

Water Resources and Use in Hendricks County

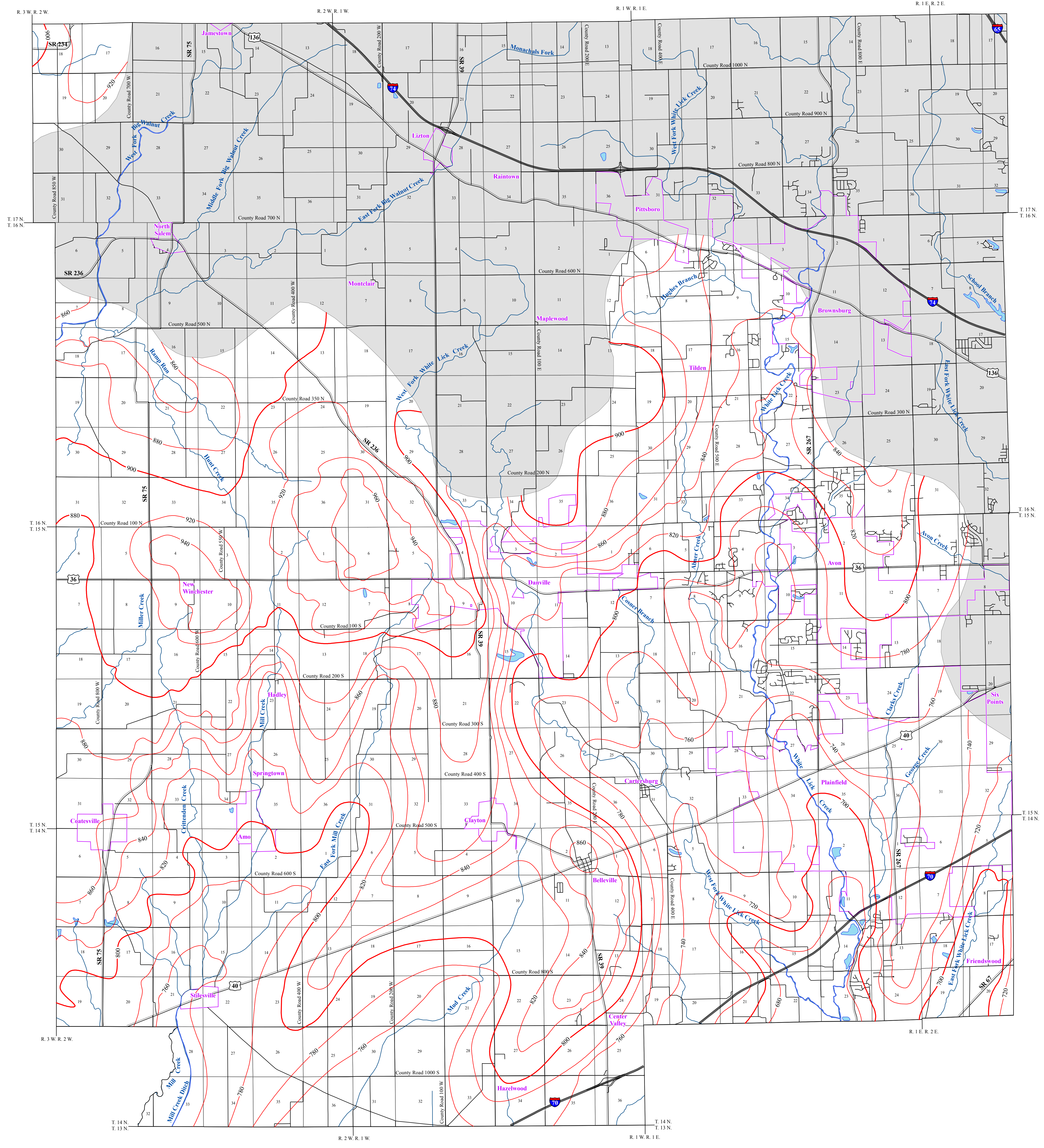
- | | |
|----------------------------|-----------------------|
| Withdrawal Location | River |
| WELL INTAKE | 7Q2 Flow (MGD) |
| ● Energy/Mining | — <10 MGD |
| ● Industry | — 10 - 50 MGD |
| ● Irrigation | — 50 - 100 MGD |
| ● Misc. | — 100 - 500 MGD |
| ● Public Supply | — > 500 MGD |
| ● Rural Use | |

