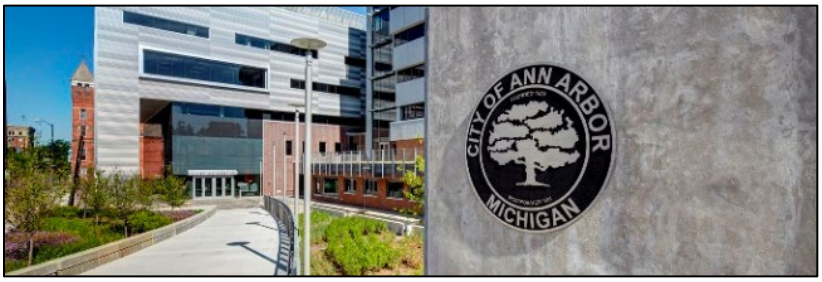


Tetra Tech recommended that the extraction well in the park be turned off to allow the remaining two extraction wells to increase their capture area and recover a larger mass of vinyl chloride. The findings were presented to the Michigan Department of Environmental Quality (MDEQ), now Michigan Department of Environment, Great Lakes and Energy (EGLE) who agreed to a six-month pilot test with the park extraction well off. Following the pilot test, static water level data was collected, and data analysis was completed to compare the predictions of the model to the actual data.

Since January 2009, the park extraction well remained off with a considerable savings to the city. The remaining two extraction wells continued to pump at 60 to 70-gallons per minute to remove the vinyl chloride mass offsite. In 2016, the 1,4-dioxane drinking water criteria was reduced by EGLE and the extraction well in the park was turned out at a low flow volume.

TETRA TECH

City of Ann Arbor Environmental Services



PROJECT DESCRIPTION

Tetra Tech has completed several projects for the City of Ann Arbor, including maintaining the closed municipal landfill operation, maintenance and monitoring contract since 2007. In addition, Tetra Tech has provided consulting services for Phase I and II Environmental Site Assessments (ESA), Baseline Environmental Assessments (BEAs), Due Care Plans (DCPs), Documentation of Due Care Compliance (DDCC), third party review of brownfield plans, reimbursement for brownfield funding, underground storage tank (UST) removal, PFAS sampling and assistance, consulting for the City attorney's office and more. Tetra Tech has maintained geotechnical and on-call environmental services contracts, providing a range of assistance. Since 2007, Tetra Tech has completed many projects for the City of Ann Arbor, as described below.

Drop-Off Station (2024 – present)

- Tetra Tech developed and completed an environmental investigation of soil and groundwater for the existing Drop-Off Station (DOS) property to determine if the property could host a newly constructed DOS facility. Results of the investigation indicated that reusing the existing DOS property was environmentally feasible.
- Geotechnical borings and an engineering feasibility assessment were completed after the environmental investigation. The initial findings indicate that repurposing the property in a similar footprint is acceptable with engineering controls and several recommendations for facility construction.

Scarlett Woods (2023 – present)

- Tetra Tech completed a Phase II ESA consisting of shallow soil sampling in a wooded location of a known dump site of slag debris and other materials in a previously identified 100 x 100 foot area.
- The area of soil investigation was potentially located in a wetland. Tetra Tech completed a wetland determination for the area of soil sampling and determined the wetland is not regulated by the State of Michigan.
- The results of the soil sampling indicated concentrations of select metals exceeded applicable State of Michigan criteria.
- Based on the results of the soil sampling, Tetra Tech removed soil from two approximately 5 x 5 foot areas that had soil with criteria exceedances. The soil was placed in drums along with slag that was collected throughout the area from the ground surface. Tetra Tech completed a waste profile for the soil and slag waste. The waste is currently staged in drums at City of Ann Arbor property awaiting disposal by a waste hauler.
- Tetra Tech is currently drafting a DDCC for the project location to ensure users of the property are protected from contamination exposure.

CLIENT

City of Ann Arbor

LOCATION

Ann Arbor, MI

DURATION

2007 - current

PROJECT TEAM

Patti McCall, CPG, PWS

Alison Rauss

Mike Savale

Bryan Allen

Jordan Russell

Marco Capodivacca

Rachel Fischer

Jenna Herrington

Zach Pinkowski

REFERENCE

Erin Donnelly (Landfill PM 2023 – current)
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Anne Warrow
Project Manager (Landfill PM 2007 – 2018)
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Molly Maciejewski
Water Treatment Services Manger
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mmaciejewski@a2gov.org

*Other references available upon request

Dhu Varren (2023 – present)

- During a brownfield plan review by EGLE personnel, an area of land proposed for redevelopment was identified as potentially having the presence of soil gas due to the area being historically used as a landfill. EGLE requested that the City of Ann Arbor complete monitoring to determine whether methane was migrating to offsite receptors.
- Tetra Tech completed indoor air monitoring in the basements of nearby residential homes, a church and area stormwater drains; and determined that methane gas was not detected in any of the structures.
- Tetra Tech completed a historical review of the available documents to identify the waste that was disposed of at the site to assess potential methane generation. Tetra Tech coordinated access with the nearby church to complete installation of two offsite soil gas probes as requested by EGLE. The wells will be installed and monitored in spring 2025.

Treeline Urban Trail (2022 – 2024)

- Tetra Tech worked with the City of Ann Arbor and the Treeline Conservancy on the first seven parcels of the Treeline Urban Trail on the north side of town to assess potential environmental concerns.
- Six Phase I ESA reports were completed.
- Meetings were held with Tree Conservancy and City of Ann Arbor personnel to share findings and suggest potential Phase II ESA options for moving forward.

Lift Station Support – Arbor Landings and Sequoia (2022)

- Prior to dewatering for lift station or dewatering well installation, Tetra Tech completed sampling of the groundwater in the Gelman Prohibition Zone for 1,4-dioxane.
- The Arbor Landings site included installation of a monitoring well that was sampled during dewatering activities and reports provided to local and state officials. Initial sampling was completed after well development.
- The Sequoia site was dewatered, and the groundwater contained in a frac tank that was sampled. Results were provided to city officials for disposal purposes.

