Case Study: Management of PFAS-Impacted Groundwater during Electric Utility Installations

Pete Szpaichler – Environmental Engineer

TRC Companies

USWAG PFAS Workshop: Managing and Mitigating PFAS Risk in Utility Operations

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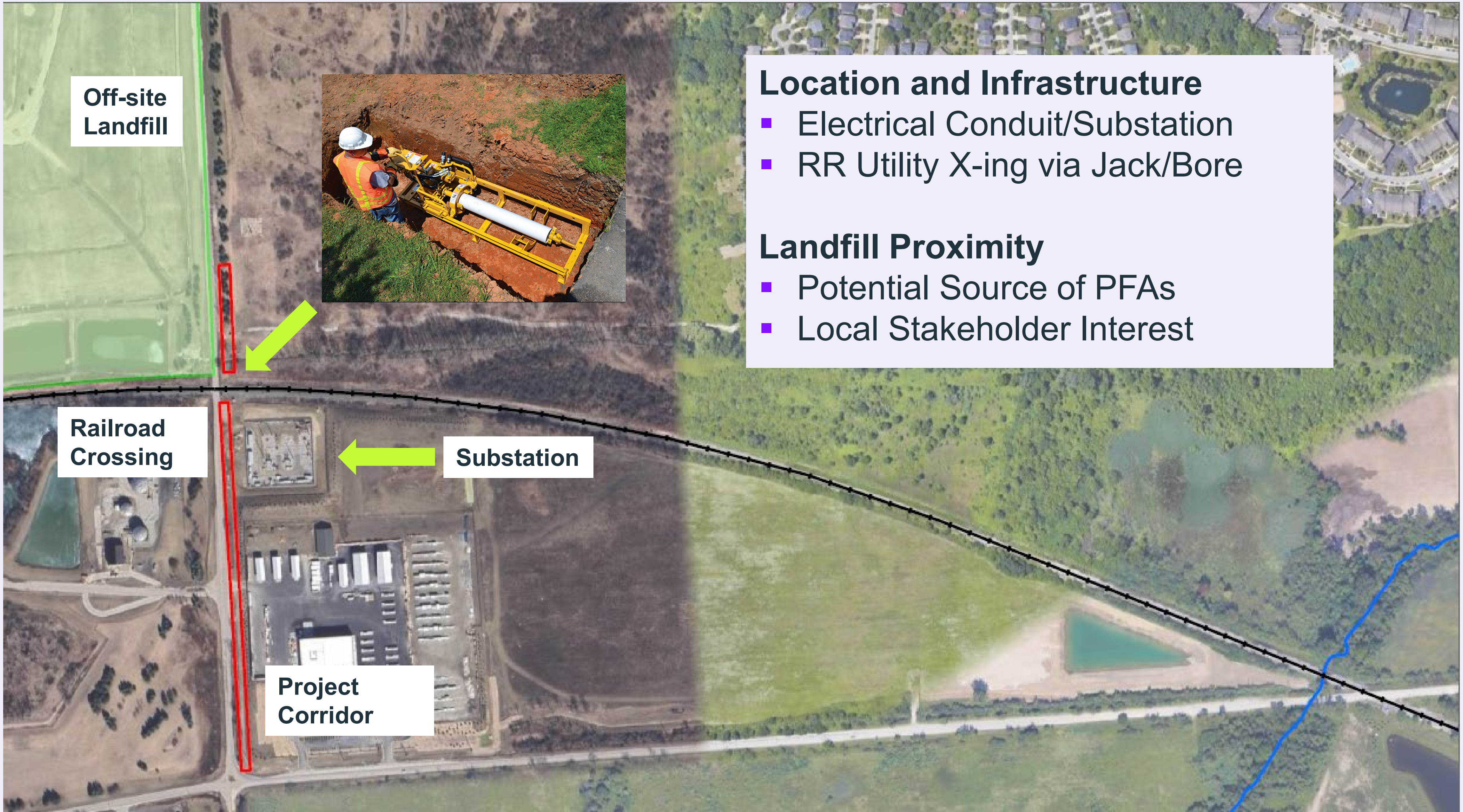
Agenda

- Project Background and Challenges
- Groundwater Management Evaluation
- Surface Water Discharge Permitting
- Groundwater Treatment System
- Monitoring and Compliance
- Key Takeaways
- Q&A