■ Major Lakes
— Interstate
 County
 City

▲ NORTH
 0
1
2
4 Miles

Data Sources: U.S. Geological Survey and Indiana Department of Natural Resources

POTENTIOMETRIC SURFACE MAP OF THE BEDROCK AQUIFERS OF HENDRICKS COUNTY, INDIANA



Hendricks County, Indiana is located in the central portion of the state and is almost entirely within the White and West Fork White River Basin with the exception of the northwest corner. The county is bounded by Putnam, Montgomery, Boone, Marion, and Morgan counties to the west, northwest, north, east and south respectively.

The Potentiometric Surface Map (PSM) of the bedrock aquifers of Hendricks County was mapped by contouring the elevations of over 1300 static water levels reported on well records received primarily over a 50 year period. These wells are completed in bedrock aquifers at various depths, and typically, under confined conditions (bounded by impermeable layers above and below the water bearing formation). However, some wells were completed under unconfined (not bounded by impermeable layers) settings. The potentiometric surface is a measure of the pressure on water in a water bearing formation. Water in an unconfined aquifer water table is at atmospheric pressure and will not rise in a well above the top of the water bearing formation. In contrast to water in a confined aquifer which is under hydrostatic pressure and will rise in a well above the top of the water bearing formation.

Universal Transverse Mercator (UTM) coordinates for the water wells were either physically obtained in the field, determined through address geocoding, or reported on water well records; however, the location of the majority of the water well records used to make the PSM were not field verified. Elevation data were either obtained from topographic maps or a digital elevation model. Quality control/quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

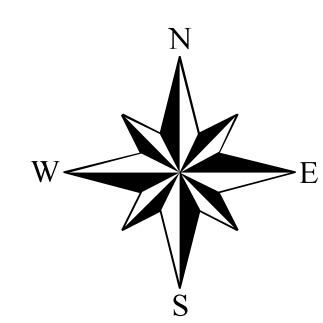
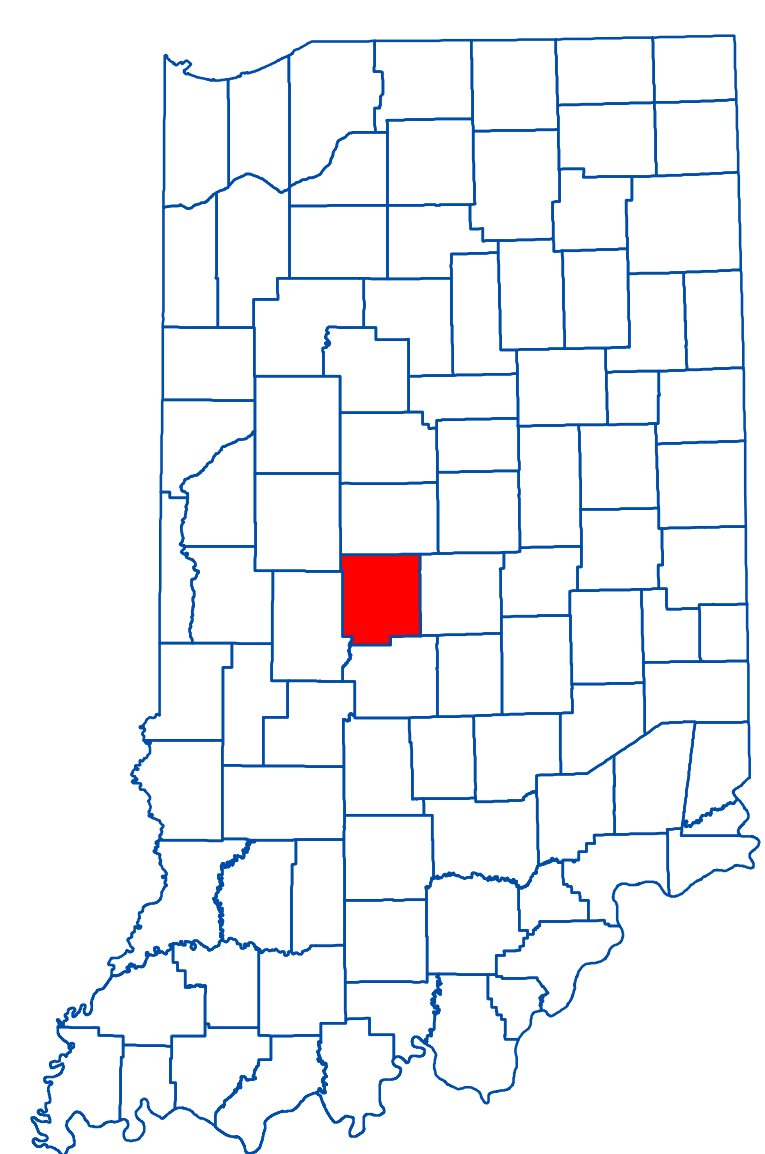
Portions of Hendricks County were not mapped due to a general lack of water well data and/or limited water bearing deposits (see Aquifer Systems Map 69-B, Bedrock Aquifer Systems of Hendricks County, Indiana, Schmidt, 2010). These areas are generally considered to have limited bedrock aquifer resources leaving it difficult to represent accurate PSM elevations.

