

Wabash Regional Water Supply Yield Analysis for Test Well Sites #1 and #2

Executive Summary

This executive summary highlights the results of the first phase of aquifer testing along the Wabash River (the river). The testing was done by INTERA, Inc. to determine the potential yield of one or two radial collector wells on a single 70-acre parcel (Parcel 1) adjacent to the river. Test Well Site 1 and Site 2 are both located within Parcel 1. The hydrogeologic investigation included drilling exploratory boreholes, constructing and instrumenting monitoring wells, conducting a geophysical survey of the region, creating a conceptual geologic model of the aquifer, two aquifer pumping tests, and finally, creating a groundwater flow model to estimate the amount of water that can be sustainably withdrawn from potential new wells constructed at Test Well Sites 1 and 2.

Location and Scope of Testing

The hydrogeologic investigation was focused on Parcel 1, located along the south bank of the river approximately 4 miles downstream of the city of West Lafayette, Indiana (Figure 1). Seventeen exploratory boreholes were drilled to examine the lithology of the subsurface material at Parcel 1. Each borehole was finished as a monitoring well. Three shallow hand-driven well points (piezometers) were also installed closer to the river to measure water levels where the drill rig could access. Finally, two 12-inch diameter test wells were drilled and constructed. Two separate aquifer tests, one at Site 1 and one at Site 2, were conducted by pumping each well at a constant rate for 72 hours. Each of the monitoring wells and piezometers were equipped with pressure transducers to record water levels before, during, and after each 72-hour pumping tests. A geophysical survey was also completed throughout the region to fill in data gaps between previously collected well log information.

Field Data / Aquifer Test Results

The drilling showed that the aquifer at Parcel 1 is generally composed of laterally continuous sand and gravel from about 15 feet below the ground down to the bedrock / clay layer at the base of the aquifer with no intervening clay or silt layers (Figure 2). Two key findings were identified from the drilling and aquifer testing:

1. **There is a uniform, thick aquifer at Parcel 1** – There are no intervening clay layers, so the aquifer is not separated into multiple units. The hydraulic conductivity of this aquifer is in the range of 500 ft/day – which is on the high end for aquifers in Indiana. This finding was also supported by results of the geophysical survey.
2. **The river is hydraulically connected to the aquifer** – The hydraulic resistance of the riverbed determines how well a river is connected to an aquifer. Testing showed that water can move easily between the river and the aquifer below at Parcel 1.

The data collected in the field was used to construct a groundwater flow model that was then used to estimate how much water could be sustainably withdrawn from potential new collector wells at Site 1 and 2.

Estimates of Sustainable Pumping Rates and Effects of Withdrawal

The groundwater model was calibrated with data from the two aquifer tests conducted at Site 1 and 2. The model was used to evaluate potential collector well yield using multiple scenarios for uncertain parameters that can affect the results. The model results match the data collected during testing and are informed by previous experience with other similar well designs. The primary results are as follows:

1. **Two collector wells at Parcel 1 could sustainably produce on average more than 30 million gallons per day (MGD).** Some model scenarios suggest much higher pumping rates could be sustained, but until more detailed design modeling is performed, the upper bound is not fully defined.
2. **Drawdown impacts will be limited to homeowner wells very near the collector wells.** Any homeowner impacts could be mitigated with a pre-construction survey of homeowner wells near Parcel 1.
3. **These results only apply to Test Well Sites 1 and 2.** While current mapping indicates other sites will show similar results, the next step will be to conduct similar testing at other sites to determine a more thorough yield for this river / aquifer system.

