



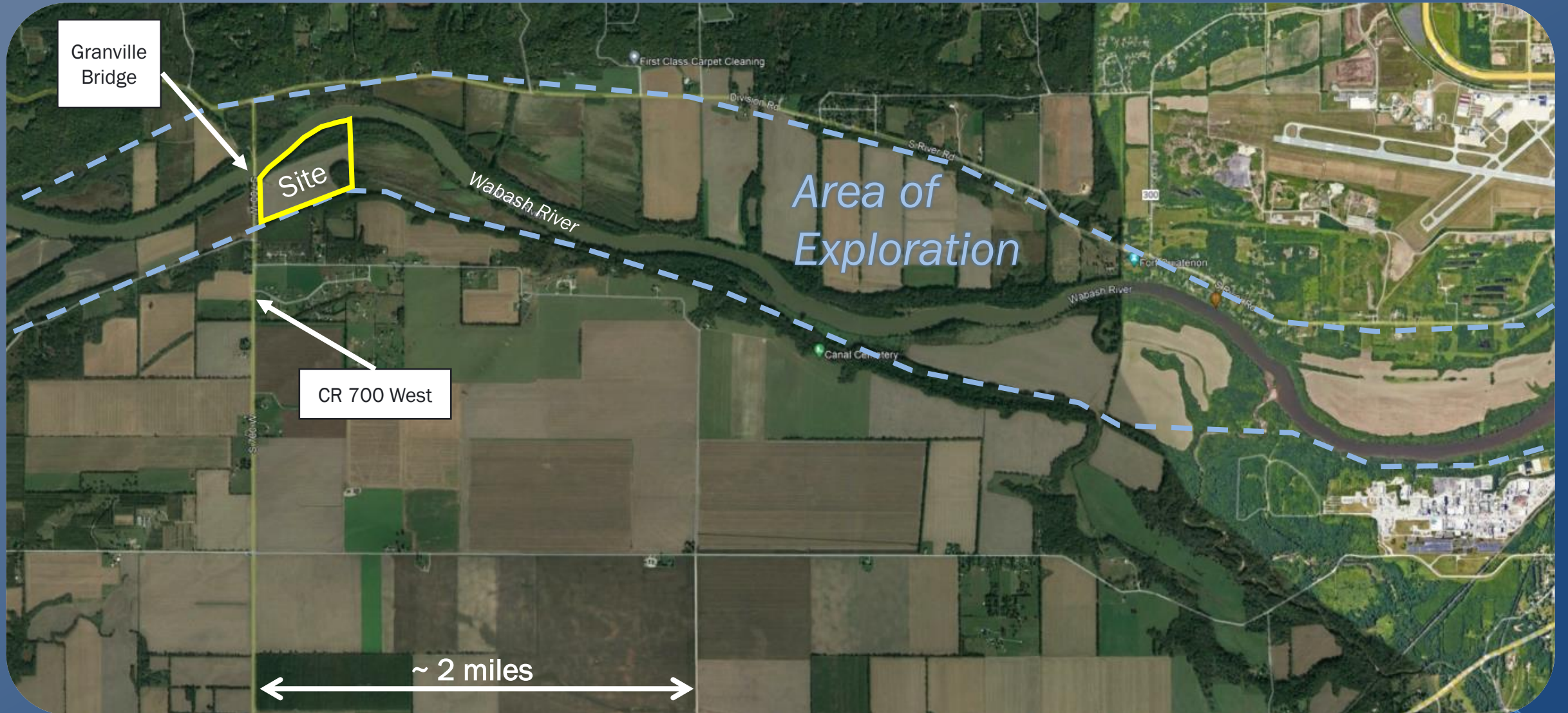
Estimates of Yield at One Site along the Wabash River

