

# Should Counties Play a Role in Water Resource Management?

WATER RESOURCES SERVICES



Indiana County Commissioners | November 2023

Jack Wittman, INTERA

Mark Heirbrandt, Hamilton County



## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

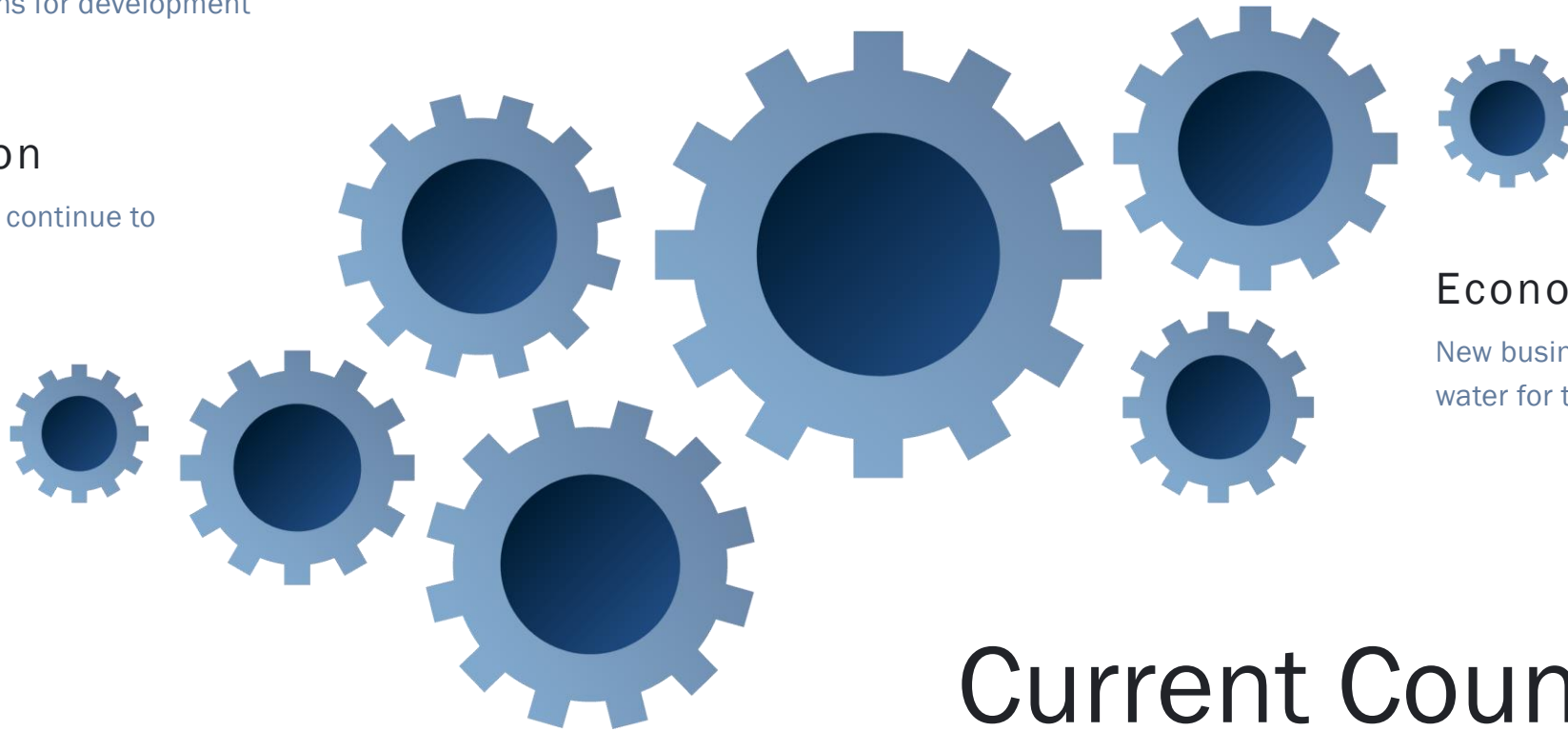
Spills and dump sites continue to require special care

## Economic Develop

New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.



# Current County-Water Nexus

## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

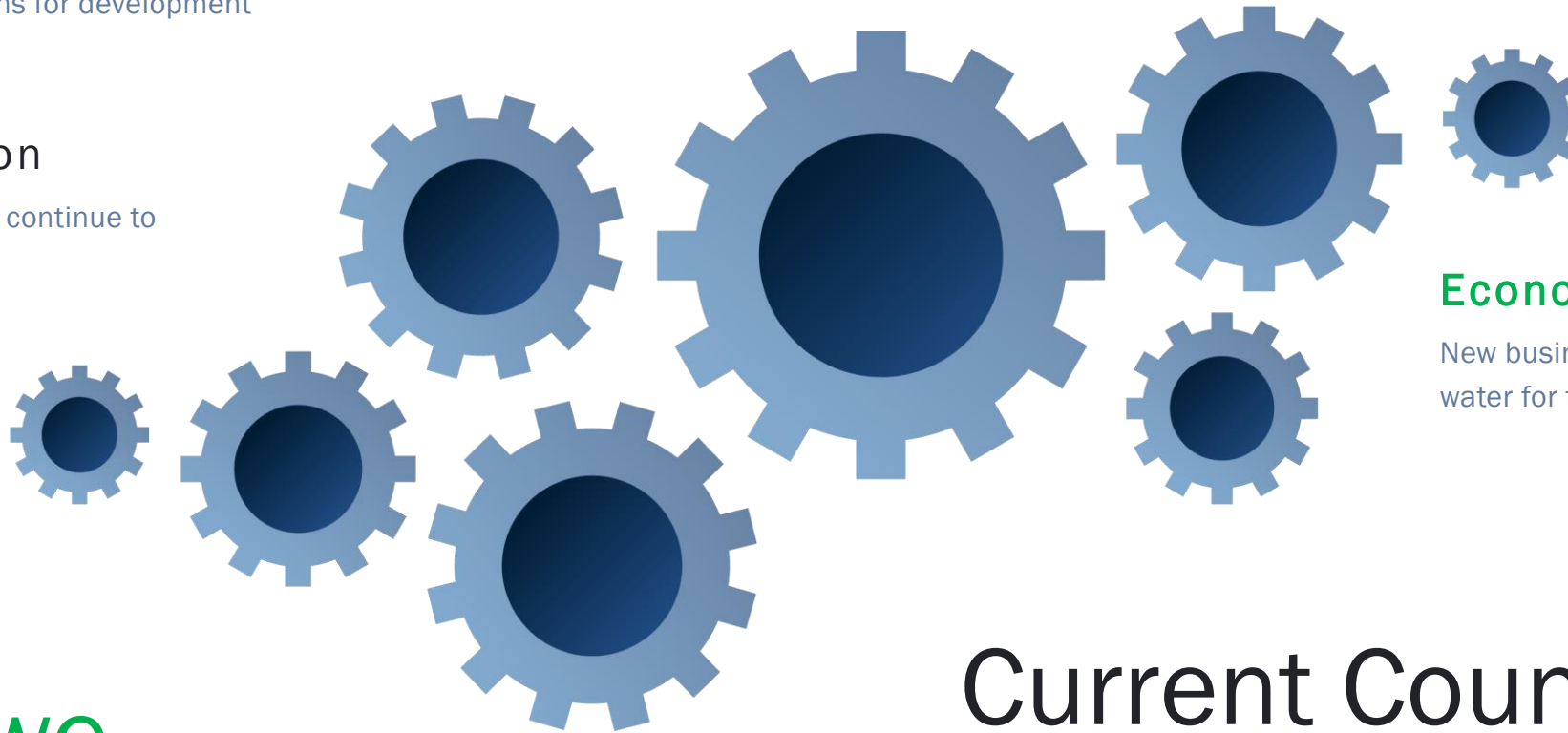
Spills and dump sites continue to require special care

## Economic Develop

New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.



How  
should we  
grow?

# Current County-Water Nexus

## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

Spills and dump sites continue to require special care

## Economic Develop

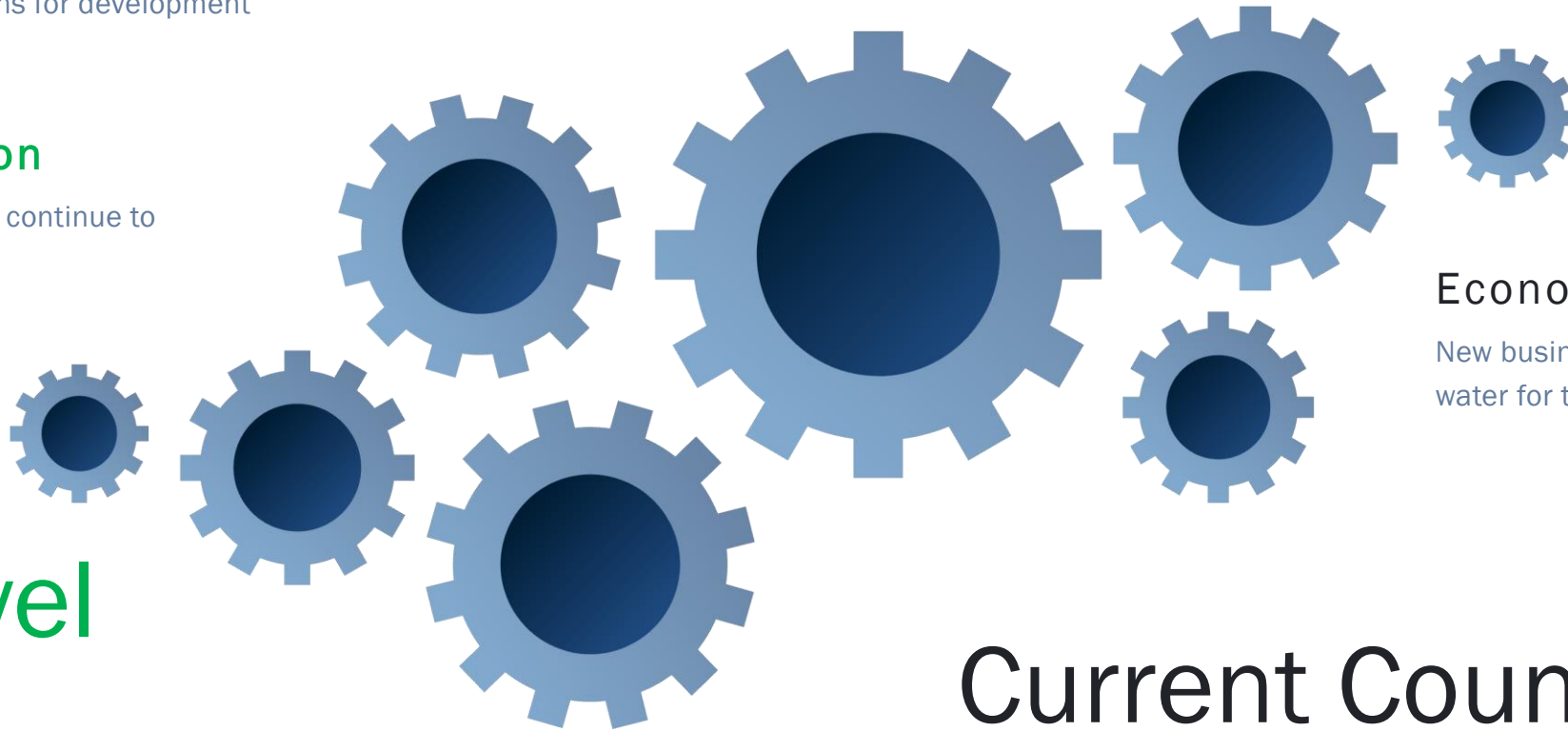
New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.

