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Revolutionizing CSM Development and Updates with Geospatial Applications and Interactive Data Analytics

*Case Study: Dissolved-Phase
Chlorinated Solvents in a Fractured
Shale Aquifer,
Federal Facility Supplemental Remedial Investigation*

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Trust.
Performance.
People.



Mike Chapa, P.G., PMP

Weston Solutions, Inc.
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-
- Principal Project Scientist/Technical Manager
 - State of Texas Professional Geoscientist (Soil Science)
 - 31 years industry experience
 - Expertise in CERCLA, RCRA investigations (L/DNAPL), remedy applications for federal clients
 - Extensive project experience with evaluation and implementation of in-situ groundwater treatments for chlorinated solvents and petroleum hydrocarbon plumes

Janine Latham

Geospatial Technical Director
Weston Solutions, Inc.
Dallas, TX

Dan Strobridge

Senior Developer
Weston Solutions, Inc.
West Chester, PA

Web-based Geospatial Platforms

Field investigation design
and real-time
implementation support



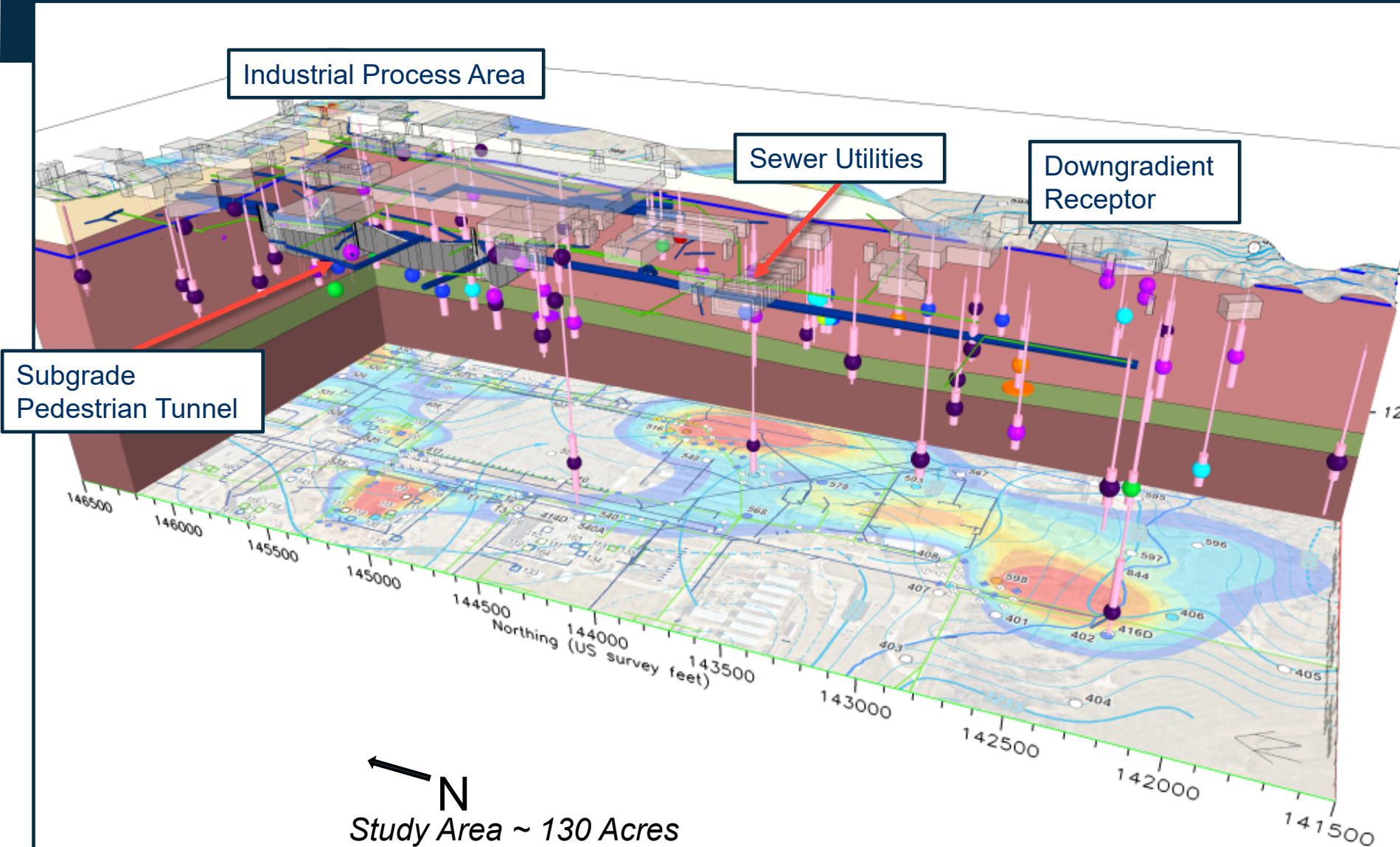
Stakeholder
Coordination of
Results and
Recommendations



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Site Background



- Fractured Permian shale bedrock aquifer impacted by historical industrial operations
- Saturated zone generally below top of shallow bedrock, 10-15 feet below ground surface (ft bgs)
- Currently characterized chlorinated organic plume concentrations at less than 0.5 milligrams per liter (mg/L)
- Investigation and monitoring from mid-1990s to present
- MNA Remedy-in-Place under review due to sporadic plume geometry changes

