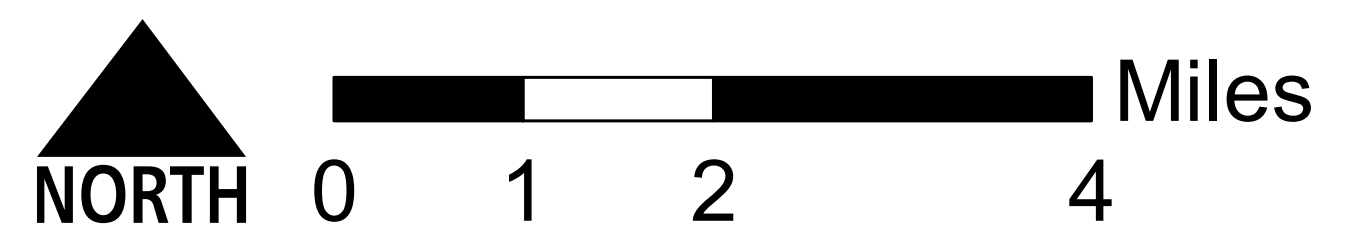
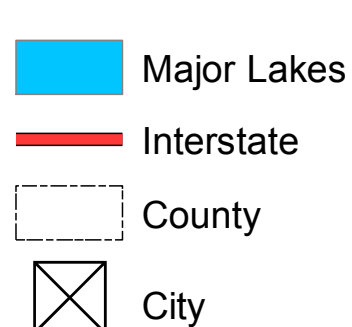
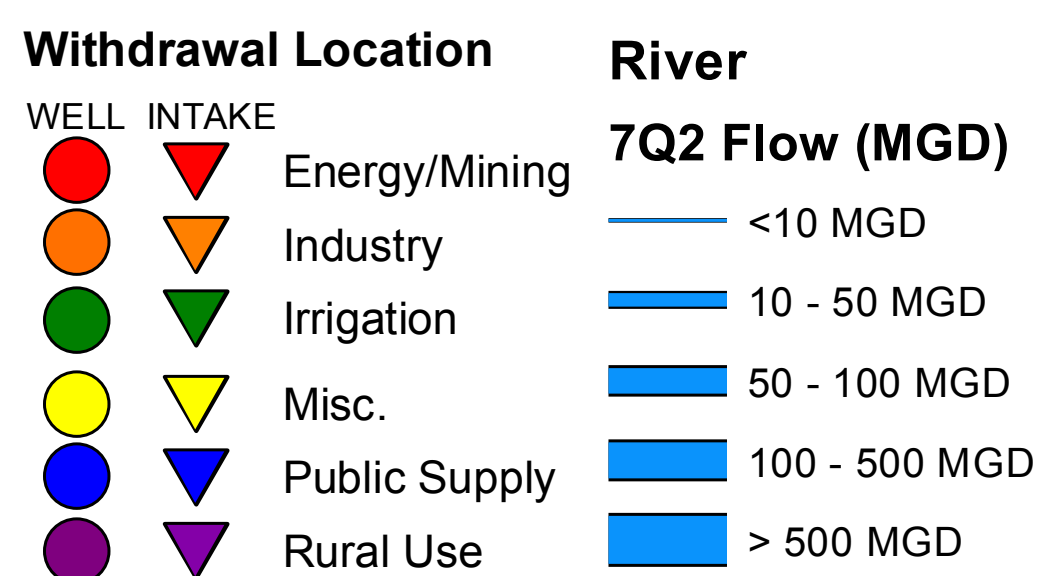