Are gravel pits a problem?

# Current County-Water Nexus



## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

Spills and dump sites continue to require special care

## Economic Develop

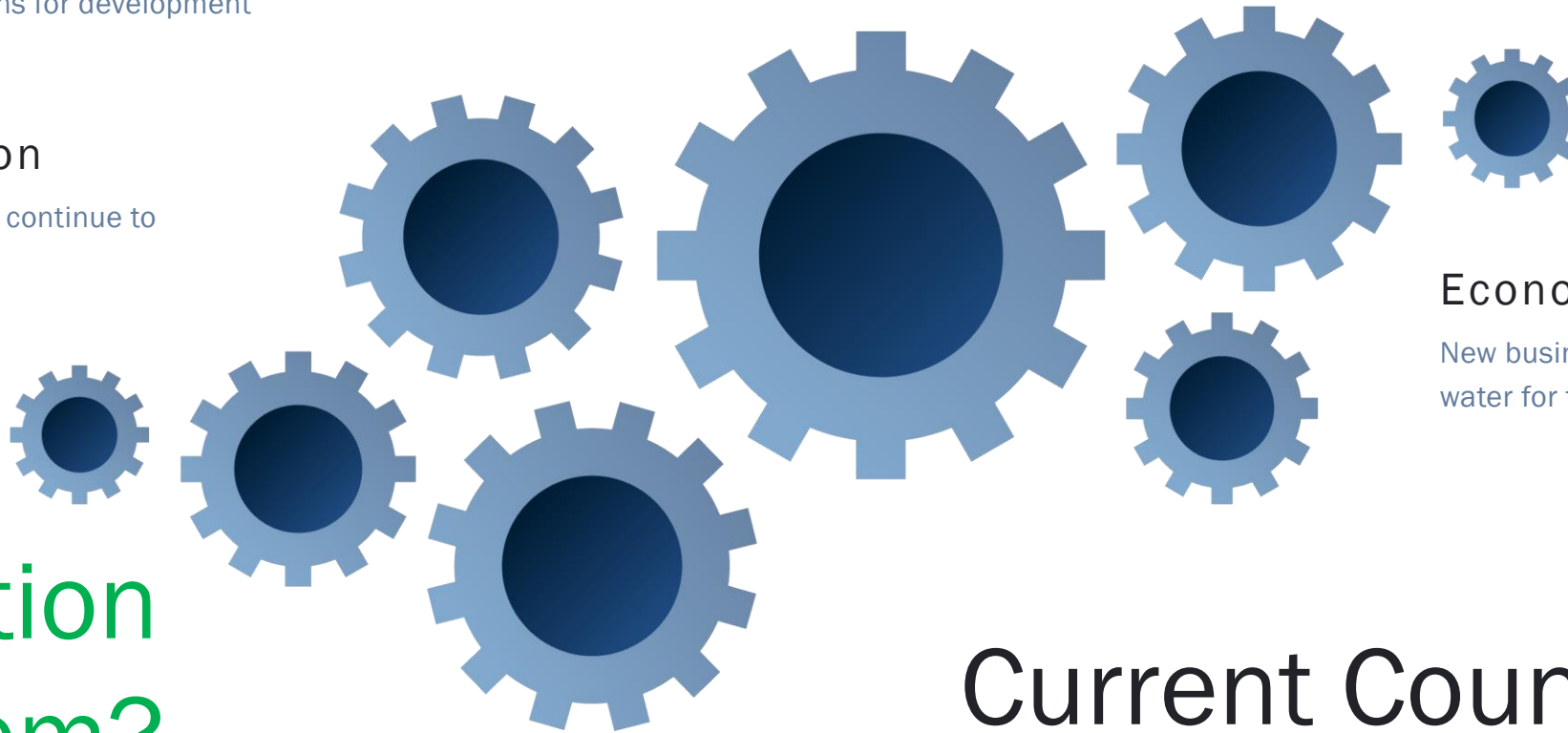
New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.

Is irrigation  
a problem?

# Current County-Water Nexus



# What about pipelines?

## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

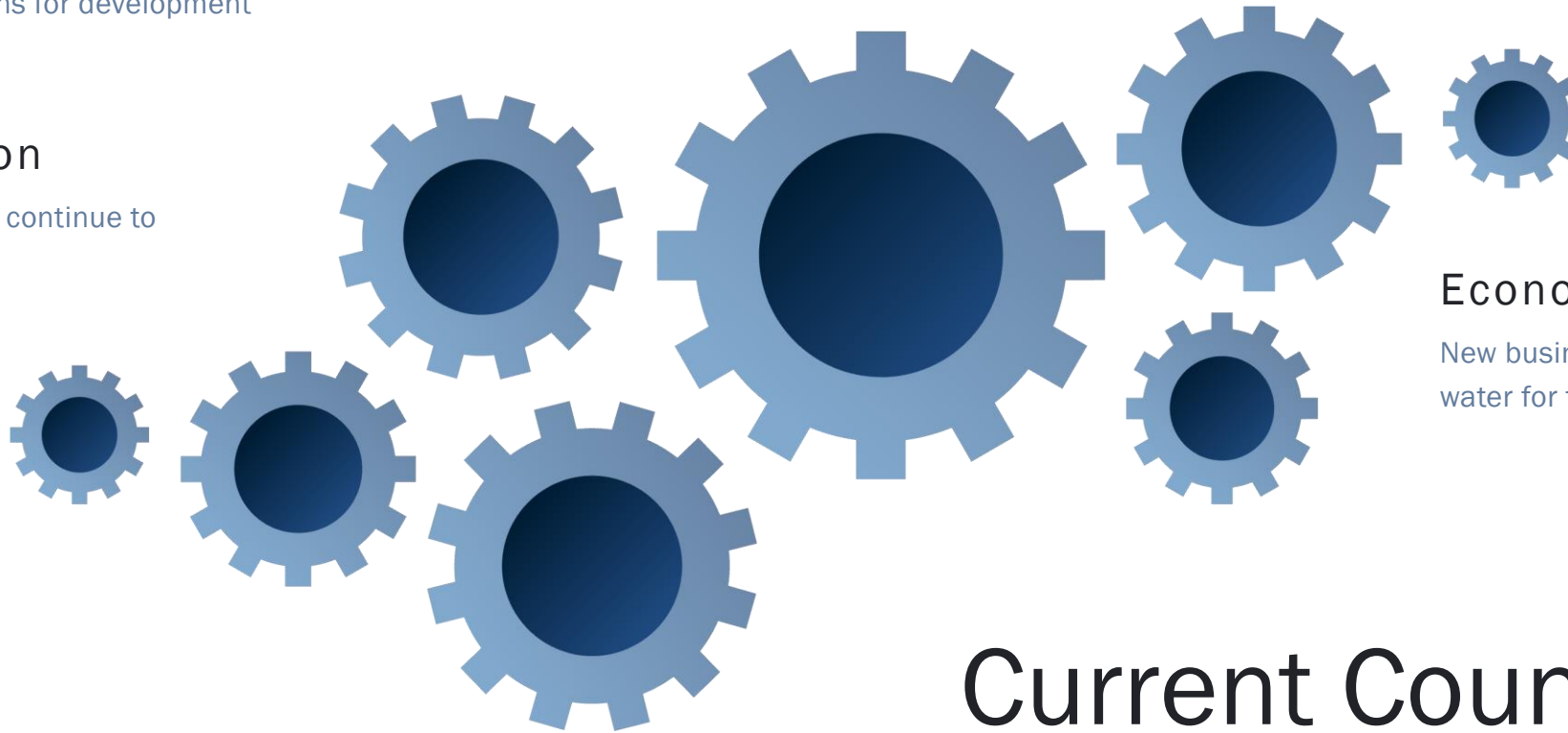
Spills and dump sites continue to require special care

## Economic Develop

New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.



# Current County-Water Nexus

## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

Spills and dump sites continue to require special care

## Economic Develop

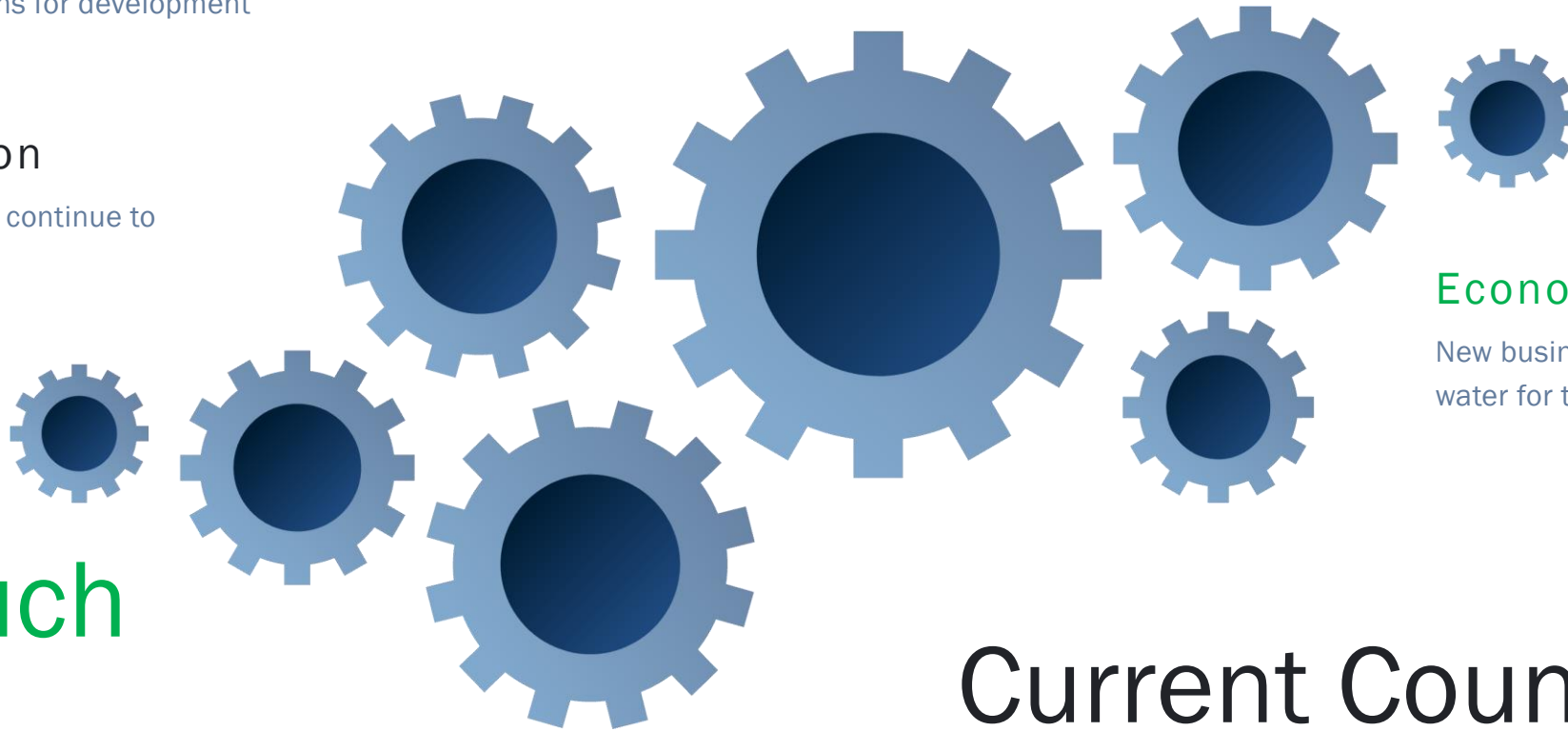
New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.

