

Water Resources and Use in Wabash County

Withdrawal Location		River
WELL	INTAKE	7Q2 Flow (MGD)
Red Circle	Red Triangle	< 10 MGD
Orange Circle	Orange Triangle	10 - 50 MGD
Green Circle	Green Triangle	50 - 100 MGD
Yellow Circle	Yellow Triangle	100 - 500 MGD
Blue Circle	Blue Triangle	> 500 MGD
Purple Circle	Purple Triangle	

■ Major Lakes
— Interstate
 County
X City

NORTH Miles
 0 1 2 4

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

BEDROCK AQUIFER SYSTEMS OF WABASH 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. In places, along the Wabash, Salamonie, and Missisnewa Rivers, bedrock is exposed or lies within 10 feet of the surface. However, the bedrock surface is buried beneath more than 400 feet of unconsolidated materials in the deep parts of a bedrock valley, which cuts across southern Wabash 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.

The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. 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.

Two bedrock aquifer systems are identified for Wabash County. They are, from younger to older: the Silurian and Devonian Carbonates and the Maquoketa Group of Ordovician age.

Silurian and Devonian Carbonates Aquifer System

The Silurian and Devonian Carbonates Aquifer System outcrops/subcrops throughout nearly all of Wabash County. This aquifer system consists primarily of Silurian age carbonates and middle Devonian age carbonates of the Muscatatuck Group, which subcrop only along the northern county line. Total thickness of this aquifer system ranges from 0 to about 500 feet.

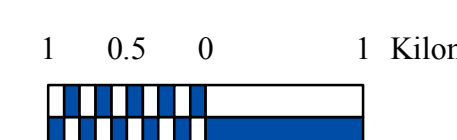
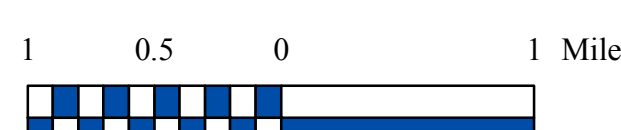
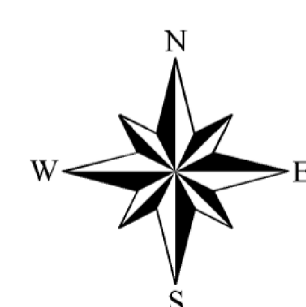
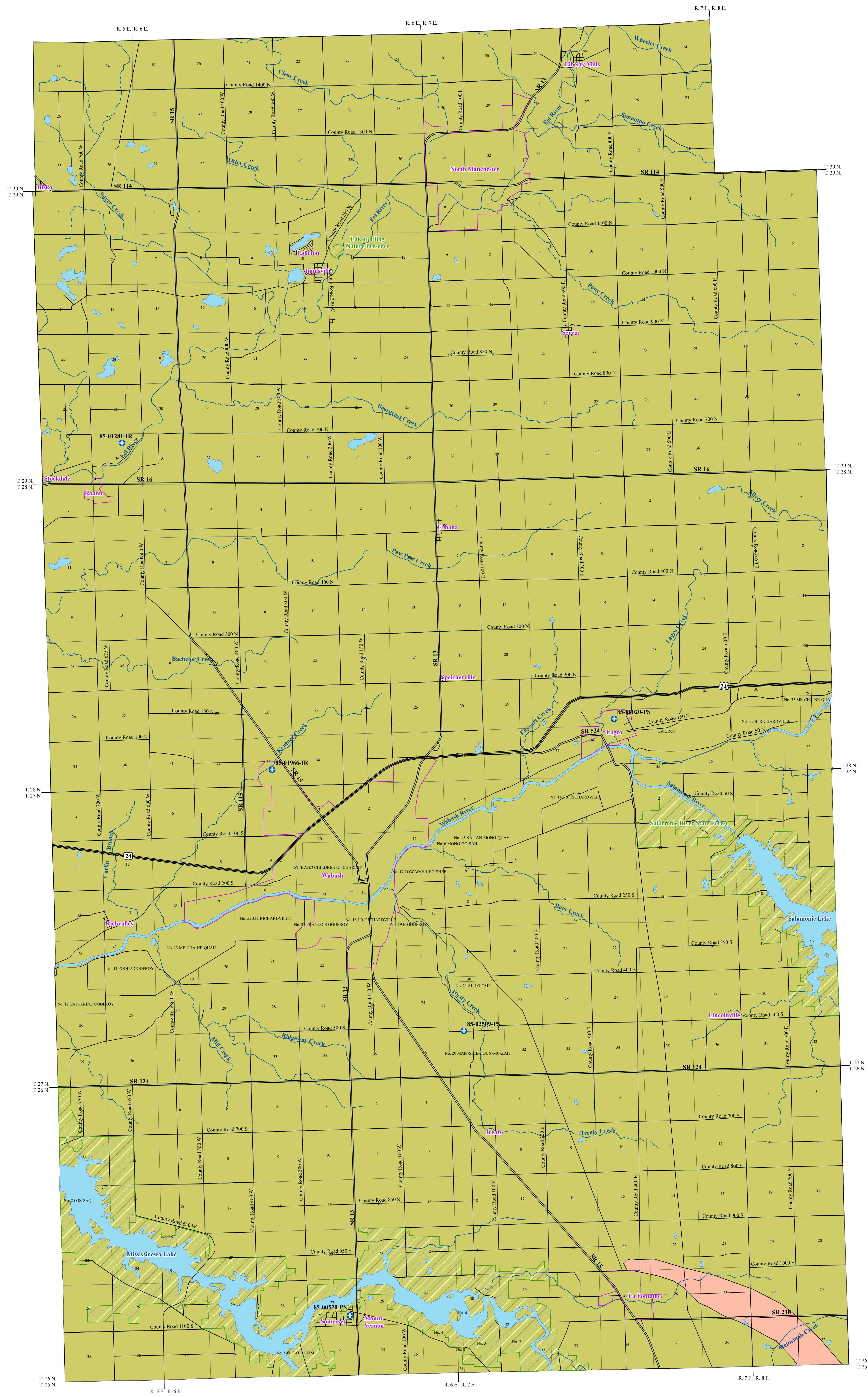
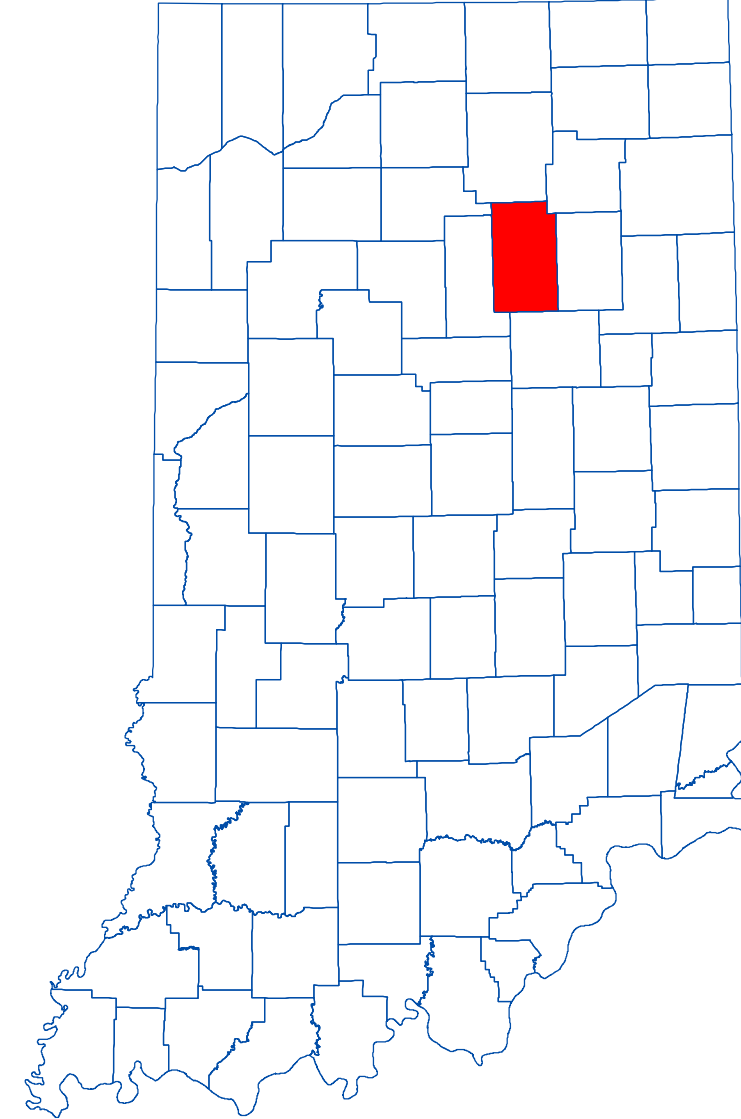
Wells completed in the Silurian and Devonian Carbonates Aquifer System are generally capable of meeting the needs of domestic and some high-capacity users in this county. Reported domestic wells utilizing this system in Wabash County have depths ranging from 32 to 514 feet, but are typically 100 to 200 feet deep. The amount of rock penetrated in this system commonly ranges from 30 to 90 feet. Solution features (caves) are described on a few well records suggesting minor karst development. Typical yields for domestic wells range from 10 to 35 gallons per minute (gpm). Static water levels are generally 20 to 55 feet below land surface. There are 5 registered significant ground-water withdrawal facilities (16 wells). Reported yields from the individual wells are 35 to 1500 gpm.

