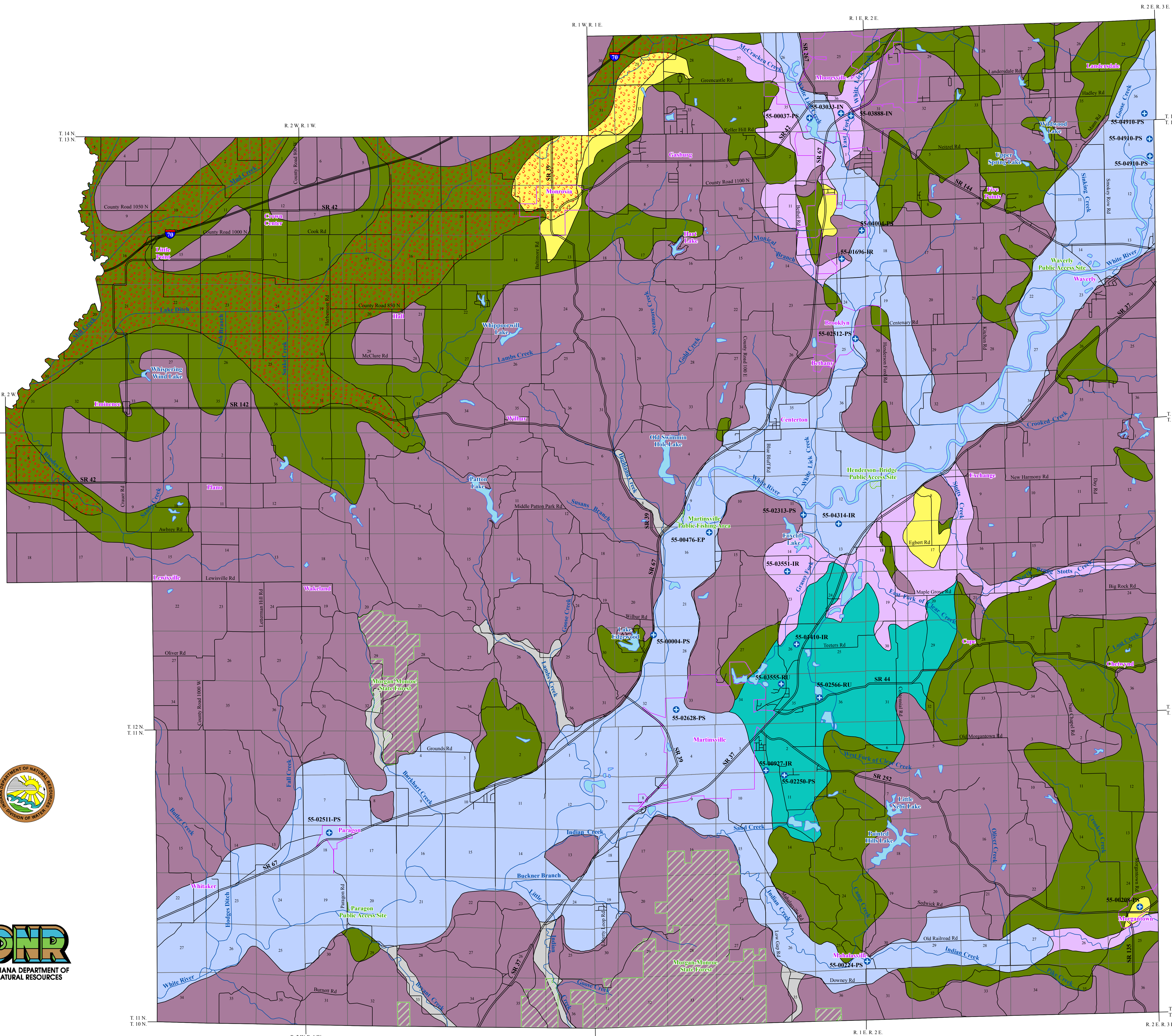


# UNCONSOLIDATED AQUIFER SYSTEMS OF MORGAN COUNTY, INDIANA



Seven unconsolidated aquifer systems have been mapped in Morgan County: the Till Veneer / Dissected Till and Residuum, the Alluvial, Lacustrine, and Backwater Deposits, the Tipton / New Castle Till, the Tipton / New Castle / Martinsville Hills Till Subsystem, the Martinsville Hills / Tipton Complex, the White River and Tributaries Outwash, and the White River and the Tributaries Outwash Subsystem. Boundaries of all aquifer systems described are commonly gradational, and individual aquifers may extend across aquifer system boundaries.

