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Public Involvement Plan (PIP) Meeting

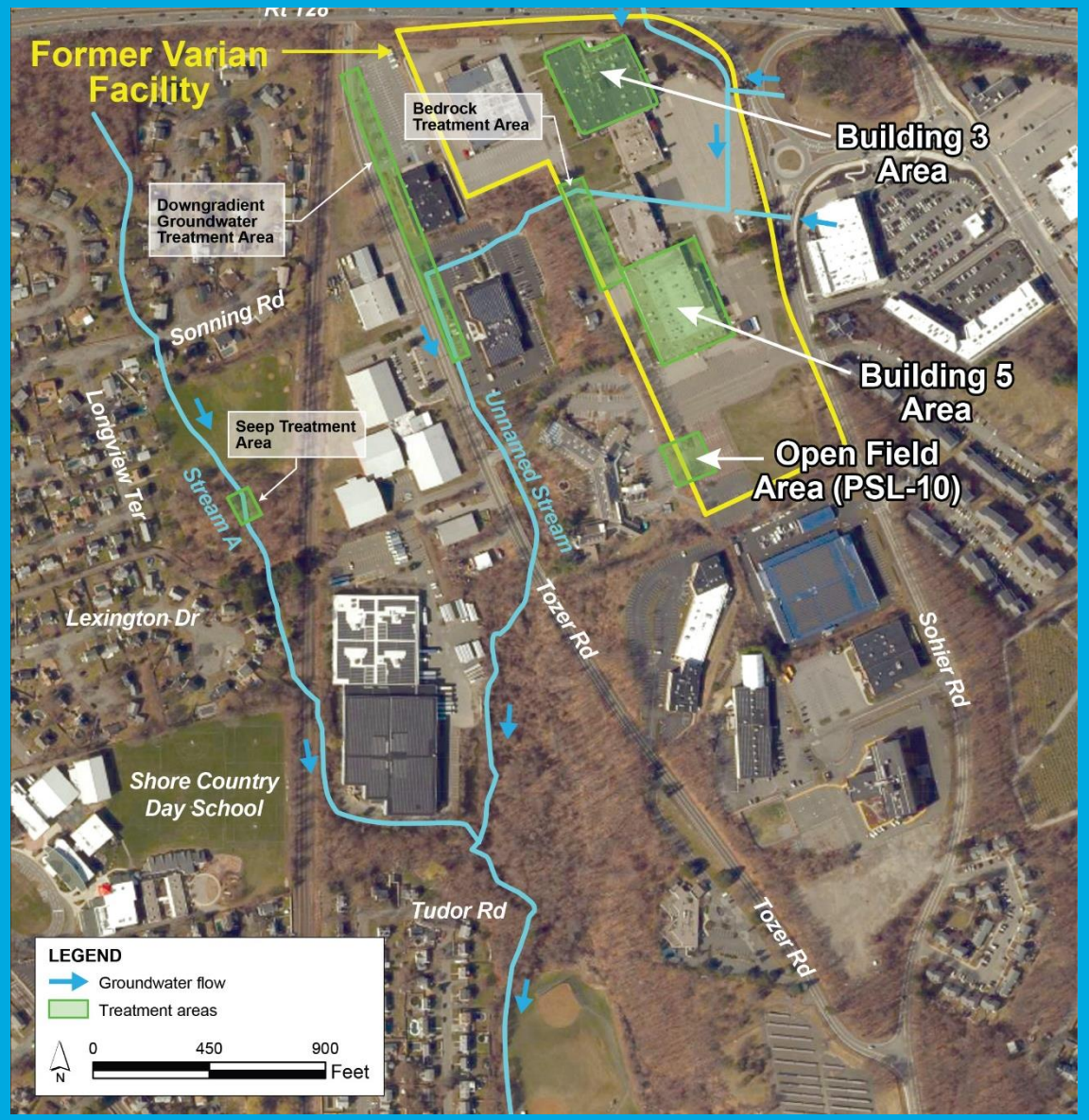
Phase IV Status Report

Former Varian Facility (Site 3-0485)
150 Sohier Road
Beverly, Massachusetts

September 18, 2024
Beverly Middle School

Presentation Objectives

- Provide an update on the installation of the six treatment systems, as documented in the biannual Phase IV Status Report
  - Submitted a revised Phase IV Report
- Provide an update on the Asbestos Abatement Immediate Response Action (IRA) Completion Report (in preparation)
- Receive feedback and answer questions from the public



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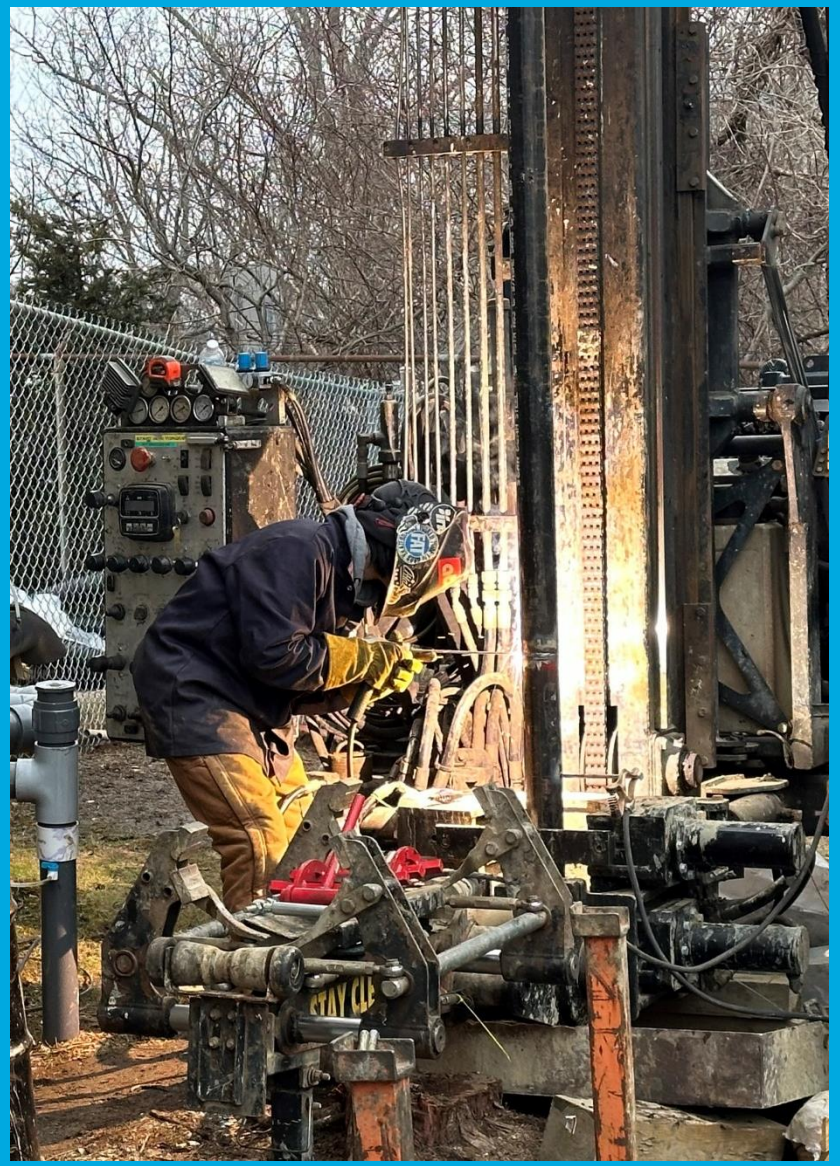
Building 3 Source Area