Static water-level measurements in individual wells used to construct county PSM's are indicative of the water-level at the time of well completion. The groundwater level within an aquifer constantly fluctuates in response to rainfall, evapotranspiration, groundwater movement, and groundwater pumping. Therefore, current site conditions may differ due to local or seasonal variations in measured static water-levels. Because fluctuations in groundwater are typically small, static water-levels can be used to construct a generalized PSM. Groundwater flow is naturally from areas of recharge toward areas of discharge. As a general rule, but certainly not always, groundwater flow approximates the overlying topography and intersects the land surface at major streams.

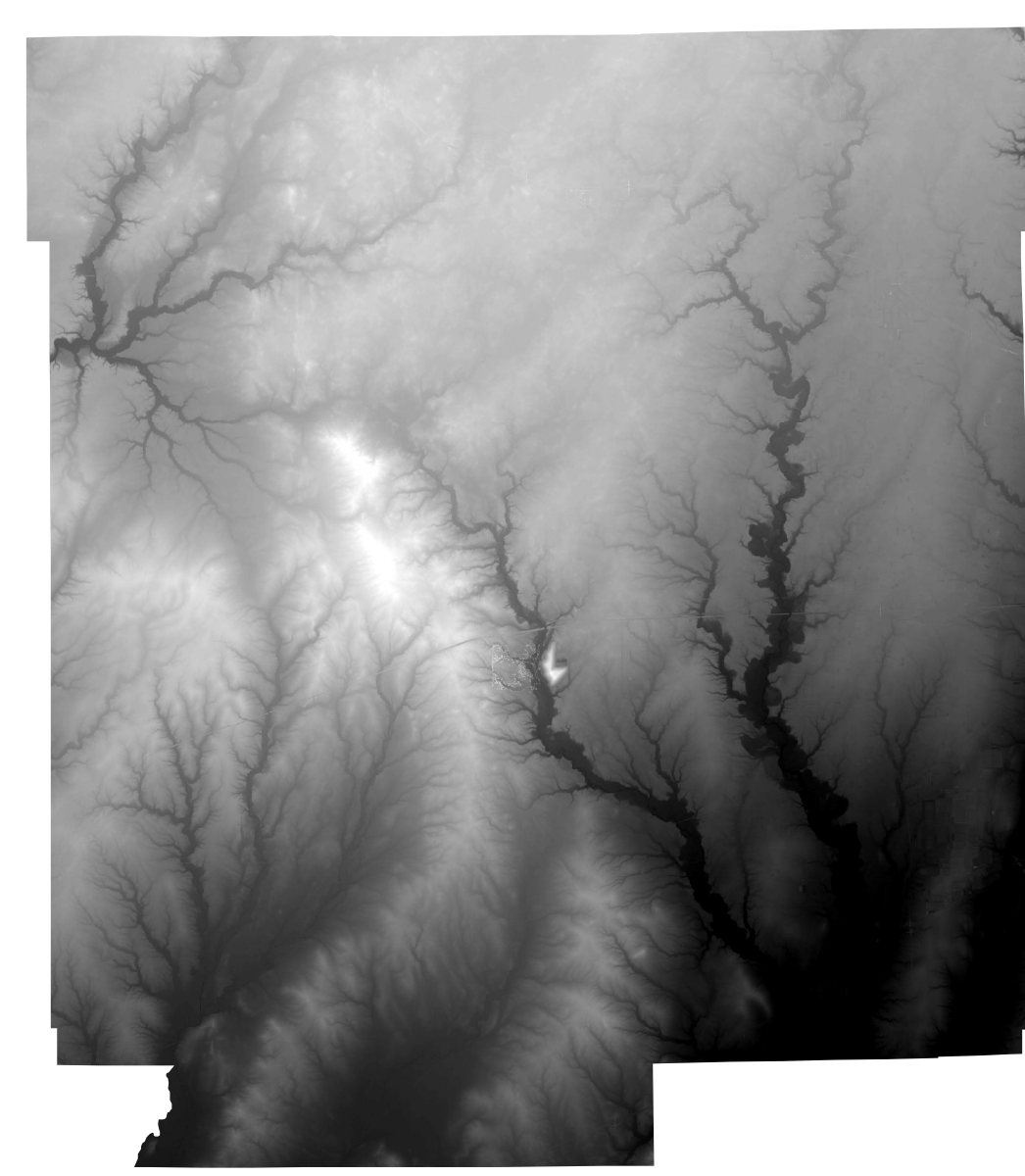
Bedrock static water levels in Hendricks County range from a high of 1022 feet mean sea level (msl) in the west-central section of the county, to a low of 527 feet msl in the southeastern portion. Groundwater flow direction in the northwestern section of the White and West Fork White River Basins is toward West Fork Big Walnut Creek. In the eastern portions of the county, groundwater flow is generally toward White Lick Creek, and in the southwest, groundwater flow is to the south-southwest.