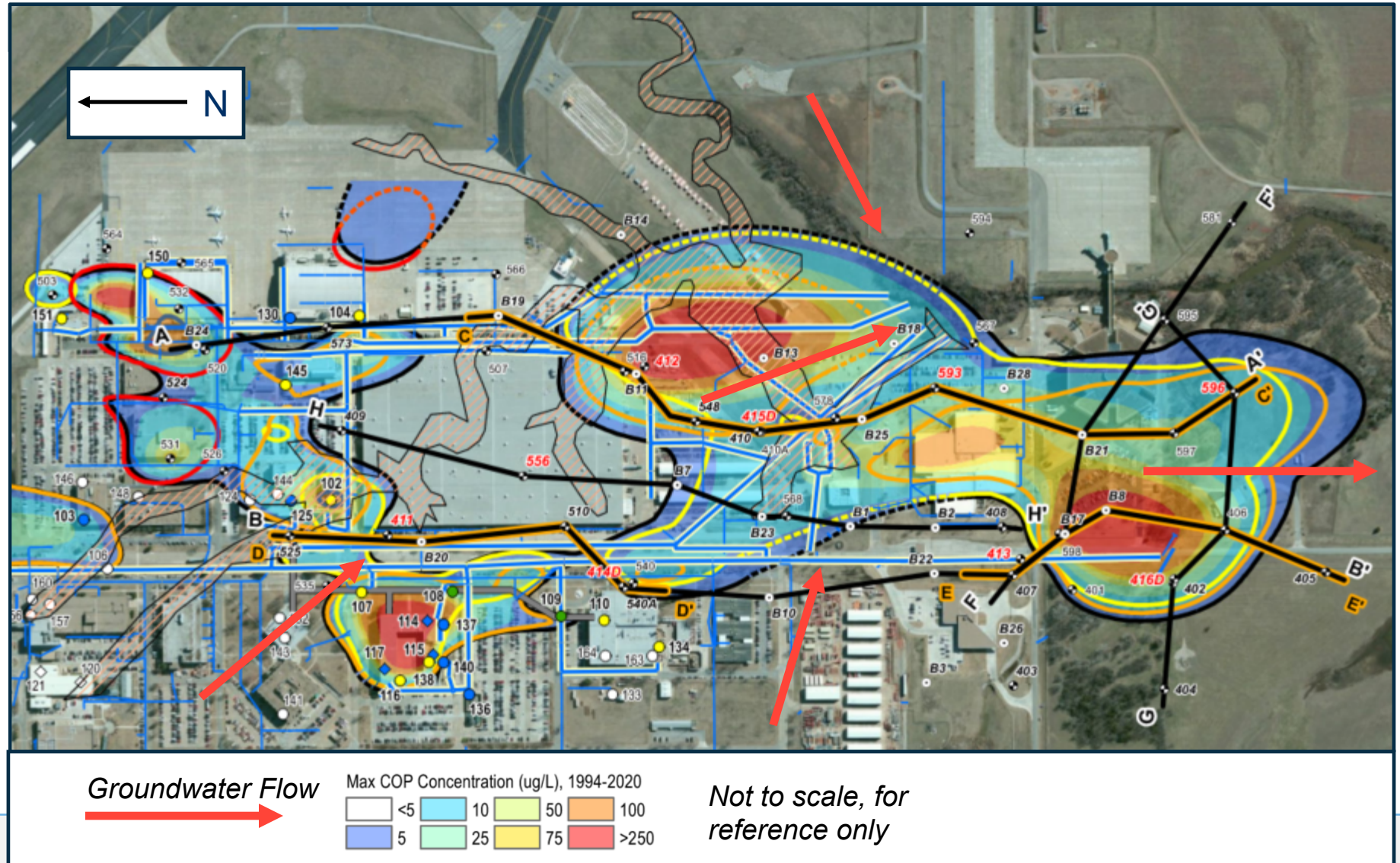
Hydrogeologic CSM Update Required!

■ Supplemental RI Problem Statement:

Contaminant groundwater plume distribution is influenced by factors other than regional direction of groundwater flow and known source areas.

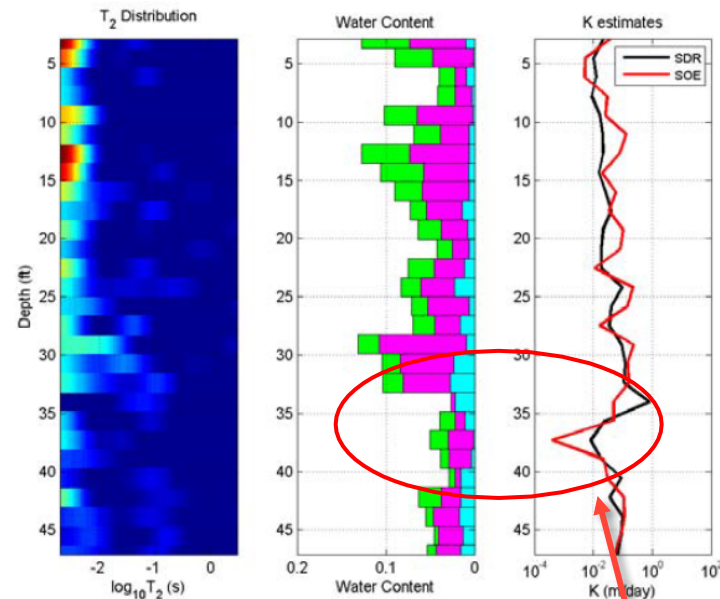
■ Investigation Objectives

- Characterize potential VI exposures.
- Characterize conditions affecting contaminant fate and transport.
- Evaluate source areas for revised remedy application.



HRSC Data Collection

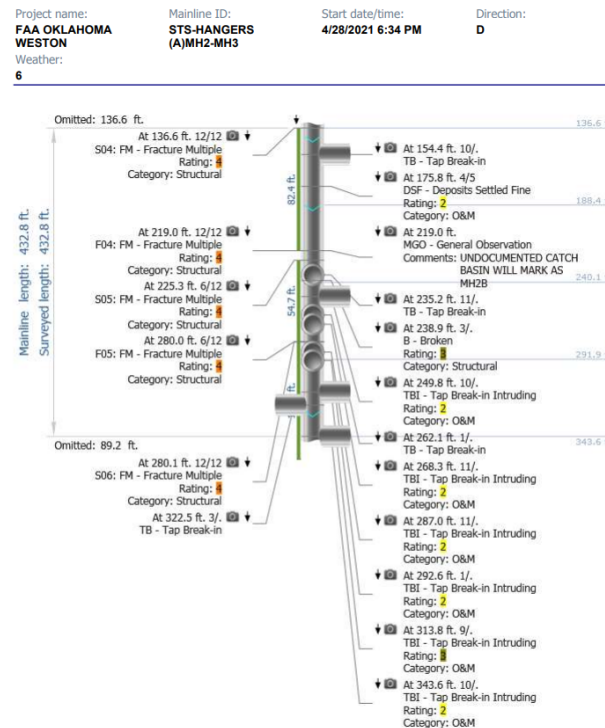
■ Nuclear Magnetic Resonance (NMR) Logging



