Stakeholder Briefing – June 30, 2020

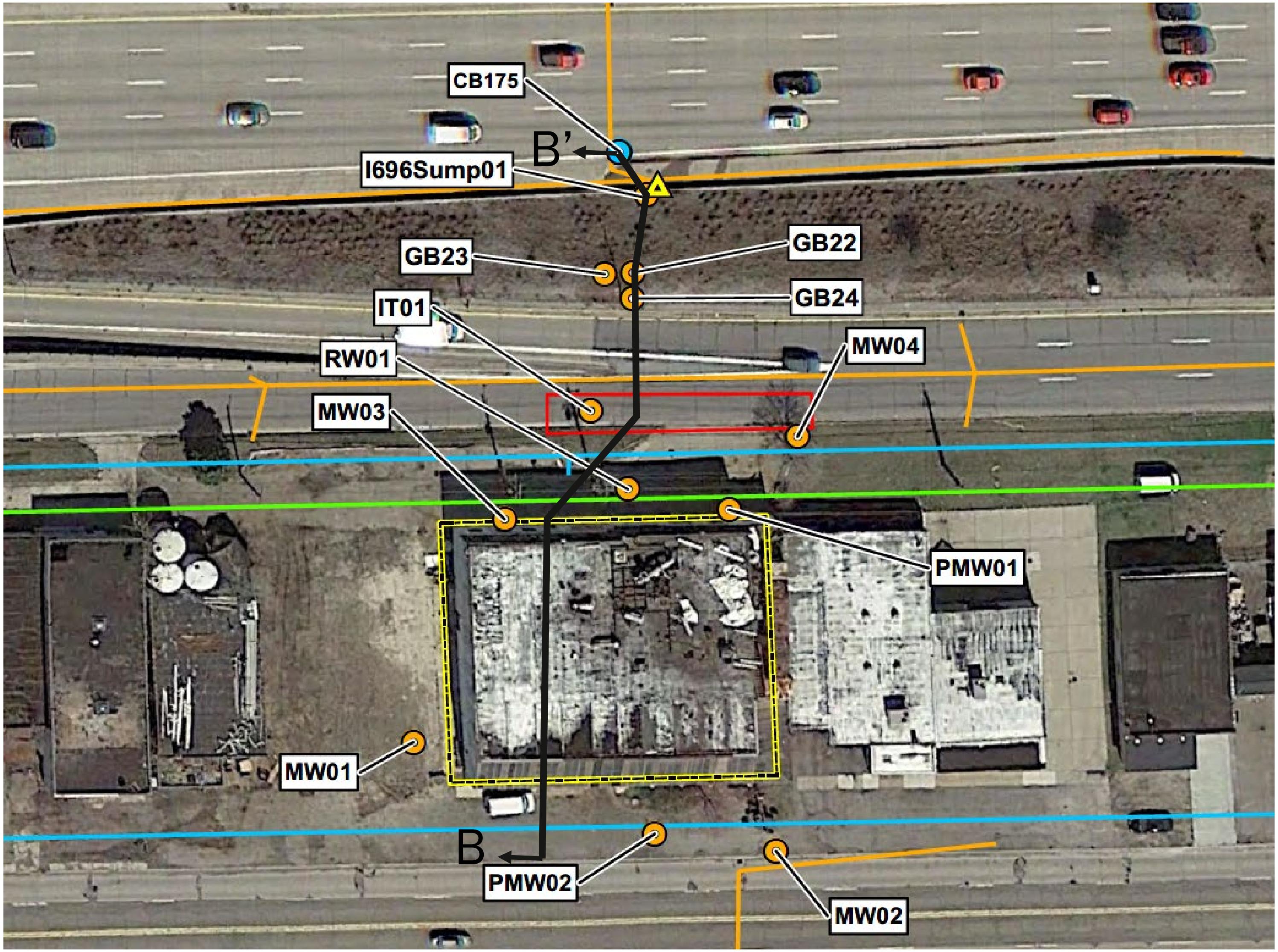
Electro Plating Services Site, Madison Heights, Michigan