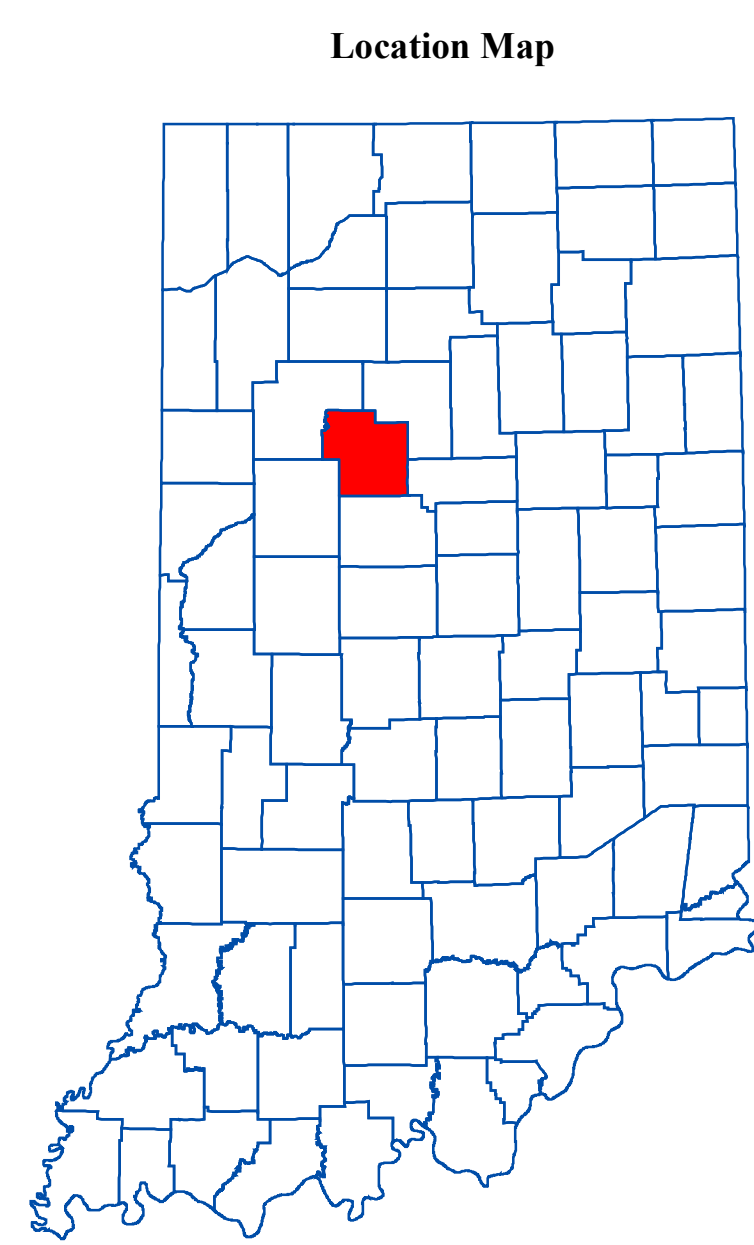
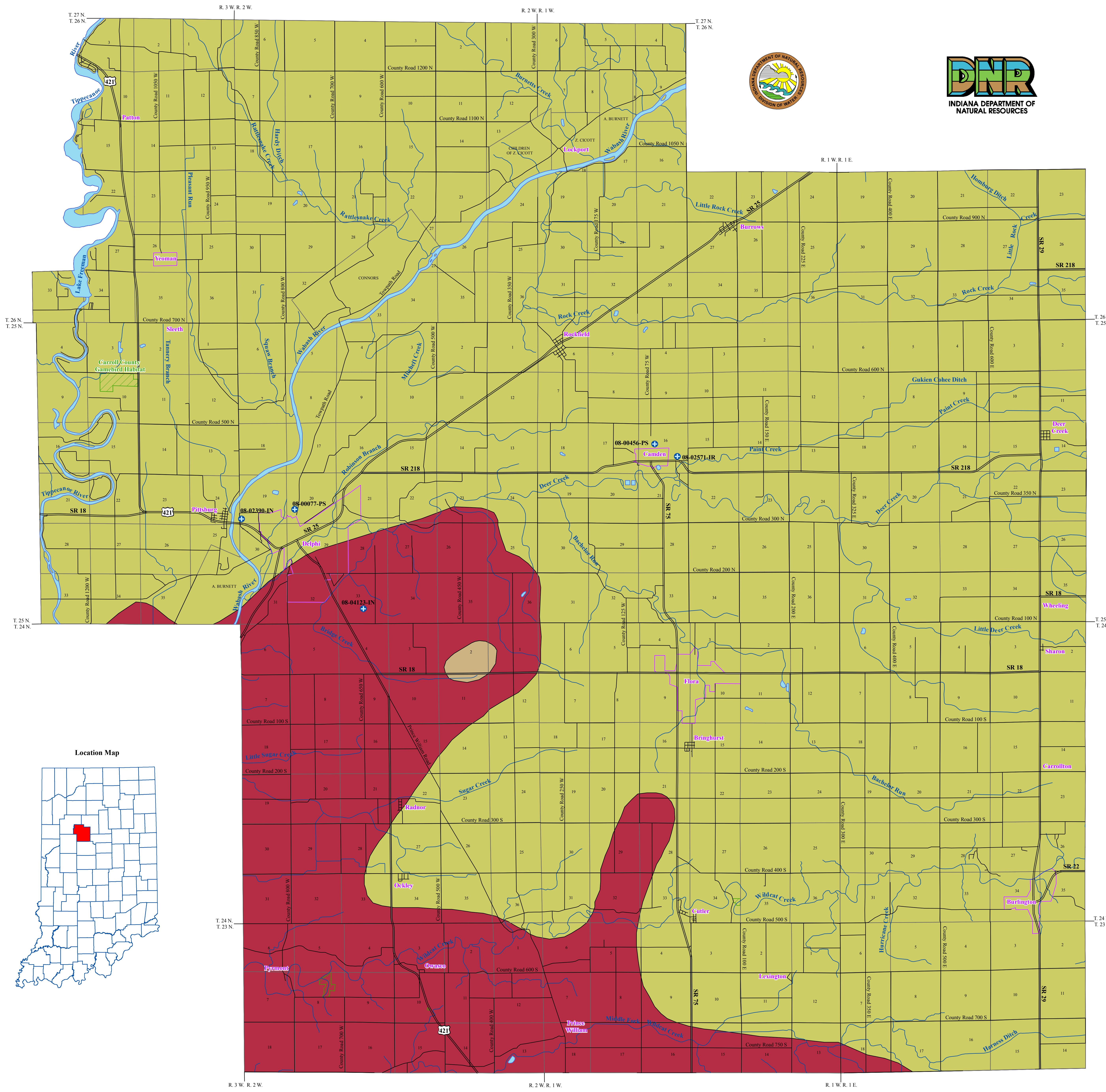