In most of Wabash County the Silurian and Devonian Carbonates Aquifer System has a low susceptibility to surface contamination because thick clay deposits overlie the system. However, in areas where overlying clays are thin or absent, the system is at moderate to high risk to contamination.

Ordovician - Maquoketa Group Aquifer System

In Wabash County, the Maquoketa Group subcrops only in the buried pre-glacial valley where the overlying Silurian and Devonian bedrock has been removed by erosion. The Maquoketa Group consists mostly of shales with interbedded limestone units. In general, this system ranges from 525 to 600 feet thick in the county. However, no known wells utilize this aquifer system in Wabash County because the Maquoketa Group lies about 275 to 425 feet below the ground surface and adequate water supplies are typically found in the overlying unconsolidated deposits. This aquifer system has a low susceptibility to surface contamination because thick clay deposits cover the subcrop area.

Location Map



EXPLANATION

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

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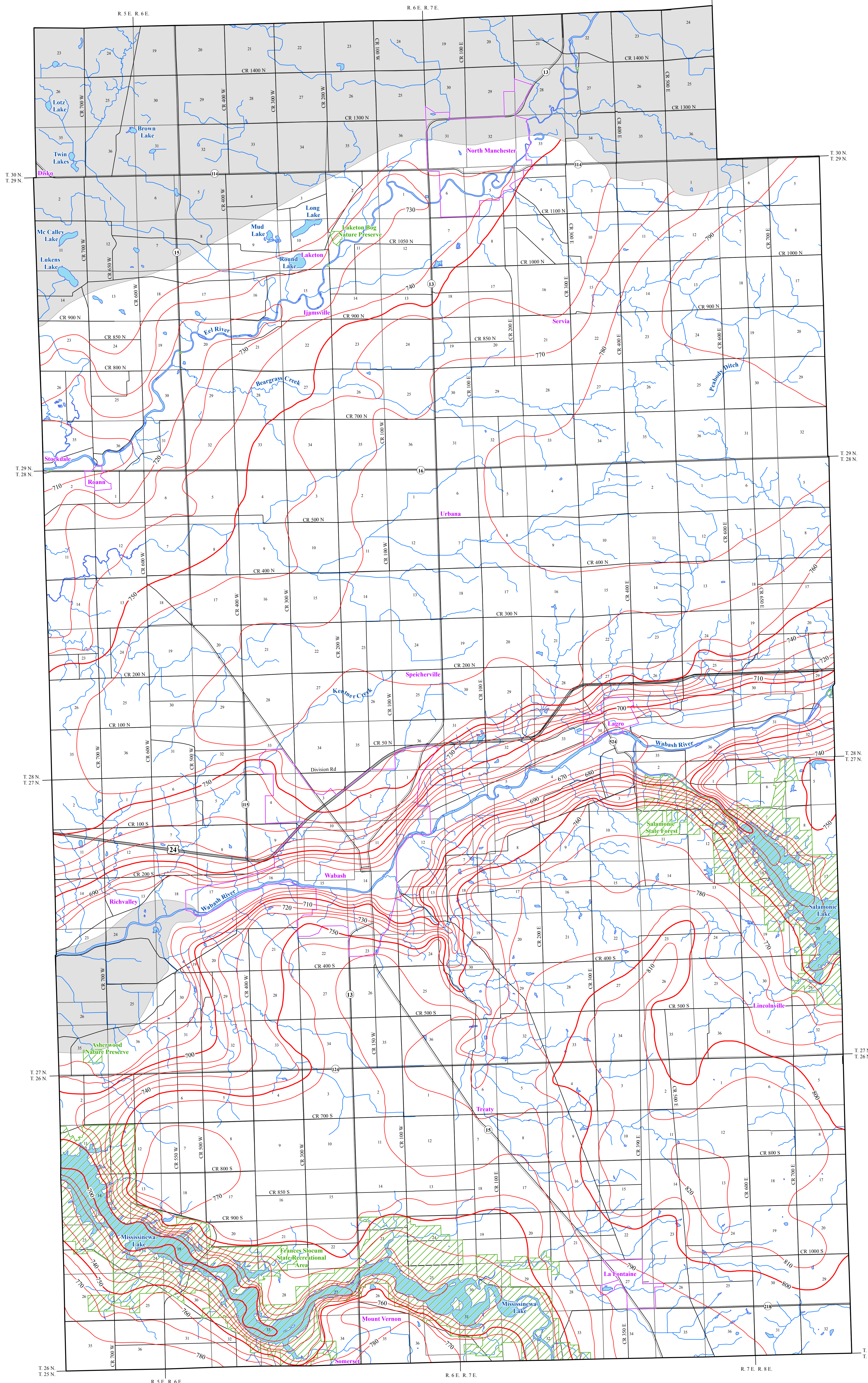
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Bedrock Aquifer Systems of Wabash County, Indiana

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

November 2007

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



Wabash County, Indiana is located in the north-central portion of the state with all of the areal extent of the county situated within the Upper Wabash River Basin.

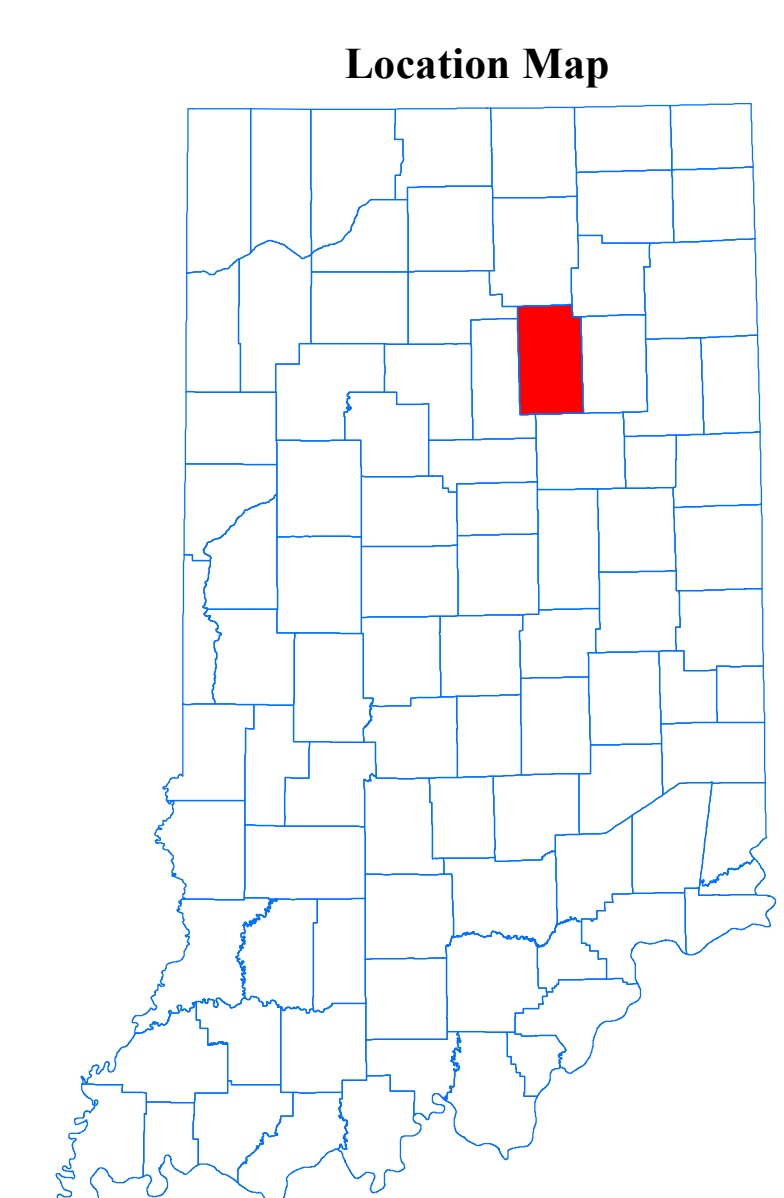
The potentiometric surface mapped (PSM) contour elevations represent lines of equal elevation relative to the measured groundwater levels in wells. In general, wells completed in a confined aquifer system are bound by impermeable layers and will have static water levels under hydrostatic pressure causing the water level to rise above the elevation of the aquifer resource. In contrast, an unconfined aquifer system is not bound by impermeable layers; therefore, the water level will not be under hydrostatic pressure and will not rise above the aquifer resource. 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.

