UNCONSOLIDATED AQUIFER SYSTEMS OF MARION COUNTY, INDIANA

The unconsolidated aquifer systems of Marion 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 Marion 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 81 percent of all wells in this county are completed in unconsolidated deposits.

The thickness of unconsolidated deposits in Marion County is quite variable, due to the deposition of glacial material over an uneven bedrock surface. Unconsolidated deposits in the county typically range from bedrock exposure along the White River in the north-central portion of Marion County, to about 305 feet thick in the northeastern section of the county.

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

The Till Veneer Aquifer System is mapped primarily in southwestern Marion County, and along the western edge of the White River in the central and northern portions of the county. This system is the product of the deposition of glacial till over an uneven, eroded bedrock surface, and is generally less than 50 feet thick.

In the Till Veneer Aquifer System, potential aquifers include thin isolated sand and/or gravel layers, and surficial sand and gravel outwash or alluvium; however, this system has the most limited groundwater resources of the unconsolidated aquifer systems with most wells being completed in the underlying bedrock.

Most of the wells in this system have reported capacities of 5 gallons per minute (gpm) or less, with static water levels ranging from flowing to about 50 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, there are areas where protective clay layers are thin or absent. These areas are very susceptible to contamination.

New Castle / Tipton Till Aquifer System

The New Castle / Tipton Till Aquifer System is mapped throughout much of Marion County. This aquifer system is up to about 305 feet in thickness, and consists primarily of glacial till with intertill sand and gravel layers.

This aquifer system is capable of meeting the needs of most domestic and some high-capacity users in Marion County. Individual sand and gravel units are commonly 5 to 15 feet thick with well depths ranging from 25 to 300 feet. Domestic well yields are typically 10 to 50 gpm and static water levels range from flowing to 185 feet below the land surface. There are 17 registered significant groundwater withdrawal facilities (38 wells) using the New Castle / Tipton Till Aquifer System. These facilities are used for public water supply, irrigation, industrial and energy production. The reported high-capacity yields for the wells range from 70 to 430 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. However, 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 generally found throughout Marion County. The subsystem is mapped similar to the New Castle / Tipton Till Aquifer System, but, potential aquifer materials are generally thinner and potential yields are less in the subsystem.

In Marion County, the New Castle / Tipton Till Aquifer Subsystem is capable of meeting the needs of most domestic users; however, about 35 percent of the wells started in this subsystem are completed in the underlying bedrock aquifer system.

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 30 to 230 feet. Domestic well yields are generally 5 to 10 gpm, and static water levels range from flowing to 180 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 susceptible to contamination.

New Castle / Tipton Complex Aquifer System

The New Castle / Tipton Complex Aquifer System is mapped primarily in the east, and in several relatively small areas in the western half of Marion County. Multiple glacial advances have resulted in complex sequences of thick clays with intertill sand and gravel aquifers that are highly variable in depth, thickness, and lateral extent. The total thickness of the combined unconsolidated deposits is up to about 280 feet in this system.

The deeper more prolific aquifers of this system are capable of meeting the needs of domestic and most high-capacity users in Marion County. Saturated aquifer materials in the New Castle / Tipton Complex Aquifer System range from 10 to 25 feet thick, and wells in this system are completed at depths from about 30 feet up to 260 feet. Domestic well yields range up to 50 gpm with reported static water levels from flowing to 160 feet below the surface. There are six registered significant groundwater withdrawal facilities (11 wells) using this system. These facilities are used for irrigation and industry. The reported high-capacity yields for the wells range from 70 to 1,100 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 adjacent to the White River in the central portion of the county, and the three tributaries entering the county from the northwest and northeast. The system includes thick glacial outwash sands and gravels that are generally capped by a layer of clay and silt deposits.

This aquifer system is capable of meeting the needs of both domestic and high-capacity users in Marion County. The wells utilizing this aquifer system are completed at depths ranging from 25 to 277 feet with saturated sand and gravel aquifer materials commonly 10 to 35 feet thick. Domestic well yields are typically up to 50 gpm with static water levels ranging from flowing to about 165 feet below the surface. In the White River and Tributaries Outwash Aquifer System there are 37 registered significant groundwater withdrawal facilities (145 wells). Reported production for these high-capacity wells ranges from 70 to 3040 gpm, and the uses for these facilities are energy production, public supply, industry, irrigation, and miscellaneous.

