

Combining High Resolution Site Characterization and 3D Data Visualization to Enhance the Conceptual Site Model

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The logo for CDM Smith, featuring the company name in a bold, white, sans-serif font against a blue background. The 'C' and 'D' are larger and more prominent than the other letters.

**CDM
Smith.**

A decorative horizontal bar at the bottom of the slide, consisting of a series of blue and green rectangular blocks of varying widths, followed by a photograph of palm trees at sunset.

Groundwater Resources Association of California 2016 Conference and 25th Annual Meeting
September 28-29, 2016 | Concord, California

Combining High Resolution Site Characterization and 3D Data Visualization to Enhance the Conceptual Site Model

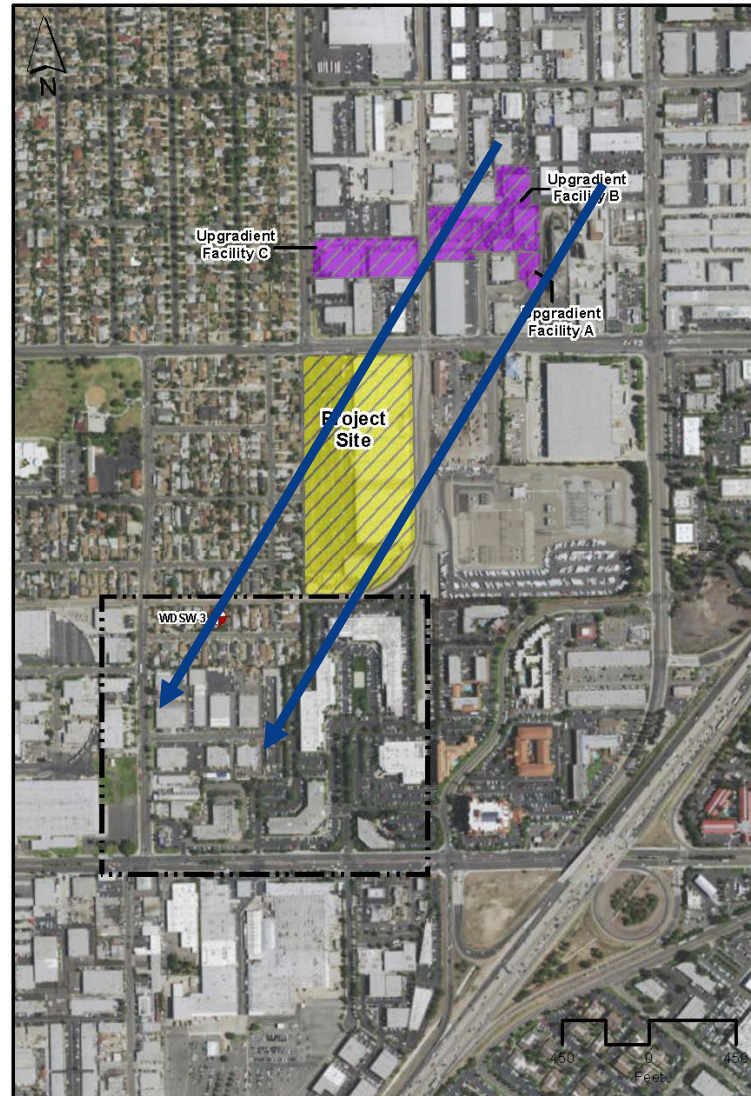
- Introduction
- Background
- Objectives
- Approach
- Results
- Conclusions

Introduction

Upgradient Facilities

Project Site Location

Downgradient Area



Introduction

Two main Areas of Concern:

AOC 1 - Main
Manufacturing Building

AOC 2 - Former Solvent
Storage Area/Chemical
Storage Warehouse



Introduction

- Offsite remediation required by California DTSC
- Challenge
 - Off-site groundwater plume not fully defined
 - Upgradient sources affecting site groundwater
 - Optimal remedial design to target downgradient portion of Site-related VOC plume
 - Construct offsite remedial system concurrently with onsite DPE system

Objectives – 2015 Offsite Groundwater Investigation

- Characterize extent of downgradient groundwater VOC plume
- Characterize downgradient lithology
- Update CSM to include downgradient, side-gradient, and upgradient areas

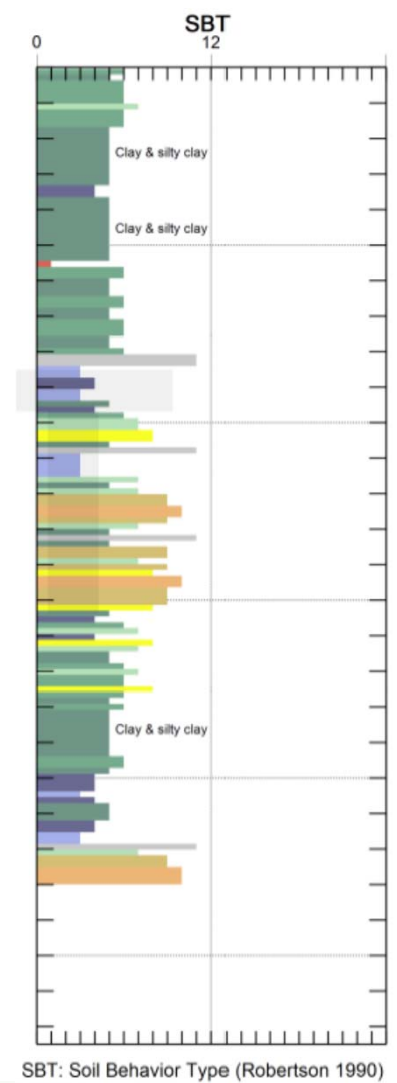
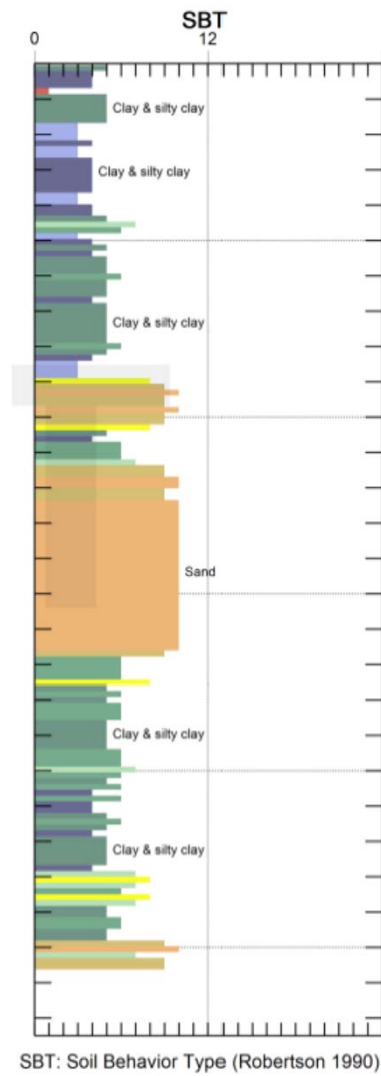
Expanded CSM and groundwater flow modeling will be used to optimize groundwater remediation system

Approach 2015 Offsite Groundwater Investigation Elements

- High-resolution site characterization (CPT/MIP)
- Groundwater screening/soil sampling
- Monitoring well installation and sampling
- 3-D modeling using Leapfrog™ data visualization software



