

Water Resources and Use in Posey County

- | | |
|----------------------------|-----------------------|
| Withdrawal Location | River |
| WELL INTAKE | 7Q2 Flow (MGD) |
| ● Energy/Mining | — <10 MGD |
| ● Industry | — 10 - 50 MGD |
| ● Irrigation | — 50 - 100 MGD |
| ● Misc. | — 100 - 500 MGD |
| ● Public Supply | — > 500 MGD |
| ● Rural Use | |

Major Lakes
 Interstate
 County
 City

INTERA
 GEOSCIENCE & ENGINEERING SOLUTIONS

NORTH
 0 1 2 4 Miles

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

BEDROCK AQUIFER SYSTEMS OF POSEY 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, such as jointing, fracturing, and solution activity, 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.

Bedrock aquifer systems in Posey County are overlain by unconsolidated deposits of varying thickness. Most of the bedrock aquifers in the county are 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 clay 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 the bedrock aquifers are extremely variable.

One bedrock aquifer system has been mapped in Posey County. The McLeansboro Group Aquifer System is of Pennsylvanian age.

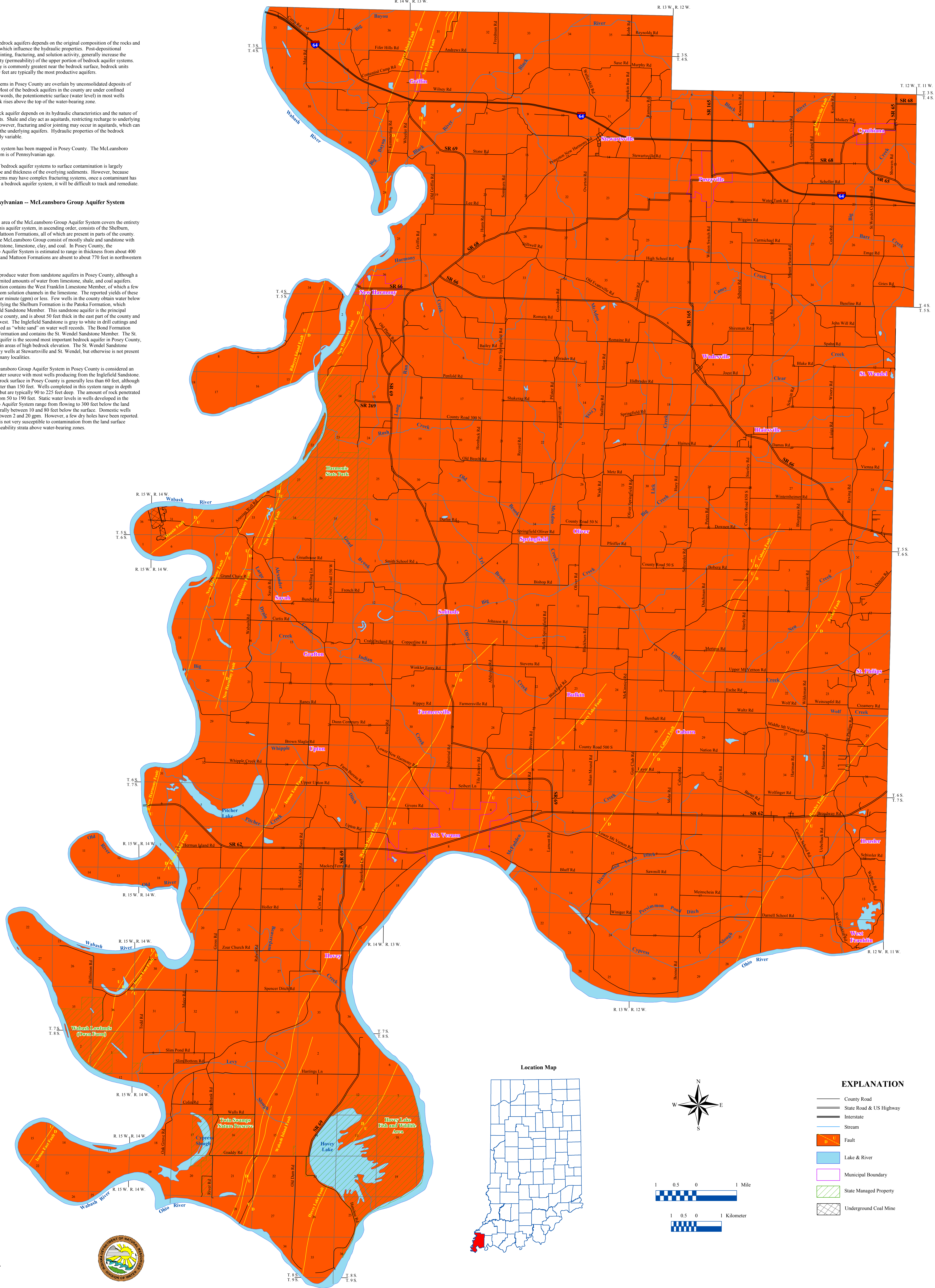
The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. However, because bedrock aquifer systems may have complex fracturing systems, once a contaminant has been introduced into a bedrock aquifer system, it will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