Thicknesses of unconsolidated sediments that overlie bedrock are quite variable in Morgan County. Total thickness ranges from less than one foot where bedrock is shallow or outcrops along sections of tributaries to the White River, to an estimated 240 feet in the northwest part of the county. Approximately 21 percent of all wells completed in the county are completed in unconsolidated deposits.

**Till Veneer / Dissected Till and Residuum Aquifer System**  
The Till Veneer / Dissected Till and Residuum Aquifer System is mapped throughout much of Morgan County and is mapped as one system because they are similar in composition and aquifer characteristics. The Dissected Till and Residuum Aquifer System includes areas of central and southern Morgan County where glacial deposits are thin and includes weathered bedrock materials. The Till Veneer Aquifer System includes areas of northern and eastern Morgan County where thin till, generally less than 50 feet thick, directly overlies an uneven bedrock surface. Also, along some of the major streams this system may include thin alluvium and surficial sands and gravels that directly overlie the bedrock surface.

There is little potential for groundwater production in this system in Morgan County. Nearly all wells drilled in areas mapped as Till Veneer / Dissected Till and Residuum bypass the unconsolidated deposits in favor of the underlying bedrock aquifer system. However, there are a few wells with aquifer deposits that include thin, isolated sands and gravels. Yields are generally less than 7 gallons per minute (gpm) with significant to complete drawdowns reported.

This aquifer system is generally not very susceptible to surface contamination because intertilt sand and gravel units are overlain by till deposits. However, some areas have surface sands and gravels or thin to no clay deposits above the aquifer resource. These areas are considered at moderate to high risk to contamination.

**Alluvial, Lacustrine, and Backwater Deposits Aquifer System**  
The Alluvial, Lacustrine, and Backwater Deposits Aquifer System in Morgan County is mapped within several wide valleys along small tributaries of the White River. This system consists of deposits resulting from glacial meltwater drainage, fine-grained glaciolacustrine deposits formed in relatively static water, and colluvium from the surrounding upland areas.

This system is an extremely limited resource and the Division has no records of wells that produce from these deposits in Morgan County. However, large-diameter bucket wells may be adequate to meet the needs of some domestic users. Typical materials overlying bedrock include fine sand, silt, and clay deposits that are generally greater than 25 feet thick. Aquifer materials commonly include thin sands that are typically less than a few feet thick. Yields are generally expected to be less than a few gpm.

Thin deposits of silt and clay that have a low susceptibility to surface contamination commonly characterize this aquifer system. However, the susceptibility is greater in areas where the surficial silt and clay deposits are thin and directly overlie sand deposits.

**Tipton / New Castle Till Aquifer System**  
The Tipton / New Castle Till Aquifer System is mapped along small portions of north-central, east-central, and southeastern Morgan County. The system typically consists of thick clay with discontinuous intertilt sands and gravels. The discontinuous sands and gravels, where present, are generally less than 10 feet thick with some noted as "dry".

Few wells are reported in the Tipton / New Castle Till Aquifer System in Morgan County. However, this system is capable of meeting the needs of domestic and some high capacity users. Well depths range from 38 to 130 feet. Aquifer sands and gravels generally range from 2 to 28 feet thick and are capped by 15 to 97 feet of clay. Domestic well yields generally range from 7 to 55 gpm with static water levels that range from 5 to 63 feet below surface.