WATER RESOURCES



Greater Lafayette Chamber of Commerce – September 20, 2023

Site Location

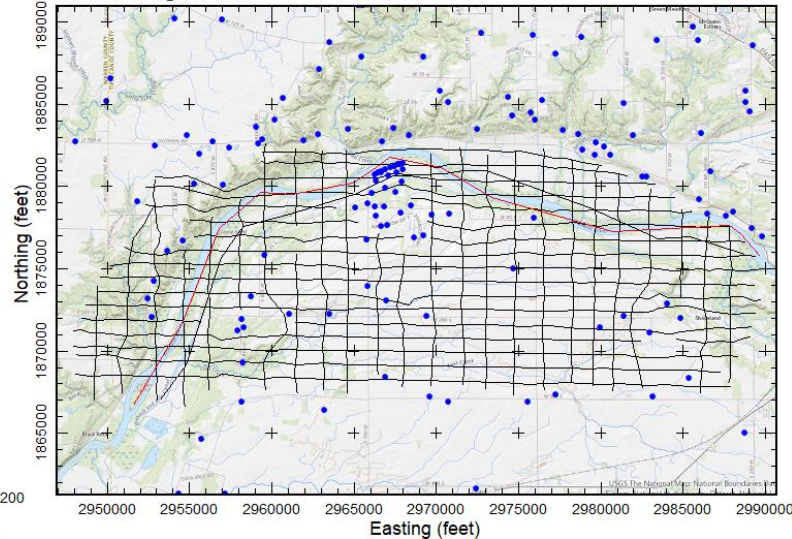


Preliminary AEM Profile Along Wabash River

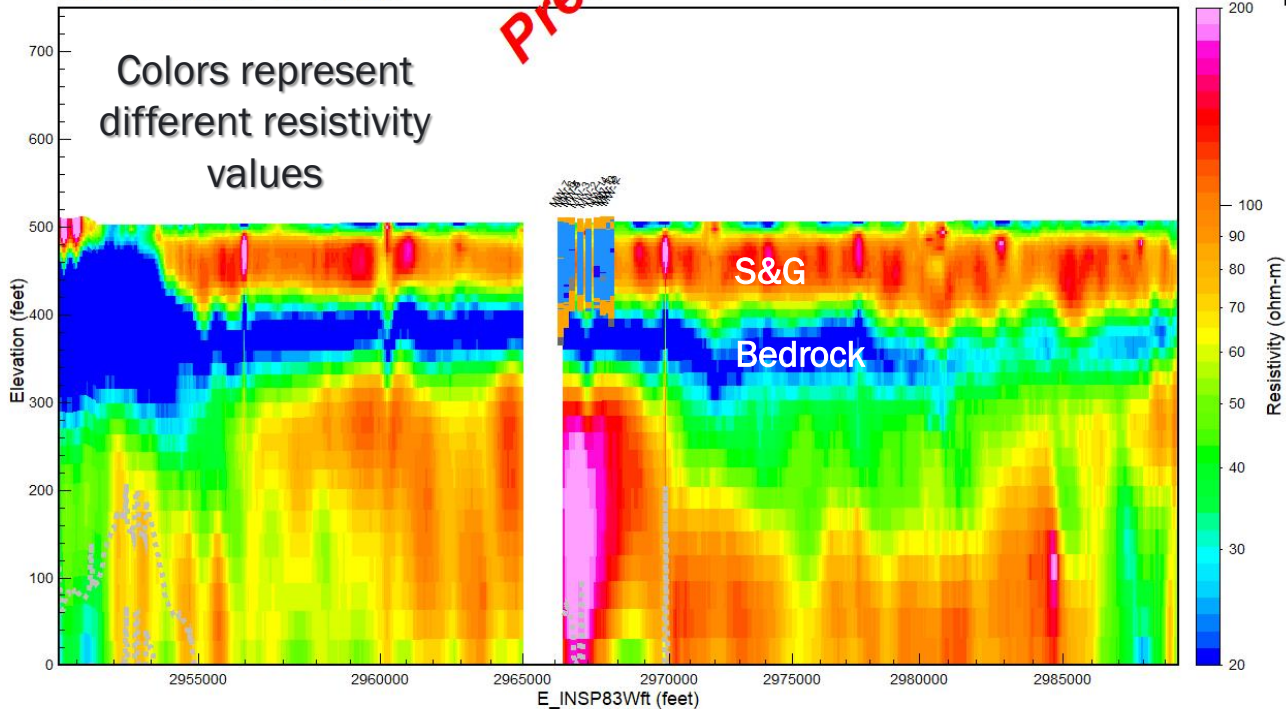
Flight Line Location Map Line L300101



Wabash Flight Area



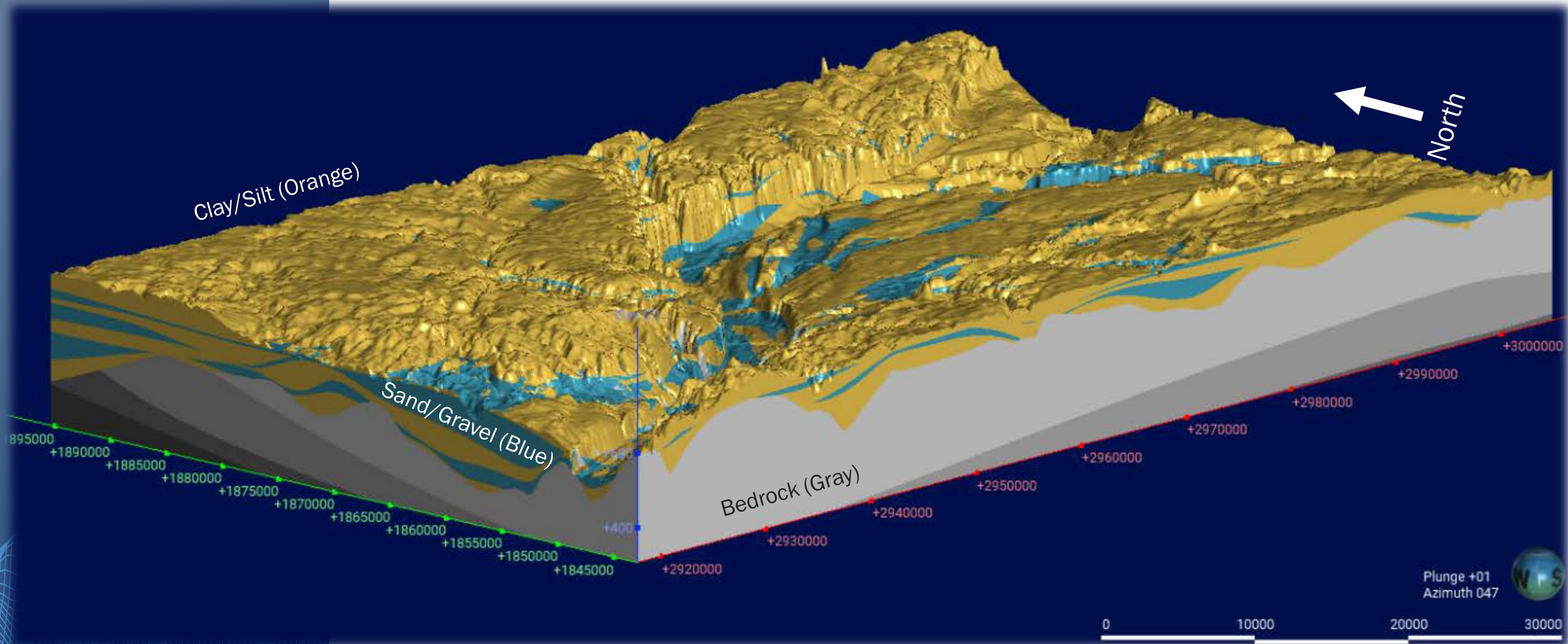
LCI Inversion Profile Line L300101



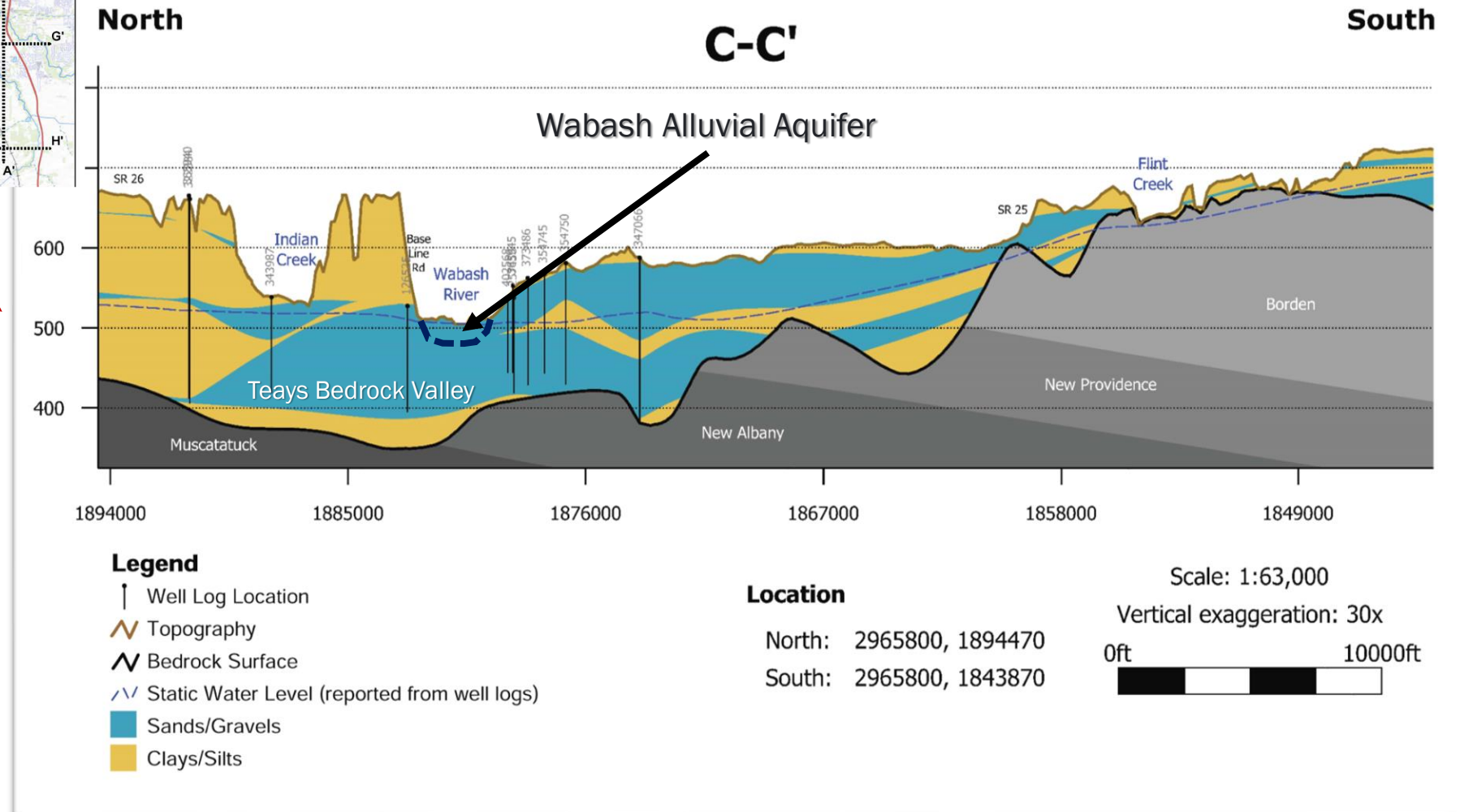
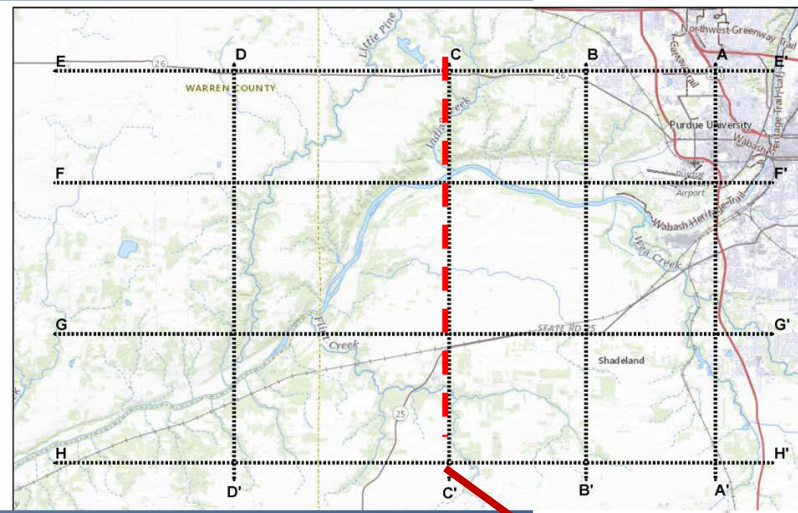
Preliminary Laterally-Constrained Inversions (LCI) of Airborne Electromagnetic (AEM) data collected over a selected area of the Wabash River in Tippecanoe County Indiana. Data acquisition occurred on July 1, 2023. The Wabash AEM Flight Area map inset to the right indicates all the flight lines as black lines. The current line displayed in the profiles is indicated in red on the USGS topographic map of the area. Blue dots are wells and test holes supplied by Intera. The Flight Location Map indicates the flight path on aerial imagery of the area. The LCI Inversion Profile shows the results of the inversion as electrical resistivity. Gaps in the resistivity profile are a result of editing areas of EM-coupling out of the data, noise removal, or of areas that were not over flown due to infrastructure. When visible the dashed gray lines indicate the depth of investigation (DOI). For the AEM resistivity profile Intera supplied test holes and wells that are within 500 feet of the flight line are plotted indicating lithology. The project projection and vertical datum are NAD83 Indiana West State Plane (feet) and NAVD88 (feet).