CPT Lithologic Logs



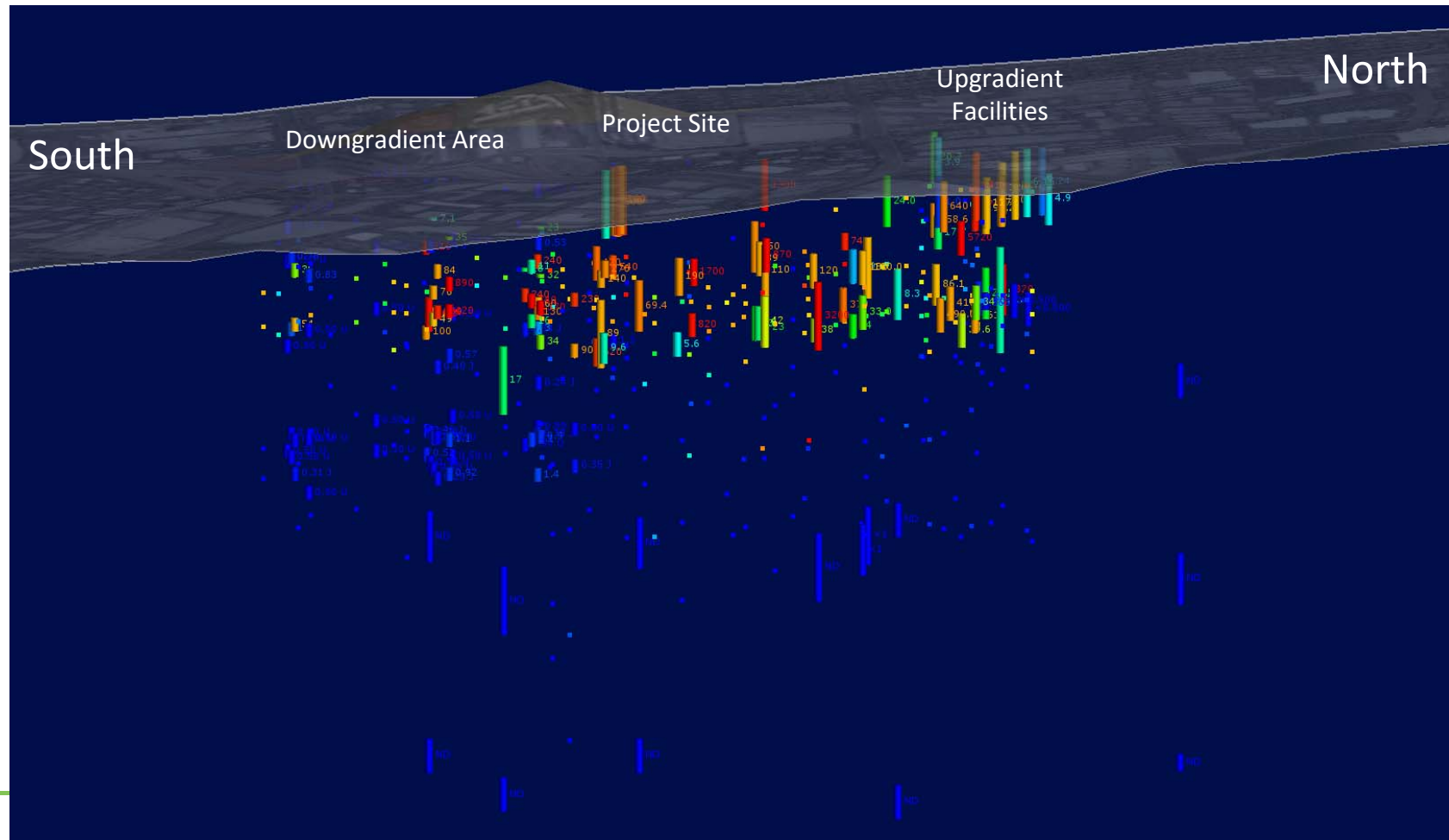
Approach – Conceptual Site Model Update

3D Data Visualization Model Inputs:

- 2015 Onsite Data
- 2015 Offsite Investigation Data
- 2015 Upgradient Facility Data
- 2012 Area-wide Water Department Data