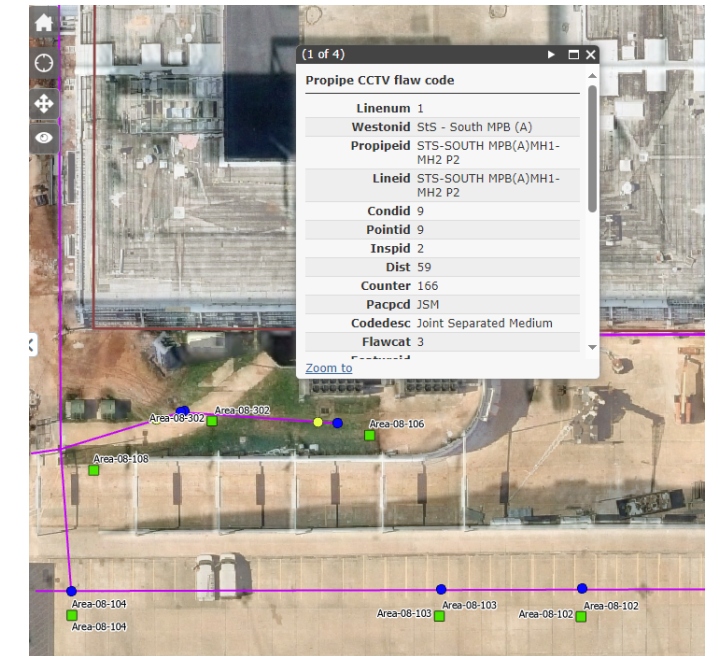
- “Clay-bound” water
- “Capillary” water
- “Mobile” water

High
Permeability
Zone with More
Water

■ Closed Circuit Television Utility Assessment and Elevation Survey



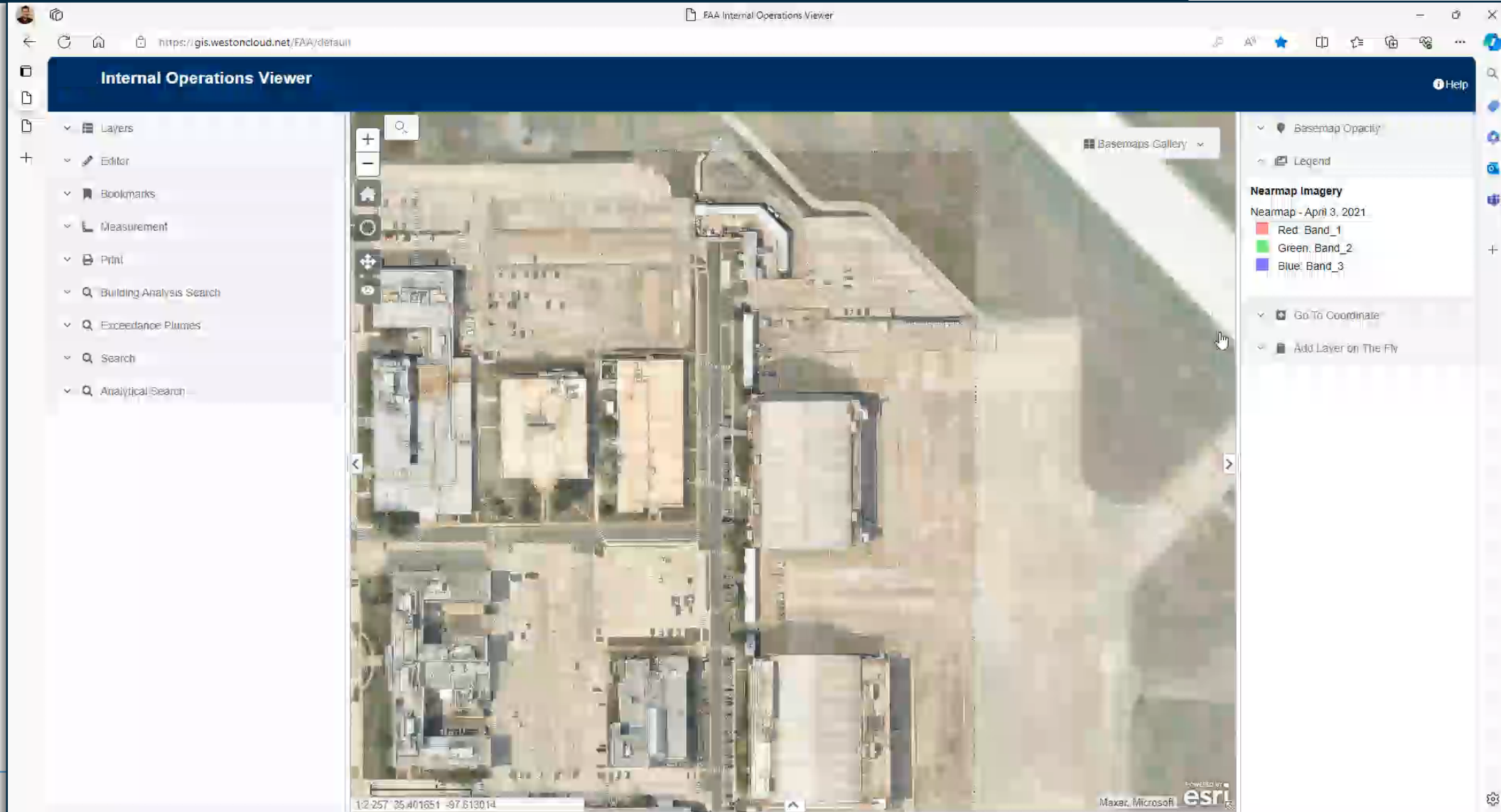
■ High Location Density Soil Vapor Survey with On-site Mobile Lab