1 Gravel

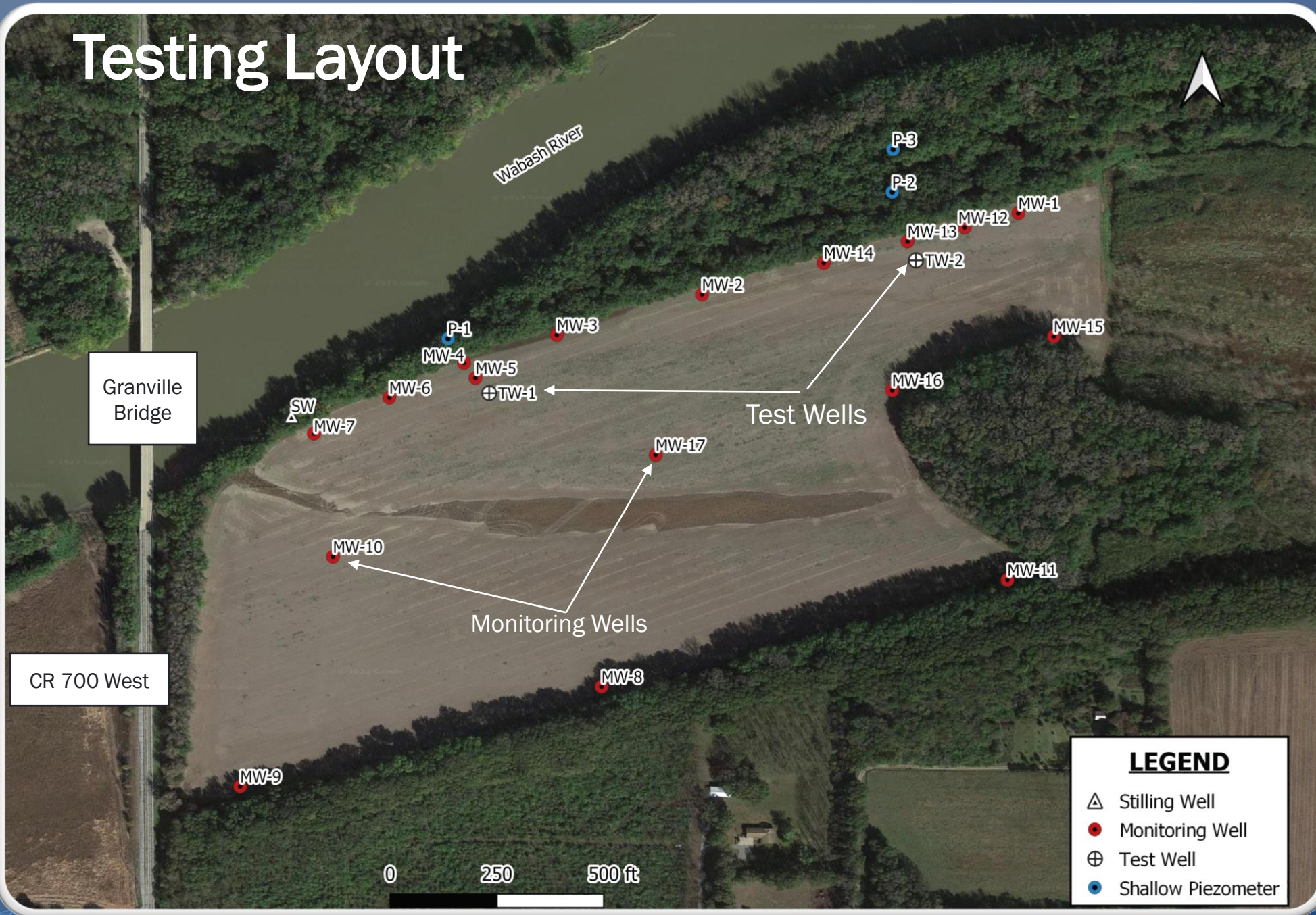
3D Geologic Model



Regional Geologic Cross-Sections



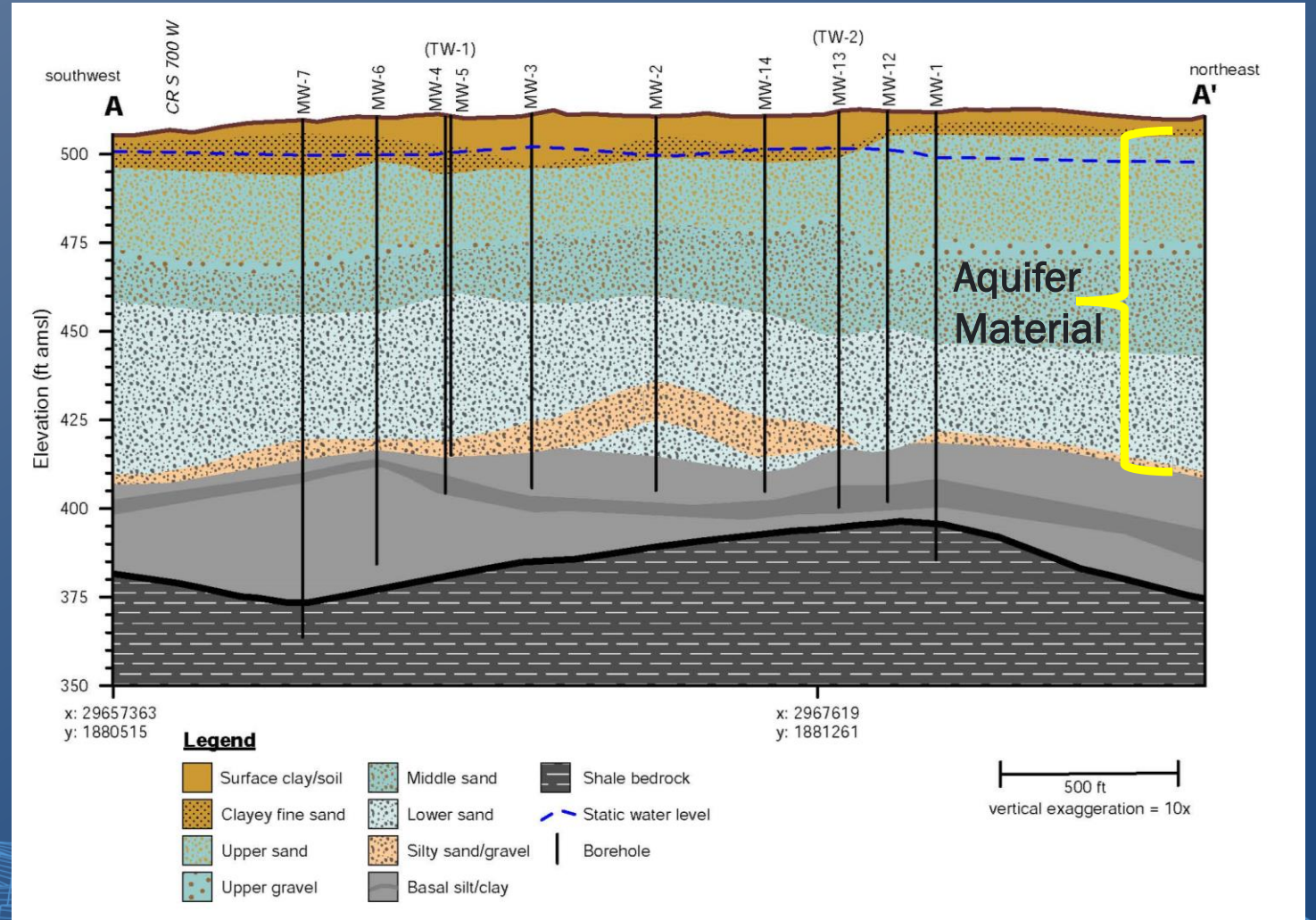