- **In situ thermal treatment**
- **In situ bioremediation polish**
- **Continued soil vapor extraction (SVE)**

- Thermal treatment system construction underway
  - CPI stockroom relocation completed
  - National Grid service design completed
  - Outdoor construction tasks ongoing
  - Indoor drilling planning in progress
  - Final MassDOT permit issued for temporary use of Route 128 right-of-way (ROW)
- Asbestos-containing material removed
- Thermal system field modifications based on presence of source material encountered during drilling



Welding sections of a heating well

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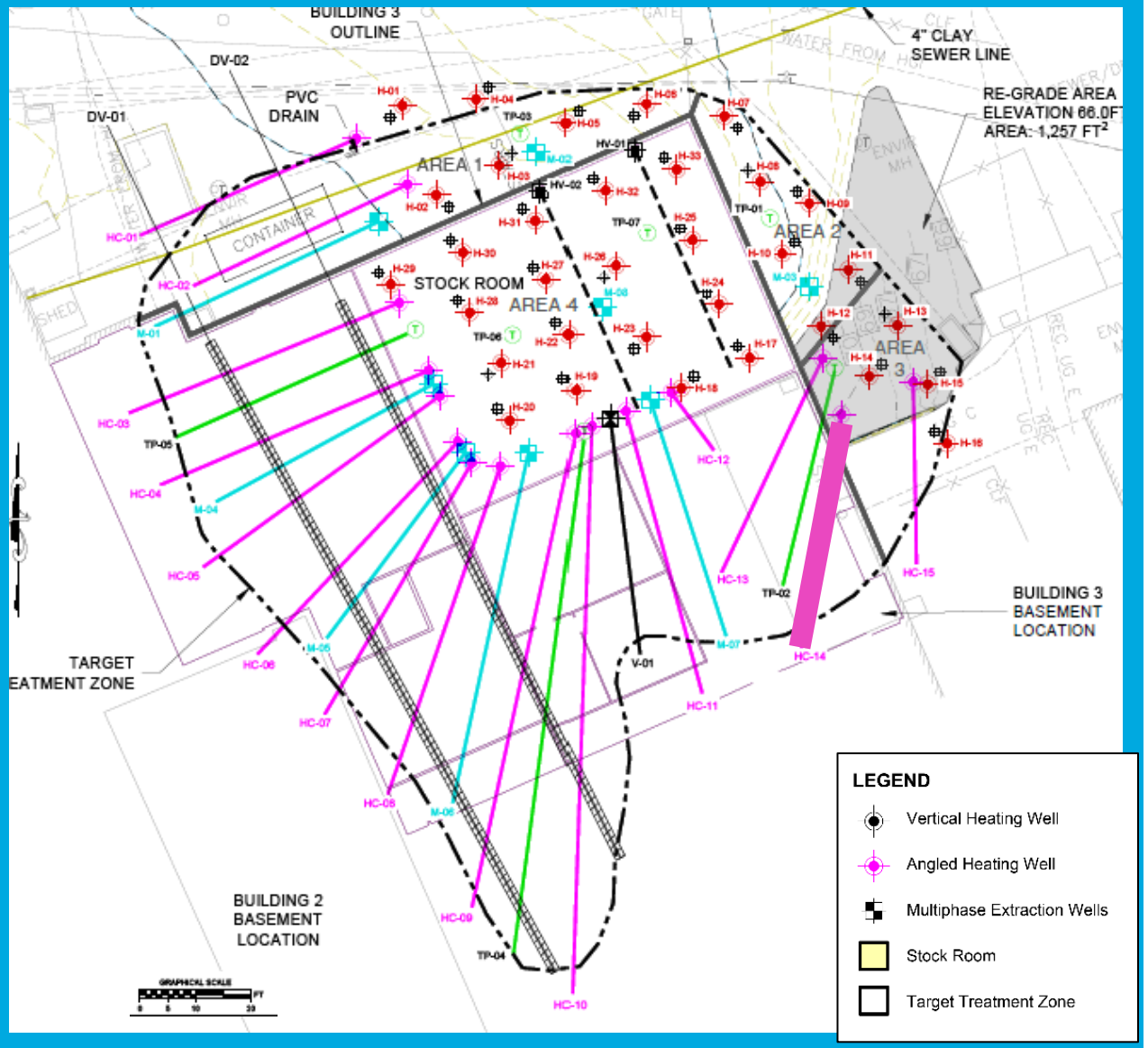
Field Conditions Alter Outdoor Construction Progress



- Boring HC-14 encountered source material near the edge of planned thermal treatment zone
  - Location previously inaccessible to investigation
  - Observed conditions may require adjustments to well length
- Outdoor drilling paused in late May
  - Buried asbestos debris removal activities
- Drilling observations identified need for additional vapor control measures during indoor system construction
  - Building 3 HVAC analysis performed
  - New HVAC equipment design completed
  - Equipment installation will occur in October

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System Construction

Current Status

- Modifications to Building 3 HVAC system underway
- Outdoor construction to restart in mid October with completion of the final two heater clusters (HC-14 and HC-13)
- Work area preparation to follow with relocation of Route 128 ROW fence on north side of CPI building
- Stockroom drilling operations will then begin