Electro-Plating Services – I-696 Incident
Site Background

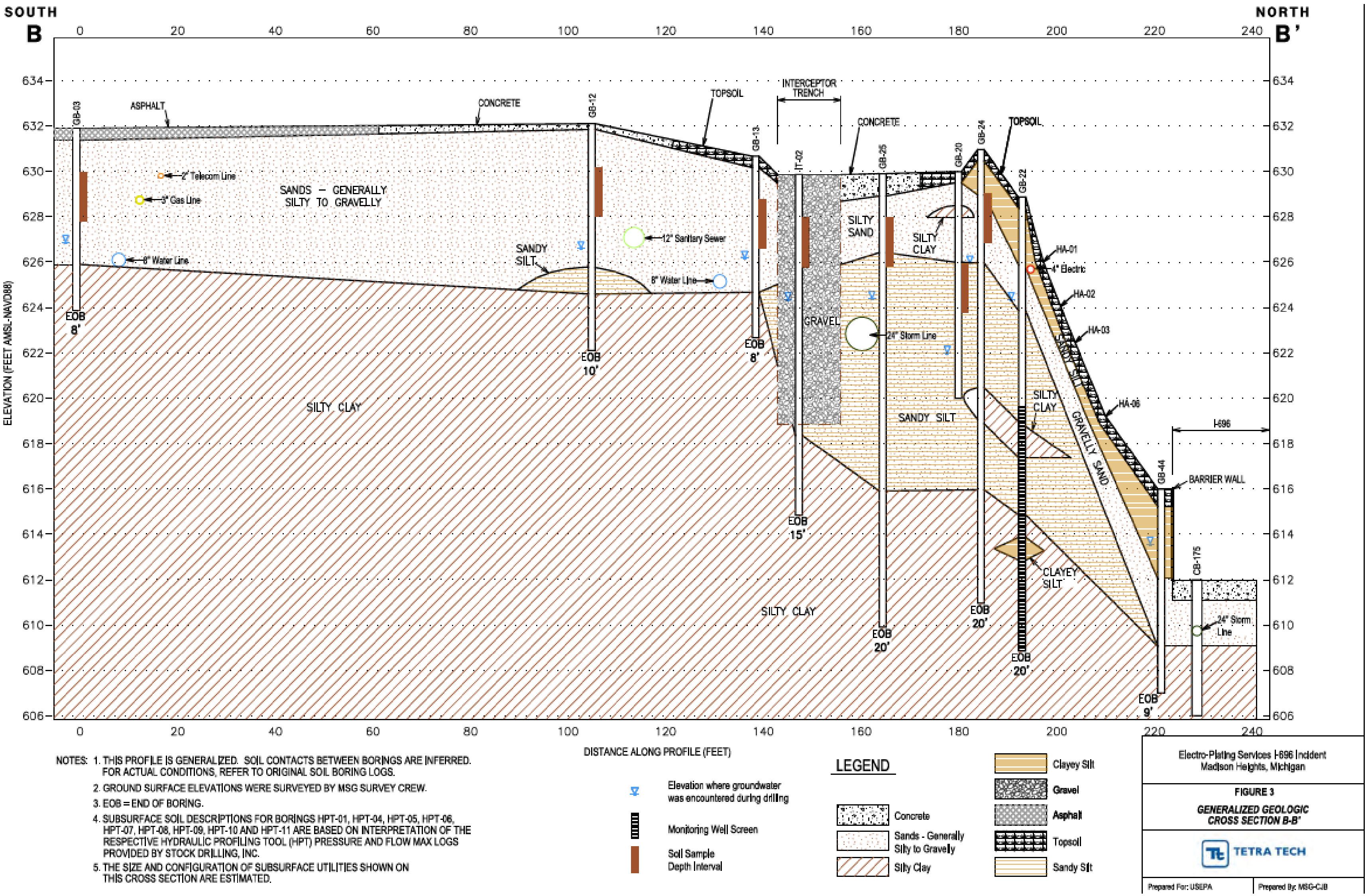
- Time Critical Removal Action (TCRA) completed in 2017.
- Dec. 20, 2019 – EGLE requested EPA assistance responding to bright yellow-green liquid visibly discharging from the barrier wall and freezing at the base of the embankment along I-696.
- The contamination was primarily hexavalent chromium.
- Source was determined to be the Electro-Plating Services facility. The basement was found to contain a significant quantity of similar standing liquids that had accumulated since the TCRA.

Electro-Plating Services I-696 Incident

Site Background



Site Background



Well Type

- Monitoring Well (Dec. 2019 - Jan. 2020)
- Monitoring Well (Pre-existing)
- Recovery Well
- Temporary Monitoring Well (2" dia - 10 ft screen)
- Piezometric Surface Elevation Measured on January 15, 2020

- Piezometric Surface Elevation Contour (Contour Interval = 0.5 ft)
- Ground Surface Elevation Contour (Contour Interval = 5 ft)
- Ground Surface Elevation Contour (Contour Interval = 1 ft)
- Inferred Groundwater Flow Direction
- Interceptor Trench
- Electro-Plating Services Building Outline

Notes:

1) Static groundwater levels were measured and recorded by MSG personnel on February 05, 2020 while groundwater withdrawal was occurring at the site.

2) The piezometric surface elevation contours shown on this figure are generalized, based on static groundwater levels measured at individual well locations while groundwater withdrawal was occurring. Actual piezometric surface elevations at other locations and at other times may be different.