Pennsylvanian – McLeansboro Group Aquifer System

The outcrop/subcrop area of the McLeansboro Group Aquifer System covers the entirety of Posey County. This aquifer system, in ascending order, consists of the Shelburn, Patoka, Bond, and Mattoon Formations, all of which are present in parts of the county. The formations of the McLeansboro Group consist of mostly shale and sandstone with minor amounts of siltstone, limestone, clay, and coal. In Posey County, the McLeansboro Group Aquifer System is estimated to range in thickness from about 400 feet where the Bond and Mattoon Formations are absent to about 770 feet in northwestern Posey County.

Most bedrock wells produce water from sandstone aquifers in Posey County, although a few wells produce limited amounts of water from limestone, shale, and coal aquifers. The Shelburn Formation contains the West Franklin Limestone Member, of which a few wells derive water from solution channels in the limestone. The reported yields of these wells are 5 gallons per minute (gpm) or less. Few wells in the county obtain water below this limestone. Overlying the Shelburn Formation is the Patoka Formation, which contains the Inglesfield Sandstone Member. This sandstone aquifer is the principal bedrock aquifer in the county, and is about 50 feet thick in the east part of the county and about 65 feet in the west. The Inglesfield Sandstone is gray to white in drill cuttings and is commonly identified as "white sand" on water well records. The Bond Formation overlies the Patoka Formation and contains the St. Wendel Sandstone Member. The St. Wendel Sandstone aquifer is the second most important bedrock aquifer in Posey County, and is found mainly in areas of high bedrock elevation. The St. Wendel Sandstone aquifer supplies many wells at Sewardville and St. Wendel, but otherwise is not present or water-bearing in many localities.

In general, the McLeansboro Group Aquifer System in Posey County is considered an important ground-water source with most wells producing from the Inglesfield Sandstone. The depth to the bedrock surface in Posey County is generally less than 60 feet, although in places can be greater than 150 feet. Wells completed in this system range in depth from 19 to 377 feet, but are typically 90 to 225 feet deep. The amount of rock penetrated commonly ranges from 50 to 190 feet. Static water levels in wells developed in the McLeansboro Group Aquifer System range from flowing to 300 feet below the land surface, but are generally between 10 and 80 feet below the surface. Domestic wells typically produce between 2 and 20 gpm. However, a few dry holes have been reported. This aquifer system is not very susceptible to contamination from the land surface because of low-permeability strata above water-bearing zones.



Map generated by Joseph L. Phillips, Jennifer K. McMillan, and Adam B. Watts
DNR, Division of Water, Resource Assessment Section

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This map was created from several existing shapefiles. Underground Coal Mines in Southwestern Indiana (polygon shapefile, 20001062), Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), and County Boundaries of Indiana (polygon shapefile, 20050621) were all from the Indiana Geological Survey and based on a 1:24,000 scale, except the Bedrock Geology of Southwestern Indiana (polygon shapefile, 20001124), which was at a 1:500,000 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. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Structural Features of Indiana (line shapefile, 20020718) was from the Indiana Geological Survey and based on various scales.