# Water Resources and Use in Carroll County

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



# BEDROCK AQUIFER SYSTEMS OF CARROLL 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 up to 300 feet. 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 Carroll County. They are, from 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 twenty-three 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 subgroups in a small area located in the south-central portion of Carroll 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 Carroll County is overlain by unconsolidated deposits with a maximum thickness ranging from 50 to 100 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 wells completed in it typically have quite limited yields. There is only one reported well completed in the Borden Group for Carroll County. This well is 143 feet deep and penetrates 83 feet of bedrock. The yield for the domestic well is 3 gallons per minute (gpm) and the static water level is reported to be 10 feet below the land surface.

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. This, along with the overlying, typically fine-grained clay materials, puts most of the Borden Group Aquifer System in Carroll County 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 subgroups mostly in the southwestern portion of Carroll County. There are a limited number of reported wells completed in the system in this county. Typically domestic wells either produce from the overlying unconsolidated deposits or 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. This system is often described as an aquitard, and yields of wells completed in it are typically quite limited. The wells utilizing the New Albany Shale Aquifer System in Carroll County have reported depths ranging from 90 to 240 feet deep. The amount of rock penetrated in this system ranges from 5 to 70 feet. The water wells completed in this system are generally capable of meeting the needs of the domestic user. The reported yields for the domestic wells range from 2 to 10 gpm. The static water levels are reported to range from 20 to 65 feet below the land surface.

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

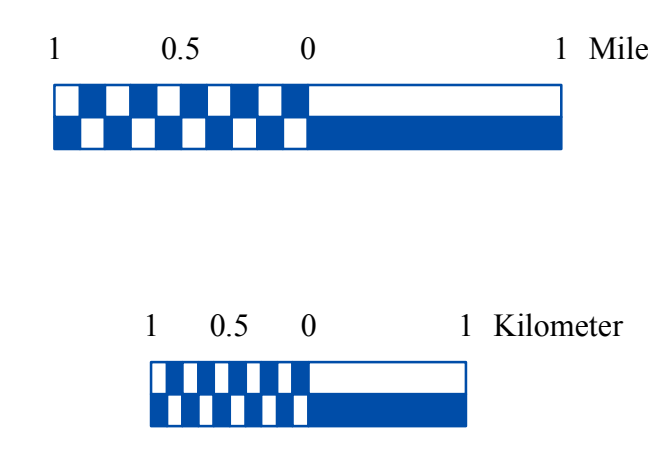
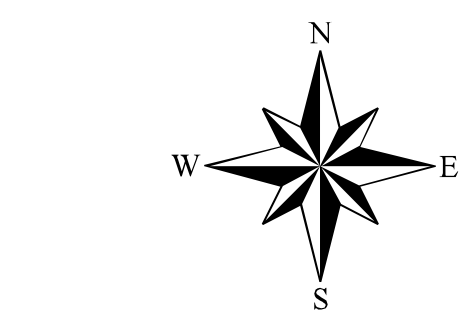
In Carroll County this aquifer system consists primarily of middle Devonian age carbonates of the Mississippian Group and underlying Silurian carbonates. Because individual units of the Silurian and Devonian systems consist of similar carbonate rock types and cannot easily be distinguished on the basis of water well records, they are considered as a single water-bearing system.

Wells utilizing the Silurian and Devonian Carbonates Aquifer System in Carroll County have reported depths commonly ranging from 100 to 200 feet, but some have been reported up to 300 feet deep. The amount of rock penetrated in this system typically ranges from 10 to 75 feet. Water wells completed in this system are generally capable of meeting the needs of domestic users. Typical yields for domestic wells range from 15 to 70 gpm. Static water levels commonly range from 15 to 65 feet below the land surface. There are five registered significant ground-water withdrawal facilities (16 wells) in this system in Carroll County. High-capacity well yields up to 1000 gpm are reported.

This aquifer system has a low susceptibility to surface contamination due to thick clay deposits over most of the county. However, the Silurian and Devonian Carbonate Aquifer System is moderately to highly susceptible where overlain by sand and gravel and in places where clay aquitards are absent.

