Managing Construction-Derived Groundwater

Michigan Environmental Compliance Conference

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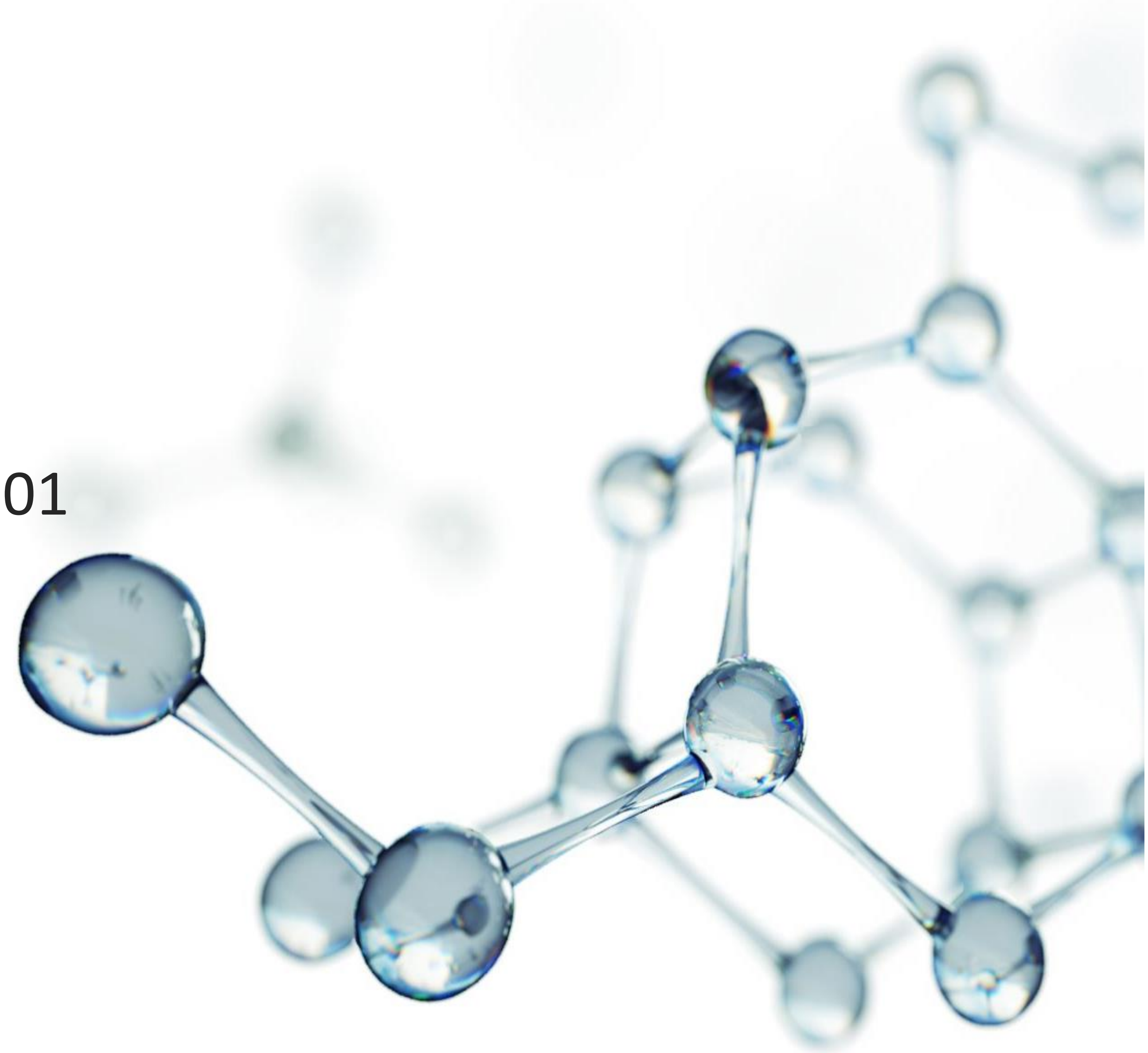
Engineers | Architects | Scientists | Constructors

Overview

- Introduction
  - Who we are?
  - Who is Fishbeck?
- Construction-Derived Dewatering 101
  - What, When & How
- Considerations
- Adelaide Pointe Case Study
- Conclusions
- Questions?



Who am I (or we)? Who am I (or we)?

Image Source-
https://playbill.com/article/beyond-the-barricades-les-miserables-jean-valjean-com-216345

Speakers

24601!

Bailey Hannah is a Hydrogeologist with Fishbeck's Geosciences and Remediation Team. She has been with Fishbeck for five years and focuses on both water supply and remediation projects.

Kirk Perschbacher is a Senior Brownfield Specialist with Fishbeck's Due Diligence and Brownfield Team. He has been in the environmental industry for 15 years (with Fishbeck for four years) and focuses on environmental due diligence and brownfield incentives.