Former Parks Department; 415 W. Washington (2011 – 2013; 2021– present)

- Completed an initial Phase I and II ESA in 2011 – 2013 including assessing the buildings onsite for hazardous building materials, including lead-based paint, asbestos and both building materials and containers inside the building that would require special handling.
- Phase I and II ESA reports were completed, documenting a trichloroethene (TCE) plume potentially migrating from offsite and the fuel impacts from the former underground storage tanks.
- Remediation estimates were completed for groundwater contaminants, asbestos abatement and lead-based paint abatement.
- In 2021, Tetra Tech completed sampling of all existing wells and installed and sampled new permanent and temporary monitoring wells, completing all necessary permitting with the City and County prior to field work.
- Tetra Tech completed notice of migration documentation, coordinated with the offsite owner (YMCA), and updated the YMCA regularly.
- Tetra Tech completed two funding requests to the Washtenaw County Brownfield Regulatory Agency (WCBRA) that have been approved and Tetra Tech coordinated with EGLE for additional assistance with area contamination.
- In 2022, a drilling investigation with groundwater sampling was completed along Third Street and W. Liberty to further delineate groundwater impacts that may be migrating to the property. Based on this, EGLE personnel collected air quality data from properties west and southwest of the 415 W. Washington Street property. Samples collected were subslab soil gas samples from vapor pins for indoor air quality. EGLE is continuing the indoor air quality investigation with the responsible party. Air purifying units and sub slab depressurization systems are being installed where impacts are identified.
- In 2023 a remediation plan and Brownfield Funding request for remediation of the site was completed.

Leslie Science and Nature Center (2019 – present)

- Completed a Phase II ESA after determining previous site practices included uncontrolled dumping. The former owner of the property maintained a laboratory onsite as well as orchards and upon his death in 1976, bequeathed the land to the City of Ann Arbor. No due diligence was completed at the time and the property has been maintained as a City Park.

- The non-profit Leslie Science and Nature Center (LSNC) is located on the premises and the organization provides programming for children and the general public. Given the high use by citizens and children in the community, the project has been widely publicized.
- Investigation has included three mobilizations for soil sampling; determining the nature and extent of chlorinated volatile organic compounds, mercury and arsenic; excavation of the former uncontrolled dumpsite on the grounds; installation of a sub-slab depressurization system; soil gas and indoor air sampling and an arsenic bioavailability study that was accepted by EGLE, Phase II ESA Report, DDCC Report approved for arsenic and awaiting approval of a DDCC Report for indoor air.
- The City of Ann Arbor was able to secure brownfield funding from WCBRA for the project and Tetra Tech has completed numerous presentations and meetings with stakeholders including the LSNC, the LSNC Board, attorneys and consultants for the non-profit, the Washtenaw County Brownfield Redevelopment Authority, the City of Ann Arbor Parks Advisory Committee, and City Council.
- Tetra Tech is currently assisting the City of Ann Arbor with drafting a Restrictive Deed Covenant (RDC) for the LSNC property.

Phase I ESA Support (2022 – 2024)

- Completed a Phase I ESA in 2023 and updated Phase I ESA in 2024 for the undeveloped MI-UM Holdings LLC Parkland Dedication property.
- Completed a Phase I ESA for an office building on Miller Road in 2023.
- Completed a Phase I ESA for an undeveloped property on Mulholland Avenue in 2022.

Phase I ESA Support – Greenbelt Program (2017 – present)

- Tetra Tech completed a Phase I and II ESA and BEA on the Hosford Property for the City's Greenbelt program. In addition, a wetland delineation was completed, and shapefiles provided to ensure wetland and floodplain impacts were avoided during final remedy. A DDCC draft plan was completed, and a BEA was completed in 2021.
- Completed a Phase I ESA on the Seeley Farm Property in 2018.
- Completed a Phase I ESA on the Guenther Farm Property in 2017.

Phase I ESA Support – Public Works (2019 – 2022)

- Completed a Phase I ESA on Madison Street in 2021/2022 for access to infrastructure.
- Completed a Phase I and II ESA on a City-owned parcel on Crest Road in 2019/2020.

Support for the Pall Life Sciences/Gelman 1,4-Dioxane Plume (2009 – present)

- Completed sampling of Holyoke seeps to determine if 1,4-dioxane was present in the groundwater in 2024.
- Continue to assist with quarterly newsletter and 1,4-dioxane mass removal.
- Identification of sentinel monitoring wells to protect the City's drinking water supply and well installation occurred with Tetra Tech oversight in fall of 2022.
- Provided a review of the proposed discharge location to First Sister Lake in the 4th Consent Judgment for the wetland impacts and viability of a National Pollutant Discharge Elimination System (NPDES) permit. The review was completed at the request of the City Attorney's office.
- Designed and implemented a basement sampling project to determine if homeowners are being exposed to 1,4-dioxane impacted groundwater. Completed a listening session for the City of Ann Arbor citizens to explain the program.
- Complete quarterly updates for public distribution on the major project updates, discharge volumes and mass of 1,4-dioxane removed.
- Participate in monthly calls with citizens group on behalf of the City of Ann Arbor.
- Complete review of information and recommendations at the direction of City staff or City Attorney's office as requested.
- Designed and modeled an area of the 1,4-dioxane plume to determine if 1,4-dioxane may be migrating to the public water supply and is so, where to install sentinel monitoring wells. Completed two public presentations to explain the project and findings.
- Participated in a technical discussion and third party review of a potential 1,4-dioxane plume migrating to Barton Pond, the City's drinking water source. Recommendations were provided to the City for additional investigation and monitoring wells.
- Completed a third party review of a 1,4-dioxane groundwater model of the Evergreen Area.

Ann Arbor Landfill Maintenance and Monitoring (2007 – present)

- Routine monitoring tasks include groundwater and wastewater sampling, landfill gas monitoring, maintenance of the north side landfill gas mitigation system, USEPA greenhouse gas reporting, quarterly environmental reporting, maintenance on the methane system and monthly mass calculations for the wastewater permit.
- Additional completed landfill related tasks include: closure certification of Phase I; completion of a Capture Zone Analysis and Conceptual Site Model that resulted in shutting off one well and saving over $100,000 annually in discharge; completion of a bioremediation pilot test that reduced contaminants to non-detect; completion of a leachate outbreak work plan, cap repairs and final letter report; replacement of extraction wells and discharge lines; successfully renewed the city's Industrial User Permit (IUP) three times to allow discharge to the sanitary, assisted with EGLE landfill inspections, completion of MDOT Environmental License Agreement and installation of required markers along I-94; negotiated the reduction of gas monitoring locations; negotiated the number of groundwater monitoring locations and the frequency of sampling; abandoned over 30 monitoring wells; completion of restrictive deed covenants and submittal of an Offsite Remedial Action Plan.

Proposed Solar Farm Support (2020 – present)

- Completed a wetland delineation and qualitative habitat analysis and completed reports.
- Completed a Phase I ESA and finalized a report.
- Assisted City of Ann Arbor with additional tasks including coordination with the state for mitigation to habitat, utility company, cultural investigation, potential Phase II ESA, as needed.
- Completed a site investigation to characterize the vegetative community and natural features present at the proposed solar site. The community vegetation information was provided in a bid document.