### EXPLANATION

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

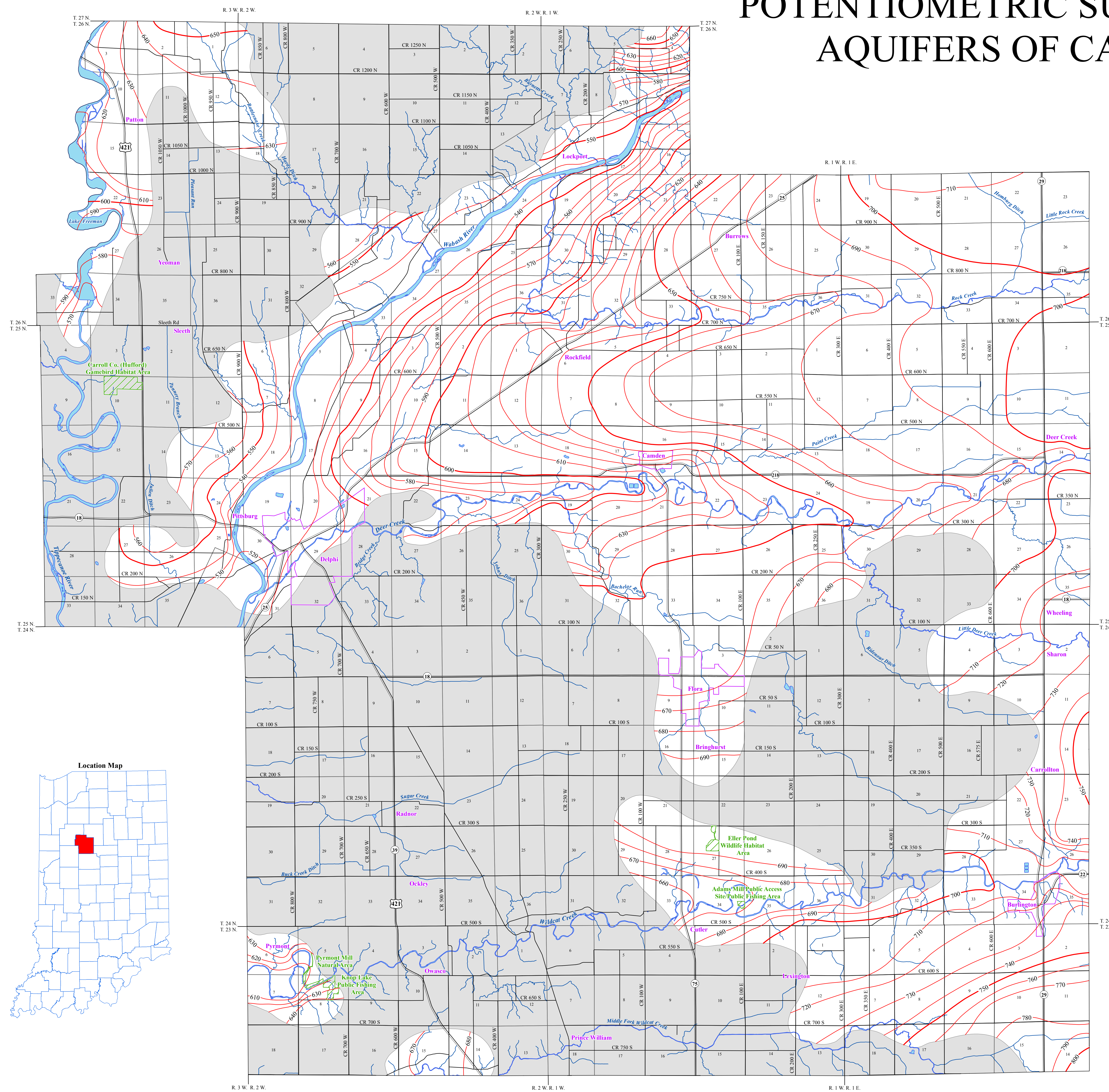
This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale, except the Bedrock Geology of Indiana (polygon shapefile, 20020318), which was at a 1:500,000 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 Carroll County, Indiana

by  
Robert A. Scott  
Division of Water, Resource Assessment Section

February 2009

# POTENTIOMETRIC SURFACE MAP OF THE BEDROCK AQUIFERS OF CARROLL COUNTY, INDIANA



Carroll County, Indiana is located in the north-central section of the state and lies within the Upper Wabash River Basin. The Potentiometric Surface Map (PSM) of the bedrock aquifers of Carroll County is mapped by contouring the elevations of 910 static water-levels reported on well records received primarily over a 50 year period. These wells are completed in aquifers at various depths, and typically, under confined conditions (bounded by impermeable layers above and below the water bearing formation). However, some wells are 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 is at atmospheric pressure and will not rise in a well above the top of the aquifer, in a confined aquifer which is under hydrostatic pressure and will rise in a well above the top of the water bearing formation.

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 pumping. Therefore, measured static water-levels in an area may differ due to local or seasonal variations. Because fluctuations in groundwater are typically small, static water-levels can be used to construct a generalized PSM. As a general rule, but certainly not always, groundwater flow approximates the overlying topography and intersects the land surface at major streams.