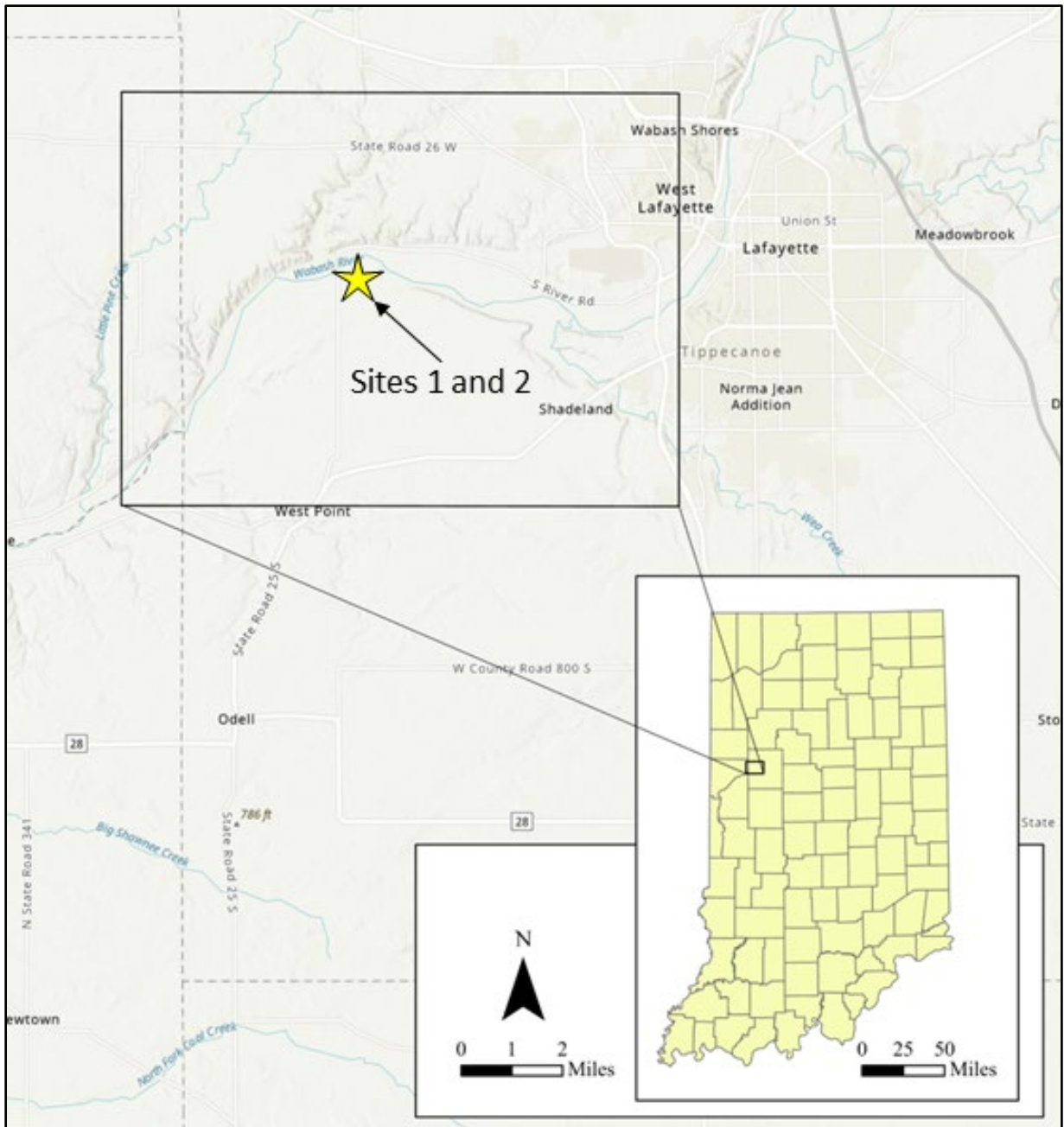


Figure 1. Location of target area and Test Well Sites 1 and 2 along the Wabash River in Tippecanoe County.

