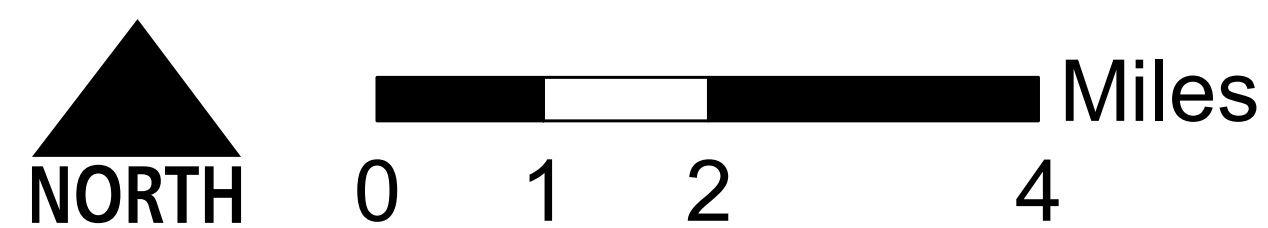
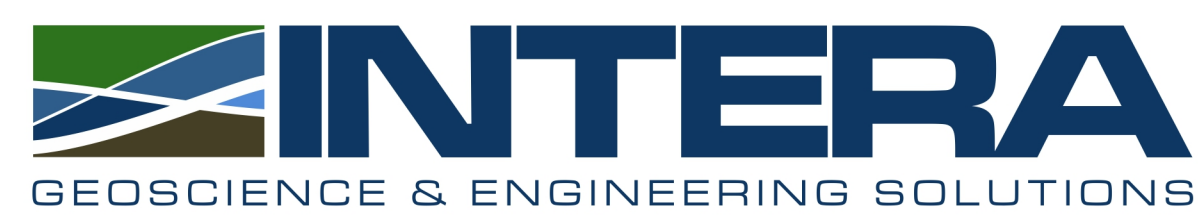
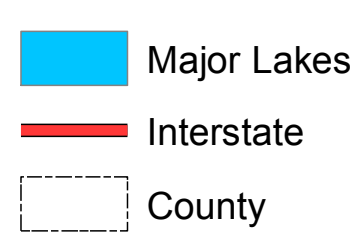
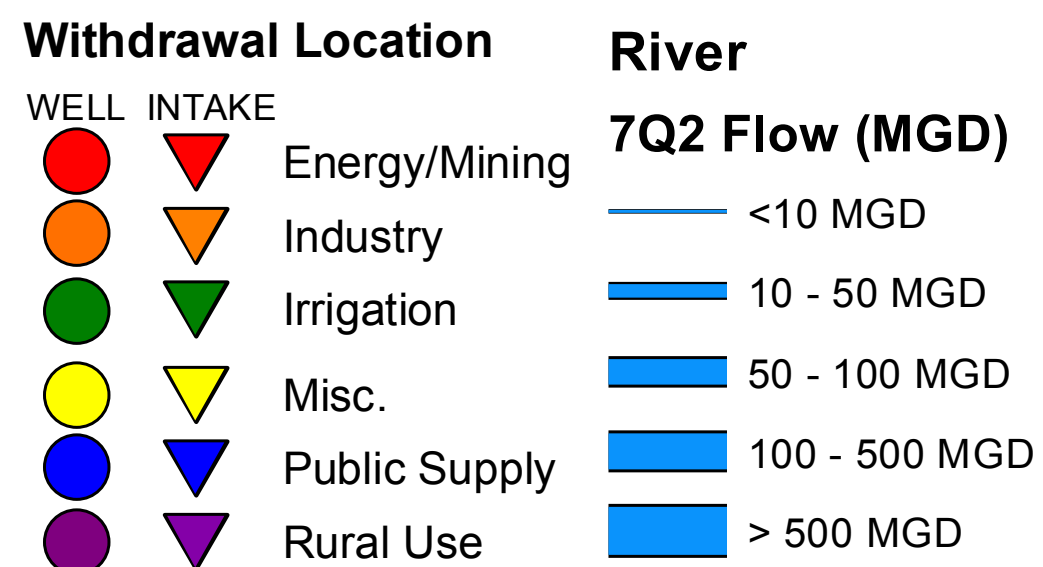
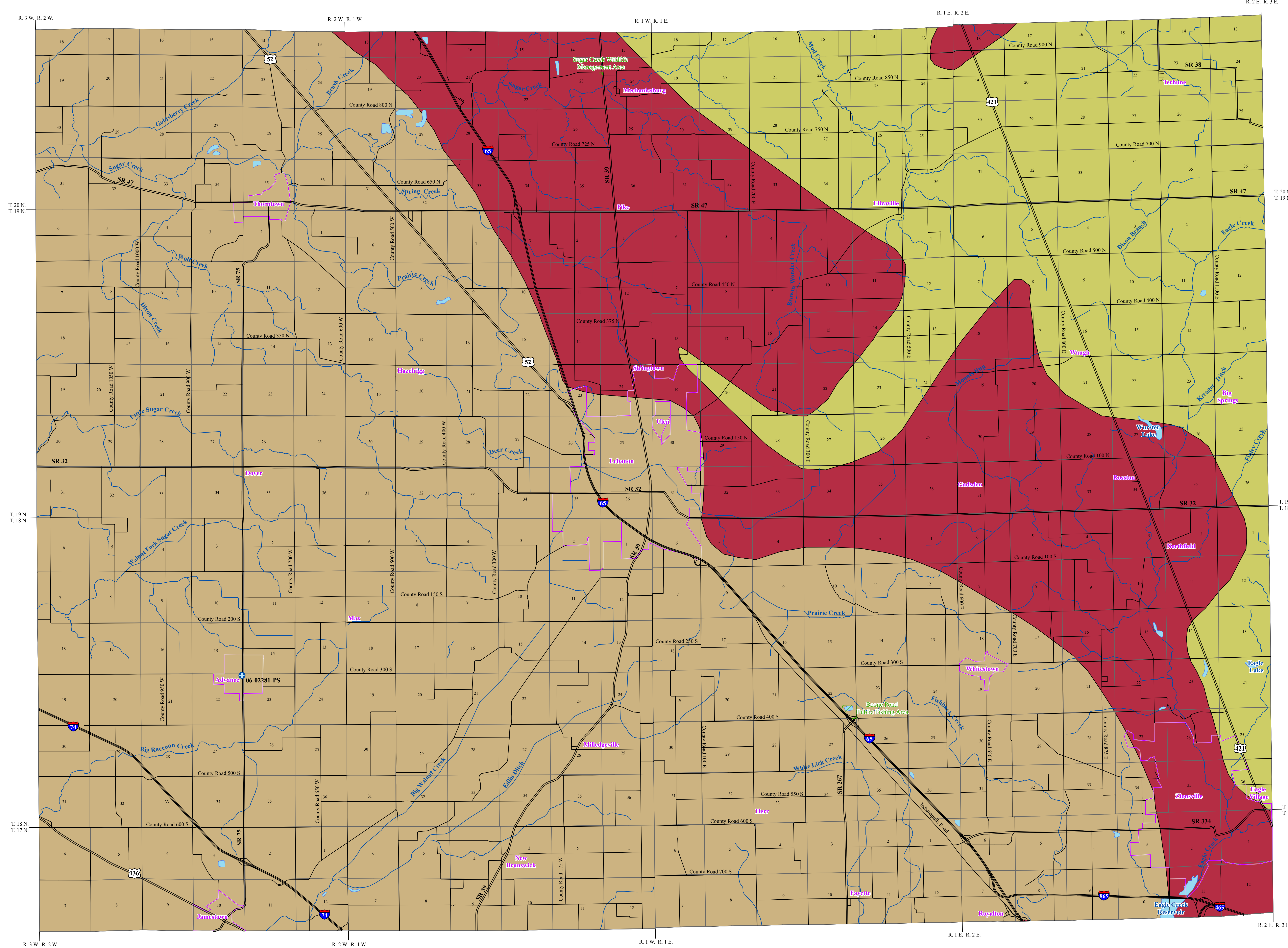


Water Resources and Use in Boone County

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



BEDROCK AQUIFER SYSTEMS OF BOONE COUNTY, INDIANA



The occurrence of bedrock aquifers depends on the original composition of the rocks and subsequent changes which influence the hydraulic properties. Post-depositional processes, which promote jointing, fracturing, and solution activity of exposed bedrock, generally increase the hydraulic conductivity (permeability) of the upper portion of bedrock aquifer systems. Because permeability in many places is greatest near the bedrock surface, bedrock units within the upper 100 feet are commonly the most productive aquifers.