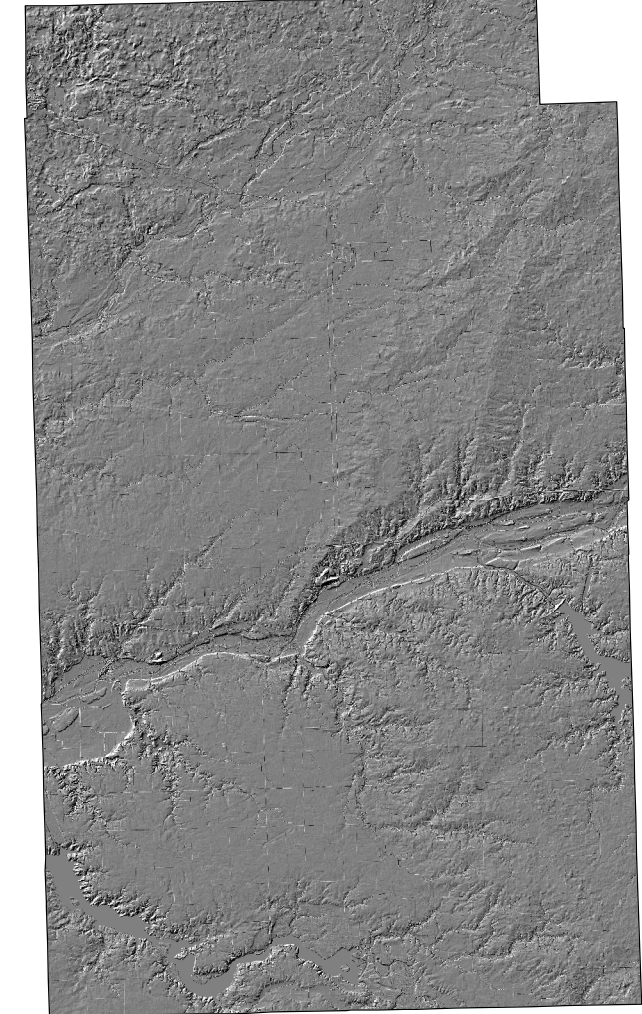
In Wabash County depth to bedrock varies from exposure along parts of the Wabash, Mississinewa, and Salamonie rivers; to as much as 400 feet where a bedrock valley cuts across the southern part of the county (Grove, 2007). Wells completed in bedrock are generally completed in carbonate deposits of the Silurian and Devonian Carbonates Aquifer System. There are approximately 671 located wells that are completed in bedrock and utilized towards the mapping of the bedrock potentiometric surface. However, portions of the 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 820 feet mean sea level (msl) in the southeast region of the county, to a low of 670 feet msl in the central part of the county along the Wabash River. Generalized groundwater flow direction for Wabash County is towards major drainage relevant to the basin. Therefore, in the Upper Wabash River Basin, groundwater flow is towards the Wabash River and its major tributaries. These include the Eel River to the north, the Salamonie River in the east-central part of the county, and the Mississinewa River to the south.

Grove, 2007, Bedrock Aquifer Systems of Wabash County, Indiana: Indiana Department of Natural Resources, Division of Water, Aquifer Systems Map 41-B.

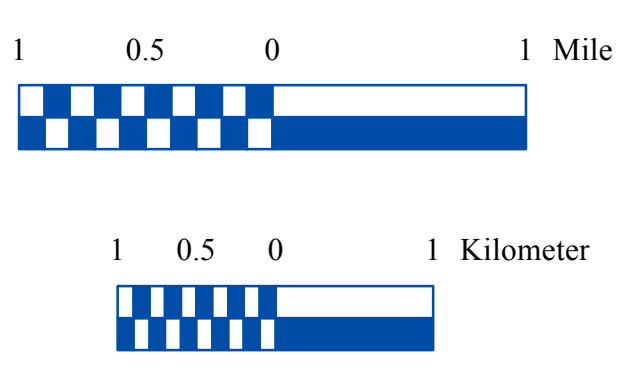
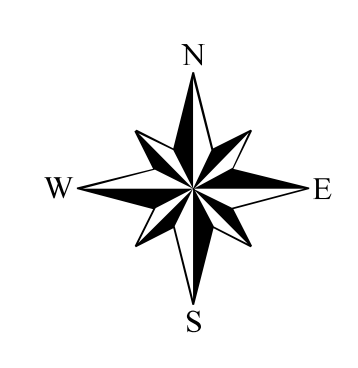


Hillshade Map of Wabash County, Indiana



EXPLANATION

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



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

by
Randal D. Maier
Division of Water, Resource Assessment Section

June 2013

Map generated by Joel Sanderson
Indiana Department of Natural Resources,
Division of Water, Resource Assessment Section

UNCONSOLIDATED AQUIFER SYSTEMS OF WABASH COUNTY, INDIANA

Seven unconsolidated aquifer systems have been mapped in Wabash County: the Till Veneer, the Bluffton Till, the Bluffton Till Subsystem, the Bluffton Complex, the Natural Lakes and Moraines, the Wabash River and Tributaries Outwash, the Bluffton Till Subsystem, and the Wabash River and Tributaries Outwash Subsystem. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

In Wabash County, the thickness of unconsolidated sediments is quite variable. Bedrock is at or near the surface in places along the Wabash River and some tributaries. However, the thickness of unconsolidated sediments exceeds 400 feet in a buried bedrock valley, which enters the county near La Fontaine and trends northwest and exits into Miami County near the Wabash River. Additionally, unconsolidated deposits are over 300 feet thick in the northwest corner of Wabash County. Elsewhere in the county, the unconsolidated deposits are commonly 50 to 125 feet thick. In Wabash County, about half of the reported wells are finished in the unconsolidated deposits.

