

# Water Resources and Use in Ohio County

Data Sources: U.S. Geological Survey and Indiana Department of Natural Resources

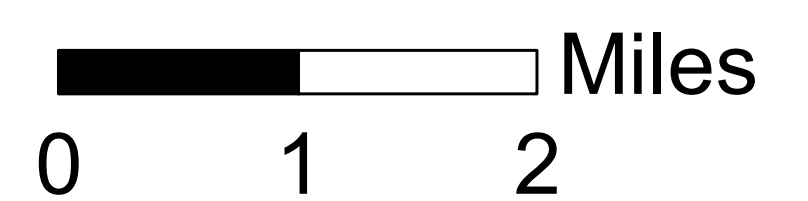
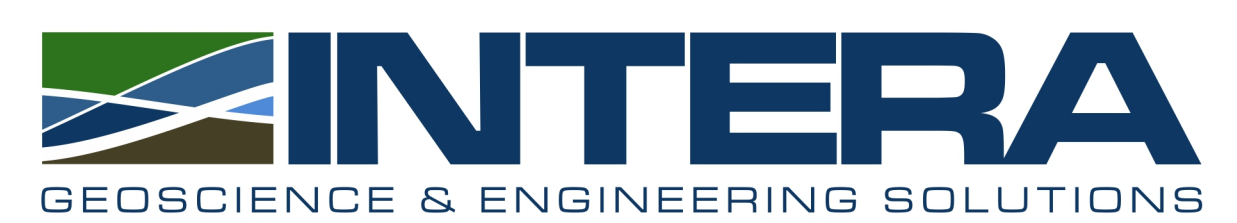
## Withdrawal Location

- WELL INTAKE
- Energy/Mining
  - Industry
  - Irrigation
  - Misc.
  - Public Supply
  - Rural Use

## River

- 7Q2 Flow (MGD)
- <10 MGD
  - 10 - 50 MGD
  - 50 - 100 MGD
  - 100 - 500 MGD
  - > 500 MGD

- Major Lakes
- Interstate
- County
- City



# BEDROCK AQUIFER SYSTEMS OF OHIO COUNTY, INDIANA

The occurrence of bedrock aquifers depends on the original composition of the rocks and subsequent changes which influence the hydraulic properties. Post-depositional processes, which promote jointing, fracturing, and solution activity of exposed bedrock, generally increase the hydraulic conductivity (permeability) of the upper portion of bedrock aquifer systems. Because permeability is commonly greatest near the bedrock surface, bedrock units within the upper 100 feet are typically the most productive aquifers.

The Maquoketa Group of Ordovician age is the only bedrock aquifer system identified for Ohio County. This system is overlain by unconsolidated deposits of variable thickness. The bedrock aquifer system is under confined conditions. In other words, the potentiometric surface (water level) in most wells completed in bedrock rises above the top of the water-bearing zone.

The yield of a bedrock aquifer depends on its hydraulic characteristics and the nature of the overlying deposits. Shale and glacial till act as aquitards, restricting recharge to underlying bedrock aquifers. However, fracturing and/or jointing may occur in aquitards, which can increase recharge to the underlying aquifers. Hydraulic properties of bedrock aquifers are highly variable.