A portion of this system overlies part of a major buried bedrock valley that includes lacustrine sand, silt, and clay deposits. The few wells completed in these areas are up to 142 feet in depth. Aquifer sands and gravels are generally less than 20 feet thick with 5 to 132 feet of clay overlying. Well capacities range from 7 to 25 gpm with static water levels from 5 to 39 feet below the surface.

This system is generally not very susceptible to surface contamination because sand and gravel units are overlain by thick till deposits.

**Martinsville Hills / Tipton Complex Aquifer System**  
The Martinsville Hills / Tipton Complex Aquifer System is mapped only in the east-central portion of Morgan County. Complex multiple glacial advances resulted in a sequence of multiple, stacked, till and outwash units that are quite variable in position and thickness. The sand and gravel deposits vary from thin to massive and are typically discontinuous and overlain by a thick till.

Completed well depths range from 80 to 185 feet. Thickness of clay deposits that overlie the aquifer resource generally ranges from 25 to 105 feet. In places, the system exhibits multiple sand and gravel deposits above the primary aquifer resource that are also a potential source of groundwater, although some are noted as "dry". Individually, the discontinuous sands and gravels range from 2 to 160 feet thick and the deeper, more productive aquifer deposits are 10 to 60 feet thick.

The Martinsville Hills / Tipton Complex Aquifer System is capable of meeting the needs of domestic and some high-capacity users. Domestic yields are reported up to 50 gpm with static water levels from 30 to 110 feet below surface. There are 5 registered significant groundwater withdrawal facilities (15 wells) with reported yields up to 650 gpm.

This aquifer system is not very susceptible to contamination where thick clay deposits overlie aquifer materials. However, in places where clay deposits are thin, these areas are at moderate to high risk to surface contamination.

**White River and Tributaries Outwash Aquifer System**  
The White River and Tributaries Outwash Aquifer System includes thick glacial outwash sands and gravels capped by recent alluvial deposits. The system is mapped primarily along the White River and along portions of White Lick Creek and Indian Creek.

Wells completed in the White River and Tributaries Outwash Aquifer System range from 16 to 195 feet but are typically 40 to 80 feet in depth. In places, the outwash aquifer deposits are up to 188 feet of continuous sands and gravels and may be capped by alluvial silt and/or clay materials that generally range from 2 to 45 feet thick. The White River and Tributaries Outwash Aquifer System is capable of meeting the needs of domestic and high-capacity users. Domestic well capacities range from 10 to 90 gpm with static water levels from 10 to 25 feet below the ground surface. There are 13 registered significant groundwater withdrawal facilities (38 wells) with capacities that range from 100 to 3000 gpm.

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

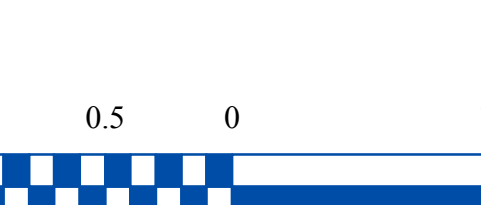
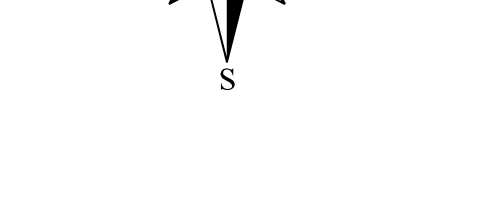
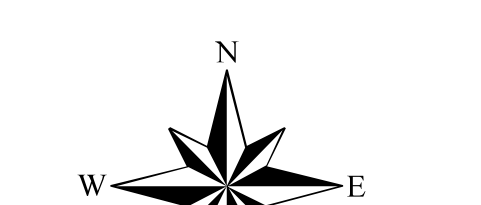
**White River and Tributaries Outwash Aquifer Subsystem**  
The White River and Tributaries Outwash Aquifer Subsystem is mapped mostly along portions of several tributaries to the White River. The subsystem is mapped similar to the White River and Tributaries Outwash Aquifer System. However, potential aquifer materials are thinner, overlying silt or clay materials are generally thicker and potential yield is less in the subsystem than in the system.