N

0 35 Feet

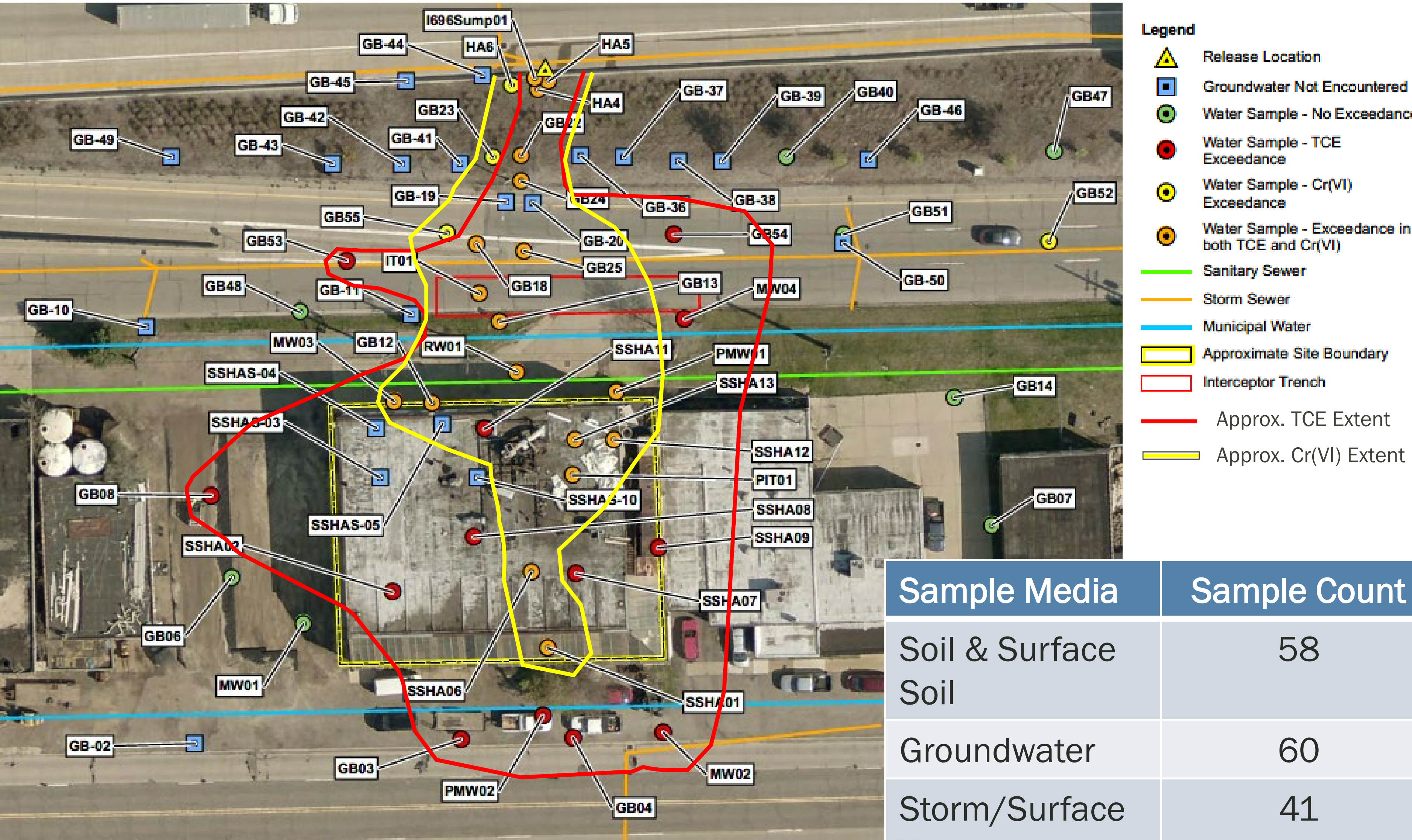
1:420

Electro-Plating Services I-696 Incident
Madison Heights, MI 48071

GROUNDWATER ELEVATION CONTOUR MAP FEBRUARY 05, 2020

TETRA TECH

Initial & Ongoing Response



Sample Media	Sample Count
Soil & Surface Soil	58
Groundwater	60
Storm/Surface Water	41

Summary of Water Samples

Contaminants	Regulatory Limit (GSI / Rule 57)	Range
Hexavalent Chromium	11 ppb	2.9-430,000 ppb
Available Cyanide	5.2 ppb	0.91-4,000ppb
Trichloroethylene (TCE)	11 ppb	0.43-1,100 ppb
PFOA	420 ppt	4.0-400 ppt
PFOS	11 ppt	4.0-797 ppt

Site Operations

	Volume (Gallons) (6/30)
Total Liquid Currently On-Site	2,290
Total Liquid Taken Off-Site for Disposal	260,540
Non-Hazardous (PFOS)	59,920
Hazardous / PFOS	200,620
Total Volume Liquid Collected On-Site	262,830

Current status

- Minimized ERRS on-site. Rotating schedules (COVID-19)
- START only on-site, as needed
    - Will increase with upcoming activities
- 696-Sump pumped up to Interceptor Trench

Remedial Alternatives Evaluation

Remedial Alternatives Evaluation

- Remedial Objectives
  - Evaluate groundwater recovery measures to prevent the migration of groundwater to I-696 such that no further lane closures or restrictions are necessary.
  - Evaluate in-situ treatment options to address contaminants of concern (COC) to treat contaminated groundwater prior to it daylighting.
  - Evaluate groundwater treatment options to reduce concentrations of COCs to below Great Lakes Water Authority discharge limits

Remedial Alternatives Evaluation

- **Alternative 1** - In-Situ Treatment (IST)
- **Alternative 2** - Source Removal + IST
- **Alternative 3** - GWCC + Wastewater Treatment System (WWTS)
- **Alternative 4** – IST + GWCC + WWTS
- **Alternative 5** - Groundwater Collection/ Conveyance (GWCC) + Off-site Transportation & Disposal (T&D) as Hazardous Waste (T&D-HW)
- **Alternative 6** - IST + GWCC + T&D for PFOS (T&D-PFOS)
- **Alternative 7** - Embankment Excavation + IST + GWCC (Interceptor Trench Only) + T&D-PFOS
- **Alternative 8** – Source Containment + IST + GWCC + T&D-PFOS
- **Alternative 9** – No further action / Maintain current operations (Storm/Sewer Lining and Service Drive Restoration)

REMOVAL ACTION DESIGN

In Situ Groundwater Treatment

Work to be completed:

- Lining of Sanitary / Storm Sewers CIPP – Cured In Place Pipe
  - Rehabilitation of damaged underground wastewater and stormwater sewer pipes without excavation
  - Rehabilitation of manhole
- Removal of 696 Sump and Restoration
- Removal of Interceptor Trench and Road Reconstruction

What is In-Situ Treatment

- In situ remediation is the treatment of contamination in location where it is found in the environment, without removing the soil or groundwater from its location.
- Because the contaminated media is treated in situ, the generation of waste is significantly reduced.
- This method is especially beneficial when addressing contamination levels in excess of hazardous waste standards.