How much water is available?

# Current County-Water Nexus



## Stormwater

From a stormwater utility to new designs for development

## Drainage

The County Surveyor and the County Engineers may share this program

## Wellhead Protection

Some counties include their utilities in quarterly meetings to protect water

## Contamination

Spills and dump sites continue to require special care

## Economic Develop

New businesses often require water for their needs

## Rural Water Systems

Utilities run water lines across the county and use county rights of way.

How much water is available?

**...without knowing this.**

**Can't do this...**

# Current County-Water Nexus



# Indiana Water Law

- Indiana is a **riparian** water law state where water users have “*absolute dominion.*”

# Indiana Water Law

- Indiana is a **riparian** water law state where water users have “*absolute dominion.*”
- Indiana has **no rules on water pipelines.**

# Indiana Water Law

- Indiana is a **riparian** water law state where water users have “*absolute dominion.*”
- Indiana has **no rules on water pipelines.**
- There are **no upper limits on pumping** rates if that pumping does not make water less available in neighboring domestic wells.

# Indiana Water Law

- Indiana is a **riparian** water law state where water users have “*absolute dominion.*”
- Indiana has **no rules on water pipelines.**
- There are **no upper limits on pumping** rates if that pumping does not make water less available in neighboring domestic wells.
- There are **no low-flow thresholds** for stream flow so there is no limit to withdrawals from streams.

# Indiana Water Law

- Indiana is a **riparian** water law state where water users have “*absolute dominion.*”
- Indiana has **no rules on water pipelines.**
- There are **no upper limits on pumping** rates if that pumping does not make water less available in neighboring domestic wells.
- There are **no low-flow thresholds** for stream flow so there is no limit to withdrawals from streams.
- The **priority of use** (public drinking water, industrial, irrigation, etc) needs to be used in conservation.

# Water planning identified issues and focused attention

- The Central Indiana Water Study led to new questions and new answers:
  - **County Data Collection**
  - **Collaborative Investigations**
- Participating local governments decided to support this additional work based on new **data and funding**.
- What the implications are for those communities and the central Indiana region generally -> **interconnectivity**
- How might the outcomes of the follow-up work affect local strategies and decision making? -> **learning now**



# Wabash Project - Questions

01

How much water  
can be pumped?

02

What are the  
impacts?

03

Can the testing  
hurt other wells?

04

Who sets the rules  
for water use?

05

Are we interested  
in all users?





# Estimates of Yield at One Site along the Wabash River

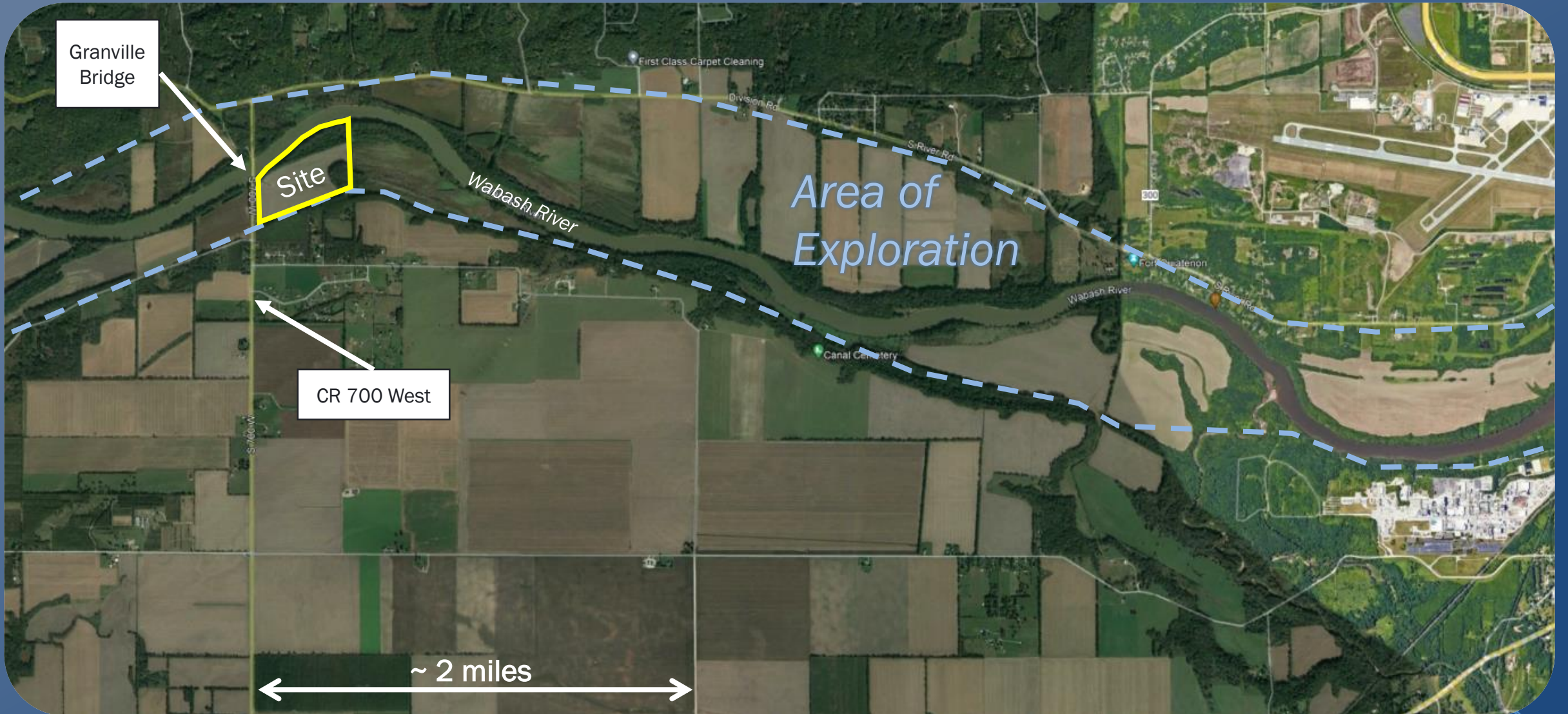
WATER RESOURCES

 **INTERA**

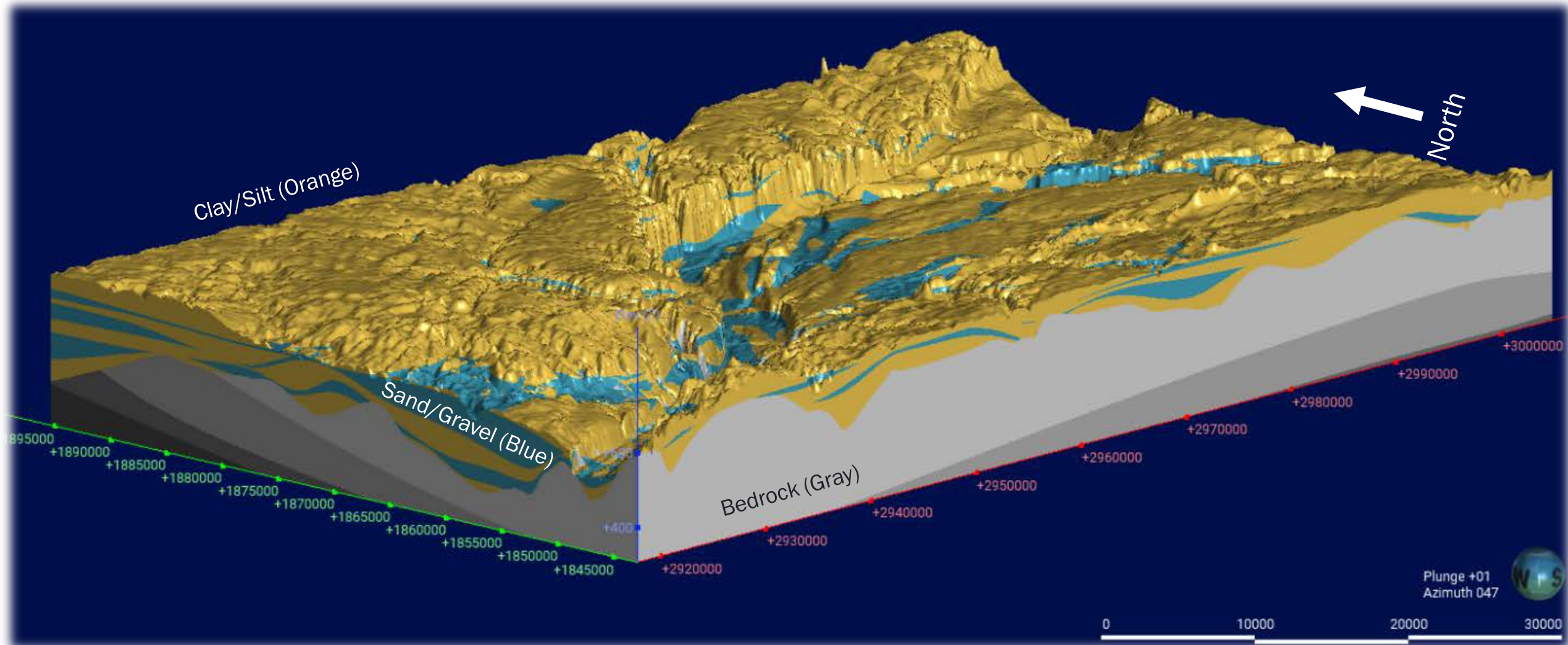
Indiana County Commissioners – November 29, 2023