Bedrock Aquifer Systems of Posey County, Indiana

by
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UNCONSOLIDATED AQUIFER SYSTEMS OF POSEY COUNTY, INDIANA

Unconsolidated Southern Hills and Lowlands Aquifer System / Dissected Till and Residuum Aquifer System

In Posey County, the Unconsolidated Southern Hills and Lowlands Aquifer System and the Dissected Till and Residuum Aquifer System are mapped as one aquifer system because they are similar in composition and in aquifer characteristics. These systems predominantly consist of eroded bedrock material and (in the glaciated area to the north) pre-Wisconsin till. The deposits are relatively high in clay and silt content and fragmented rock, and are typically capped with loess. Included in these systems are relatively thin deposits of alluvium, colluvium, and lacustrine materials within a few of the stream valleys. In places, thin Wisconsin dune sands are present, particularly along the edge of the Wabash River floodplain. Together the Unconsolidated Southern Hills and Lowlands Aquifer System and the Dissected Till and Residuum Aquifer System cover about 43 percent of Posey County. The total thickness of these systems in Posey County typically ranges from about 20 to 60 feet. In Posey County, there is little potential for water production in these systems. All of the wells that have been reported to penetrate these aquifer systems are completed in the underlying bedrock. Because of the low permeability of the surface materials, these aquifer systems are not very susceptible to contamination from surface sources.

Alluvial, Lacustrine, and Backwater Deposits Aquifer System

The Alluvial, Lacustrine, and Backwater Deposits Aquifer System is mapped adjacent to and in a few of the valleys tributary to the Wabash and Ohio Rivers. The materials in this aquifer system come from two major sources. One source is alluvium deposited by the streams along with colluvium eroded from the valley walls and upland areas. The second source is glaciolacustrine sediment, which accumulated in bodies of relatively stagnant lake water. These silts and clays were deposited when the Wabash and Ohio River valleys were choked with coarser material carried by glacial meltwater that effectively dammed tributaries, creating lakes. Thick deposits of silt and clay, sometimes called "blackwater clay," mark the former locations of these glacial lakes.

The Alluvial, Lacustrine, and Backwater Deposits Aquifer System is not regarded as a major ground-water resource in this county. However, a few wells produce from this system in Mount Vernon and the surrounding area. Well depths range from 35 to 100 feet with reported static water levels of 10 to 30 feet below the land surface. The wells completed in the system have been tested at rates ranging from less than 1 to 10 gallons per minute (gpm). The Alluvial, Lacustrine, and Backwater Deposits Aquifer System in Posey County is marked by thick deposits of soft silt and clay that have a low susceptibility to surface contamination.

Buried Valley Aquifer System

The Buried Valley Aquifer System consists of unconsolidated sediment, which was deposited in bedrock valleys. The sediments are of variable thickness and primarily consist of lacustrine silt and clay, glacial drift, and alluvium. Only the larger buried valleys that contain significant water-bearing sediments have been included as mapped units of the Buried Valley Aquifer System.

The main buried bedrock valley is mapped just south of Poseyville and extends north into Gibson County. It cuts as deeply as about 140 feet into Pennsylvanian (McLeansboro Group) bedrock. A tributary bedrock valley is mapped near Cynthiana and trends west.

Almost all of the wells penetrating the Buried Valley Aquifer System in Posey County were completed in the underlying bedrock. Potential is limited in most places because of the fine-grained, commonly dirty nature of the water-bearing sand and gravel units. However, lenses of sand and gravel (5 to 10 feet thick) were reported for wells located near the town of Cynthiana that were completed in bedrock. In addition, two wells within the Poseyville city limits formerly produced from this system. The wells were completed in sand and gravel units 18 and 40 feet thick. Reported capacities were 220 gpm. The wells were discontinued because of diminished capacity and poor water quality (high iron content). The Buried Valley Aquifer System in Posey County has a low susceptibility to surface contamination because tills and lacustrine silts and clays generally overlie sand and gravel deposits occurring within the bedrock valleys.

Wabash Lowland Till Aquifer Subsystem

The Wabash Lowland Till Aquifer Subsystem is mapped in one area in northern Posey County. The unconsolidated deposits consist primarily of pre-Wisconsin glacial materials and loess deposits. The sediments range in thickness from about 50 feet to more than 150 feet. Loess overlies the till across much of this system, and dune deposits consisting of mostly fine sand are located along the western edge of the system.