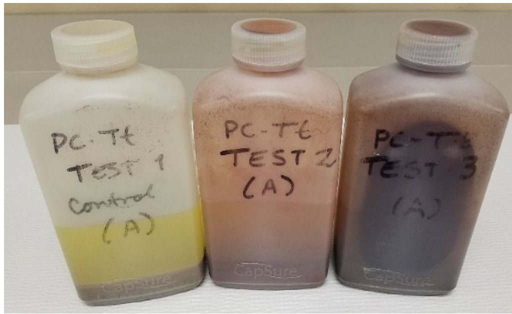
In-situ Groundwater Treatment Design

- Technology Background
  - Cr(VI) – Chemical reduction and precipitation. Reduce Cr(VI) to trivalent chromium (Cr(III)). The Cr(III) precipitates as $Cr(OH)_3$ or $Cr_xFe_{1-x}(OH)_3$ in the presence of ferric iron. Very stable.
  - TCE – Abiotic transformation and anaerobic reductive dechlorination.
  - CN – Formation and precipitation of iron-CN precipitates. Essentially nontoxic precipitate, Prussian Blue.
  - PFOS – Sorption. Activated carbon is applied to groundwater to sorb dissolved phase PFOS compounds present in groundwater. Partially demonstrated technologies. Does not destroy PFOS, and sorption sites will become filled over time. Long-term stability of activated carbon amendments for PFOS remediation is unknown.

In-situ Groundwater Treatment Design

- MetaFix® / EHC Plus ® Treatability Study

Analyte	EP-RW-01-012120	Test 1 Control	Test 2 I-3+EHC Plus (2 wt.%)	Test 3 I-3+EHC Plus (5 wt.%)	Remediation Goal
pH (SU)	6.83	8.36	7.01	6.98	---
ORP (mV)	130	110	100	51	
Chromium, Hexavalent (µg/L)	**302,000**	**268,000**	**91,000**	<10	11
Mercury (µg/L)	**1.2**	<0.084	<0.084	<0.084	0.20
Arsenic (µg/L)	**<167**	**96.1 (J)**	1.8 (J)	1.7 (J)	10
Selenium (µg/L)	**<122**	**124 (J)**	**6.8**	<0.79	5
Cyanide, Free (µg/L)	3.9	**29.6**	1.9 (J)	1.4 (J)	5.2
Trichloroethene (µg/L)	**368**	**221**	1.9	0.37 (J)	200
cis-1,2-Dichloroethene (µg/L)	43.2	46.7	1.4	0.36 (J)	620
trans-1,2-Dichloroethene (µg/L)	<10.9	3.2 (J)	<1.1	<1.1	1,500
Chloroethene (µg/L)	**14.1**	**13.8**	3.3	0.90 (J)	13
Perfluorooctanoic acid (PFOA) (µg/L)	0.0905	0.0827 (J)	0.0218 (J) / 0.0200 (J)	0.0218 (J)	12
Perfluorooctane sulfonate (PFOS) (µg/L)	**20.2 (J)**	**3.47 (J)**	**0.617 (J) / 0.558 (J)**	**0.467 (J)**	0.012



What is a Permeable Reactive Barrier (PRB)?

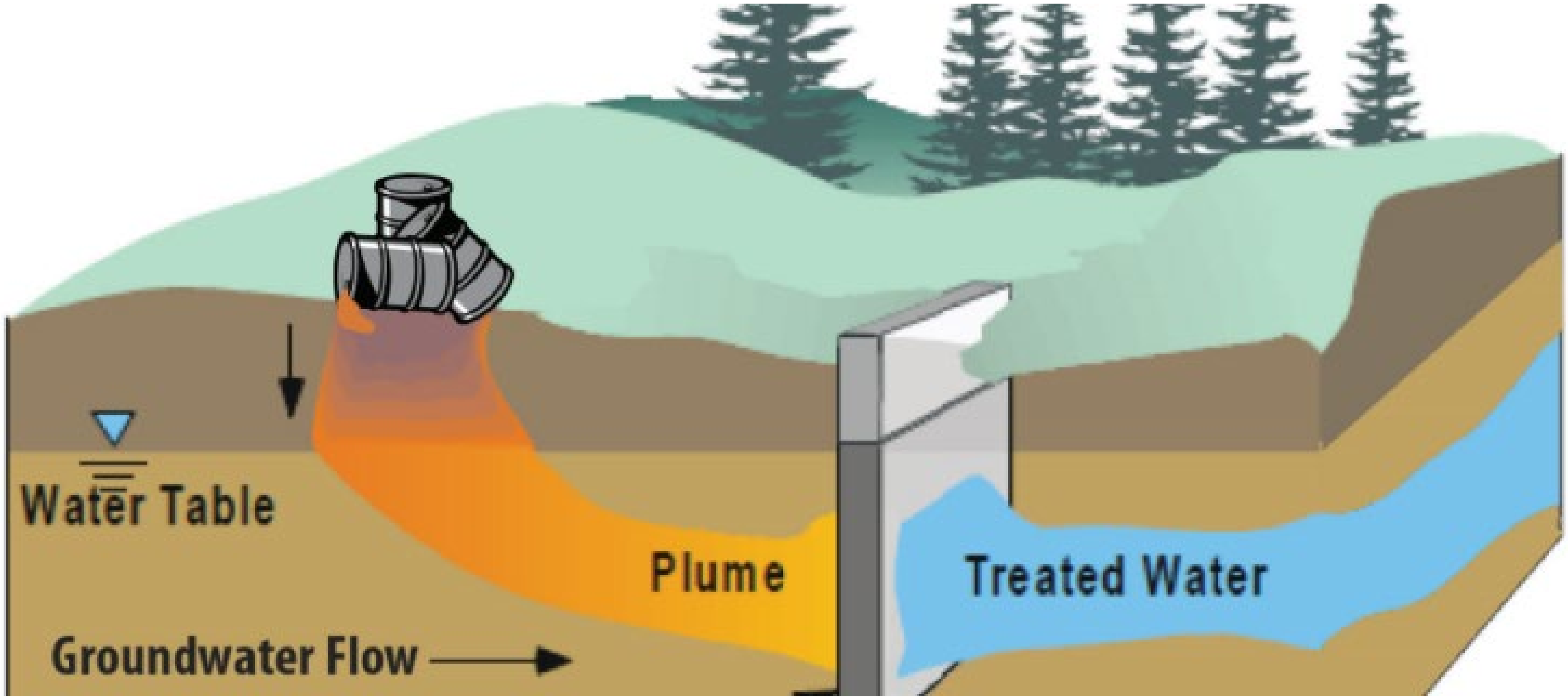
- A permeable reactive barrier (PRB) is an in situ treatment zone established within a contaminated groundwater unit through the application of reactive products.
- The reactive materials interact with the plume of contaminants as it passively migrates through the PRB, removing or degrading contaminants with treated groundwater migrating out of the PRB.
- The primary removal mechanisms include:

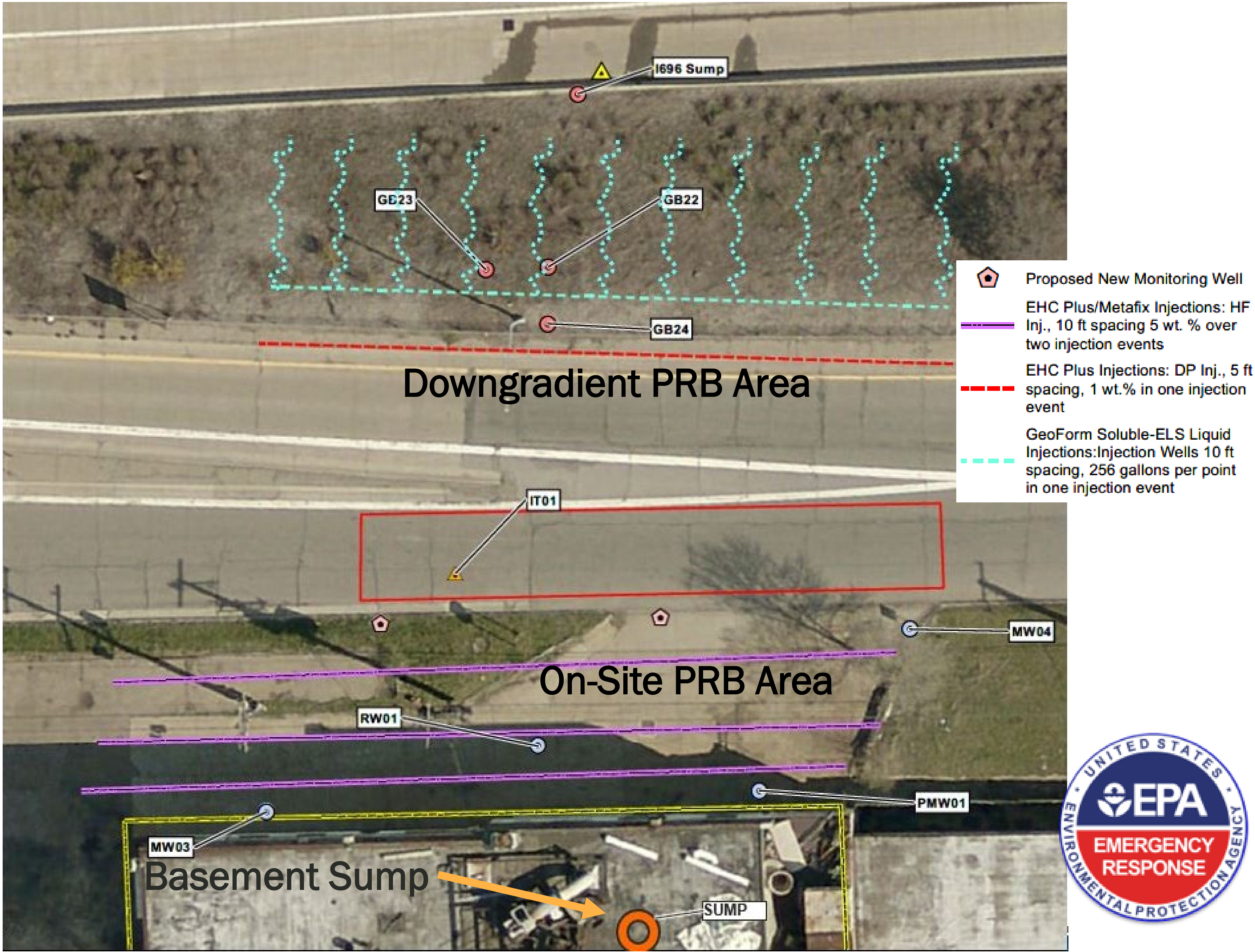
  (1) sorption and precipitation,

  (2) chemical reaction, and

  (3) biological oxidation or reduction, depending on the target contaminants.