Bedrock aquifer systems in the county are overlain by unconsolidated deposits of varying thickness, ranging from outcropping along Sugar Creek in parts of western Boone County to over 350 feet in the north-central portion of the county. Most of the bedrock aquifers in the county are under confined conditions. In other words, the potentiometric surface (water level) in most wells completed in bedrock rises above the top of the water-bearing zone.

The yield of a bedrock aquifer depends on its hydraulic characteristics and the nature of the overlying deposits. Shale and glacial till act as aquitards, restricting recharge to underlying bedrock aquifers. However, fracturing and/or jointing may occur in aquitards, which can increase recharge to the underlying aquifers. Hydraulic properties of the bedrock aquifers are highly variable.

Three bedrock aquifer systems are identified for Boone County. They are, from west to east and younger to older, the Borden Group of Mississippian age, the New Albany Shale of Devonian and Mississippian age, and the Silurian and Devonian Carbonates. Bedrock wells represent about ten percent of all wells completed in the county.

The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. However, because the bedrock aquifer systems have complex fracturing systems, once a contaminant has been introduced into a bedrock aquifer system, it will be difficult to track and remediate.

Mississippian – Borden Group Aquifer System

The Mississippian age Borden Group outcrops/subcrops primarily west of Interstate 65 in Boone County. This bedrock aquifer system is composed mostly of siltstone and shale, but fine-grained sandstones are common. Carbonates are rare, but do occur as discontinuous interbedded limestone lenses, mostly in the upper portion of the group. The Borden Group in Boone County is overlain by unconsolidated deposits with a maximum thickness ranging from less than 5 feet to over 300 feet.

Because the Borden Group is generally not very productive, it is typically used only where overlying deposits do not contain aquifer material. The Borden Group is often described as an aquitard, and yields of wells completed in it are typically quite limited. Most of the domestic wells either produce from the overlying unconsolidated deposits or penetrate through the shale and siltstone in favor of the underlying Silurian and Devonian Carbonates. Reported depths commonly range from 90 to 200 feet deep. The amount of rock penetrated in this system typically ranges from 50 to 175 feet. The typical domestic well in the subcrop area produces less than 15 gallons per minute (gpm). Many dry holes have been reported in this system. Static water levels commonly range from 10 to 40 feet below the land surface. There is one registered significant ground-water withdrawal facility (1 well) in the subcrop area of this system. However, the well is completed in the more productive underlying Silurian and Devonian Carbonates. This facility is used for public water supply and has a reported capacity of 100 gpm.

The Borden Group is composed of primarily fine-grained materials that limit the movement of ground water to fractures, joints, and along the bedrock surface. Thus, in most of the western portion of the county where bedrock is shallow, risk to contamination from the surface or near surface sources is high. Where the overlying sediment consists of thick fine-grained clay materials, the Borden Group Aquifer System in Boone County is at low risk to contamination from the surface or near surface sources.

Devonian and Mississippian – New Albany Shale Aquifer System

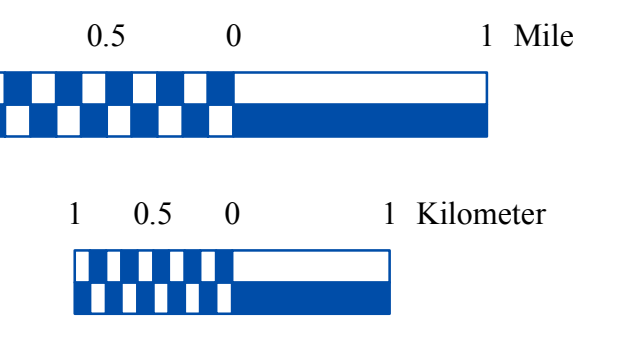
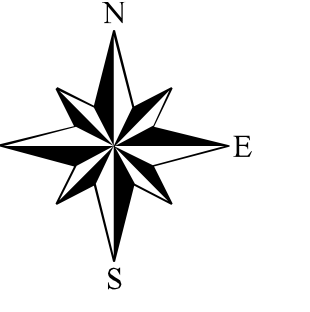
The New Albany Shale consists mostly of brownish-black carbon-rich shale, greenish-gray shale, and minor amounts of dolomite and dolomitic quartz sandstone. The New Albany Shale is generally less than 100 feet thick and it subsides in a thin band east of Interstate 65 in Boone County. About half of the domestic wells penetrate through the shale in favor of the underlying Silurian and Devonian Carbonates.

Because the New Albany Shale is generally not very productive, it is typically used only where overlying deposits do not contain aquifer material. The New Albany Shale is often described as an aquitard, and yields of wells completed in it are typically quite limited. Domestic water wells commonly yield less than 10 gpm with typical static water levels ranging from 10 to 60 feet below the surface. Many dry holes have been reported. The permeability of shale materials is considered low. The New Albany Shale Aquifer System, therefore, has a low susceptibility to contamination introduced at or near the surface.

Silurian and Devonian Carbonates Aquifer System

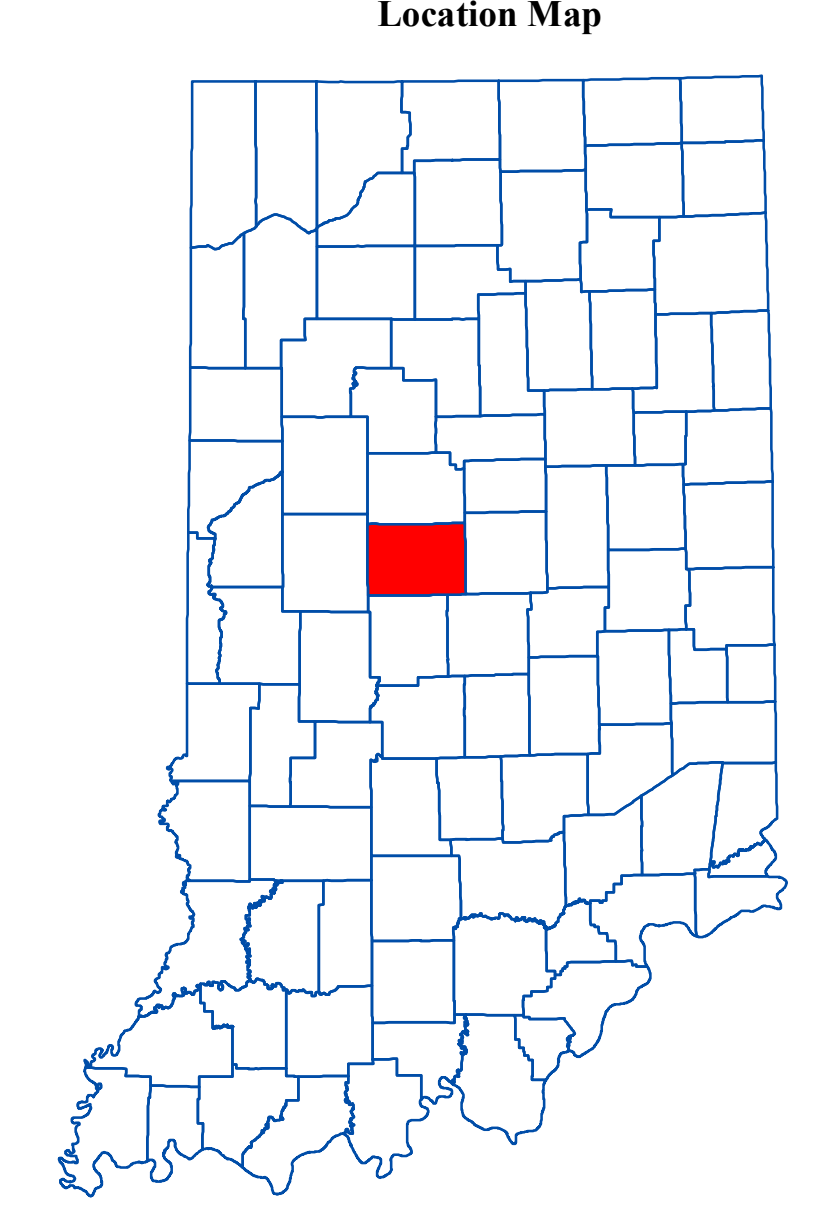
In Boone County, this aquifer system consists primarily of middle Devonian age carbonates of the Muscatatuck Group and underlying Silurian carbonates. It is composed of only Silurian carbonates where Muscatatuck Group rocks have been removed by erosion. Because individual units of the Silurian and Devonian systems consist of similar carbonate rock types and cannot easily be distinguished on the basis of water well records, they are considered as a single water-bearing system.