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FACTS

Established in 1956

15
LOCATIONS

ALL IN ONE
SERVICES

ARCHITECTURE/ ENGINEERING

INFRASTRUCTURE

ENVIRONMENTAL

CONSTRUCTION

600+
PROFESSIONALS

EMPLOYEE OWNED

280
SHAREHOLDERS

TOP
500
DESIGN FIRM IN THE NATION

What is Construction-Derived Groundwater Dewatering?

EGLE Definition

Dewatering is the removal of ground or surface water from a construction site to allow construction to be done "in the dry" (as opposed to under wet conditions).

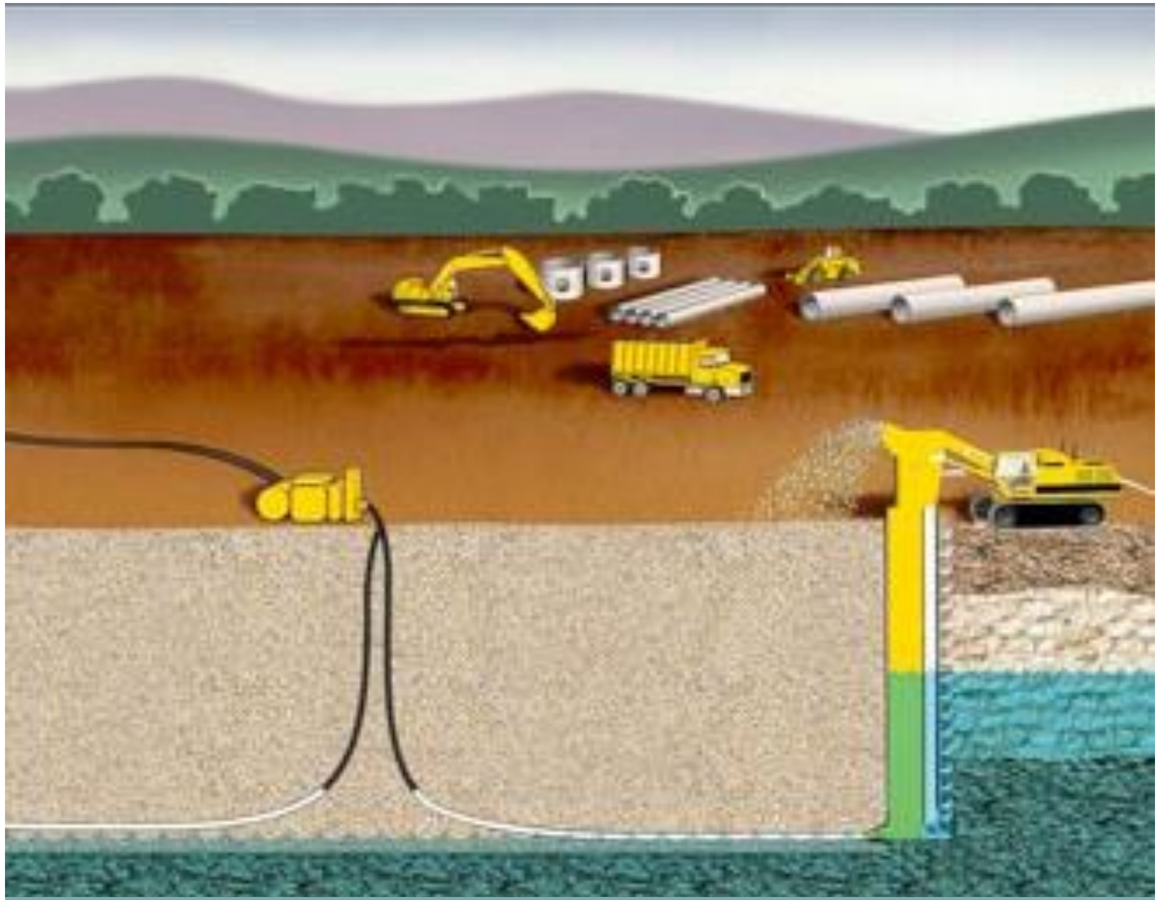


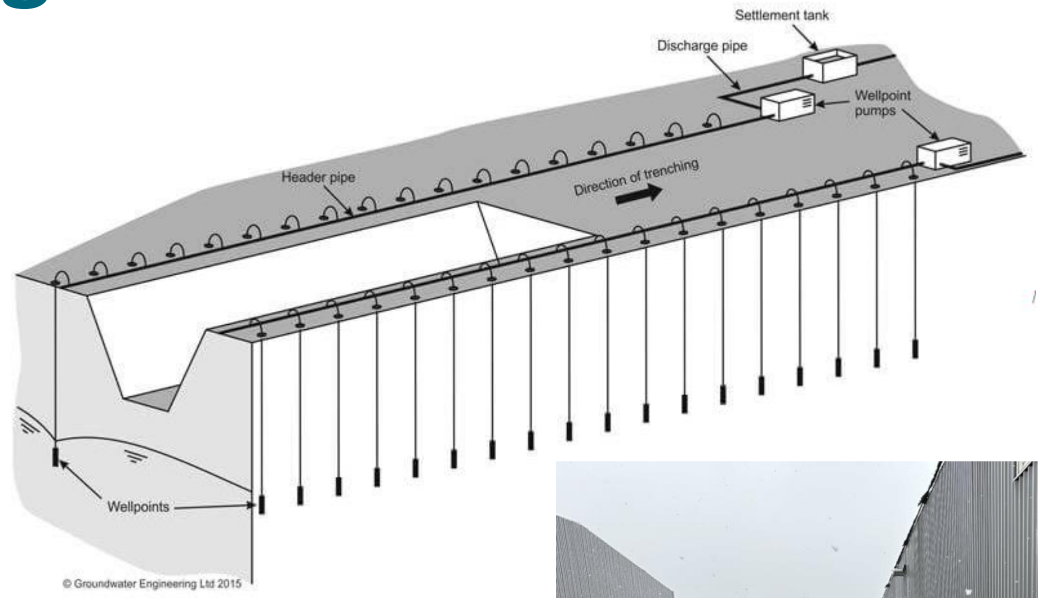
Image Source- http://www.dewindonepasstrenching.com/wp-content/uploads/2012/08/SOCK-PIPE-Dewatering.jpg

