3D Data Visualization for Contaminated Sites

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Contaminated sites

Residual contamination can exist at many types of sites.

- Industrial Manufacturing
- Military Facilities
- Former Landfills
- Dry Cleaners
- Many more

Contaminants of Concern

- Chlorinated Solvents
- Metals
- PCBs
- Emerging Contaminants

Understanding Contamination

Researchers need to create a "Conceptual Site Model"

- What was the source of contamination?
- What is there and how much?
- How deep/far has the contamination reached?
- What are the best ways to clean up?

How do we study these sites?

- Drilling – soil borings and monitoring wells
- Testing soil, groundwater, air, concrete, many other substances
- Measuring groundwater flow
- Understanding the geology and hydrology of the site

The Problem: Lots of Data!

One study can generate thousands of data points – soil, water, sediment, etc..

- Tables and reports are difficult to interpret
- Many contaminated sites across the country have been studied for decades
- Historic data are often scattered over many reports, maps, etc, with varying quality
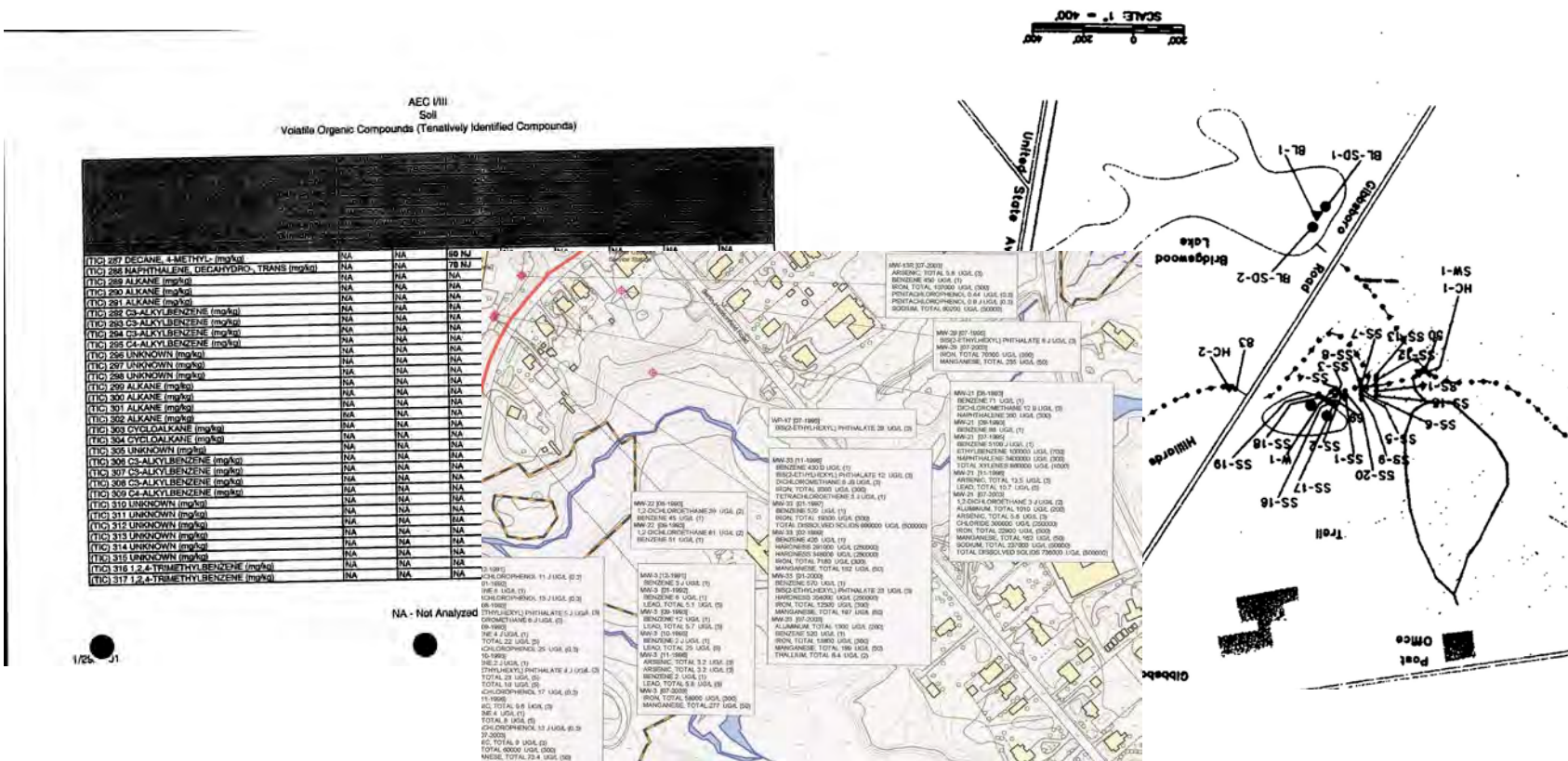
The Problem: 2D Visualization of 3D Data