Brownfield Review (2019-2021)

- Completed review of a proposed mixed-use redevelopment of a former manufactured gas plan site along the Huron River on behalf of the City of Ann Arbor. Tetra Tech reviewed investigation documents, proposed remedial actions, engineering controls and mitigation practices; and provided a summary of findings and recommendations for the project.
- Completed review of a mixed-use redevelopment for a former gas station in downtown Ann Arbor. Tetra Tech reviewed previous investigation documents; proposed remedial actions and engineering controls; and provided a summary of findings and recommendations for the project.

Soil Relocation Assistance (2019)

- Provided contract language for City of Ann Arbor engineering staff to include in their bid documents. The language included guidance on encountering contaminated soils and non-hazardous soils that have naturally occurring elevated metals.

Road Material Impact Assistance (2019)

- Provided assistance with diesel-impacted road base on several projects throughout the City. Completed sampling, data analysis, regulatory assistance, and statutory guidance. Summary information was provided in reports and emails to share with citizens and contractors.

PFAS Sampling (2018-2019)

- Completed sampling of various City facilities for PFAS, including the water department, wastewater treatment plant, compost piles and leachate at the closed landfill.

Hoover/Greene Road Improvement (2018 – 2019)

- Designed a drilling investigation on five roads to determine if environmental impacts were present. Joint meeting with utilities (public, city and University of Michigan) was completed along with ground penetrating radar to help determine locations. Lithology was logged at all locations for geotechnical engineering.
- Soil sampling was completed on stockpiled material removed from the road where potentially naturally occurring arsenic and selenium were detected. Synthetic process leaching procedure analysis was completed to determine if the material would leach under normal rainwater water conditions and ultimately if the material had to be landfilled.

Historic District Preservation and Legal Support (2015)

- Reviewed City provided documents and provided professional opinion on Part 201 assessment of the property.

Wheeler Service Center and Water Treatment Plant (2015)

- Completed an inventory of waste and coordinated lab packing and manifesting the wastes offsite at both locations.

Wheeler Farm UST (2014 – 2015)

- Completed soil and groundwater investigation of a UST discovered at Wheeler Farm. Tetra Tech completed an analysis, determined waste needs and manifested the tank and contents offsite for disposal.

Drop-Off Station Air Monitoring (2014)

- Completed air monitoring during installation of underground utilities to a temporary site trailer at the DOS.

Soil Background Concentrations (2014)

- Compiled metals data from City and County sites for inclusion in the Michigan Background Soil Survey update. Data was reviewed, filtered and provided to EGLE (formerly known as Michigan Dept or Environmental Quality) (MDEQ) TAPS team.

Pontiac Trail (2014)

- Completed onsite soil sampling and soil reuse options in response to odors encountered during a road improvement project. Assisted project manager and city attorney with regulatory guidance and contractor issues.

220 Felch Street (2013 – 2015)

- Attended meetings with City personnel and third party environmental consulting firm for migrating contamination on an adjacent property. Provided professional opinion on sampling plan, data review and options for remediation.

Madison/Main (2013)

- Completed onsite soil sampling and waste characterization in response to odors encountered during infrastructure installation.

Wastewater Treatment Plant Assistance (2013 – 2014)

- Assisted water treatment plant operator with review of a third party sampling plan and reviewed metals concentrations detected in clay samples.

721 North Main Street (2012)

- Completed Phase I ESA and provided Phase II ESA guidance.

Leaf Collection Sampling (2012-2013)

- Collected street swept samples to determine if material could be used for composting. Completed laboratory analysis, coordinated with City, EGLE (MDEQ) and compost contractor to determine suitable and legal requirements.

Plymouth/Traver Road Railroad Embankment Project (2012)

- Completed onsite groundwater and soil sampling and waste characterization in response to odors encountered in a railroad embankment project.

Packard Road Water Main Project (2012)

- Completed soil sampling and delineation in response to hydrocarbon odors encountered along a water main project.

Veterans Memorial Park Soils Removal and Dexter Road Infrastructure Improvement Project (2012)

- Completed soil sampling and waste characterization for hydrocarbon impacted soils during a road improvement project and responded to a ruptured gas main with soil screening, sampling and waste characterization of the soils.

Millers Creek Sediment Sampling (2012)

- Completed creek sediment sampling for characterization purposes prior to dredging project. Completing physical analysis first, saved the expense of numerous samples for quality analysis and allowed the project to proceed quicker.

East Stadium Blvd. Bridge (2010-2011)

- Completed site investigation and waste characterization, groundwater sampling, completion of a due care plan and provided aquifer dewatering assistance for a bridge replacement and infrastructure improvement project.

North University Soil Investigation (2010)

- Completed soil investigation and waste characterization prior to a University of Michigan Road improvement project.

Maple/Dexter Road Excavation (2008)

- Completed soil sampling and delineation of impacted soils during a water main installation project.

Closure In-Place of an Underground Storage Tank at 312 South State Street (2007)

- Assisted City with determining contents, sampling and in-place closure of a UST encountered during infrastructure installation.

TETRA TECH

Leslie Science and Nature Center
Site Characterization and Remediation

CLIENT

City of Ann Arbor

LOCATION

Ann Arbor, MI

DURATION

2019 - 2023

PROJECT TEAM

Patti McCall, CPG, PWS

Michelle Gillie, CIH, CSP, CPEA, FAIAH

Alison Rauss

Bryan Allen

REFERENCES

Derek Delacourt
City of Ann Arbor
301 E. Huron Street
P.O. Box 8647
Ann Arbor, MI 48107-8647
734-794-6000 ext. 43902

KEY FEATURES

- Completed Phase II Environmental Site Assessment (ESA).
- Installed vapor pins for indoor air monitoring of onsite structure.
- Installed a vapor system, installed a telemetry system connected to the existing alarm system, sealed the floor and completed one year of air monitoring.
- Completed a limited excavation to remove impacted soils.
- Completed an arsenic bioavailability study to ensure the public's safety, adopting site specific criteria for arsenic based on the use.
- Completed a Documentation of Due Care Compliance (DDCC) Report for arsenic and a DDCC Report for indoor air.
- In coordination with Michigan Department of Environment, Great Lakes and Energy (EGLE) personnel, Tetra Tech prepared and submitted a Brownfield Plan that was funded by the Washtenaw County Brownfield Redevelopment Authority for the investigation work.
- Tetra Tech completed numerous presentations and meetings with stakeholders including the Leslie Science and Nature Center (LSNC), the LSNC Board, attorneys and consultants for the non-profit, the Washtenaw County Brownfield Redevelopment Authority, the City of Ann Arbor Parks Advisory Committee and City Council.

PROJECT DESCRIPTION

The LSNC is an independent, nonprofit organization that operates STEM and nature focused programing in partnership with the City of Ann Arbor. The centers daily operations and programs utilize approximately 40 acres that was gifted to the City of Ann Arbor by the former property owners.