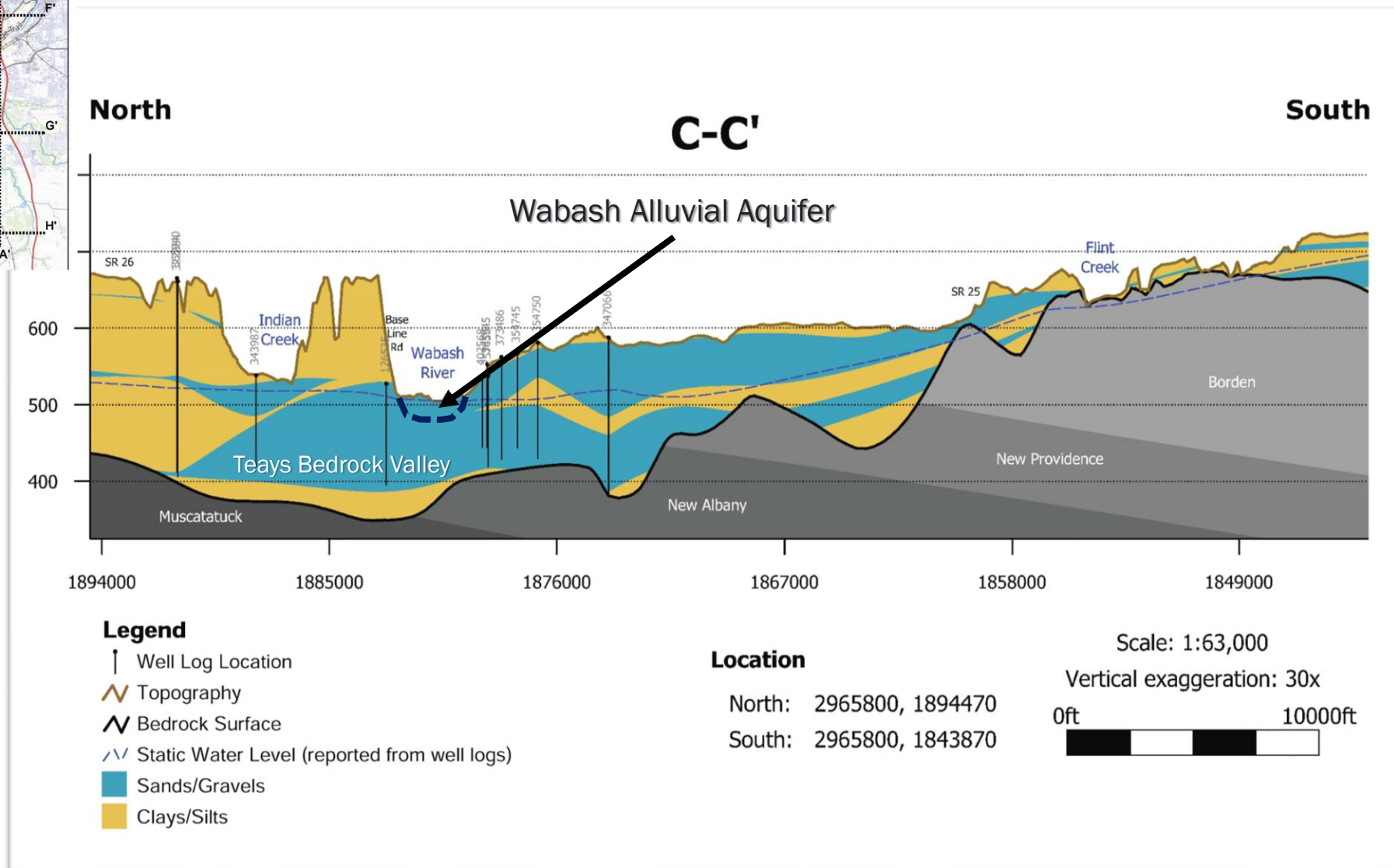
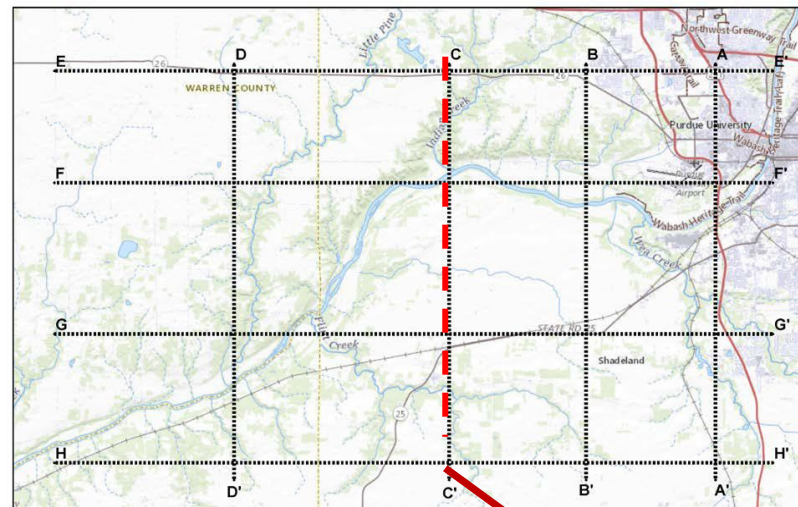
# Site Location