Underground contaminant plume are a 3D system

- Visualizing 3D data is inherently difficult in 2D
  – Stakeholders may not be used to interpreting 2D map data like contours, geologic maps, etc.
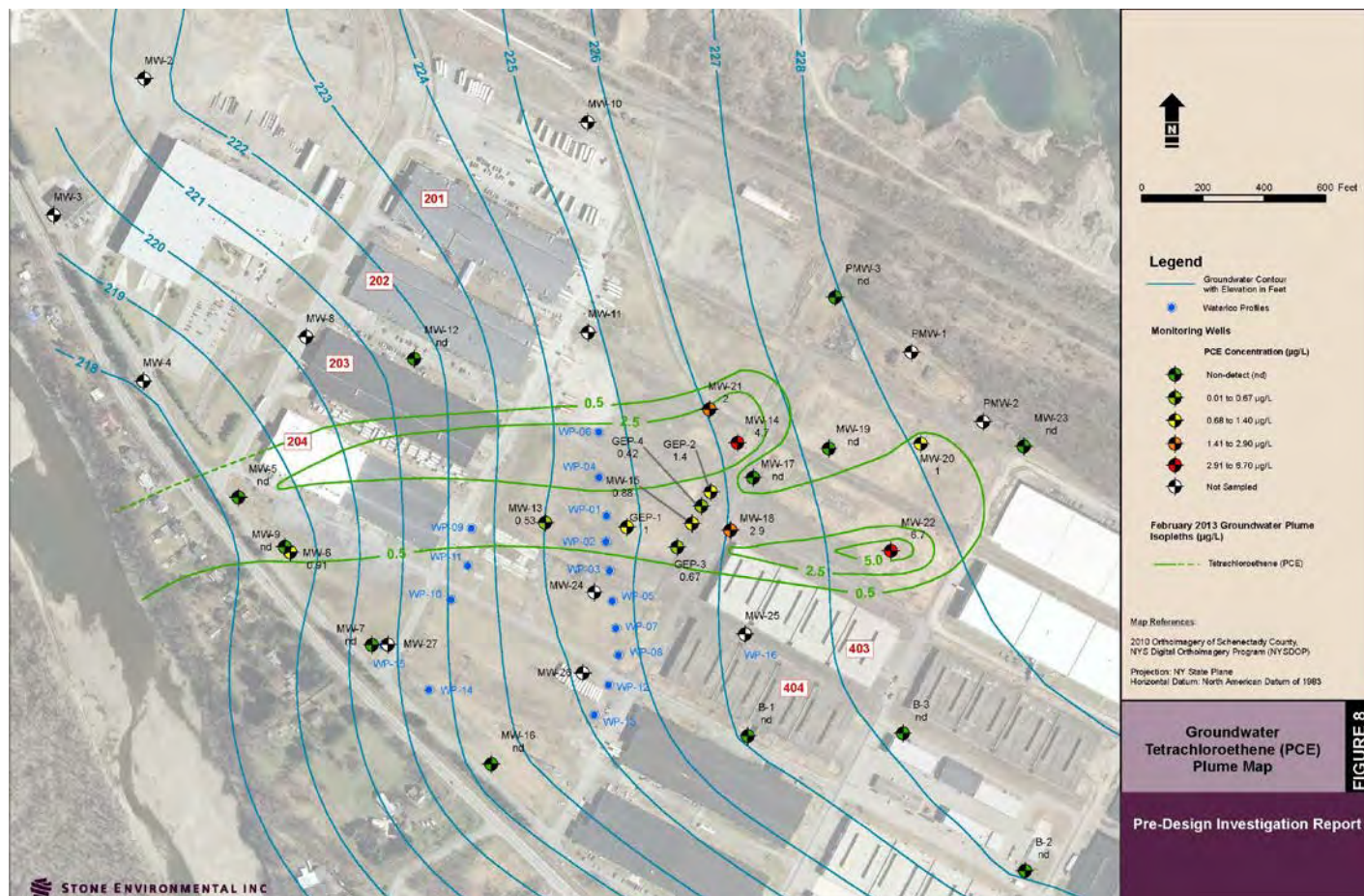
The Solution: 3D Visualization