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 Wabash County, the Till Veneer Aquifer System encompasses areas where the unconsolidated material is predominantly thin glacial till and/or alluvium overlying an eroded bedrock surface. This system is mapped primarily in the southern half of the county, along portions of the Wabash River, the Mississippi River, and the Salamonie River. Total thickness of the Till Veneer Aquifer System generally ranges from about 20 to 50 feet.

This system has the most limited ground-water resources of the unconsolidated aquifer systems in Wabash County. Potential aquifers within the Till Veneer Aquifer System are primarily thin, isolated sand and gravel layers. Therefore, very few of the reported wells penetrating this aquifer system are completed in the unconsolidated materials, which are bypassed in favor of the more productive underlying bedrock.

This system is not very susceptible to contamination from surface sources because the near-surface materials generally have low permeability. However, there are areas where unconsolidated deposits are extremely thin. These areas are very susceptible to contamination.

Bluffton Till Aquifer System

The Bluffton Till Aquifer System is mapped mostly in the northern half of the county and primarily consists of thick clay with intertill sand and gravel layers. In Wabash County, this system ranges in thickness from about 50 feet to gravelly till, but is typically 80 to 120 feet thick. Saturated aquifer materials include sands and/or gravels that commonly range from 5 to 15 feet thick and are generally overlain by 40 to 80 feet of till.

In Wabash County, most of the wells in this system are completed in the underlying bedrock; however, the Bluffton Till Aquifer System is generally capable of meeting the needs of most domestic and some high-capacity users. Wells producing from the Bluffton Till Aquifer System are generally 65 to 140 feet deep. Domestic well capacities are typically 10 to 60 gallons per minute (gpm) and static water levels are commonly 20 to 60 feet below the surface.

The Bluffton Till Aquifer System has a low susceptibility to surface contamination because intertill sand and gravel units are generally separated from the surface by thick till layers.

Bluffton 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 Till Aquifer Subsystem in Wabash County. This subsystem is mapped in about 17 percent of the county. This subsystem ranges from about 50 to 220 feet thick, but is typically less than 100 feet thick. Potential aquifer materials include thin, intertill sand and gravel deposits. Where present, aquifer materials are capped by till that is generally 40 to 120 feet thick.

More than 80 percent of wells started in the Bluffton Till Aquifer Subsystem in Wabash County are completed in the underlying bedrock aquifer system. However, this subsystem is capable of meeting the needs of some domestic users in the county. The few wells producing from the Bluffton Till Aquifer Subsystem are completed at depths of 50 to 215 feet.

This subsystem is generally not very susceptible to surface contamination because intertill sand and gravel lenses are overlain by thick till deposits. Wells producing from shallow aquifers are moderately susceptible to contamination.

Bluffton Complex Aquifer System

The Bluffton Complex Aquifer System is mapped over a large portion of Wabash County. This aquifer system is characterized by deposits that are quite variable in materials and thickness. A thick till commonly overlies sand and gravel aquifer deposits. This system generally has multiple layers of intertill sands and gravels of various thickness and lateral extent. The main aquifer deposits are typically deeper, thicker, and more continuous than the shallower sands and gravels in this system. In Wabash County, this system is up to 250 feet thick. Saturated aquifer materials in the Bluffton Complex Aquifer System are generally 10 to 25 feet thick and are overlain by a till cap which is commonly 30 to 75 feet thick.

This system is capable of meeting the needs of domestic and most high-capacity users in Wabash County. Wells in this system are typically completed at depths of 75 to 125 feet. Domestic well yields are commonly 10 to 60 gpm and static water levels are generally 20 to 50 feet below the surface. There are 10 registered significant ground-water withdrawal facilities (20 wells) utilizing this system and individual wells produce 130 to 1500 gpm.

Part of the Bluffton Complex Aquifer System overlies a deep buried bedrock valley in southern Wabash County. The total unconsolidated thickness exceeds 400 feet in many places. Only a few wells that utilize the deeper aquifers within the buried bedrock valley have been reported. These wells indicate that the deep sand and gravel deposits are 10 to 60 feet thick in places. Reported domestic well yields are greater than 50 gpm and high-capacity wells yield in excess of 300 gpm.

The Bluffton Complex Aquifer System is not very susceptible to contamination because thick clays overlie the aquifer materials.

Natural Lakes and Moraines Aquifer System

The Natural Lakes and Moraines Aquifer System in Wabash County is mapped north of the Eel River and is a complex aquifer system typically with multiple intertill sand and gravel seams. Unconsolidated deposits range in thickness from about 100 feet to over 250 feet. Thick surficial clays predominate and are generally 50 to 110 feet thick. A low localized surficial sand and gravel deposits are reported and range from 20 to 50 feet thick; however, the static water levels are typically deep and these deposits are seldom used.