HVAC Equipment Upgrade Approach

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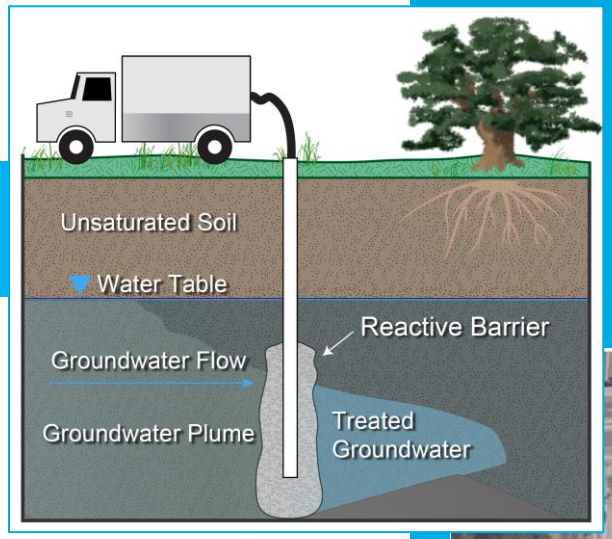
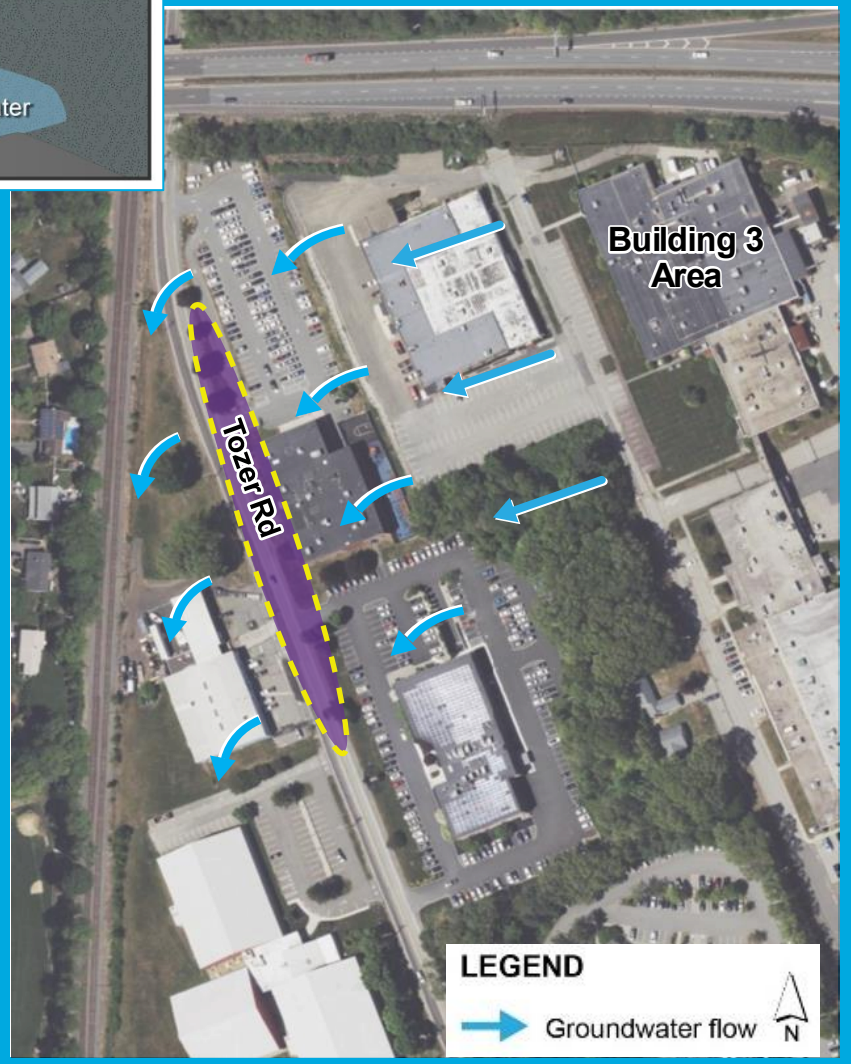
Tozer Road Groundwater

❖ Permeable Reactive and Adsorptive Barrier





- Remedial activities include:
  - Investigation to provide additional high-resolution data and soil/groundwater sampling data to help refine the design
  - Installation of new monitoring wells upgradient and downgradient of the treatment area
  - Baseline groundwater sampling
  - Injection of amendments to form a permeable treatment zone along Tozer Road
  - Monitoring during injection
  - Post-remediation monitoring to assess barrier performance

Pre-design Investigation

- Investigation conducted to provide high-resolution data and soil/groundwater sampling data to help refine the Tozer Road barrier design

Collecting groundwater sample along Tozer Road via DPT drilling (August 2024)

Sonic drilling at 30 Tozer Road to install a nested monitoring well (August 2024)

Activities Completed

- Membrane Interface Hydraulic Profiling Tool (MiHPT) investigation
- Grab samples collected at seven new locations
- Installation of four monitoring wells

Next Steps

- Groundwater sampling
- Deploy flux meters
- Install additional groundwater monitoring wells

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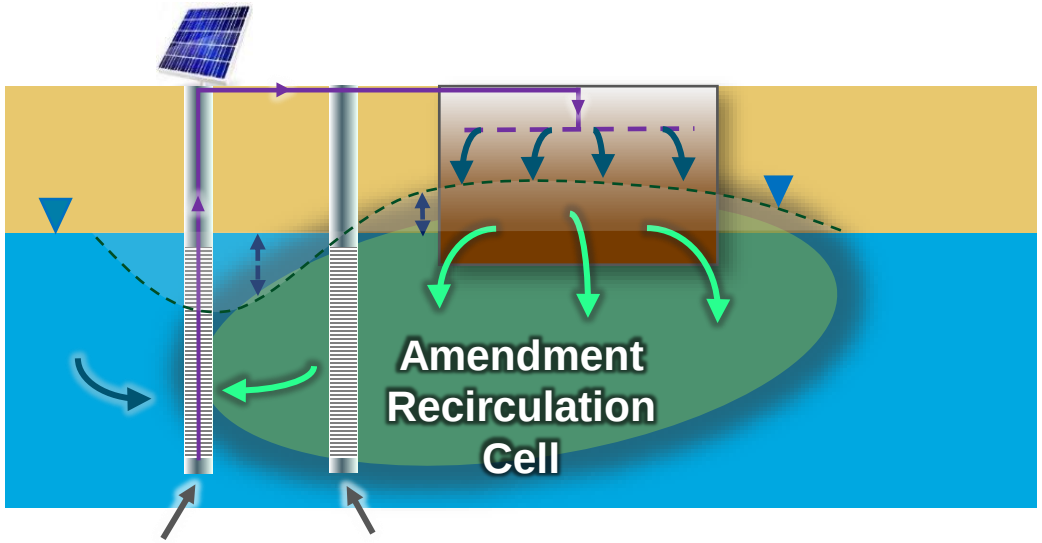
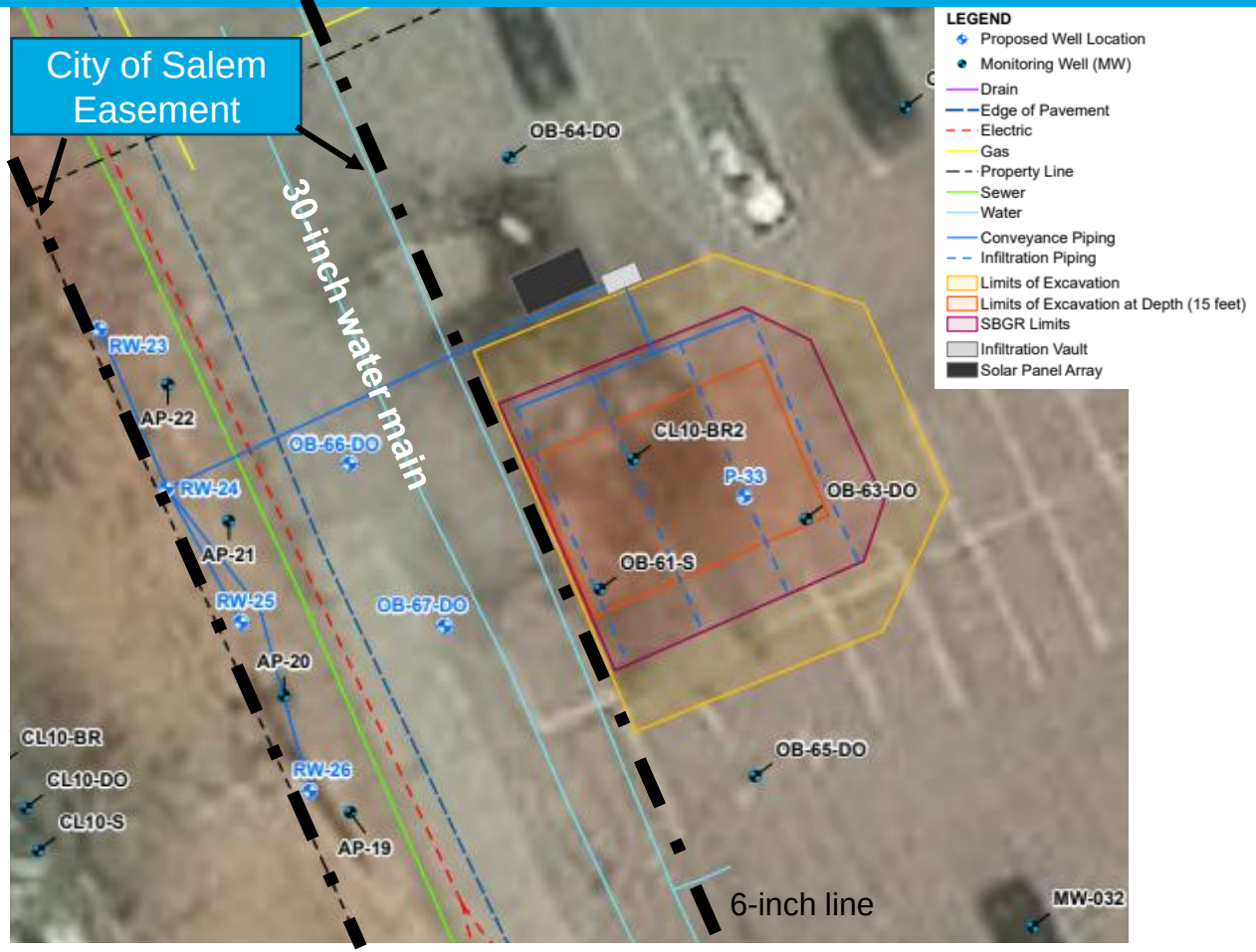
PSL 10