Step 1: Historic Data Compilation

Step 2: New Data Collection

Step 3: Geospatial Analysis
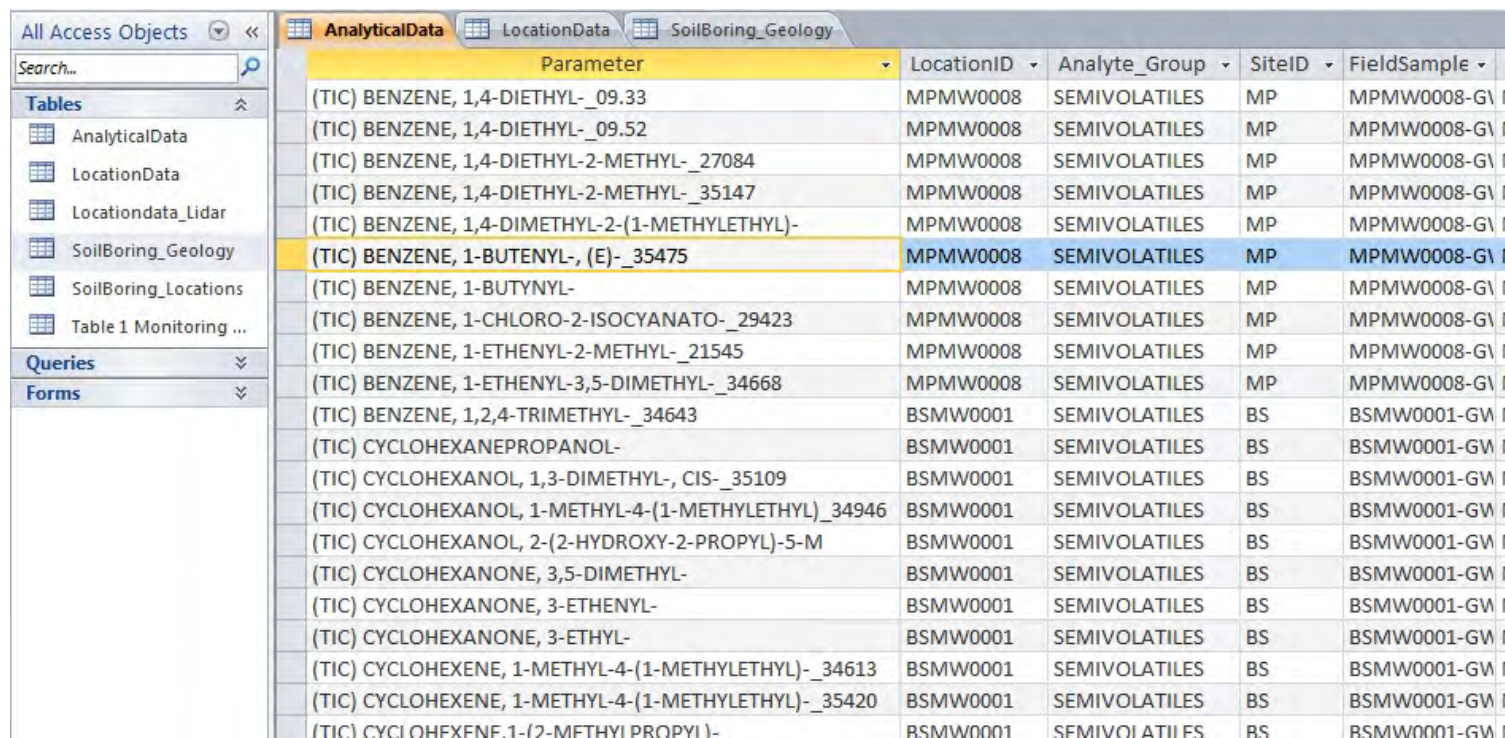
Step 4: Data Visualization
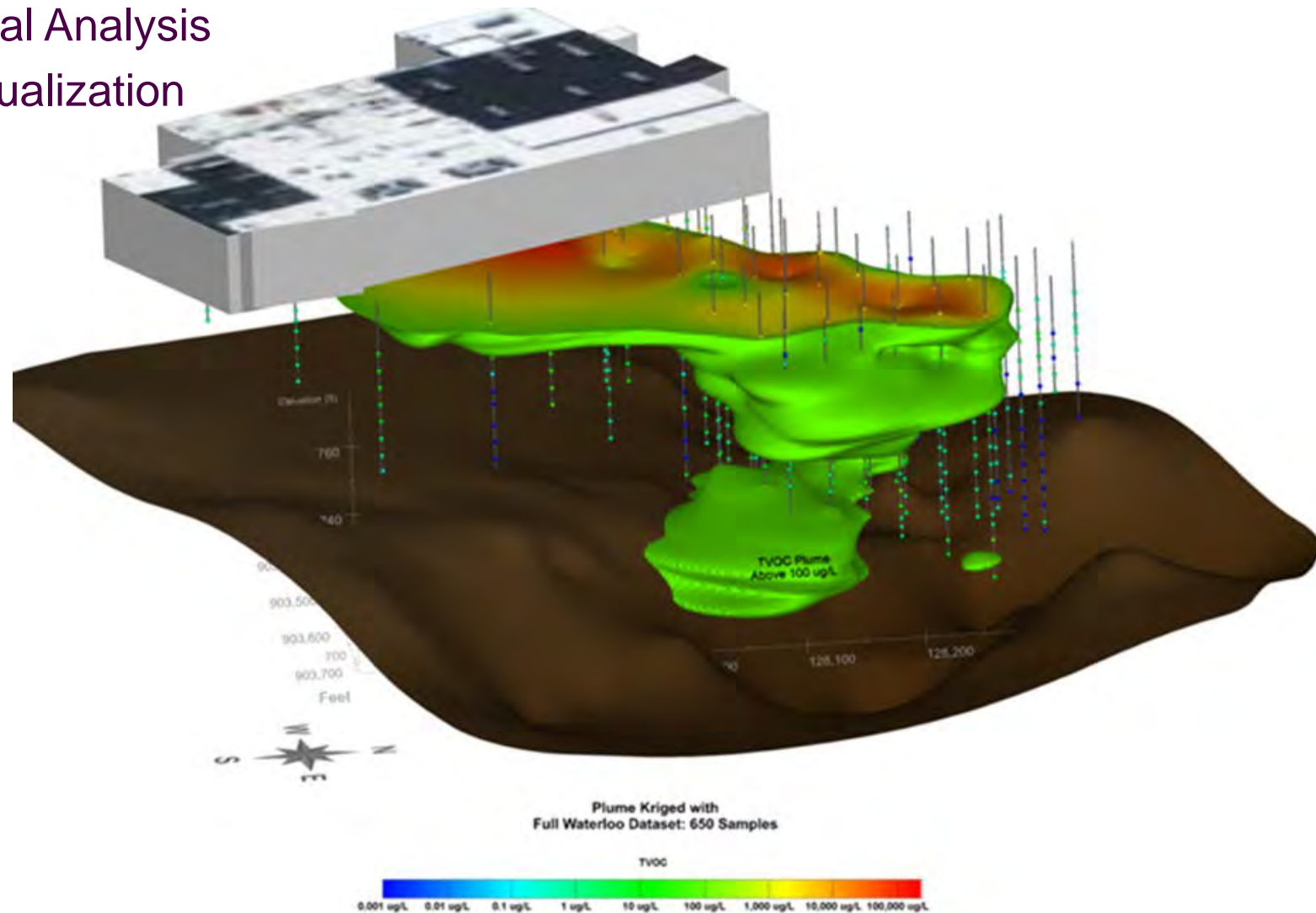
Step 1: Historic Data Compilation

Comb through all available documents and import the data into a single database

- Standardized formats (chemical names, etc)
- Searchable
- Exhaustive – All the data is in one place!

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Step 2: Field Data Collection

Utilize ArcGIS online and Collector app to store new data

- Multiple users, offline mapping
- Data moves directly to the cloud
- No more creating messy datasets!