# 3D Geologic Model



# Regional Geologic Cross-Sections

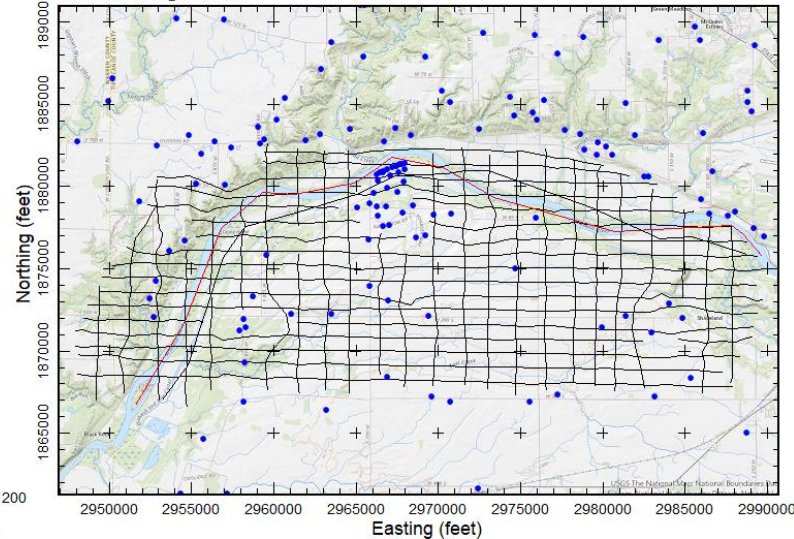


# Preliminary AEM Profile Along Wabash River

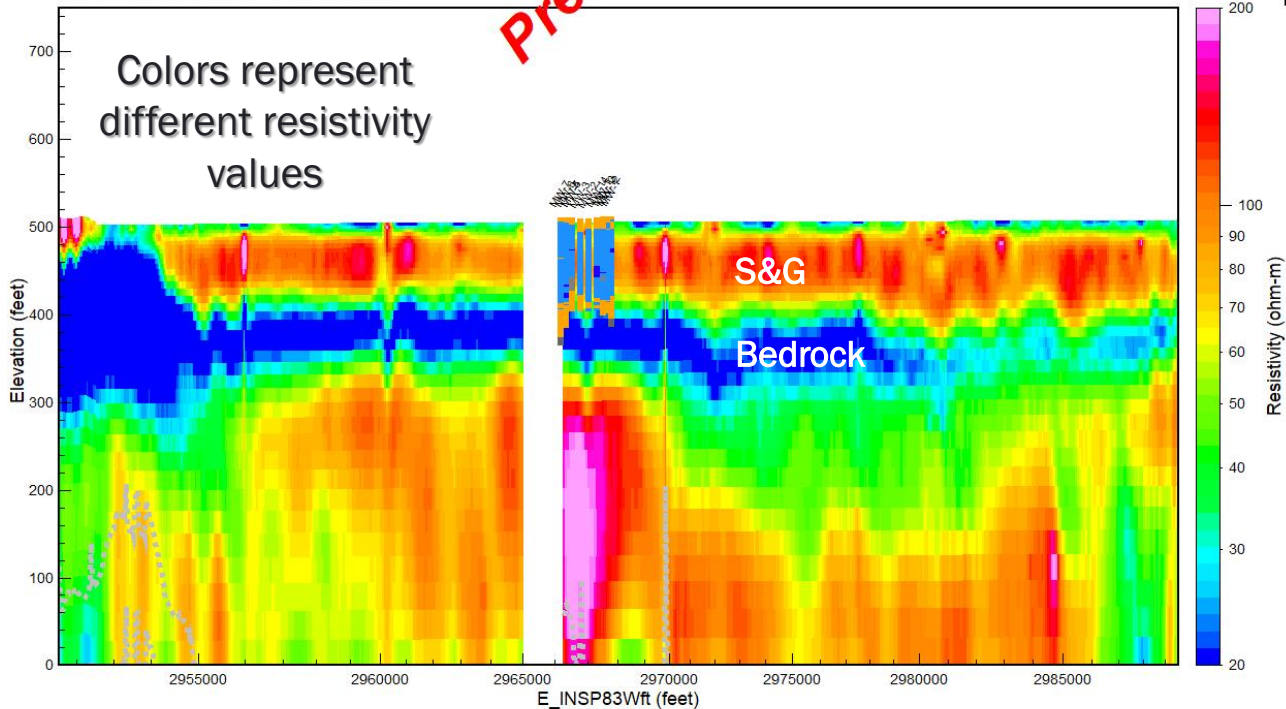
Flight Line Location Map Line L300101



Wabash Flight Area



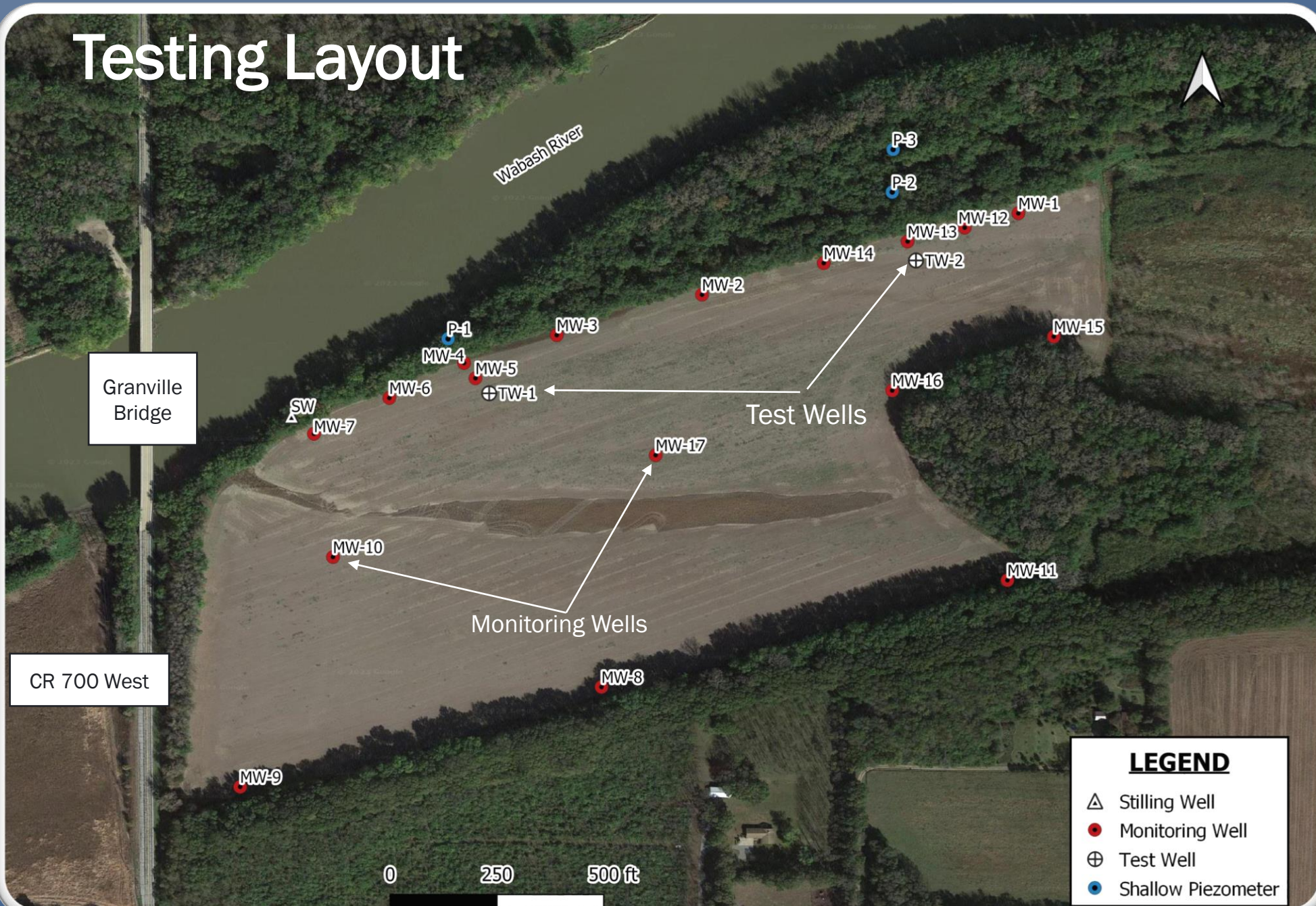
LCI Inversion Profile Line L300101



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

# Testing Layout



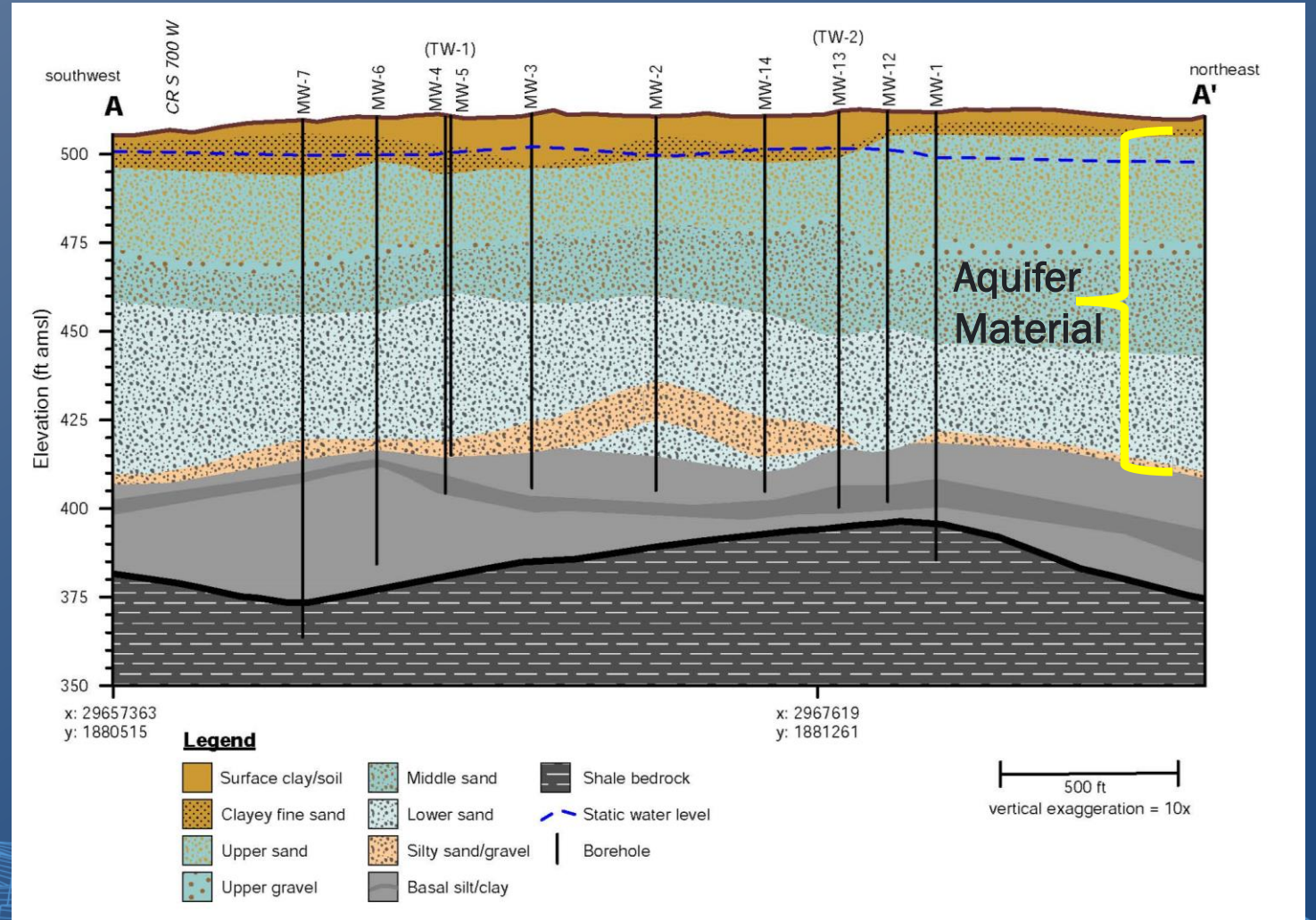
## Field Program

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

### LEGEND

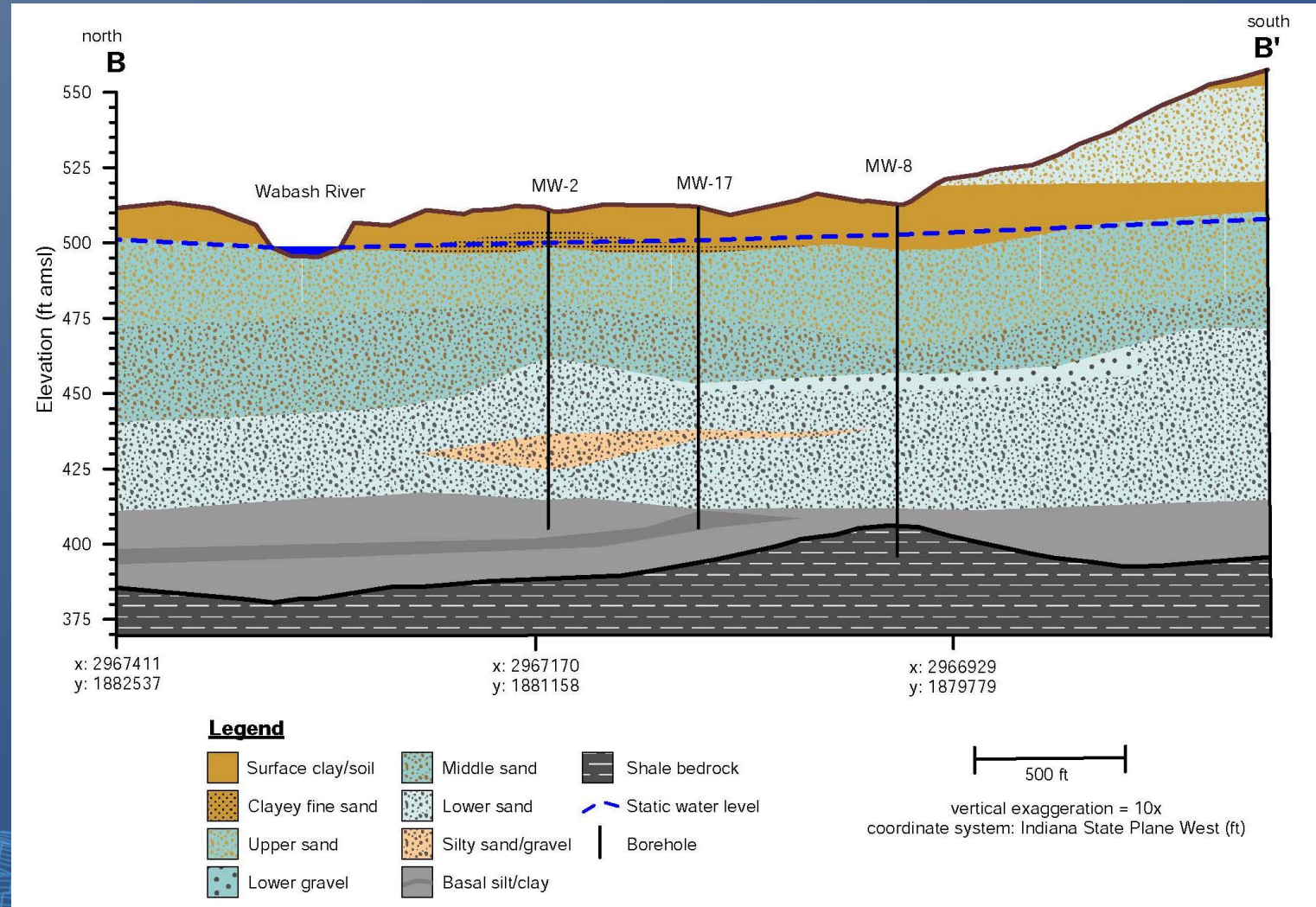
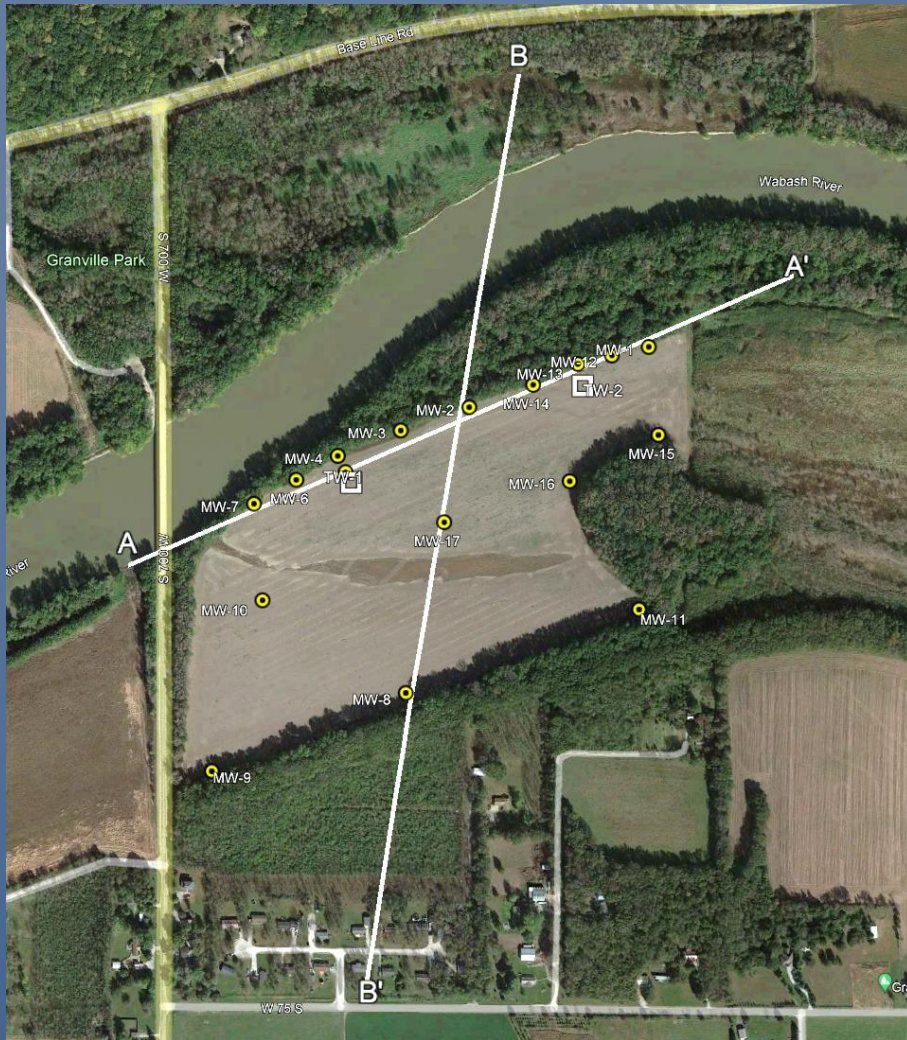
- △ Stilling Well
- Monitoring Well
- ⊕ Test Well
- Shallow Piezometer