The county PSM can be used to define the regional groundwater flow path and to identify significant areas of groundwater recharge and discharge. County PSM's represent overall regional characteristics and are not intended to be a substitute for site-specific studies.

Location Map

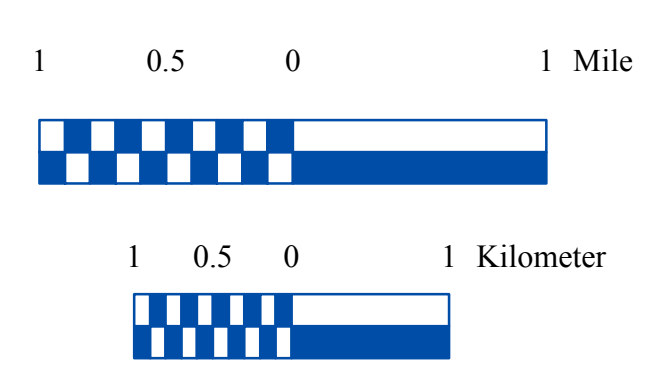


Digital Elevation Model of Hendricks County, Indiana



EXPLANATION

- 800 — Line of equal elevation, in feet above mean sea level
- Potentiometric Contour Interval 20 feet
- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- Lake & River
- No Aquifer Material or Limited Data



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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. Hydrography, Streams (NHD) (line shapefile, 20081218), Rivers (NHD) (polygon shapefile, 20081218), Lakes (NHD) (polygon shapefile, 20081218) were from the U.S. Geological Survey and the U.S. Environmental Protection Agency, and based on a 1:24,000 scale. Managed Lands (DNR IN) (polygon shapefile, 20100920) was from the Indiana Department of Natural Resources and based on a 1:24,000 scale. Digital Elevation Model image is derived from the Indiana OrthoLiDAR Statewide Collection Program (2011). No Aquifer Material and Limited Data (polygon shapefile) was based on the Bedrock Aquifer Systems of Hendricks County, Indiana (polygon shapefile, Schmidt, 2010). Potentiometric Surface Map of the Bedrock Aquifers of Hendricks County, Indiana (line shapefiles, Schmidt, 2012) was based on a 1:24,000 scale.