When is Construction-Derived Dewatering Needed?

- Limitless needs as groundwater doesn’t always play nice for construction
- Most common needs:
  - Installation of utilities or pump/lift stations
  - Installation of building footers/foundations
  - Installation of underground storage tanks
  - Below grade parking structures

Typical Dewatering Methods- The How

- Shallow/Deep Well point
- Sump



source: Groundwater Engineering

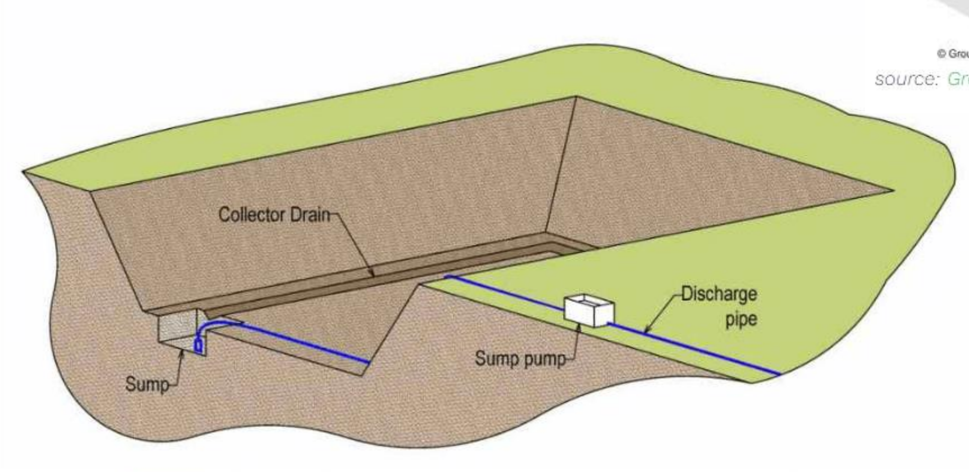


Image source: Gharpedia

Image Sources-
https://gharpedia.com/blog/dewatering-methods-for-waterlogged-area/
https://www.groundwatereng.com/blog/2014/12/wellpoint-dewatering

What Needs to be Considered?

- Timeline
- Subcontractors
- Water Chemistry
- PFAS/PFOS
- Discharge Permitting
- Preparing for Dewatering
- Equipment
- Discharge Location
- Communication
- Sampling
- Weather
- Reporting

There's a lot to it!

Give yourself ample time otherwise your project might be *"Misérables"*

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Timeline

1. Identify when the work must be completed by and work backwards from there
2. Consider seasonal challenges
3. Factor in delays and permit turn around times
4. Plan ahead and give yourself ample time

3-6 months is a good rule of thumb!

Subcontractors

- Temporary monitoring well driller
- Analytical laboratory for groundwater/effluent samples
- Consultant or Project Manager
- Company to conduct dewatering
- Company to design and implement treatment

Water Chemistry

Groundwater sampling

- Prior site work?
- New temporary monitoring wells?
  - Identify strategic and representative locations for sampling

Mobilize early

- Schedule a driller
- Sample the monitoring wells
- Analysis turn around times

Expected analytes

- PFAS
- Metals
- Volatiles
- Semi-volatiles
- Pesticides
- PCBs
- Phenols
- Cyanide
- Maybe more

PFAS

- Often the contaminant driving treatment needs
- EGLE Criteria are low and poised to go lower based on EPA MCLs
- Sample for it, using the correct laboratory methods
- Most municipal facilities require it
- Effluent concentrations less than 12 ng/L for PFOS and 8 ng/L for PFOA