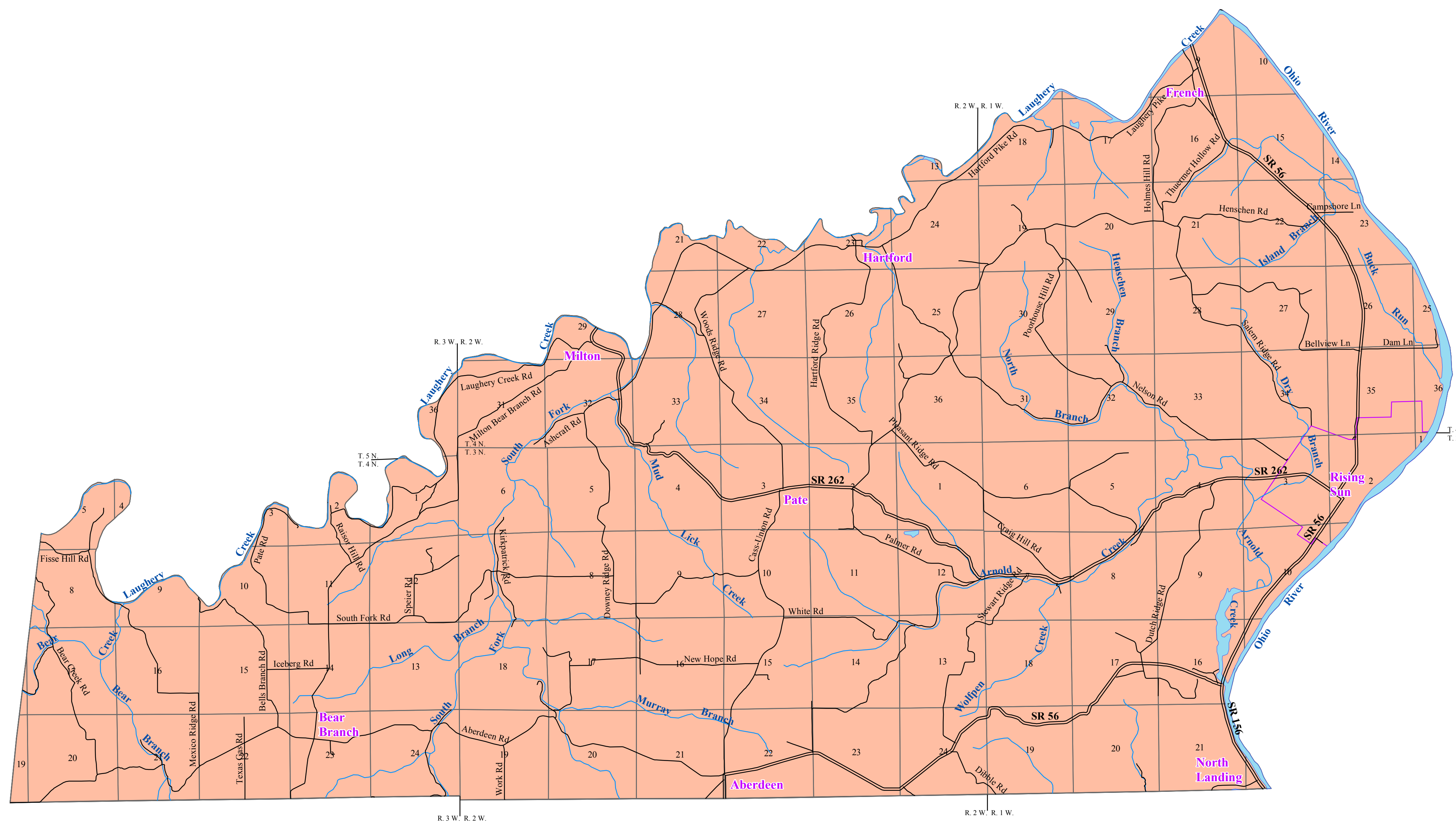
The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. However, because the bedrock aquifer systems have complex fracturing systems, once a contaminant has been introduced into a bedrock aquifer system, it will be difficult to track and remediate.