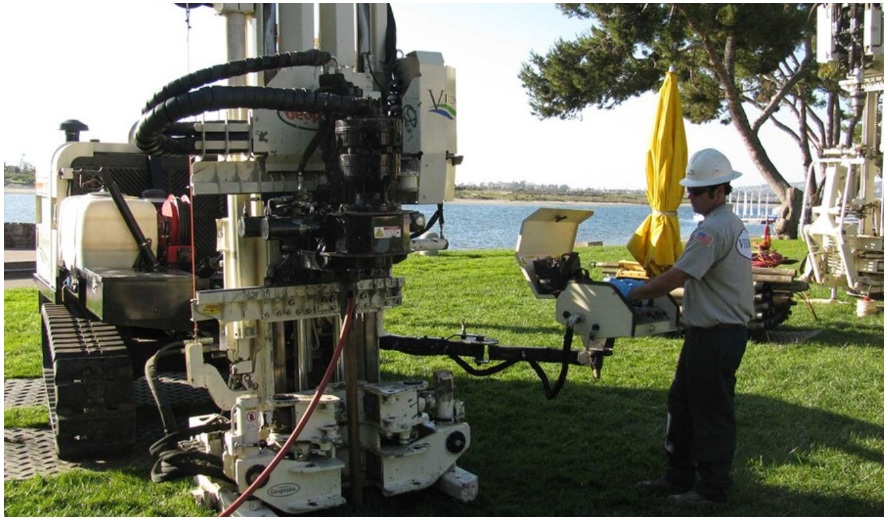
Conceptual example design



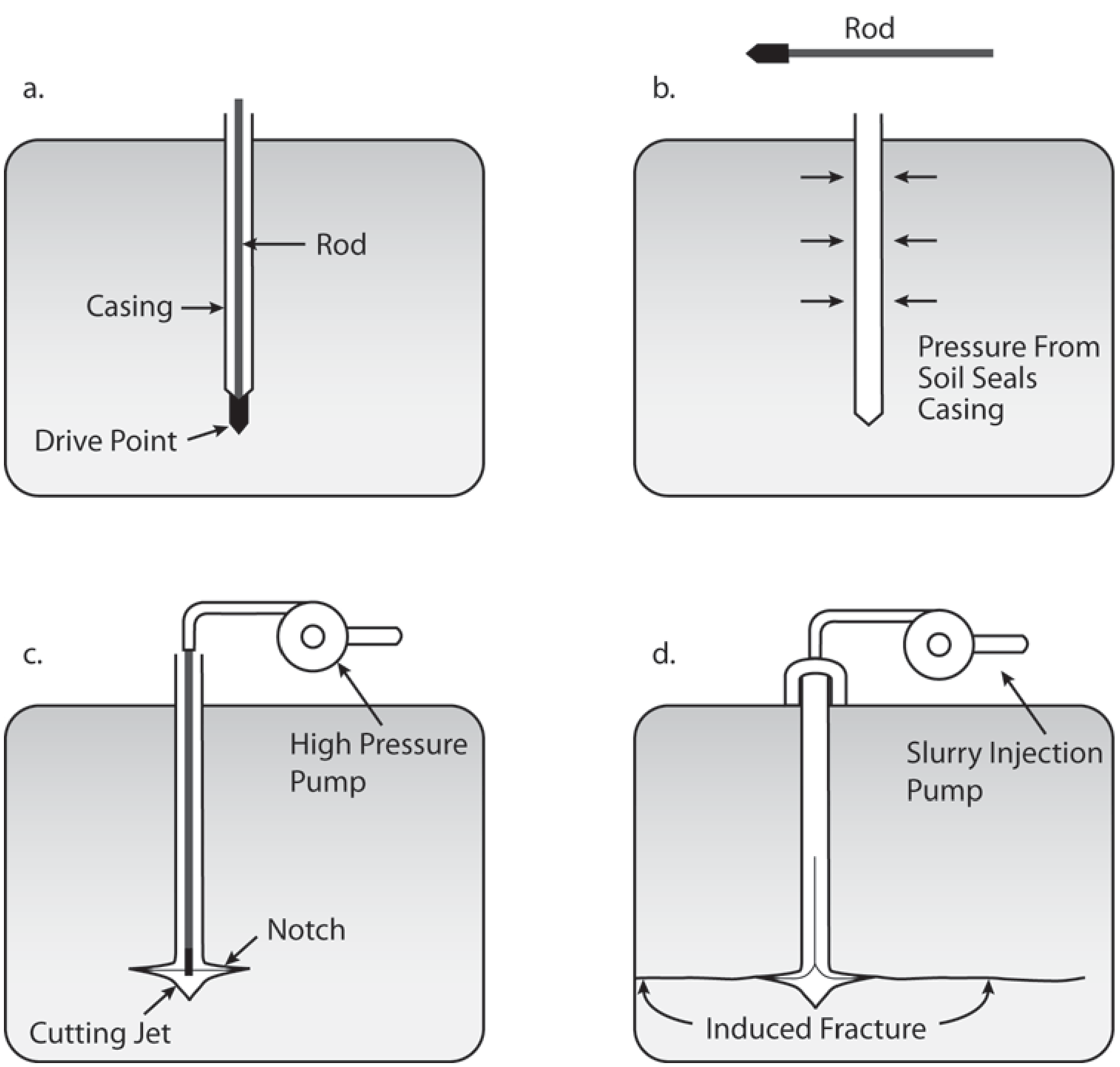

I696 Sump
GB23
GB22
GB24
Downgradient PRB Area
IT01
MW04
On-Site PRB Area
RW01
PMW01
MW03
Basement Sump
SUMP
Proposed New Monitoring Well
EHC Plus/Metafix Injections: HF Inj., 10 ft spacing 5 wt. % over two injection events
EHC Plus Injections: DP Inj., 5 ft spacing, 1 wt.% in one injection event
GeoForm Soluble-ELS Liquid Injections:Injection Wells 10 ft spacing, 256 gallons per point in one injection event