Few wells utilize the Silurian and Devonian Carbonates Aquifer System in the subcrop area in Boone County due to availability of thick unconsolidated deposits. Reported depths range from 88 to 305 feet deep. The amount of rock penetrated in this system ranges from 2 to 132 feet. Water wells completed in this system are generally capable of meeting the needs of domestic users. Reported yields for domestic wells range from a few dry holes up to 65 gpm. Static water levels range from 16 to 100 feet below the land surface. This aquifer system has a low susceptibility to surface contamination due to thick clay deposits over most of the county.



EXPLANATION

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



Map Use and Disclaimer Statement

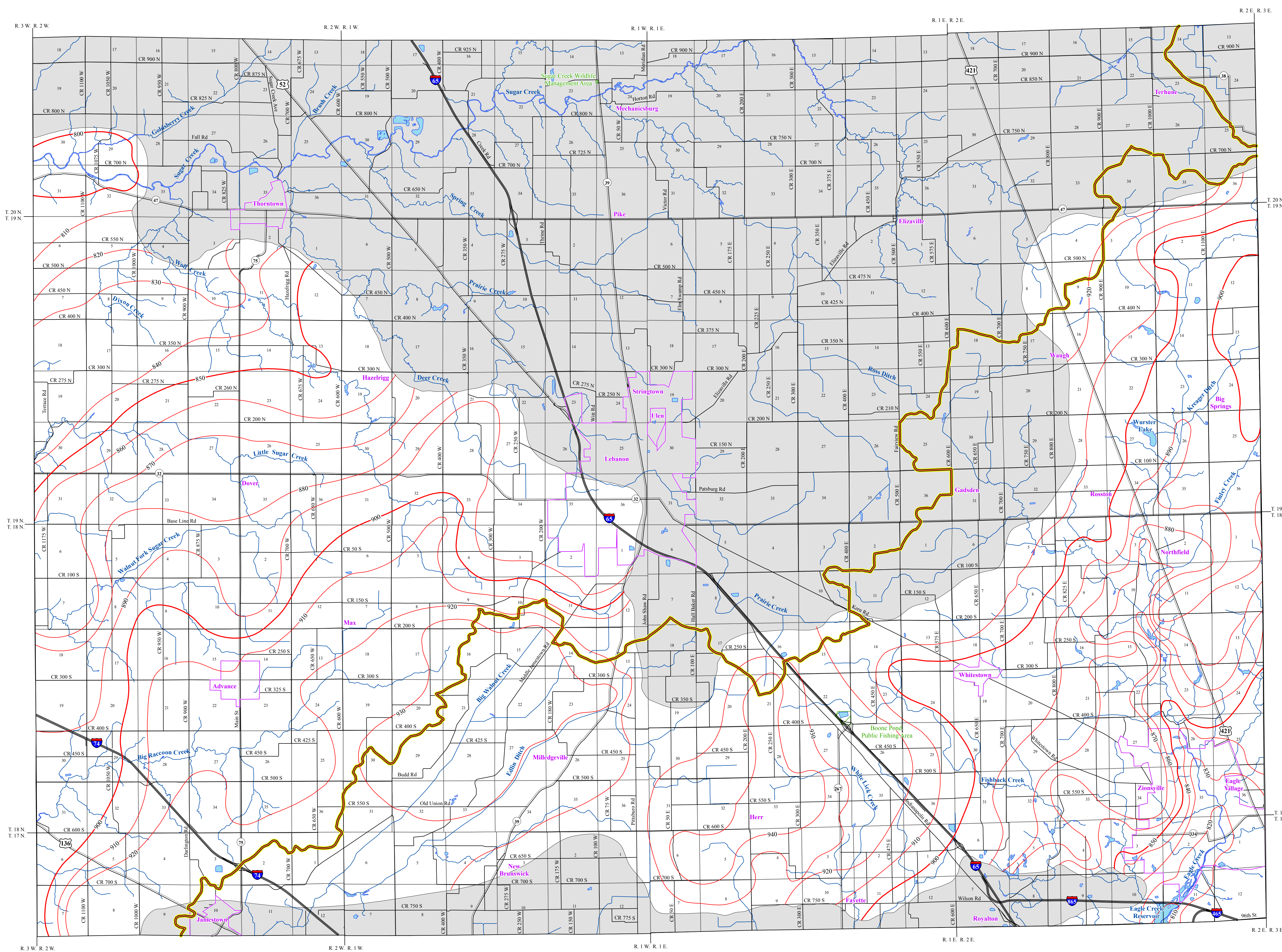
We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water. This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.

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, except the Bedrock Geology of Indiana (polygon shapefile, 20020318), which was at a 1:50,000 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.

Bedrock Aquifer Systems of Boone County, Indiana

by
Glenn E. Grove
Division of Water, Resource Assessment Section
December 2008

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



Boone County, Indiana is located in the central portion of the state and is situated within two major drainage basins, the Middle Wabash River Basin to the northwest and the White and West Fork White River Basin to the southeast.

The generalized potentiometric surface map (PSM) contour elevations represent lines of equal elevation relative to the measured groundwater levels in wells. Static water level measurements in individual wells used to construct the potentiometric surface map are indicative of the water level at the time of well completion. Therefore, current site-specific conditions may differ due to local or seasonal variations in measured static water levels.