Well depths in the White River and Tributaries Outwash Aquifer Subsystem generally range from 30 to 125 feet. In places, aquifer materials are up to 127 feet of continuous sand and gravel and may be capped by alluvial silt and/or clay materials that generally range from 3 to 62 feet thick. However, in some areas the upper portions of the total aquifer sequence of sands and gravels are reported as "dry". The subsystem is capable of meeting the needs of domestic and some high-capacity users. Domestic well capacities range from 10 to 60 gpm with static water levels of 5 to 70 feet below ground surface. There are 5 registered significant groundwater withdrawal facilities (13 wells) with capacities up to 500 gpm.

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

### EXPLANATION

- Registered Significant Groundwater Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- State Managed Land
- Lake & River



### Tipton / New Castle / Martinsville Hills Till Aquifer Subsystem

The Tipton / New Castle / Martinsville Hills Till Aquifer Subsystem is mapped throughout Morgan County. The subsystem is mapped similar to that of the Tipton / New Castle Till Aquifer System. However, potential aquifer materials are thinner and potential yield is less in the subsystem than in the system.

In Morgan County approximately 50 percent of the wells drilled in areas mapped as till subsystem are completed in the underlying bedrock aquifer system. However, the subsystem has the potential of meeting the needs of some domestic users. Well depths typically range from 45 to 90 feet. Potential aquifer materials include sand and gravel deposits that generally range from 3 to 20 feet thick and are capped by 25 to 70 feet of till with, in places, intertilt sands and gravels. Where present, the intertilt sands and gravels are generally less than 10 feet thick and are often noted as "dry". The few wells that utilize the available sand and gravel deposits have yields that range from 1 to 10 gpm with static water levels of 10 to 35 feet below the surface. Most wells with yields of 10 gpm or greater are associated with significant drawdown. Many wells with deeper static water levels have limited available drawdown.

A portion of this system overlies part of a major buried bedrock valley that includes lacustrine sand, silt, and clay deposits. Depth to bedrock in these areas is up to 220 feet. Few wells are completed in these areas; however, those reported are up to 188 feet in depth. Thickness of aquifer deposits range from 2 to 97 feet with 25 to 138 of overlying clay. Well capacities range from 2 to 40 gpm with static water levels from 2 to 48 feet below surface.

This aquifer subsystem is generally not very susceptible to surface contamination because intertilt sand and gravel units are overlain by thick till deposits. However, some areas have surface sands and gravels or thin to no clay deposits above the aquifer resource. These areas are considered at moderate to high risk to contamination.

### Martinsville Hills / Tipton Complex Aquifer System

The Martinsville Hills / Tipton Complex Aquifer System is mapped only in the east-central portion of Morgan County. Complex multiple glacial advances resulted in a sequence of multiple, stacked, till and outwash units that are quite variable in position and thickness. The sand and gravel deposits vary from thin to massive and are typically discontinuous and overlain by a thick till.

Completed well depths range from 80 to 185 feet. Thickness of clay deposits that overlie the aquifer resource generally ranges from 25 to 105 feet. In places, the system exhibits multiple sand and gravel deposits above the primary aquifer resource that are also a potential source of groundwater, although some are noted as "dry". Individually, the discontinuous sands and gravels range from 2 to 160 feet thick and the deeper, more productive aquifer deposits are 10 to 60 feet thick.

The Martinsville Hills / Tipton Complex Aquifer System is capable of meeting the needs of domestic and some high-capacity users. Domestic yields are reported up to 50 gpm with static water levels from 30 to 110 feet below surface. There are 5 registered significant groundwater withdrawal facilities (15 wells) with reported yields up to 650 gpm.

This aquifer system is not very susceptible to contamination where thick clay deposits overlie aquifer materials. However, in places where clay deposits are thin, these areas are at moderate to high risk to surface contamination.