In Posey County, this aquifer system is a limited resource. Potential aquifer materials within the glacial till include sand or sand and gravel units. Only two wells producing from the system have been reported. These two wells completed in the Wabash Lowland Till Aquifer Subsystem have depths of 40 and 120 feet. Static water levels are 25 and 80 feet, and reported pumping rates are 5 and 90 gpm. The Wabash Lowland Till Aquifer Subsystem typically has a low susceptibility to surface contamination because aquifer materials are generally separated from the surface by low-permeability layers within the system.

Wabash River and Tributaries Outwash Aquifer System / Ohio River Outwash Aquifer System

In Posey County, the Wabash River and Tributaries Outwash Aquifer System occupies portions of the valley of the Wabash River. The Ohio River Outwash Aquifer System occupies portions of the main valley of the Ohio River. The watershed surface drainage divide separates the systems.

These systems contain large volumes of sand and gravel that partially fill the main river valleys. As the glaciers melted, the sediment contained within them was delivered to the Wabash and Ohio Rivers in quantities too large for the streams to transport. As a result, the increased sediment load was stored in the valleys as vertical and lateral accretionary deposits. As long as the retreating glaciers continued to provide sediment in quantities too large for the streams to transport, the main valleys continued to be filled. These valley-filling processes formed the most prolific aquifer systems in the county.

The total thickness of the Wabash River and Tributaries Outwash Aquifer System / Ohio River Outwash Aquifer System ranges from about 40 feet near the edge of the valley to 120 feet. The saturated sand and gravel (aquifer) thickness of the systems is typically between 20 and 45 feet. Commonly, 10 to 15 feet of silty sand and silty clay overlie the aquifer materials. However, in some areas this layer is thin or absent.

The Wabash River and Tributaries Outwash Aquifer System / Ohio River Outwash Aquifer System has the potential to consistently meet the needs of domestic and high-capacity water users. Domestic wells commonly produce from 10 to 25 gpm with static water levels typically 15 to 25 feet below the land surface. There are 32 registered significant ground-water withdrawal facilities (54 wells) using these aquifer systems in Posey County. Typical production for high-capacity wells ranges from 500 to 800 gpm. Static water levels are generally 10 to 20 feet below the land surface. There is one significant ground-water withdrawal facility using a radial collector well system. The reported capacity for this facility is 8000 gpm.

These aquifer systems are typically highly susceptible to contamination, because most areas lack overlying thick layers of clay or silt. Areas within the system that are overlain by thick layers of clay or silt are moderately susceptible to surface contamination.

Wabash River and Tributaries Outwash Aquifer Subsystem / Ohio River Outwash Aquifer Subsystem

In Posey County, the Wabash River and Tributaries Outwash Aquifer Subsystem / Ohio River Outwash Aquifer Subsystem is generally mapped as a transitional zone, contiguous to the outwash systems. These systems (subsystems) are commonly mapped where the topographic position is higher and the thickness of the aquifer is considerably less than the main outwash aquifer systems. The saturated thickness of sand and gravel in the outwash subsystems is typically less than 15 feet. In places, the saturated sand and gravels are overlain by a greater thickness of silt, clay, or lacustrine deposits. Silty clay, with a thickness of 10 to 90 feet, generally overlies the aquifer materials.

Wells are commonly completed at depths of about 40 to 100 feet in these subsystems in Posey County. Domestic wells typically yield 5 to 20 gpm, and static water levels are generally 15 to 40 feet below the land surface. Two significant ground-water withdrawal facilities (4 wells) in the county utilize the Wabash River and Tributaries Outwash Aquifer Subsystem / Ohio River Outwash Aquifer Subsystem. Reported capacities range from 35 to 160 gpm. Prospects of completing high-capacity wells in these aquifer subsystems are limited to areas with sufficient saturated thickness.