❖ Subgrade Biogeochemical Reactor (SBGR)

- Selected driller for well installation and excavation/SBGR installation contractor
- Utilities marked by Cities of Beverly and Salem; also performed property boundary survey
- Working with City of Salem regarding water main located within easement
  - City of Salem has a 3rd party consultant performing a review





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Bedrock

❖ In situ chemical oxidation (ISCO)

- Pre-design investigation July 8 – Current
  - Advanced 5 bedrock borings
  - Inspected bedrock cores
  - Downhole geophysics to identify key fracture zones (new boreholes and several existing wells)
  - Packer tests and groundwater sampling of key fractures (4 boreholes)
  - Identified fracture zones to target with monitoring and injection wells

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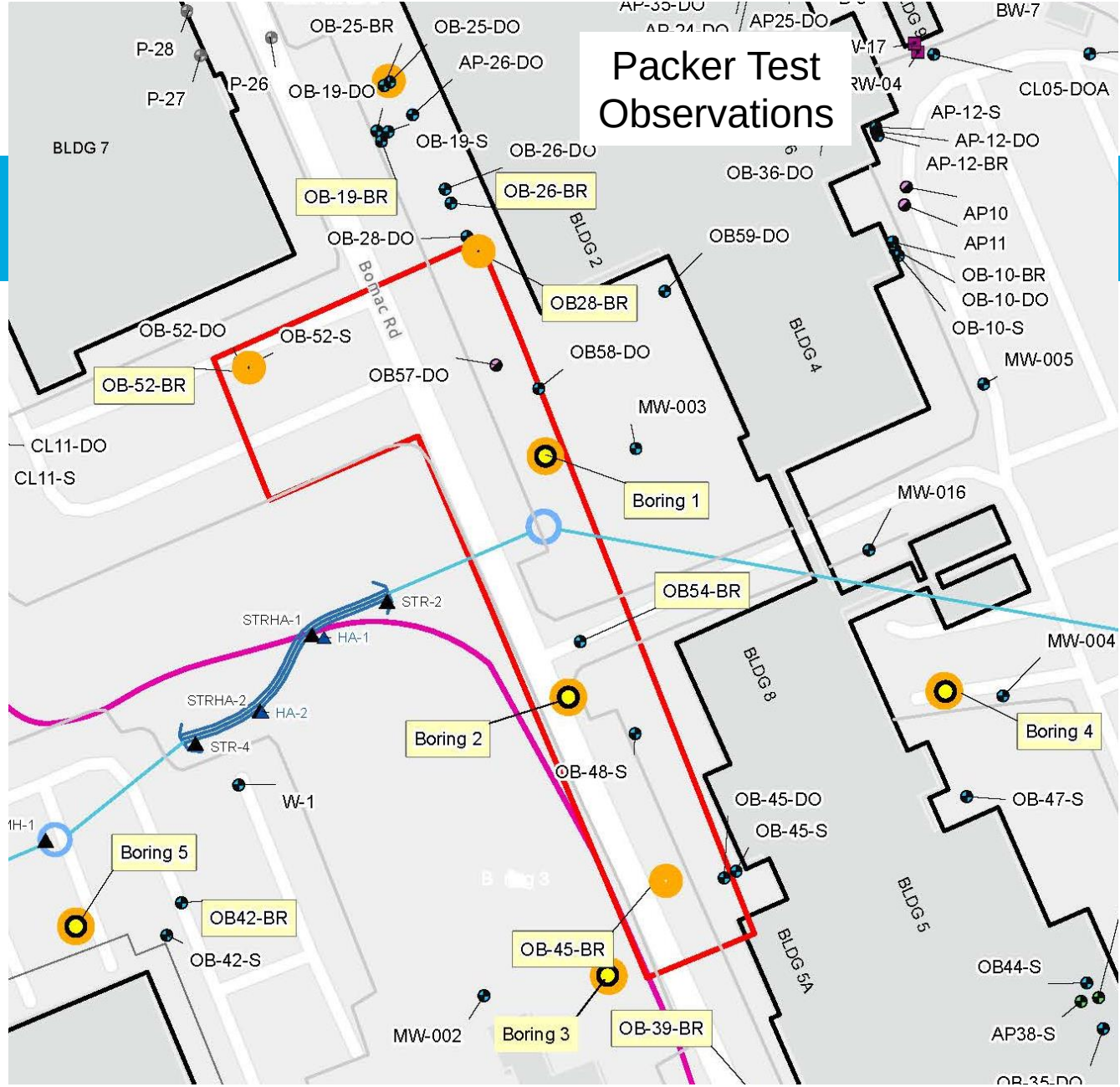
Bedrock