After identifying an unnatural depression in the woods, LSNC contacted City of Ann Arbor personnel for guidance. Tetra Tech personnel completed a site walk and participated in a meeting with City and LSNC personnel to discuss a plan forward. A Phase II ESA was recommended after determining previous site practices included uncontrolled dumping. The former owner of the property maintained a laboratory onsite as well as orchards and upon his death

in 1976, bequeathed the land to the City of Ann Arbor. No due diligence was completed at the time and the property has been maintained as a City Park since.

Phase II ESA investigations on the site were completed in three phases and remediation was completed to excavate heavy metals and volatile organic compounds (VOCs) from the depression in the woods. Arsenic concentrations in soil across the site are elevated, likely from herbicide application. Samples were selected and were analyzed for the relative bioavailability of the arsenic for absorption through ingestion. Site specific arsenic criteria were developed from this information and approved by EGLE personnel. The DDCC report for arsenic was reviewed by EGLE and determined that the arsenic concentration onsite is safe for LSNC to continue programming onsite with no risk to the children because the arsenic is not bioavailable.

A chlorinated plume was identified emanating from a concrete cap located northwest of the DTE Energy House onsite. Initial soil results indicated that the plume was likely venting inside the building. As a result, access to the building was restricted immediately, vapor pins were installed for subslab concentrations and summa canisters were used to measure indoor air in the basement, upstairs and outside as ambient air. Review of the data indicated that concentrations were present in the basement in excess of acceptable concentrations. The floor was sealed to ensure pathways are not present for off-gassing of the VOCs and a mitigation system was installed in December 2019 to ensure the chlorinated plume vapors are not entering the building. Monitoring occurred for over a year and a telemetry system was installed.

Changes in vapor intrusion screening levels in fall 2020 necessitated re-evaluation of onsite buildings and mercury in the indoor air of DTE Energy House. Mercury and all other contaminants were below applicable indoor air criteria. Additional monitoring was completed, and a DDCC report was submitted to EGLE personnel in March 2022 and approved in November 2022. Tetra Tech implemented training on the DDCC requirements and the mitigation system operation and maintenance requirements.

In coordination with EGLE personnel, Tetra Tech prepared and submitted a Brownfield Plan to the Washtenaw County Brownfield Redevelopment Authority (WCBRA) that was successfully awarded at $535,000. Tetra Tech presented updates to the WCBRA, completed reimbursement requests and attended regular monthly meetings.

Given the high use by citizens and children in the community, the project was widely publicized. Tetra Tech completed presentations to the LSNC Board, Park Advisory Committee, combined stakeholders and met regularly to provide information to stakeholders including City of Ann Arbor and LSNC personnel, Washtenaw County Brownfield Authority, Washtenaw County Health Department, City Council, attorneys, LSNC consultants and EGLE.

Tetra Tech is currently assisting the City of Ann Arbor with drafting a Restrictive Deed Covenant (RDC) for the LSNC property.

Attachment III Proposed Work Plan

ATTACHMENT III
PROPOSED WORK PLAN
Schedule and City Resources Required
Ann Arbor Landfill Monitoring and Maintenance FY 2026-2027 RFP 25-16

TASK	FREQUENCY	CITY RESOURCES REQUIRED
1.0 Groundwater Monitoring Program		
Collection of Static Groundwater Levels	Semi – Annual (April & October)	--
Sample Groundwater Monitoring Wells	Semi – Annual (April & October)	--
Perform Lab Analysis	April & October	--
Review and Analysis of Results	April & October	--
Prepare and Submit Monitoring Report	Due to EGLE: January 31 (October), July 31 (April)	City Review / Meeting
Regulatory and/or Public Meetings	Two / year as requested	Meetings as Requested
Update of Capture Zone Analysis	Fiscal Year 2027	City Review / Meeting
2.0 Landfill Gas Monitoring Program		
Complete Field Monitoring	Quarterly (Jan & July) Semi-Annual (April & Oct)	--
Prepare and Submit Monitoring Report	Due to EGLE: January 31 (October), April 30 (January), July 31 (April), October 31 (July)	City Review / Meeting
Regulatory and Public Meetings	Two / year as requested	Meetings as Requested
Michigan Air Emissions Reporting System	Annual reporting if required	Meetings as Requested
Federal Greenhouse Gas Reporting – Field Measurements	Monthly	--
Federal Greenhouse Gas Reporting	February - March	City Review / Meeting
3.0 Wastewater Monitoring Program		
Collection of Monthly Discharge Readings	Monthly	--
Collection of Quarterly Wastewater Samples	Quarterly	--
Perform Laboratory Analysis	3 Quarterly (January, April, October); 1 Annual (July)	City of Ann Arbor lab analyzes select parameters

ATTACHMENT III
PROPOSED WORK PLAN
Schedule and City Resources Required
Ann Arbor Landfill Monitoring and Maintenance FY 2026-2027 RFP 25-16

Review and Analysis of Results	January, April, July & October	--
Prepare and Submit Monitoring Reports	Due to EGLE: January 31 (October), April 30 (January), July 31 (April), October 31 (July)	City Review / Meeting
Annual Wastewater Report	Due to Wastewater Treatment Plant July 31	City Review / Meeting
Industrial User Permit Inspection	Annually (Typically November)	City Review / Onsite Inspection
Renewal of Industrial User Permit	Next due December 2028	City Review / Meeting
4.0 Environmental System Maintenance Activities		
Evaluation of Systems - Annual Maintenance Report	Due after fiscal year annually	City Review / Meeting
5.0 Project Oversight		
Landfill Inspection	Monthly March – October	City Review / Meeting
Health and Safety Plan	Updated July 2025, quarterly figures updated	--
Project Management	Ongoing	Monthly meetings
Deliverables – Annual Document Control	Ongoing	--

Notes:

1. All documents will be uploaded to the Share Point site maintained by Tetra Tech when finalized, including reports, meeting agendas and minutes, agency correspondence, and other documents.
2. Routine monitoring reports can be reviewed during monthly calls.
3. The Capture Zone Analysis (CZA) will be completed in the second year of the contract. A schedule will be determined with City personnel and additional meetings focused on the CZA will be scheduled as needed with the modeling team.
4. The north side methane collection system is currently not operating. If the City decides to turn the system back on, monthly site visits would be required for maintenance, that are not included in this table. This is task 2.4 in the RFP.