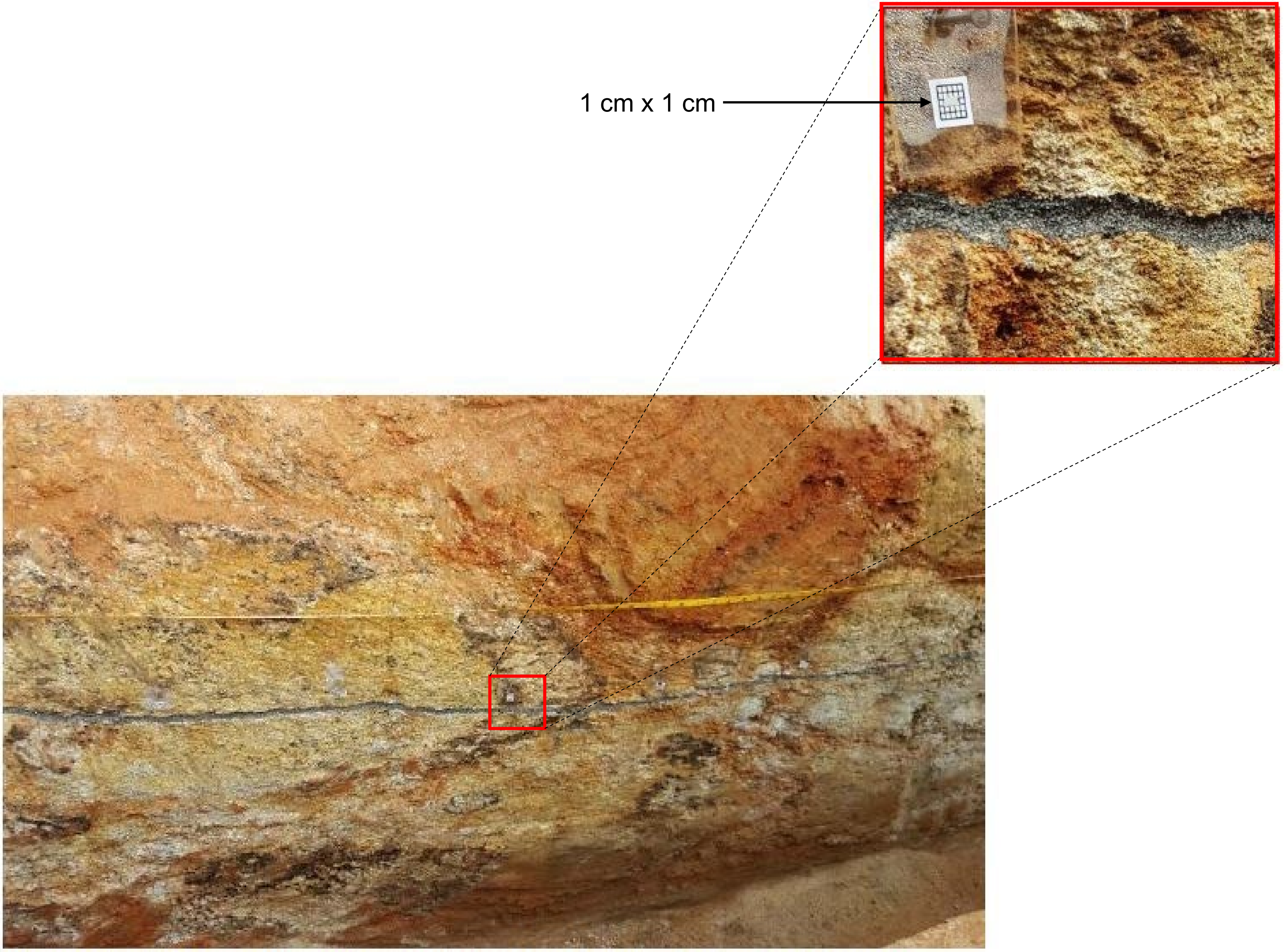
In-situ Groundwater Treatment Design

- On-Site Permeable Reactive Barrier
  - Application of PeroxyChem MetaFix® I-3A and EHC® Plus (reagents)
  - Slurry Injection using hydraulic fracturing methods
  - Application over two events approximately one month apart to achieve target in-situ mass of reagents.
  - Provide treatment of groundwater migrating from the building prior to capture by the Interceptor Trench.