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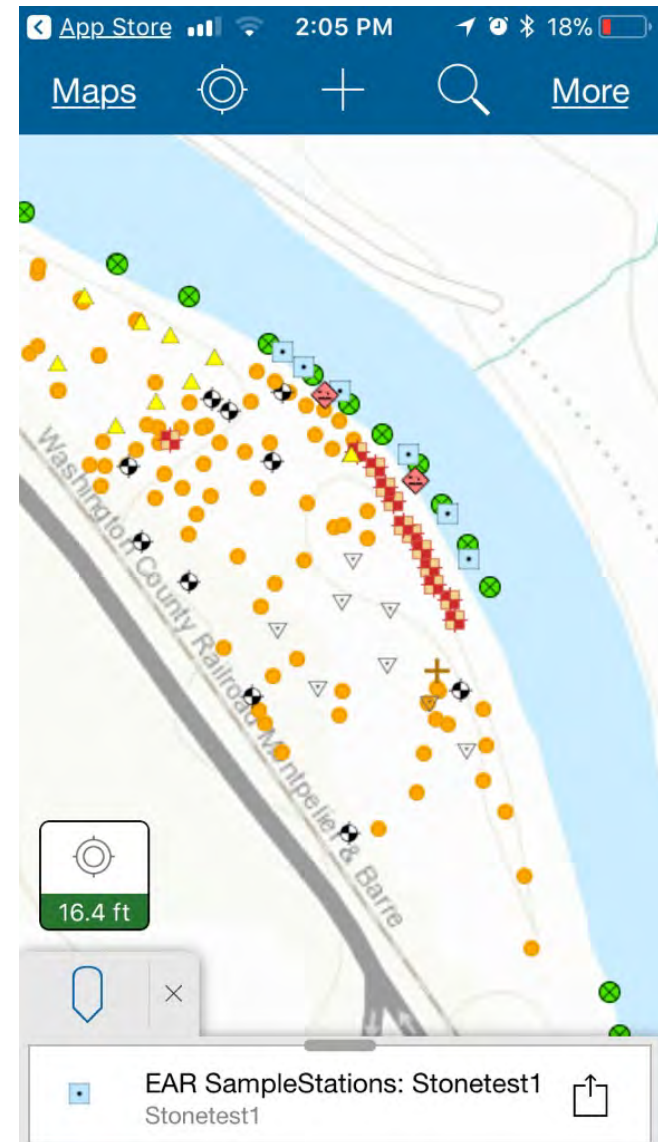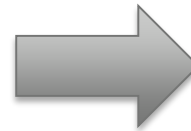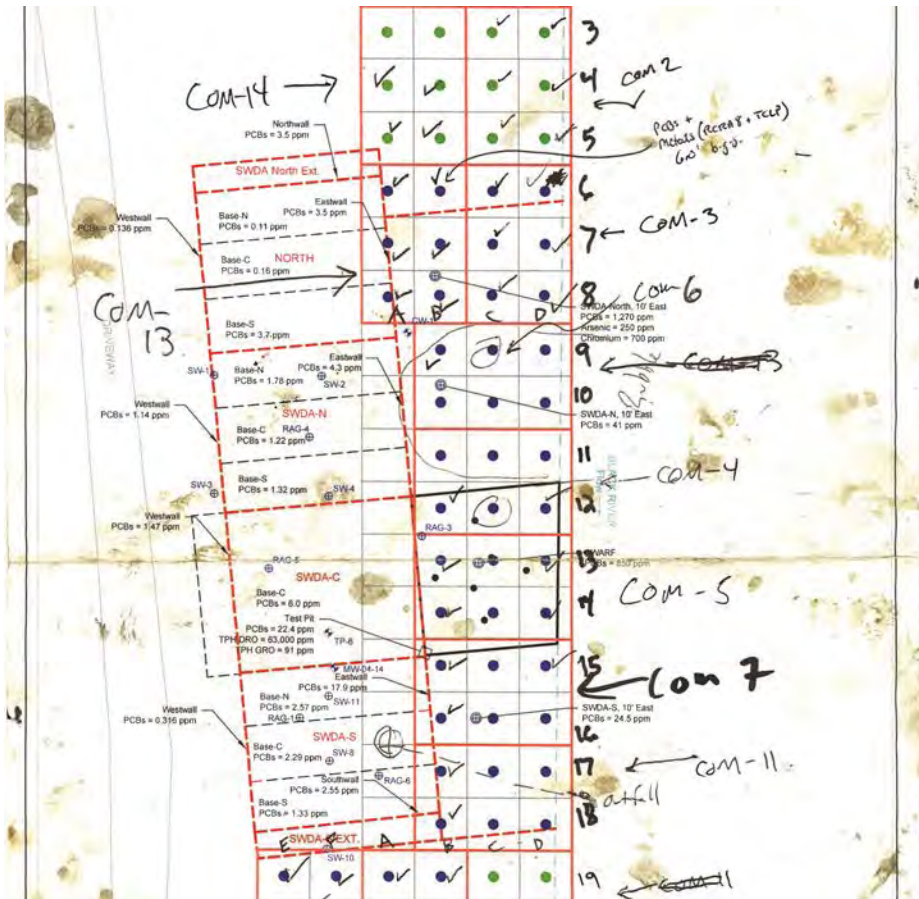
Geospatial Analysis