Attachment IV Scope of Work

ATTACHMENT IV
SCOPE OF WORK
Ann Arbor Landfill Monitoring and Maintenance Program FY2026 – 2027 RFP 25-16

January • Quarterly gas monitoring • Quarterly wastewater sampling and readings • Monthly LGTE biomass readings • **Fourth Quarter Reports (gas, groundwater and wastewater) due to EGLE**	**February** • Monthly wastewater readings • Monthly LGTE biomass readings	**March** • Monthly wastewater readings • Monthly LGTE biomass readings • Monthly landfill inspections • **Federal greenhouse gas (GHG) Database Reporting due end of March (due date changes annually)**
April • Semi-annual gas monitoring • Semi-annual groundwater sampling • Annual wastewater sampling and readings • Monthly LGTE biomass readings • Monthly landfill inspections • **First Quarter Reports due to EGLE (gas and wastewater)**	**May** • Monthly wastewater readings • Monthly LGTE biomass readings • Monthly landfill inspections	**June** • Monthly wastewater readings • Monthly LGTE biomass readings • Monthly landfill inspections • **Annual Maintenance Report due to City after June 30th**
July • Quarterly gas sampling • Quarterly wastewater sampling and readings • Monthly LGTE biomass readings • Monthly landfill inspections • **Second Quarter Reports (gas, groundwater and wastewater) due to EGLE** • **Annual Wastewater Report due July 31st to City**	**August** • Monthly wastewater readings • Monthly LGTE biomass readings • Monthly landfill inspections	**September** • Monthly wastewater readings • Monthly LGTE biomass readings • Monthly landfill inspections
October • Semi-annual gas sampling • Semi-annual groundwater sampling • Quarterly wastewater sampling and readings • Monthly Biomass readings • Monthly landfill inspections • **Third Quarter Reports (gas and wastewater) due to EGLE**	**November** • Monthly wastewater readings • Monthly LGTE Biomass readings	**December** • Monthly wastewater readings • Monthly LGTE Biomass readings

Notes:

- Reporting tasks are in red.
- The northside methane collection system (NSMCS) has been idled since March 2022. Monthly NSMCS tasks are not required while system is idled (tasks not included above). If the system is turned on, monthly tasks would be required for maintenance.
- Landfill gas to energy (LGTE) system is currently operated by Monitoring, Control & Compliance (MCC).

ATTACHMENT IV
SCOPE OF WORK
Ann Arbor Landfill Monitoring and Maintenance Program FY2026 - 2027 RFP 25-16

TASK 1

TASK 1.1 Collection of Static Groundwater Levels

Objective

Collect static water levels from 54 locations: 26 groundwater monitoring wells, 3 purge wells, 3 observation wells, and 22 piezometers for the purpose of evaluating groundwater flow direction and hydraulic gradients across the site and across the slurry wall. Note: well W-102-93 is only gauged every 5 years. During these years there is a total of 55 locations. The next gauging of this well will be in April 2030.

Method and Sequence Summary

•Review Health and Safety Plan (HASP)
•Notify City officials and EGLE as appropriate of scheduled field activities
•Bring the following to the field:

HASP	electronic water level meter
first aid kit	disposable gloves
mobile phone	paper towel
well keys	water
socket set	liquinox
field forms and map	

•Don disposable gloves.
•Open up wells using appropriate sized socket and/or keys.

•Obtain static water level measurements from each monitoring point with an electronic water level meter accurate to 0.01-foot following the removal of the well cap and stabilization of static water level. The measurement shall be taken from the designated point on the casing. If there is not a designated point, the measurement shall be taken from the north side of the casing.
•Rinse the water level meter thoroughly with distilled water prior to, and following, each use to avoid the potential for cross contamination between wells.
•A new pair of disposable gloves shall be donned for each location.
•At each monitoring well, the depth-to-water shall be recorded, referenced to the top of the well casing and used with existing information to calculate the groundwater elevation and the volume of standing water in each well.
•Collect and record total well depths annually (October).
•Field personnel will inspect the well and note the condition of the well and maintenance requirements, if any.
•Each location shall be locked prior to leaving. Broken locks shall be replaced immediately.

•Water level data (not including existing purge wells due to potential well losses and/or well inefficiencies) will be used to generate a potentiometric surface map. The potentiometric surface map, as well as static water levels collected across the slurry wall, shall be used to demonstrate that the hydraulic barrier system (slurry wall and purge wells) is maintaining an inward hydraulic gradient.

Sampling and Analysis

The following locations will be gauged for static water levels on a Semi-annul basis (April and October):

Monitoring Wells (27)*			Purge Wells (3)	Observation Wells (3)	Piezometers (22)	
W-14-84	W-87-92	W-106-20	PW-1R-12	OW-31-08	P-0U	P-6U
W-46-89	W-88-92	W-107-20	PW-2R-22	OW-32-08	P-0D	P-6D
W-47-89	W-89-92	W-108-20	PW-3R-12	OW-33-08	P-1U	P-7UR
W-48-89	W-90-92				P-1D	P-7D
W-50-89	W-92-92	*W-102-93 gauged			P-2U	P-8U
W-51-89	W-94-92	every 5 years (next			P-2D	P-8D
W-64-90	W-96-92	gauging 4/2030). 26			P-3U	P-9U
W-68-90	W-99-93	monitoring wells			P-3D	P-9D
W-70-92	W-100-93	are gauged other			P-4U	P-10U
W-72-90	W-101-93	years.			P-4DR	P-10D
W-84-92	*W-102-93				P-5U	
W-85-92	W-105-20				P-5D	

Investigation Derived Waste Management and Other Comments

•Investigation derived wastes (IDW) for this task are paper towel and disposable gloves.
•The IDW is non-hazardous and therefore, may be placed in garbage bags and disposed of in an appropriate general waste receptacle.

TASK 1

TASK 1.2 Sample Groundwater Monitoring Wells

Objective

Collect representative samples from the groundwater monitoring wells on a semi-annual basis to monitor the concentrations of parameters at the site. Collect samples according to the methods and reporting limits identified in the Revised Hydrogeological Monitoring Plan, dated December 18, 2015 and Hydrogeologic Monitoring Plan Amendment, dated June 1, 2018.

