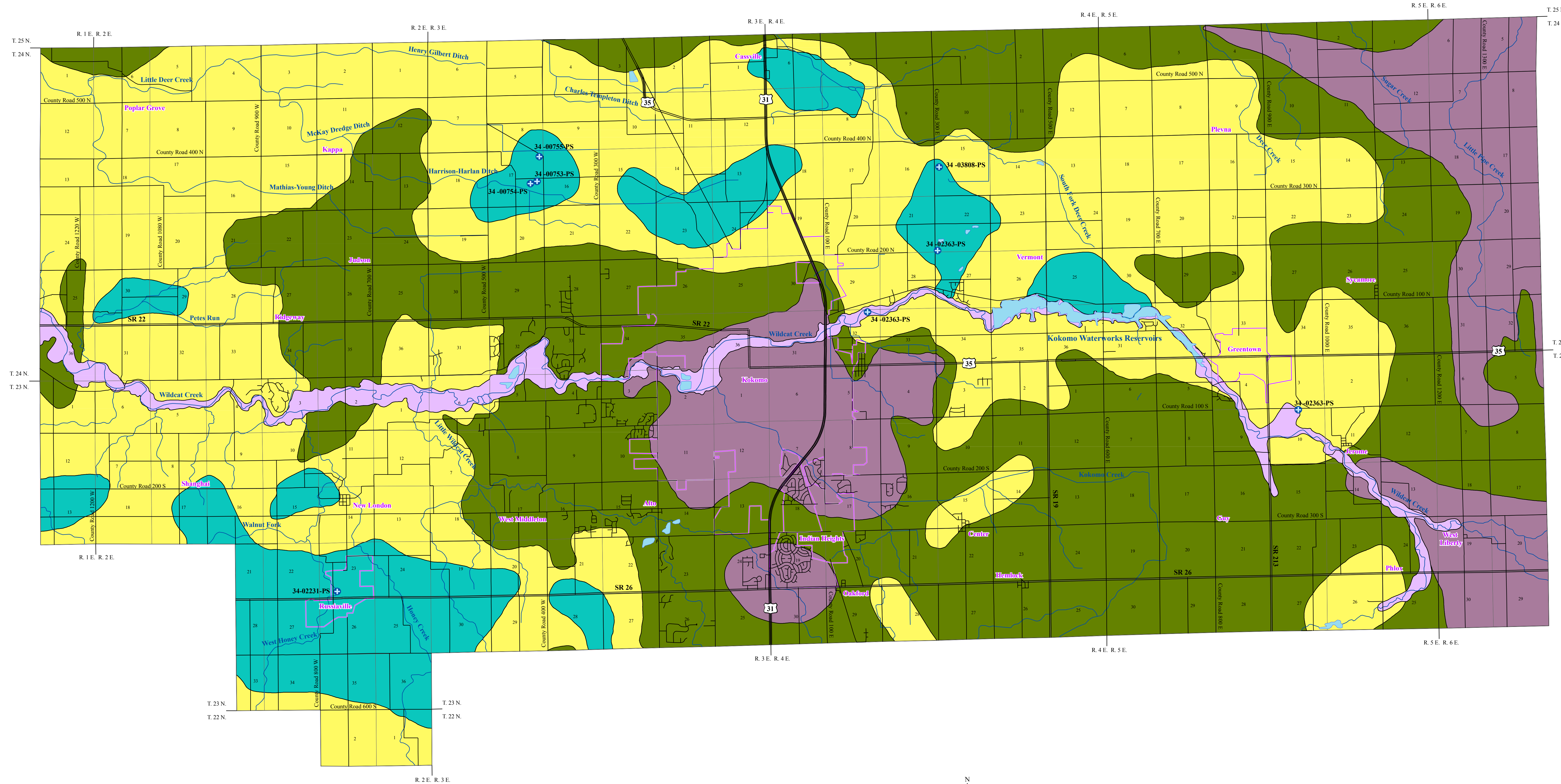


UNCONSOLIDATED AQUIFER SYSTEMS OF HOWARD COUNTY, INDIANA



Five unconsolidated aquifer systems have been mapped in Howard County: the Tipton Veneer, the Bluffton / Tipton Till, the Bluffton / Tipton Till Subsystem, the Tipton Complex, 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 Howard County is quite variable, because glacial material has been deposited over an uneven bedrock surface. The thickness of unconsolidated deposits ranges from about 25 feet in the eastern portion of Howard County to over 250 feet in the western portion of Howard 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.

