Investing in Data Visualization to Develop Adaptive Environmental Liability Management Strategies to Streamline Site Closure

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antea group
S₂ C₂ inc.
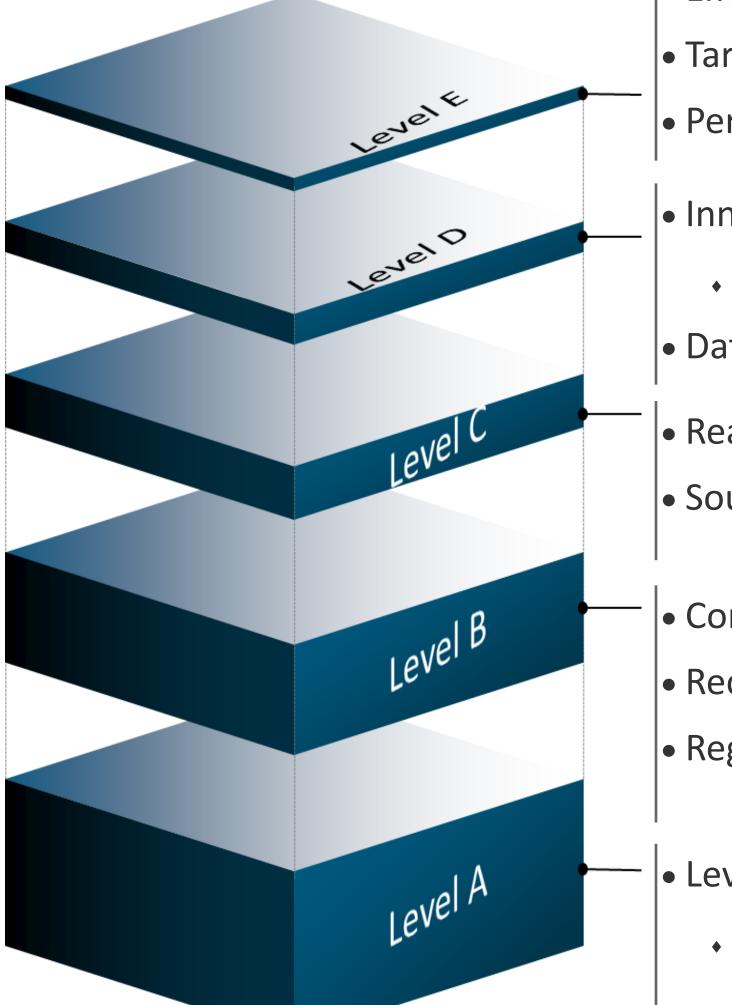
BUILDING THE DIGITAL CONCEPTUAL SITE MODEL

Managing data and developing an accurate Conceptual Site Model (CSM) are critical challenges for complex environmental sites. Leveraging innovation through technology supports improvements in the development of dynamic CSMs that are sustainable, and adaptive to a client's environmental liability and unique business needs.

Technical Management Challenges:
- Complex data sets over several years
- Complex environmental systems
- Varied site investigation methods
- Performance inconsistency
- Variability in data interpolation and deficient analysis
- Stakeholder engagement
- Receptors and third-party potential impacts
- Varied regulatory requirements for cleanup: numeric vs risk-based

Goal: Build all Relevant Site Knowledge into the CSM

Traditional Workflow: Not a Comprehensive CSM

Level E
- Effective remedy selection & refined design
- Targeted remedy Implementation
- Performance monitoring

Level D
- Innovative investigation methods:
  - High resolution site characterization
- Data Gap Analysis