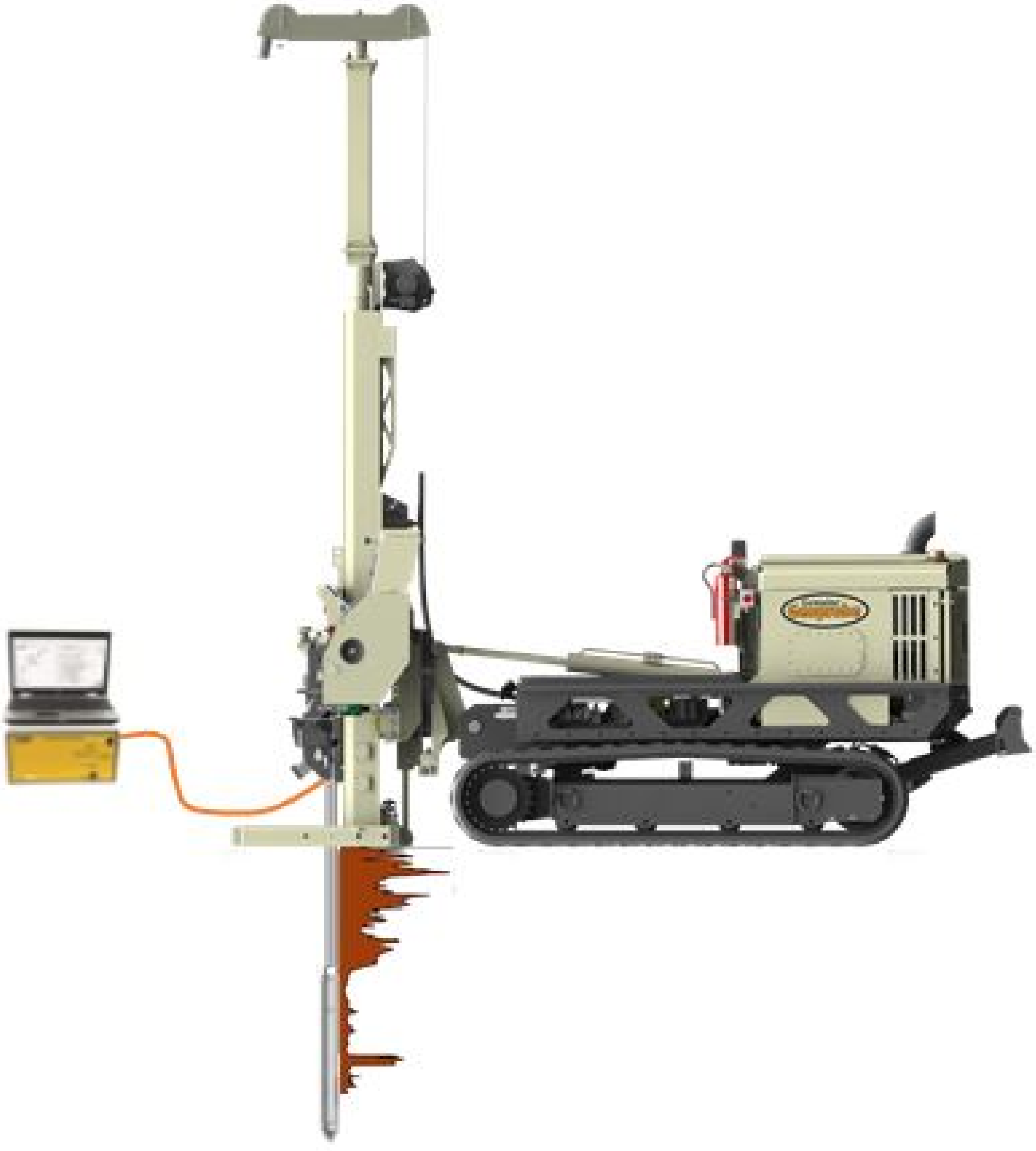
Basics of Hydrofracturing




1 cm x 1 cm

In-situ Groundwater Installation

- Pilot Test
  - Hydraulic Fracturing – On Site
    - 3 days
    - 4 to 8 injection points (20 - 30% of full-scale)
    - HF efficacy
    - Reagent blend/injection optimization
    - Injection distribution (soil borings and sodium bromide)
    - Strategically locate near existing wells for subsequent GW testing
  - Liquid Injection – Off Site / Basement Sump
    - 3 days
    - Installation of 2 to 3 injection wells
    - Well injection efficacy
    - Direct injection efficacy, if well injection deemed ineffective/inefficient
    - Reagent blend/injection optimization
    - Injection distribution (soil borings, dye (Rhodamine) tracer, sodium bromide)
    - Strategically locate near existing wells for subsequent GW testing
    - Application to basement sump to provide some source area treatment until a more robust final remedy is possible.



Upcoming Schedule:

ESTIMATED TIMELINE	DESCRIPTION
Week of July 13	Pilot Study
July (TBD)	Lining of Sanitary/Storm Sewer
	Removal of By-Pass System
Early September	First Round of Injections
Late September / Early October	Second Round of Injections
Late December	Remove Interceptor Trench / Restore Service Drive
	Remove I-696 Sump / Restore
	Demobilization of EPA / Transfer Site to EGLE

Groundwater In-Situ Treatment (IST)

Advantages

- Successful treatability studies to reduce Cr(VI), CN and TCE.
- PFOS reduction of 87%
- On-Site PRB / Downgradient PRB

Disadvantages

- PFOS reduction still above EGLE Rule 57 Water Quality Value
- Reagent requires weeks to several months for optimal efficacy

*Requires continuation of temporary measures

Service Drive Restoration
Storm/Sanitary Lining
Removal of 696 Sump

Estimated Capital Costs + 1 Qtr Monitoring:	$1,061,172
Est. Continued Operations (end of year):	$ 771,900

EPA Total Project Ceiling

- Costs to date: Approximately $1.7M

- Action Memo (2/13/20)
  - $1,994,113

- Action Memo (6/22/20)
  - $2,592,608*

Annual Operation & Maintenance Costs (O&M)
*To be conducted by EGLE

- **Estimated IST O&M Costs: $63,600**
  - Quarterly GW Monitoring: $48,500*
  - Soluble Reagent Maintenance: $45,300**
    - $15,100 Annualized
  - Slurry Reagent Maintenance: $238-330,000***

* Base Annual Cost

** 3-years initial app

***Every 5-10 years – may be required if no source removal

INFORMATION

- Public Website
  - https://www.epa.gov/mi/electro-plating-services-i696-release-site
- POLREPs
  - https://response.epa.gov/
  - Electro-Plating Services – I696 Release
  - Contact me to be added to the Distribution List
- WebViewer
  - https://response.epa.gov/
  - Electro-Plating Service Web Mapping

Questions?