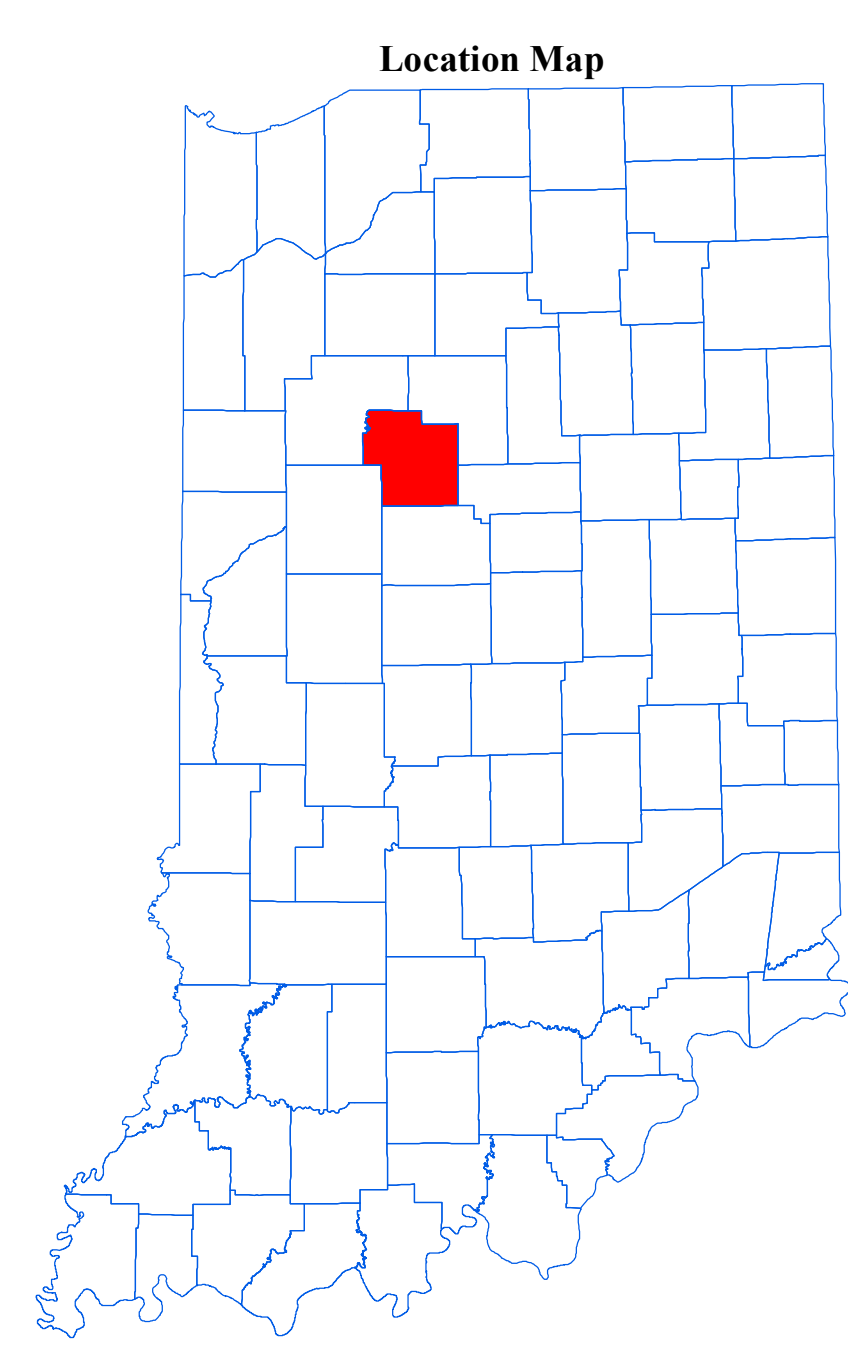
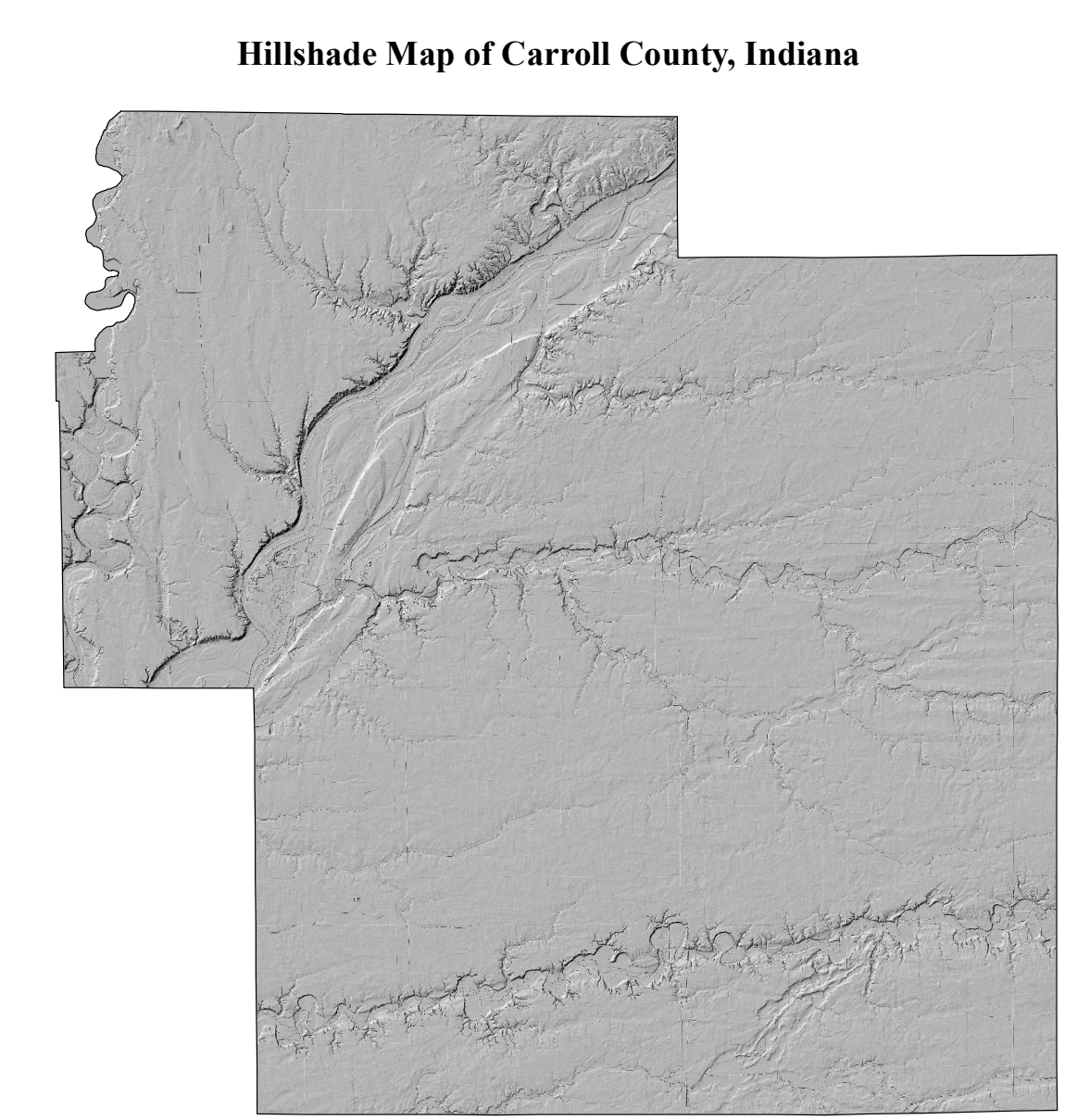
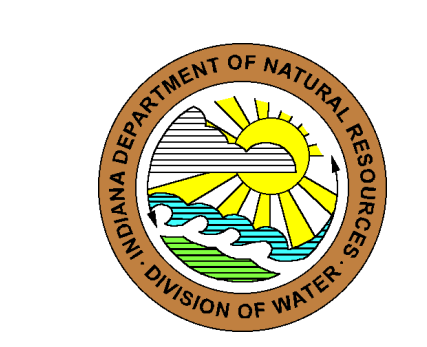
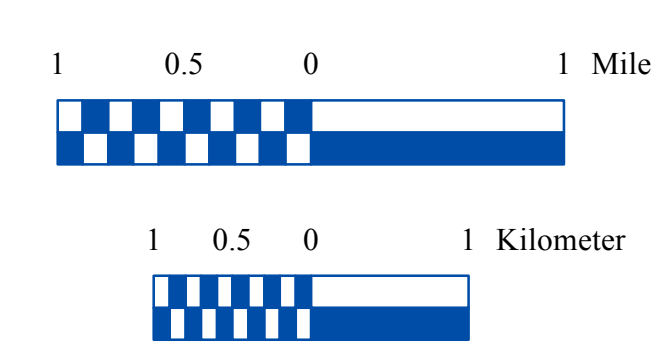
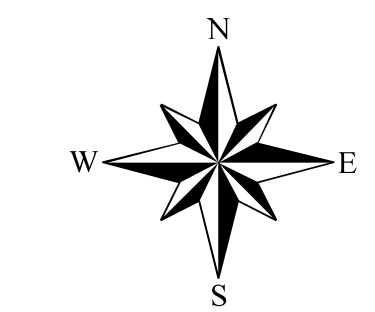
Universal Transverse Mercator (UTM) coordinates for the water wells are either physically obtained in the field, determined through address geocoding, or reported on water well records. The location of the majority of the water well records used to make the PSM are field verified. Elevation data are obtained from a digital elevation model. Quality control/quality assurance procedures are utilized to refine or remove data where errors are readily apparent.