Level C
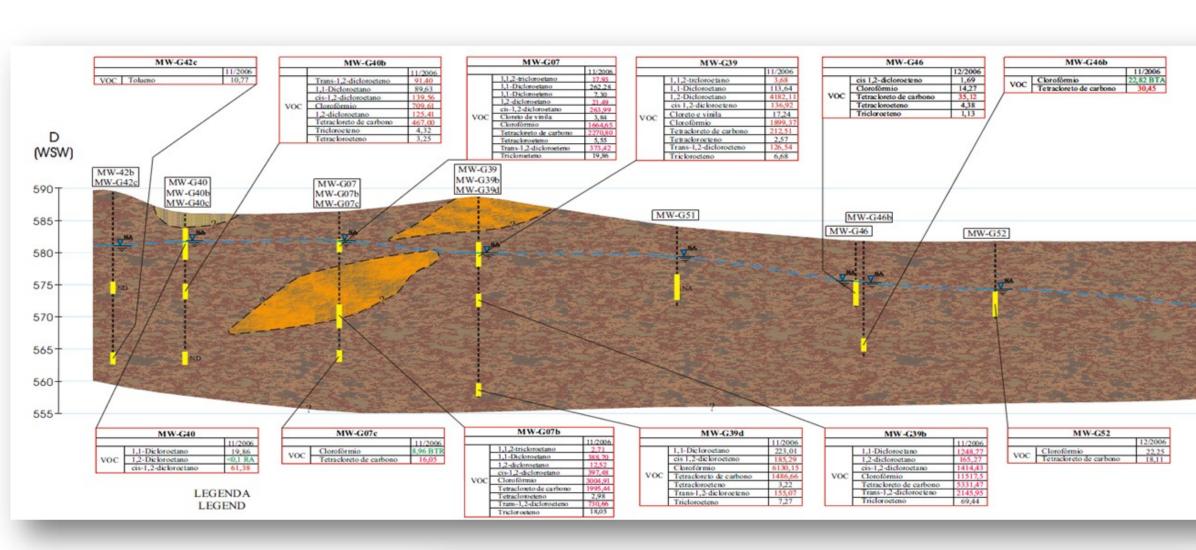- Real estate—current and future land use
- Source area evaluation

Level B
- Contaminant distribution
- Receptors
- Regulatory drivers

Level A
- Leverage Historical Data
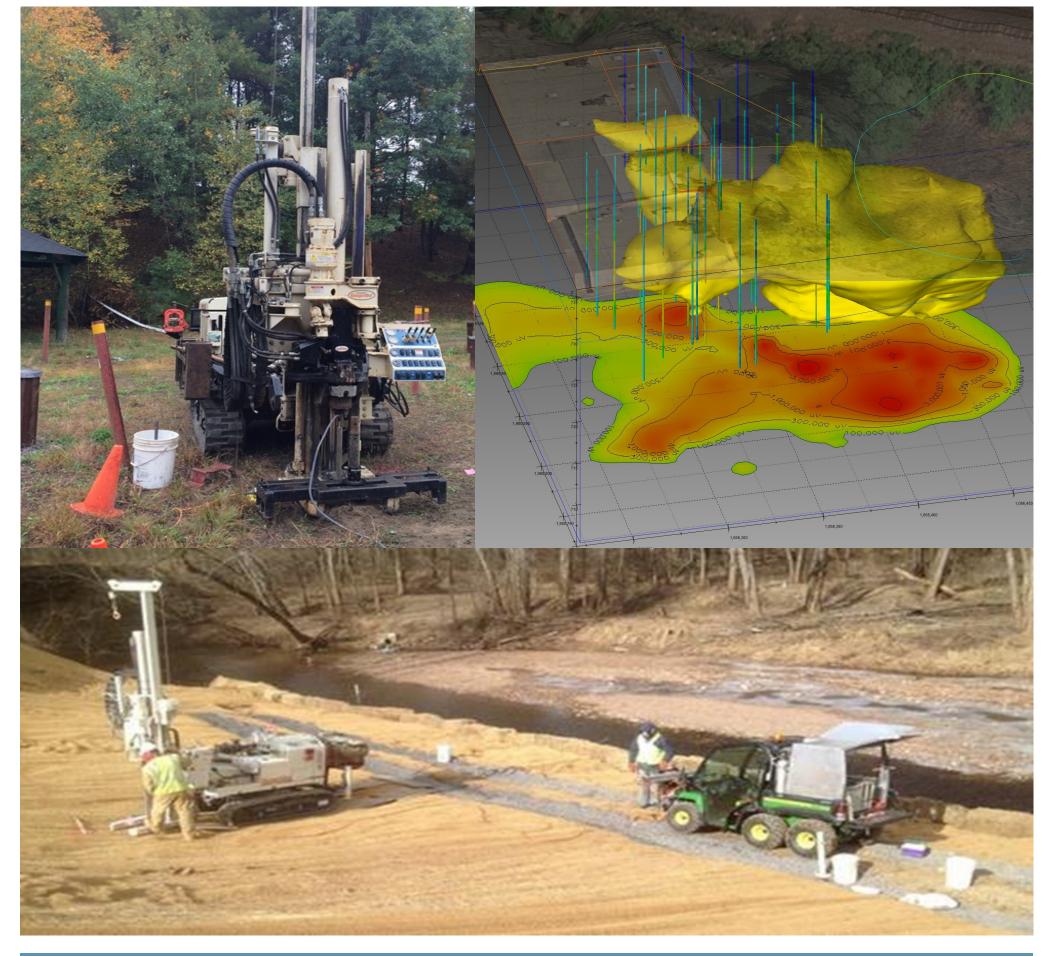 - Site investigation data
  - Geology/hydrogeology