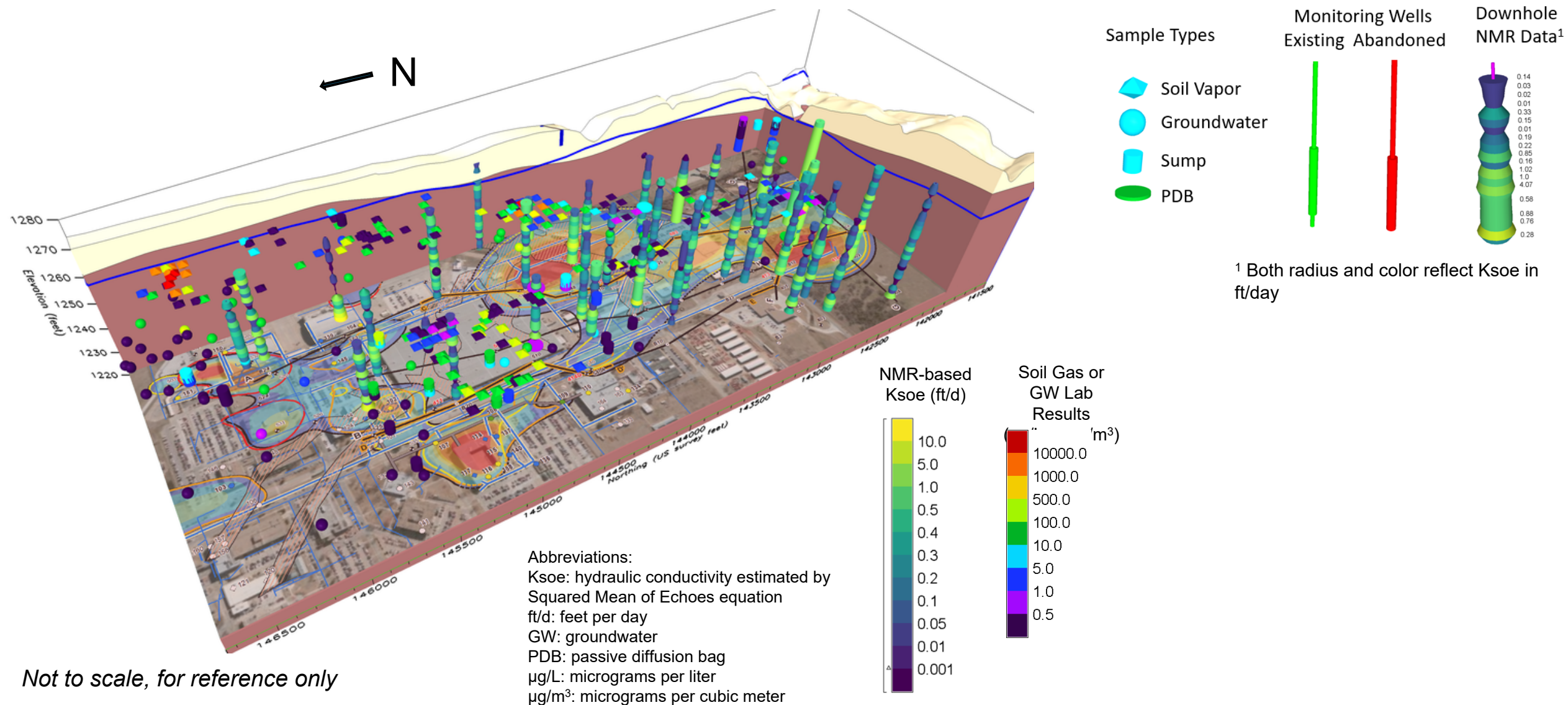
Field Investigation Geospatial Support

Home Office Direction of Field Sampling

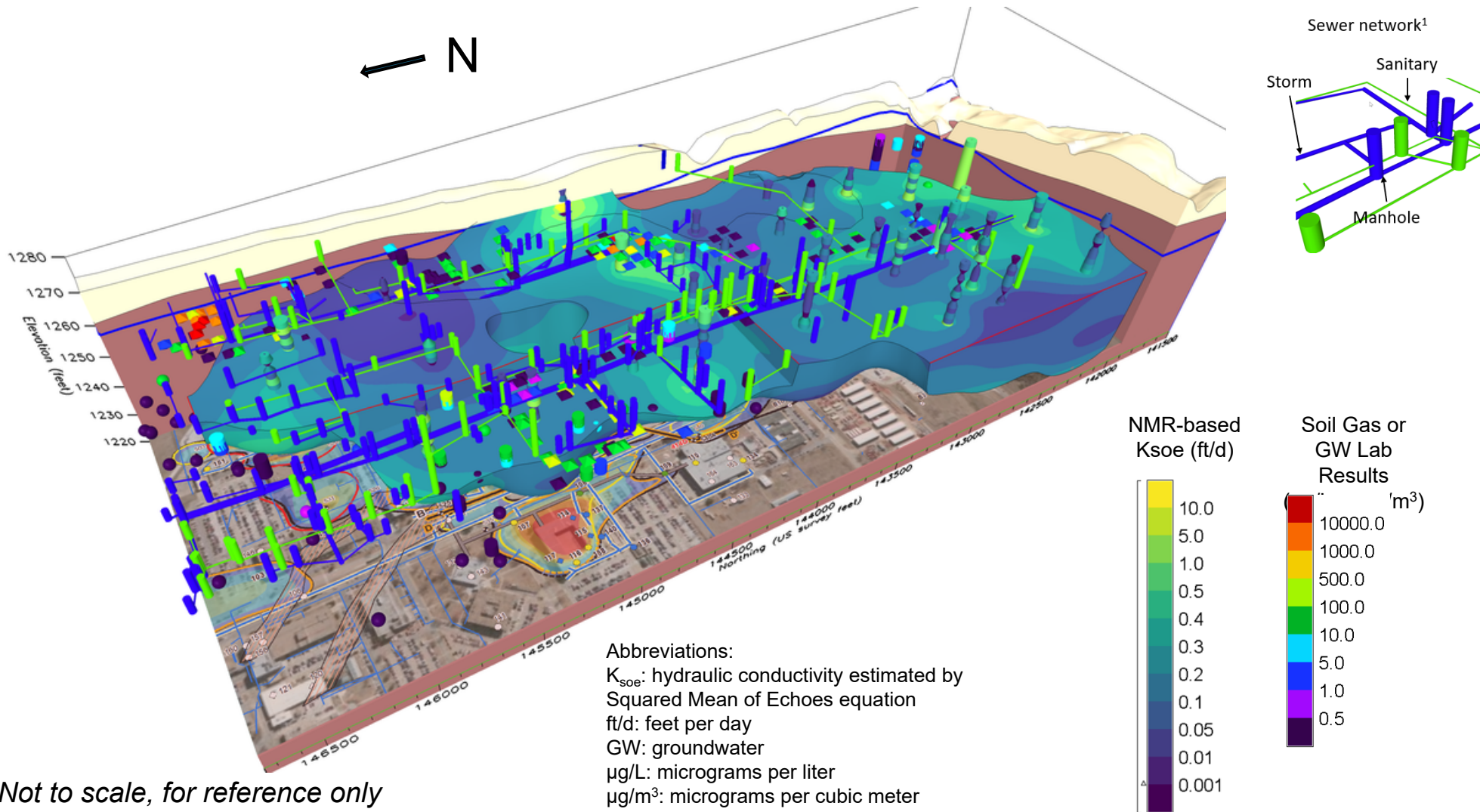
- Monitoring Wells
- Groundwater Contours
- Plume Extent
- Release Sites
- Utilities w/ Integrity Assessment
- Pre-cleared Areas for SVS delineation
- Field observations and analytical results



