

# **Unconsolidated Aquifer Systems of Posey County, Indiana**

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Nine unconsolidated aquifer systems have been mapped in Posey County: the Unglaciaded Southern Hills and Lowlands; the Dissected Till and Residuum; the Alluvial, Lacustrine, and Backwater Deposits; the Buried Valley; the Wabash Lowland Till Subsystem; the Wabash River and Tributaries Outwash; the Ohio River Outwash; the Wabash River and Tributaries Outwash Subsystem; and the Ohio River Outwash Subsystem. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

Sand and gravel were deposited of sufficient thickness and extent in places within the main valleys of the Wabash and Ohio Rivers to make up an aquifer capable of supplying large municipal, industrial, and irrigation needs. Outside of the main valleys of the Wabash and Ohio Rivers, much of the county is covered by relatively low permeable material overlying the bedrock, and ground-water resources from unconsolidated deposits are minimal.

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. In general, the unconsolidated aquifer systems of the county are most vulnerable to contamination from surface sources where thick clay layers are lacking.

## **Unglaciaded Southern Hills and Lowlands Aquifer System / Dissected Till and Residuum Aquifer System**

In Posey County, the Unglaciaded 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 glaciaded 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 Unglaciaded 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 tributary streams, creating lakes. Thick deposits of silt and clay, sometimes called “slackwater 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 eroded bedrock. 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 sands 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.

### **Registered Significant Ground-water Withdrawal Facilities**

There are 34 registered significant ground-water withdrawal facilities (total of 58 wells) using unconsolidated aquifers in the county. Most of these facilities (32 facilities, 54 wells) utilize the Wabash River and Tributaries Outwash Aquifer System / Ohio River Outwash Aquifer System. Two facilities use the Wabash River and Tributaries Outwash Aquifer Subsystem / Ohio River Outwash Aquifer Subsystem (4 wells). The facilities utilize the aquifer systems for irrigation, public water supply, energy production, and industry. Refer to the Table for some details on the wells and to the map for facility locations.

## **Map Use and Disclaimer Statement**

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