Tipton Veneer Aquifer System

In Howard County, the Tipton Veneer Aquifer System encompasses areas where the unconsolidated material is predominantly thin till overlying an eroded bedrock surface. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county and is mapped around the Kokomo area and near the eastern edge of Howard County. Total thickness of the Tipton Veneer Aquifer System generally ranges from about 25 to 50 feet.

There is little potential for ground-water production in the Tipton Veneer Aquifer System in Howard County. Potential aquifer materials include thin isolated sand and/or gravel layers. However, none of the reported domestic wells penetrating this aquifer system are completed in unconsolidated materials, which are bypassed in favor of the underlying bedrock. The Tipton Veneer Aquifer System is not very susceptible to contamination from surface sources because the near-surface materials generally have low permeability.

Bluffton / Tipton Till Aquifer System

In Howard County, this aquifer system ranges in thickness from about 75 feet in the eastern portion of the county to over 225 feet in the western portion of the county. Wells completed in the Bluffton / Tipton Till Aquifer System are capable of meeting the needs of most domestic and some high-capacity users in Howard County. However, approximately 65 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 20 feet thick and are generally overlain by 45 to 85 feet of silt. Silt produced from the Bluffton / Tipton Till Aquifer System are typically 60 to 105 feet deep. Domestic well capacities are commonly 10 to 50 gallons per minute (gpm). Static water levels generally range from 10 to 30 feet below the surface. There are no registered significant ground-water withdrawal facilities in this system in Howard County.

The Bluffton / Tipton 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 because surficial clay deposits are thin in some areas.

Bluffton / Tipton 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 / Tipton Till Aquifer Subsystem in the county. The unconsolidated material in this subsystem ranges from about 50 to 175 feet thick in Howard County. Potential aquifer materials include intratill sand and gravel deposits. Where present, aquifer materials are typically capped by till that is commonly 45 to 85 feet thick.

Approximately 86 percent of wells started in the Bluffton / Tipton Till Aquifer Subsystem are completed in the underlying bedrock aquifer system in Howard County. However, this subsystem is capable of meeting the needs of some domestic users in the county. The few wells producing from the Bluffton / Tipton Till Aquifer Subsystem are generally completed at depths of 60 to 95 feet. Intratill sand and gravel aquifer materials are typically 5 to 10 feet thick. Reported well yields generally range from 5 to 15 gpm and static water levels are commonly 10 to 35 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. However, in some areas where aquifers are shallow and overlying clay deposits are thin, the system is at moderate risk.

Tipton Complex Aquifer System

The Tipton 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. Total thickness of the Tipton Complex Aquifer System generally ranges from about 125 to over 250 feet in Howard County.

This system is capable of meeting the needs of domestic and some high-capacity users in Howard County. Consequently, approximately 71 percent of wells started in this system are completed in the system. The most utilized aquifer layers in the Tipton Complex Aquifer System are generally 5 to 30 feet thick sands and/or gravels overlain by a till cap which is commonly 50 to 80 feet thick with thin intratill sand and gravel layers. Wells in this system are typically completed at depths ranging from 70 to 110 feet. Domestic well yields are commonly 10 to 60 gpm and static water levels are generally 10 to 25 feet below the surface. There are 6 registered significant ground-water withdrawal facilities (10 wells) in this system in Howard County. High-capacity well yields up to 350 gpm are reported.

The Tipton Complex Aquifer System is not 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.