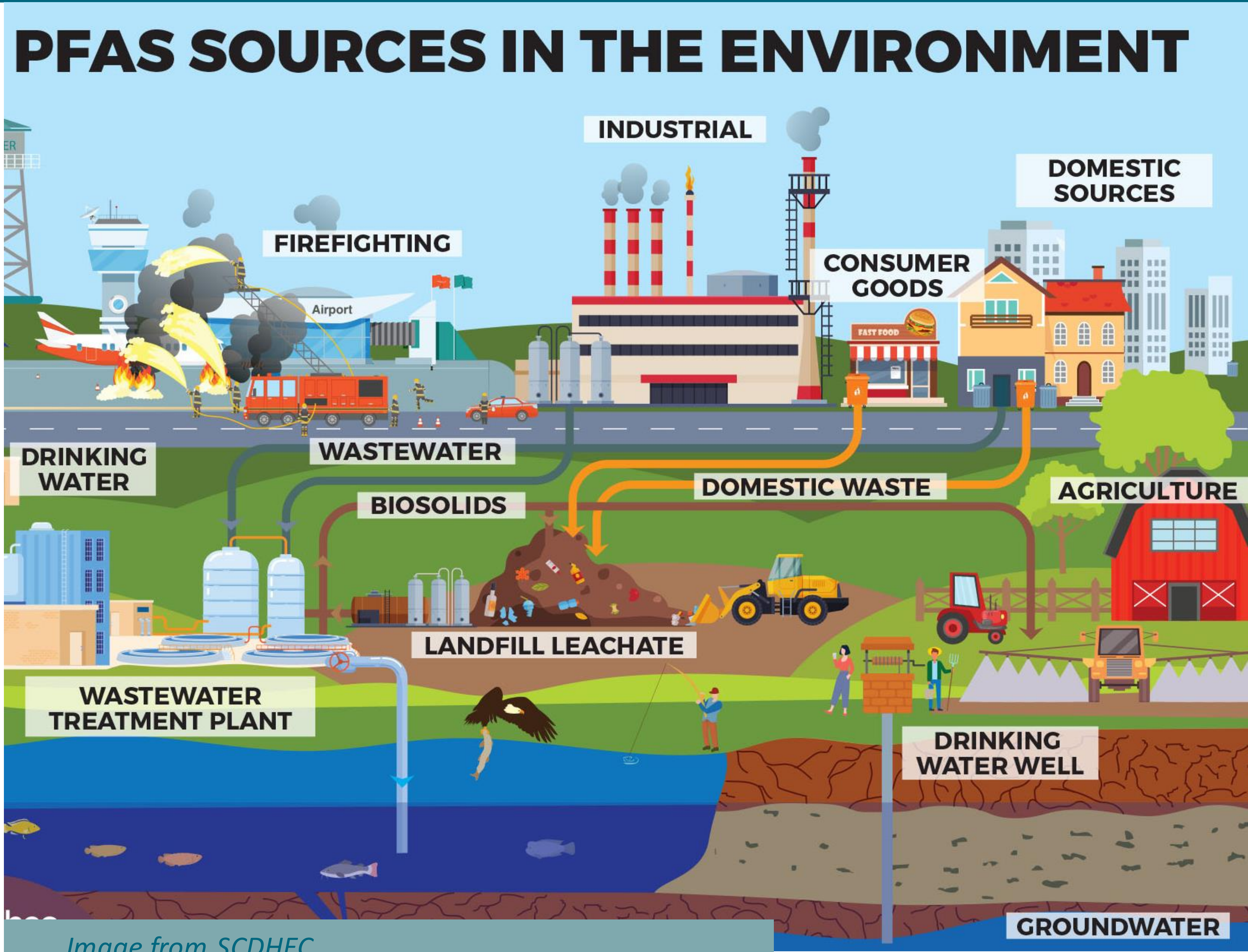


Image from SCDHEC

Discharge Permitting

NPDES Permit	Publicly Owned Treatment Works
• Permit is required • Contaminants identified above permitted limits will need to be treated • Monitoring throughout the dewatering process • ~6 month lead time for approval • Apply through the state • Fees are relatively low • Discharge location can be troublesome!	• Permit is required • Contaminants identified above permitted limit will need to be treated • Monitoring throughout the dewatering process • Typically shorter lead time • Apply through municipality • Fees can be quite costly!

Apply for the permit as soon as possible!

Preparing for Dewatering

Method of Dewatering

- Find a contactor
- Talk to municipality/EGLE

Estimate Volume

- Contractor
- Inflow calculations
- Modeling

Treatment Needs

- Groundwater sampling results
- Communicate with permitter to identify contaminant limits

CREATE A DETAILED RFP!!

Request for Proposal (RFP)

Always Provide Contractors:

- Timeline
- Estimated total volume of discharge and duration
- Required permitted discharge flow rate (GPM)
- All existing groundwater data (water quality and contaminant concentrations)
- Contaminant reduction requirements

Allow Bidders to:

- Size treatment system to your requirements for discharge and contaminant reduction
- Provide daily performance monitoring.
- They are the experts!