earthsoft

HRSC—Field Data Collection to 3D Visualization

INOGEN

3D CSM AS A BEST-MANAGEMENT PRACTICE

A standardized digital solution process for the management and consistent representation of complex data sets. An adaptable process that facilitates more **informed business decisions,** leading to environmental liability **lifecycle cost and risk reduction.**

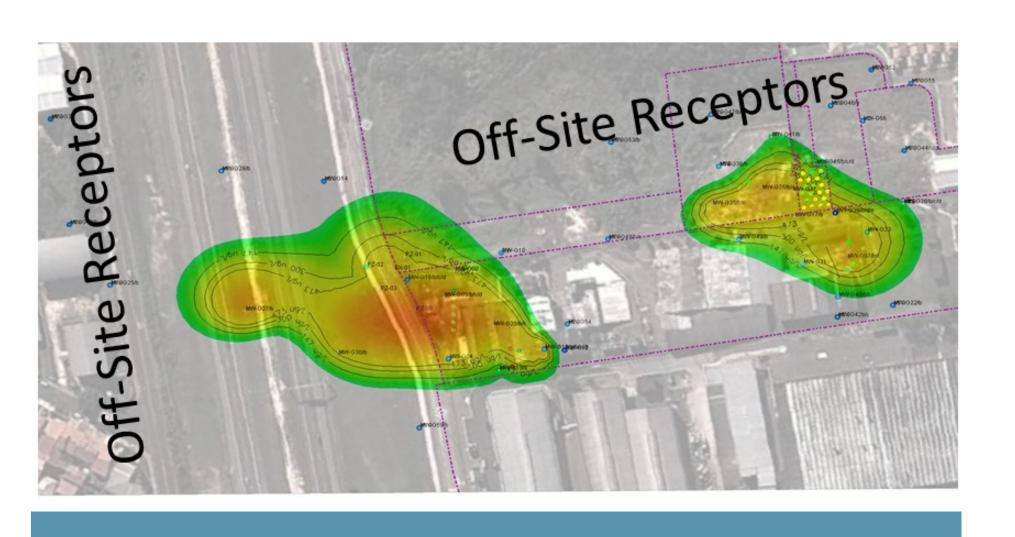**Leveraging Technology for Data Analysis:**
- Evaluate historic data sets
- Evaluate chemical data in relationship to geologic data
- Evaluate data gaps—statistically and visually
- Assist in the design of more targeted investigations
- Calculate contaminant mass and volume estimates for varying degrees of confidence
- Evaluate potential remedial design options
- Evaluate data sets over time: predictive model (simulations)
- Optimize monitoring well network(s)

A Solution to Facilitate Environmental Liability Management Strategy Development:
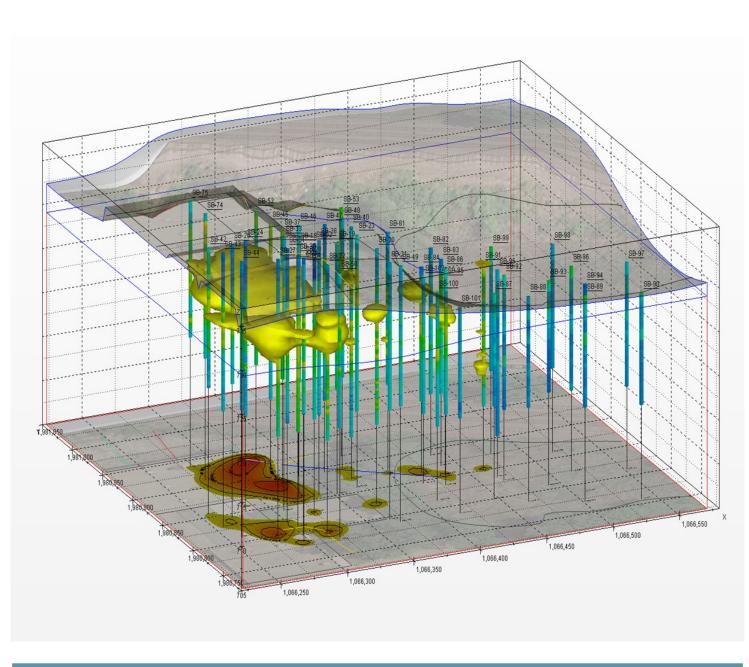- Assist technical team in presenting data-information to non-technical stakeholders & Business Leadership
- Minimize global cultural barriers through technology
- Facilitate collaborative discussions with regulators
- Enhance negotiating leverage for Mergers & Acquisitions