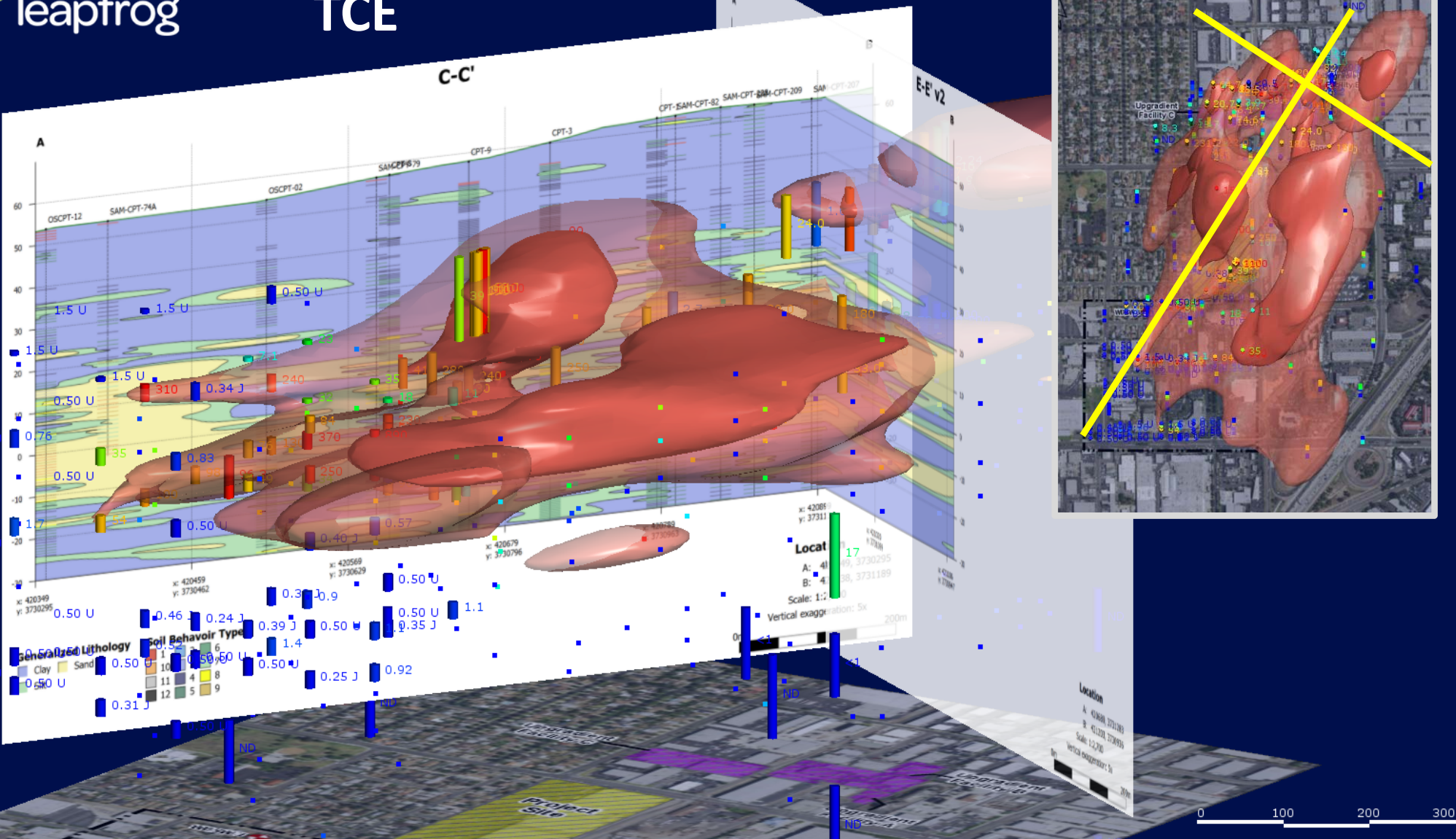


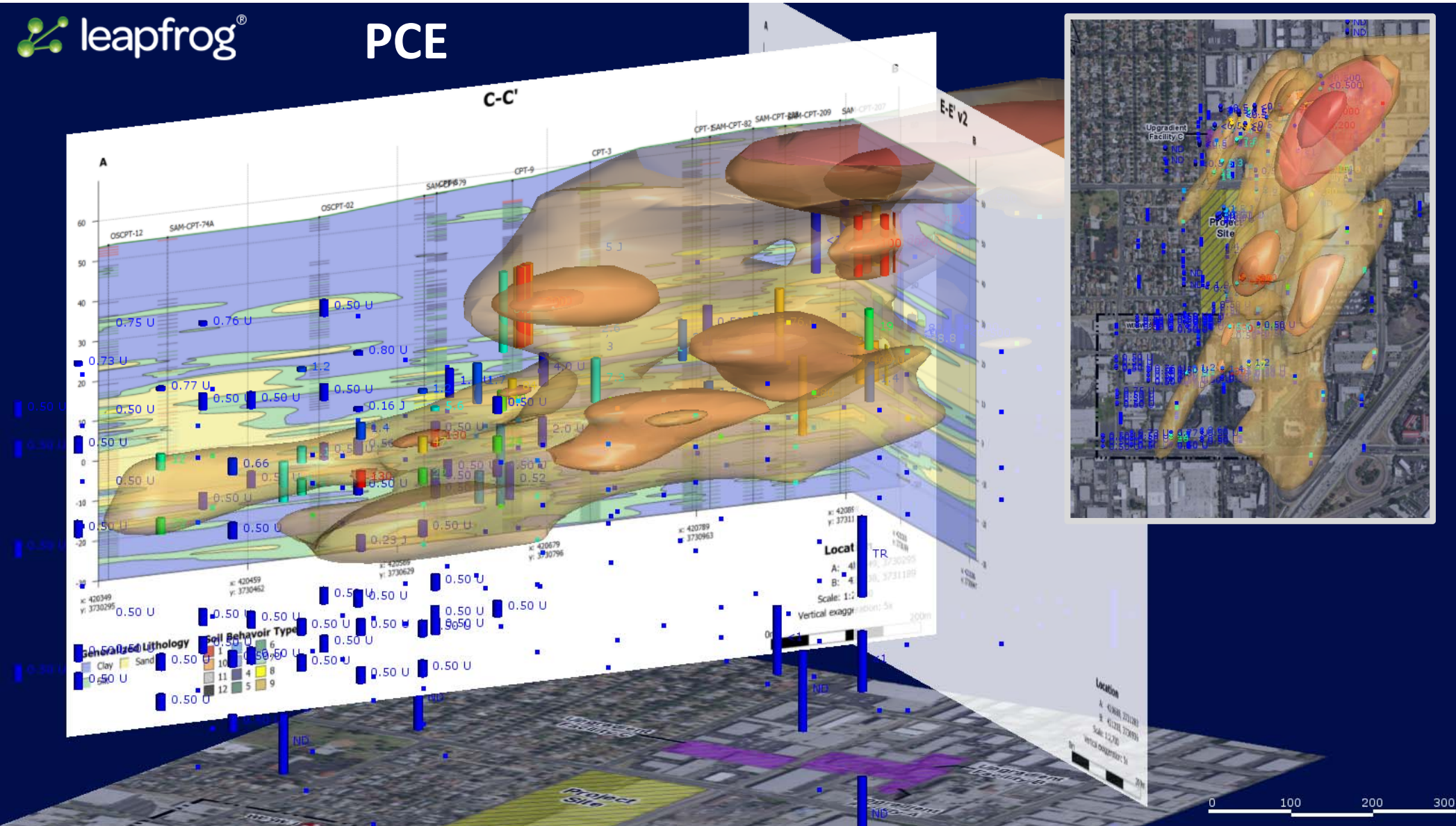
VOC Data in 3D Visualization Model







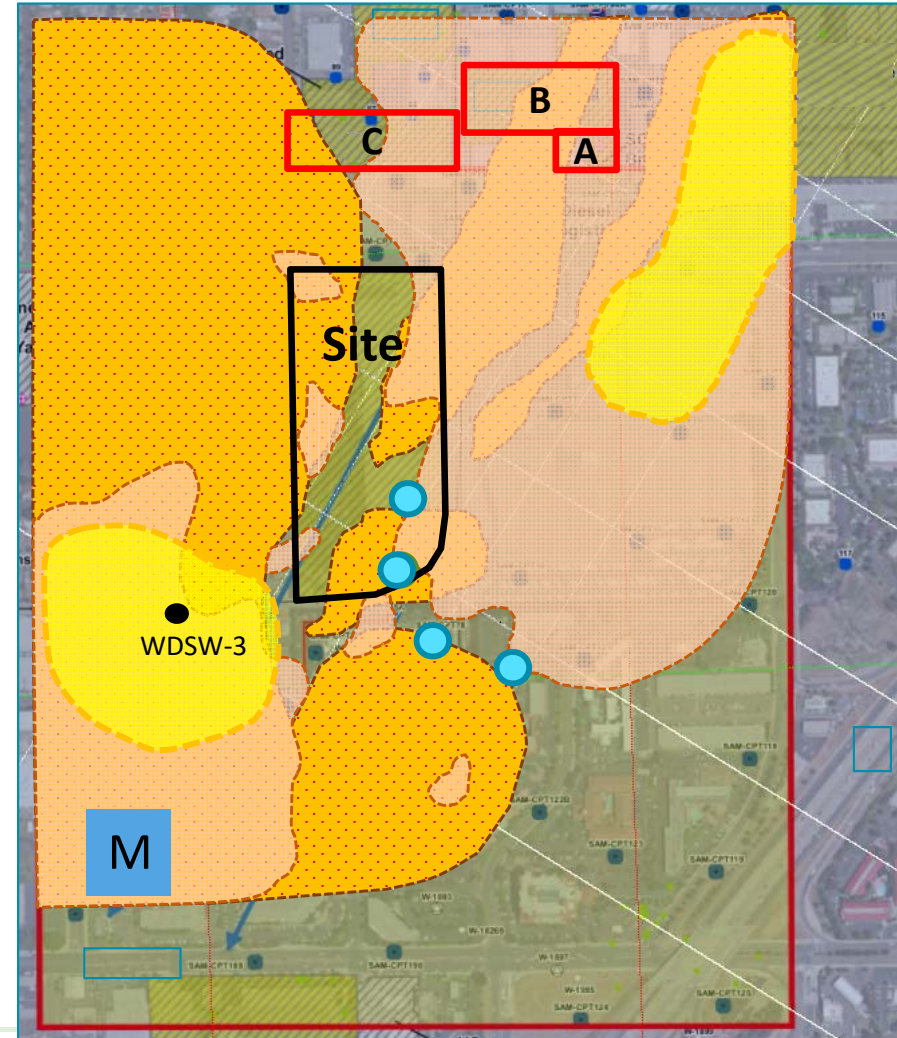
TCE





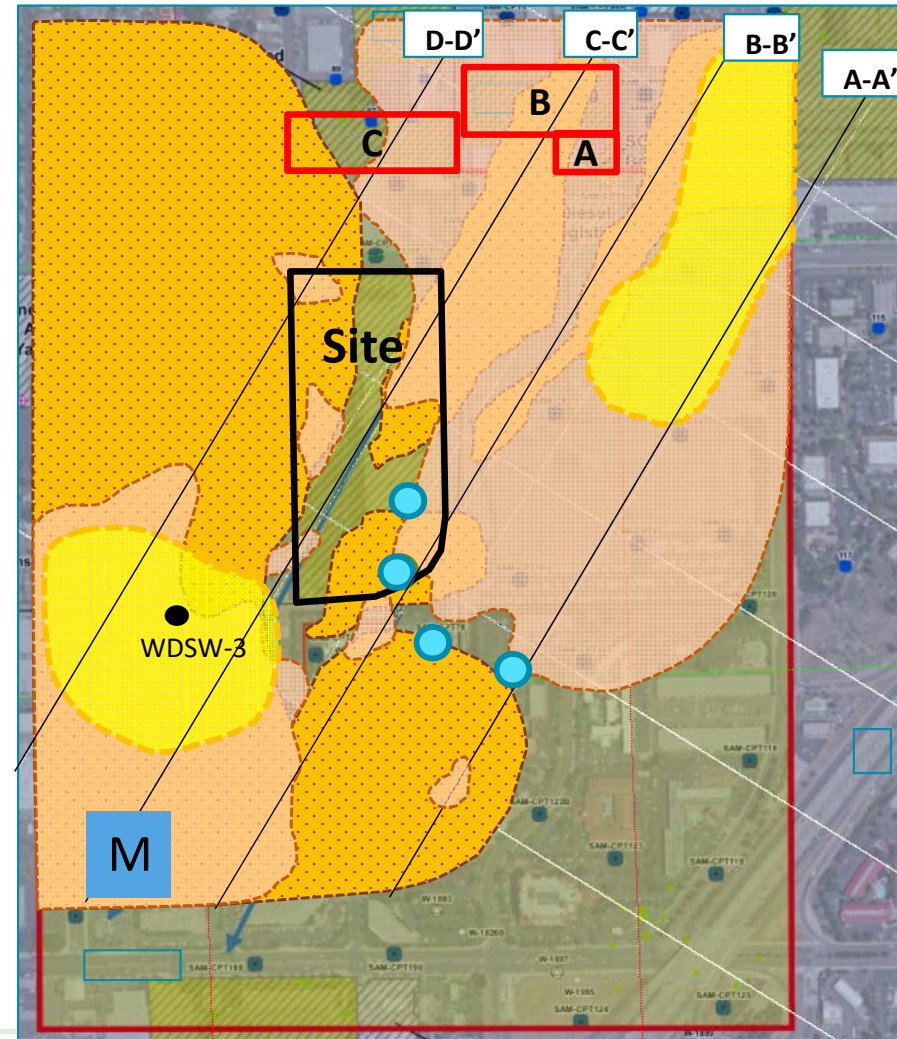
Results

- Yellow= Shallow Zone
- Peach = Sand A
- Orange = Sand B
