

Unconsolidated Aquifer Systems of Miami County, Indiana

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Seven unconsolidated aquifer systems have been mapped in Miami County: the Till Veneer; the Bluffton Till; the Bluffton Till Subsystem; the Bluffton Complex; the Natural Lakes and Moraines; the Wabash River and Tributaries Outwash System; and the Wabash River and Tributaries Outwash Subsystem. These systems comprise sediments deposited by or resulting from glaciers, glacial meltwaters, and post-glacial precipitation events. Boundaries of these aquifer systems are commonly gradational, and individual aquifers may extend across aquifer system boundaries.

The thickness of unconsolidated deposits in Miami County is quite variable, because glacial material has been deposited over an uneven bedrock surface. In general, the thickness of unconsolidated deposits increases from south to north in Miami County and is over 360 feet thick south of Gilead. However, segments of the Mississinewa River and Wabash River valleys are cut into bedrock. The thickness of unconsolidated sediments exceeds 250 feet in a buried bedrock valley, which cuts across the center of the county from east to west before turning slightly northwestward.

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 Miami County, the Till Veneer Aquifer System encompasses areas where the unconsolidated material is predominantly thin till overlying bedrock. This system also includes thin alluvium overlying bedrock along some of the major streams. The Till Veneer Aquifer System is mapped, in places, within the southern half of Miami County. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county. Total thickness of the Till Veneer Aquifer System generally ranges from about 25 to 50 feet.

Nearly all wells started in the Till Veneer Aquifer System in Miami County are completed in the underlying bedrock. Potential aquifers within this system include shallow sand and/or gravel layers. The few wells completed in the Till Veneer Aquifer System in this county range from 34 to 48 feet deep.

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.

Bluffton Till Aquifer System

The Bluffton Till Aquifer System primarily consists of glacial till with intratill sand and gravel layers. In Miami County, this aquifer system ranges in thickness from about 50 feet to over 250 feet.

Wells completed in the Bluffton Till Aquifer System are capable of meeting the needs of most domestic and some high-capacity users in Miami County. However, approximately 55 percent of wells started in this system utilize the underlying bedrock aquifer. Saturated aquifer materials include sand and/or gravel deposits that are commonly 10 to 20 feet thick and are generally overlain by 10 to 50 feet of till. Wells producing from the Bluffton Till Aquifer System are typically 70 to 140 feet deep. Domestic well capacities are commonly 15 to 60 gallons per minute (gpm). Static water levels generally range from 30 to 80 feet below the surface. There is 1 registered significant ground-water withdrawal facility using the Bluffton Till Aquifer System. The facility's two wells in this system each have a reported pumping rate of 60 gpm.

This system overlies part of a buried bedrock valley northwest of Peru. The wells completed in this portion of the system produce from both shallow and deep aquifers, and range in depth from 100 to 250 feet. Saturated sand and gravel layers are typically 10 to 20 feet thick.

The Bluffton 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.

Bluffton Till Aquifer Subsystem

Areas where unconsolidated materials are generally greater than 50 feet in thickness, yet have limited aquifer potential, are mapped as the Bluffton Till Aquifer Subsystem in Miami County. The subsystem in this county ranges from about 45 feet to 200 feet thick. However, the depth to bedrock is generally less than 100 feet. Potential aquifer materials include intratill sand and gravel deposits. Where present, aquifer materials are typically capped by till that is commonly 15 to 60 feet thick.

More than 90 percent of wells started in the Bluffton Till Aquifer Subsystem in Miami County are completed in the underlying bedrock aquifer system. However, this subsystem is capable of meeting the needs of some domestic users in the county. The

few wells producing from the Bluffton Till Aquifer Subsystem are completed at depths of 45 to 190 feet. Intratill sand and gravel aquifer materials are typically about 10 feet thick. Domestic well yields are commonly 10 to 15 gpm and static water levels are generally 15 to 50 feet below the surface.

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

Bluffton Complex Aquifer System

The Bluffton 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 thickness of unconsolidated deposits ranges from about 50 feet to over 250 feet.