Testing Layout



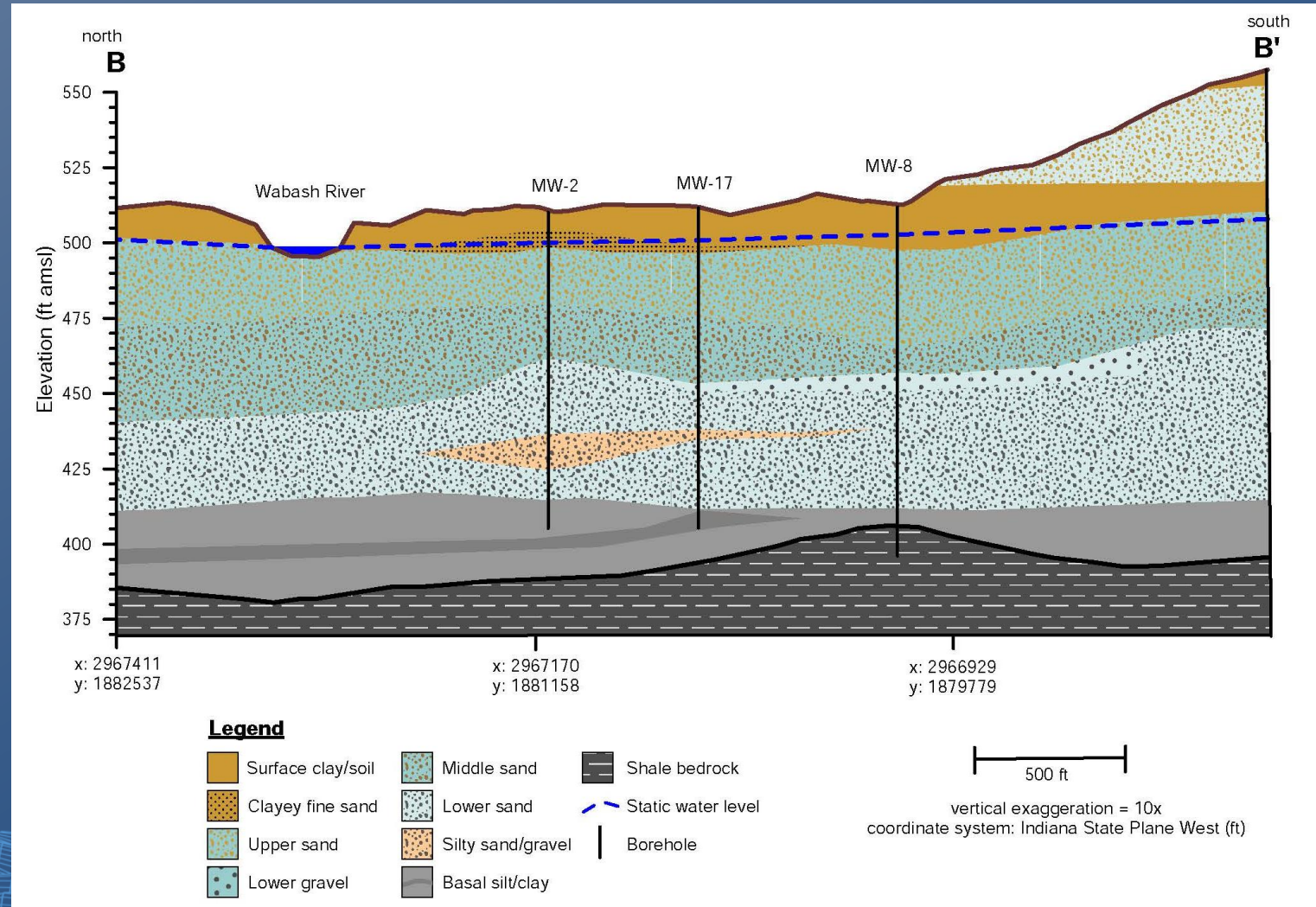
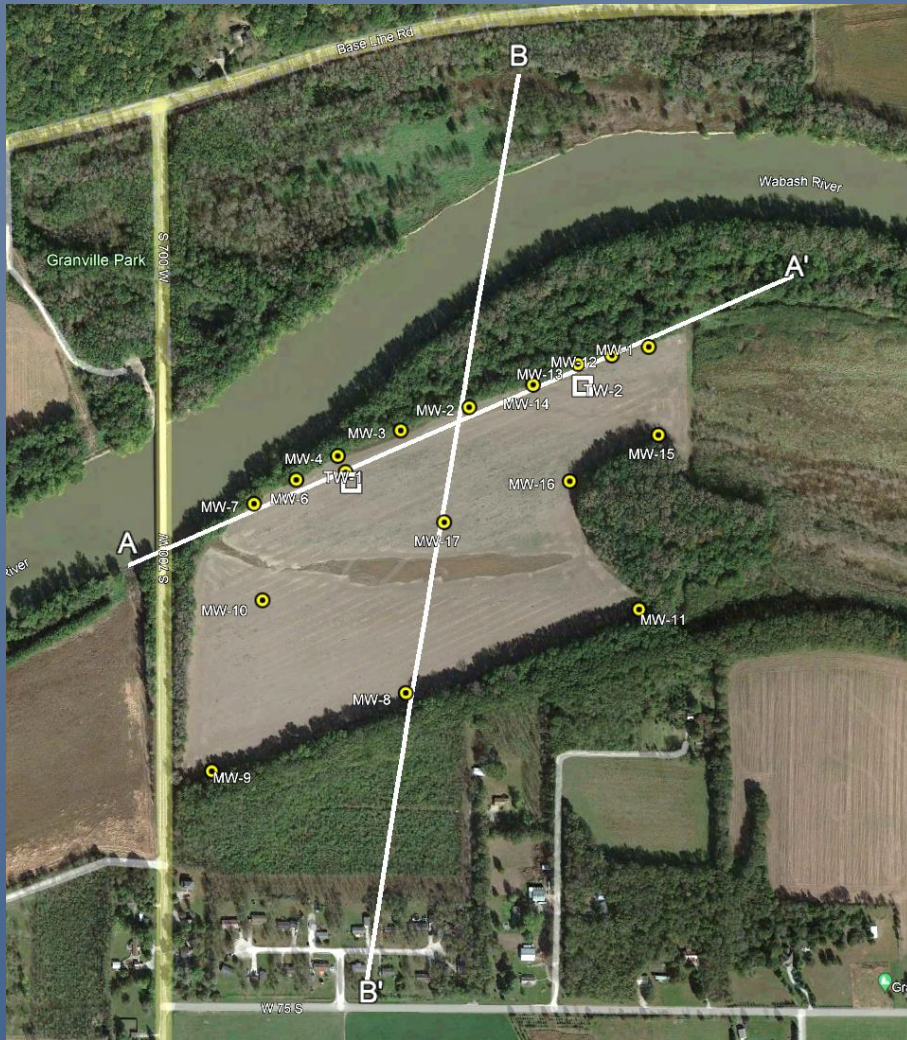
Field Program