❖ In situ chemical oxidation (ISCO)

- Several key fracture zones identified and sampled
- Updated conceptual site model
  - Some tight fractures (no or very low groundwater flow)
  - Transmissive fractures (groundwater flow), connecting source areas with downgradient zones
- Recommend changing the treatment amendment to be injected



Geophysical Testing Wells

Existing Bedrock Well

New Bedrock Borehole

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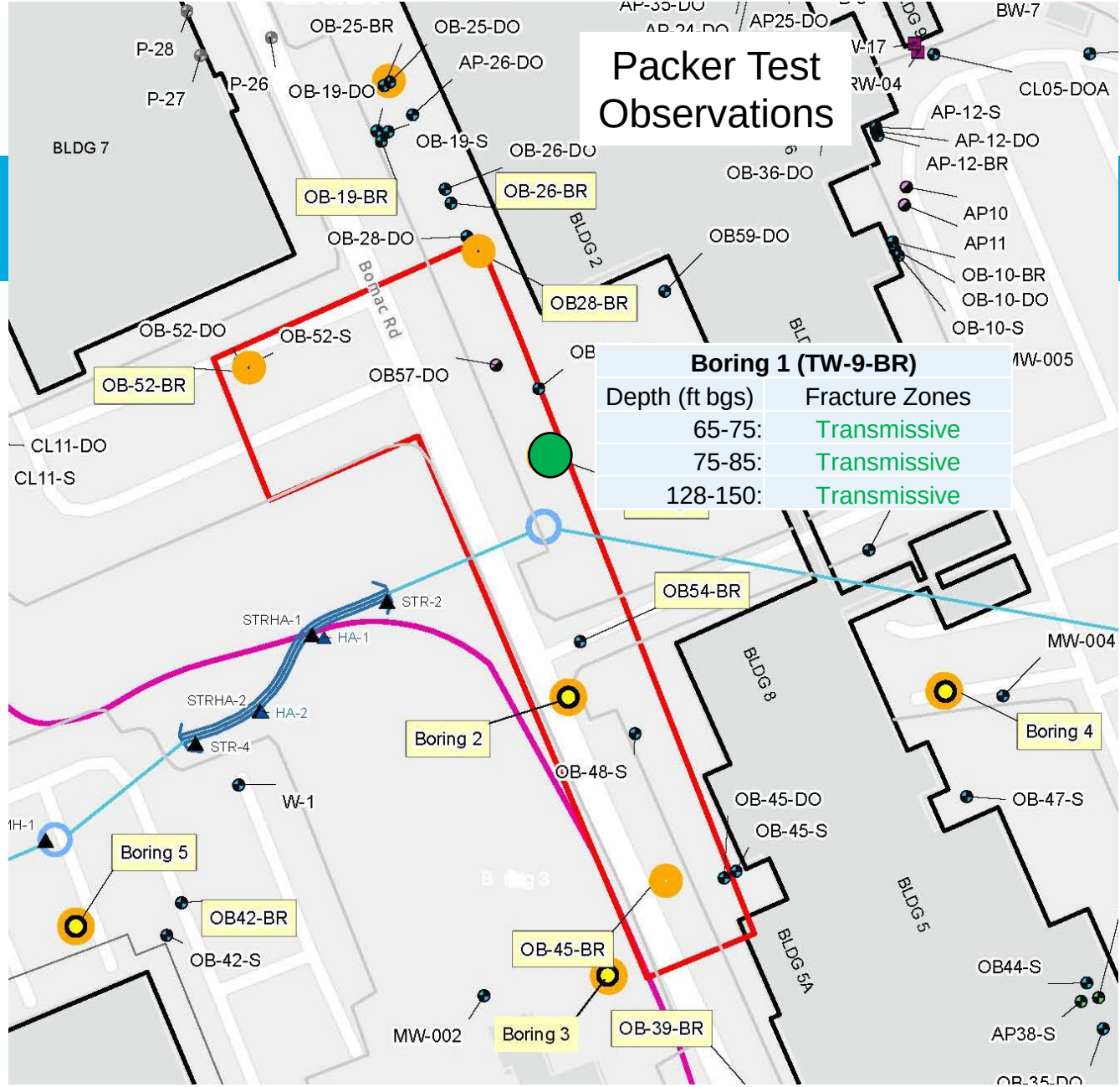

Geophysical Testing Wells

Existing Bedrock Well

New Bedrock Borehole

Concentrations above bedrock treatment goals

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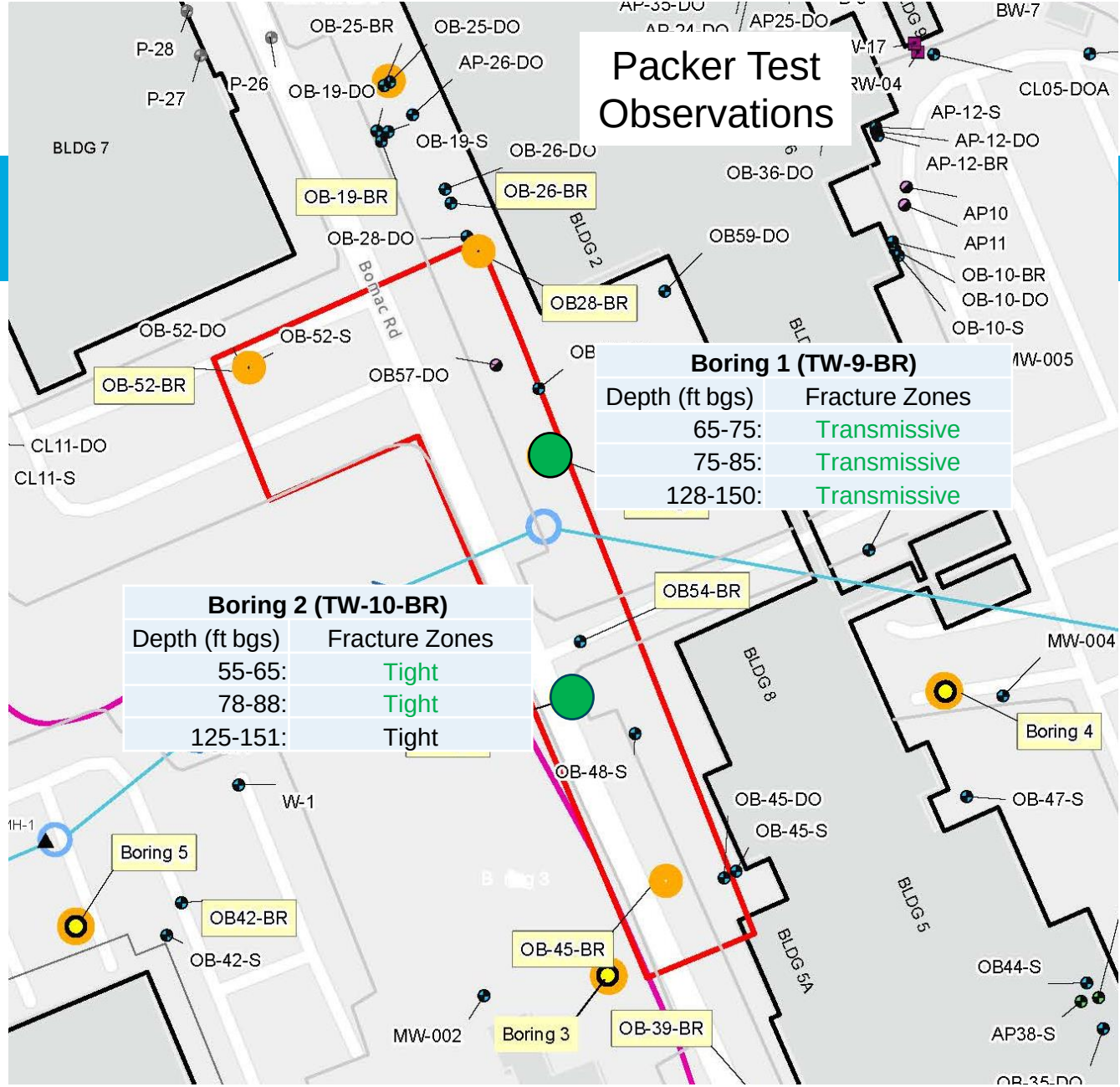