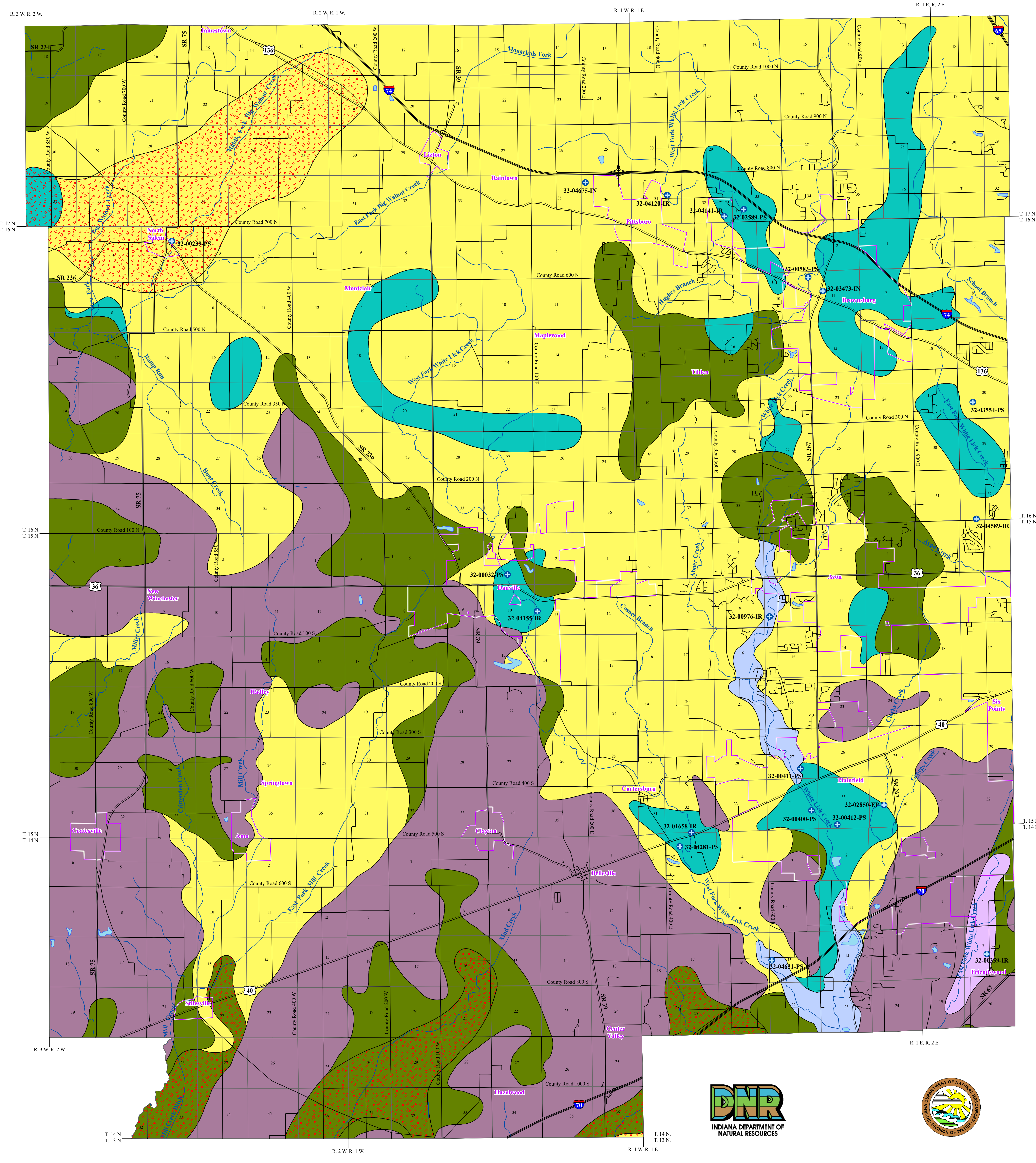
Potentiometric Surface Map of the Bedrock Aquifers of Hendricks County, Indiana

by
Robert K. Schmidt
Division of Water, Resource Assessment Section

September 2012

Map generated by Robert K. Schmidt,
Indiana Department of Natural Resources,
Division of Water, Resource Assessment Section

UNCONSOLIDATED AQUIFER SYSTEMS OF HENDRICKS COUNTY, INDIANA



The unconsolidated aquifer systems of Hendricks County are composed of sediments deposited by, or resulting from, a complex sequence of glacial, glacial meltwaters, and post-glacial precipitation events. Six unconsolidated aquifer systems have been mapped in Hendricks County: the Till Vencer, the Tipton Till, the Tipton Till Subsystem, the 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 64 percent of all wells in this county are completed in unconsolidated deposits.