Method and Sequence Summary

•Notify City officials and EGLE as appropriate of scheduled field activities
•Bring the following to the field:

HASP	water quality meter
first aid kit	sampling equipment (peristaltic pump, well wizard equipment, tubing, buckets, etc.)
mobile phone	sample bottles
well keys	disposable gloves
socket set	paper towel
field forms and map	water

•Don disposable gloves.
•All samples obtained shall be collected in a manner to ensure results are representative of the aquifer and groundwater quality.
•Prior to collection of groundwater samples, water will be evacuated from each well using low flow purging techniques until a stabilized water level is
•Seven of the wells (W-47-89, W-48-92, W-68-90, W-87-92, W-89-92, W-94-92 and W-100-93) will be purged using well wizard pumps dedicated to the wells, the purge wells (PW-1R-12, PW-2R-22 and PW-3R-12) will be purged using dedicated pumps in the well and the remaining wells will require the use of a peristaltic pump.
•During stabilization of water levels, pH, specific conductance, oxidation reduction potential (ORP) and temperature readings will be recorded every 2-3 minutes until the parameters stabilize per USEPA Low-Flow groundwater sampling procedures.
•After stable conditions are achieved, samples representative of the groundwater shall be collected. For wells that bail dry during purging, field measurements of pH, specific conductance, ORP and temperature shall be recorded after the well recharges.
•Samples shall be stored and transported to the laboratory on ice under standard chain of custody protocol.
•Samples will be analyzed in accordance with the methods and reporting limits identified in the Revised Hydrogeological Monitoring Plan, dated December 18, 2015 and Hydrogeologic Monitoring Plan Amendment, dated June 1, 2018. The 1-4-dioxane groundwater samples will be analyzed using method 522 analysis.

Sampling and Analysis

The following groundwater samples will be collected:

Semi-Annual (April and October)	
VOCs (16)	**1,4-Dioxane (11)**
W-47-89	W-47-89
W-84-92	W-48-89
W-85-92	W-68-90
W-87-92	W-87-92
W-88-92	W-105-20
W-89-92	W-106-20
W-90-92	W-107-20
W-92-92	W-108-20
W-94-92	PW-1R-12
W-96-92	PW-2R-22
W-99-93	PW-3R-12
W-100-93	
*W-102-93	
PW-1R-12	
PW-2R-22	
PW-3R-12	
*Well sampled every 5 years (next sampling 4/2030)	

QA/QC Samples
Semi-Annual and Annual Sampling:
•Two (2) QA/QC samples will be collected and submitted for laboratory analysis of VOCs (one each: trip blank, field blank).
•One (1) QA/QC sample will be collected and submitted for laboratory analysis of 1,4-Dioxane (trip blank).

Investigation Derived Waste Management and Other Comments

•Investigation derived wastes (IDW) for this task are paper towel, disposable gloves, disposable tubing and purge water from wells.
•The IDW is non-hazardous and therefore, may be placed in garbage bags and disposed of in an appropriate general waste receptacle.
•Purge water shall be collected in buckets and discharged into the sanitary sewer located within the former maintenance yard (S1).

TASK 2

TASK 2.1 Quarterly Gas Sampling Survey
TASK 2.4 Methane Collection System Monitoring
TASK 2.5 Monthly Landfill Gas to Energy Biomass System Readings

Objective

TASK 2.1 and TASK 2.4: Gas sampling surveys are conducted on a quarterly basis to demonstrate compliance with Federal and State regulations.
Gas sampling occurs in storm sewers, sanitary sewers, meter pit, water main and gas probes.
Monitoring locations are completed quarterly (January and July),and Semi-Annually (April and October).
TASK 2.4: The methane collection system is currently off. When the methane collection system is running , monthly and quarterly tasks are completed. Monthly methane extraction system inspections and flow adjustments are conducted in order to optimize the extraction rate. Quarterly perimeter extraction well (PEW) measurements and adjustments are completed in March, June, September and December.

TASK 2.5: Monthly Landfill Gas to Energy Biomass System readings.

Method and Sequence Summary

TASK 2.1 Quarterly Gas Sampling Survey

- Review Health and Safety Plan (HASP)
- Notify City officials and EGLE as appropriate of scheduled field activities
- Bring the following to the field:

HASP	field forms and map
first aid kit	multi-parameter gas meter (LEL, percent methane, carbon dioxide, oxygen)
mobile phone	disposable gloves
well keys	paper towel
socket set	

- The meter shall be calibrated prior to each use with the accompanying calibration kit supplied by the manufacturer.
- Ambient methane concentrations shall be measured with a combustible gas indicator and infrared sensor.
- Instruments shall display the lower explosive limit (LEL) and percent by volume methane as calibrated to methane in ambient air.
- Gas monitoring data collected in the field shall be recorded on field data sheets.
- Information collected at each gas monitoring location shall include date, time, personnel, LEL, percent methane, carbon dioxide and oxygen readings. In addition, calibration information shall be
- For locations over the action levels (5% methane by volume at or beyond the property boundary or 1.25% methane by volume in on-site utility structures or buildings) additional semi-annual or annual locations will be monitored to evaluate concentrations. Information will be provided to EGLE immediately if results offsite exceed the action limits.
- Barometric pressure readings for gas monitoring locations will be obtained from gas meter or the internet (weatherunderground.com, or similar site).
- Pressure readings with magnehelic gauges are taken during each methane sampling survey.

TASK 2.4 Methane Gas Collection System Monitoring (When System Running)

- Complete monthly methane extraction system inspections and flow adjustments.
- Provide technical assistance to the City of Ann Arbor regarding issues related to the north-side methane collection system.
- Complete quarterly perimeter extraction well (PEW) measurements and adjustments.

TASK 2.5 Monthly Landfill Gas to Energy Biomass System Readings

- Record temperature and vacuum readings from Landfill Gas to Energy Biomass system gauges.

Sampling and Analysis

The following locations will be monitored for the gas sampling survey (TASK 2.1):

Quarterly Gas Sampling Locations (January, July)

Sanitary Sewers (2)	Storm Sewer Manholes (2)	Indoor Locations (28)	Gas Probes (17)	Temporary Gas Probes (1)	Piezometers (1)
S1 and S3	R1 and R2	MP-1 through MP-8, MP-10, MP-11, MP-14,MP-15, MP-18 through MP-33	GP-1S/1D through GP-5S/5D, GP-7S-98/GP-7D-98, GP-8SR-05/GP-8D-98, GP-13-99, GP-14-02,	TGP-2	P-3U

Semi-Annual Gas Sampling Locations (April, October)

Sanitary Sewers (5)	Storm Sewer Manholes (3)	Indoor Locations (28)	Gas Probes (19)	Temporary Gas Probes (2)	Piezometers (1)	Meter Pit (1)
S1 through S3, S5 and S6	R1, R2 and R6	MP-1 through MP-8, MP-10, MP-11, MP-14,MP-15, MP-18 through MP-33	GP-1S/1D through GP-5S/5D, GP-6SR-99, GP-7S-98/GP-7D-98 GP-8SR-05/GP-8D-98, GP-13-99, GP-14-02, GP-15-02, GP-16-02	TGP-1, TGP-2	P-3U	MP

Quarterly Preliminary Extraction Well Measurements (TASK 2.4) (When System Running)

PEW 3 through PEW 10 (along Ellsworth Road)

Monthly Landfill Gas to Energy Biomass System Readings (TASK 2.5)

Landfill Gas to Energy Biomass System (south of Phase II of landfill)

Investigation Derived Waste Management and Other Comments

- Investigation derived wastes (IDW) for this task are paper towel and disposable gloves.
- The IDW is non-hazardous and therefore, may be placed in garbage bags and disposed of in an appropriate general waste receptacle.