Geophysical Testing Wells

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Concentrations below bedrock treatment goals

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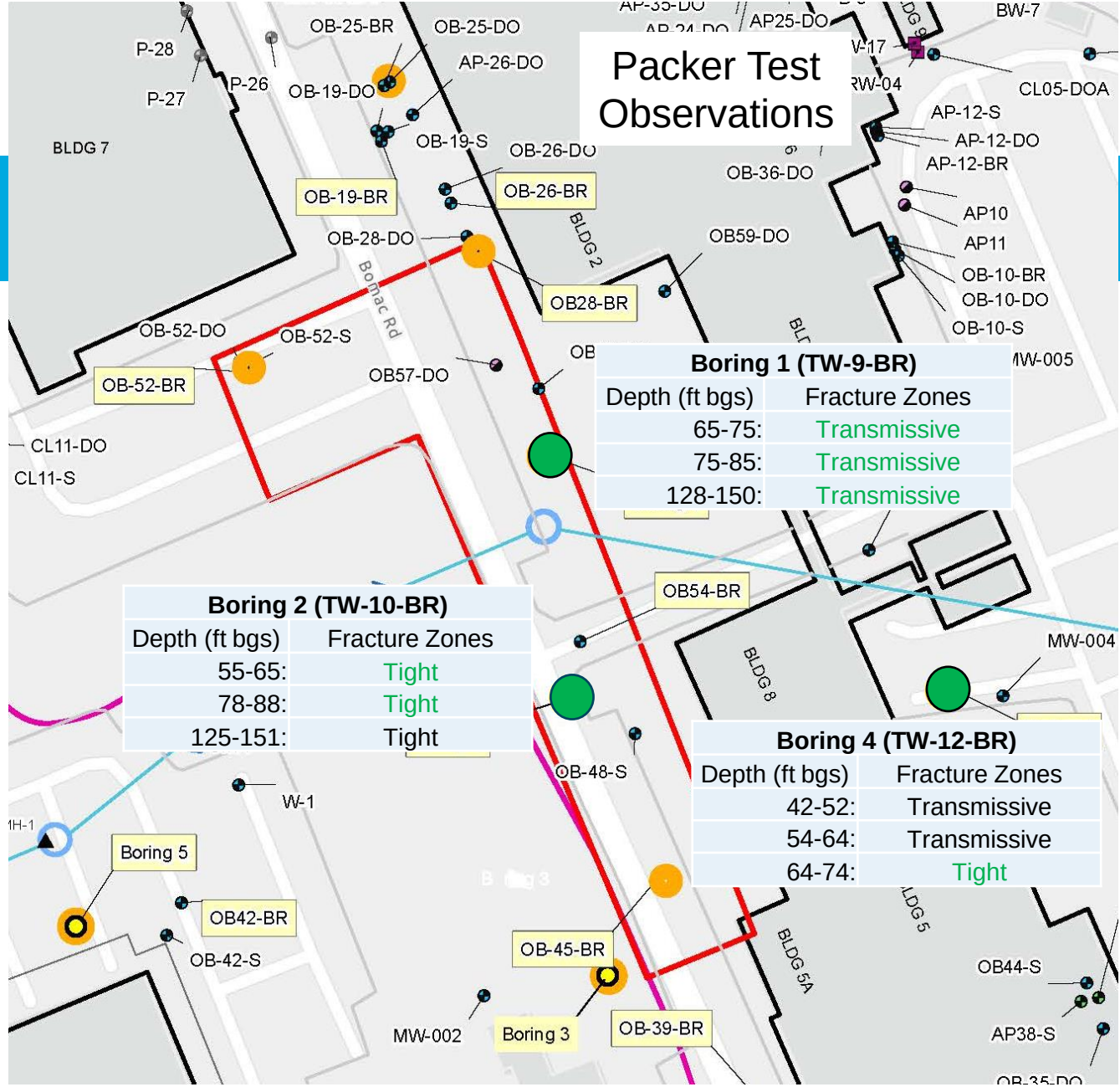