**Ordovician -- Maquoketa Group Aquifer System**

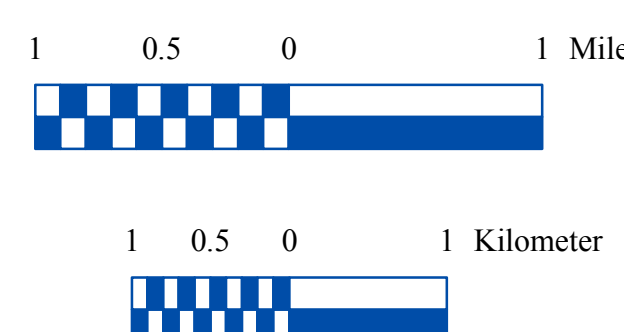
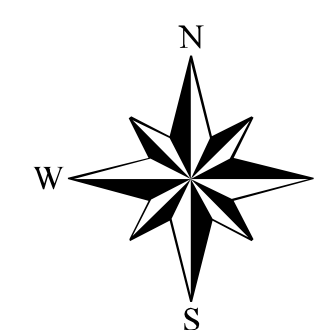
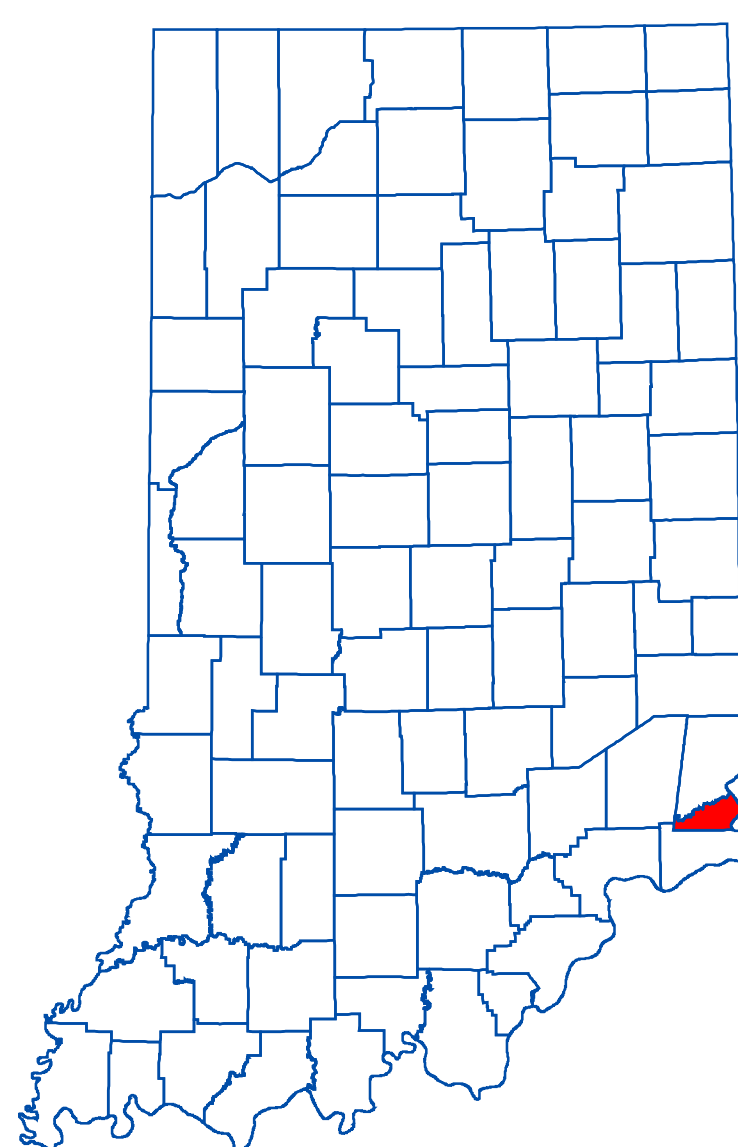
In Ohio County, the Maquoketa Group consists mostly of shales with interbedded limestone units. Although this system is approximately 800 to 850 feet thick in the county, little more than the top 100 feet is typically used for water production.

The depth to the bedrock surface is generally about 15 to 40 feet in Ohio County. Few bedrock wells have been reported in this county. Wells drilled in the Maquoketa Group in Ohio County and in neighboring Ripley, Switzerland, and Dearborn Counties are commonly completed at depths from 60 to 130 feet with generally about 30 to 80 feet of rock penetration. Typical yields from wells completed in this system are 1 to 7 gallons per minute (gpm) and static water levels are generally 15 to 30 feet below the land surface. However, several dry holes have been reported.

The quality of water in the Maquoketa Group Aquifer System in this county is generally acceptable for domestic use. However, salt water has been reported in 1 well in Ohio County and 3 wells in Dearborn County. These wells all tap the Maquoketa Group Aquifer System. Except in areas where overlying clay-rich till and residuum is thin or absent, this aquifer system is not very susceptible to contamination from the land surface.



Location Map



**EXPLANATION**

- Stream
- County Road
- State Road & US Highway
- Municipal Boundary
- Lake & River



**Map Use and Disclaimer Statement**

Map generated by Joseph L. Phillips and Jennifer K. McMillan  
 IDNR, Division of Water, Resource Assessment Section

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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale, except the Bedrock Geology of Indiana (polygon shapefile, 20020318), which was at a 1:500,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University.

**Bedrock Aquifer Systems of Ohio County, Indiana**

by  
 Gregory P. Schrader  
 Division of Water, Resource Assessment Section

June 2006

# UNCONSOLIDATED AQUIFER SYSTEMS OF OHIO COUNTY, INDIANA

Four unconsolidated aquifer systems have been mapped in Ohio County: the Dissected Till and Residuum; the Alluvial, Lacustrine, and Backwater Deposits; the Ohio River Outwash; and the Ohio River Outwash Subsystem. The first system includes deposits left by continental ice sheets as well as eroded residuum (a product of bedrock weathering). The next three systems comprise sediments deposited by, or resulting from, glaciers, glacial meltwaters, and post-glacial precipitation events. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