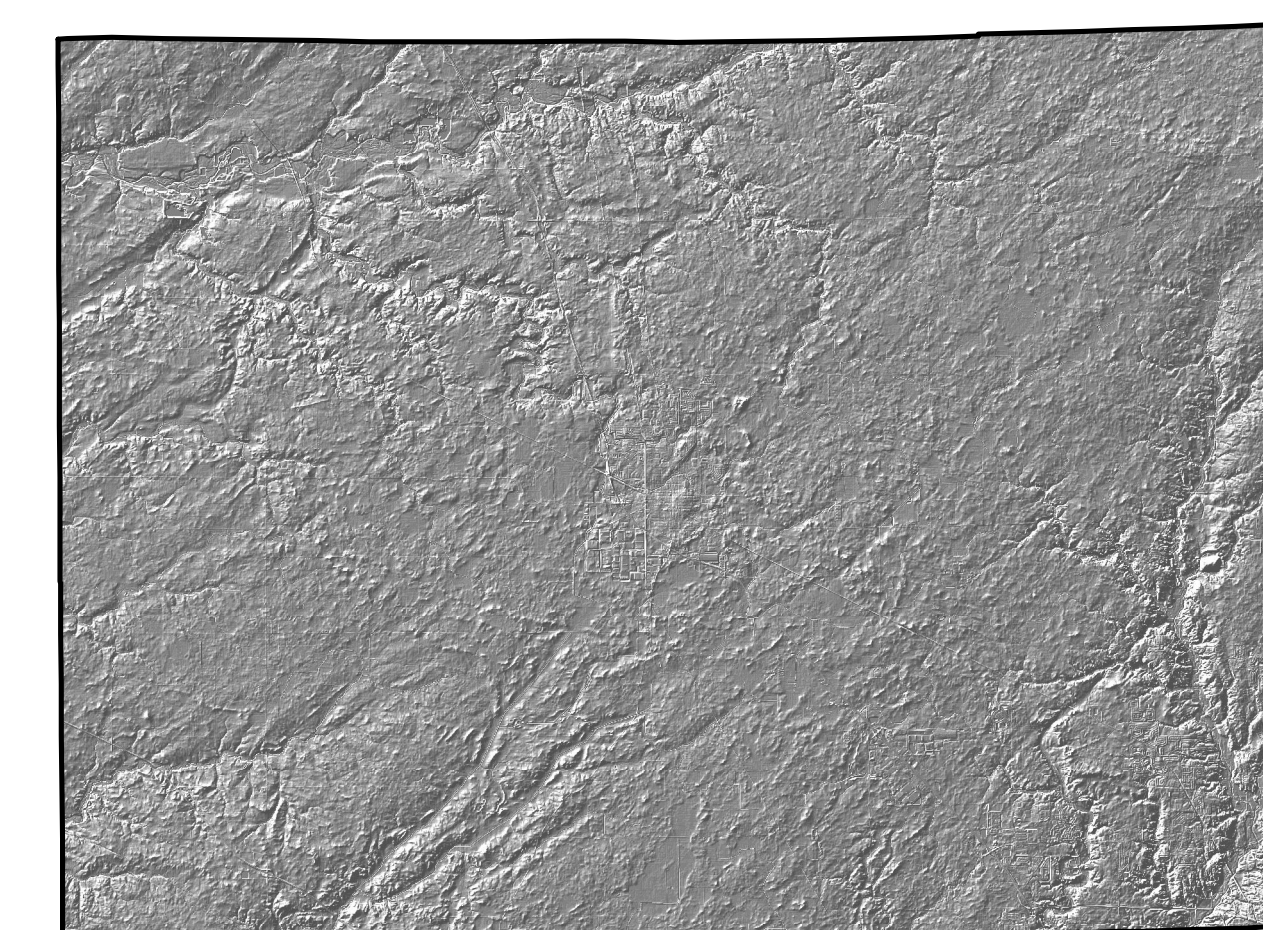
Coordinate locations of water well records were physically obtained in the field, determined through address geocoding, or reported on water well records. Elevation data were either obtained from topographic maps or a digital elevation model (DEM). Elevation and location quality control/quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

In Boone County depth to bedrock varies from outcropping along sections of Sugar Creek in the western part of the county, to 350 feet in the north-central area (Grove, 2008). Wells are generally completed in shale and siltstone bedrock deposits of the Mississippian Borden Group, the Devonian and Mississippian New Albany Shale or carbonate deposits of the Silurian and Devonian Carbonates. There are approximately 273 located wells that are completed in bedrock and utilized towards the mapping of the bedrock potentiometric surface. However, much of the central and northern portions of Boone County are lacking in data and/or covered by more prolific unconsolidated deposits that limit the necessity to complete wells in bedrock. Therefore, potentiometric surface elevations contours have not been extended through these areas.

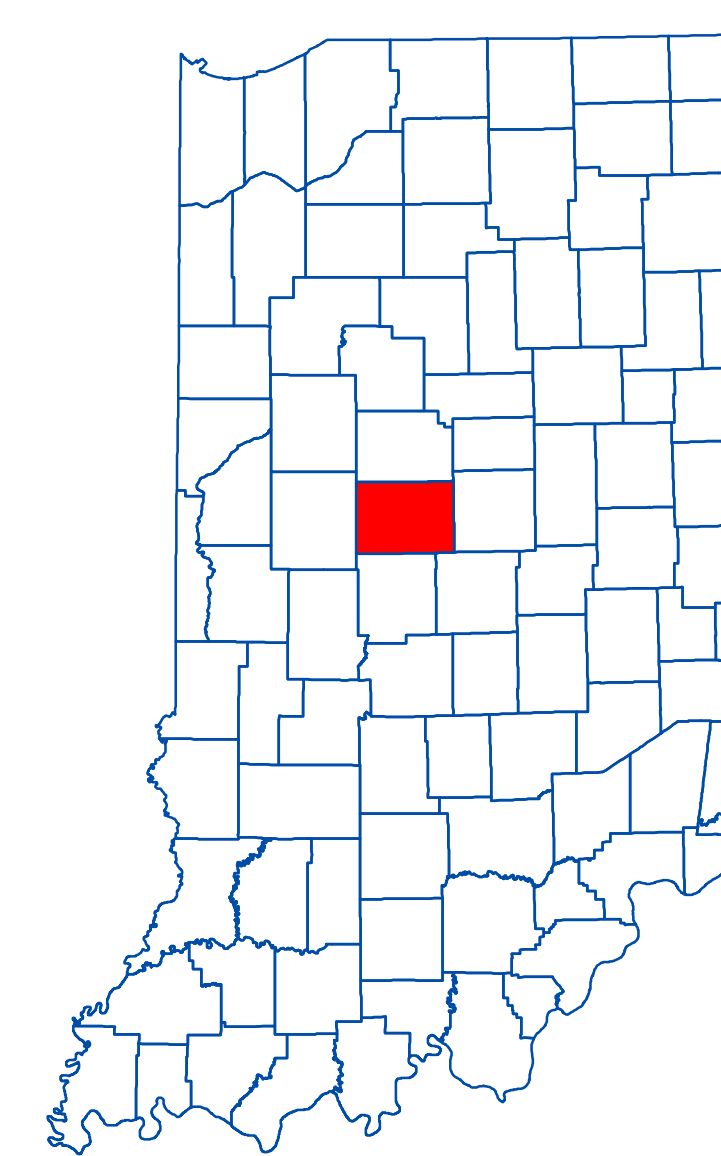
Potentiometric surface elevations range from a high of 940 feet mean sea level (msl) in the south-central region of the county near the basin divide, to a low of 800 feet msl in the northeast part of the county. Generalized groundwater flow direction for Boone County is towards major drainage relevant to the basin. Therefore, in the White and West Fork White River Basin, groundwater flow is southeast towards Eagle Creek, and northeast towards Sugar Creek for the Middle Wabash River Basin.

Grove, 2008. Bedrock Aquifer Systems of Boone County, Indiana. Indiana Department of Natural Resources, Division of Water, Aquifer System Map 14-8.

Hillshade Map of Boone County, Indiana

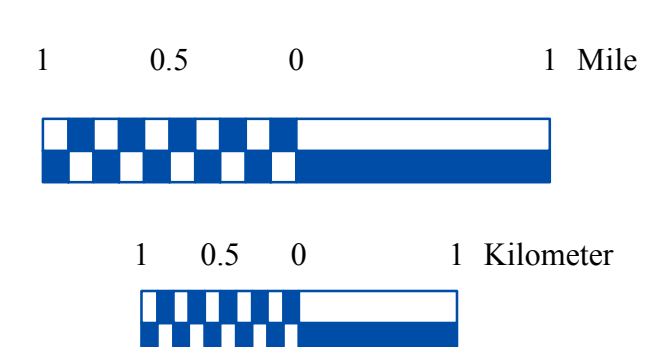
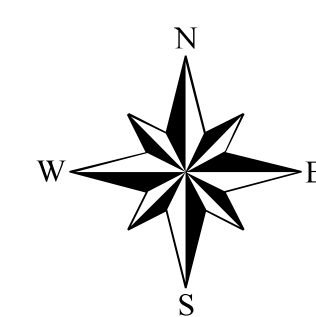


Location Map



EXPLANATION

- 800 — Line of equal elevation, in feet above mean sea level
- Potentiometric Contour interval 10 feet
- Stream
- County Road
- State Road
- US Highway
- Interstate
- Basin Boundary
- Municipal Boundary
- State Managed Property
- Lake & River
- No Aquifer Material or Limited Data