The thickness of unconsolidated deposits in Hendricks 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 at the surface to about 275 feet thick in the buried valleys.

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.

Tipton Complex Aquifer System

In Hendricks County, the Tipton Complex Aquifer System occurs in 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, and is generally less than 50 feet thick. Much of west-central and southern Hendricks County is mapped as Tipton Vencer.

The Tipton Complex Aquifer System has the most limited groundwater resources of the unconsolidated aquifer systems. Potential aquifers within this system include thin isolated sand and/or gravel layers, and surficial sand and gravel outwash or alluvium. However, there is little potential for groundwater production in this system in Hendricks County with most wells being completed in the underlying bedrock.

In the Tipton Complex Aquifer System, static water levels range between flowing and 40 feet below the surface. Most of the wells in this system have reported capacities of 5 gallons per minute (gpm) or less with some wells being reported as "dry". 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.

Tipton Till Aquifer System

The Tipton Till Aquifer System is mapped primarily in the northern and central portions of Hendricks County. This aquifer system is up to about 270 feet in thickness, and consists primarily of glacial till with intertill sand and gravel layers. However, the sand and gravel aquifers in this system tend to be relatively thin and discontinuous.

This aquifer system is capable of meeting the needs of most domestic and some high-capacity users in Hendricks County. Individual sand and gravel units are commonly 5 to 15 feet thick with well depths ranging from about 25 to 270 feet. Domestic well yields are typically 10 to 50 gpm and static water levels range from flowing to about 100 feet below the land surface. There are six registered significant groundwater withdrawal facilities (13 wells) using the Tipton Till Aquifer System. These facilities are used for public water supply, irrigation, and industrial. The reported yields for the wells range from 60 to 600 gpm.

A relatively small area of the Tipton Till Aquifer System overlies a buried bedrock valley in the northwestern portion of the county. The total unconsolidated thickness is about 275 feet in this area. There is one registered significant groundwater withdrawal facility (2 wells) using this system. This facility is used for public water supply. The reported yields for the wells are 150 and 180 gpm.

The 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. Shallow wells completed in this system are moderately susceptible to contamination.

Tipton Till Aquifer Subsystem

The Tipton Till Aquifer Subsystem is found primarily in the west-central and southern portions of Hendricks County. The subsystem is mapped similar to the Tipton Till Aquifer System. However, potential aquifer materials are generally thinner and potential yields are less in the subsystem.

About 71 percent of wells started in this subsystem in Hendricks County are completed in the underlying bedrock aquifer system. However, the Tipton Till Aquifer Subsystem is capable of meeting the needs of some domestic users in the county. 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 140 feet. Domestic well yields are generally 5 to 10 gpm and static water levels range from 10 to 70 feet below the surface. There are no registered significant groundwater withdrawal facilities utilizing this subsystem.

Along the southern border of Hendricks County, the Tipton Till Aquifer Subsystem overlies portions of three buried bedrock valleys. Maximum unconsolidated thickness is about 200 feet in these areas. No wells utilize the deeper aquifers within these buried bedrock valleys because the shallower aquifers have greater potential. The aquifer utilized by these shallow wells is about 10 feet thick and the reported yields are approximately 10 gpm.

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.

EXPLANATION

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

Tipton Complex Aquifer System

The Tipton Complex Aquifer System is mapped in several relatively small, isolated areas of Hendricks County. Multiple glacial advances have resulted in sequences of intertill sand and gravel layers, typically overlain by thick clay layers resulting in aquifers that are highly variable in depth, thickness, and lateral extent. The total thickness of the combined unconsolidated deposits is up to about 250 feet.

The deeper more prolific aquifers of this system are capable of meeting the needs of domestic and some high-capacity users in Hendricks County. However, there are relatively few wells in this system. Saturated aquifer materials in the Tipton Complex Aquifer System range from about 10 to 25 feet thick, and wells in this system are completed at depths from about 20 feet up to 250 feet. Domestic well yields range up to 50 gpm and static water levels are about 15 to 80 feet below the surface. There are eleven registered significant groundwater withdrawal facilities (26 wells) using this system. These facilities are used for irrigation, public water supply, and energy production. The reported yields for the wells range from 120 to 2,500 gpm.