Optional, but recommended

- 24/7 oversight by contractor can be a difference maker!
- Winterization cost option
- 3 qualified bidders
- Consultant to collect samples

Equipment – Frac Tanks

Equipment – Carbon Vessels

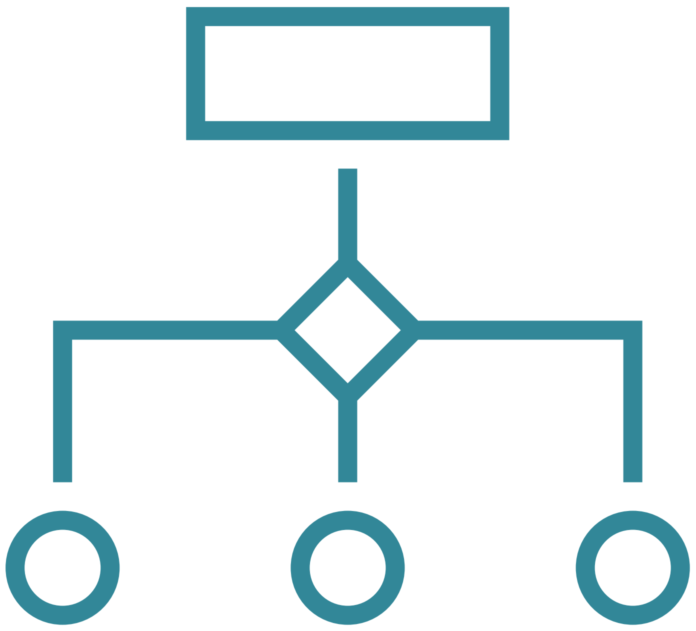
Equipment – Flow Meter (essential)

Discharge Location

- Location of discharge must be able to handle the volume and rate of discharge
- Must be approved by the permitting entity

Communication

- Important to understand how the different parties relate and communicate
  - Client
  - Consultant
  - Municipality/governing body
  - Dewatering company
  - Treatment company
- Establish chain of command early



Sampling

- Analyte list will be included in the Permit
- Coordinate with consultant/lab as soon as the analytes are determined
  - Samples will require a rapid turnaround time
- Sampling frequency
  - Start up (KEY POINT)
  - 24 hours
  - 48 hours
  - May be weekly or monthly there after
- Discharge is primary concern, but influent and mid point samples will have to be collected periodically to prevent breakthrough of contaminants

Weather

- Everyone loves Michigan summers.. so do treatment systems and dewatering pumps!
- Sustained temperatures below freezing can cause carbon to freeze and reduce the contact time for treatment

  Frozen carbon = breakthrough and broken parts = BAD NEWS and Potential Violations

- Treatment systems can be winterized utilizing <u>recirculation, construction of enclosures, or heat wrapping</u>....however, if unprepared can be expensive!!

Reporting

- Submitted to the permitting entity monthly
  - Average flow
  - Daily discharge
  - Monthly discharge
  - Lab results
- Calculations
  - Modeling
    - Might not have daily discharge data
    - Use linear equation to bridge data gaps (or best fit)
- Make sure that you have first and last day of the month meter readings

Case Study - Adelaide Pointe

- Large mixed-use development in Muskegon. Roughly $260 million in investment
- Condo, restaurant and dry/wet marina…oh my
- Former Foundry = Groundwater contamination (including PFOS)
- All new utilities (water, sewer and sanitary) + shallow groundwater (less than 9 feet) = Dewatering needed
- Groundwater contamination + dewatering= Dewatering Treatment…YAY!