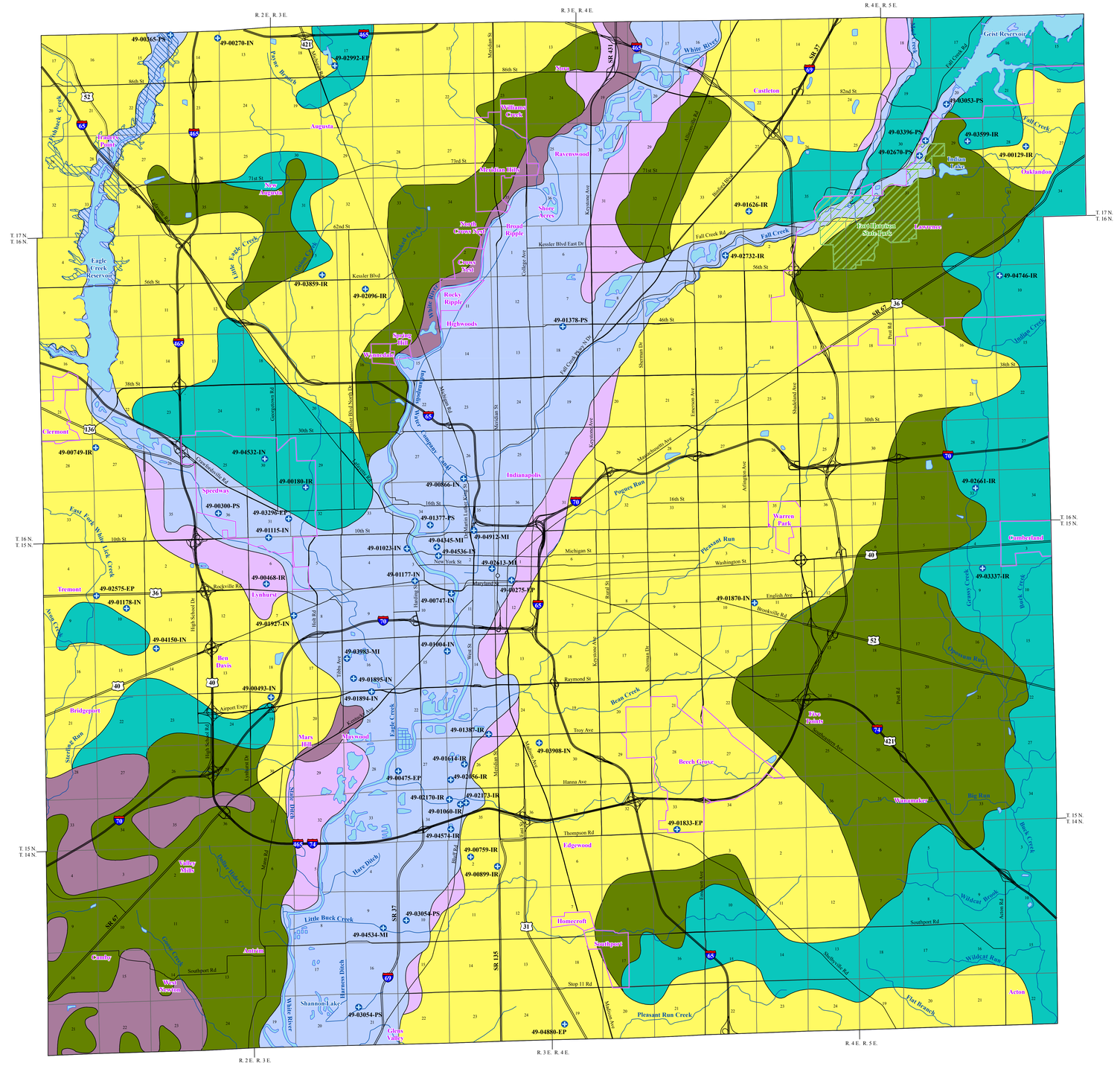
The White River and Tributaries Outwash Aquifer System is highly susceptible to surface contamination where sand and gravel deposits are near the surface and have little or no clay deposits. However, areas having relatively thick clays overlying the sand and gravel deposits are moderately susceptible to contamination.

White River and Tributaries Outwash Aquifer Subsystem

The White River and Tributaries Outwash Aquifer Subsystem is mapped along portions of the White River and its tributaries in Marion County. This subsystem is mapped similar to the White River and Tributaries Outwash Aquifer System, however, the aquifer materials are generally thinner, overlying silt and/or clay materials are thicker, and potential yields are less.

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 ranging from 35 to 245 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 5 to 20 feet thick. Domestic well yields are generally 50 gpm or less with static water levels ranging from 4 to 138 feet below the surface. There are two registered significant groundwater withdrawal facilities (3 wells) in the White River and Tributaries Outwash Aquifer Subsystem. The use for these facilities is irrigation. Reported production for the high-capacity wells are up to 300 gpm.

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



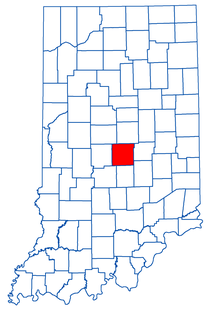
1 0.5 0 1 Mile

1 0.5 0 1 Kilometer

EXPLANATION

- Registered Significant Ground-Water Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- State Managed Property
- Inundation Area of Eagle Creek Reservoir
- Lake & River

Location Map



INDIANA DEPARTMENT OF NATURAL RESOURCES

DEPARTMENT OF NATURAL RESOURCES — DIVISION OF WATER

Map generated by Scott H. Dean
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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. Managed Areas 96 (polygon shapefile, various dates) was from IDNR. Unconsolidated aquifer systems coverage (Schmidt, 2011) was based on a 1:24,000 scale.

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