Project Background



Location and Infrastructure

- Electrical Conduit/Substation
- RR Utility X-ing via Jack/Bore

Landfill Proximity

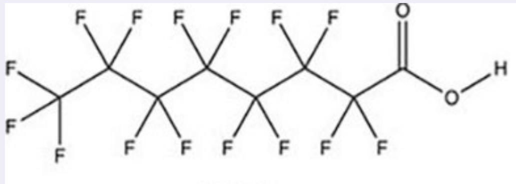
- Potential Source of PFAs
- Local Stakeholder Interest

Project Challenges

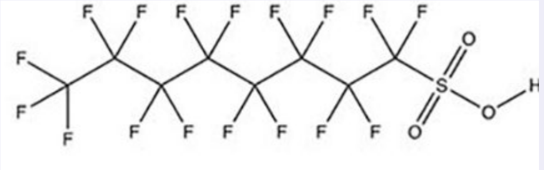
- Schedule Constraints
- Site Conditions
- Off-site Active Landfill
- High Trafficked Roadways
- Local Stakeholder Interest
- Railroad Proximity
- Moving Work Area
- Limited Footprint
- Remote Location
- Freezing Conditions

Site Conditions & PFAS Risk

- **Subsurface Investigation**
  - Soil Borings
  - Groundwater Samples
- **PFAS Detection in Groundwater**
  - PFAS: 3.2 – 40 ng/L
  - 13 of 35 PFAS Compounds Detected
  - **PFOS and PFOA Measured Above Applicable Criteria**