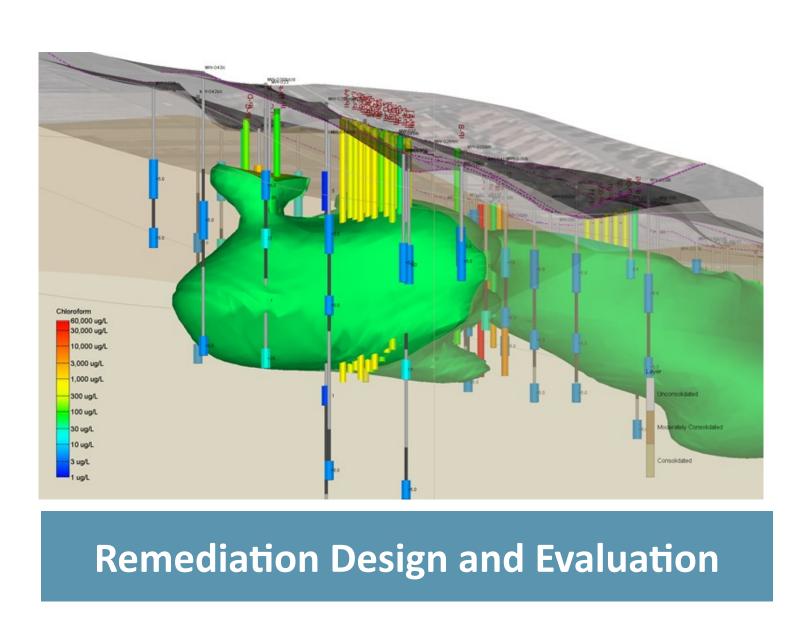**Technology Innovation to Reduce Lifecycle Costs ($$):**
- Reduce uncertainties
- Focus remediation strategies for expediting Site Closures
- Validate strategies and investments for stakeholder influence
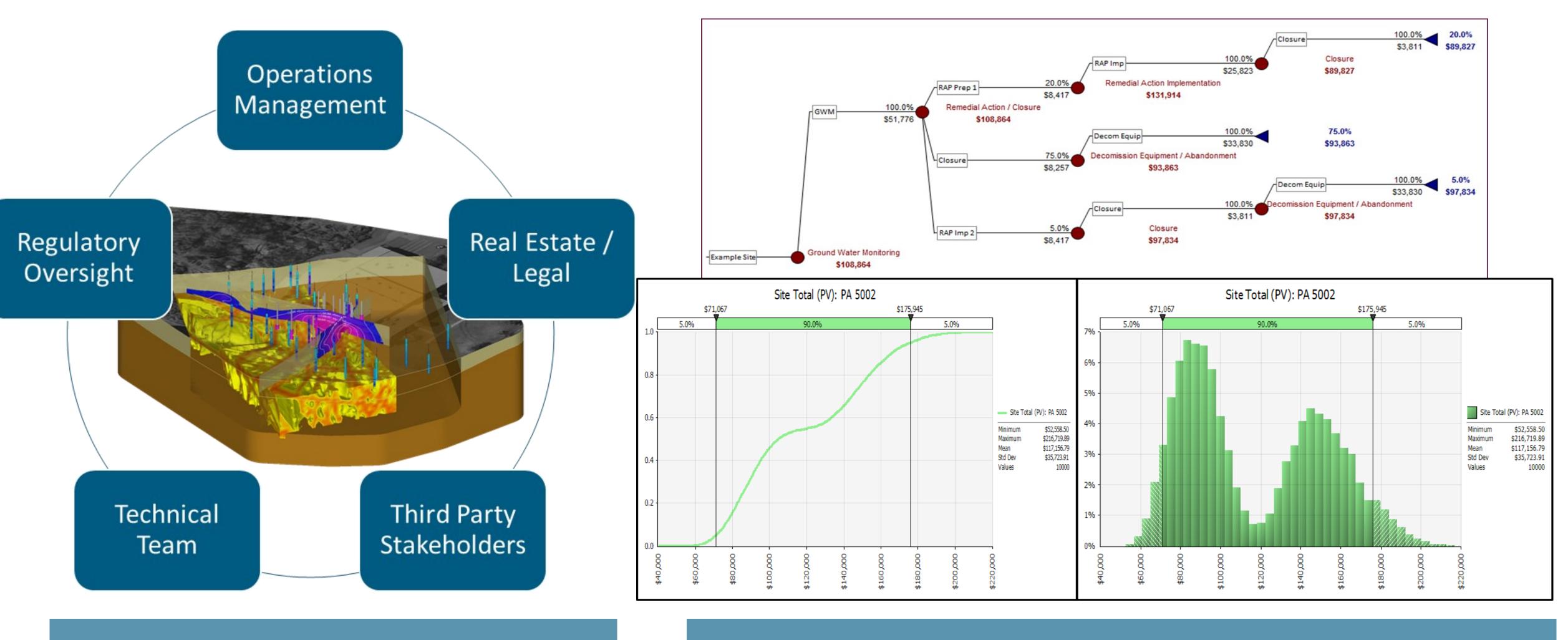- Enhance corporate reserve cost modeling process