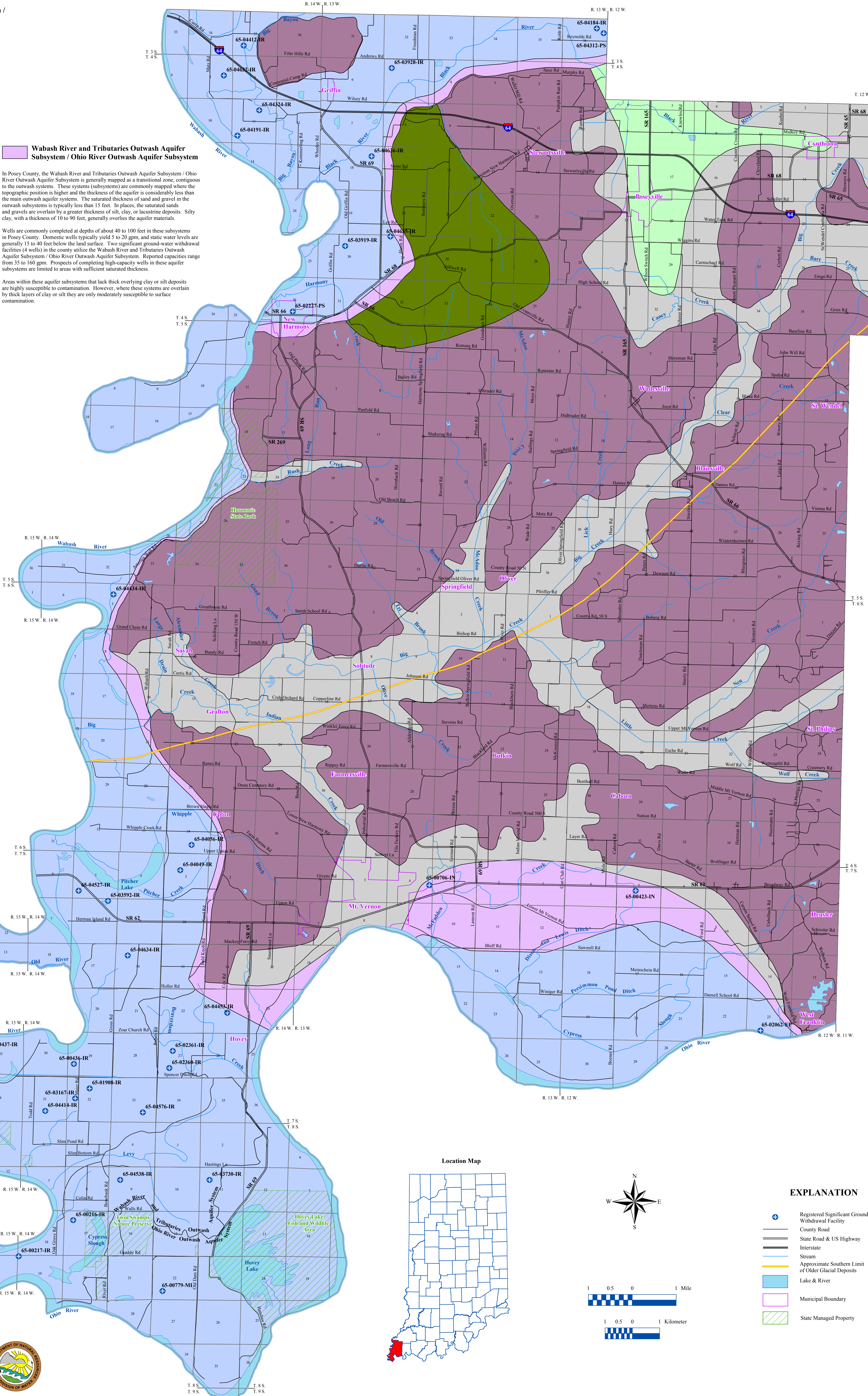
Areas within these aquifer subsystems that lack thick overlying clay or silt deposits are highly susceptible to contamination. However, where these systems are overlain by thick layers of clay or silt they are only moderately susceptible to surface contamination.

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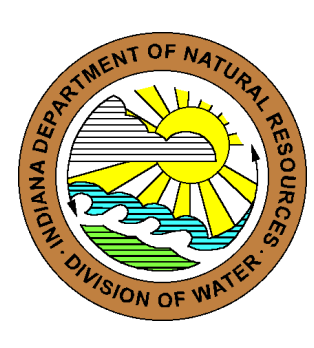
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EXPLANATION

- Registered Significant Ground-Water Withdrawal Facility
- County Road
- State Road & US Highway
- Interstate
- Stream
- Approximate Southern Limit of Older Glacial Deposits
- Lake & River
- Municipal Boundary
- State Managed Property



Posey County