# 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?



1. Measure drawdown in all the monitoring wells.
2. Estimate aquifer properties.
3. Model the aquifer test to see if we can reproduce the drawdown.
4. Model collector wells pumping in to estimate yield.

# Aquifer Test Data

Response to Test Well 1 Constant-Rate Test

Test Rate = 1420 gpm

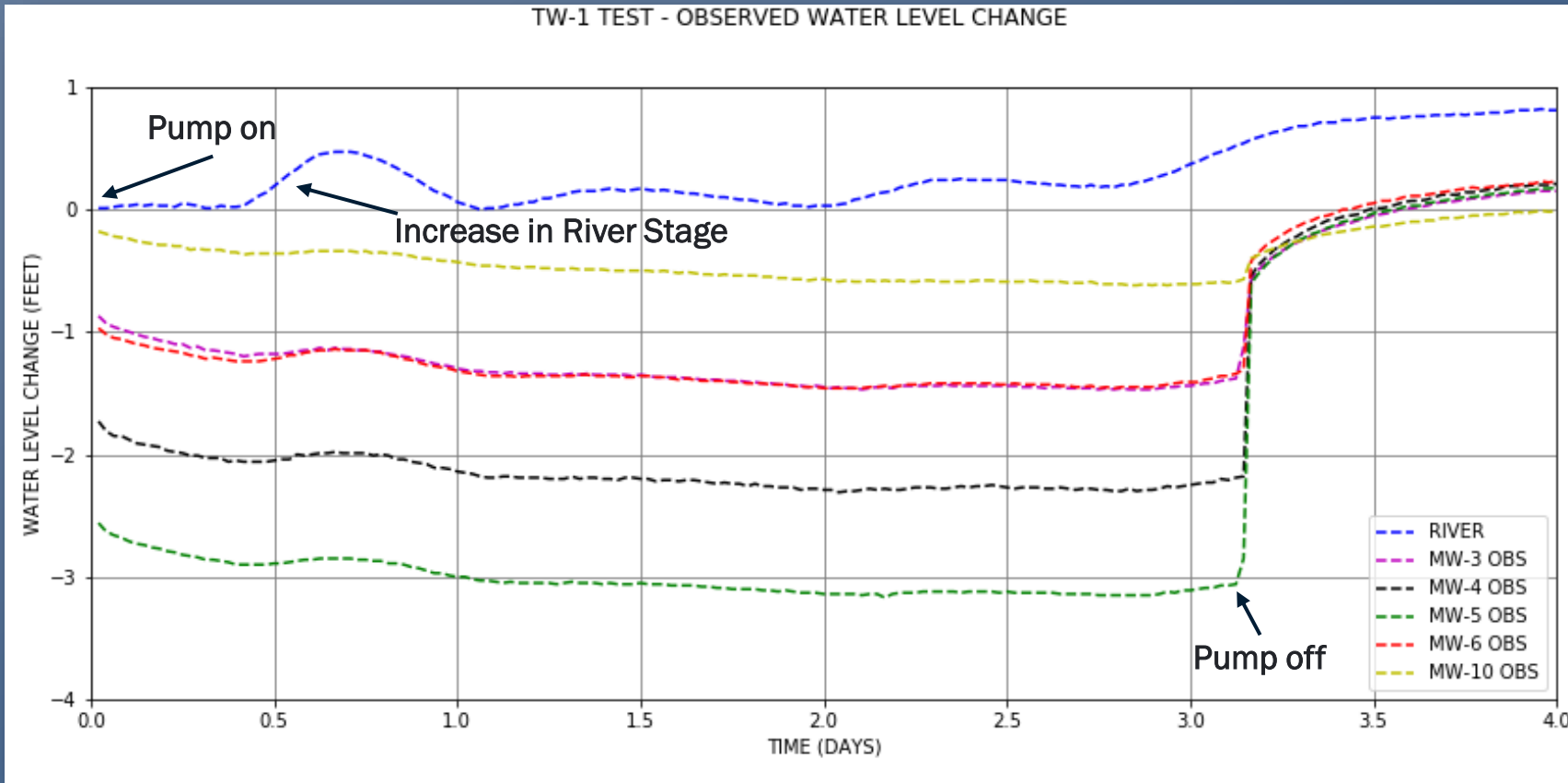


River affects water levels in monitoring wells. Pumping wells do not affect River stage.  
Wells closer to pumping experience more drawdown.