Map Use and Disclaimer Statement

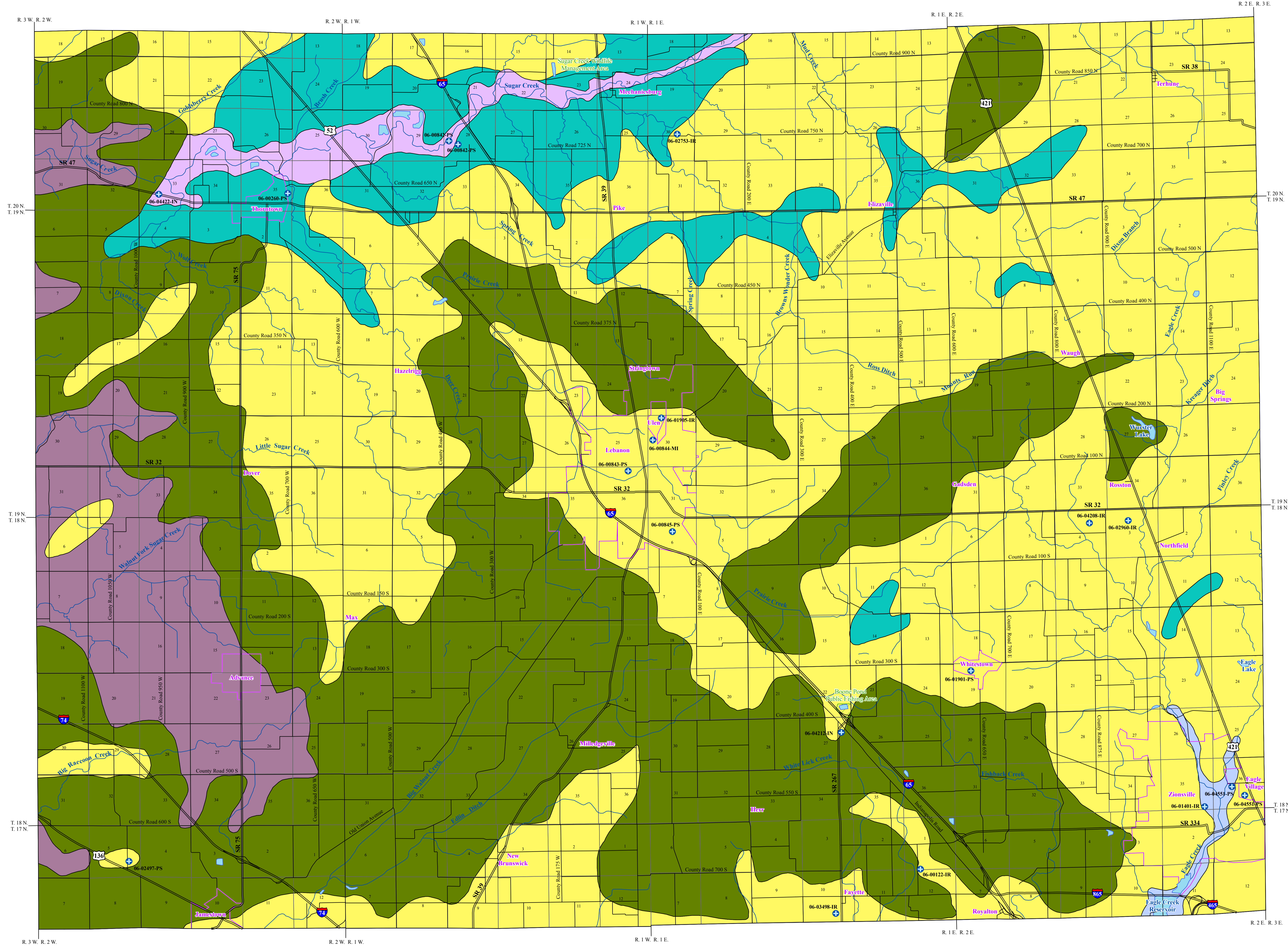
We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water. This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.

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) was 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 DNR and based on a 1:24,000 scale. County Hillshade (img) was from the U.S. Geological Survey National Elevation Dataset (raster image, 20100224). No Aquifer Material and Limited Data (red, limited, data, polygon shapefile, Maier, 2012). Potentiometric Surface Map of the Bedrock Aquifers of Boone County, Indiana (line shapefiles, Maier, 2012) was based on a 1:24,000 scale.

Potentiometric Surface Map of the
Bedrock Aquifers of Boone County, Indiana
by
Randal D. Maier
Division of Water, Resource Assessment Section

March 2013

UNCONSOLIDATED AQUIFER SYSTEMS OF BOONE COUNTY, INDIANA



The unconsolidated aquifer systems of Boone County are a result of a complicated sequence of glacial events and post-glacial sediments deposited by or resulting from glaciers, glacial meltwaters, and post-glacial precipitation events. Six unconsolidated aquifer systems have been mapped in Boone County: the Till Veneer, the Tipton Till, the Tipton Till Subsystem, the Tipton Complex, the Wabash River and Tributaries Outwash Subsystem; and the White River and Tributaries Outwash. 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.

The thickness of unconsolidated deposits in Boone County is quite variable, due to the deposition of glacial material over an uneven bedrock surface. In a few places along Sugar Creek and Big Raccoon Creek in western Boone County, bedrock is at or near the surface. North and northeast of Lebanon, the thickness of unconsolidated deposits increases to over 350 feet. Elsewhere, the depth to bedrock is generally less than 100 feet, roughly west of a diagonal from the southeast corner to the northwest corner of Boone 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.

Till Veneer Aquifer System

In Boone County, the Till Veneer Aquifer System consists of areas where the unconsolidated material is predominantly thin till overlying bedrock. Along some of the major streams, this system also includes thin alluvium and surficial sand and gravel deposits overlying shallow bedrock. The Till Veneer Aquifer System in Boone County is primarily mapped in places along Sugar Creek and Big Raccoon Creek, and some tributaries in the western third of the county. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county. Total thickness of the Till Veneer Aquifer System generally ranges from about 25 to 50 feet.

There is little potential for ground-water production in this system in Boone County. Potential aquifers within this system include thin isolated sand and gravel layers. Therefore, very few of the reported wells penetrating this aquifer system in the county are completed in unconsolidated materials. The system is commonly bypassed in favor of the underlying bedrock. In this county the depth of the few wells completed in the Till Veneer Aquifer System range from 36 to 47 feet deep with static water levels ranging between 3 and 20 feet below the surface. Most of the wells have reported capacities of less than 10 gallons per minute (gpm).

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 primarily consists of glacial till with intratill sand and gravel layers. In Boone County, this aquifer system ranges in thickness from about 50 feet to around 300 feet. However, the sand and gravel aquifers in this system tend to be thin and discontinuous.

Wells completed in this system are capable of meeting the needs of most domestic and some high-capacity users in Boone County; however, where one well might produce a good or adequate water supply, a nearby well may not produce any water. Saturated aquifer materials include sand and/or gravel deposits that are commonly 7 to 15 feet thick and are generally overlain by 40 to 75 feet of till. Wells producing from this aquifer system are typically 75 to 175 feet deep. Domestic well yields are commonly 10 to 30 gpm. Static water levels generally range from 20 to 45 feet below the surface. There are 13 registered significant ground-water withdrawal facilities (23 wells) using the Tipton Till Aquifer System. Primary uses for these facilities are public water supply and irrigation. The reported pumping rates range up to 350 gpm.

The 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.

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 Tipton Till Aquifer Subsystem in Boone County. The unconsolidated deposits vary between 50 feet to over 300 feet thick for the subsystem in this county. However, the depth to bedrock is generally less than 150 feet. Potential aquifer materials include thin, discontinuous intratill sand and gravel deposits. Where present, these deposits are typically capped by till that is commonly 45 to 85 feet thick.