- Secured Access to a 50-acre parcel.
- 19 Borings
 - 17 Monitoring Wells
 - 2 Test Wells
- 2 Aquifer Tests
- Aerial Electromagnetic Survey (AEM)

Site-specific Geologic Cross Section Parallel to the River



Site-specific Geologic Cross Section Perpendicular to the River



Aquifer Testing

- Two test wells constructed and pumped for 3 days each while the 17 monitoring wells recorded water level changes.



Water Quality Sampling during aquifer test



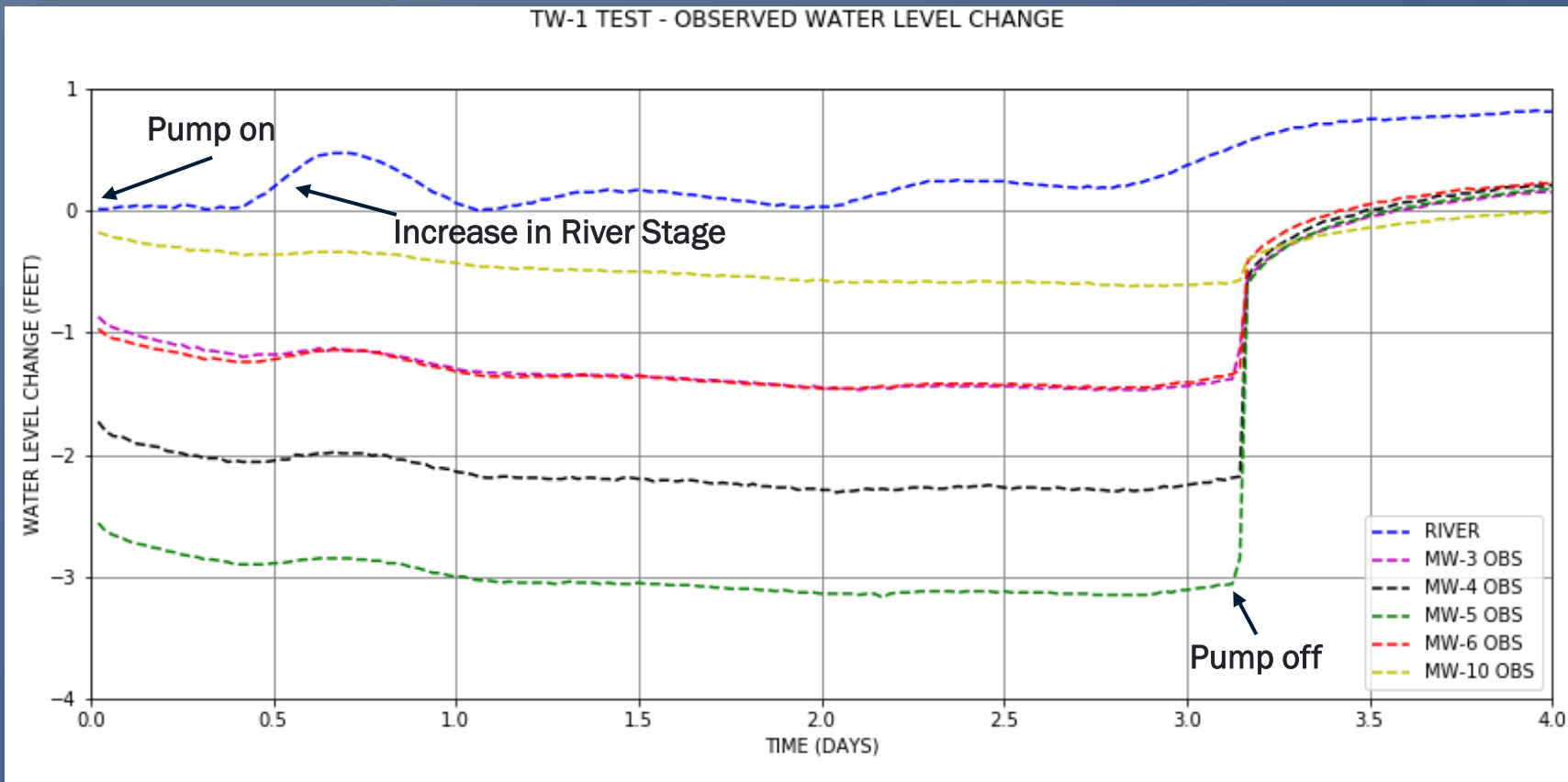
Test Well during aquifer testing

What does the aquifer test tell us?

