

Unconsolidated Aquifer Systems of Carroll County, Indiana

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Six unconsolidated aquifer systems have been mapped in Carroll County: the Till Veneer; the Tipton / Iroquois Till; the Tipton / Iroquois Till Subsystem; the Tipton / Iroquois Complex; the Wabash River and Tributaries Outwash; and the Wabash River and Tributaries Outwash Subsystem. Boundaries of all aquifer systems described are commonly gradational and individual aquifers may extend across aquifer system boundaries.

The thickness of unconsolidated deposits in Carroll County is quite variable, due to glacial material that has been deposited over an uneven bedrock surface. The thickness of unconsolidated deposits ranges from less than 50 feet near Delphi to over 300 feet along the Lafayette (Teays) Bedrock Valley System, which trends from northeast, near Burnetts Creek, to the west-southwest at the Tippecanoe River in 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

In Carroll 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. The Till Veneer Aquifer System in Carroll County is primarily mapped in places along the Wabash River and in the northeastern portion of the county. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county. Aquifer layers utilized in the Till Veneer Aquifer System are generally up to 10 feet thick sands and/or gravels. These sands and gravels are overlain by a till cap which is commonly 5 to 20 feet thick.

There is little potential for ground-water production in this system in Carroll County. Potential aquifers within this system include thin isolated sand and/or gravel layers. Therefore, very few of the reported wells penetrating this aquifer system in the county are completed in unconsolidated materials. The system is commonly bypassed in favor of the underlying bedrock. The depth of the few wells completed in the Till Veneer Aquifer System range from 35 to 40 feet deep with static water levels between 15 and 25 feet below the surface. The majority of the wells have reported capacities of less than 10 gallons per minute (gpm). There are no registered significant ground-water withdrawal facilities in this system in Carroll County.

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

Tipton / Iroquois Till Aquifer System

In Carroll County, the unconsolidated thickness of this aquifer system ranges from about 100 feet to over 200 feet in the central and eastern portions of the county. Wells completed in the Tipton / Iroquois Till Aquifer System are capable of meeting the needs of most domestic users in Carroll County. However, approximately 35 percent of wells started in this system utilize the underlying bedrock aquifer. Saturated aquifer materials include sand and/or gravel deposits that are commonly 5 to 15 feet thick and are generally overlain by 40 to 75 feet of till. Wells producing from the Tipton / Iroquois Till Aquifer System are typically 50 to 95 feet deep. Domestic well capacities are commonly 15 to 50 gpm. Static water levels generally range from 15 to 40 feet below the surface. There are no registered significant ground-water withdrawal facilities in this system in Carroll County.

The Tipton / Iroquois Till Aquifer System typically has a low susceptibility to surface contamination because intratill sand and gravel units are commonly overlain by thick glacial till. Shallow wells completed in this system are moderately susceptible to contamination where surficial clay deposits are thin.

Tipton / Iroquois Till Aquifer Subsystem

The subsystem is mapped similar to the Tipton / Iroquois Till Aquifer System. However, potential aquifer materials are typically thinner and potential yield is generally less in the subsystem than in the Tipton / Iroquois Till Aquifer System. The unconsolidated material in this subsystem ranges from about 50 to 150 feet thick. Potential aquifer materials include thin intratill sand and gravel deposits. Where present, aquifer materials are typically capped by till that is commonly 45 to 75 feet thick.

Approximately 75 percent of wells started in the Tipton / Iroquois Till Aquifer Subsystem are completed in the underlying bedrock aquifer system in Carroll County. However, this subsystem is capable of meeting the needs of some domestic users in the county. The few wells producing from the Tipton / Iroquois Till Aquifer Subsystem are generally completed at depths of 60 to 90 feet. Intratill sand and gravel aquifer materials are typically 2 to 10 feet thick. Reported well yields generally range from 10 to 15 gpm and static water levels are commonly 20 to 50 feet below the surface. There are no registered significant ground-water withdrawal facilities in this system in Carroll County.