About 30 percent of wells started in this subsystem in Boone 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. The wells producing from this subsystem are completed at depths ranging from 50 to 120 feet. Intratill sand and gravel aquifer materials are typically less than 5 feet thick. Domestic well yields are commonly 5 to 15 gpm and static water levels are generally 5 to 40 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. Wells producing from shallow aquifers are moderately to highly susceptible to contamination.

EXPLANATION

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

Tipton Complex Aquifer System

The Tipton Complex Aquifer System is characterized by unconsolidated deposits that are quite variable in materials and thickness and primarily located in the northern third of Boone County. Aquifers within the system range from thin to thick, and include single or multiple discontinuous intratill sand and gravel layers. The aquifers are highly variable in depth and lateral extent and are typically confined by thick clay layers. The total thickness of unconsolidated deposits ranges from about 50 feet to over 350 feet.

This system is capable of meeting the needs of domestic and most high-capacity users in Boone County. Saturated aquifer materials in the Tipton Complex Aquifer System are generally 10 to 35 feet thick and are overlain by a till cap which is commonly 40 to 90 feet thick. Wells in this system are typically completed at depths ranging from 70 to 160 feet. Domestic well yields are commonly 10 to 50 gpm and static water levels are generally 10 to 40 feet below the surface. There are two registered significant ground-water withdrawal facilities (5 wells) using this system. These facilities are used for public water supply. Reported capacities for the wells range from 200 to 700 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 thin or lacking, 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 along sections of Eagle Creek and Little Eagle Creek in Boone County. In places, sand and gravel from the melting glaciers (outwash) were deposited in the stream valleys. The total thickness of unconsolidated deposits in this system ranges from about 50 feet to over 150 feet.

This aquifer system is capable of meeting the needs of domestic and high-capacity users in Boone County. Wells in the White River and Tributaries Outwash Aquifer System are completed at depths from 55 to 160 feet. Sand and gravel aquifers are commonly 20 to 50 feet thick and are generally capped by silt, sandy clay, or clay ranging from 5 to 20 feet thick. However, in many places, the protective cap is missing and unsaturated sand and gravel deposits lie above the productive aquifer. Domestic well yields in this system are 10 to 60 gpm and static water levels range from flowing to 50 feet below the surface. In Boone County, there are two registered significant ground-water withdrawal facilities (4 wells) in this system. Uses for these facilities are public water supply and irrigation. Reported capacities for these wells range up to 220 gpm in Boone County, however, the Indianapolis Water Company has wells with reported capacities of around 600 gpm just south of the county line.

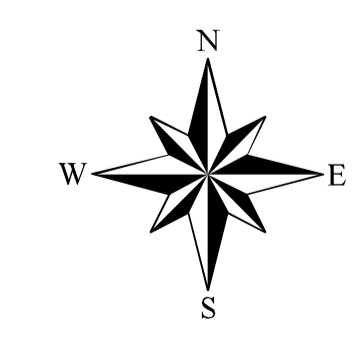
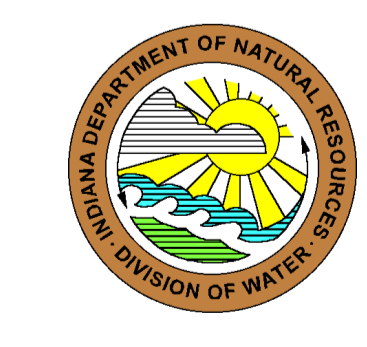
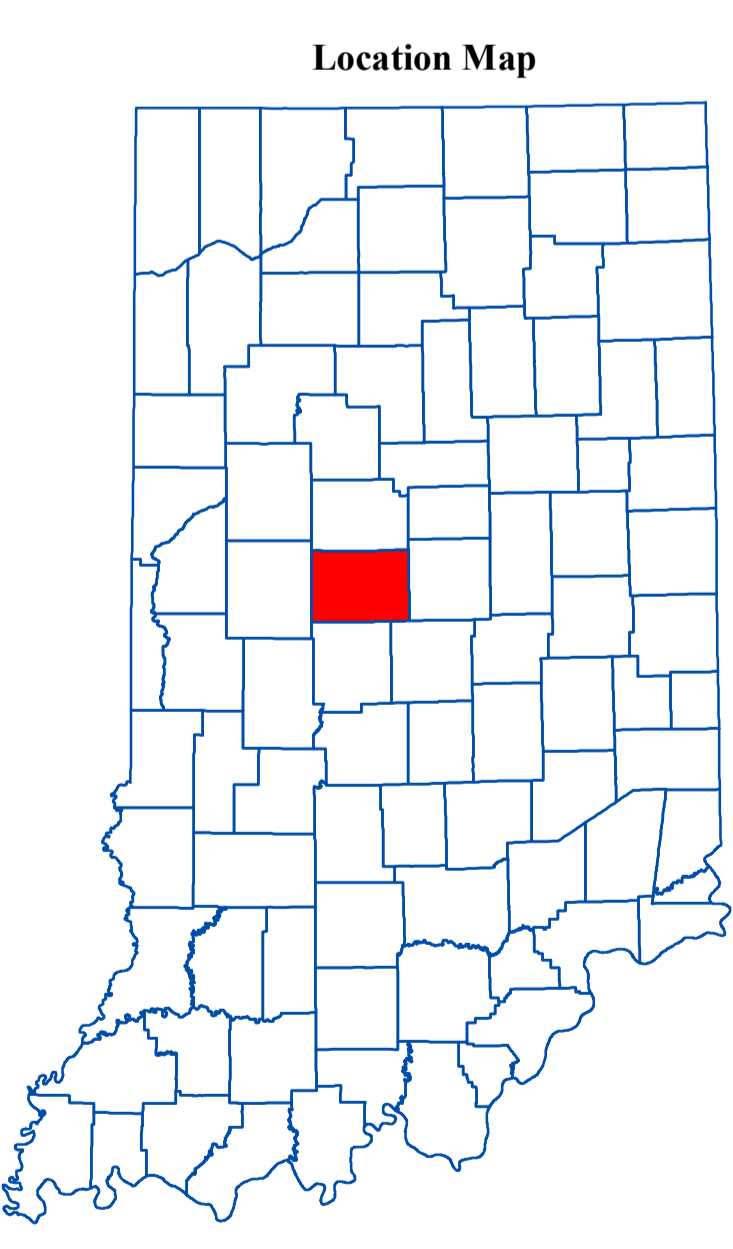
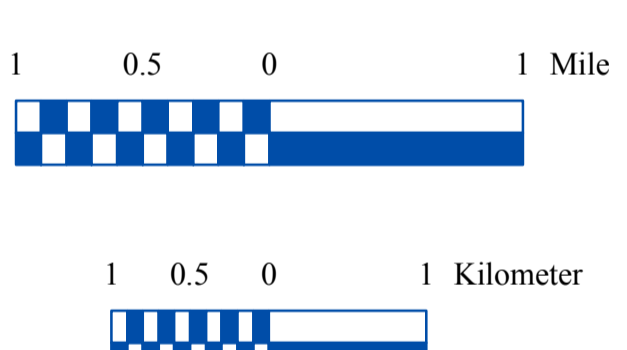
This system is moderately susceptible to surface contamination where overlying clay or silt deposits are present. However, areas that lack overlying clay or silt deposits are highly susceptible to contamination.

Wabash River and Tributaries Outwash Aquifer Subsystem

In Boone County, the Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along portions of Sugar Creek. Total thickness of unconsolidated deposits overlying bedrock ranges from about 50 feet to over 300 feet.

The Wabash River and Tributaries Outwash Aquifer Subsystem has the potential to meet the needs of domestic and some high-capacity users. The wells in this system are completed at depths from 36 to 285 feet. Saturated aquifer materials include sand and gravel deposits that are commonly 10 to 25 feet thick. Domestic well yields typically range from 10 to 45 gpm with static water levels ranging from flowing to 50 feet below the surface. There are two registered significant ground-water withdrawal facilities (4 wells) using this system. These facilities are used for public water supply and industry. Reported capacities for the wells range up to 700 gpm.