- = Hydraulic communication from Sand A to Sand B
-  M = Sand A & Sand B Merge



Results

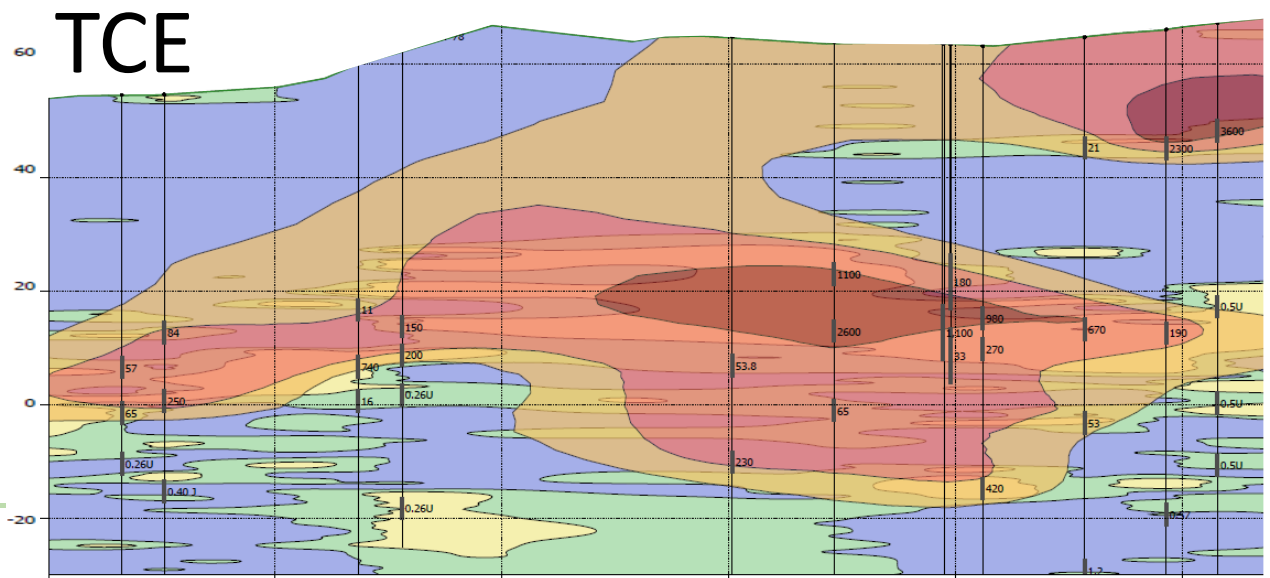
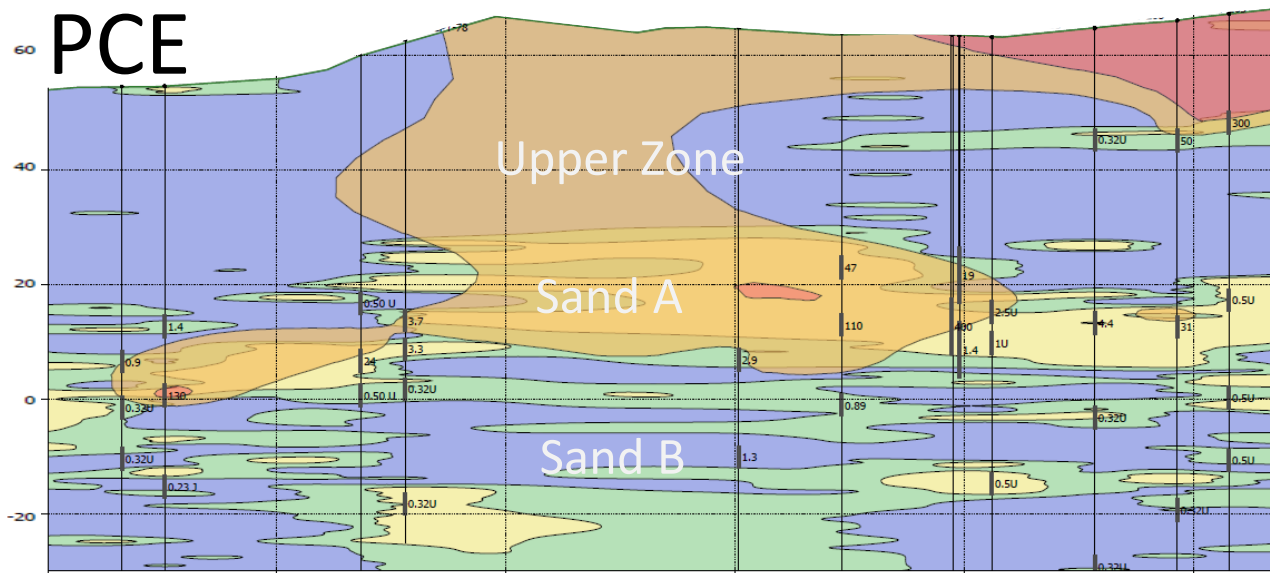
- Cross-sections perpendicular to groundwater flow
- Plan-view Horizontal Sections:
 - Shallow Zone
 - Sand A Unit
 - Sand B Unit



[illegible]