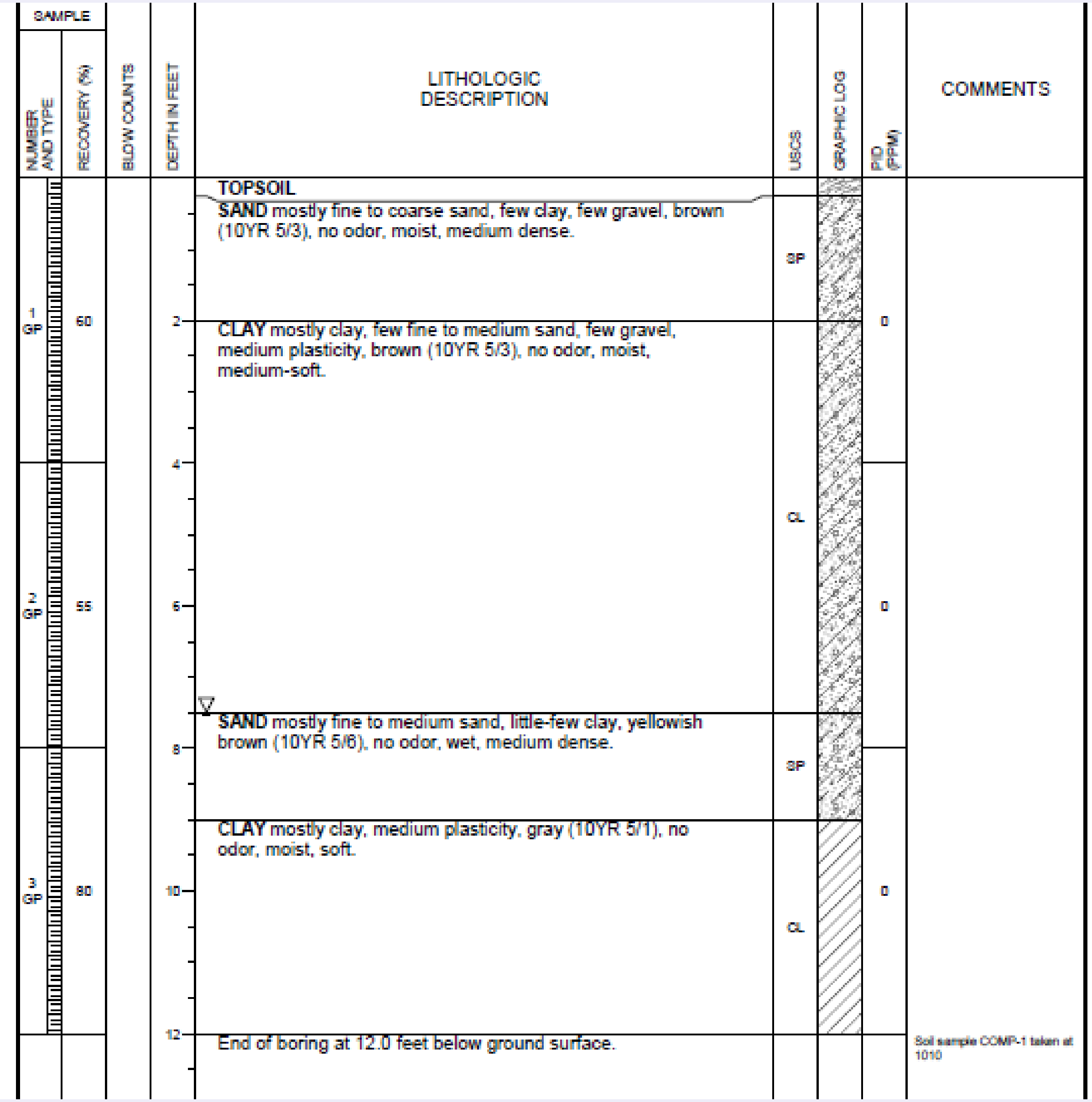


PFOA



PFOS

Example soil boring log:

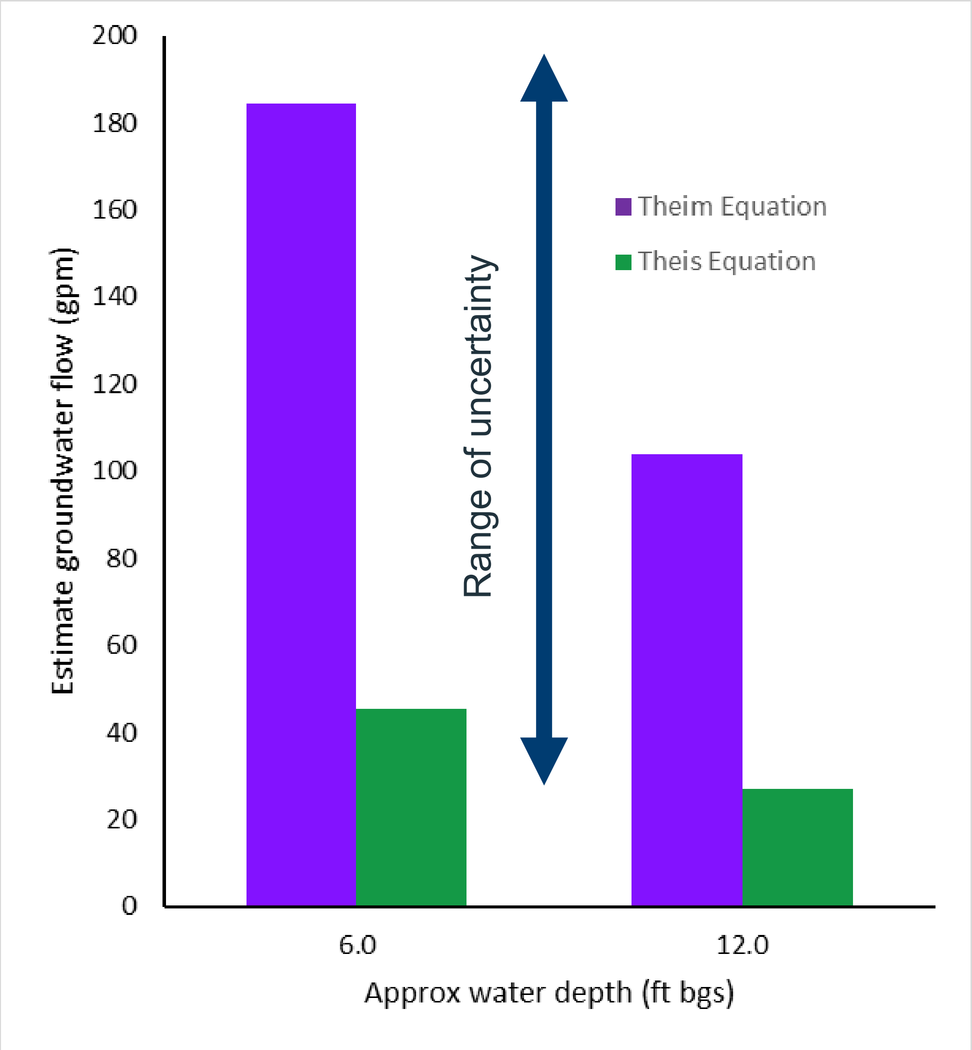


SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL				
1 GP	60			**SAND** mostly fine to coarse sand, few clay, few gravel, brown (10YR 5/3), no odor, moist, medium dense.	SP		0	
			2	**CLAY** mostly clay, few fine to medium sand, few gravel, medium plasticity, brown (10YR 5/3), no odor, moist, medium-soft.	CL			
2 GP	55		4, 6				0	
				SAND mostly fine to medium sand, little-few clay, yellowish brown (10YR 5/6), no odor, wet, medium dense.	SP			
3 GP	80		8, 10	**CLAY** mostly clay, medium plasticity, gray (10YR 5/1), no odor, moist, soft.	CL		0	
			12	End of boring at 12.0 feet below ground surface.				Soil sample COMP-1 taken at 1010