This system is capable of meeting the needs of domestic and some high-capacity users in Wabash County. Wells completed in this aquifer system range in depth from 30 to 241 feet deep. However, the wells are typically 60 to 130 feet deep. Aquifer thickness is generally between 15 and 30 feet thick. In addition, several areas have two or more aquifers ranging in thickness from 5 to 15 feet. Domestic well yields are commonly 10 to 75 gpm and static water levels are typically 15 to 50 feet below the surface. There are 2 registered significant ground-water withdrawal facilities (4 wells) utilizing this system with individual wells producing up to 70 gpm.

The Natural Lakes and Moraines Aquifer System is generally not very susceptible to surface contamination because thick clay deposits overlie intertill sand and gravel seams. Wells producing from shallow aquifers are moderately to highly susceptible to contamination.

Wabash River and Tributaries Outwash Aquifer System

The Wabash River and Tributaries Outwash Aquifer System is mapped along the Eel River and along the Wabash River in the western portion of the County. Large amounts of outwash sand and gravel from the receding glaciers were deposited in the stream valley. This system exceeds 150 feet in thickness in a few places with up to 90 feet of continuous sand and gravel in some places. However, the outwash is typically 25 to 75 feet thick with the thickness of saturated sands and gravels generally ranging from 15 to 50 feet. In some areas 10 to 45 feet of sandy clay or silt occurs at the surface or below the surficial sand and gravels.

These sand and gravel deposits have adequate potential for domestic and most high-capacity users. Well depths are commonly 40 to 100 feet. Domestic well yields are commonly 10 to 60 gpm and static water levels are generally 10 to 25 feet below the surface. Five registered significant ground-water withdrawal facilities (10 wells) currently use the Wabash River and Tributaries Outwash Aquifer System in Wabash County. Reported yields for high-capacity wells in this aquifer system are 100 to 1100 gpm.

In places, this system overlies a deep buried bedrock valley. The total unconsolidated thickness exceeds 300 feet in many places. The few wells that use the deeper aquifers of the buried valley have sand and gravel thicknesses that typically range from 20 to over 45 feet. Reported domestic well yields are greater than 50 gpm and there are no high-capacity wells in the buried valley but yields would be expected to be in excess of 500 gpm.

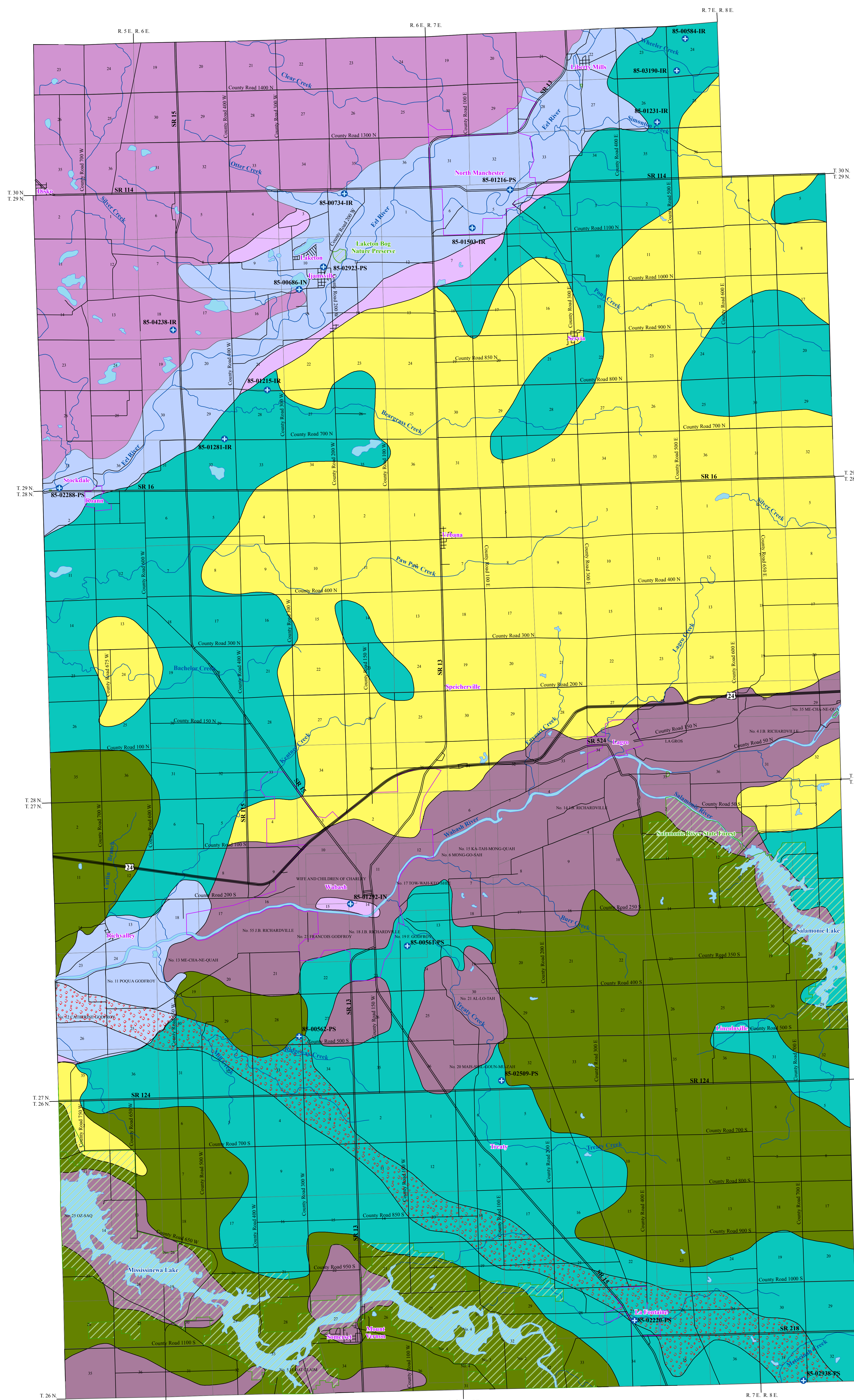
This aquifer system is highly susceptible to contamination from surface sources in areas that lack overlying clay layers. The system is only moderately susceptible where it is overlain by thick clay or silt deposits.