- 5 - 50 ug/L
- 50 - 500 ug/L
- > 500 ug/L

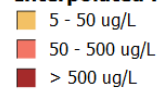
- Clay
- Silt
- Sand



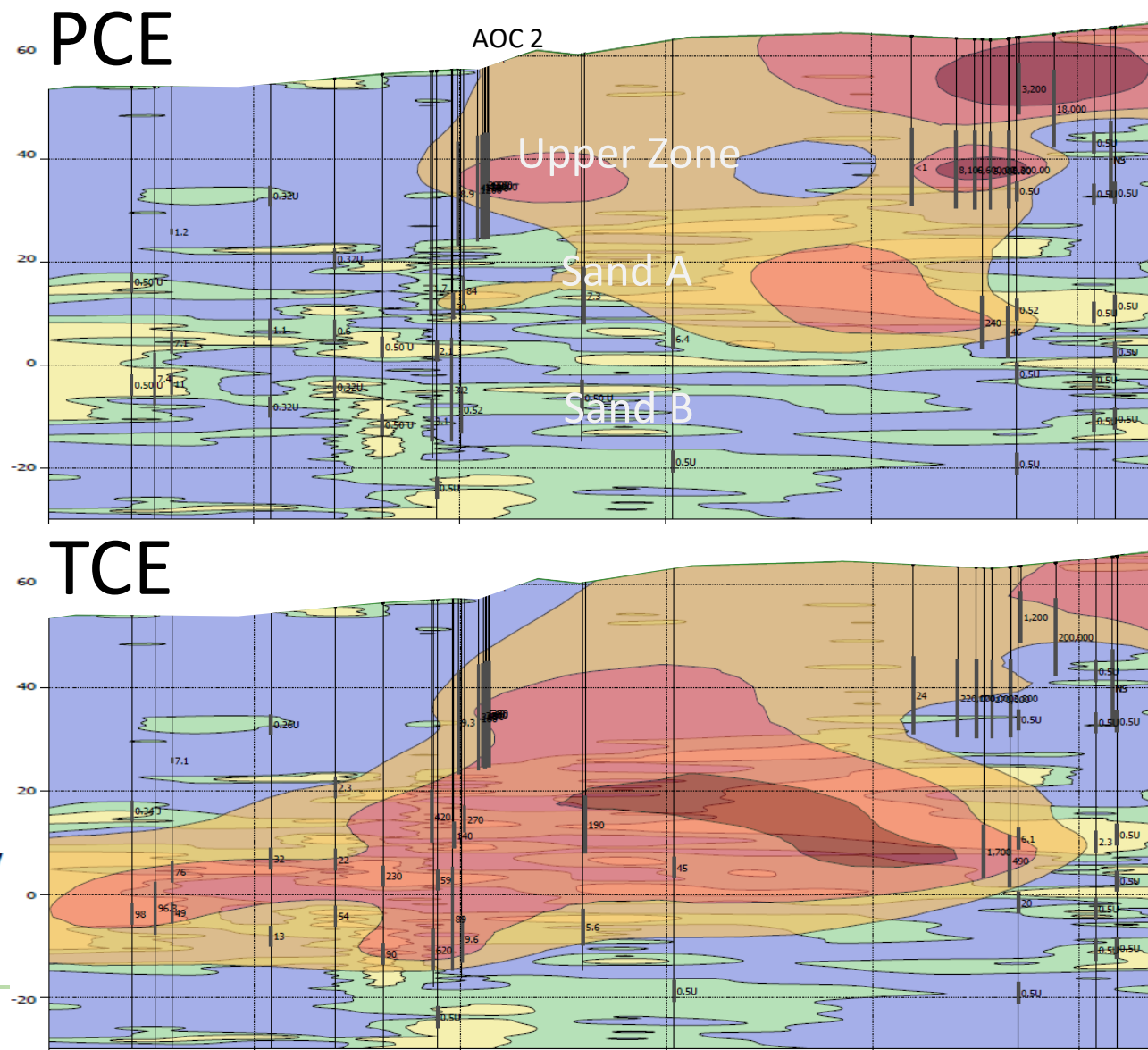
Cross Section B-B'



Interpolated PCE/TCE Concentration



Interpolated Lithology



Cross Section C-C'



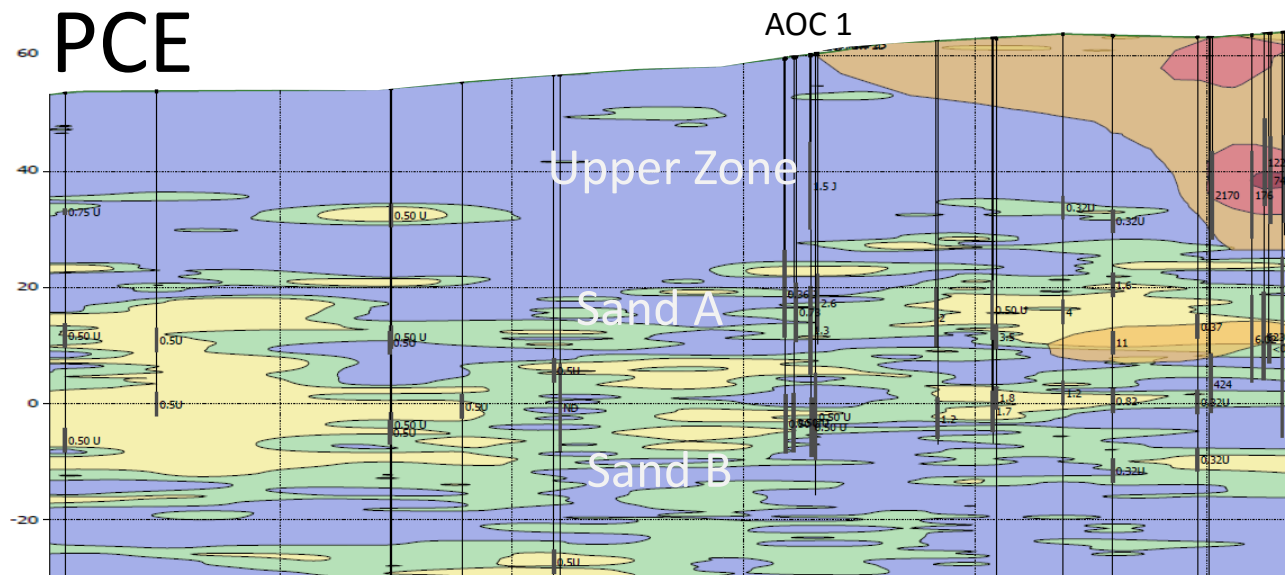
Interpolated PCE/TCE Concentration

- 5 - 50 ug/L
- 50 - 500 ug/L
- > 500 ug/L

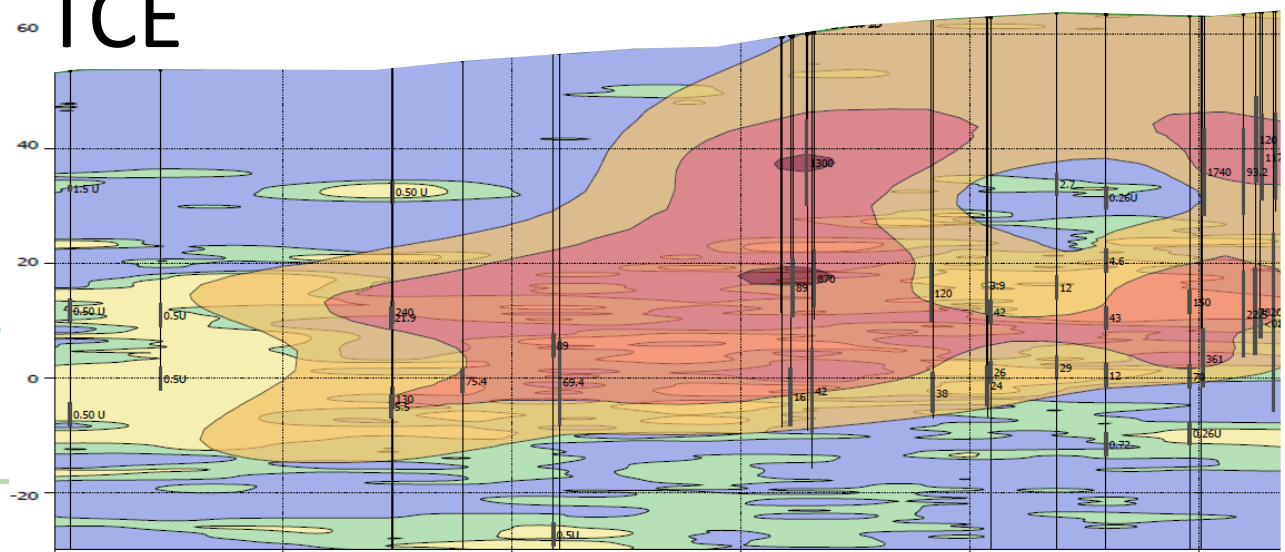
Interpolated Lithology

- Clay
- Silt
- Sand

PCE



TCE



Cross Section D-D'



