

Unconsolidated Aquifer Systems of Montgomery County, Indiana

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The unconsolidated aquifer systems of Montgomery County are composed of sediments deposited by, or resulting from, a complicated sequence of glaciers, glacial meltwaters, and post-glacial precipitation events. Six unconsolidated aquifer systems have been mapped in Montgomery County: the Till Veneer; the Tipton Till; the Central Wabash Valley/Tipton Till Subsystem; the Central Wabash Valley/Tipton Complex; the Wabash River and Tributaries Outwash System; and the Wabash River and Tributaries Outwash Subsystem. Because of the complicated glacial geology, boundaries of the aquifer systems in this county are commonly gradational and individual aquifers may extend across aquifer system boundaries.

The thickness of unconsolidated deposits in Montgomery County is quite variable, due to the deposition of glacial material over an uneven bedrock surface. Unconsolidated deposits are typically less than 100 feet deep in much of the county. However, in places, bedrock is at or near the surface along Sugar Creek and its tributaries, and Big Raccoon Creek. The thickest unconsolidated deposits are about 400 feet thick where a deep narrow buried bedrock valley exits the county northwest of Kirkpatrick. Another narrow buried bedrock valley is present along the southeast corner of the county with up to 250 feet of unconsolidated deposits in a few places.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably due to a wide range of variation within geologic environments. 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

In Montgomery County, the Till Veneer Aquifer System consists of areas where the unconsolidated material is predominantly thin till overlying bedrock. Along some of the major streams, this system also includes thin alluvium, and surficial sand and gravel outwash deposits overlying shallow bedrock. This system in Montgomery County is primarily mapped along the major streams including Big Raccoon Creek, Coal Creek, Sugar Creek and many of its tributaries. Total thickness of the Till Veneer Aquifer System generally ranges from about 10 to 50 feet. This system has the most limited groundwater resources of the unconsolidated aquifer systems in the county.

There is little potential for groundwater production in this system in Montgomery County. The system is commonly bypassed and most wells are completed in the underlying bedrock. Potential aquifers within this system include thin isolated sand and/or gravel layers, and surficial

sand and gravel outwash or alluvium. Very few of the reported wells penetrating this aquifer system in the county are completed in unconsolidated materials. In this county the depth of the few wells completed in the Till Veneer Aquifer System range from 32 to 50 feet deep with static water levels ranging between 5 and 20 feet below the surface. Most of the wells have reported capacities of less than 10 gallons per minute (gpm).

This system is generally not very susceptible to contamination from surface sources because of the low permeability of the near-surface materials. However, there are areas where protective clay layers are thin or absent. These areas are very susceptible to contamination.

Tipton Till Aquifer System

The Tipton Till Aquifer System primarily consists of glacial till with intertill sand and gravel layers. In Montgomery County, this aquifer system ranges in thickness from about 50 feet to 260 feet. However, the sand and gravel aquifers in this system tend to be thin and discontinuous.

Wells completed in this system are capable of meeting the needs of most domestic and some high-capacity users in Montgomery County. Saturated aquifer materials include sand and/or gravel deposits that are commonly 5 to 15 feet thick and are generally overlain by 35 to 90 feet of till. Wells producing from this aquifer system are typically 55 to 110 feet deep. Domestic well capacities are commonly 10 to 20 gpm with static water levels generally ranging from 15 to 60 feet below the surface. There are 16 registered significant groundwater withdrawal facilities (28 wells) using the Tipton Till Aquifer System and most of these facilities are used for public supply and industry. The reported pumping rates range from 10 to 543 gpm.

A small area of the Tipton Till Aquifer System overlies a buried bedrock valley in the southeastern part of the county. The total unconsolidated thickness generally exceeds 200 feet in this area. Only one reported well utilizes the deeper aquifer within the buried bedrock valley. The aquifer utilized by this well is reported to be 10 feet thick and the reported yield is 20 gpm.

The Tipton Till Aquifer System typically has a low susceptibility to surface contamination because intertill sand and gravel units are commonly overlain by thick glacial till. Shallow wells completed in this system are moderately susceptible to contamination.

Central Wabash Valley/Tipton Till Aquifer Subsystem

The Central Wabash Valley/Tipton Till Aquifer Subsystem is mapped throughout the county. The subsystem is mapped similar to that of the Tipton Till Aquifer System. However, potential aquifer materials are generally thinner and potential yields are less in the subsystem.

The unconsolidated deposits typically range from 50 feet to 130 feet thick for the subsystem in this county. However, the depth to bedrock is generally less than 100 feet. Potential aquifer materials include thin, discontinuous intertill sand and gravel deposits. Where present, these

deposits are typically capped by till that is commonly 40 to 60 feet thick. There are no registered significant groundwater withdrawal facilities utilizing this system.

About half of the wells started in this subsystem in Montgomery County are completed in the underlying bedrock aquifer system. However, the Central Wabash Valley/Tipton Till Aquifer Subsystem is capable of meeting the needs of some domestic users in the county. The wells producing from this subsystem are completed at depths ranging from 50 to 100 feet. Intertill sand and gravel aquifer materials are typically less than 5 feet thick. Domestic well yields are commonly 5 to 10 gpm and static water levels are generally 10 to 35 feet below the surface.