<u>Dewatering Needs-</u>

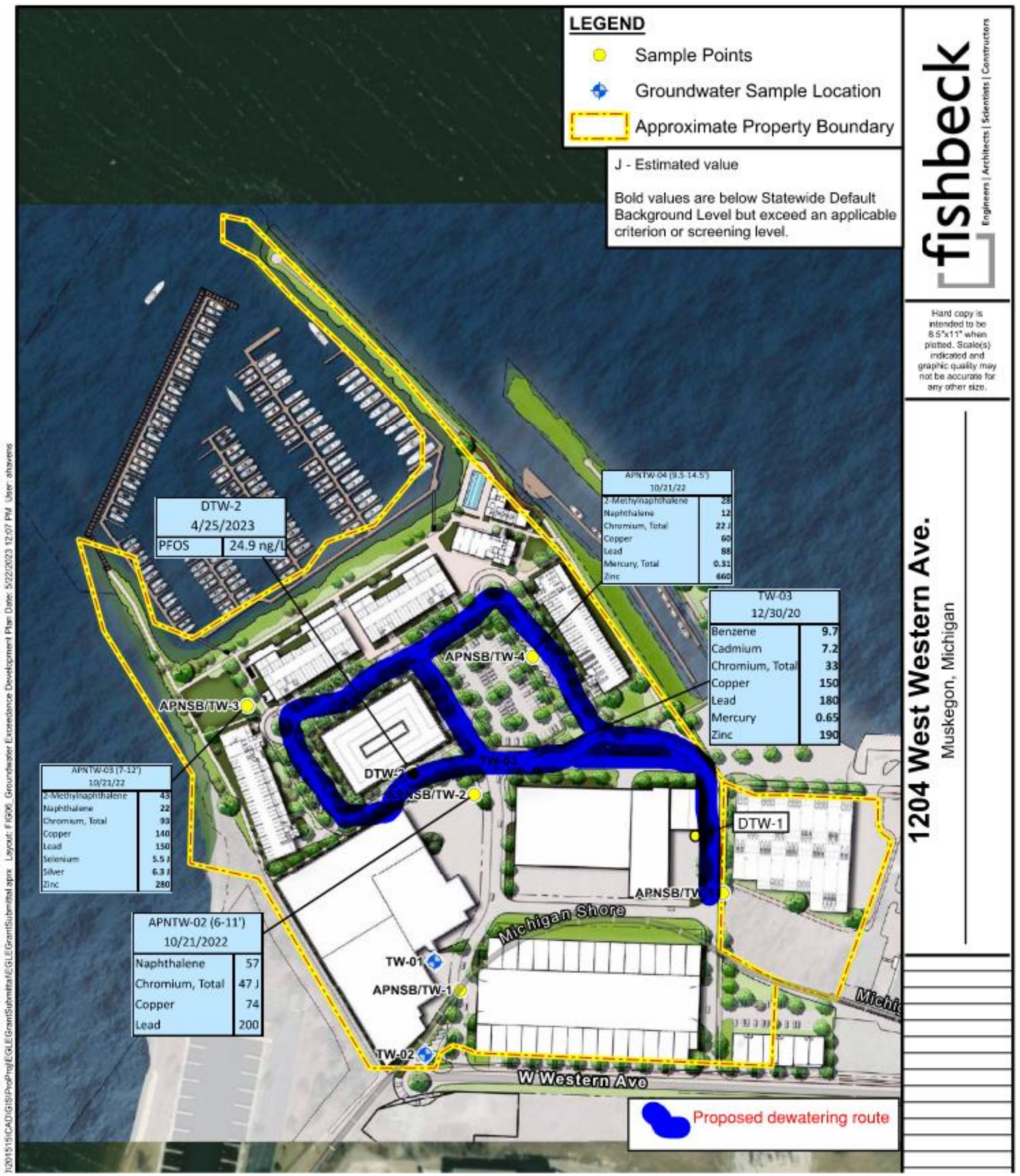
- 24/7 dewatering for installation of sanitary sewer utility line
- Deepest structure 20 feet bgs