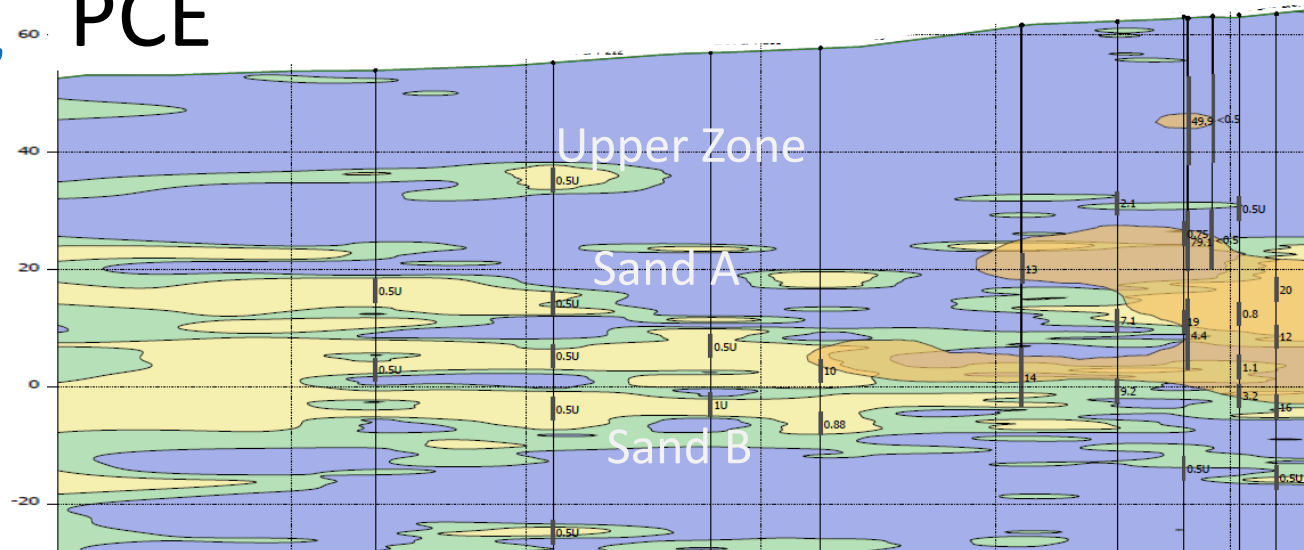
Interpolated PCE/TCE Concentration

- 5 - 50 ug/L
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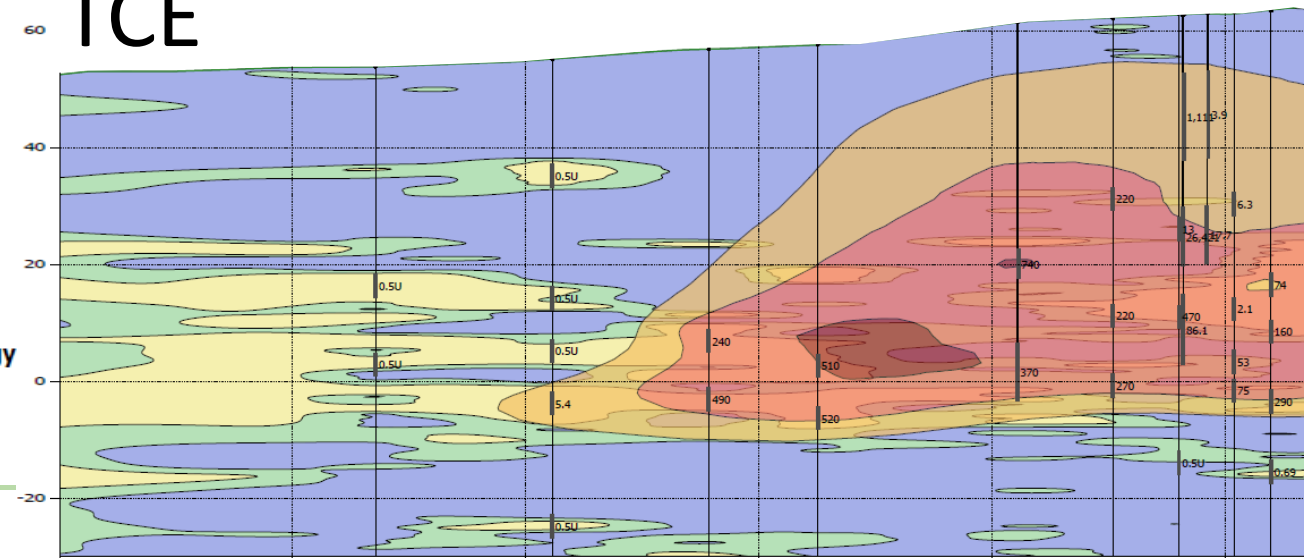
Interpolated Lithology