Thickness, type, and areal extent of unconsolidated sediments in Ohio County are variable. Pre-Wisconsin glacial sediments and bedrock residuum extend across most of the county. Wisconsin age and younger outwash, alluvial, and lacustrine sediments are confined to the Ohio River Valley and its tributaries. Throughout most of the county, sediments overlying bedrock are less than 5 feet thick and bedrock crops out along portions of some deeply incised streams. In Ohio County, bedrock is exposed in Laughery Creek from the Ripley County line to about a mile west of Milton. However, the thickness of unconsolidated materials exceeds 150 feet where outwash, alluvial, and lacustrine deposits have filled part of the Ohio River Valley.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably from local reality. Variations within geologic environments can cause variation in susceptibility to surface contamination. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations can provide contaminant pathways that bypass the naturally protective clays.

## Dissected Till and Residuum Aquifer System

This aquifer system, which covers about 89 percent of Ohio County, is the most limited ground-water resource of the unconsolidated aquifer systems in the county. The Dissected Till and Residuum Aquifer System consists of extremely thin pre-Wisconsin till deposits with very thin layers of outwash sand and gravel, or thin, eroded bedrock residuum. Total thickness of this aquifer system generally ranges from about 20 to 40 feet. Because the Dissected Till and Residuum Aquifer System is generally thin and lacking in aquifer materials, it is not widely used. Only a few wells utilizing this aquifer system in Ohio County have been reported. However, large diameter bucket wells have been successful in meeting the needs of some domestic users. This system is not very susceptible to contamination from surface sources because the near-surface materials generally have low permeability.

## Alluvial, Lacustrine, and Backwater Deposits Aquifer System

In Ohio County the Alluvial, Lacustrine, and Backwater Deposits Aquifer System is mapped along portions of larger tributaries of the Ohio River, including Laughery Creek at the northern county line and Arnold Creek near Rising Sun. This system consists of deposits that come from two primary sources. The first is alluvium deposited by streams along with colluvium eroded from valley walls and upland areas. The second is from pre-Wisconsin and Wisconsin fine-grained glaciolacustrine deposits formed in relatively static lake water. Typical materials include fine sand, silt, and clay deposits that are commonly greater than 25 feet thick.

Few wells produce from the Alluvial, Lacustrine, and Backwater Deposits Aquifer System in Ohio County. However, nearly 5 feet of saturated sand and gravel have been reported in a few wells in the floodplain of Laughery Creek. Commonly, large-diameter bored (bucket-rig) wells are used to produce water from sand and gravel units within the predominantly clay and silt materials of this aquifer system. Constructed at depths of 25 to 50 feet with 30-inch diameter porous casing, these wells are built to maximize storage. Reported capacities are 0.5 to 6 gallons per minute (gpm) for bored wells utilizing the Alluvial, Lacustrine, and Backwater Deposits Aquifer System along Laughery Creek. Although wells constructed in this system in Ohio County would not typically support high-capacity usage, there is 1 well with a reported yield of 150 gpm from this aquifer system, just across the Dearborn County line near French.

Thick deposits of silt and clay that have a low susceptibility to surface contamination generally mark this aquifer system. The susceptibility is greater in areas where the surficial silt and clay deposits are thin and directly overlie outwash deposits.

## Ohio River Outwash Aquifer System

This aquifer system is mapped along the main valley of the Ohio River in Ohio County. Aggradation of the Ohio River Valley with large amounts of outwash sand and gravel from pre-Wisconsin and Wisconsin receding glaciers filled the river valley. Recent alluviation continues to fill the valley. These outwash and alluvial deposits form the most prolific aquifer system in the county.