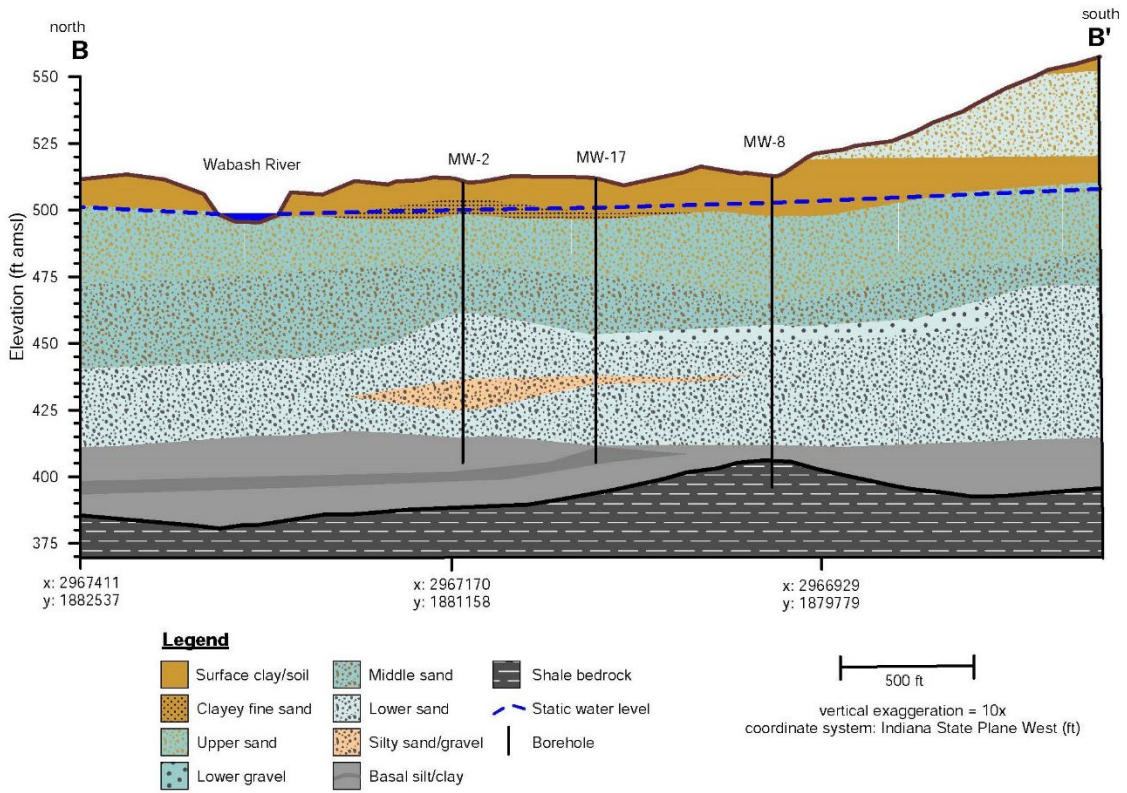
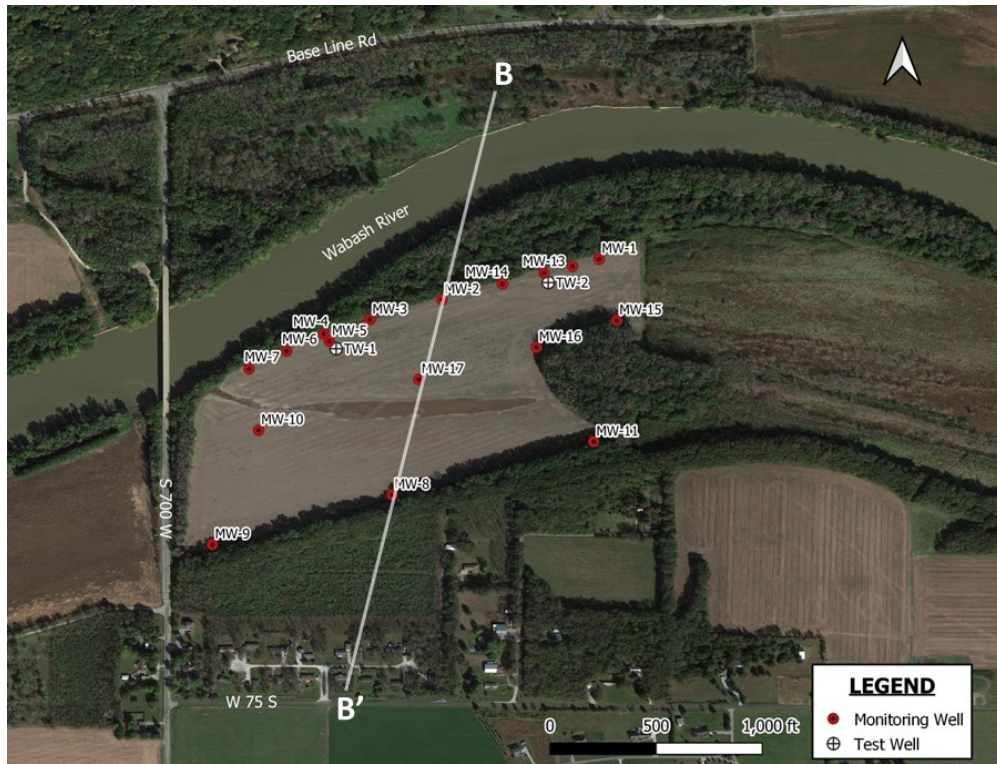


Figure 2. Parcel 1 test layout and location of section B-B' (top). Geologic cross section B-B' through Parcel 1 (bottom).