

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

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Five unconsolidated aquifer systems are mapped in Warrick County: the Unglaciaded Southern Hills and Lowlands; the Alluvial, Lacustrine, and Backwater Deposits; the Ohio River Outwash; the Ohio River Outwash Subsystem; and the Coal Mine Spoil. Boundaries of these aquifer systems are commonly gradational, and individual aquifers may extend across aquifer system boundaries. However, in areas where the topography is steep, boundaries between aquifer systems are distinct.

Thickness, type, and areal extent of unconsolidated deposits in Warrick County are variable. Thick deposits (up to 130 feet) of outwash, alluvial, and lacustrine sediments are confined to the Ohio River Valley and its tributaries. However, bedrock residuum extends across the remainder of the county ranging in thickness from 5 feet to as much as 50 feet.

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.

## **Unglaciaded Southern Hills and Lowlands Aquifer System**

In Warrick County, the Unglaciaded Southern Hills and Lowlands Aquifer System is mapped throughout most of the county and consists primarily of thin, eroded bedrock residuum covered by eolian silt. Total thickness of unconsolidated deposits is generally from 5 feet to about 50 feet. Potential aquifer materials consist of thin, residual, sand-sized and gravel-sized units that are generally less than 3 feet thick. This system is the most limited ground-water resource of the unconsolidated aquifer systems mapped in the county.

There are no reported wells producing from the Unglaciaded Southern Hills and Lowlands Aquifer System in Warrick County. Because this aquifer system is generally thin and not very productive, wells are typically completed in the underlying bedrock aquifer system. However, large diameter bucket wells may be successful in meeting the needs of some domestic users. Typical well yields are extremely limited with the potential of some dry holes.

Because of the low permeability of the surface materials, this aquifer system is not very susceptible to contamination from surface sources.

### **Alluvial, Lacustrine, and Backwater Deposits Aquifer System**

The Alluvial, Lacustrine, and Backwater Deposits Aquifer System in Warrick County is mapped extensively along several north-south trending tributaries of the Ohio River and along portions of the Ohio River floodplain. 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 age fine-grained glaciolacustrine deposits formed in relatively static lake water. Typical materials include fine sand, silt, and clay deposits that are generally greater than 25 feet thick. Aquifer materials commonly include thin sand seams that are generally less than a few feet thick.

This system is a limited resource and few wells produce from these deposits in Warrick County. Because this aquifer system is generally not very productive, wells are typically completed in the underlying bedrock. However, a few wells are adequate to meet the needs of some domestic users. Total well depths range from 20 to 90 feet with aquifer materials commonly less than 3 feet in thickness. Yields are generally less than 5 gallons per minute (gpm) with static water levels 10 to 40 feet below surface. However, several coal mine dewatering wells along Bluegrass Creek indicate potential yields ranging from 5 to 75 gpm.

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 sand deposits.

### **Ohio River Outwash Aquifer System**

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

Few wells produce from the Ohio River Outwash Aquifer System in Warrick County. However, the Ohio River Outwash Aquifer System has the greatest potential of any aquifer system in Warrick County and can meet the needs of domestic and high-capacity users. Well depths range from 40 to 130 feet with up to 125 feet of continuous sand and gravel. Saturated sands and gravels generally range from 15 to 85 feet thick. There are 3 registered high-capacity facilities (13 wells) using this system. Reported well yields range from 400 to 2000 gpm with static water levels of 20 to 50 feet below surface.

In some areas nearly 20 feet of silt or sandy clay overlie outwash and alluvial aquifer materials. Where these deposits overlie the aquifer system, the aquifer is moderately susceptible to surface contamination. In areas that lack these overlying clays, this aquifer system is highly susceptible to contamination from surface sources.

### **Ohio River Outwash Aquifer Subsystem**

In Warrick County the Ohio River Outwash Aquifer Subsystem is mapped parallel to the Ohio River Outwash System. In general, this system (subsystem) is mapped where the topographic position is higher and the 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.

Total depth of wells within this system ranges from about 40 to 130 feet with nearly 125 feet of continuous sand and gravel. Saturated sands and gravels generally range from 10 to 50 feet thick. The Ohio River Outwash Aquifer Subsystem has the potential to meet the needs of domestic and some high-capacity users. There are 3 registered high-capacity facilities (8 wells) with reported yields that range from 200 to 800 gpm and static water levels of 10 to 50 feet below ground surface.

In some areas 10 to 50 feet of silt, clay, or sandy clay overlie outwash and alluvial aquifer materials. 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.

### **Coal Mine Spoil Aquifer System**

The Coal Mine Spoil Aquifer System includes several large areas of central and western Warrick County. This aquifer system is formed through the process of mining coal by surface-mining methods. Typically, overburden is broken up by blasting and moved aside to uncover the desired coal seam. These deposits, therefore, became a heterogeneous mixture that can contain considerable amounts of water.

In Warrick County, one test well reports a yield of 20 gpm and two discontinued dewatering wells report yields of 300 gpm each from the Coal Mine Spoil Aquifer System.

In general, it is expected that older spoil areas are not graded and capped with compacted soil and are highly susceptible to surface contamination, whereas new spoil areas benefiting from modern reclamation methods are likely to be moderately susceptible. The general quality of ground water in this system is probably less desirable than before mining took place.

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