

Unconsolidated Aquifer Systems of Vanderburgh County, Indiana

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Five unconsolidated aquifer systems have been mapped in Vanderburgh County: the Dissected Till and Residuum; the Unglaciaded Southern Hills and Lowlands; the Alluvial, Lacustrine, and Backwater Deposits; the Ohio River Outwash; and the Ohio River Outwash Subsystem. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

Thickness, type, and areal extent of unconsolidated sediments in Vanderburgh County are quite variable. Throughout much of the county, sediments overlying bedrock are less than 50 feet thick. Unconsolidated sediments are thickest in the floodplain of the Ohio River, where the combined thickness of outwash, alluvial, and lacustrine deposits exceeds 150 feet in places.

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.

Dissected Till and Residuum Aquifer System / Unglaciaded Southern Hills and Lowlands Aquifer System

In Vanderburgh County, the Dissected Till and Residuum Aquifer System and the Unglaciaded Southern Hills and Lowlands Aquifer System are mapped as one aquifer system because they are similar in composition and in aquifer characteristics. These systems predominantly consist of thin, eroded bedrock residuum and (in the glaciaded area in the northwest) pre-Wisconsin tills. In many parts of the county, these deposits are capped with lacustrine silt and clay and Wisconsin loess. Together, the Dissected Till and Residuum Aquifer System and the Unglaciaded Southern Hills and Lowlands Aquifer System cover about 57 percent of Vanderburgh County. Total thickness of these aquifer systems generally ranges from about 15 to 40 feet.

There is little potential for water production in these aquifer systems in Vanderburgh County. Nearly all wells penetrating these unconsolidated aquifer systems in the county are developed in the underlying bedrock. However, in places large-diameter bored (bucket-rig) wells may be successful in meeting the needs of some domestic users. The Dissected Till and Residuum Aquifer System and the Unglaciaded Southern Hills and Lowlands Aquifer System are not very susceptible to contamination from surface sources because the near-surface materials generally have low permeability.

Alluvial, Lacustrine, and Backwater Deposits Aquifer System

In Vanderburgh County this system is mapped extensively along several tributaries of the Ohio and Wabash Rivers. The Alluvial, Lacustrine, and Backwater Deposits Aquifer System consists of deposits that come from two primary sources. The first is alluvium deposited by streams along with colluvium eroded from valley walls and upland areas. The second is from pre-Wisconsin and Wisconsin fine-grained glaciolacustrine deposits formed in relatively stagnant lake water. Typical materials include fine sand, silt, and clay deposits that are generally greater than 25 feet thick.

This system is a limited resource and few wells produce from these deposits in Vanderburgh County. Because this aquifer system is generally not very productive, wells are typically completed in the underlying bedrock. However, a few wells are adequate to meet the needs of some domestic users. Total well depths range from 25 to 105 feet with static water levels 15 to 40 feet below surface. Yields are generally less than 6 gallons per minute (gpm).

Thick deposits of silt and clay that have a low susceptibility to surface contamination generally mark this aquifer system. The susceptibility is greater in areas where the surficial silt and clay deposits are thin and directly overlie sand deposits.

Ohio River Outwash Aquifer System

This aquifer system is mapped along the main valley of the Ohio River in Vanderburgh County. Aggradation of the pre-glacial Ohio River Valley with large amounts of outwash sand and gravel from pre-Wisconsin and Wisconsin receding glaciers partially filled the river valley. Recent alluviation continues to fill the valley. These outwash and alluvial deposits form the most prolific aquifer system in the county.

In places, the Ohio River Outwash Aquifer System exceeds 150 feet in thickness with nearly 100 feet of continuous sand and gravel. Wells completed in this system range from 30 to 130 feet deep, but are commonly 45 to 85 feet deep and typically penetrate 20 to 65 feet of saturated aquifer materials. In many places a layer of sandy clay or silt, commonly less than 25 feet thick, overlies the sand and gravel. The Ohio River Outwash Aquifer System has the potential to meet the needs of domestic and high-capacity users. Reported capacities range from 200 to 900 gpm for wells associated with active significant ground-water withdrawal facilities using this system in Vanderburgh County. However, large-diameter wells tapping this aquifer system have been tested at rates up to 2000 gpm.

This aquifer system is highly susceptible to contamination from surface sources in areas that lack overlying clay layers. However, this system is moderately susceptible to surface contamination where aquifer materials are capped by thick layers of clay or silt.

Ohio River Outwash Aquifer Subsystem

In Vanderburgh County, this system is mapped parallel to the Ohio River Outwash Aquifer System. In general, the Ohio River Outwash Aquifer Subsystem is mapped where the topographic position is higher and thickness of saturated outwash materials is considerably less than that of the main outwash system. Individual sand and gravel aquifer units are generally overlain by greater thicknesses of silt and clay.

There are few reported wells utilizing the Ohio River Outwash Aquifer Subsystem in Vanderburgh County. However, information from these wells and from wells in nearby counties suggests that in Vanderburgh County this subsystem has the potential to meet the needs of domestic and some high-capacity users. Total depth of wells in this system ranges from about 40 to 130 feet and saturated aquifer materials are commonly 10 to 30 feet thick. Although there are no registered significant ground-water withdrawal facilities utilizing this system, two wells have reported test rates greater than 200 gpm.

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 7 registered significant ground-water withdrawal facilities (total of 13 wells) using unconsolidated aquifers in the county. All of these wells utilize the Ohio River Outwash Aquifer System. Reported capacities for individual wells are 200 to 900 gpm. Uses for these facilities are irrigation and industry. Refer to table for details on the wells and to the map for facility locations.

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