Aquifer Test Data

Response to Test Well 1 Constant-Rate Test

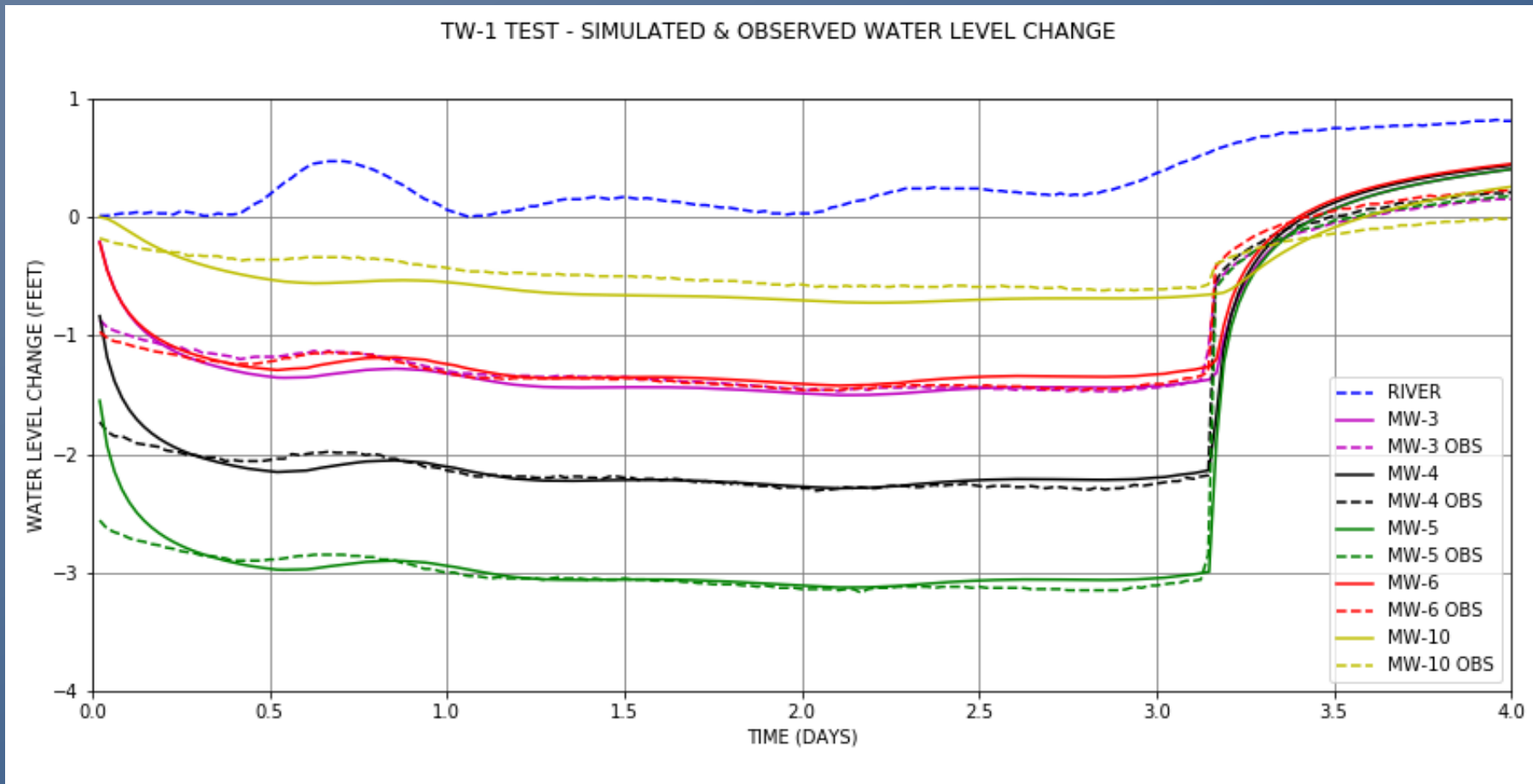
Test Rate = 1420 gpm



River affects water levels in monitoring wells. Pumping wells do not affect River stage. Wells closer to pumping experience more drawdown.

Aquifer Test Analysis

Objective: Match Ttim model of test to observed water-level changes. Use hydraulic parameters in predictive modeling analysis



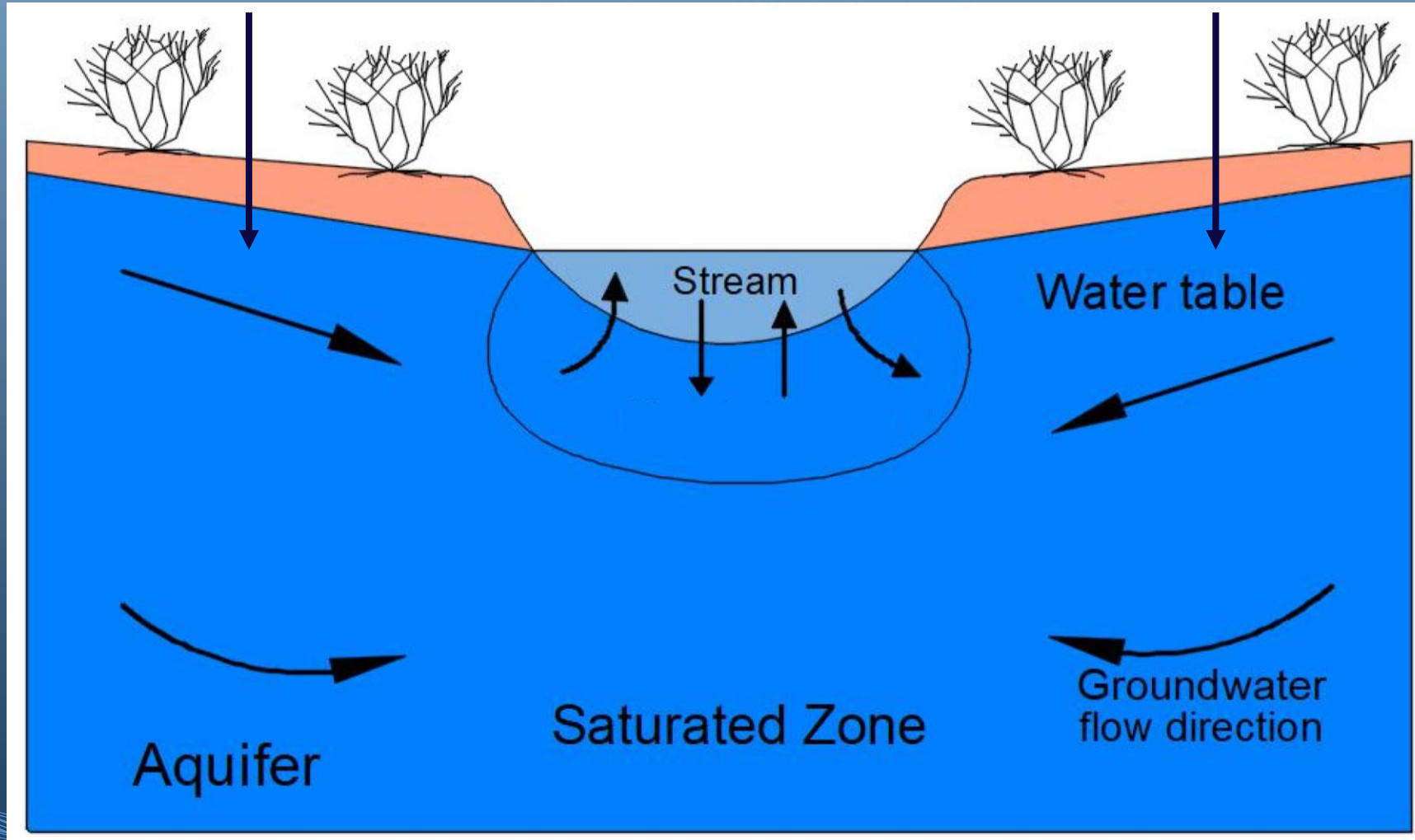
Hydraulic Parameter Results

- Riverbed resistance:
1.0 - 2.5 days
- Aquifer hydraulic conductivity:
450 - 550 ft/day