3D Block Model – Supplemental RI Results



3D CSM Update with Utilities and NMR-based K

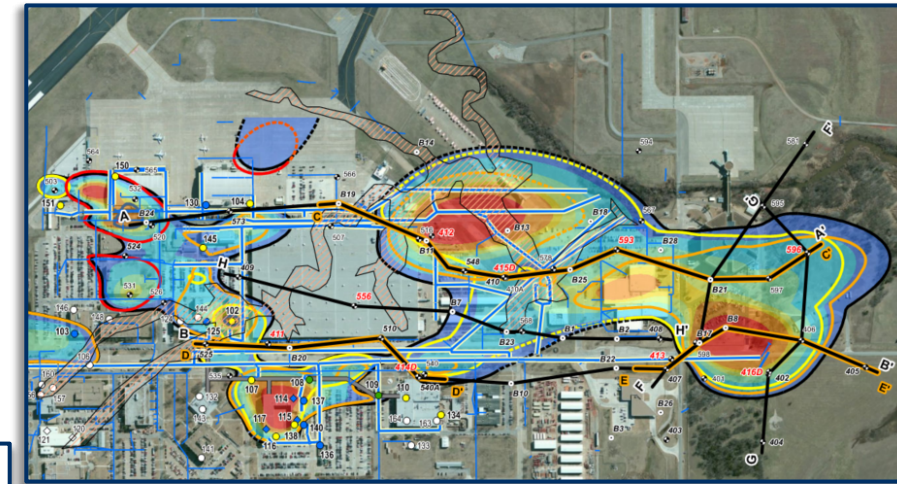
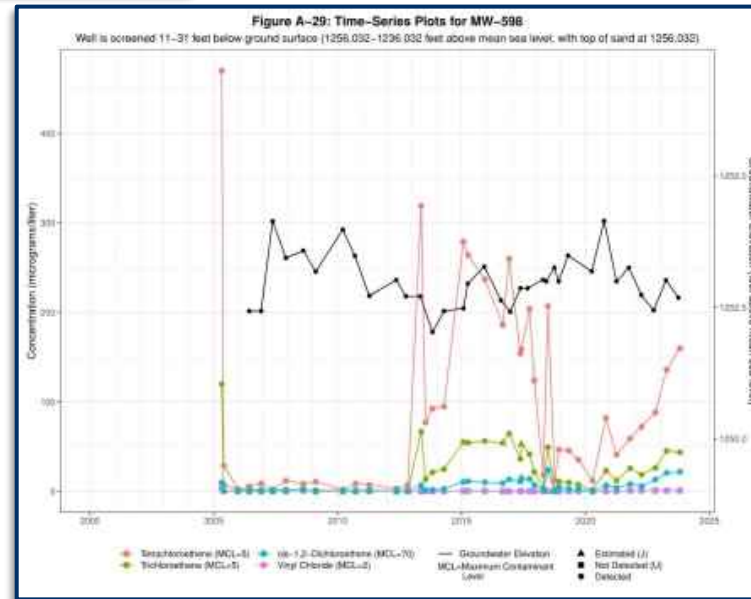


¹ Tube diameter reflects pipe diameter.

Supplemental RI: Data Gap Review Challenges

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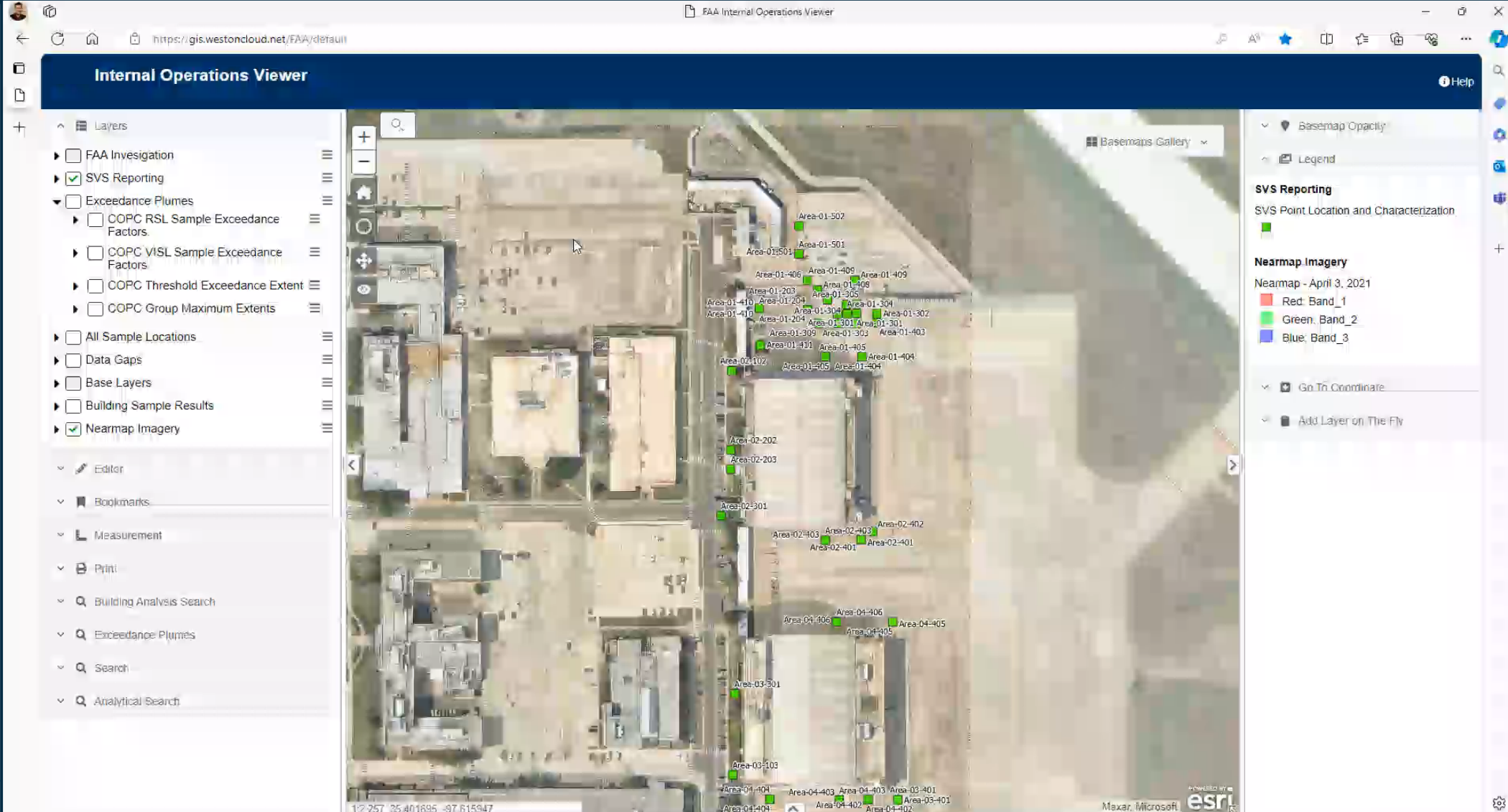
- **60+ volatile organic compounds (VOCs) detected in one or more medium > USEPA Screening Levels (SLs)**
- **Combined into functional COPC groups for automated R script derived contouring**