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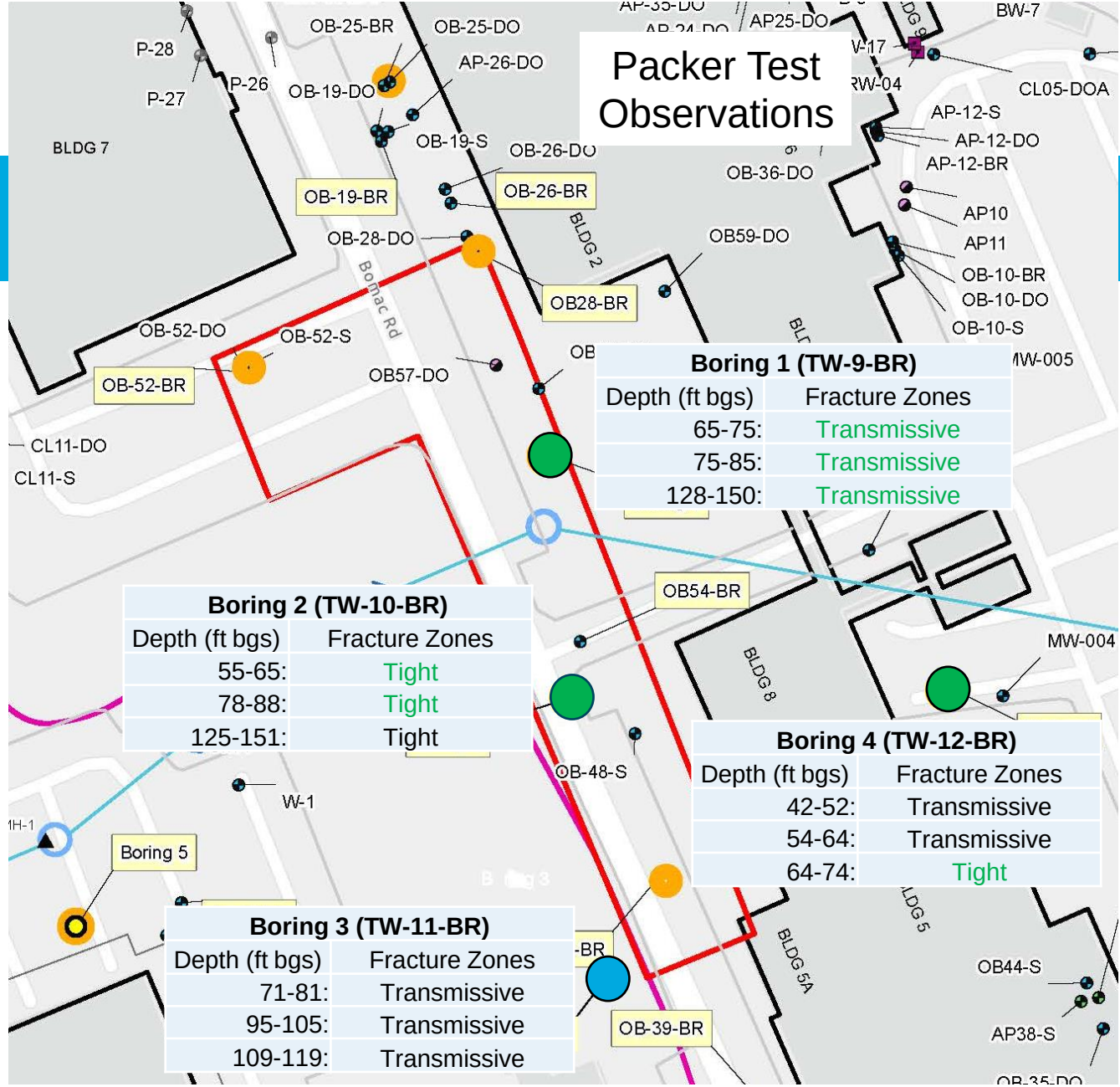

Boring 1 (TW-9-BR)

Depth (ft bgs)	Fracture Zones
65-75:	Transmissive
75-85:	Transmissive
128-150:	Transmissive

Boring 2 (TW-10-BR)

Depth (ft bgs)	Fracture Zones
55-65:	Tight
78-88:	Tight
125-151:	Tight

Boring 3 (TW-11-BR)

Depth (ft bgs)	Fracture Zones
71-81:	Transmissive
95-105:	Transmissive
109-119:	Transmissive

Boring 4 (TW-12-BR)

Depth (ft bgs)	Fracture Zones
42-52:	Transmissive
54-64:	Transmissive
64-74:	Tight

Geophysical Testing Wells

Existing Bedrock Well

New Bedrock Borehole

Concentrations above bedrock treatment goals

Concentrations below bedrock treatment goals

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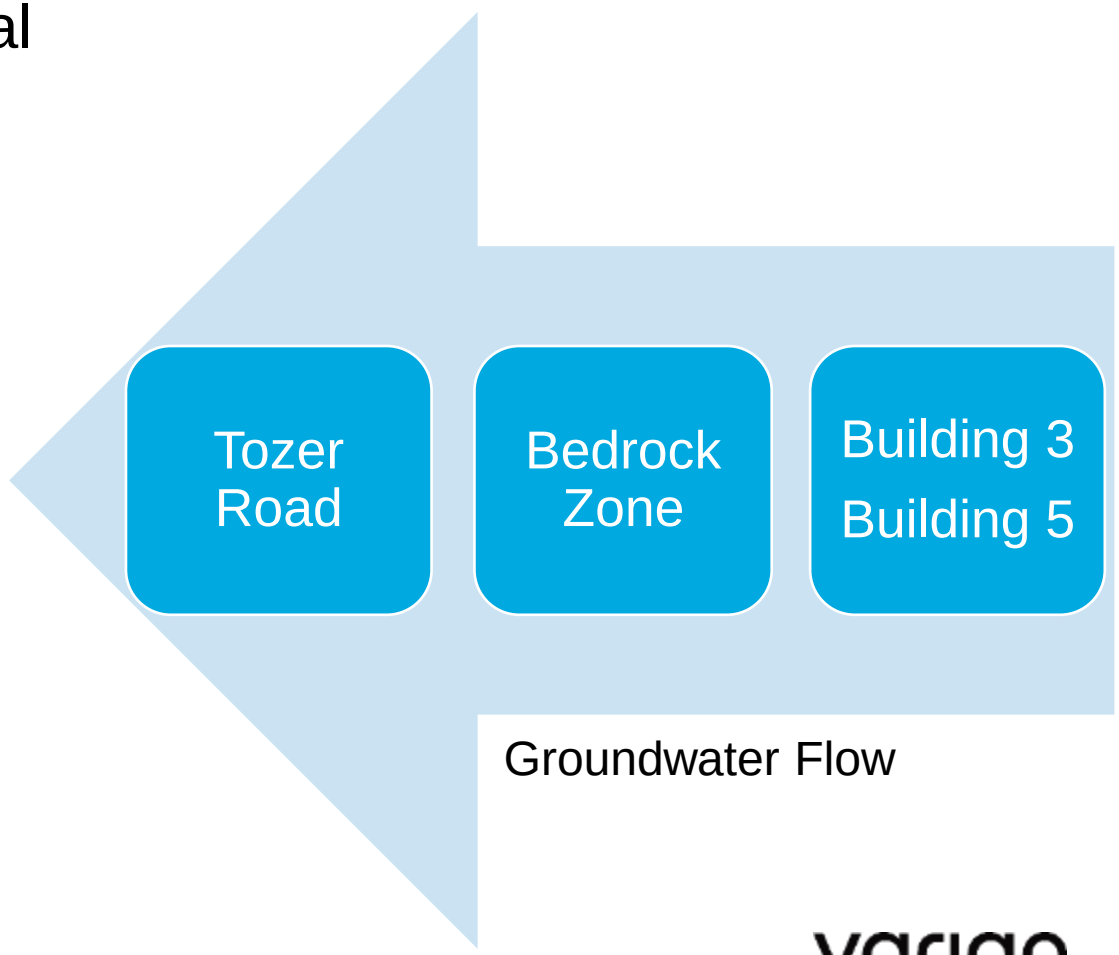
Bedrock