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

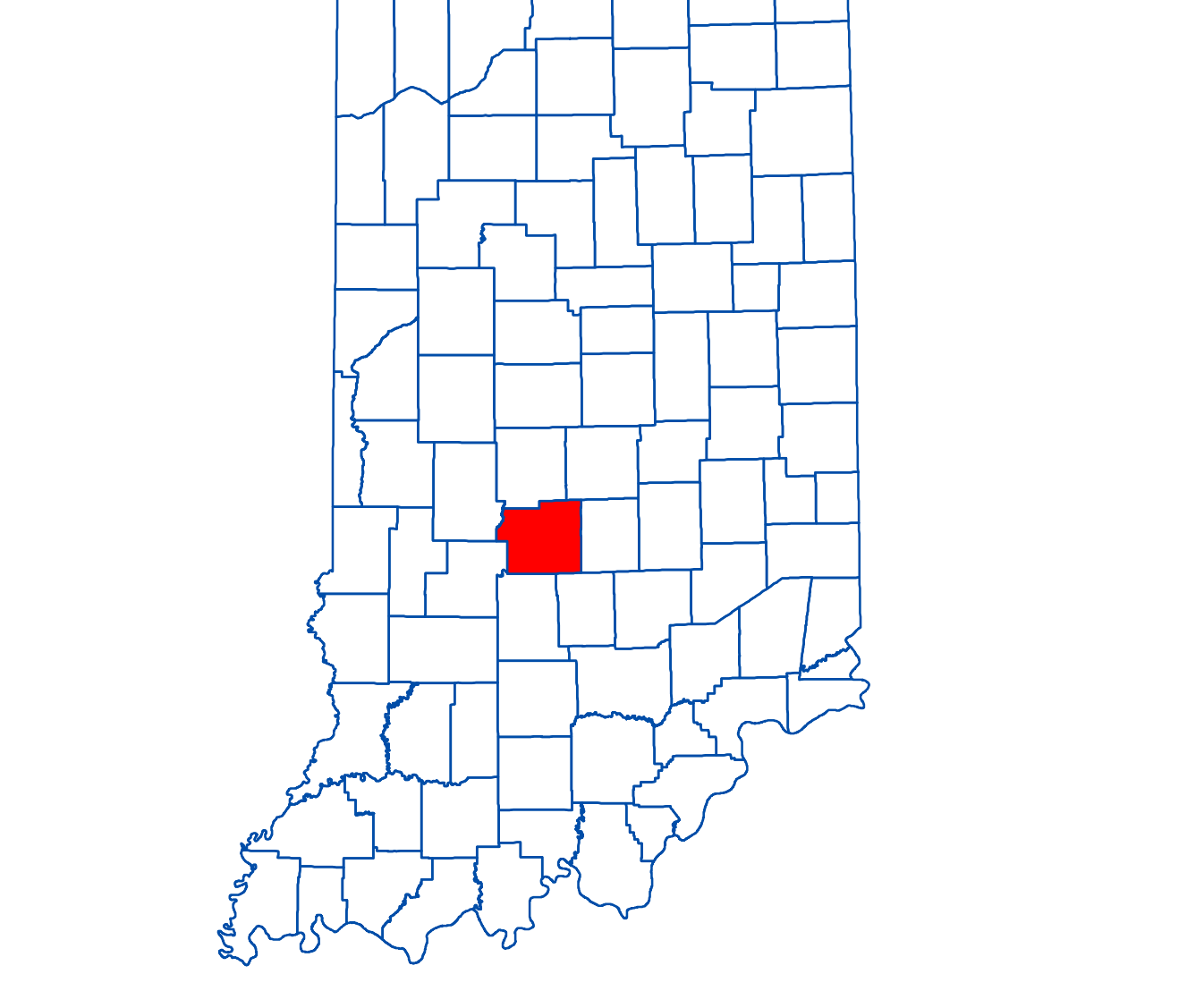
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### Location Map



### 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. Streams7 (line shapefile, 2000420) was from the Center for Advanced Applications in GIS at Purdue University. Managed Areas 96 (polygon shape file, various dates) was from IDNR. Unconsolidated aquifer systems coverage (Maier, 2010) was based on a 1:24,000 scale.

### Unconsolidated Aquifer Systems of Morgan County, Indiana

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April 2010

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