Combines datasets into a cohesive conceptual framework

- Mapping in ArcGIS
- 3D kriging and geologic modeling in EVS
- Create a conceptual site model
  - Hydrology
  - Geology
  - Contaminant Pathways
  - Identify data gaps
 - Recommend clean up strategies
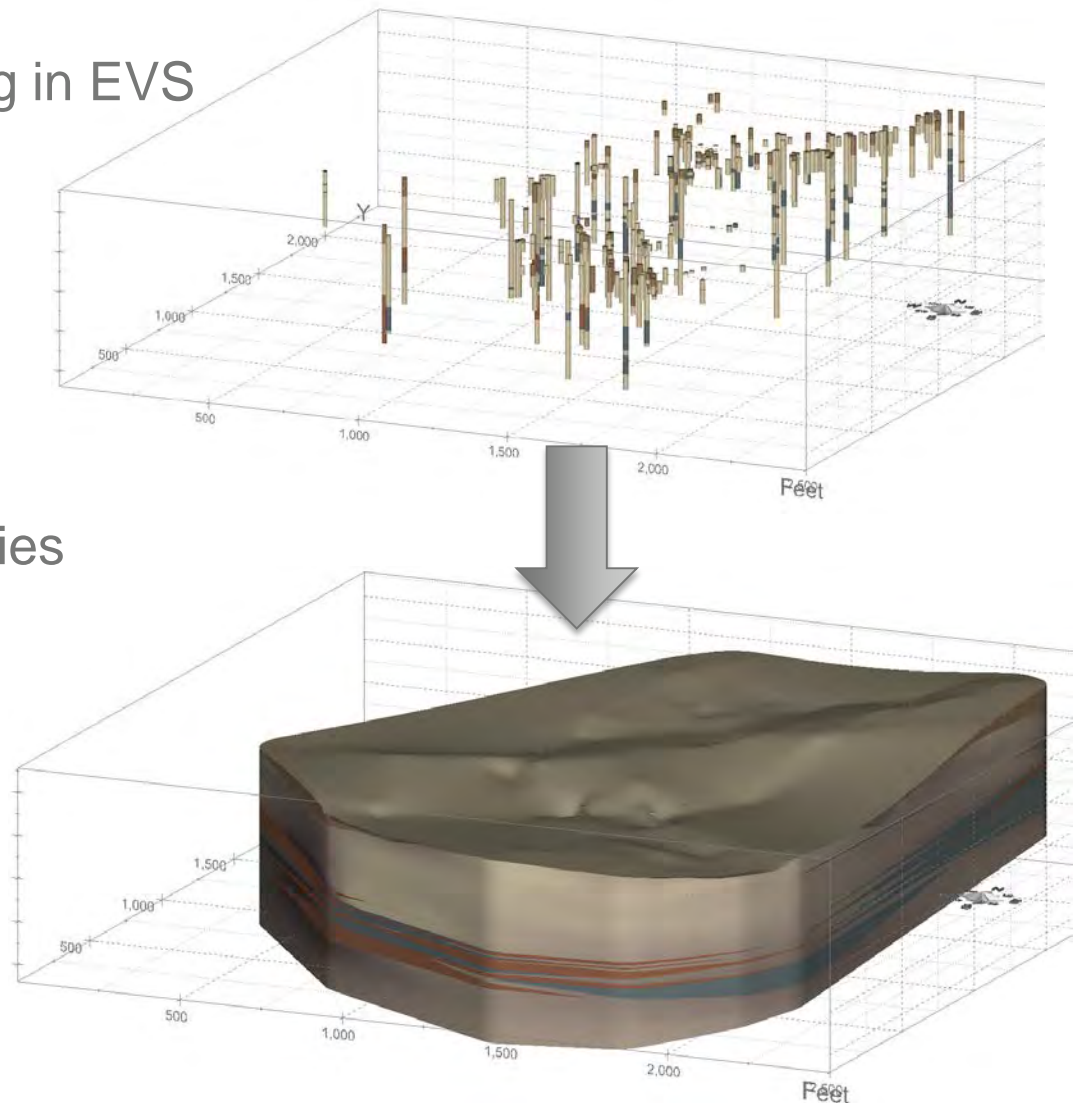
Data Visualization

Visualize highly complex sites in intuitive and data-rich formats

- Visually compare contaminant concentrations with geology, hydrology, etc.
  - 3D visualization with Earth Volumetric Studio
  - Interactive, shareable maps with ArcGIS online
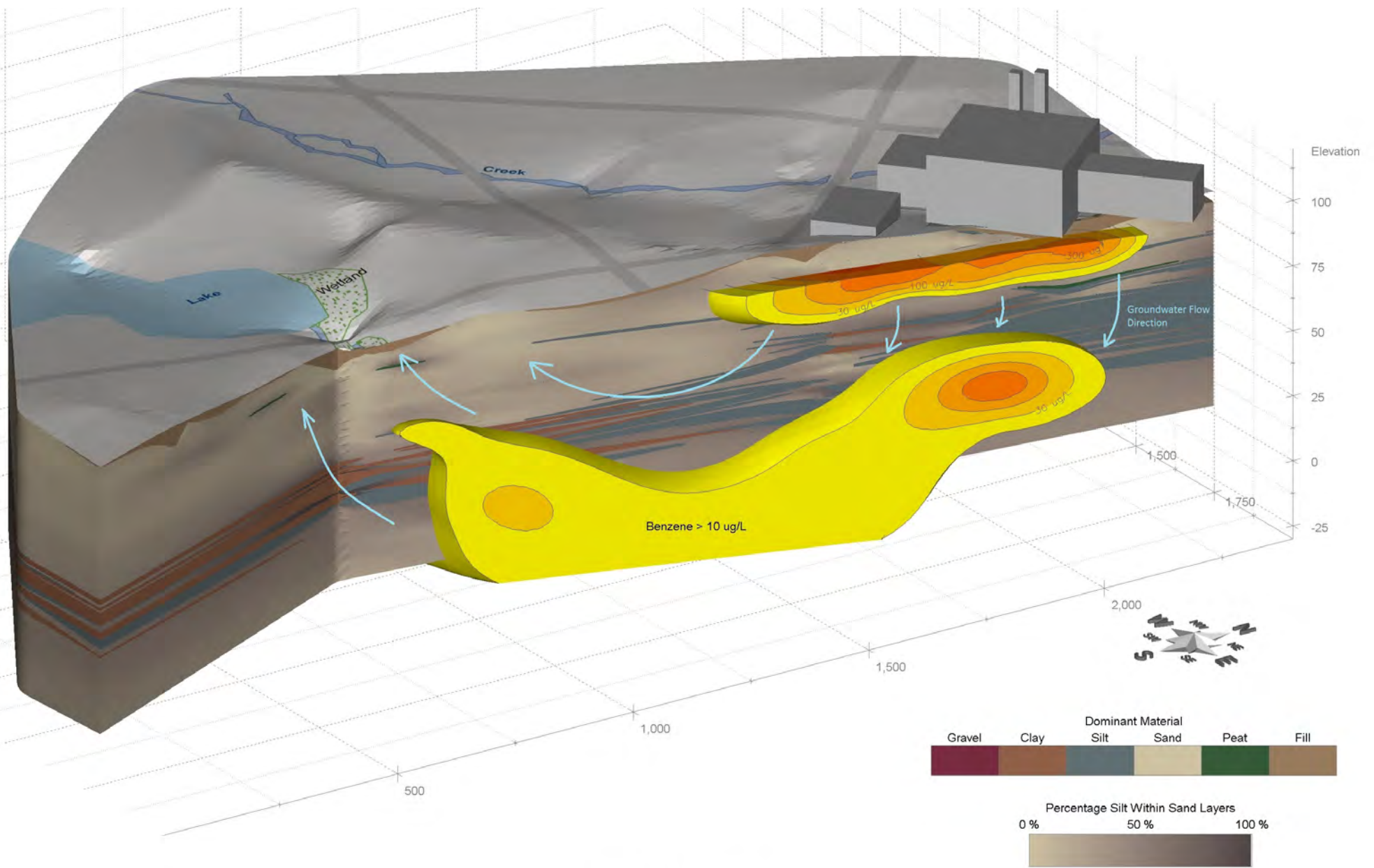 - Interpretation