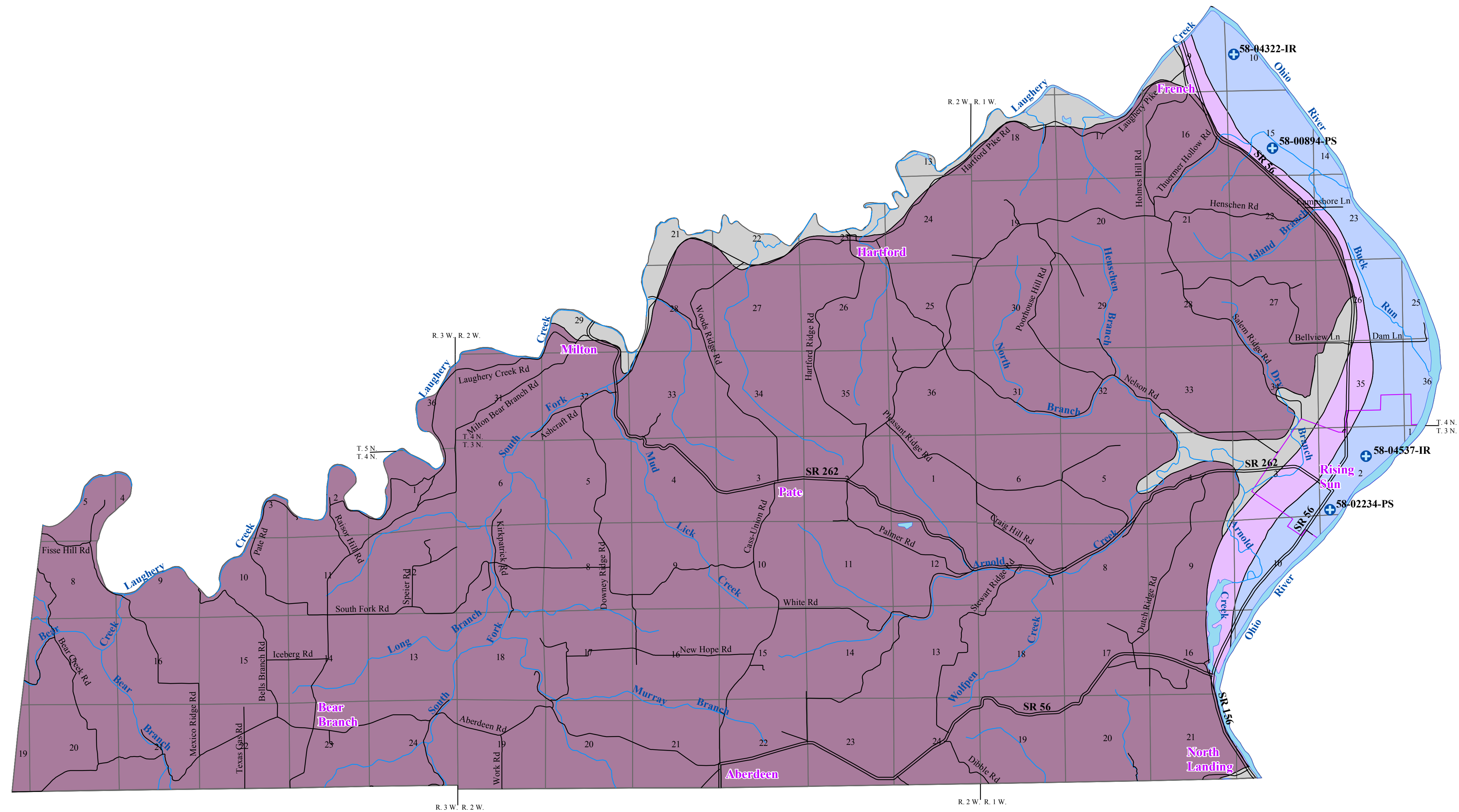
Although this aquifer system is highly productive, few wells are completed in the Ohio River Outwash Aquifer System in Ohio County. Well information from neighboring Switzerland and Dearborn Counties was used to augment the data available from Ohio County. In places this aquifer system exceeds 150 feet in thickness with nearly 100 feet of continuous sand and gravel. However, the outwash is typically 40 to 70 feet thick with saturated sands and gravels generally ranging from 30 to 60 feet thick. Well depths are commonly 60 to 110 feet. In some areas 15 to 35 feet of sandy clay or silt overlie the aquifer materials. Nearly all of the reported wells utilizing this aquifer system in Ohio County are associated with high-capacity facilities. The Ohio River Outwash Aquifer System has the potential to meet the needs of domestic and high-capacity users.

In areas that lack overlying clays, this aquifer system is highly susceptible to contamination from surface sources. Where clay or silt deposits overlie the aquifer system, the aquifer is moderately susceptible to surface contamination.