The Tipton Complex Aquifer System overlies a buried bedrock valley in the northwestern corner of the county. The total unconsolidated thickness is up to about 275 feet in this area. Only a few reported wells utilize the deeper aquifer within the buried bedrock valley. The aquifer utilized by these wells is up to 20 feet thick, and the reported yields are about 10 gpm.

The 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 in the southeastern and east-central portions of Hendricks County. The system includes thick glacial outwash sands and gravels, that are generally capped by a layer of clay and silt deposits.

The White River and Tributaries Outwash Aquifer System is capable of meeting the needs of both domestic and high-capacity users in Hendricks County. The wells utilizing this aquifer system are completed at depths ranging from 25 to 135 feet with saturated sand and gravel aquifer materials commonly 10 to 25 feet thick. Domestic well yields are typically 10 to 50 gpm with static water levels ranging from 5 to 45 feet below the surface. In the White River and Tributaries Outwash Aquifer System there is one registered significant groundwater withdrawal facility (2 wells). Reported production for these high-capacity wells are 1,000 gpm each and the use for this facility is public water supply.

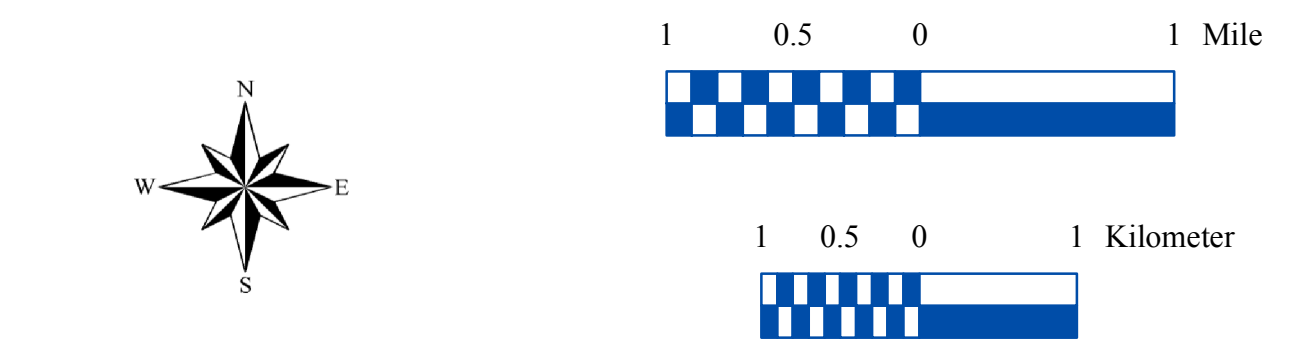
The White River and Tributaries Outwash Aquifer System is highly susceptible to surface contamination where sand and gravel deposits are near the surface and have little or no clay deposits. However, areas having relatively thick clays overlying the sand and gravel deposits are moderately susceptible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

White River and Tributaries Outwash Aquifer Subsystem

The White River and Tributaries Outwash Aquifer Subsystem is mapped in southeastern Hendricks County. This subsystem is mapped similar to the White River and Tributaries Outwash Aquifer System; however, aquifer materials in the White River and Tributaries Outwash Aquifer Subsystem are generally thinner, overlying silt and/or clay materials are thicker, and potential yields are less in the subsystem.

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 commonly ranging from 35 to 100 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 5 to 20 feet thick. Domestic well yields are generally 10 gpm with static water levels ranging from 15 to 40 feet below the surface. There is one registered significant groundwater withdrawal facility (2 wells) in the White River and Tributaries Outwash Aquifer Subsystem. The use for this facility is irrigation. Reported production for the high-capacity wells are 100 and 300 gpm.

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



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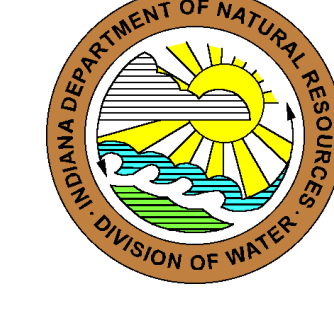
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Unconsolidated Aquifer Systems of Hendricks County, Indiana

by
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Division of Water, Resource Assessment Section

June 2010



Hendricks County

