

Unconsolidated Aquifer Systems of Vigo County, Indiana

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The unconsolidated aquifer systems of Vigo 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 Vigo County: the Dissected Till and Residuum/Till Veneer; the Central Wabash Valley/Wabash Lowland Till; the 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. 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 Vigo County is quite variable, due to the deposition of glacial material over an uneven bedrock surface. Unconsolidated deposits typically range from 25 to 75 feet thick in the county and are up to 150 feet thick in some areas along the Wabash River.

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.

Dissected Till and Residuum/Till Veneer Aquifer System

In Vigo County, the Dissected Till and Residuum Aquifer System and the Till Veneer Aquifer System are mapped as one system because they are similar in composition and in aquifer characteristics. As in counties to the south, the Dissected Till and Residuum Aquifer System includes areas where pre-Wisconsin and/or Wisconsin till is thin and dissected due to deep down-cutting by streams or where soils have formed directly from bedrock due to weathering. The Till Veneer Aquifer System encompasses 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 rather than erosion of till by younger streams. Also included in this aquifer system are relatively thin deposits of alluvium, colluvium and gravel outwash overlying shallow bedrock in many stream valleys.

Much of northern Vigo County is mapped as Dissected Till and Residuum, especially along the Wabash River where the streams are deeply incised. In most of the southern half and in the upland regions in the northern half of the county thin till over bedrock is mapped as the Till

Veneer Aquifer System. Total thickness of this system generally ranges from about 20 to 50 feet.

The Dissected Till and Residuum/Till Veneer Aquifer System has the most limited groundwater resources of the unconsolidated aquifer systems. There is little potential for groundwater production in this system in Vigo County, and most wells are completed in the underlying bedrock. About 85 percent of the reported wells penetrating this aquifer system in the county are completed in bedrock. Potential aquifers within this system include thin isolated sand and/or gravel layers, and surficial sand and gravel outwash or alluvium. Depth of the wells completed in the Dissected Till and Residuum/Till Veneer Aquifer System typically ranges from 30 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). 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, there are areas where protective clay layers are thin or absent. These areas are very susceptible to contamination.

Central Wabash Valley/Wabash Lowland Till Aquifer System

The Central Wabash Valley/Wabash Lowland Till Aquifer System is mapped primarily in the northern half of Vigo County. This aquifer system predominantly consists of pre-Wisconsin glacial materials that typically exceed 70 feet in thickness.

This aquifer system is generally capable of meeting the needs of most domestic users and some high-capacity users. Potential aquifer materials within the glacial till include discontinuous intertill sand and gravel layers. Individual sand and gravel units are commonly 7 to 15 feet thick. Well depths range from 60 to 115 feet in this system. Domestic well yields range from 5 to 15 gpm and static water levels are 10 to 65 feet below the land surface. There are two registered significant groundwater withdrawal facilities (5 wells) using the Central Wabash Valley/Wabash Lowland Till Aquifer System. These facilities are used for public supply and have reported pumping rates ranging from 40 to 90 gpm.

The Central Wabash Valley/Wabash Lowland 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/Wabash Lowland Till Aquifer Subsystem

The Central Wabash Valley/Wabash Lowland Till Aquifer Subsystem is primarily mapped east of the Wabash River in Vigo County. The subsystem is mapped similar to that of the Central Wabash Valley/Wabash Lowland Till Aquifer System. However, potential aquifer materials are generally thinner and potential yields are less in the subsystem.

Unconsolidated deposits typically range from 50 to 100 feet thick in the subsystem. Potential aquifer materials include thin, discontinuous intertill sand and gravel deposits. Where present, these deposits are typically capped by till that is commonly 30 to 60 feet thick.

About half of the wells started in this subsystem in Vigo County are completed in the underlying bedrock aquifer system. However, the Central Wabash Valley/Wabash Lowland Till Aquifer Subsystem is capable of meeting the needs of some domestic users in the county. The wells producing from this subsystem are typically completed at depths ranging from 50 to 90 feet. Intertill sand and gravel aquifer materials are commonly less than 5 feet thick. Domestic well yields are generally 2 to 10 gpm and static water levels are typically 10 to 45 feet below the surface. There are no registered significant groundwater withdrawal facilities utilizing this 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.

Wabash River and Tributaries Outwash Aquifer System

The Wabash River and Tributaries Outwash Aquifer System is mapped along the Wabash River in the county. This system includes thick glacial outwash sands and gravels and is capped by a layer of clay, sandy clay, silt, or loess deposits in a few places. The total thickness of unconsolidated deposits in this system ranges from 40 feet up to 150 feet.

This aquifer system is capable of meeting the needs of domestic and high-capacity users in Vigo County. The wells utilizing the Wabash River and Tributaries Outwash Aquifer System are completed at depths ranging from 40 to 75 feet with saturated sand and gravel aquifer materials commonly 25 to 60 feet thick. Static water levels are typically 20 to 40 feet below the surface. In Vigo County, there are 36 registered significant groundwater withdrawal facilities (78 wells) in this system. Predominate uses for these facilities are public water supply, industry and irrigation. Reported production for high-capacity wells ranges up to 2700 gpm. Also, one large diameter radial collector well has a reported capacity of 8333 gpm.

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 portions of Otter Creek and Prairie Creek and a few areas adjacent to the Wabash River. 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. The total thickness of unconsolidated deposits in this subsystem ranges from about 30 feet to over 100 feet. The aquifer materials are generally overlain by 10 to 45 feet of silt and/or clay. However, in some 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 subsystem are completed at depths commonly ranging from 45 to 75 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 10 to 30 feet thick. Domestic well yields typically range from 5 to 20 gpm with static water levels generally ranging from 5 to 30 feet below the surface. There are no registered significant groundwater withdrawal facilities in this subsystem in Vigo County.

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

Coal Mine Spoil Aquifer System

The Coal Mine Spoil Aquifer System covers about 7 percent of Vigo County primarily because the coal seams are shallow enough to be economically surface mined. The coal seams occur within the Carbondale Group of Pennsylvanian age and the upper Raccoon Creek Group of Pennsylvanian age. The surface mined seams are in several large areas in eastern Vigo County and a few smaller areas west of the Wabash River. 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 contain considerable amounts of groundwater.

Information from surface coal mine areas in other counties indicate the quality of groundwater in this system is probably much poorer than 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. Nearly all of the wells started in this system are completed in bedrock in Vigo County. However, one domestic well reports a yield of 10 gpm and a static water level of 25 feet below the surface. Also, a few observation wells for watershed reclamation projects utilize 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 moderately susceptible.

Registered Significant Groundwater Withdrawal Facilities

There are 38 registered significant groundwater withdrawal facilities using unconsolidated aquifers in the county (total of 83 wells). Most of these facilities utilize the Wabash River and Tributaries Outwash Aquifer System (36 facilities, 78 wells). There are two registered significant groundwater withdrawal facilities (5 wells) using the Central Wabash Valley/Wabash Lowland Till Aquifer System. Reported capacities for individual wells range from 40 to 2,700 gpm. There is one significant groundwater withdrawal facility with one radial collector well system with a reported capacity of 8333 gpm. The dominate uses for the Vigo 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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