Groundwater Management Evaluation

- **Pump Testing Not Feasible**
  - Construction Schedule
  - High Flow
  - PFAS Management
- **Dewatering Calculation**
  - Based on Soil Borings
  - 100-400 GPM Total Discharge
  - Other estimates: 800 GPM
- **Well Point Installation**
  - Jack/Bore Operation
  - 30 ft Below Ground Surface (bgs)

Calculated Discharge flow from each of 4 wells ranged from average 25-100 gpm



* Assumed silty-sand hydraulic conductivity (most conservative)

Groundwater Management Evaluation

1. **Containerize and Dispose Off-site**
2. **Discharge to Sanitary Sewer**
   - No treatment necessary
   - Not feasible in location
3. **Discharge to Surface Water**
   - Treatment necessary
   - NPDES permit required

Cost

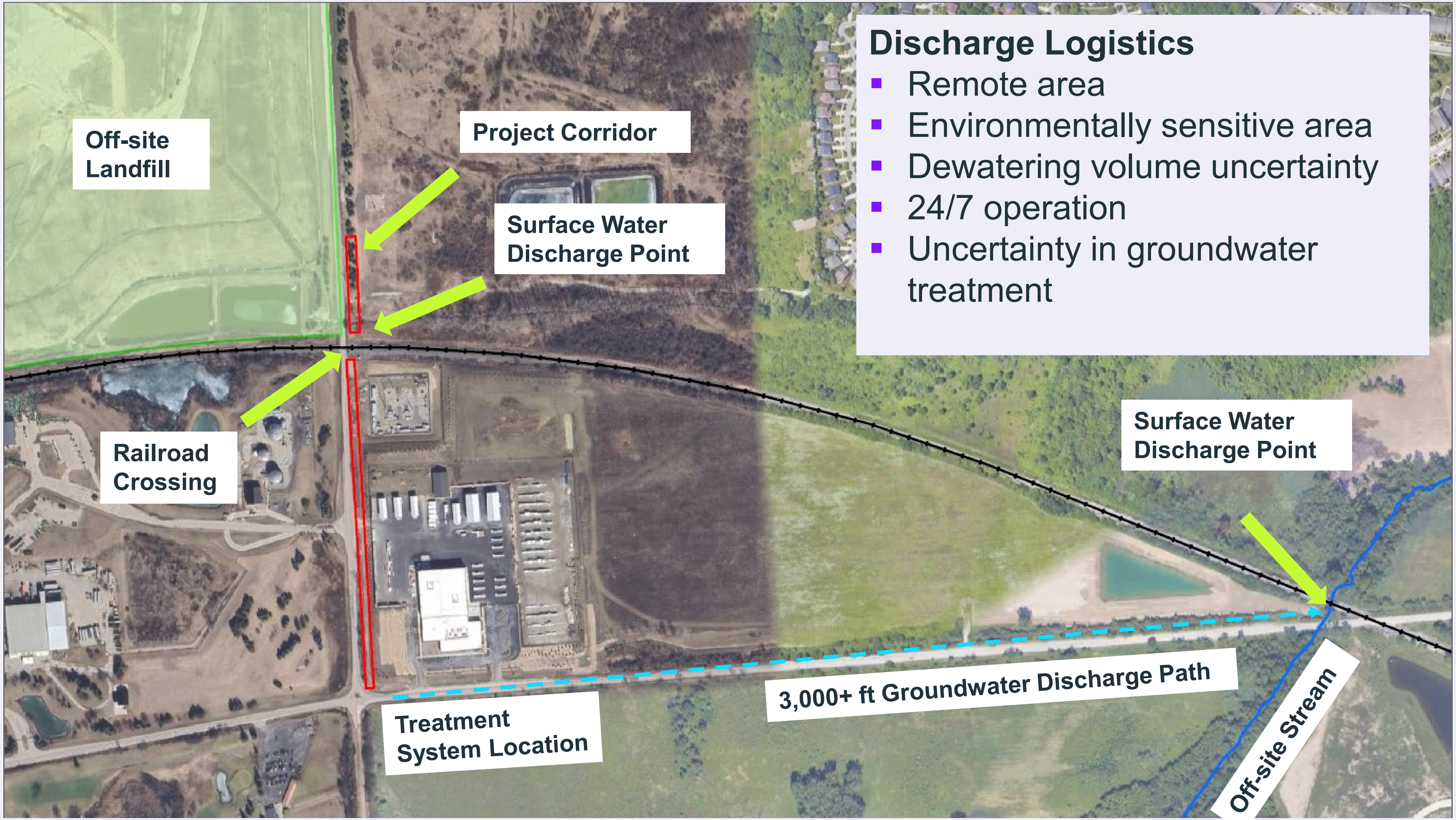
Reliability

Litigation Risk

Environmental Impact

Construction Impact

Discharge to Surface Water



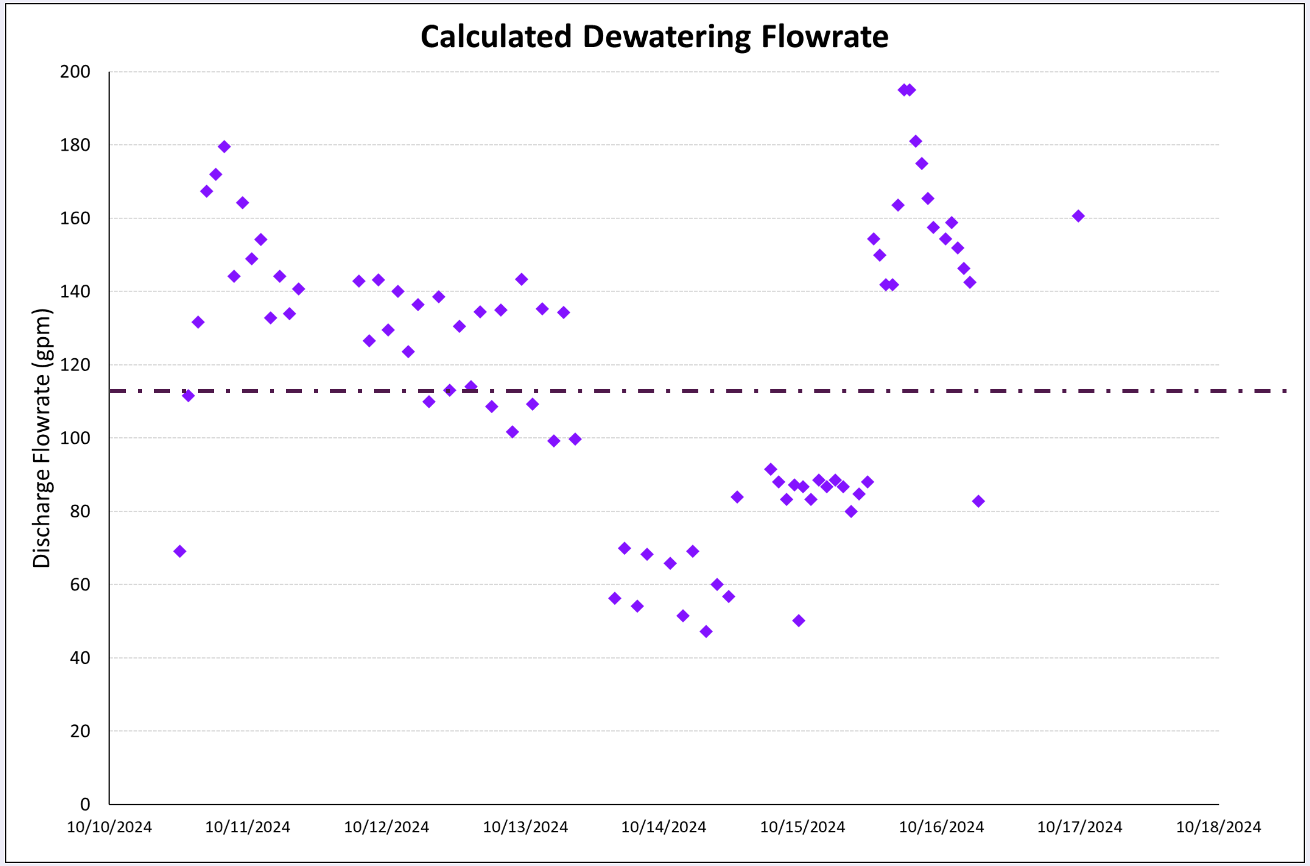
Discharge Logistics

- Remote area
- Environmentally sensitive area
- Dewatering volume uncertainty
- 24/7 operation
- Uncertainty in groundwater treatment