This system is capable of meeting the needs of domestic and high-capacity users in Miami County. Saturated aquifer materials in the Bluffton Complex Aquifer System are generally 10 to 30 feet thick and are overlain by a till cap which is commonly 30 to 70 feet thick. Wells in this system are typically completed at depths ranging from 60 to 120 feet. Domestic well yields are commonly 15 to 60 gpm and static water levels are generally 25 to 70 feet below the surface. There is 1 registered significant ground-water withdrawal facility utilizing this system. The facility's one high-capacity well has a reported pumping rate of 240 gpm.

This system overlies part of a buried bedrock valley east of Peru, just north of the Wabash River valley. The few wells completed in this portion of the system produce from both shallow and deep aquifers, and range in depth from 70 to 175 feet. In places, the total saturated thickness of the aquifer exceeds 80 feet.

The Bluffton 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, the shallow aquifer, if present, is at moderate to high risk.

Natural Lakes and Moraines Aquifer System

In Miami County, the Natural Lakes and Moraines Aquifer System normally contains at least two potential sand and gravel aquifers, one near the surface, the other at depth. In places, the near-surface aquifer is absent and surficial clays over 100 feet thick are present. The total thickness of unconsolidated deposits in this system in Miami County ranges from about 110 to over 360 feet.

This system is capable of meeting the needs of domestic and some high-capacity users in Miami County. Wells completed in the Natural Lakes and Moraines Aquifer System range in depth from 30 to 360 feet but are typically completed at depths ranging from 75 to 150 feet. Sand and gravel aquifers are generally 10 to 15 feet thick and are overlain by a till cap which is commonly 60 to 140 feet thick. Domestic well yields are typically 10 to 60 gpm and static water levels are generally 20 to 50 feet below the surface.

The near-surface aquifers of the Natural Lakes and Moraines Aquifer System are highly susceptible to surface contamination where they are directly connected to surficial sands and gravels. The deeper sand and gravel aquifers are generally overlain by thick clay deposits and are slightly susceptible to contamination.

Wabash River and Tributaries Outwash Aquifer System

The Wabash River and Tributaries Outwash Aquifer System is mapped along sections of the Wabash River and Eel River in Miami County. Sand and gravel from the melting glaciers (outwash) were deposited in the stream valleys. The total thickness of unconsolidated deposits in this system is over 200 feet in this county.

This system is capable of meeting the needs of domestic and high-capacity users in Miami County. Wells in the Wabash River and Tributaries Outwash Aquifer System are typically completed at depths ranging from 50 to 130 feet. Sand and gravel aquifers are commonly 15 to 50 feet thick and are generally capped by silt, sandy clay, or clay ranging from 5 to 50 feet thick. However, in many places, the protective cap layer is missing and unsaturated sand and gravel deposits lie above the productive aquifer. Domestic well yields in the Wabash River and Tributaries Outwash Aquifer System are commonly 15 to 60 gpm and static water levels are generally 10 to 30 feet below the surface. There are 4 registered significant ground-water withdrawal facilities (7 wells) in this system in Miami County. Reported capacities range from 300 to 2100 gpm.

In places, this system overlies segments of a deep buried bedrock valley. The wells completed in this portion of the system produce from both shallow and deep sand and gravel aquifers, and range in depth from 30 to 175 feet. In places, the total saturated thickness exceeds 100 feet.

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

In Miami County, the Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along portions of the Wabash River and Eel River. Total thickness of unconsolidated deposits overlying bedrock ranges from about 45 to over 200 feet.

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 typically completed at depths ranging from 40 to 70 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 10 to 20 feet thick. Domestic well yields typically range from 15 to 60 gpm with static water levels of 10 to 35 feet below the surface.

The aquifer materials in the Wabash River and Tributaries Outwash Aquifer Subsystem are generally overlain by 5 to 30 feet of silt or clay. However, in many places, this layer is missing and unsaturated sand and gravel deposits lie above the productive aquifer. 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.

Registered Significant Ground-Water Withdrawal Facilities

There are 5 registered significant ground-water withdrawal facilities (total of 10 wells) using unconsolidated aquifers in the county. Most of these facilities utilize the Wabash River and Tributaries Outwash Aquifer System (4 facilities, 7 wells). However, one facility uses the Bluffton Complex Aquifer System (1 well) and the Bluffton Till Aquifer System (2 wells). Reported capacities for individual wells range from 60 to 2100 gpm. Uses for these 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.

Map Use and Disclaimer Statement

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