- **Multiple high groundwater concentration areas over 100+ acres**

- **Up to 30-year sample record for 50+ wells and sumps**

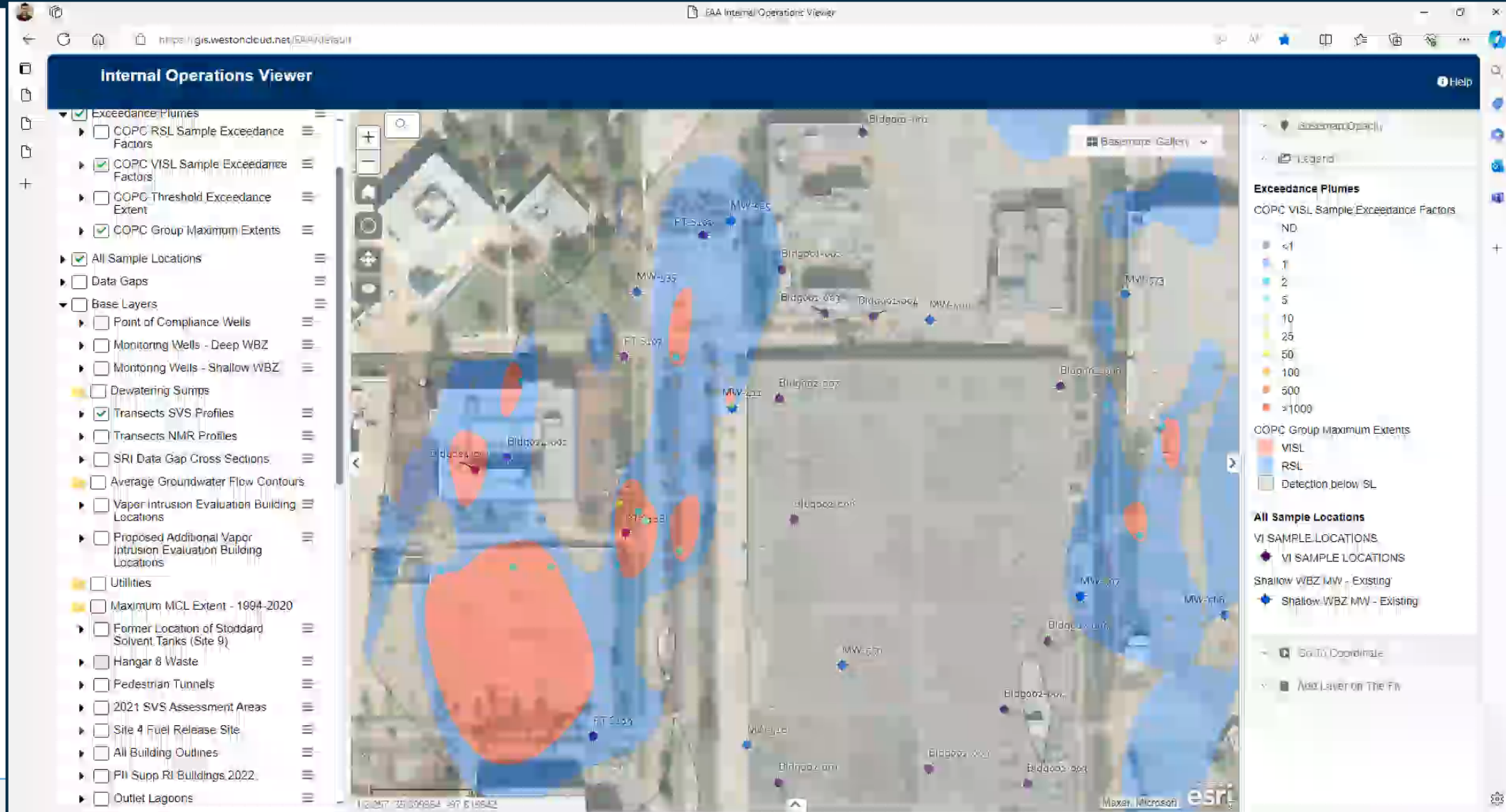
- Grouped or individual COPC Displays



Cross-Media Impact/Fate and Transport Analysis

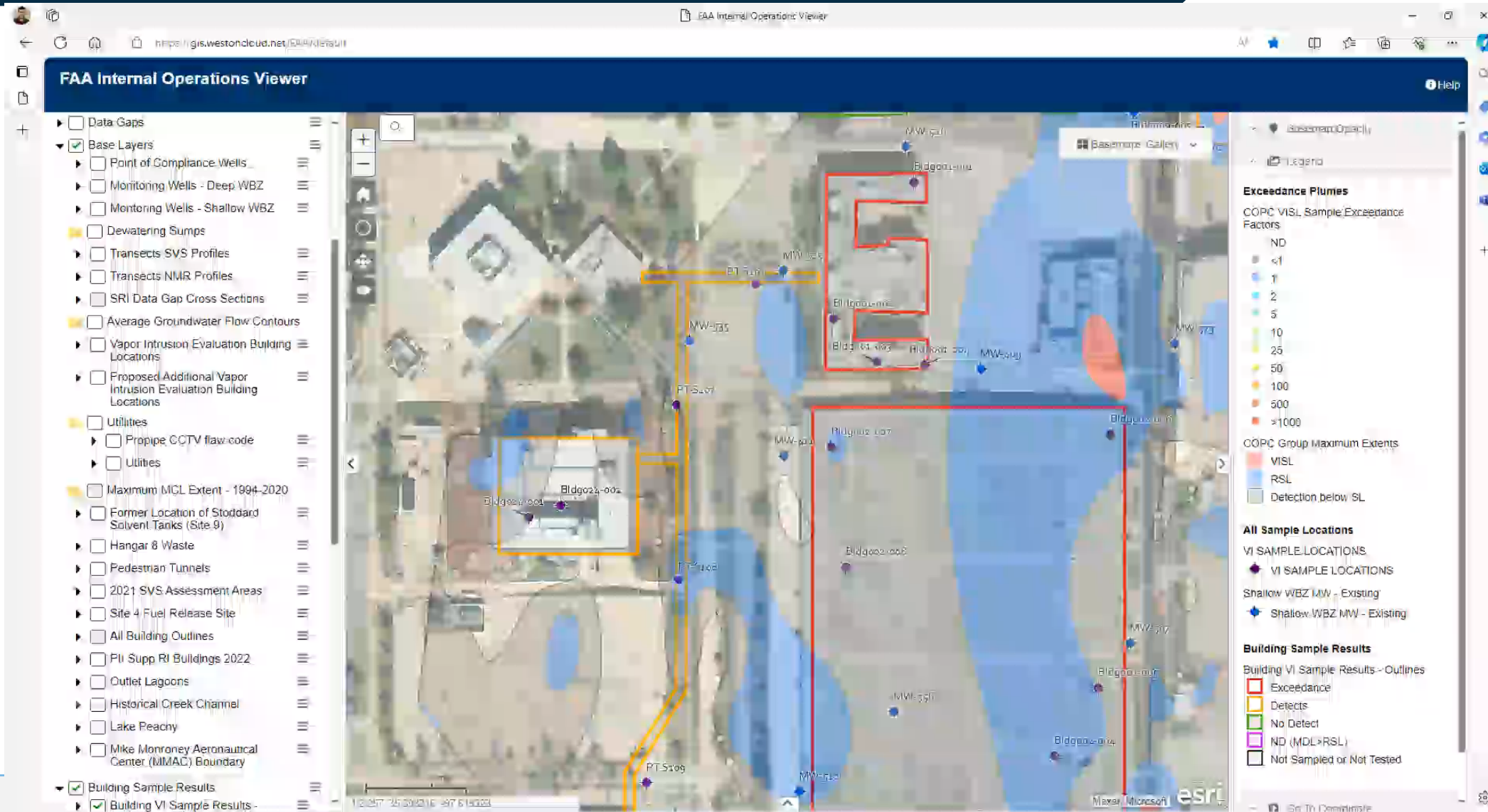
Geospatially referenced Cross-Sections:

- SVS and groundwater results with utilities
- Proposed new investigation points with analytical results and NMR-based K