The aquifer materials in the Wabash River and Tributaries Outwash Aquifer Subsystem are generally overlain by 5 to 25 feet of silt or clay. However, in many places, this layer is missing and unsaturated sand and gravel deposits lie above the productive aquifer. 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.



Map Use and Disclaimer Statement

We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water.

This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.

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. Stream27 (line shapefile, 20000420) 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 (Grove, 2008) was based on a 1:24,000 scale.

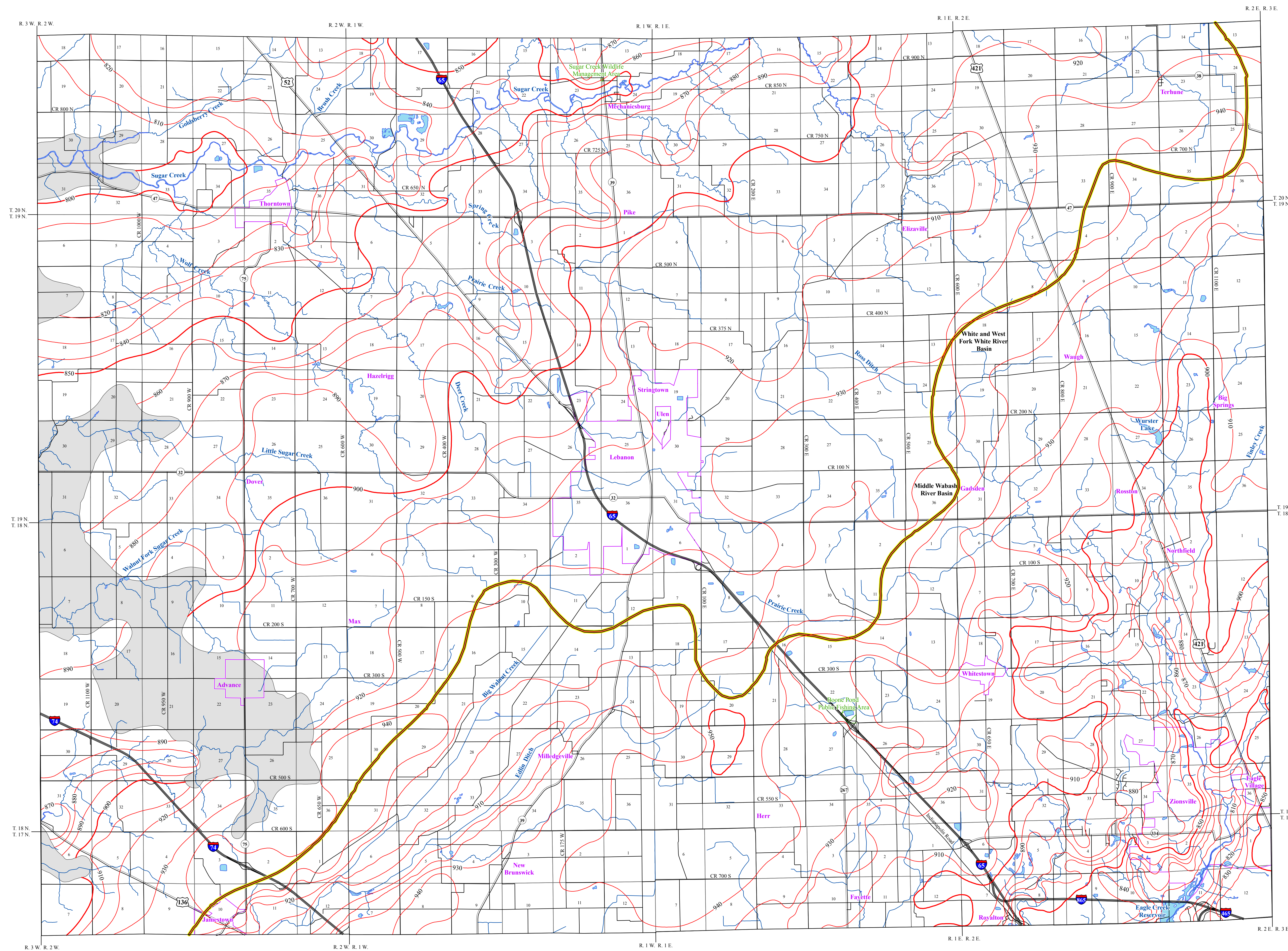
Unconsolidated Aquifer Systems of Boone County, Indiana

by
Glenn E. Grove
Division of Water, Resource Assessment Section
December 2008

POTENTIOMETRIC SURFACE MAP OF THE UNCONSOLIDATED AQUIFERS OF BOONE COUNTY, INDIANA

Michael R. Pines, Governor
 Department of Natural Resources
 Robert E. Carter, Jr., Director

Potentiometric Surface Map 20-A



Boone County, Indiana is located in the central portion of the state and is situated within two major drainage basins; the Middle-Wabash River Basin to the northwest and the White and West Fork White River Basin to the southeast.

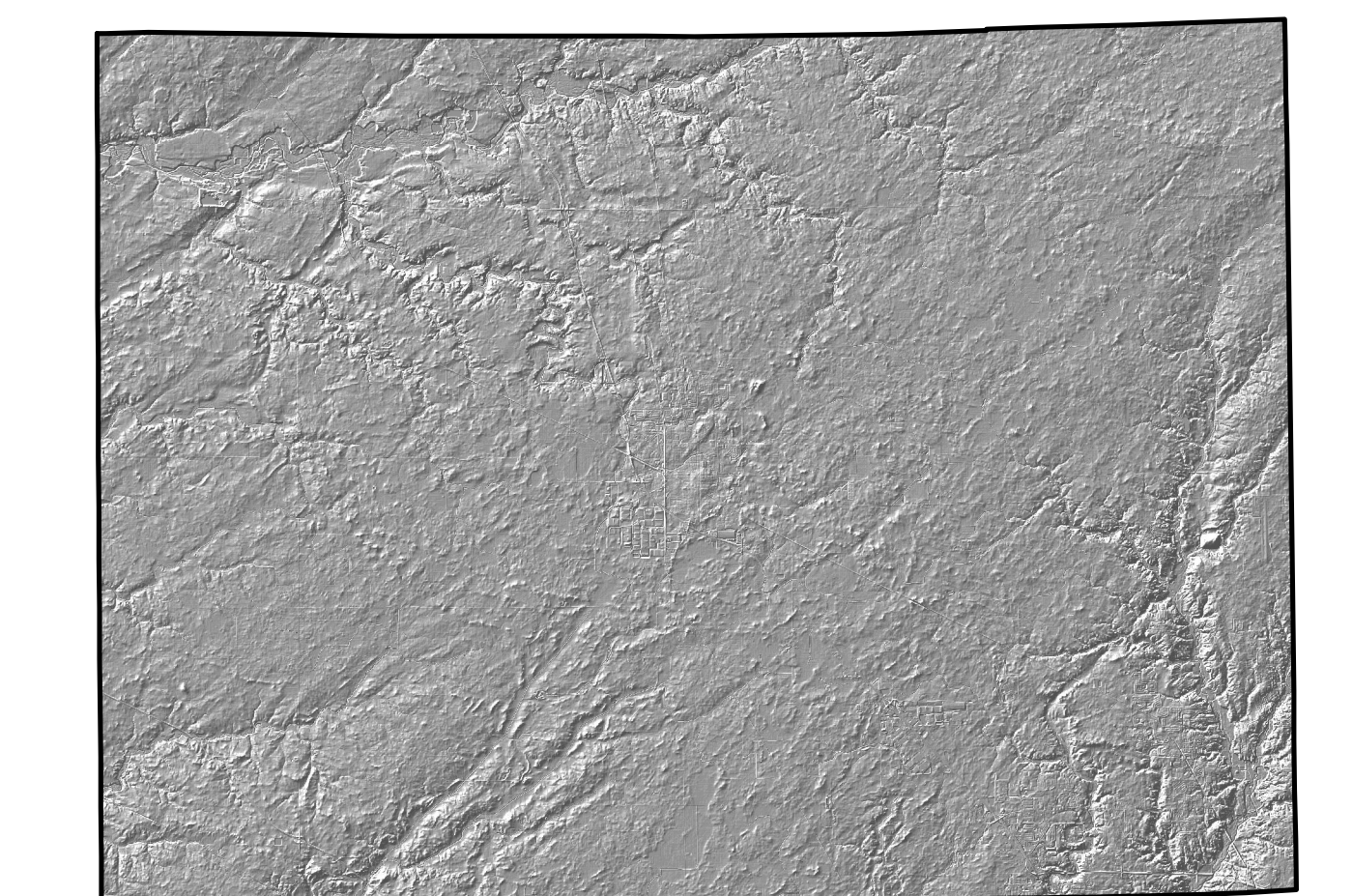
The generalized potentiometric surface map (PSM) contour elevations represent lines of equal elevation relative to the measured groundwater levels in wells. Static water level measurements in individual wells used to construct the potentiometric surface map are indicative of the water level at the time of well completion. Therefore, current site specific conditions may differ due to local or seasonal variations in measured static water levels.

