

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

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Six unconsolidated aquifer systems have been mapped in Parke County: the Till Veneer; the Tipton / Central Wabash Valley / Wabash Lowland Till; the Tipton / Central Wabash Valley / Wabash Lowland Till Subsystem; the Wabash River and Tributaries Outwash; the Wabash River and Tributaries Outwash Subsystem; and the Coal Mine Spoil. Boundaries of all aquifer systems described are commonly gradational, and individual aquifers may extend across aquifer system boundaries.

Thicknesses of unconsolidated sediments that overlie bedrock are quite variable in Parke County. Total thickness ranges from less than one foot where bedrock is shallow or outcrops along sections of tributaries to the Wabash River, to an estimated 250 feet in the southwestern portion of the county.

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.

## **Till Veneer Aquifer System**

The Till Veneer Aquifer System is mapped throughout much of Parke County, especially along Sugar Creek, Big Raccoon Creek and portions of smaller tributaries. The system consists of thin till, generally less than 50 feet thick, which directly overlies an uneven bedrock surface. Along some of the major streams this system may include thin alluvium and surficial sands and gravels that directly overlie the bedrock surface.

There is little potential for groundwater production in this system in Parke County. Nearly all wells drilled in areas mapped as Till Veneer bypass the unconsolidated deposits in favor of the underlying bedrock aquifer system. However, potential aquifer deposits include thin, isolated sands and/or gravels with yields less than 5 gallons per minute (gpm).

This aquifer system is generally not very susceptible to surface contamination because intertill sand and gravel units are overlain by till deposits. However, some areas have surface sands and gravels or thin to no clay deposits above the aquifer resource. These areas are considered at moderate to high risk to contamination.

### **Tipton / Central Wabash Valley / Wabash Lowland Till Aquifer System**

The Tipton / Central Wabash Valley / Wabash Lowland Till Aquifer System is mapped along small portions of southwestern and northern Parke County. The system typically consists of thick clay with discontinuous intertill sands and gravels. The discontinuous sands and gravels, where present, are generally less than 10 feet thick and are often noted as “dry”. Well depths range from 90 to 160 feet. Aquifer sands and gravels generally range from 1 to 15 feet thick and are capped by 80 to 157 feet of clay.

This system is capable of meeting the needs of domestic and some high-capacity users. However, some higher yield wells have significant drawdown. Domestic well yields are generally from 4 to 65 gpm with static water levels that range from 16 to 50 feet below surface. There are no registered significant groundwater withdrawal facilities. This system is generally not very susceptible to surface contamination because sand and gravel units are overlain by thick till deposits.

### **Tipton / Central Wabash Valley / Wabash Lowland Till Aquifer Subsystem**

The Tipton / Central Wabash Valley / Wabash Lowland Till Aquifer Subsystem is mapped throughout most of Parke County. The subsystem is mapped similar to that of the Tipton / Central Wabash Valley / Wabash Lowland Till Aquifer System. However, potential aquifer materials are thinner and potential yield is less in the subsystem than in the system.

In Parke County approximately 75 percent of the wells drilled in areas mapped as till subsystem are completed in the underlying bedrock aquifer system. However, the subsystem has the potential of meeting the needs of some domestic users. Well depths typically range from 55 to 130 feet. Potential aquifer materials include sand and gravel deposits that generally range from 2 to 10 feet thick and are capped by 45 to 115 feet of till with, in places, intertill sands and gravels. Where present, the intertill sands and gravels are generally less than 10 feet thick and are often noted as “dry”. The few wells that utilize the available sand and gravel deposits have yields that range from 5 to 15 gpm with static water levels of 15 to 65 feet below surface. Most wells with yields greater than 10 gpm are associated with significant drawdown. Many wells with deeper static water levels have limited available drawdown.

This aquifer subsystem is generally not very susceptible to surface contamination because intertill sand and gravel units are overlain by thick till deposits. However, some areas have surface sands and gravels or thin to no clay deposits above the aquifer resource. These areas are considered at moderate to high risk to contamination.

## **Wabash River and Tributaries Outwash Aquifer System**

The Wabash River and Tributaries Outwash Aquifer System includes thick glacial outwash sands and gravels capped by recent alluvial deposits. The system is mapped primarily along the Wabash River and portions of Big Raccoon and Little Raccoon creeks.

Wells completed in the Wabash River and Tributaries Outwash Aquifer System range from 30 to 140 feet but are typically 45 to 90 feet in depth. In places, the outwash aquifer deposits are up to 110 feet of continuous sands and gravels and may be capped by thin alluvial silt and/or clay materials that are generally 15 feet thick or less. The Wabash River and Tributaries Outwash Aquifer System is capable of meeting the needs of domestic and high-capacity users. Domestic well capacities range from 5 to 50 gpm with static water levels of 8 to 50 feet below ground surface. There are 13 registered significant groundwater withdrawal facilities (27 wells) with capacities that range from 100 to 1500 gpm.

Areas that lack overlying clay deposits are highly susceptible to contamination. However, where overlying clay or silt deposits are present the system is moderately susceptible to surface contamination.

## **Wabash River and Tributaries Outwash Aquifer Subsystem**

The Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along the northwestern fringe of the Wabash River and along portions of Sugar, Big Raccoon and Little Raccoon creeks. The subsystem is mapped similar to the Wabash River and Tributaries Outwash Aquifer System. However, potential aquifer materials are thinner, overlying silt or clay materials are generally thicker and potential yield is less in the subsystem than in the system.

There are a limited number of wells completed in the Wabash River and Tributaries Outwash Aquifer Subsystem in Parke County. Well depths generally range from less than 30 to 190 feet. In places aquifer materials are up to 130 feet of continuous sand and gravel. However, in some areas the upper portion of the total aquifer sequence of sands and gravels are reported as “dry”. The subsystem is capable of meeting the needs of domestic and some high-capacity users. Domestic well capacities range from 5 to 40 gpm with static water levels of 8 to 111 feet below ground surface. There is one registered significant groundwater withdrawal facility (2 wells) with capacities for both wells reported at 240 gpm.

Areas that lack overlying clay deposits are highly susceptible to contamination. However, where overlying clay or silt deposits are present the system is moderately susceptible to surface contamination.

## **Coal Mine Spoil Aquifer System**

The Coal Mine Spoil Aquifer System is present mainly in the southeastern portion of Parke County as well as a few small isolated areas in the central and north-central parts of the county. This aquifer system was formed during the process of mining coal by surface-mining methods. The overburden was typically broken up by blasting and moved aside to uncover the desired coal seam. The overburden, most of which was originally solid rock, became a heterogeneous mixture of particles ranging in size from clay, silt, and sand up to gravel, slabs, and boulders. Where extensive, these spoil areas may contain considerable amounts of groundwater.

In Parke County, there are no reported wells producing from the Coal Mine Spoil Aquifer System. Information from surface coal mine areas in other counties indicate that the quality of groundwater in this system is probably much poorer than that in the overburden before mining took place. Typically a significant increase in total dissolved solids, especially calcium, magnesium, bicarbonate, and sulfate occurs. High iron, and in places low pH, can severely limit potential uses of groundwater from this system.

Generally, it is expected that aquifers in old coal mine spoil that was not graded and capped with compacted soil are highly susceptible to contaminants introduced at the surface. However, spoil aquifers in areas benefiting from modern reclamation methods are likely to be only moderately susceptible.

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