Wabash River and Tributaries Outwash Aquifer Subsystem

This system is primarily mapped along part of the Eel River in northern Wabash County and along portions of the Wabash River along the Miami County line and the city of Wabash. Saturated sand and gravel layers are generally 7 to 20 feet thick and are commonly overlain by silt, sandy clay, or clay ranging from 10 to 30 feet thick.

The Wabash River and Tributaries Outwash Aquifer Subsystem has the potential to meet the needs of domestic and some high-capacity users. Few wells utilize this system in Wabash County. There is an only one registered high-capacity facility (5 wells) with reported yields up to 350 gpm.

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.



Logos for the Indiana Department of Natural Resources (DNR) and the Division of Water, Resource Assessment Section. Includes a north arrow and scale bars in miles and kilometers.

EXPLANATION legend listing symbols for Registered Significant Ground-Water Withdrawal Facility, Stream, County Road, State Road & US Highway, Municipal Boundary, State Managed Property, and Lake & River.

Location Map showing the outline of Indiana with Wabash County highlighted in red.

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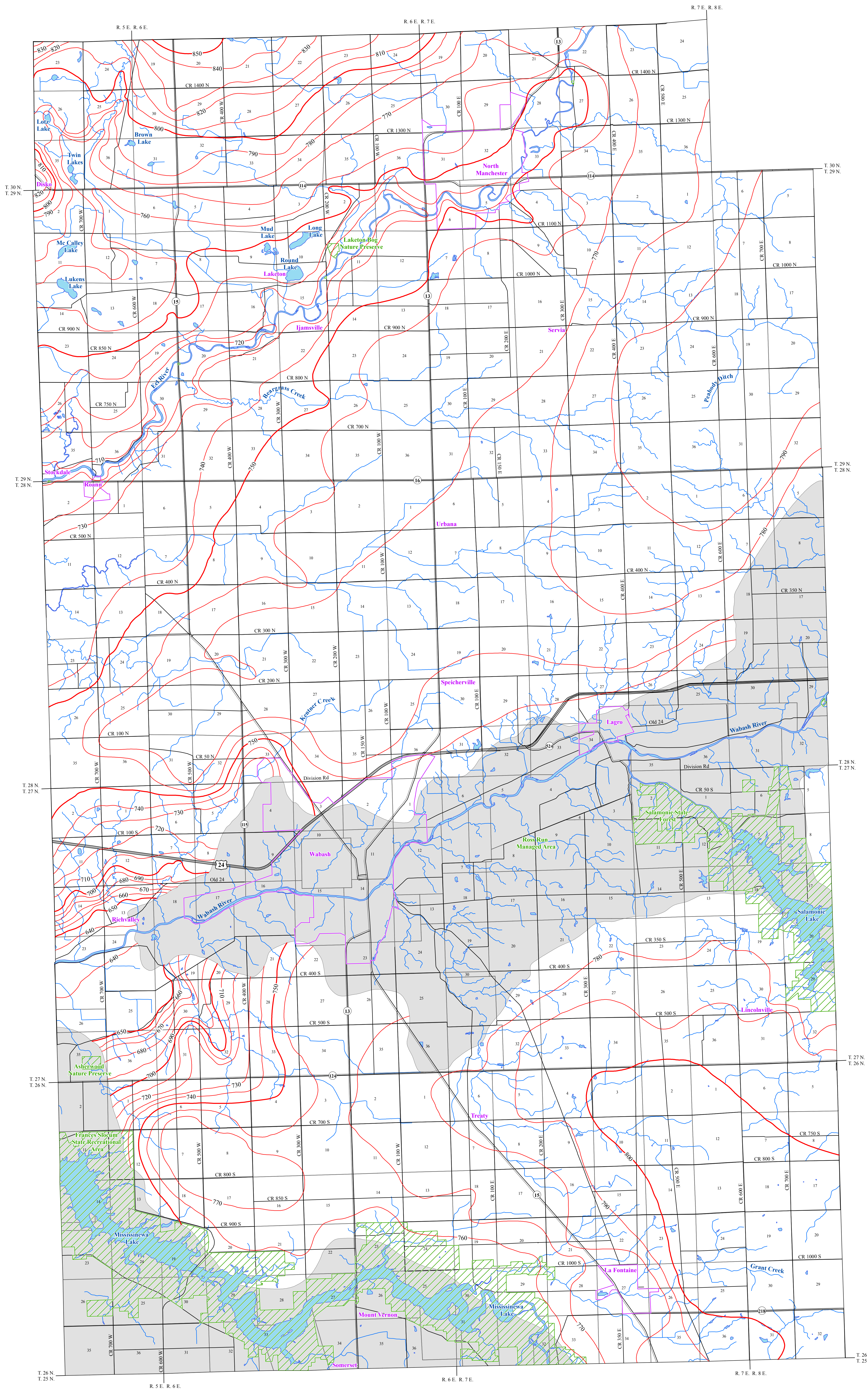
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Unconsolidated Aquifer Systems of Wabash County, Indiana