TASK 3

TASK 3.1 Collection of Monthly Wastewater Discharge Readings
TASK 3.2 Collection of Quarterly Wastewater Samples

Objective

The wastewater monitoring program is conducted to demonstrate compliance the City's Industrial User Permit No. 20240615, dated June 10, 2024.

Outfall 001: Groundwater Purge Well PW-1R-12

Outfall 003: Leachate Discharge from Manhole MH-A

Outfall 004: Leachate Discharge from MH-B

Outfall 005: Groundwater Purge Well PW-2R-22

Outfall 006: Groundwater Purge Well PW-3R-12

TASK 3.1: Collect monthly wastewater readings and measurements at all 5 outfall locations.

TASK 3.2: Collect quarterly (January, July, October) and annual (April) wastewater samples from Outfall 001 and 006. Determine if permitted discharge rates have been exceeded to require wastewater sampling from other outfall locations.

Method and Sequence Summary

TASK 3.1 Collection of Monthly Wastewater Discharge Readings

Complete monthly wastewater discharge reading from each outfall. Adjust flow rates to maintain target discharge flow rates at purge wells. Obtain static water level at purge wells.

TASK 3.2 Collection of Quarterly Wastewater Samples

•Review Health and Safety Plan (HASP)

•Notify City officials and EGLE as appropriate of scheduled field activities

•Bring the following to the field:

HASP	sampling equipment (tubing, buckets, etc.)
first aid kit	sample bottles
mobile phone	disposable gloves
well keys	paper towel
field forms and map	water
electronic water level meter	liquinox
water quality meter	

•Don disposable gloves.

•Collect grab water samples from the wastewater sample locations. Dedicated pumps are located in the purge wells and grab water samples are collected via sample ports located at each purge well. A bucket is used to collect grab water samples from the manholes if required.

•Field measurements of pH, specific conductance, ORP and temperature shall be recorded for each wastewater sample.

•Samples shall be stored and transported to the laboratory on ice under standard chain of custody protocol.

•Samples will be analyzed in accordance with the methods and reporting limits identified in the Industrial User Permit Number 20240615, dated June 10, 2024.

•Outfall 001 (PW-1R-12) and Outfall 006 (PW-3R-12) will be sampled on a quarterly and annual basis.

•Outfall 003 (MH-A), Outfall 004 (MH-B) and Outfall 005 (PW-2R-01) will only be sampled if calculated discharge rates exceeds the daily average flow rate or stated gallons per day identified in the Industrial User Permit.

- •Outfall 003 (MH-A) discharge rate is > 100 gallons per day (gpd).
- •Outfall 004 (MH-B) discharge rate is > 100 gpd.
- •Outfall 005 (PW-2R-22) flow volume during the previous quarter exceeded 2,250,000 gallons (average of 25,000 gpd).

Sampling and Analysis

The following wastewater samples will be collected:

Quarterly (January, July and October)	Annual (April)				
1,4-Dioxane (2) PW-1R-12 PW-3R-12	**COD (2)** PW-1R-12 PW-3R-12	**Ammonia (2)** PW-1R-12 PW-3R-12	**BOD (2)** PW-1R-12 PW-3R-12	**TDS (2)** PW-1R-12 PW-3R-12	**PFBS (2)** PW-1R-12 PW-3R-12
Ammonia (2) PW-1R-12 PW-3R-12	**TSS (2)** PW-1R-12 PW-3R-12	**TKN** PW-1R-12 PW-3R-12	**Total Metals* (2)** PW-1R-12 PW-3R-12	**Pesticides (2)** PW-1R-12 PW-3R-12	**PFNA (2)** PW-1R-12 PW-3R-12
Vinyl Chloride (2) PW-1R-12 PW-3R-12	**1,4-Dioxane (2) (Method 8260D)** PW-1R-12 PW-3R-12	**Cyanide, Total and Available (2)** PW-1R-12 PW-3R-12	**VOCs + TICs(4)** PW-1R-12 PW-3R-12	**2,3,7,8-TCDD (Dioxin Screen) (2)** PW-1R-12 PW-3R-12	**PFBHxS (2)** PW-1R-12 PW-3R-12
Total Phosphorous (1) PW-1R-12	**Fats, Oil and Grease (2)** PW-1R-12 PW-3R-12	**Total Phenols (2)** PW-1R-12 PW-3R-12	**SVOCs + TICs (4)** PW-1R-12 PW-3R-12	**PFOS (2)** PW-1R-12 PW-3R-12	
	Non-polar Fats, Oil and Grease (2) PW-1R-12 PW-3R-12	**Total Phosphorous (2)** PW-1R-12 PW-3R-12	**PCBs (2)** PW-1R-12 PW-3R-12	**PFOA (2)** PW-1R-12 PW-3R-12	

*Metals include: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, zinc

QAQC Samples

Quarterly and Annual Sampling:

One (1) QA/QC sample will be collected and submitted for laboratory analysis of VOCs (trip blank).

One (1) QA/QC sample will be collected and submitted for laboratory analysis of 1,4-Dioxane (trip blank).

Investigation Derived Waste Management and Other Comments

•Investigation derived wastes (IDW) for this task are paper towel, and disposable gloves.

•The IDW is non-hazardous and therefore, may be placed in garbage bags and disposed of in an appropriate general waste receptacle.

•Any excess purge water collected from the manholes shall be discharged back into the manhole from which it came.

•Any excess purge water collected from the purge wells shall be discharged into the sanitary sewer located within the former maintenance yard (S1).

ATTACHMENT IV
SCOPE OF WORK
Ann Arbor Landfill Monitoring and Maintenance Program FY2026 - 2027 RFP 25-16

TASK 4 Environmental System Maintenance Activities

Objective

Systems and wells are inspected, at a minimum, during each field event. Maintenance is performed, as needed, which may include:
• purge well maintenance activities
• monitoring well repair, if damaged
• repair of methane monitoring points, if required
• methane collection system troubleshooting, if required

Method and Sequence Summary

•Review Health and Safety Plan (HASP). The HASP will be updated to address any new task performed as part of maintenance activities.
•Inspect system and wells, at a minimum, during each routine field event.
•Record observations and identify all required maintenance.
•Notify City officials of maintenance needs and upon City approval, coordinate all necessary repairs.
•Purge well maintenance is expected to be performed by subcontractor 1 time at PW-1R-12, 1 time at PW-2R-22 and 3 times at PW-3R-22 during the FY 2026-2027 period.
•An annual maintenance report shall be prepared and submitted electronically to the City.