❖ In situ chemical ~~oxidation (ISCO)~~ reduction (ISCR)

- ISCO and ISCR both involve in-place chemical destruction of VOCs; not a significant change
- ISCR is an anaerobic process
  - Zero-valent iron + emulsified vegetable oil
  - Upgradient source area and Tozer Road remedies are anaerobic
  - Complementary approach
- Next Steps
  - Sample monitoring wells
  - Surface geophysics (3D view of fracture networks)
  - Install injection wells
  - Inject amendments to destroy contaminants in place
  - Collect post-injection groundwater samples



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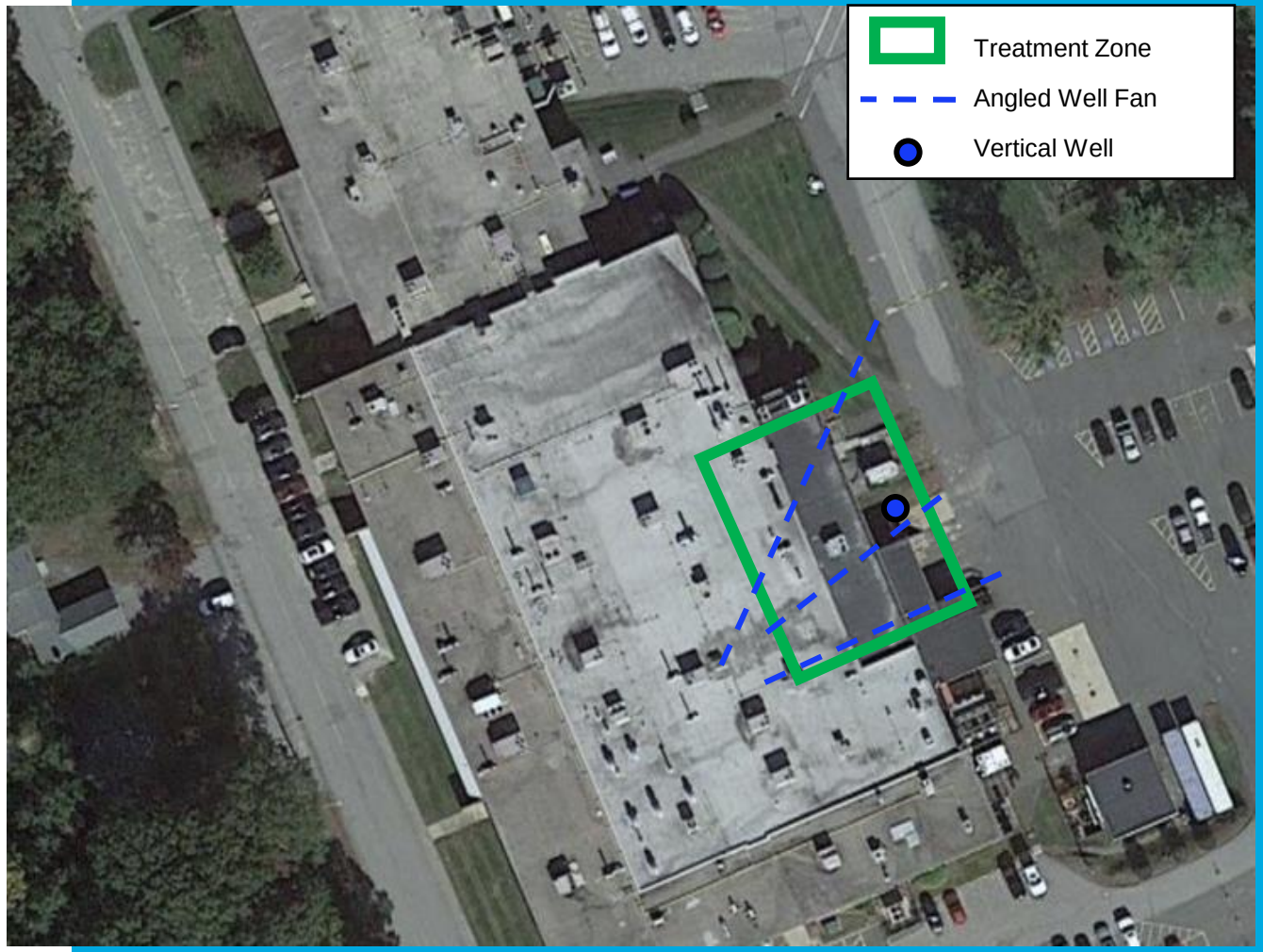
Building 5

- **In situ bioremediation**
- **Continued soil vapor extraction**

- Pre-design investigation and initial treatment
  - Includes vertical and angled wells
  - Completed structural evaluation in August 2024 ahead of pneumatic injection
  - Well installation with pneumatic injection of sand + zero-valent iron (ZVI) + emulsified vegetable oil (EVO) to enhance permeability
  - Plan to start once evaluation is done and Tozer Road barrier is in place
- After pre-design investigation and initial treatment, will complete additional treatment in shallow areas, as needed



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Stream A Reactive Core Mat

- **Granular activated carbon permeable adsorptive barrier**

- Inspections continue – no issues observed
- Drainpipe video inspection indicated a collapsed pipe, with no connection to the stormwater drainage at Longview Drive/Terrace

System Installation Schedule*

Treatment Area	Design Complete	System Installation	Start of Treatment	Monitoring
Building 3 (Thermal)	Complete	In Progress	Summer 2025	2025
Tozer Rd (Barrier)	Fall/Winter 2024	Winter/Spring 2025	Winter/Spring 2025	2025
PSL10 (SBGR)	Complete	Late Fall/Winter 2024	Winter 2025	2025
Building 5 (Bio)	Fall 2024	Winter/Spring 2025	Winter/Spring 2025	2025
Bedrock (ISCR)	Fall 2024	Late Fall 2024	Winter/Spring 2025	2025
Stream A (Mat)	Complete	Complete	Complete	Ongoing

NOTES:
* = Estimated schedule, subject to change
Bio = Bioremediation
ISCT = In situ chemical treatment
Mat = Reactive core mats
SBGR = Subgrade Biogeochemical Reactor

Reports Available

- Currently available for more information
  - Revised Phase IV Status Report
- Upcoming for public comment (dates to be announced)
  - Asbestos Abatement IRA
- Hard copies
  - Beverly Public Library Reference Desk
- Online

  https://eeaonline.eea.state.ma.us/EEA/FileViewer/Rtn.aspx?rtn=3-0000485

For More Information

- Website: https://beverlysitecleanup.com/
  - Homepage updated monthly
  - Public meeting videos
  - Overview of environmental investigation and treatment to date
  - Links to MassDEP website
  - Links to MassDEP and EPA fact sheets on cleanup process and technologies
  - Forms to submit comments or sign up for emailed site mailing list
- Email: beverlysitecleanup@jacobs.com

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Questions

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