This subsystem is generally not very susceptible to surface contamination because intertill sand and gravel units are overlain by thick till deposits. Wells producing from shallow aquifers are moderately to highly susceptible to contamination.

Central Wabash Valley/Tipton Complex Aquifer System

The Central Wabash Valley/Tipton Complex Aquifer System is mapped in a few areas of Montgomery County and is characterized by unconsolidated deposits that are quite variable in materials and thickness. The aquifers are typically overlain by thick clay layers. The aquifers are highly variable in depth and lateral extent and include single or multiple intertill sand and gravel layers. The total thickness of unconsolidated deposits ranges from about 50 feet to over 400 feet.

The deeper more prolific aquifers of this system are capable of meeting the needs of domestic and some high-capacity users in Montgomery County. Saturated aquifer materials in the Central Wabash Valley/Tipton Complex Aquifer System are generally 15 to 40 feet thick. Wells in this system are typically completed at depths ranging from 70 to 110 feet. Domestic well yields are commonly 10 to 40 gpm and static water levels are generally 20 to 50 feet below the surface. There are four registered significant groundwater withdrawal facilities (7 wells) using this system. These facilities are used for irrigation. The reported yield for the high-capacity wells ranges from 85 to 740 gpm.

Northwest of Kirkpatrick, a portion of this system overlies the Lafayette (Teays) Bedrock Valley System with a total thickness of unconsolidated deposits of around 400 feet. The deeper portion of the buried bedrock valley is filled with thick sand and gravel deposits. A test well reported over 50 feet of sand and gravel above the bedrock valley. Another small area of this system is located in the southeastern corner of the county and overlies a smaller buried bedrock valley with a total thickness of unconsolidated deposits around 225 feet, with reported sand and gravel thickness of around 35 feet. There are two registered significant groundwater withdrawal facilities (3 wells) using this system which is used for public water supply and irrigation. Reported pumping rates range from 800 to 1100 gpm.

The Central Wabash Valley/Tipton Complex Aquifer System is not very susceptible to contamination where overlain by thick clay deposits. However, in some areas where surficial clay deposits are thin or lacking, the shallow aquifer, if present, is at moderate to high risk.

Wabash River and Tributaries Outwash Aquifer System

The Wabash River and Tributaries Outwash Aquifer System is mapped in a few places along Sugar Creek around Crawfordsville and Big Raccoon Creek southwest of Ladoga. This system includes thick glacial outwash sands and gravels capped by recent alluvial deposits. The total thickness of unconsolidated deposits in this system ranges from 30 feet to over 150 feet.

This aquifer system is capable of meeting the needs of domestic and high-capacity users in Montgomery County. The few wells utilizing the Wabash River and Tributaries Outwash Aquifer System are completed at depths ranging from 29 to 141 feet with saturated sand and gravel aquifer materials commonly 10 to 40 feet thick. Static water levels range from flowing to 27 feet below the surface. In Montgomery County, there are five registered significant groundwater withdrawal facilities (12 wells) in this system. The main uses for these facilities are public water supply and energy production. Reported capacities for these wells range from 100 to 800 gpm in Montgomery County.

This system is highly susceptible to surface contamination where sand and gravel deposits are near the surface and have little or no clay deposits. However, areas that have overlying thick clay deposits are moderately susceptible to contamination.

Wabash River and Tributaries Outwash Aquifer Subsystem

The Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along Sugar Creek around Crawfordsville and Big Raccoon Creek southwest of Ladoga. In places, sand and gravel from the melting glaciers (outwash) were deposited in the stream valleys. The subsystem is mapped similar to the Wabash River and Tributaries Outwash Aquifer System. However, potential aquifer materials are generally thinner, with thicker overlying silt and/or clay materials, and potential yields are less in the subsystem than in the system. The total thickness of unconsolidated deposits in this system ranges from about 30 feet to over 150 feet. The aquifer materials in this system are generally overlain by 10 to 35 feet of silt and/or clay. However, in many places, this layer is missing and unsaturated sand and gravel deposits lie above the productive aquifer.

The Wabash River and Tributaries Outwash Aquifer Subsystem has the potential to meet the needs of domestic and some high-capacity users. The wells in this system are completed at depths commonly ranging from 40 to 85 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 15 to 25 feet thick. Domestic well yields typically range from 10 to 20 gpm with static water levels generally ranging from flowing to 45 feet below the surface. There is only one registered significant groundwater withdrawal facility with one well

in this system. The reported capacity for this well is 100 gpm and the well is used for energy production.

Areas within this aquifer system that have overlying clay deposits are moderately susceptible to surface contamination; whereas, areas that lack overlying clay deposits are highly susceptible to contamination.

Registered Significant Groundwater Withdrawal Facilities

There are 24 registered significant groundwater withdrawal facilities using unconsolidated aquifers in the county (total of 50 wells). Most of these facilities utilize the Tipton Till Aquifer System (16 facilities, 28 wells), and the Wabash River and Tributaries Outwash Aquifer System (5 facilities, 12 wells). Six facilities use the Central Wabash Valley/Tipton Complex Aquifer System (10 wells) and one facility uses the Wabash River and Tributaries Outwash Aquifer Subsystem with one well. The reported capacities for individual high capacity wells range up to 1100 gpm. The main uses for the Montgomery County facilities are public water supply, irrigation and industry. Refer to the table for some details on the wells and to the map for the facilities location.

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