Supplemental RI: Data Gap Area Delineation

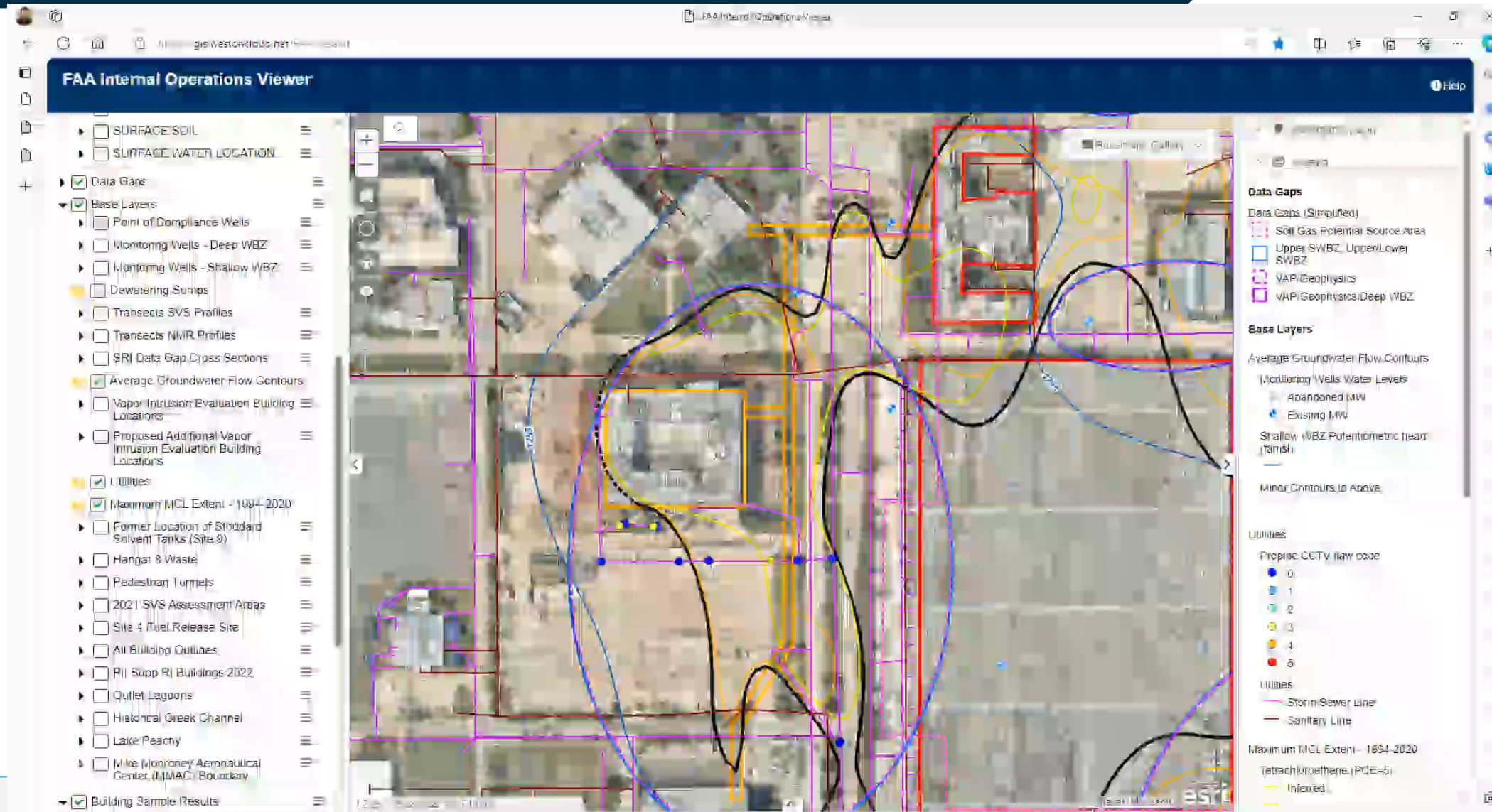
- Review nature and extent by medium, by grouped, individual COPCs
- Geospatial processing to combine COPC Group data gap areas



Supplemental RI: Proposed Sample Location Review

Select New Investigation Points:

- Focus on VI Pathway
- Vertical Aquifer Profiling
- Combined COPC review for soil gas and groundwater