Coordinate locations of water well records were physically obtained in the field, determined through address geocoding, or reported on water well records. Elevation data were either obtained from topographic maps or a digital elevation model (DEM). Elevation and location quality control assurance procedures were utilized to refine or remove data where errors were readily apparent.

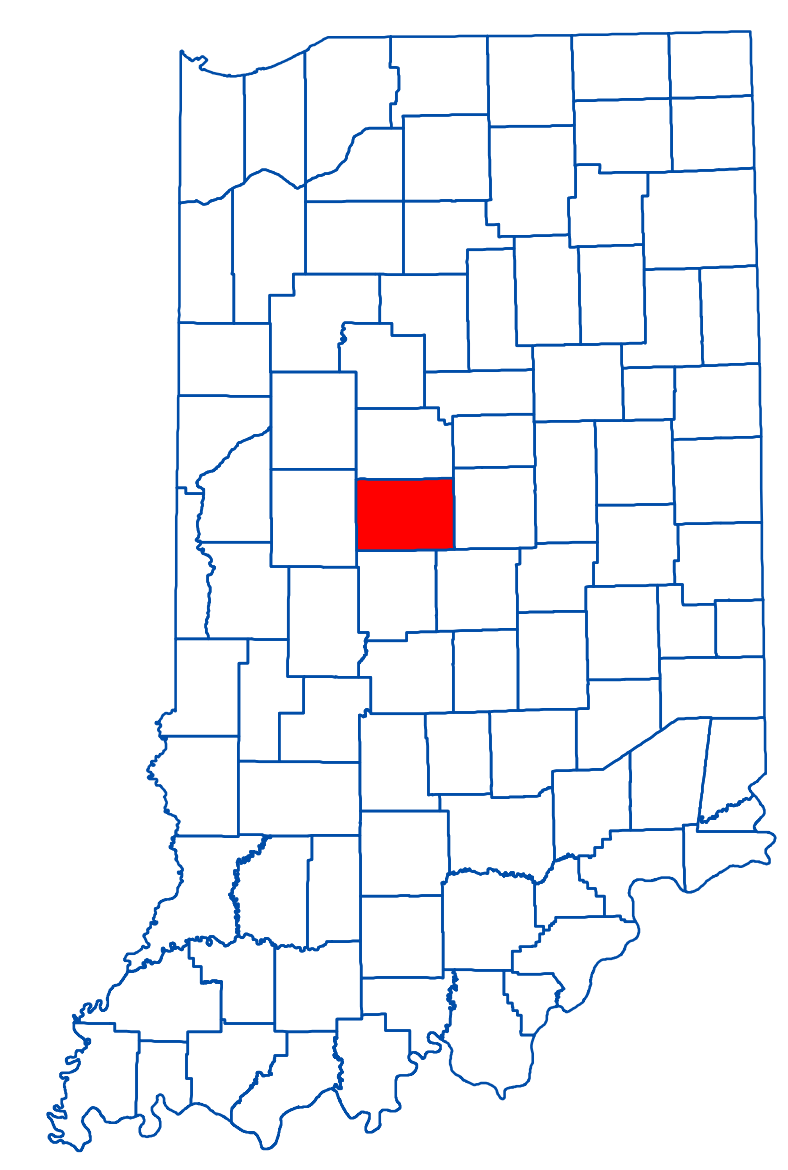
In Boone County well depths 100 feet or less were a priority in mapping the potentiometric surface. However, portions of western Boone County are lacking in data and/or are covered by deposits that have limited to non-existent aquifer potential. Therefore, potentiometric surface elevations contours have not been extended through these areas. There are approximately 914 unconsolidated water well records in the county located that are within the priority depth range.

Potentiometric surface elevations range from a high of 950 feet mean sea level (msl) in the south-central region of the county near the basin divide, to a low of 800 feet msl in the northwest part of the county and 810 msl in the southeast part of the county. Generalized groundwater flow direction for Boone County is towards major drainage relevant to the basin. Therefore, in the White and West Fork White River Basin, groundwater flow is southeast towards Eagle Creek, and northwest towards Sugar Creek for the Middle-Wabash River Basin.

Hillshade Map of Boone County, Indiana

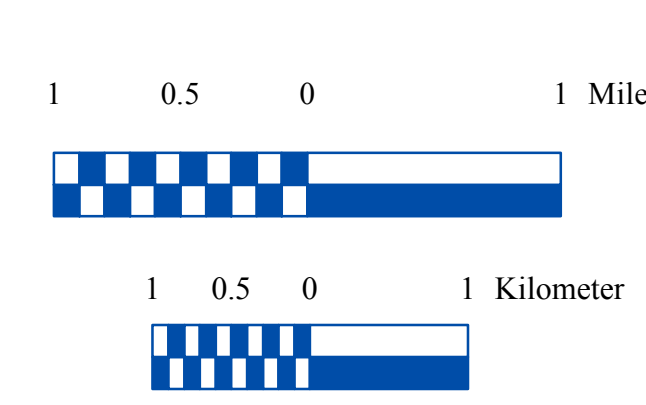
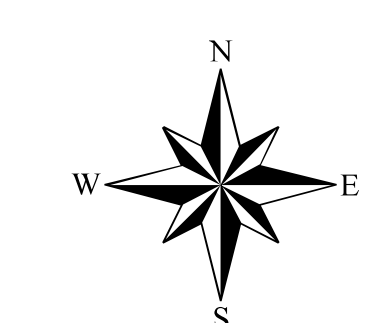


Location Map



EXPLANATION

- Line of equal elevation, in feet above mean sea level
- Potentiometric Contour interval 10 feet
- Stream
- County Road
- State Road
- US Highway
- Interstate
- Basin Boundary
- Municipal Boundary
- State Managed Property
- Lake & River
- No Aquifer Material or Limited Data



Map Use and Disclaimer Statement

We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water. This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.

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 (NHID) (line shapefile, 20081218), Rivers (NHID) (polygon shapefile, 20081218), Lakes (NHID) (polygon shapefile, 20081218) was 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 IDNR and based on a 1:24,000 scale. County Hillshade image was from the U.S. Geological Survey National Elevation Dataset (raster image, 20100324). No Aquifer Material and Limited Data (unc. limited_data_nonaquifer_boone polygon shapefile) coverage is based on The Unconsolidated Systems of Boone County, Indiana (polygon shapefile, Groves, 2008). Potentiometric Surface Map of the Unconsolidated Aquifers of Boone County, Indiana (line shapefiles, Maier, 2012) was based on a 1:24,000 scale.

Potentiometric Surface Map of the Unconsolidated Aquifers of Boone County, Indiana
 by Randal D. Maier
 Division of Water, Resource Assessment Section

March 2013

Map generated by Joel Sanderson and Randal D. Maier
 IDNR, Division of Water, Resource Assessment Section

Boone County