Potentiometric surface elevations range from a high of 800 feet mean sea level (msl) in the southeastern corner of the county, to a low of 520 feet msl along the Wabash River in the west-central portion. The potentiometric contour lines crossing through Lake Freeman represents the potentiometric surface of the groundwater in the immediate area, not the water level of the reservoir, which is a man-made feature. Additionally, long-term high-capacity pumping in the bedrock aquifer is causing local drawdown in the Delphi area. Flowing wells have been reported within the bedrock aquifers within Carroll County along Wildcat Creek, Deer Creek, Bachelor Run and the Tippecanoe River. Groundwater flow direction in the west-central and north-central portions of the county is generally towards the Wabash River and trends toward the southwest. In the northwestern part of the county, groundwater flow direction is generally to the west-southwest toward the Tippecanoe River, and in the eastern and southern portions of the county the flow is generally westward, or towards Wildcat Creek, Deer Creek and Rock Creek. Bedrock potentiometric surface elevation contours have not been extended through the western and southern portions of the county. These areas are lacking in data and/or covered by more prolific unconsolidated deposits that limit the necessity to complete wells in bedrock.

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.

### 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



### 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.

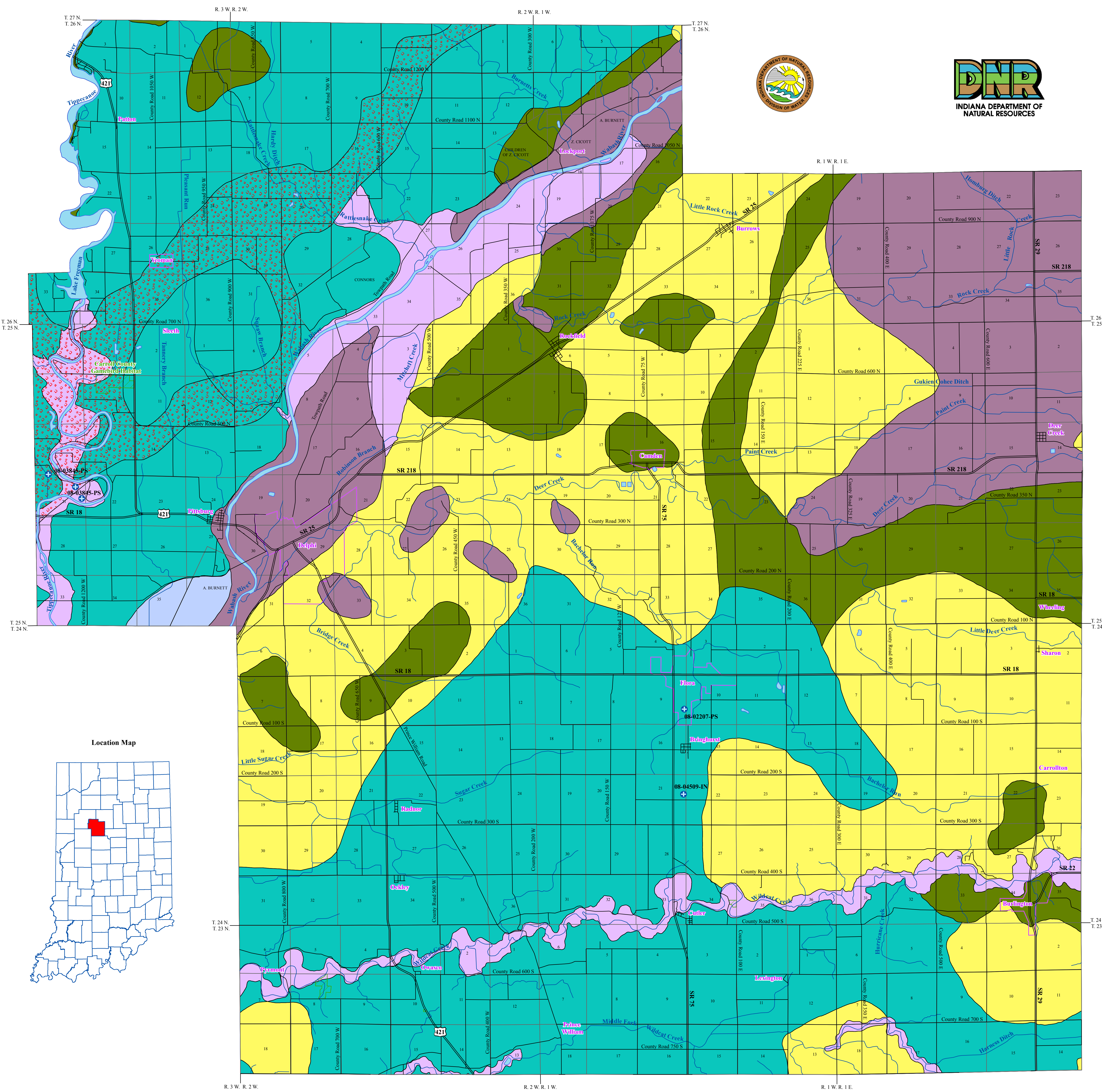
This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map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

This map is 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), are all from the Indiana Geological Survey and based on a 1:24,000 scale. Roads (TIGER and NDOT) (line shapefile, 2005) is from the Indiana Department of Transportation and based on a 1:100,000 scale. System1 (line shapefile, 2003) is from the Indiana Department of Transportation and based on a 1:24,000 scale. Incorporated Areas in Indiana 2000 (polygon shapefile, 20021000) is 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), and Lakes (NHID) (polygon shapefile, 20081218) are from the U.S. Geological Survey and based on a 1:24,000 scale. Managed Lands IDNR IN (polygon shapefile, 20100920) is from the Indiana Department of Natural Resources and based on a 1:24,000 scale. Digital Elevation Model image is derived from the Indiana Ortho/LIDAR Statewide Collection Program (2011) Carroll County Bedrock No-Aquifer Material or Limited Data (polygon shapefile, Grove, 2013) and Potentiometric Surface Contours of the Bedrock Aquifers of Carroll County, Indiana (line shapefile, Grove, 2013) are based on a 1:24,000 scale.

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

**Potentiometric Surface Map of the Bedrock Aquifers of Carroll County, Indiana**  
by  
Glenn E. Grove  
Division of Water, Resource Assessment Section  
December 2013

# UNCONSOLIDATED AQUIFER SYSTEMS OF CARROLL COUNTY, INDIANA



Six unconsolidated aquifer systems have been mapped in Carroll County: the Tipton Veneer, the Tipton / Iroquois Till, the Tipton / Iroquois Till Subsystem, the Tipton / Iroquois Complex, the Wabash River and Tributaries Outwash, and the Wabash River and Tributaries Outwash Aquifer Subsystem. Boundaries of all aquifer systems described are commonly gradational and individual aquifers may extend across aquifer system boundaries.

The thickness of unconsolidated deposits in Carroll County is quite variable, due to glacial material that has been deposited over an uneven bedrock surface. The thickness of unconsolidated deposits ranges from less than 50 feet near Delphi to over 300 feet along the Lafayette (Teays) Bedrock Valley System, which trends from northeast, near Burnetts Creek, to the west-southwest at the Tippecanoe River in the 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.