# Aquifer Test Data

Response to Test Well 1 Constant-Rate Test

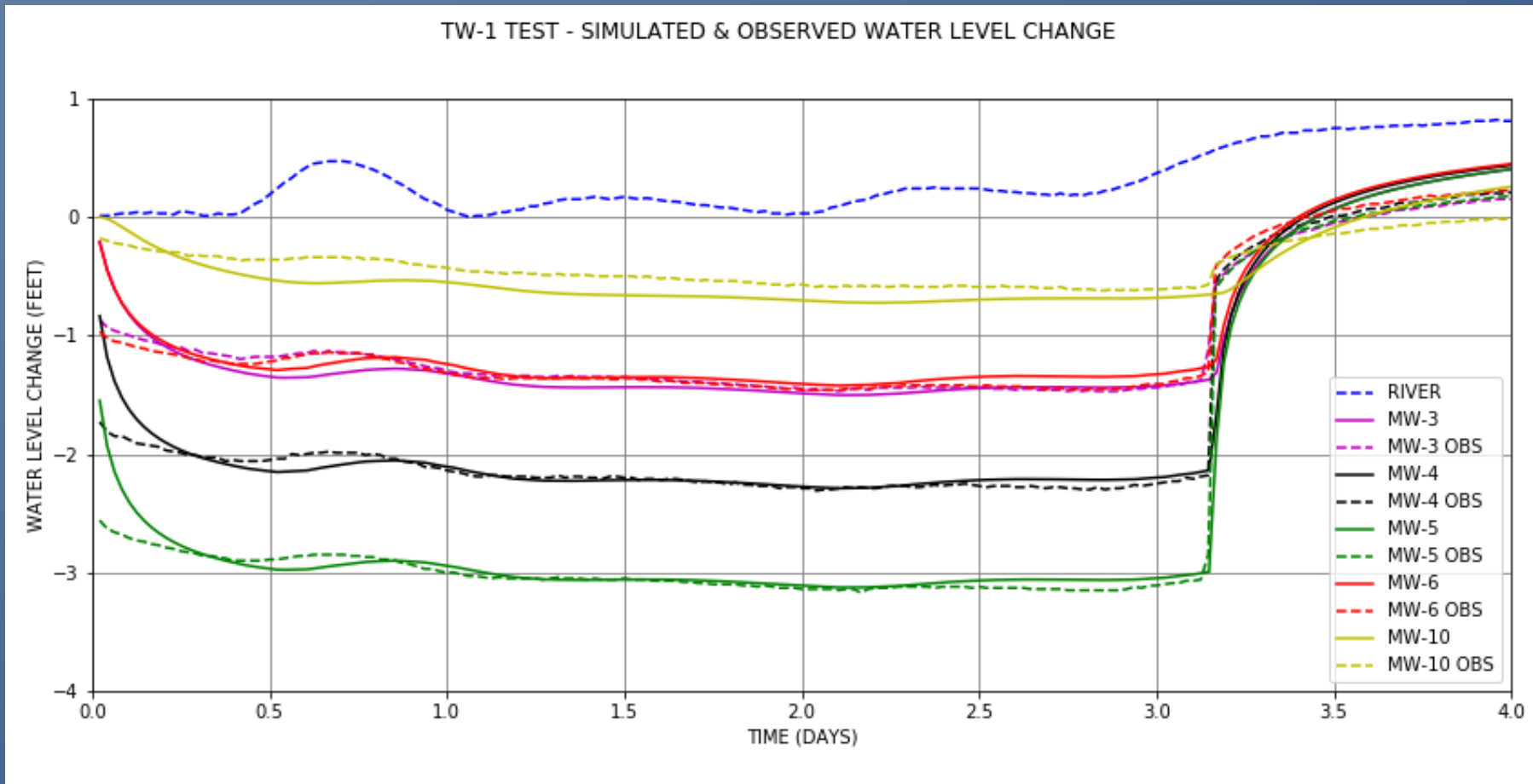
Test Rate = 1420 gpm



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

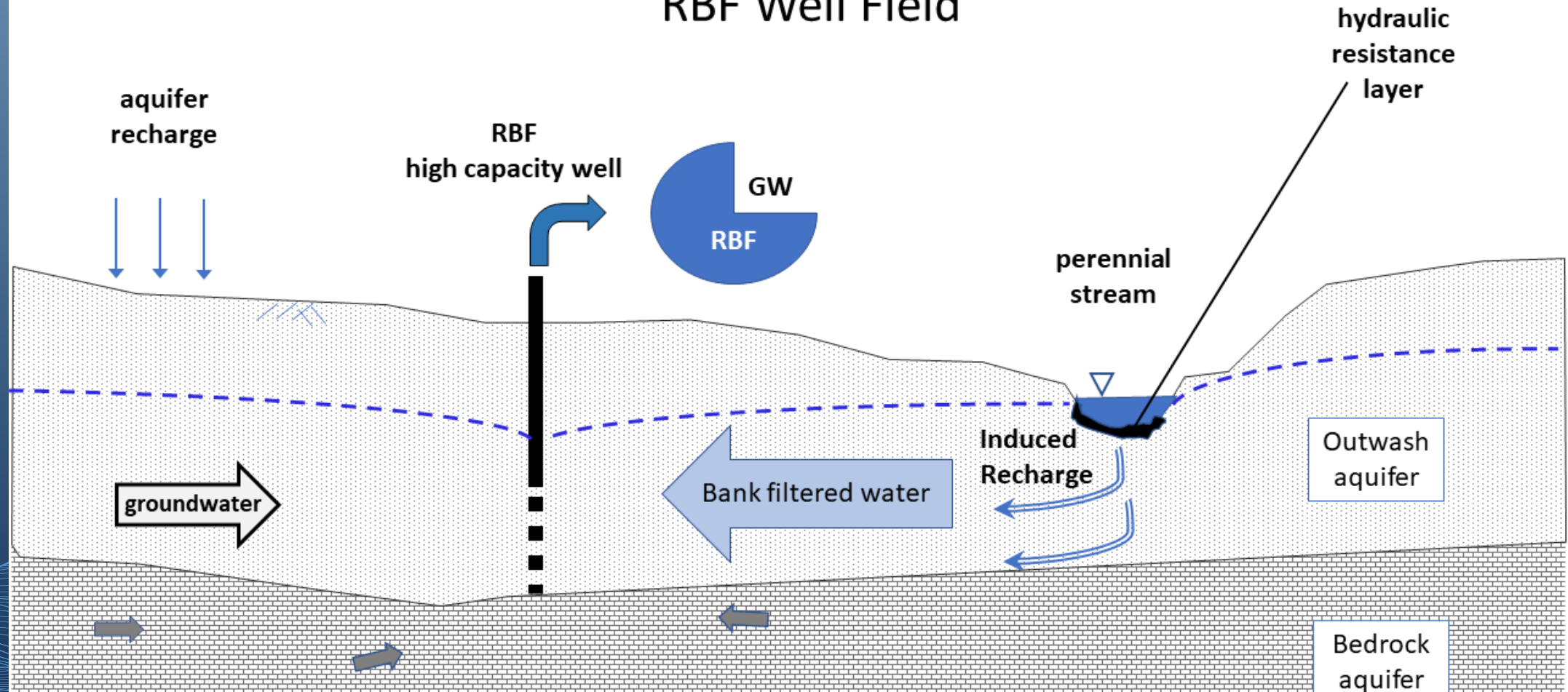
- Riverbed resistance:  
1.0 - 2.5 days
- Aquifer hydraulic conductivity:  
450 - 550 ft/day

# Model of Well Field Yield

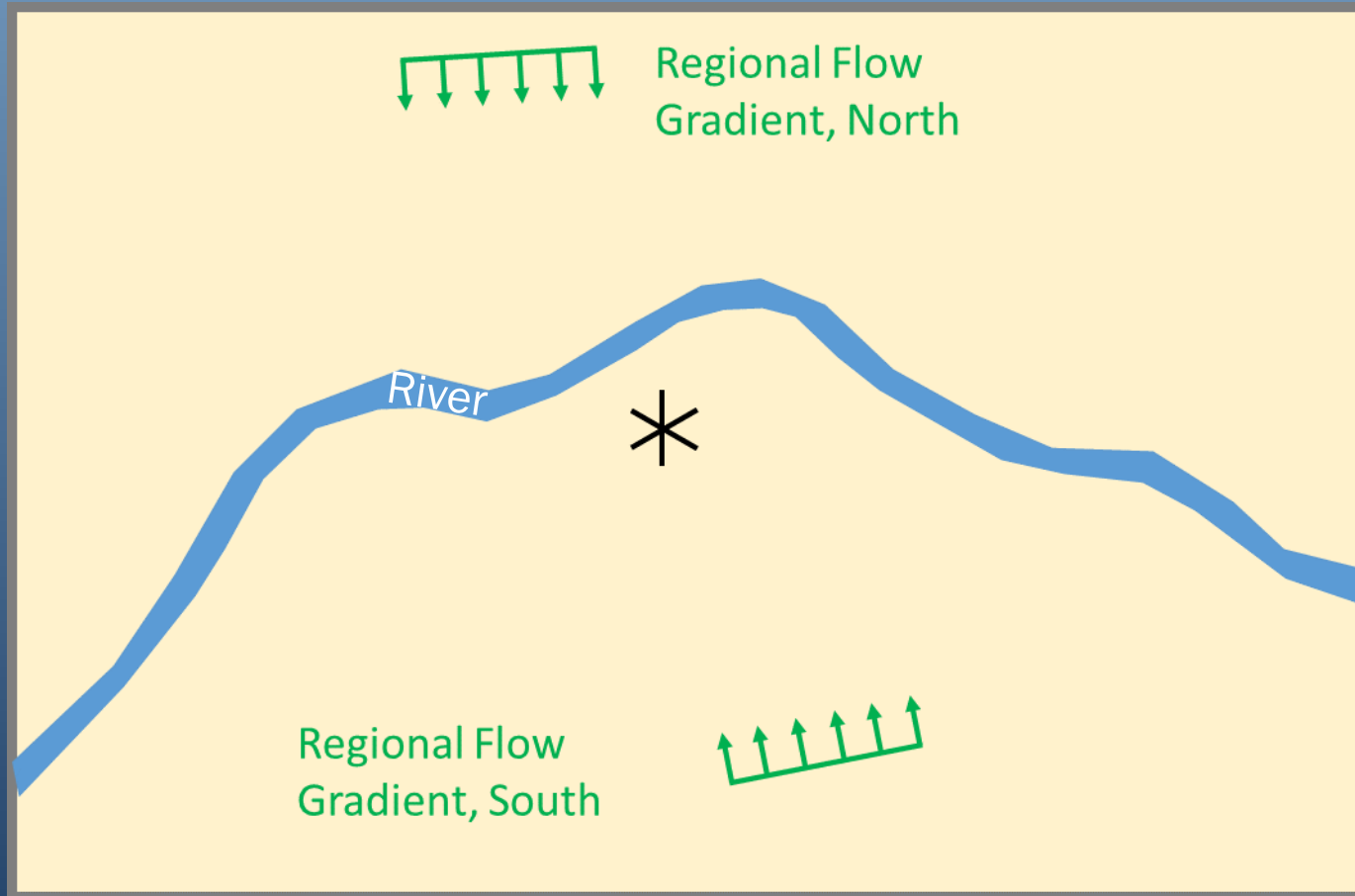
- Aquifer Properties
- Calibrated with Test Data
- Pumping Scenarios
- Estimate Yield and Drawdown

# How does the river connect to the aquifer?

## Diagram of Subsurface Flow RBF Well Field



# GFlow Modeling to Estimate Yield



Aquifer Properties:  
Hydraulic Conductivity  
Regional Flow Gradient

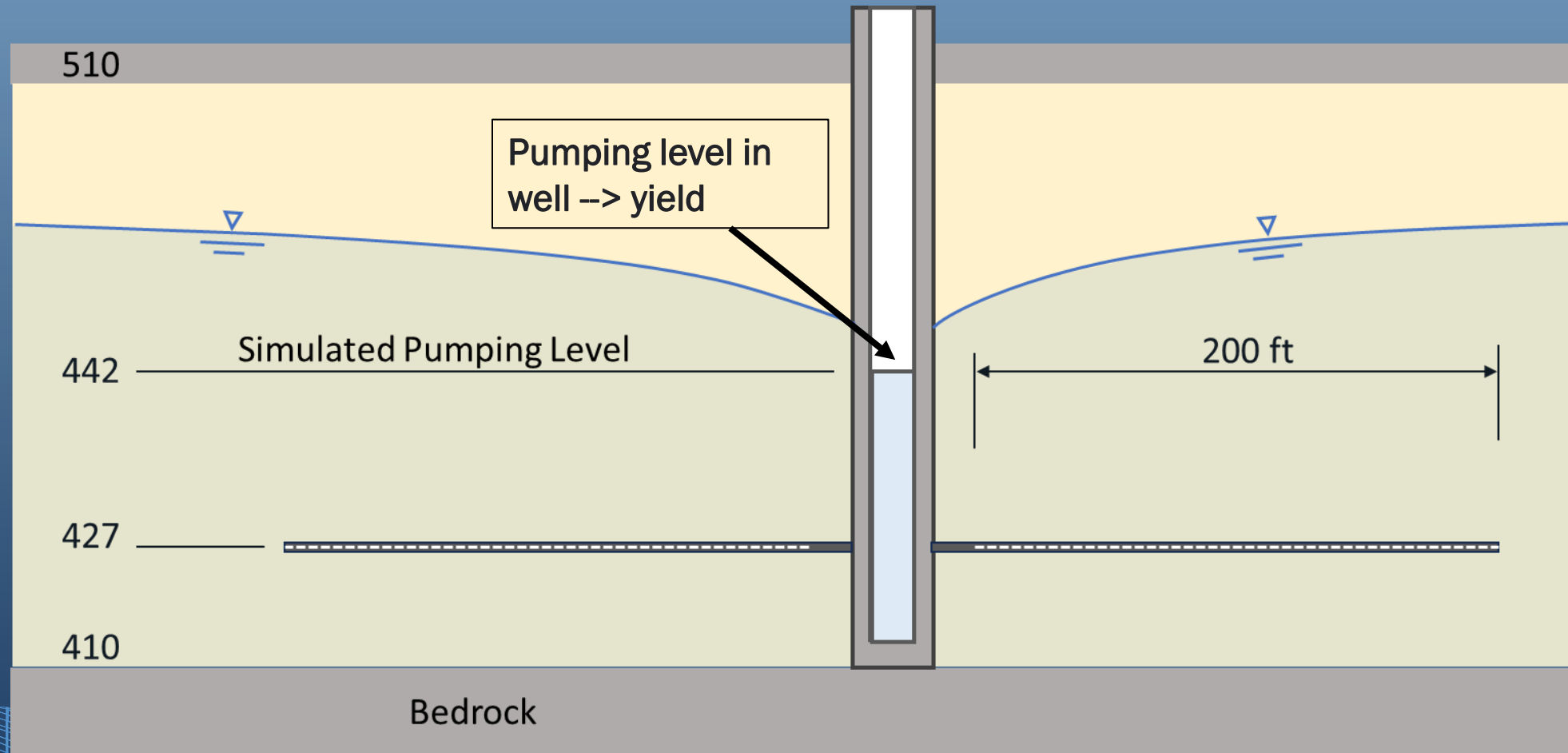
River Properties:  
Stage  
Depth  
Riverbed Resistance