by
Glenn E. Grove
Division of Water, Resource Assessment Section
November 2007

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



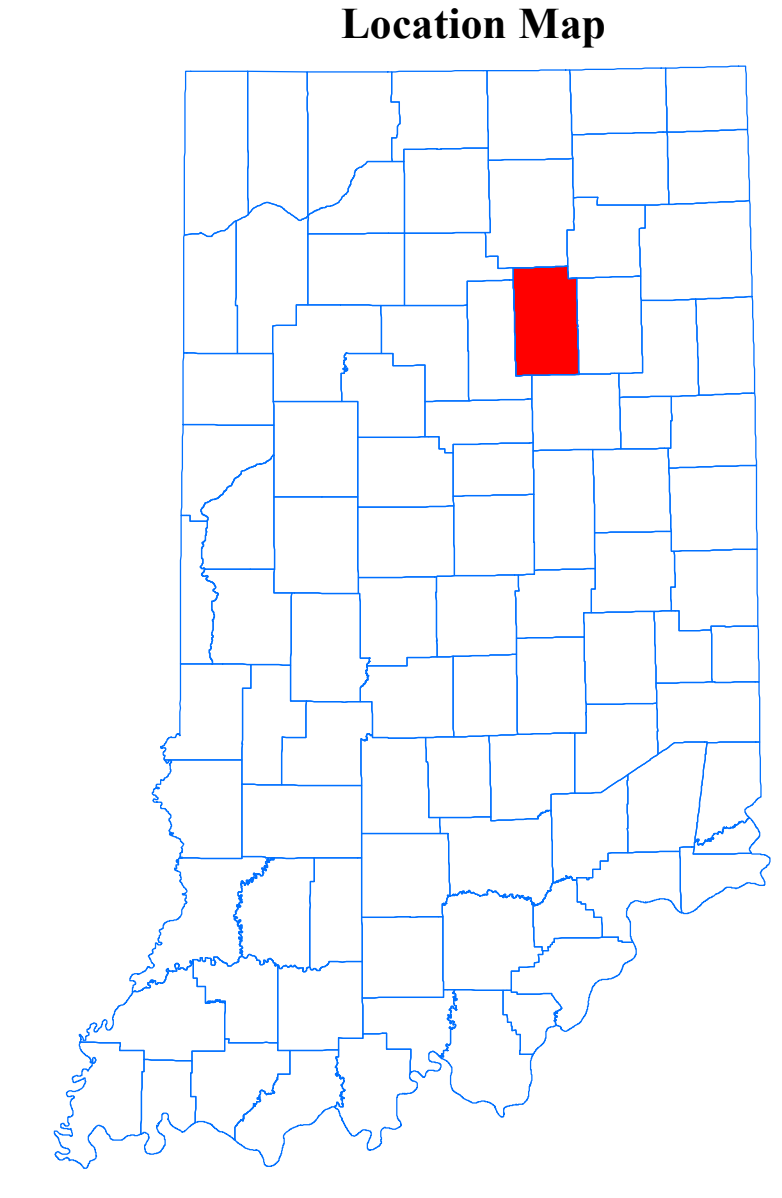
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The mapped potentiometric surface (PSM) contour elevations represent lines of equal elevation relative to the measured groundwater levels in wells. In general, wells completed in a confined aquifer system are bound by impermeable layers and will have static water levels under hydrostatic pressure causing the water level to rise above the elevation of the aquifer resource. In contrast, an unconfined aquifer system is not bound by impermeable layers; therefore, the water level will not be under hydrostatic pressure and will not rise above the aquifer resource. 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 Wabash County well depths 100 feet or less were a priority in mapping the potentiometric surface. However, portions of Wabash 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 535 unconsolidated water well records in the county located that are within the priority depth range.

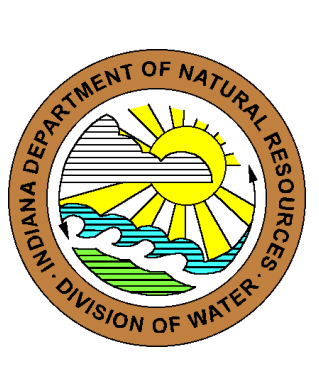
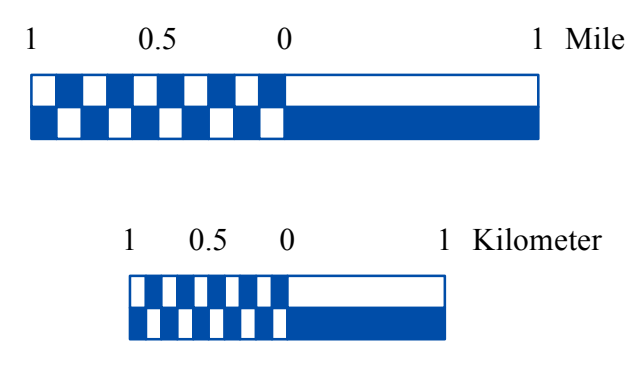
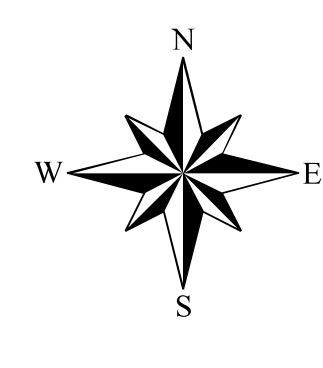
Potentiometric surface elevations range from a high of 850 feet mean sea level (msl) in the northwest corner of the county, to a low of 640 feet msl in the west-central part of the county along the Wabash River. Generalized groundwater flow direction for Wabash County is towards major drainage relevant to the basin. Therefore, in the Upper Wabash River Basin, groundwater flow is towards the Wabash River and its major tributaries. These include the Eel River to the north, the Salamonie River in the east-central part of the county, and the Mississinewa River to the south.



Hillshade Map of Wabash County, Indiana



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



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Potentiometric Surface Map of the Unconsolidated Aquifers of Wabash County, Indiana

by
Randal D. Maier
Division of Water, Resource Assessment Section

June 2013

Map generated by Joel Sanderson
Indiana Department of Natural Resources,
Division of Water, Resource Assessment Section

Wabash County