Example 1: Superfund Site
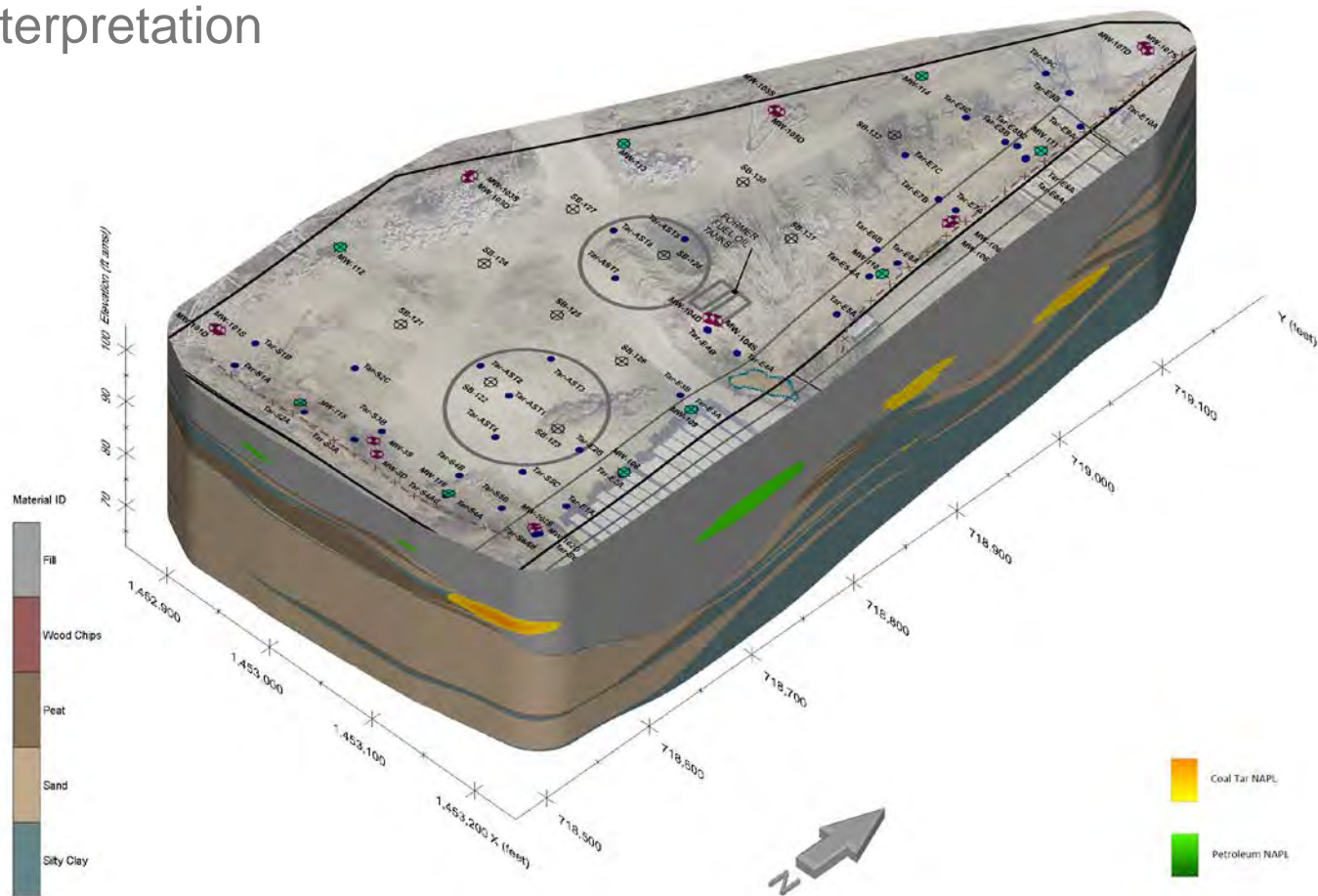
Stone was tasked with creating a conceptual site model for a superfund site