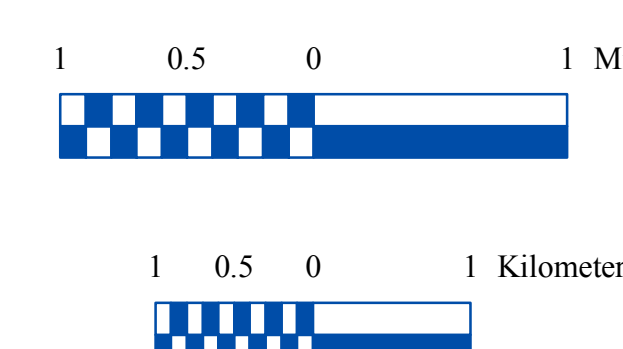
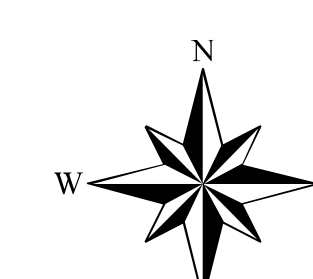
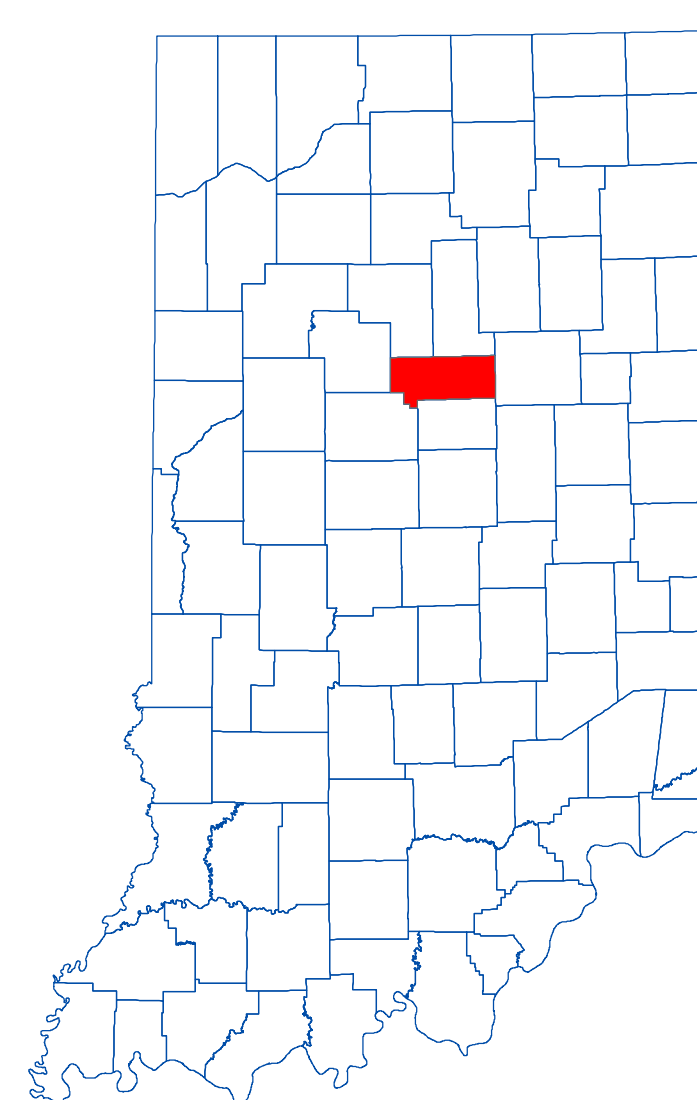
Wabash and Tributaries Outwash Aquifer Subsystem

The Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along portions of Wildcat Creek in Howard County. The system is made up of thick, glacially derived outwash deposits (sand and gravel).

Approximately 74 percent of wells started in the Wabash River and Tributaries Outwash Aquifer Subsystem are completed in the underlying bedrock aquifer system in Howard County. However, this subsystem is capable of meeting the needs of domestic and some high-capacity users in the county. The few wells producing from the Wabash River and Tributaries Outwash Aquifer Subsystem are generally completed at depths ranging from 55 to 85 feet below surface with up to 45 feet of continuous sand and gravel. In places, aquifer materials are capped by silt or sandy clay ranging from 5 to 30 feet thick. Domestic wells are typically 15 to 50 gpm with static water levels commonly 10 to 20 feet below surface. There is one registered significant ground-water withdrawal facility (10 wells) in the outwash subsystem in Howard County. Reported well yields range from 300 to 500 gpm.

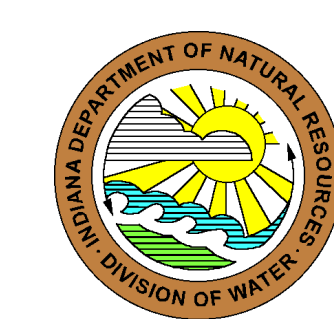
Areas that lack overlying clay or silt deposits are highly susceptible to contamination. However, where overlying clay or silt deposits are present the system is moderately susceptible to surface contamination.

Location Map



EXPLANATION

- Registered Significant Ground-Water Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Municipal Boundary
- Lake & River



Map generated by Scott H. Dean and Robert A. Scott
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Map Use and Disclaimer Statement

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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University. Unconsolidated aquifer systems coverage (Scott, 2008) was based on a 1:24,000 scale.

Unconsolidated Aquifer Systems of Howard County, Indiana

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