Surface Water Discharge Permitting

NPDES Permit

- Agency Collaboration
- Sampling Frequency
  - Daily, 1-3x weekly, monthly
- Contaminants Monitored
  - PFAs, Metals, Hg, Cl-, TSS
- Daily pH and Flowrate Recording
- Routine Operation & Maintenance
- Reporting
  - Discharge Monitoring Report (DMR)
  - PFAs
- Adaptive Management
  - Adjust operations based on sampling results



Average dewatering flow: 118 gpm
Total volume treated: 1.38 MG

Groundwater Treatment System

- **Size: 400 GPM**
- **Mobile**
- **Modular**
- **Telemetry**

Uncertainty in Groundwater Treatment Operation

- Rate of Dewatering
- 24/7 Operation
- PFAs Loading
- Construction Duration
- Discharge Modification
- Licensed Operator
- Freezing Conditions

Incoming
- Vacuum Extraction
- Influent Tank

Treatment
- Bag Filters
- Granular Activated Carbon (GAC)

Outgoing
- Effluent Tank
- Discharge Flow & Sampling

Monitoring and Compliance

24/7 Treatment Operation

- Risk Management
- Staffing
- Licensed Operator

Real-Time Tracking

- Automated Pump System
- Remote Water Level Monitoring
- System Alerts

Analytical Reporting

- Sampling Program
- Use of Data Collection App
- Data Management

Key Takeaways

Holistic Management of PFAs Challenges

- Coordination of groundwater dewatering
- Address regulatory and community concerns

Overcoming Operational Challenges

- Maintain 24/7 treatment operations
- Extreme weather
- Unplanned delays
- Managing multiple contaminants

Impacts on Infrastructure Development

- Identifying and mitigating PFAs-related risk to support successful design and construction of large-scale infrastructure projects

Questions?

Phone:

Pete Szpaichler
734.395.3927

Email:

pszpaichler@trccompanies.com

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About Me

Pete Szpaichler, EIT, TRC

Pete Szpaichler is an environmental engineer at TRC with five years of experience supporting utility construction, site remediation and renewable development in Michigan and throughout the Midwest. His construction and remediation work includes PFAS-impacted sites, where he has managed PFAS treatment operations, supported design, permitting, bidding, estimating, construction oversight, sampling and quality assurance. He also specializes in environmental permitting for utility transmission line, pipeline, substation, and renewable energy developments. Pete holds a Bachelor's in Environmental Engineering from Michigan Technological University and is a member of TRC's PFAS Center of Research and Expertise (CORE) team. Contact Pete at pszpaichler@trccompanies.com.

Abstract

Case Study: Management of PFAS-Impacted Groundwater during Electric Utility Installations

An energy generation/distribution company was seeking to bolster/expand its electrical infrastructure into a suburban/rural area that was under designed for the amount of commercial growth anticipated for the area. These expansion operations included the installation of an electrical substation and a sub-grade conduit network along a 1.5-mile public utility corridor, much of which was adjacent to an active landfill that has served this geographical area for several decades. As a result of exploratory borings and groundwater sample collection during substation and conduit design, it was determined that groundwater encountered during construction activities would most likely be impacted by PFAS due to the proximity of the proposed construction activities relative to the operating landfill. Additionally, a railroad conduit crossing that required bore/jack operations increased the likelihood of encountering PFAS-impacted groundwater during the proposed construction activities, since the railroad required these activities to occur at a depth of approximately 20 ft below track level.

During design, TRC was engaged to support the anticipated PFAS-impacted groundwater management operations for the project. Initially, TRC calculated anticipated groundwater withdrawal rates for potential dewatering operations based on known hydrogeology for the area. Municipalities were contacted to determine whether this PFAS-impacted groundwater derived from the proposed construction activities could be temporarily discharged to either of their sewerage systems. Because of the remote location, sanitary sewers in the area were not large enough to support the anticipated flow rates. Therefore, direct discharge to surface water after PFAS treatment (using bag filtration and GAC adsorption) was determined to be the most viable cost-effective option for groundwater management.