- Clay
- Silt
- Sand

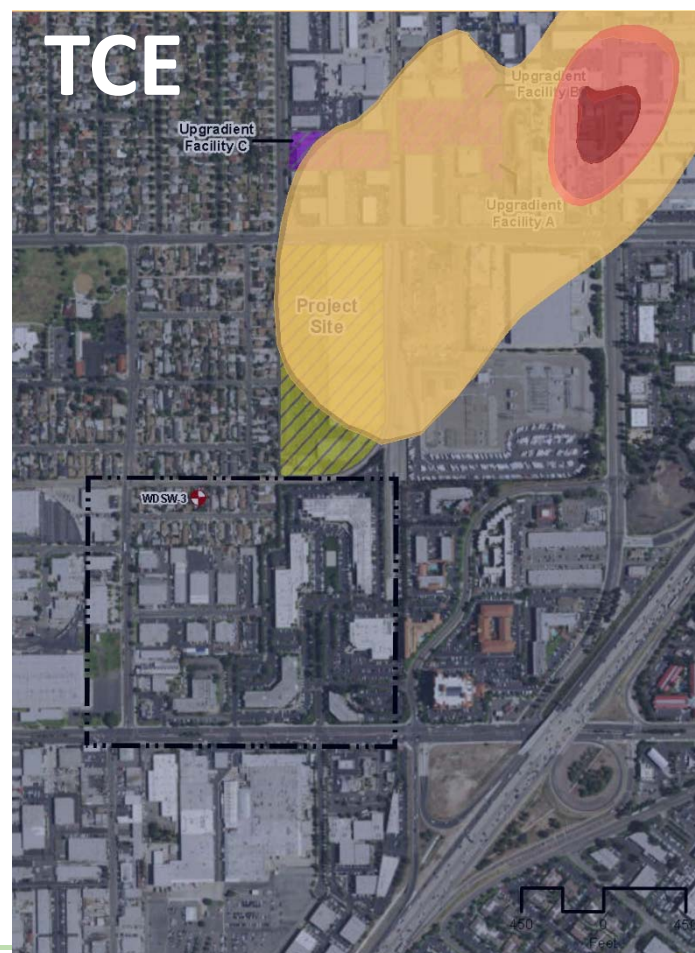
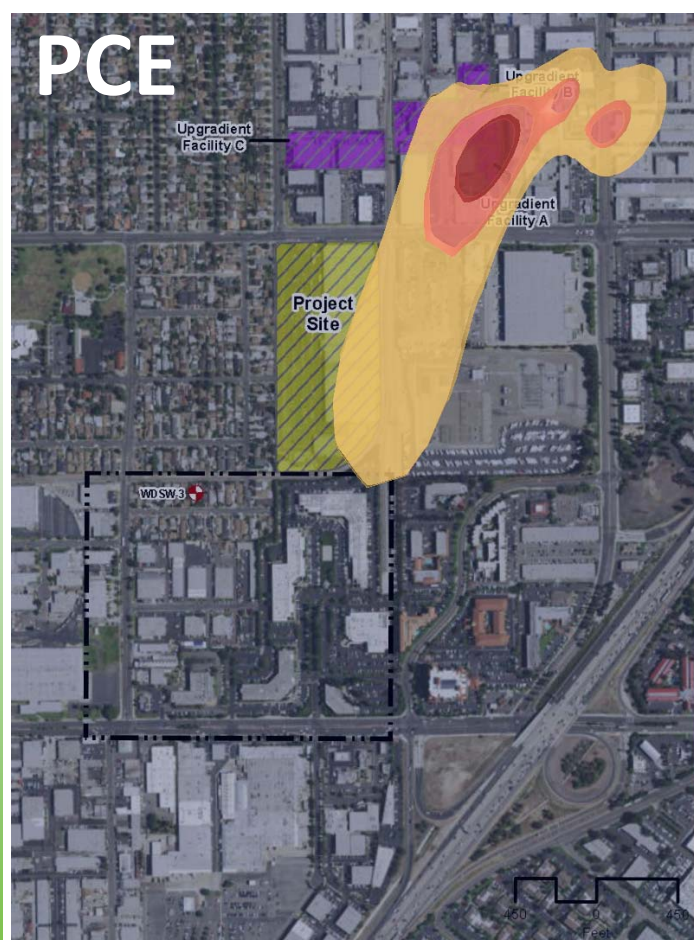
PCE



TCE



Plan View – Upper Zone (10 feet bgs)



Interpolated PCE/TCE Concentration

- 5 - 50 ug/L
- 50 - 500 ug/L
- > 500 ug/L

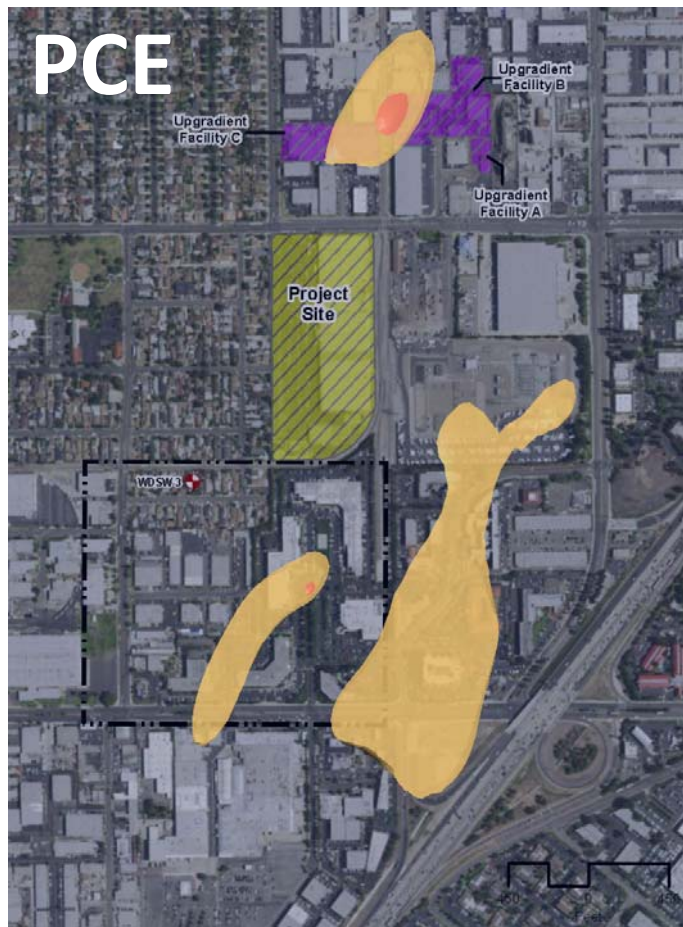
Plan View – Sand A Zone (50 feet bgs)



Interpolated PCE/TCE Concentration

- 5 - 50 ug/L
- 50 - 500 ug/L
- > 500 ug/L

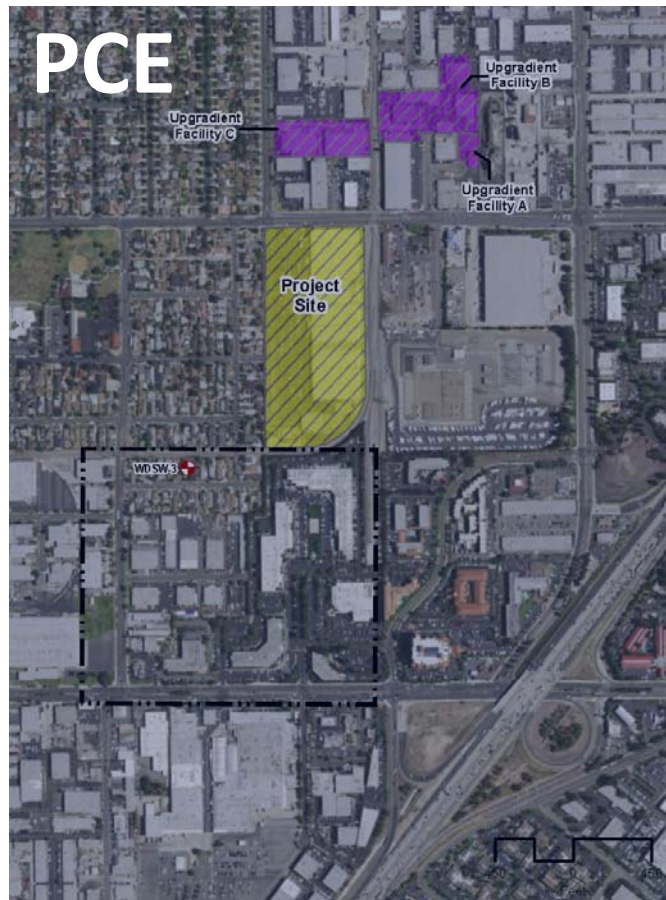
Plan View – Sand B Zone (60 feet bgs)