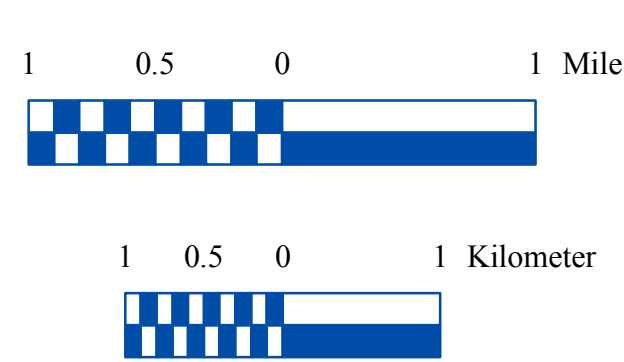
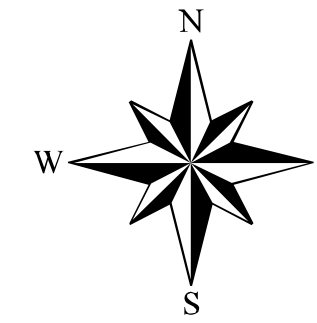
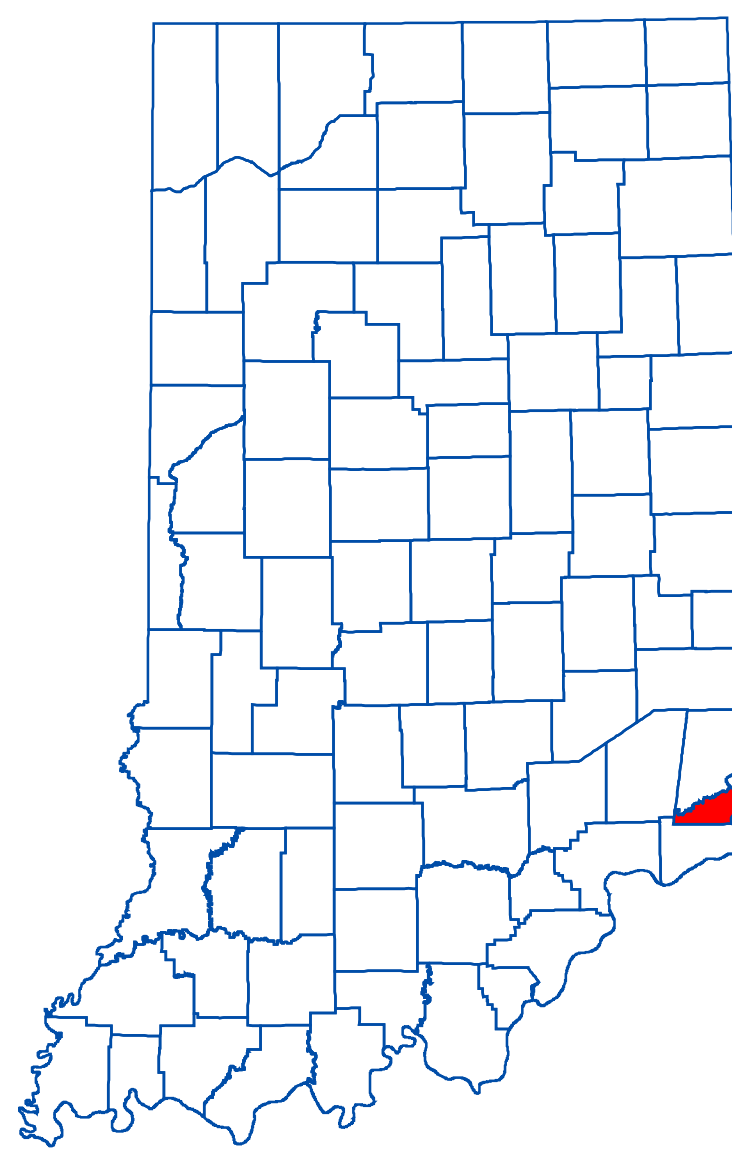
## Ohio River Outwash Aquifer Subsystem

In Ohio County, this system is mapped parallel to the Ohio River Outwash Aquifer System. In general, the Ohio River Outwash Aquifer Subsystem is mapped where the topographic position is higher and thickness of saturated outwash materials is considerably less than the main outwash system. Individual sand and gravel aquifer units are generally overlain by greater thicknesses of silt, clay, or lacustrine deposits.

There are very few reported wells utilizing this aquifer system in Ohio County. However, information from other counties where the Ohio River Aquifer Subsystem is mapped suggests that the subsystem in Ohio County has the potential to meet the needs of domestic and some high-capacity users. Areas within this aquifer system that have overlying clay or silt deposits are moderately susceptible to surface contamination; whereas, areas that lack overlying clay or silt deposits are highly susceptible to contamination.



Location Map



## EXPLANATION

- Registered Significant Ground-Water Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Municipal Boundary
- Lake & River



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### Unconsolidated Aquifer Systems of Ohio County, Indiana

by  
Gregory P. Schrader  
Division of Water, Resource Assessment Section

June 2006

# Ohio County