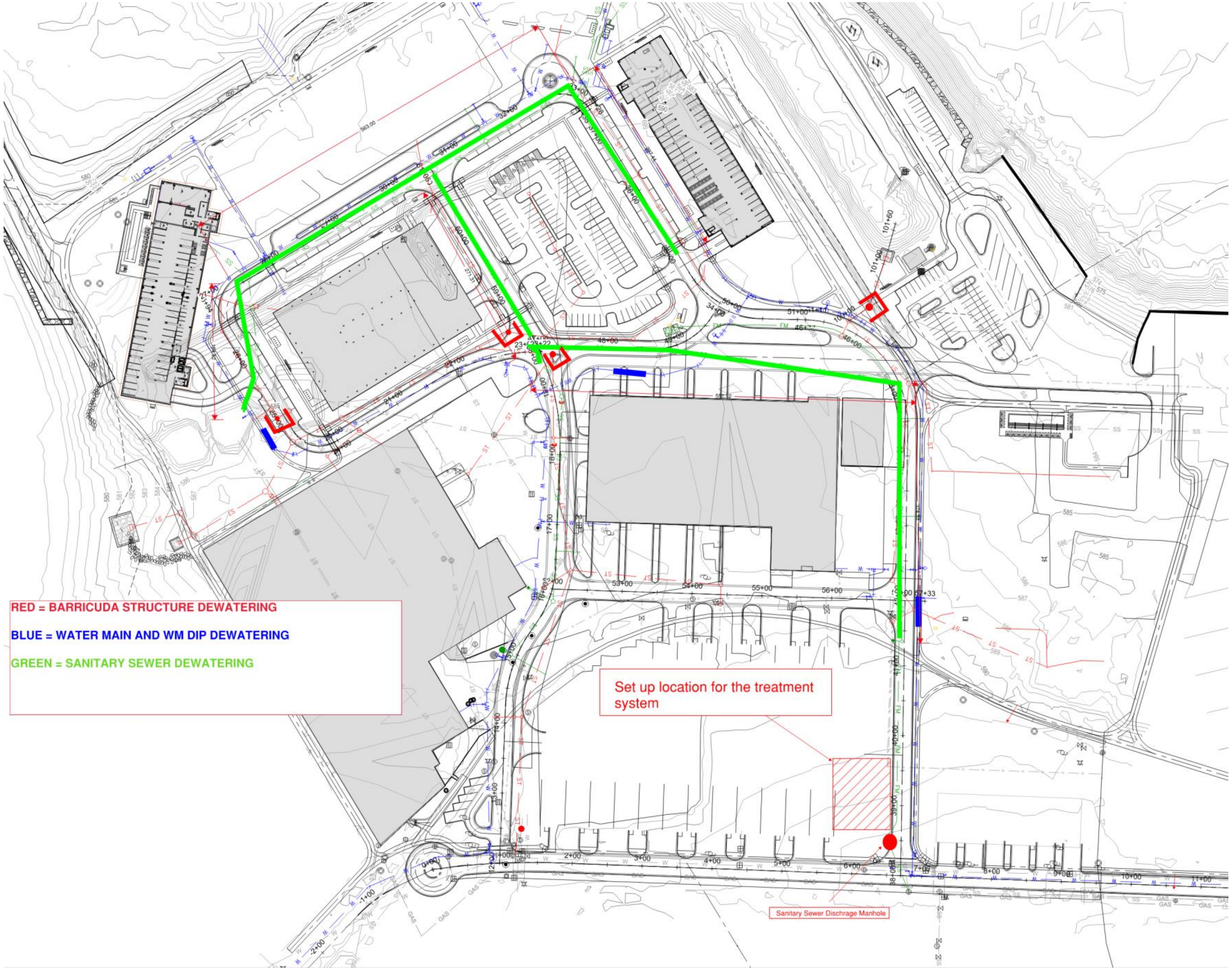
<u>Considerations-</u>

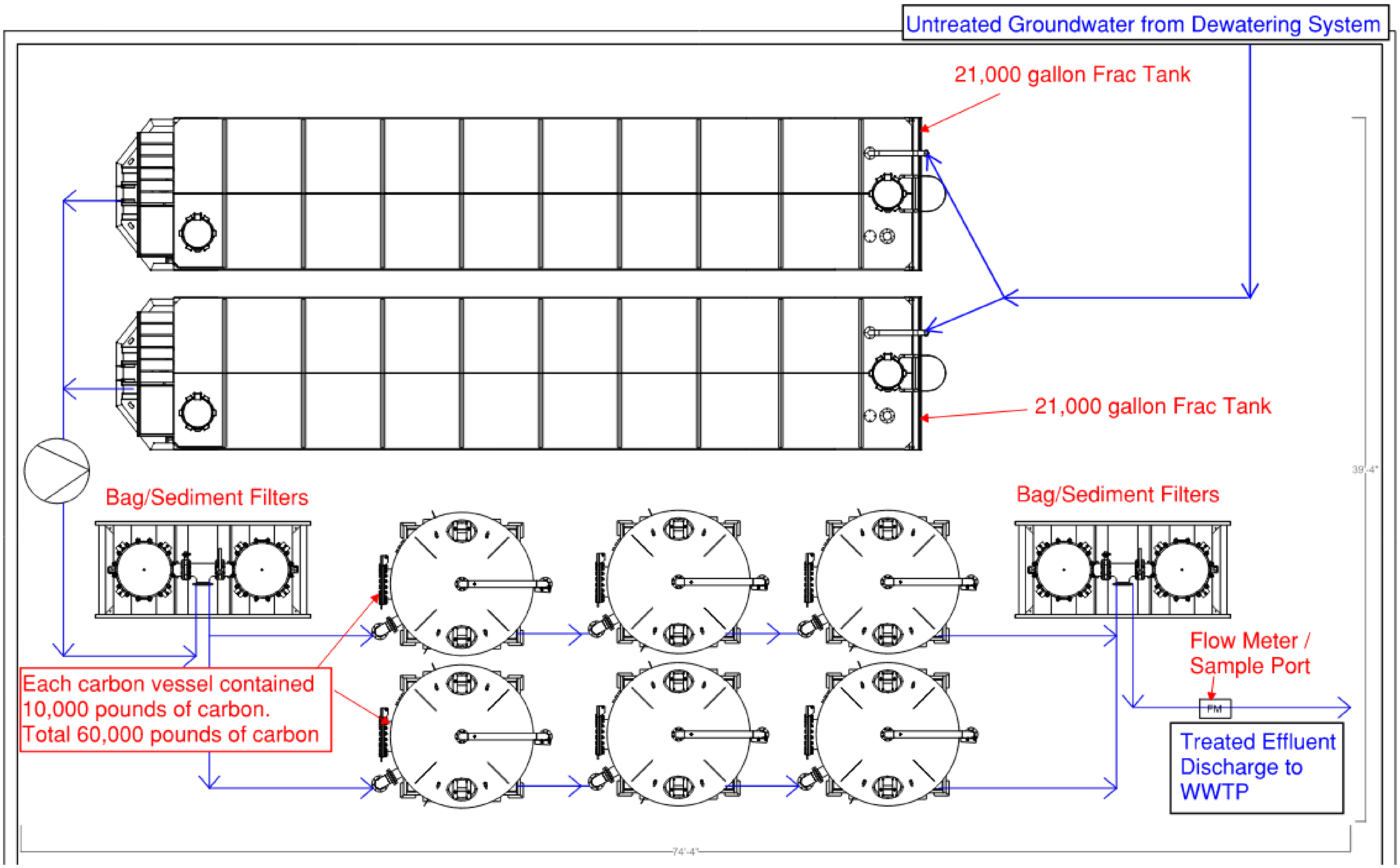
- Groundwater contamination on-Site and off-site
- EGLE won't allow full site dewatering