- Data going back to 1979
- More than 250 soil borings and wells
- Thousands of individual datapoints
- Data scattered between 115 different files
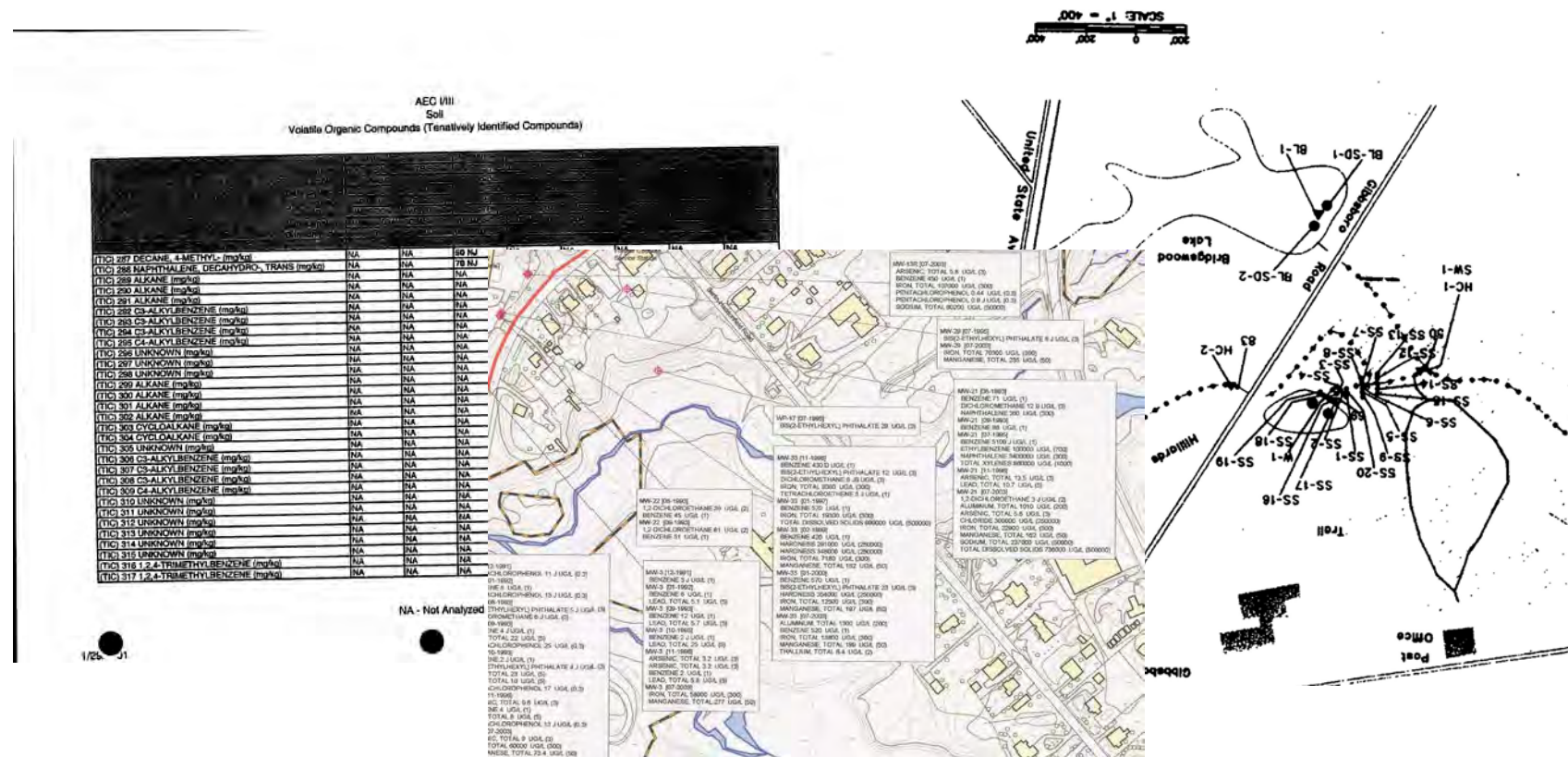
Example 1: Superfund Site
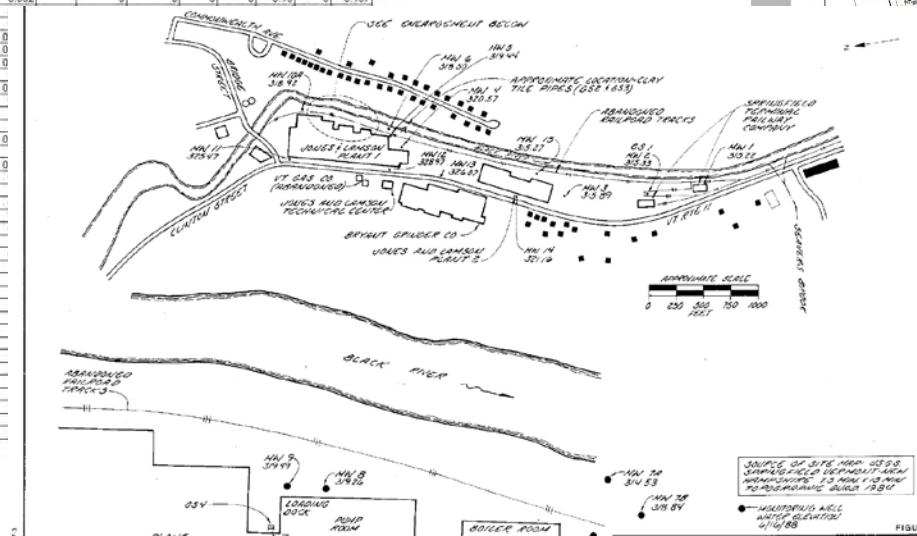