This subsystem is generally not very susceptible to surface contamination because intratill sand and gravel units are overlain by thick till deposits. However, in some areas where aquifers are shallow and overlying clay deposits are thin, the system is at moderate risk.

Tipton / Iroquois Complex Aquifer System

The Tipton / Iroquois Complex Aquifer System is characterized by unconsolidated deposits that are quite variable in materials and thickness. Aquifers within the system range from thin to thick and include single or multiple intratill sands and gravels. The aquifers are highly variable in depth and lateral extent and are typically confined by thick clay layers. The total unconsolidated thickness of the Tipton / Iroquois Complex Aquifer System generally ranges from about 150 feet to over 300 feet in Carroll County.

This system is capable of meeting the needs of domestic and most high-capacity users in the county. Aquifer layers utilized in this system are generally 5 to 25 feet thick sands and/or gravels. These sands and gravels are overlain by a till cap which is commonly 55 to 125 feet thick with thin intratill sand and gravel layers. Wells in this system are typically completed at depths ranging from 70 to 150 feet. Domestic well yields are commonly 15 to 70 gpm and static water levels are generally 15 to 65 feet below the surface. There are three registered significant ground-water withdrawal facilities (8 wells) in this system in Carroll County. High-capacity well yields up to 600 gpm are reported.

In northwestern Carroll County, this system overlies the Lafayette (Teays) Bedrock Valley System, which trends from northeast, near Burnetts Creek, to the west-southwest at the Tippecanoe River. The wells completed in this portion of the system produce from both upper and deep sand and gravel aquifers. The wells producing from the upper aquifer range in depth from about 75 feet to 140 feet. The deeper aquifer wells produce from depths up to 195 feet deep. In places, the total saturated thickness exceeds 20 feet.

The Tipton / Iroquois Complex Aquifer System is generally not susceptible to contamination because it is typically overlain by thick clay deposits. However, where surficial clay thickness is thin or not present these areas are at moderate to high risk to surface contamination.

Wabash River and Tributaries Outwash Aquifer System

The Wabash River and Tributaries Outwash Aquifer System is mapped along a small section of the Wabash River in Carroll County. In places, sand and gravel from the melting glaciers (outwash) were deposited in the stream valleys. There are only two reported wells in the Wabash River and Tributaries Outwash Aquifer System for Carroll County and these wells were completed at depths of 73 and 74 feet. Both wells have a sand and gravel aquifer that is 61 feet thick and the aquifers are capped by 11 and 13 feet of clay, respectively. The wells have reported yields ranging up to 1000 gpm and were developed for public water supply; however, they are currently not utilized. This system is moderately susceptible to surface contamination where overlying clay or silt deposits are present. However, areas that lack overlying clay or silt deposits are highly susceptible to contamination.

Wabash River and Tributaries Outwash Aquifer Subsystem

The Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along Wildcat Creek, portions of the Wabash River, Tippecanoe River, and Middle Fork Wildcat Creek in Carroll County. The system is made up of thick, glacially derived outwash deposits.

This subsystem is capable of meeting the needs of domestic users in the county. The few wells producing from the Wabash River and Tributaries Outwash Aquifer Subsystem are completed at depths ranging from 45 to 105 feet below surface with up to 25 feet of continuous sand and gravel. In places, aquifer materials are capped by silt or sandy clay ranging from 5 to 40 feet thick. Domestic wells typically yield 20 to 75 gpm with static water levels commonly 10 to 35 feet below surface. There is one registered significant ground-water withdrawal facility (5 wells) in this system in Carroll County. High-capacity well yields up to 100 gpm are reported.

In places, this system overlies segments of the Lafayette (Teays) Bedrock Valley System. The wells completed in this portion of the system produce from both upper and deep sand and gravel aquifers. The wells producing from the upper aquifer range in depth from about 60 to 95 feet. The deeper aquifer wells produce from depths up to 150 feet deep. In places, the total saturated thickness exceeds 30 feet.

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

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