Sampling and Analysis

A specific sampling and analysis plan has not been identified for this task.

Investigation Derived Waste Management and Other Comments

•Investigation derived wastes (IDW) for this task will vary based on the type of maintenance performed. Therefore, disposal for IDW will be evaluated on a case-by-case basis.

TASK 5

TASK 5.1 Landfill Inspection

A specific sampling and analysis plan will be identified on a case by case basis.

Complete monthly inspection (March through October) of landfill cap and infrastructure.
•Walk site and document changes and issues in accordance with field data sheets.
•Take photographs representative of the site and any areas that may require additional investigation or continued monitoring.
•If maintenance issues are identified, repairs may need to be performed.

Coordinate EGLE requested inspections with EGLE personnel. This may include onsite visits or follow-up visits with EGLE personnel.

Method and Sequence Summary

•Review Health and Safety Plan (HASP). The HASP will be updated to address any new task performed as part of maintenance activities.
•Coordinate any necessary repairs with subcontractors or City of Ann Arbor Field Service personnel.
•Incorporate these repairs into quarterly landfill and annual maintenance reports as needed.

•When needed, coordinate EGLE landfill inspections and prepare work plans to address any deficiencies.

Sampling and Analysis

A specific sampling and analysis plan will be identified on a case by case basis.

Investigation Derived Waste Management and Other Comments

•Investigation derived wastes (IDW) for this task will vary based on the type of maintenance performed. Therefore, disposal for IDW will be evaluated on a case-by-case basis.

Attachment V Fee Proposal (under separate cover)

Attachment VI City of Ann Arbor Compliance Forms

Attachment A – Legal Status of Offeror

ATTACHMENT A
LEGAL STATUS OF OFFEROR

(The Respondent shall fill out the provision and strike out the remaining ones.)

The Respondent is:

- A corporation organized and doing business under the laws of the state of Michigan, for whom Patti McCall bearing the office title of Principal Hydrogeologist, whose signature is affixed to this proposal, is authorized to execute contracts on behalf of respondent.*

  *If not incorporated in Michigan, please attach the corporation's Certificate of Authority

- A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

- A partnership organized under the laws of the State of _____ and filed with the County of _____, whose members are (attach list including street and mailing address for each.)

- An individual, whose signature with address, is affixed to this RFP.

Respondent has examined the basic requirements of this RFP and its scope of services, including all Addendum (if applicable) and hereby agrees to offer the services as specified in the RFP.

_____ Date: 4/7/25,
Signature

(Print) Name Patti McCall, CPG, PWS Title Principal Hydrogeologist

Firm: Tetra Tech, Inc

Address: 1136 Oak Valley Drive, Suite 100, Ann Arbor, MI 48108

Contact Phone 734-665-6000 Fax _____

Email patti.mccall@tetratech.com

UNITED STATES OF AMERICA

The State of Michigan

Department of Licensing and Regulatory Affairs

Lansing, Michigan

This is to Certify That

TETRA TECH, INC.

a(n) DELAWARE profit corporation, was validly authorized on June 7, 1999, to transact business in Michigan, and that said corporation holds a valid certificate of authority to transact business in this state.

This certificate is issued pursuant to the provisions of 1972 PA 284, as amended, to attest to the fact that the corporation is in good standing in Michigan as of this date and is duly authorized to transact business in this state any business of the character set forth in its application which a domestic corporation formed under this act may lawfully conduct.

This certificate is in due form, made by me as the proper officer, and is entitled to have full faith and credit given it in every court and office within the United States.

LICENSING AND REGULATORY AFFAIRS
Corporations, Securities & Commercial Licensing Bureau

Sent by Facsimile Transmission
1428408

In testimony whereof, I have hereunto set my hand, in the City of Lansing, this 13th day of January, 2017.

Julia Dale

Julia Dale, Director
Corporations, Securities & Commercial Licensing Bureau

Attachment B - Non-Discrimination Ordinance Declaration of Compliance Form

ATTACHMENT B
CITY OF ANN ARBOR DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy.

(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

Tetra Tech
Company Name

Nicole L Spencer 3/28/2025
Signature of Authorized Representative Date

Nicole L Spencer Sr HR Manager
Print Name and Title

351 Coffman St, Ste 200 Longmont CO 80501
Address, City, State, Zip

720-864-4510 nicole.spencer@tetratech.com
Phone/Email address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

Revised 3/31/15 Rev. 0 NDO-2

Attachment C - Living Wage Declaration of Compliance Form

ATTACHMENT C
CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] *No. of employees*__

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $17.08/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $19.04/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[X] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Tetra Tech
Company Name

351 Coffman St., Ste 200
Street Address

Nicole L Spencer 3/28/2025
Signature of Authorized Representative Date

Longmont CO 80501
City, State, Zip

Nicole L Spencer Sr HR Manager
Print Name and Title

720 864 4510 nicole.spencer@tetratech.com
Phone/Email address

City of Ann Arbor Procurement Office, 734/794-6500, procurement@a2gov.org

Attachment D - Vendor Conflict of Interest Disclosure Form

ATTACHMENT D

VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee ( ) Interest in vendor's company ( ) Other (please describe in box below)
N/A	

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:

Tetra Tech, Inc		734-665-6000
Vendor Name		**Vendor Phone Number**
Patti McCall	4/7/25	Patti McCall, CPG, PWS
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Attachment E - Non-Discrimination Ordinance Poster

ATTACHMENT E
CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below. You can review the entire ordinance at www.a2gov.org/humanrights.

Intent: **It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.**

Discriminatory Employment Practices: **No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.**

Discriminatory Effects: **No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.**

Nondiscrimination by City Contractors: **All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.**

Complaint Procedure: **If any individual believes there has been a violation of this chapter, he/she may file a complaint with the City's Human Rights Commission. The complaint must be filed within 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the allegedly discriminatory action. A complaint that is not filed within this timeframe cannot be considered by the Human Rights Commission. To file a complaint, first complete the complaint form, which is available at www.a2gov.org/humanrights. Then submit it to the Human Rights Commission by e-mail (hrc@a2gov.org), by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107), or in person (City Clerk's Office). For further information, please call the commission at 734-794-6141 or e-mail the commission at hrc@a2gov.org.**

Private Actions For Damages or Injunctive Relief: **To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.**

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.

Attachment F - Living Wage Ordinance Poster

ATTACHMENT F

CITY OF ANN ARBOR LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2025 - ENDING APRIL 29, 2026

$17.08 per hour
If the employer provides health care benefits*

$19.04 per hour
If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than $10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than $500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed $.50 an hour for an average work week; and the employer cost or contribution must equal no less than $1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

For Additional Information or to File a Complaint contact
Colin Spencer at 734/794-6500 or cspencer@a2gov.org