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



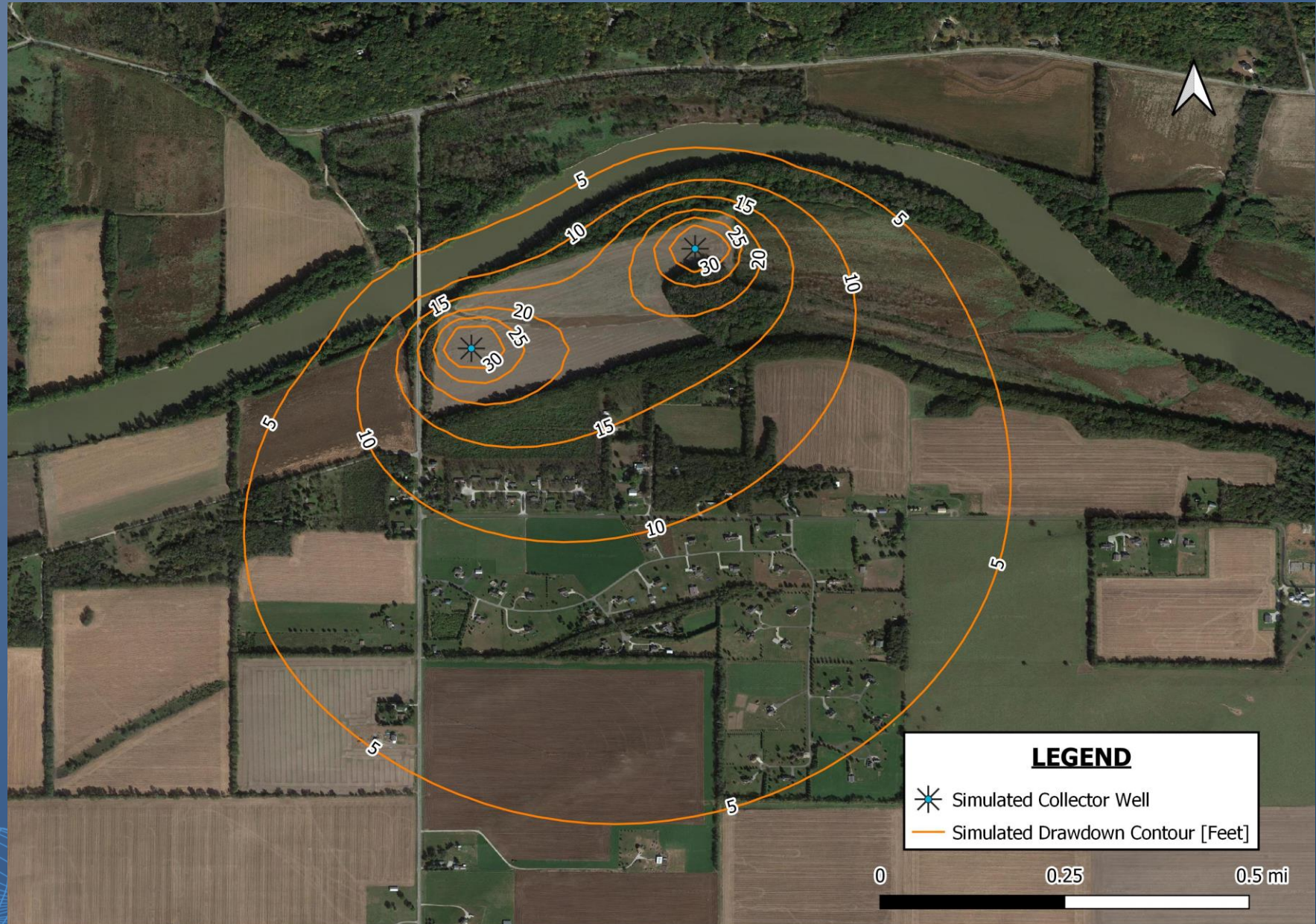
# Collector Well Yield >15 MGD

## Site #1



# Maximum Drawdown Scenario

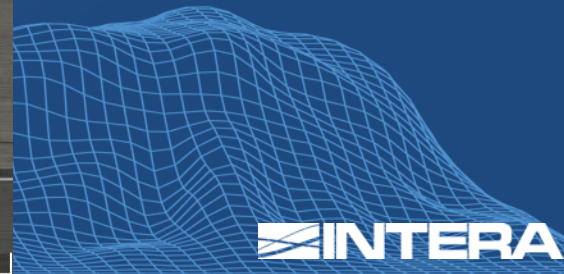
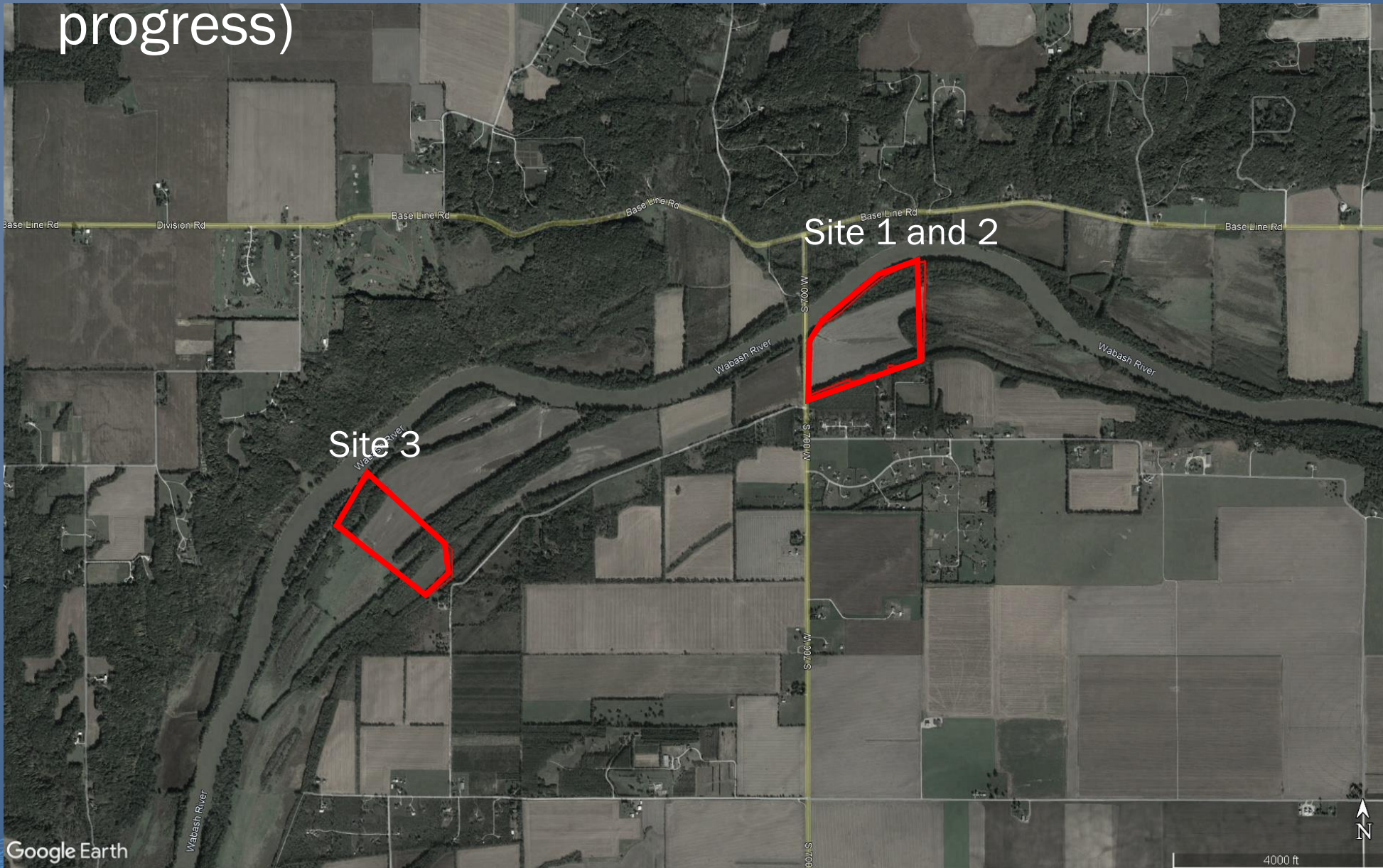
45 MGD  
Combined  
Pumping Rate



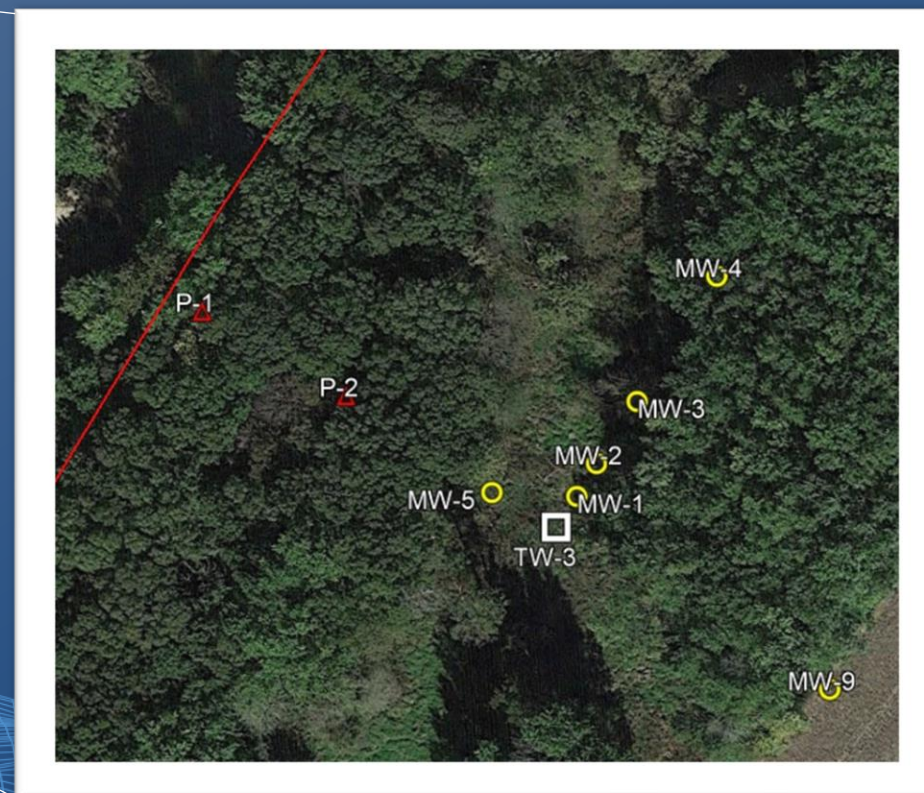
# Problem

No rules.

# Site 3 field data collection (currently in progress)



# Site #3



Sonic Drilling at Site 3





Sonic Core

\*zoom\*



\*enhance\*



Thank You

[jwittman@intera.com](mailto:jwittman@intera.com)

[Mark.Heirbrandt@hamiltoncounty.in.gov](mailto:Mark.Heirbrandt@hamiltoncounty.in.gov)