HRSC Data Analysis (MiHPT & OiHPT)

Remediation Design and Evaluation

Time Series and Decay Analysis— Mass, Concentration (Average & Maximum)

Off-Site Receptors

Off-site Receptor Evaluation and Risk Evaluation

Operations Management

Regulatory Oversight

Real Estate / Legal

Technical Team

Third Party Stakeholders

Data Visualization is the Central Communication and Technical Analysis Tool

Corporate Reserve Cost Modeling Based on 3D CSM

CASE STUDIES

CASE STUDY 1: 1.6-acre Former Manufacturing Facility—Tampa, FL
- 1992—Original release date
- Remediation strategies:
  - $1.0 MM lifecycle cost-to-date
  - IRM GW pump & treat
  - Injection of ZVI/EVO
- GW monitoring was $50k @ 30-year lifecycle
- 2015 Project Transition:
  - Implemented 3DVA, data management and CSM development
  - HRSC MIP program was scoped but was deferred after 3DVA was completed
  - 2017—obtained FDEP Closure NFA
  - $100K 2-year lifecycle

Click the QR Code or the Weblink to View 3D Data Visualization

https://www.youtube.com/watch?v=ali4LT2Sz2w&feature=youtu.be

CASE STUDY 2: 12-acre Former Manufacturing Facility—Sorocaba, Brazil
- 2003 — Original release date
- Remediation strategy — Biostimulation system
- GW monitoring $200k annual @ 30-year lifecycle
- $2.0 MM lifecycle cost through 2011
- Project transition 2011:
  - Implemented 3D Data Visualization and CSM Development
  - $50k – 3DVA/data management
  - $60k annual GW monitoring
  - 2 new source areas identified:
    - Hot melt sump
    - Wastewater treatment plant (WWTP)
- Targeted remediation strategies implemented (2012 & 2014):
  - Chemical soil mixing
  - Source area excavation
  - Hot melt sump
  - WWTP—demolition
  - Permeable reactive barrier design & installation
- 2017—site reached regulatory **Commercial** closure levels
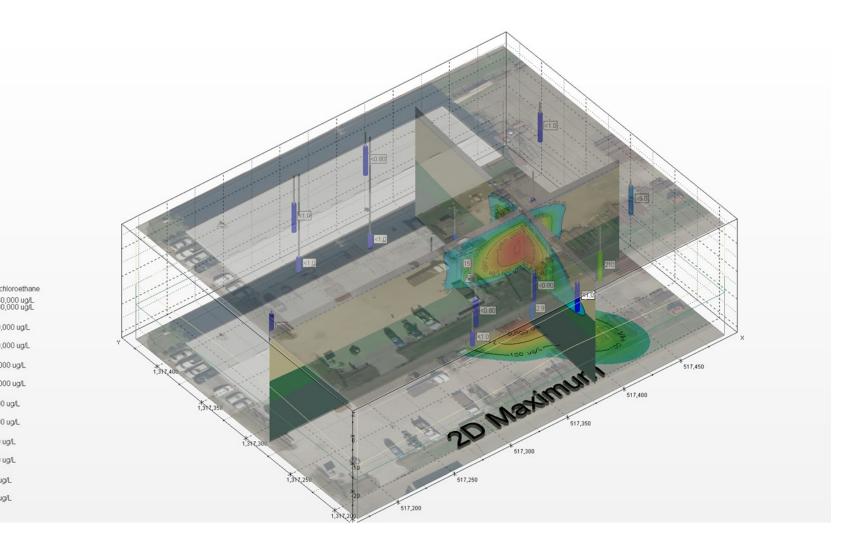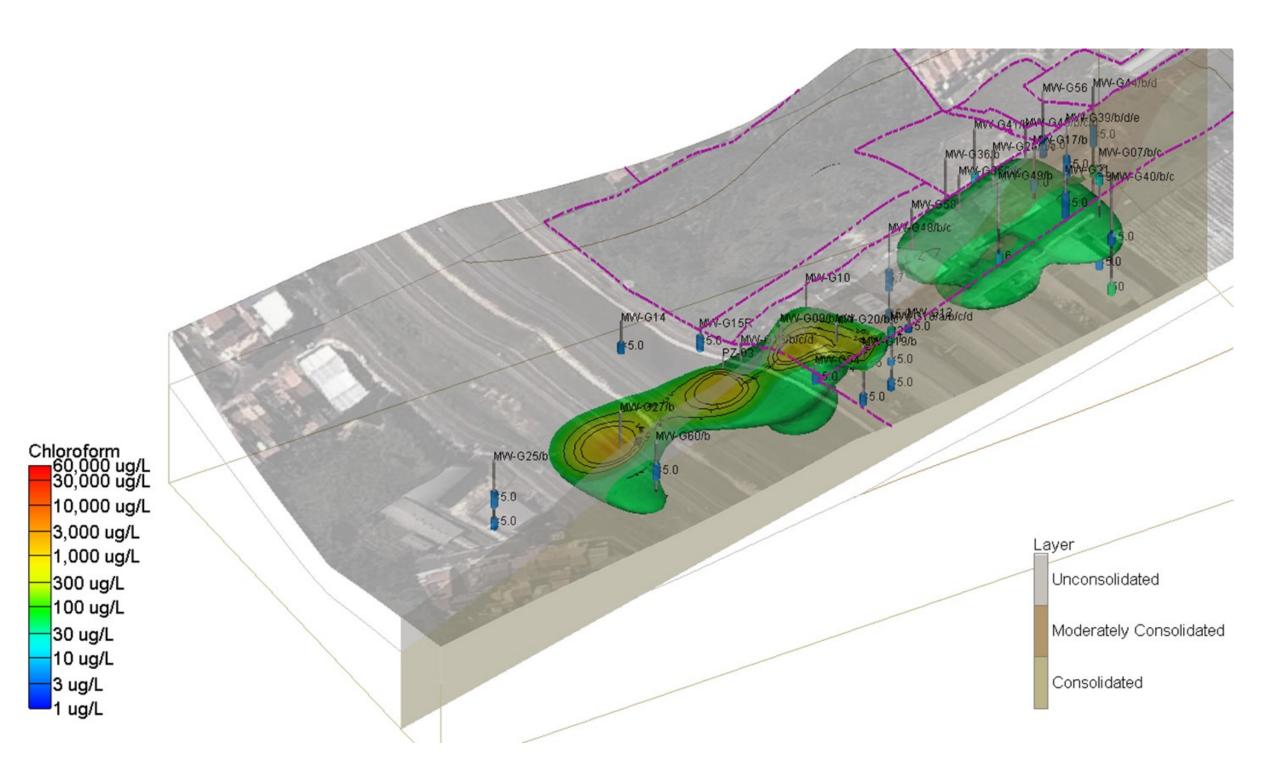- $860k spent 2011-2018
- $200k Supplemental Remediation planned for 2019; business investment decision to reach **Residential** Closure levels

Click the QR Code or the Weblink to View 3D Data Visualization

https://youtu.be/JSz9lGLMuK0

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