<u>Solution-</u>

- Well points installed to 20-feet set up in 200 foot sections and moved accordingly




RED = BARRICUDA STRUCTURE DEWATERING
BLUE = WATER MAIN AND WM DIP DEWATERING
GREEN = SANITARY SEWER DEWATERING
Set up location for the treatment system
Sanitary Sewer Dischrage Manhole



Untreated Groundwater from Dewatering System
21,000 gallon Frac Tank
21,000 gallon Frac Tank
Bag/Sediment Filters
Bag/Sediment Filters
Flow Meter / Sample Port
FM
Each carbon vessel contained 10,000 pounds of carbon. Total 60,000 pounds of carbon
Treated Effluent Discharge to WWTP
39'-4"
74'-4"

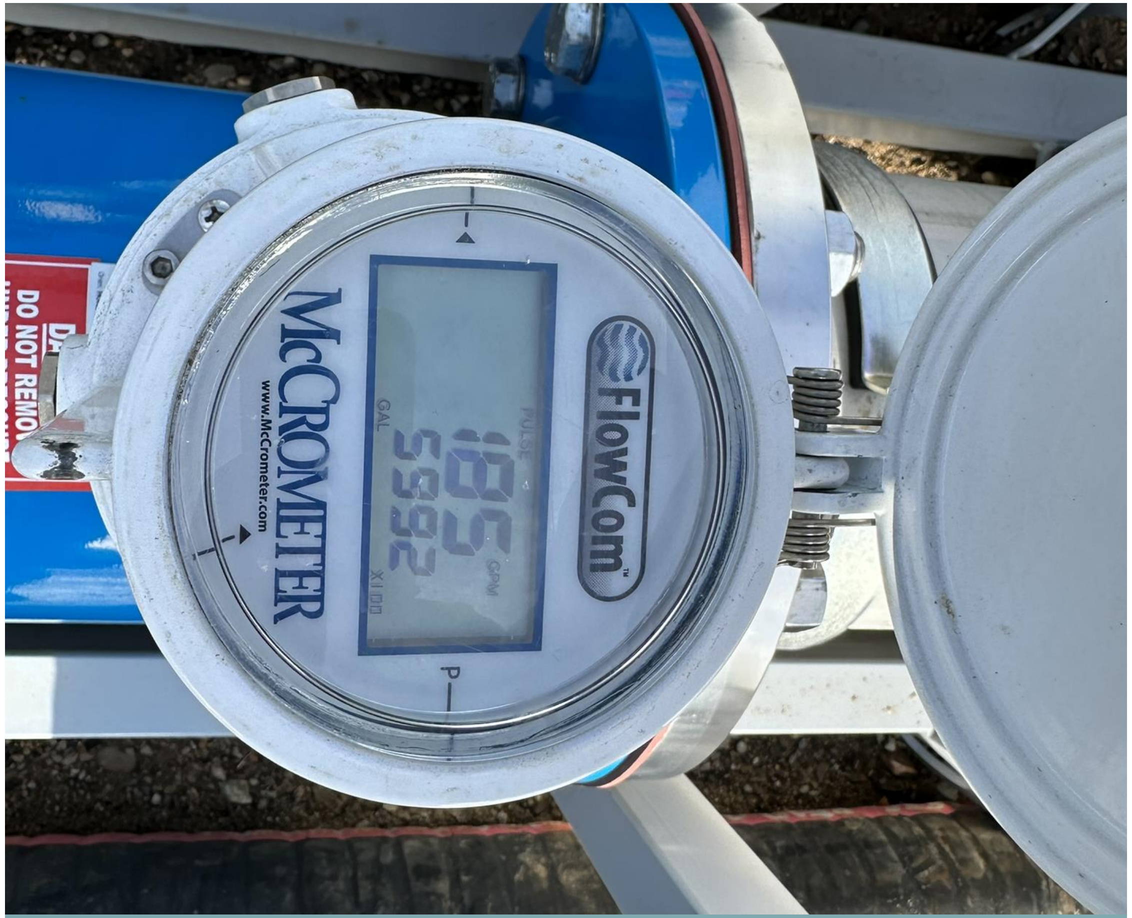
Treatment System Setup

Carbon Delivery

Well Point Dewatering Run

Assembled Treatment System

Effluent Discharge



Flow Gauge

Frac Tanks in Use

Weather!!

Adelaide Pointe Final Summary

- Two months of 24/7 dewatering/effluent treatment
- Approximately 6,000,000 gallons of effluent treated and discharged to WWTP
- <u>All startup and weekly effluent samples were non-detect for PFOS</u>
- Total cost of the system $350,000 paid for by an EGLE Brownfield Grant.
- SUCCESSFUL treatment and all utilities installed and development currently moving forward!

Conclusions

Maintain a timeline and establish good communication

Submit permit application as soon as possible

Detailed RFP to contractors

Remember: no discharge until the permit is approved

Record the following:

- Average flow
- Daily discharge
- Monthly discharge

Sample per requirements and review results

Maintain a good relationship with your permitter!

Questions?

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Thank you!

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