

Unconsolidated Aquifer Systems of Hamilton County, Indiana

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The unconsolidated aquifer systems of Hamilton County are composed of sediments deposited by, or resulting from, a complex sequence of glaciers, glacial meltwaters, and post-glacial precipitation events. Six unconsolidated aquifer systems have been mapped in Hamilton County: the Till Veneer; the New Castle / Tipton Till; the New Castle / Tipton Till Subsystem; the New Castle / Tipton Complex; the White River and Tributaries Outwash; and the White 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. Approximately 75 percent of all wells in this county are completed in unconsolidated deposits.

The thickness of unconsolidated deposits in Hamilton County is quite variable, due to the deposition of glacial material over an uneven bedrock surface. Unconsolidated deposits in the county range from less than 5 feet to about 300 feet thick.

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 Hamilton County, the Till Veneer Aquifer System occurs in areas where the unconsolidated material is predominantly thin till overlying bedrock. This system is chiefly the product of the deposition of glacial till over an uneven, eroded bedrock surface, and is generally less than 50 feet thick. Small areas of eastern and southeastern Hamilton County are mapped as Till Veneer.

The Till Veneer Aquifer System has the most limited groundwater resources of the unconsolidated aquifer systems. Potential aquifers within this system include thin isolated sand and/or gravel layers, and surficial sand and gravel outwash or alluvium. However, there is little potential for groundwater production in this system in Hamilton County with 96 percent of the wells being completed in the underlying bedrock. The wells utilizing this aquifer system are completed at depths ranging from 30 to 40 feet. Most of the wells in this system have reported capacities of 5 gallons per minute (gpm) or less with some wells being reported as "dry". Static water levels range between 8 and 20 feet below the surface. There are no registered significant groundwater withdrawal facilities utilizing this system.

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 very susceptible to contamination.

New Castle / Tipton Till Aquifer System

The New Castle / Tipton Till Aquifer System is mapped throughout a large portion of Hamilton County. This aquifer system is up to about 170 feet in thickness, and consists primarily of glacial till with intertill sand and gravel layers. However, the sand and gravel aquifers in this system tend to be relatively thin and discontinuous.

This aquifer system is capable of meeting the needs of most domestic and some high-capacity users in Hamilton County. The wells utilizing this aquifer system are completed at depths ranging from 65 to 135 feet with saturated sand and gravel aquifer materials commonly 4 to 18 feet thick. Domestic well yields are typically 10 to 40 gpm and static water levels range from flowing to 44 feet below the land surface. There are 17 registered significant groundwater withdrawal facilities (32 wells) using the Tipton Till Aquifer System. The reported yields for the high-capacity wells range from 70 to 777 gpm.

The New Castle / 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.

New Castle / Tipton Till Aquifer Subsystem

The New Castle / Tipton Till Aquifer Subsystem is mapped in several isolated areas of Hamilton County. The subsystem is mapped similar to the New Castle / Tipton Till Aquifer System. However, potential aquifer materials are generally thinner and potential yields are less in the subsystem.

About 84 percent of wells started in this subsystem in Hamilton County are completed in the underlying bedrock aquifer system. However, the New Castle / Tipton Till Aquifer Subsystem is capable of meeting the needs of some domestic users in the county. Potential aquifer materials include relatively thin, discontinuous intertill sand and gravel deposits. These intertill sand and gravel aquifer materials are commonly less than 10 feet thick. The wells producing from this subsystem are typically completed at depths ranging from about 50 to 110 feet. Domestic well yields are generally 5 to 10 gpm and static water levels range from 12 to 40 feet below the surface. There are no registered significant groundwater withdrawal facilities using the New Castle / Tipton Till Aquifer Subsystem.

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.

New Castle / Tipton Complex Aquifer System

The New Castle / Tipton Complex Aquifer System is mapped throughout much of Hamilton County. Multiple glacial advances resulted in sequences of intertill sand and gravel layers, typically overlain by thick clay, resulting in aquifers that are highly variable in depth, thickness, and lateral extent. The total thickness of the combined unconsolidated deposits is up to about 300 feet.

The deeper more prolific aquifers of this system are capable of meeting the needs of domestic and some high-capacity users in Hamilton County. Saturated aquifer materials in the New Castle / Tipton Complex Aquifer System range from about 5 to 20 feet thick, and wells in this system are generally completed at depths from about 75 to 150 feet. Domestic well yields range up to 50 gpm and static water levels are about 15 to 50 feet below the surface. There are 18 registered significant groundwater withdrawal facilities (38 wells) using this system. The reported yields for the high-capacity wells range from 70 to 1500 gpm.

The New Castle / 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 relatively thin, the shallow aquifer, if present, is at moderate to high risk.

White River and Tributaries Outwash Aquifer System

The White River and Tributaries Outwash Aquifer System is mapped in the southeastern and east-central portions of Hamilton County along the White River, Stony Creek, William Lock Ditch, Mud Creek, and Fall Creek. The system includes thick glacial outwash sands and gravels that are generally capped by a layer of clay and silt deposits.

The White River and Tributaries Outwash Aquifer System is capable of meeting the needs of both domestic and high-capacity users in Hamilton County. The wells utilizing this aquifer system are completed at depths ranging from 45 to 85 feet with saturated sand and gravel aquifer materials commonly 10 to 45 feet thick. Domestic well yields are typically 10 to 50 gpm with static water levels ranging from 12 to 30 feet below the surface. In the White River and Tributaries Outwash Aquifer System there are 20 registered significant groundwater withdrawal facilities (55 wells). Reported production for these high-capacity wells range from 75 to 2100 gpm.

The White River and Tributaries Outwash Aquifer 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 having relatively thick clays overlying the sand and gravel deposits are moderately susceptible to contamination.

White River and Tributaries Outwash Aquifer Subsystem

The White River and Tributaries Outwash Aquifer Subsystem is mapped in southeastern and east-central Hamilton County along portions of the White River, William Lock Ditch, Mud Creek, and Fall Creek. This subsystem is mapped similar to the White River and Tributaries Outwash Aquifer System; however, aquifer materials in the White River and Tributaries Outwash Aquifer Subsystem are generally thinner, overlying silt and/or clay materials are thicker, and potential yields are less in the subsystem.

The White River and Tributaries Outwash Aquifer Subsystem has the potential to meet the needs of domestic and some high-capacity users. The wells in this subsystem are completed at depths commonly ranging from 45 to 95 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 5 to 30 feet thick. Domestic well yields are generally 10 gpm with static water levels ranging from 15 to 40 feet below the surface. There are no registered significant groundwater withdrawal facilities in the White River and Tributaries Outwash Aquifer Subsystem.

Areas within the White River and Tributaries Outwash Aquifer Subsystem that have overlying clay deposits are moderately susceptible to surface contamination; however, areas lacking overlying clay deposits are highly susceptible to contamination.

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