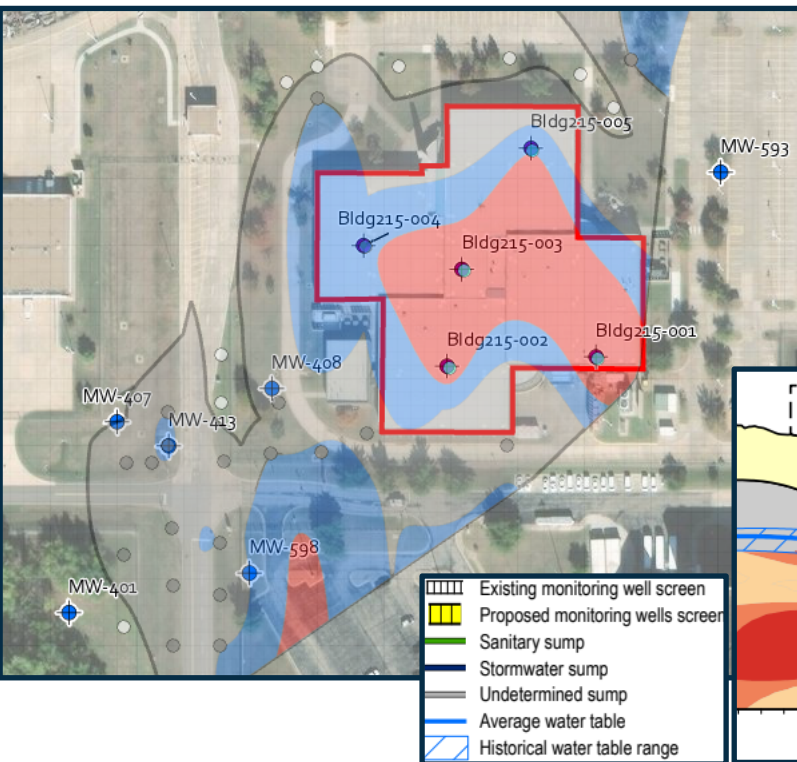


Supplemental RI: Interim Scope Review

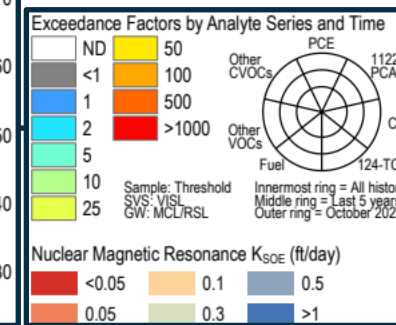
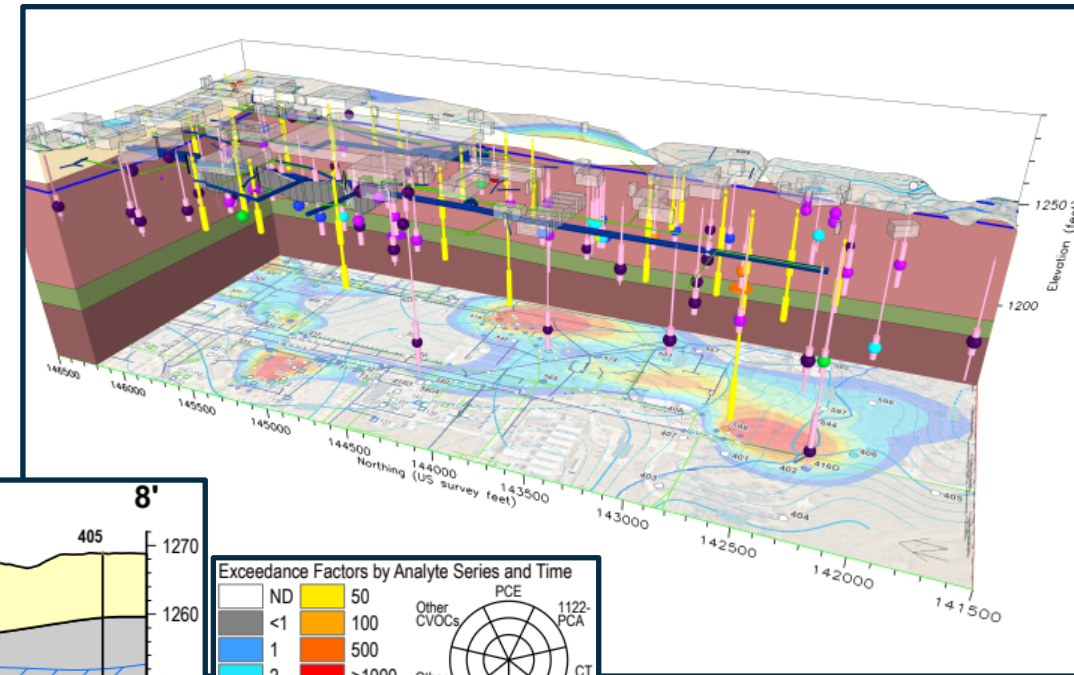
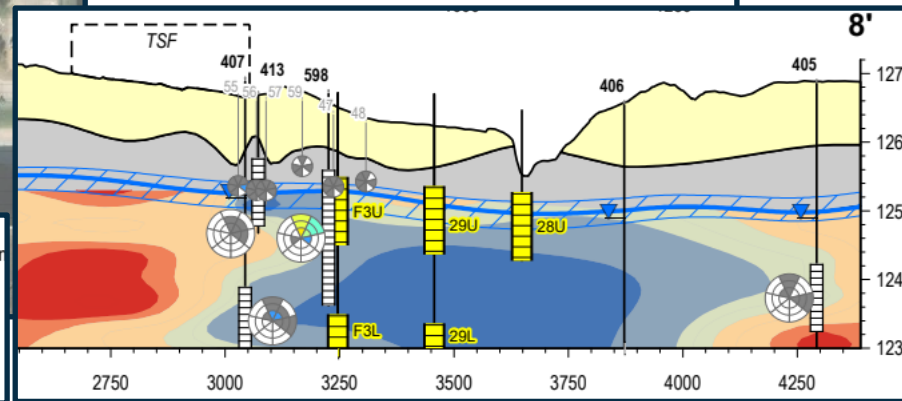
Streamlined Review of Investigation Priorities

- VI Pathway
- COPCs with shared indoor air/subsurface media screening level exceedances
- Downgradient groundwater delineation

Stakeholder coordination of next phase Supplemental RI scope prior to work plan submittal for review



Videoconference Review Sessions Supported by Geospatial CSM Content



Questions?



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THANK YOU!

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