Interpolated PCE/TCE Concentration

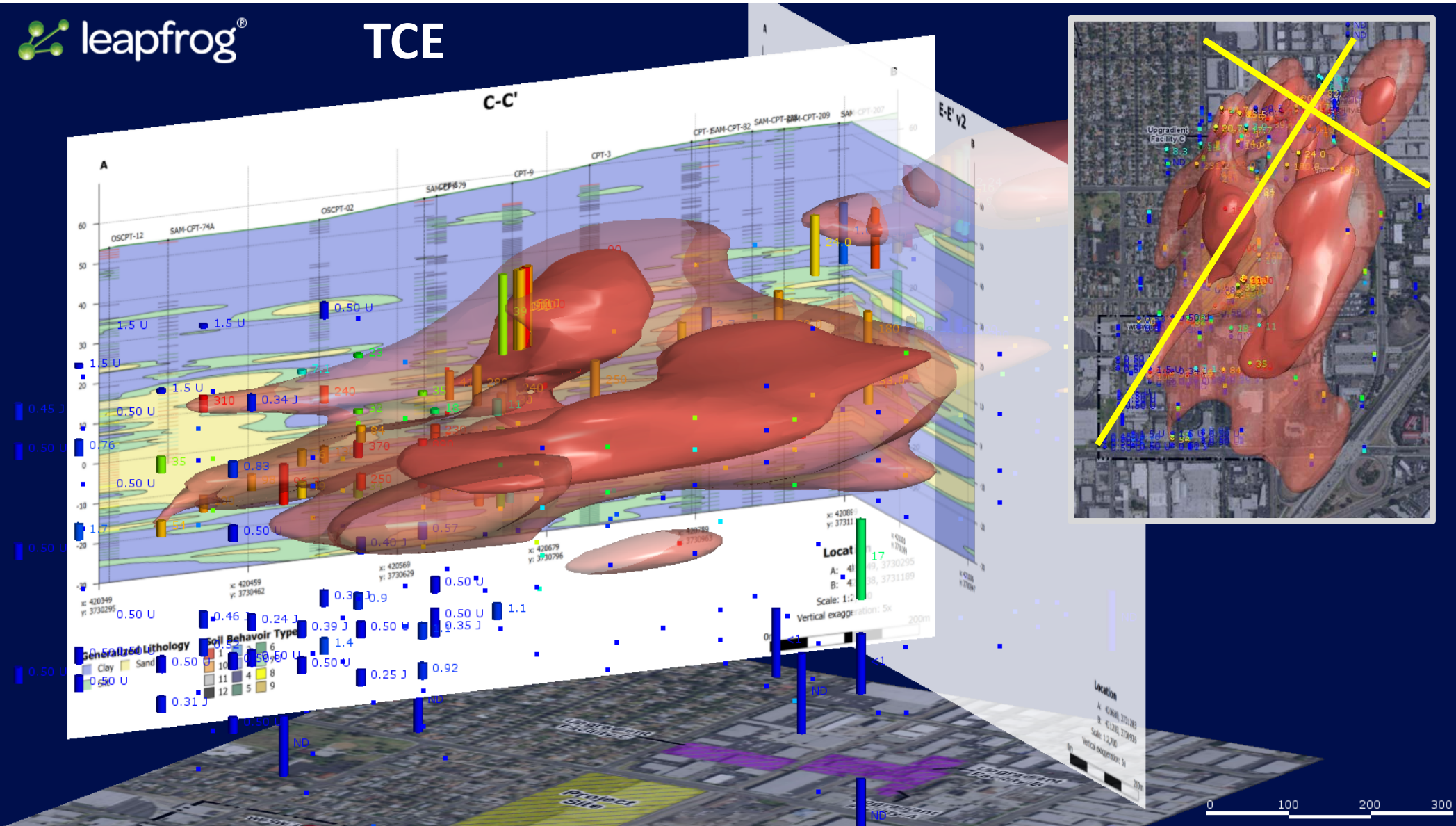
- 5 - 50 ug/L
- 50 - 500 ug/L
- > 500 ug/L

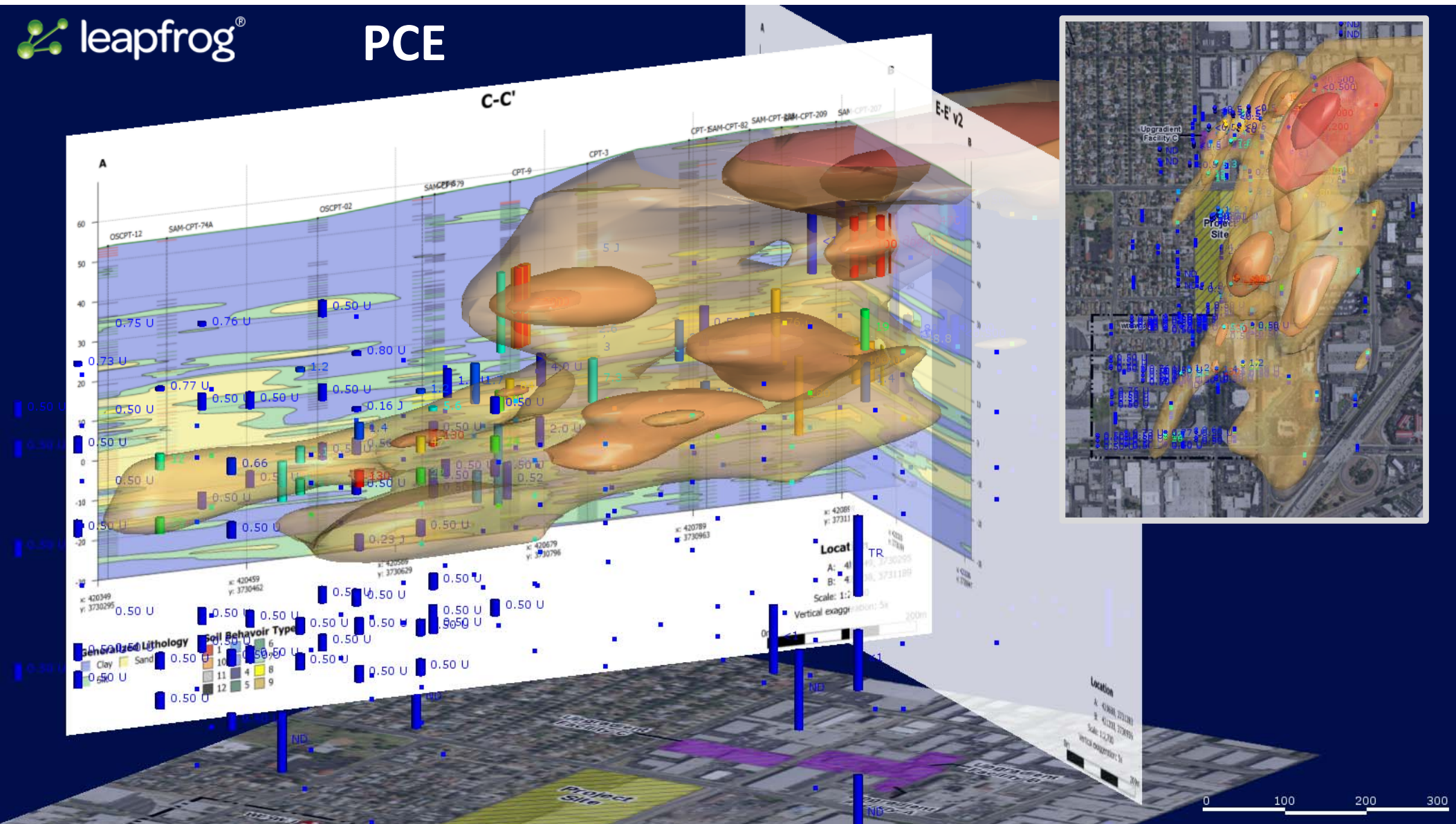
Plan View – Sand B Zone (70 feet bgs)



Interpolated PCE/TCE Concentration

- 5 - 50 ug/L
- 50 - 500 ug/L
- > 500 ug/L





Conclusions

- Area-wide lithology characterized – Sand A/Sand B zones not continuous; thickness is highly variable, and often grades to silt; mostly clay/silt underlying site that impedes vertical migration
- Site vs. upgradient facility contribution to area-wide groundwater VOC plume
- Offsite groundwater remediation system currently being developed/optimized; completion upon groundwater modeling