Benzene in Groundwater

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Example 2: Brownfields Site

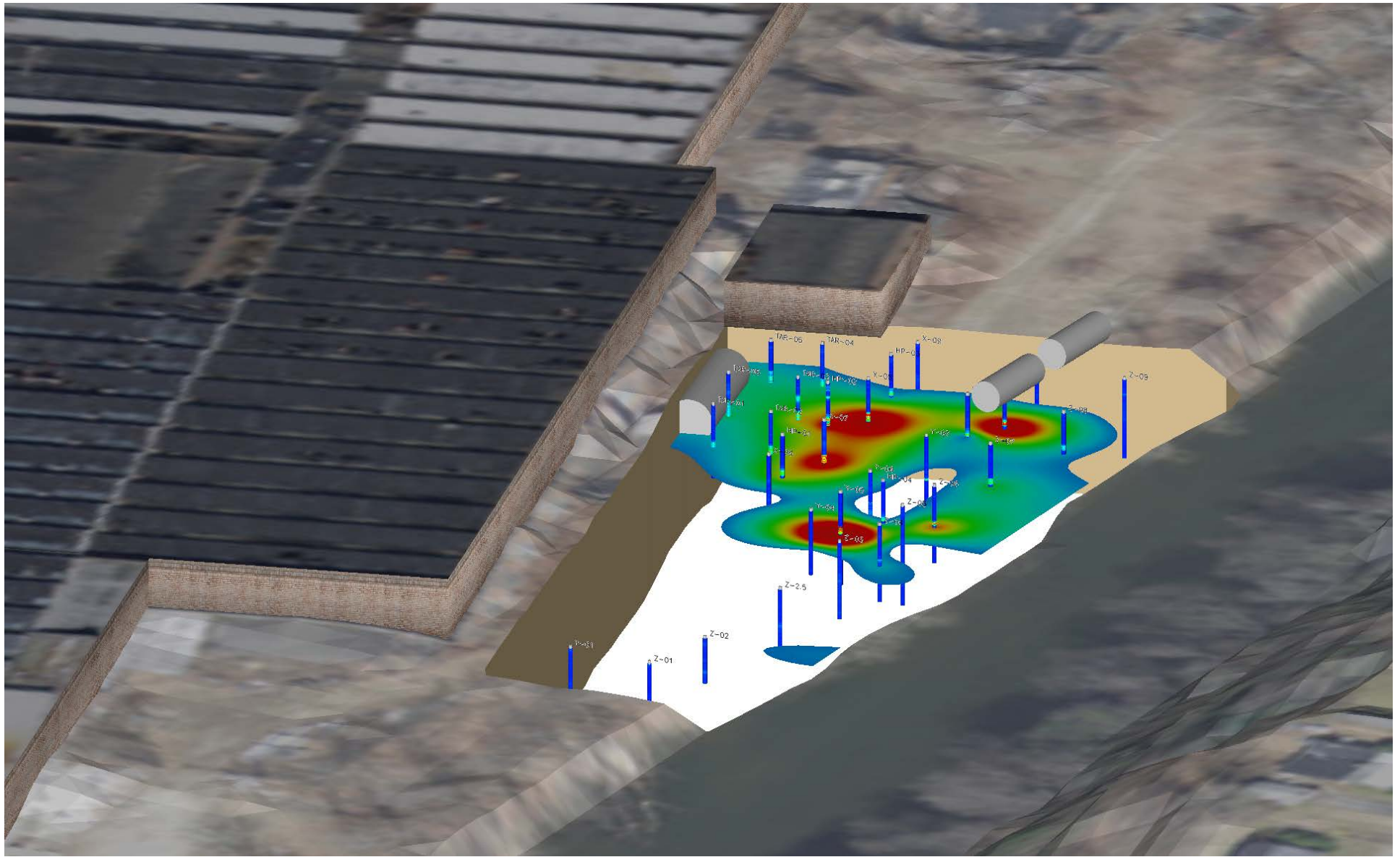Stone is collecting data at a Brownfields site in southern VT

- Data going back to 1988
- 1014 Individual sample locations
- >15,000 individual data points
- Data scattered between 240 source documents

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Example 2: Brownfields Site

Example 2: Brownfields Site

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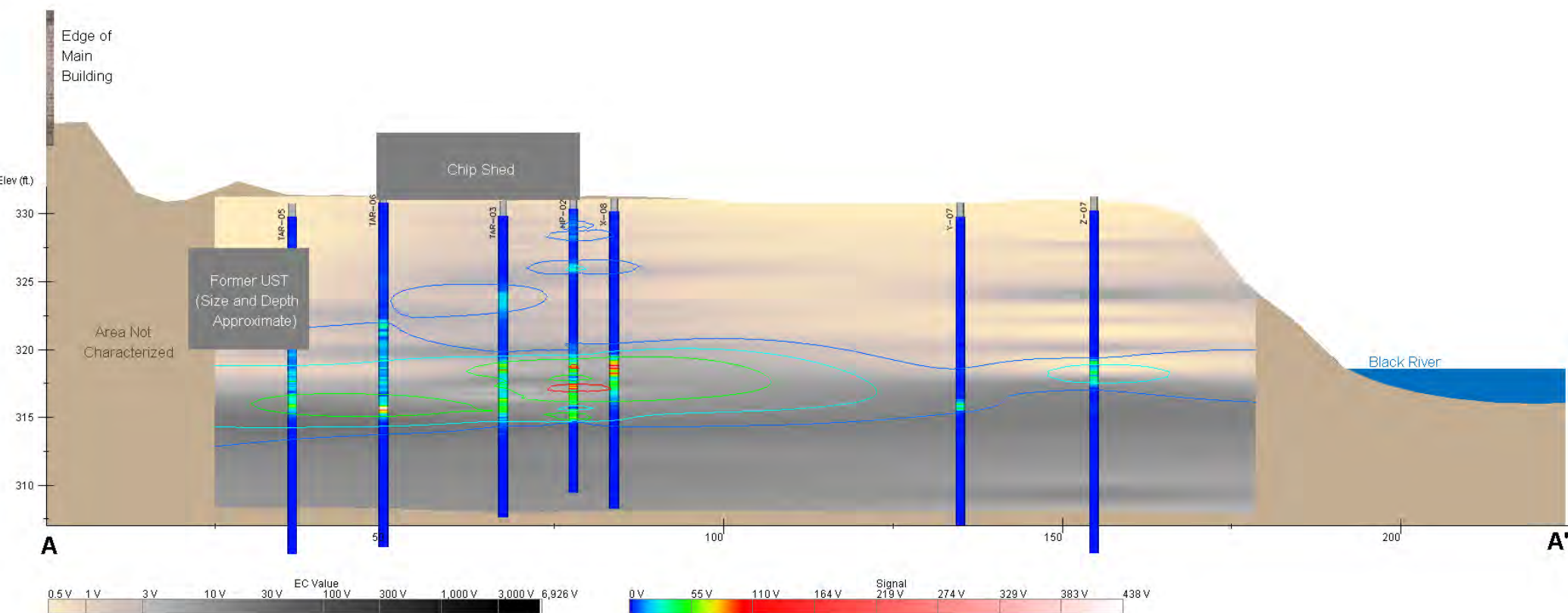
Example 3: Area Wide Redevelopment

Analyzed and mapped historic uses of parcels in Bennington, VT

- Historic maps and directories
- Presented in ArcGIS Online

[Bennington Story Map](#)

Thank You!

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