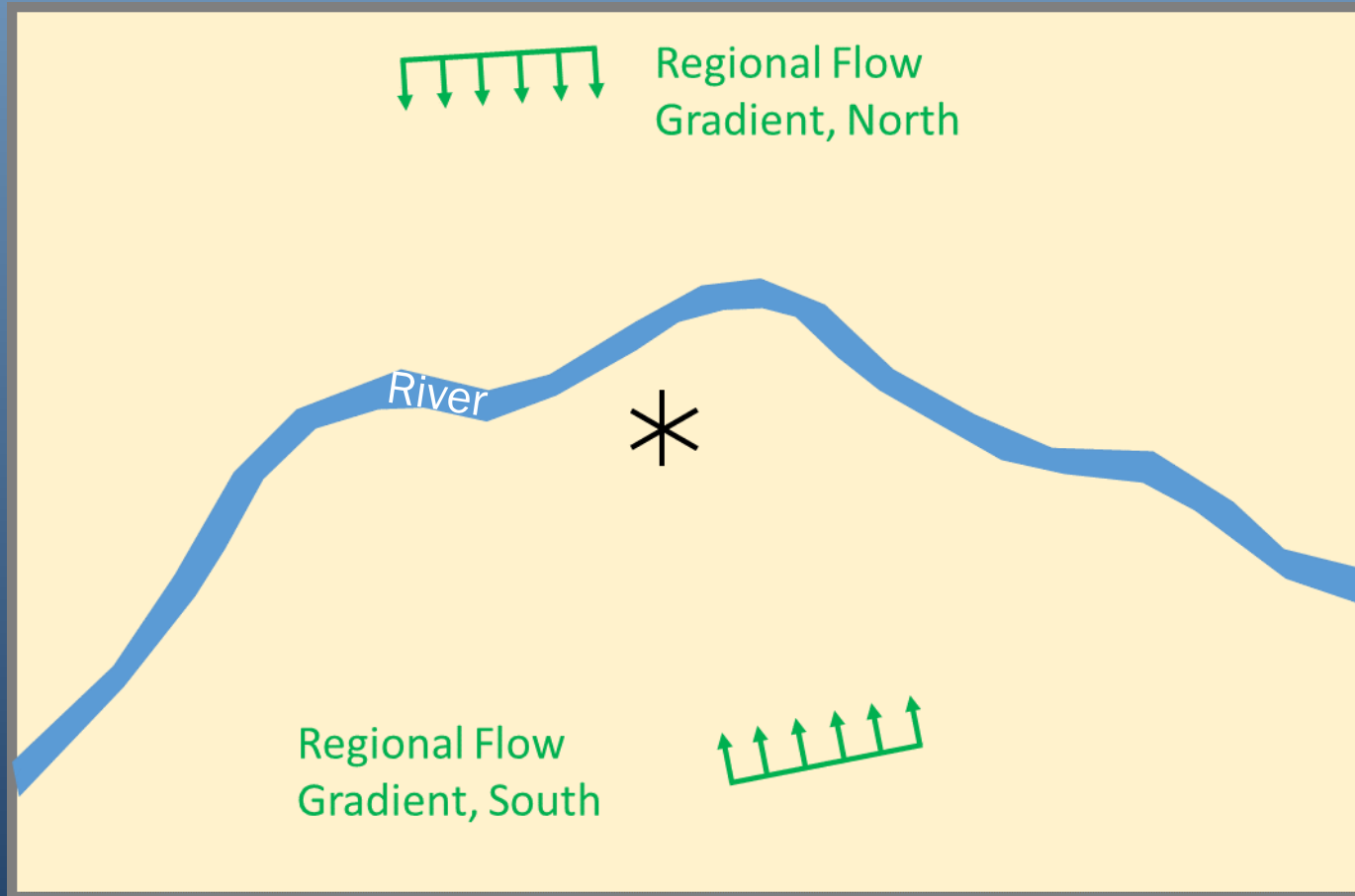
Model of Well Field Yield

- Properties
- Calibration to Test Data
- Scenarios
- Estimated Yield

Stream / Aquifer Hydrology



GFlow Modeling to Estimate Yield

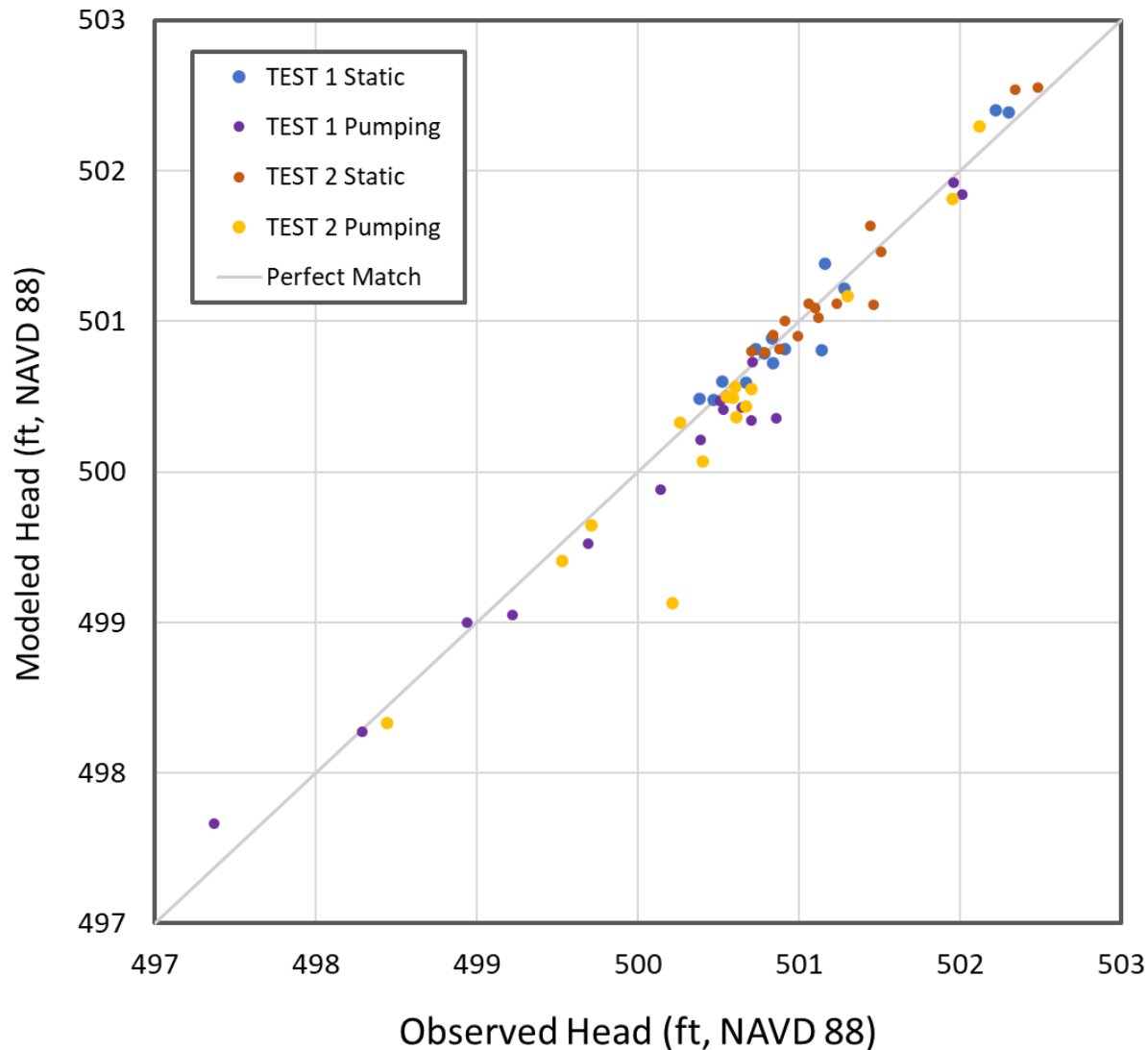


Aquifer Properties:
Hydraulic Conductivity
Regional Flow Gradient

River Properties:
Stage
Depth
Riverbed Resistance

Collector Well Properties:
Pumping Level in Caisson
Arm Resistance
No. and Length of Laterals

Calibration to Aquifer Test Data



Regional Gradients:

South: 0.006

North: 0.004

Hydraulic Conductivity*:

$k = 500 \text{ ft/day}$

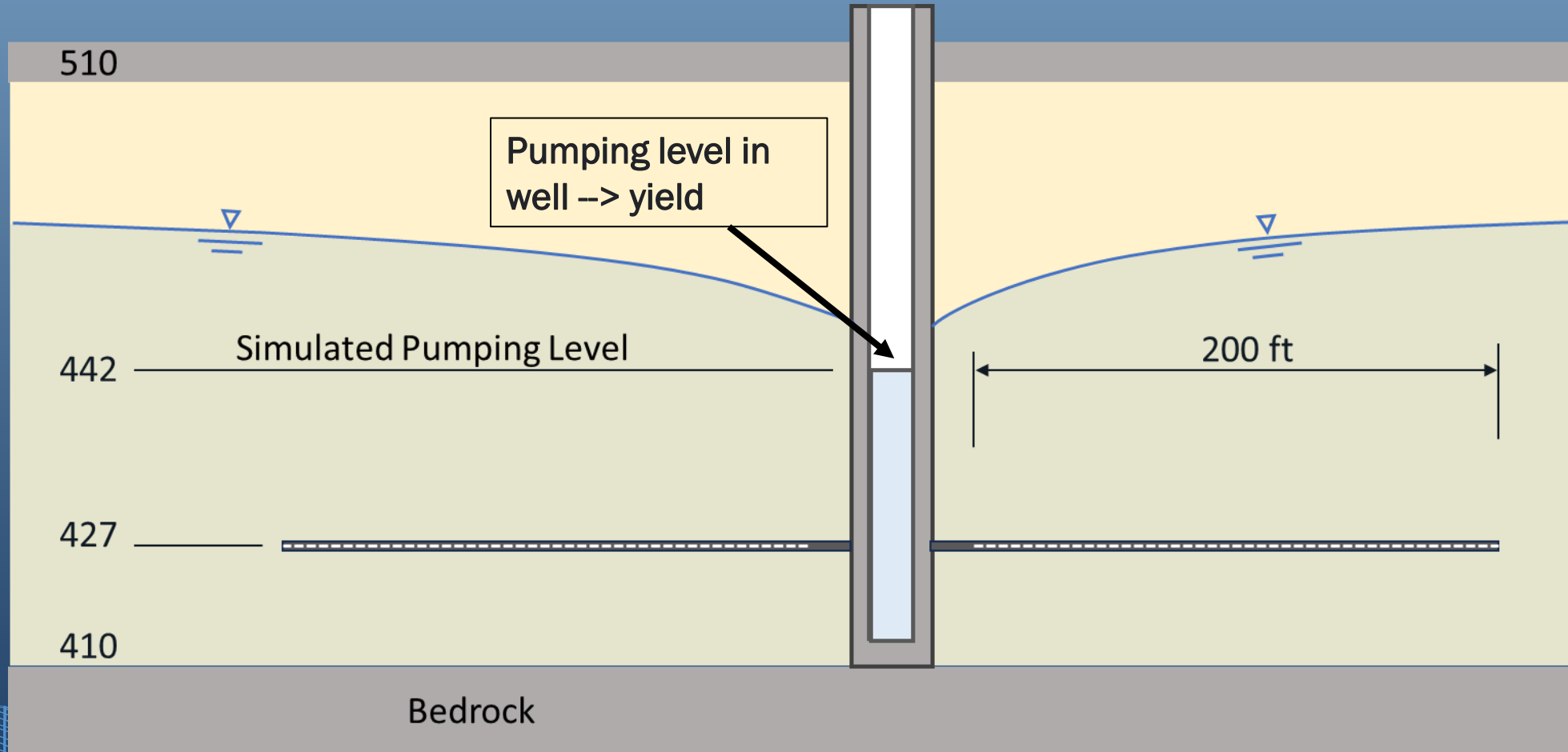
Riverbed Resistance*:

$c = 2 \text{ days}$

*Calibrated hydraulic parameters in excellent agreement with aquifer test analysis

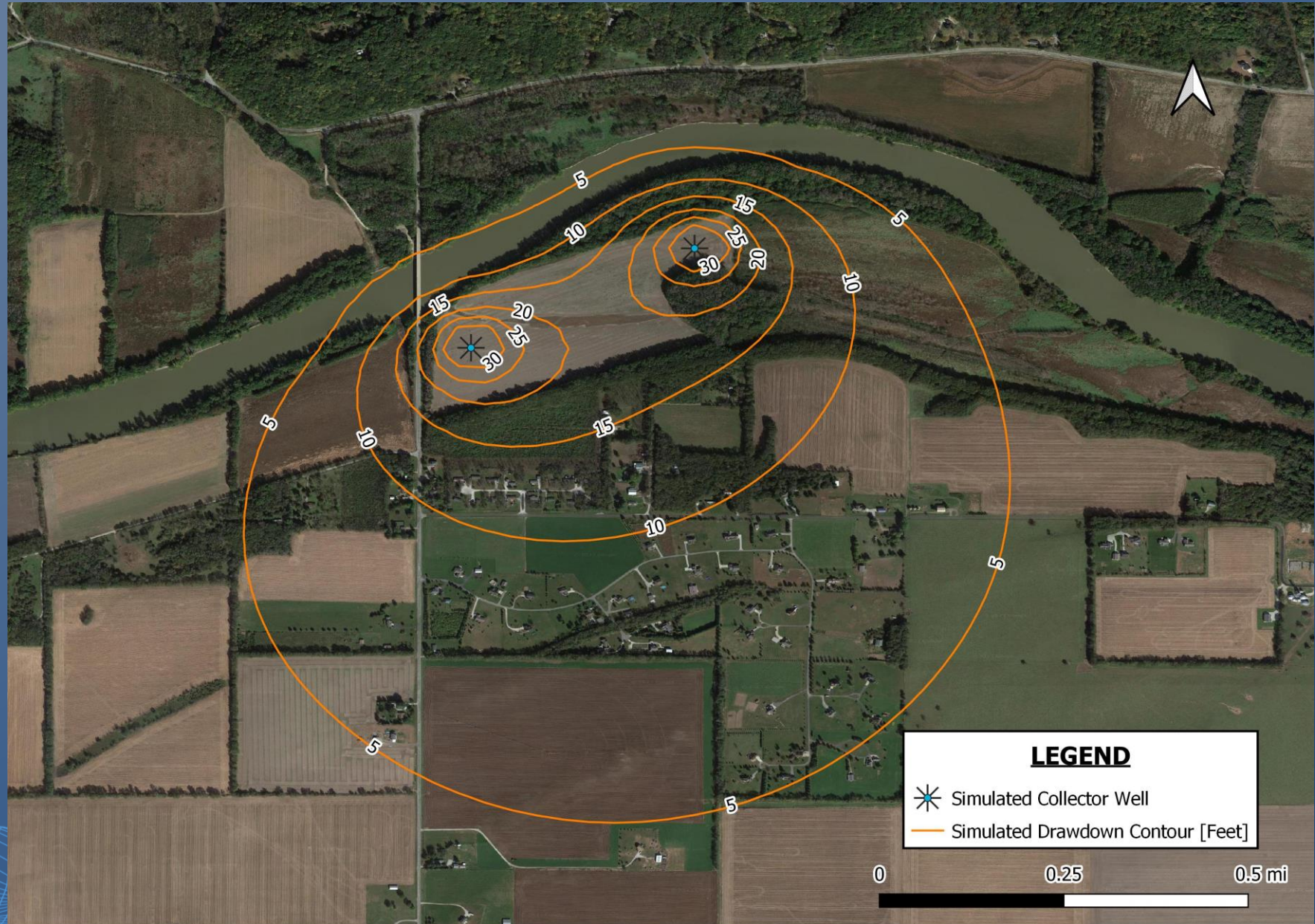
Collector Well Yield >15 MGD

Site #1



Maximum Drawdown Scenario

45 MGD
Combined
Pumping Rate



Next Steps

- Local outreach and communication
- Incorporate final Aerial Electromagnetic Survey results into 3D Geologic Model
- Exploration and testing at two more sites
- Peer review
- Conceptual collector well design analysis
- Additional Phases

Questions ?