### Tipton Veneer Aquifer System

In Carroll County, the Tipton 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 outwash deposits overlying shallow bedrock. The Tipton Veneer Aquifer System in Carroll County is primarily mapped in places along the Wabash River and in the northeastern portion of the county. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county. Aquifer layers utilized in the Tipton Veneer Aquifer System are generally up to 10 feet thick sands and/or gravels. These sands and gravels are overlain by a till cap which is commonly 5 to 20 feet thick.

There is little potential for ground-water production in this system in Carroll County. Potential aquifers within this system include thin isolated sand and/or 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. The depth of the few wells completed in the Tipton Veneer Aquifer System range from 25 to 40 feet deep with static water levels between 15 and 25 feet below the surface. The majority of the wells have reported capacities of less than 10 gallons per minute (gpm). There are no registered significant ground-water withdrawal facilities in this system in Carroll County.

This system is generally not very susceptible to contamination from surface sources because of the low permeability of the near-surface materials. However, areas where protective clay layers are thin or absent are susceptible to contamination.

### Tipton / Iroquois Till Aquifer System

In Carroll County, the unconsolidated thickness of this aquifer system ranges from about 100 feet to over 200 feet in the central and eastern portions of the county. Wells completed in the Tipton / Iroquois Till Aquifer System are capable of meeting the needs of most domestic users in Carroll County. However, approximately 35 percent of wells started in this system utilize the underlying bedrock aquifer. Saturated aquifer materials include sand and/or gravel deposits that are commonly 5 to 15 feet thick and are generally overlain by 40 to 75 feet of till. Wells producing from the Tipton / Iroquois Till Aquifer System are typically 50 to 95 feet deep. Domestic well capacities are commonly 15 to 50 gpm. Static water levels generally range from 15 to 40 feet below the surface. There are no registered significant ground-water withdrawal facilities in this system in Carroll County.

The Tipton / Iroquois 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 where surficial clay deposits are thin.

### Tipton / Iroquois Till Aquifer Subsystem

The subsystem is mapped similar to the Tipton / Iroquois Till Aquifer System. However, potential aquifer materials are typically thinner and potential yield is generally less in the subsystem than in the Tipton / Iroquois Till Aquifer System. The unconsolidated material in this subsystem ranges from about 50 to 150 feet thick. Potential aquifer materials include thin intertill sand and gravel deposits. Where present, aquifer materials are typically capped by till that is commonly 45 to 75 feet thick.

Approximately 75 percent of wells started in the Tipton / Iroquois Till Aquifer Subsystem are completed in the underlying bedrock aquifer system in Carroll County. However, this subsystem is capable of meeting the needs of some domestic users in the county. The few wells producing from the Tipton / Iroquois Till Aquifer Subsystem are generally completed at depths of 60 to 90 feet. Intertill sand and gravel aquifer materials are typically 2 to 10 feet thick. Reported well yields generally range from 10 to 15 gpm and static water levels are commonly 20 to 50 feet below the surface. There are no registered significant ground-water withdrawal facilities in this system in Carroll County.

This subsystem is generally not very susceptible to surface contamination because intertill sand and gravel units are overlain by thick till deposits. However, in some areas where aquifers are shallow and overlying clay deposits are thin, the system is at moderate risk.

### Tipton / Iroquois Complex Aquifer System

The Tipton / Iroquois Complex Aquifer System is characterized by unconsolidated deposits that are quite variable in materials and thickness. Aquifers within the system range from thin to thick and include single or multiple intertill sands and gravels. The aquifers are highly variable in depth and lateral extent and are typically confined by thick clay layers. The total unconsolidated thickness of the Tipton / Iroquois Complex Aquifer System generally ranges from about 150 feet to over 300 feet in Carroll County.

This system is capable of meeting the needs of domestic and most high-capacity users in the county. Aquifer layers utilized in this system are generally 5 to 25 feet thick sands and/or gravels. These sands and gravels are overlain by a till cap which is commonly 55 to 125 feet thick with thin intertill sand and gravel layers. Wells in this system are typically completed at depths ranging from 70 to 150 feet. Domestic well yields are commonly 15 to 70 gpm and static water levels are generally 15 to 65 feet below the surface. There are three registered significant ground-water withdrawal facilities (8 wells) in this system in Carroll County. High-capacity well yields up to 600 gpm are reported.

In northwestern Carroll County, this system overlies the Lafayette (Teays) Bedrock Valley System, which trends from northeast, near Burnetts Creek, to the west-southwest at the Tippecanoe River. The wells completed in this portion of the system produce from both upper and deep sand and gravel aquifers. The wells producing from the upper aquifer range in depth from about 75 feet to 140 feet. The deeper aquifer wells produce from depths up to 195 feet deep. In places, the total saturated thickness exceeds 20 feet.

The Tipton / Iroquois Complex Aquifer System is generally not susceptible to contamination because it is typically overlain by thick clay deposits. However, where surficial clay thickness is thin or not present these areas are at moderate to high risk to surface contamination.

### Wabash River and Tributaries Outwash Aquifer System

The Wabash River and Tributaries Outwash Aquifer System is mapped along a small section of the Wabash River in Carroll County. In places, sand and gravel from the melting glaciers (outwash) were deposited in the stream valleys. There are only two reported wells in the Wabash River and Tributaries Outwash Aquifer System for Carroll County and these wells were completed at depths of 73 and 74 feet. Both wells have a sand and gravel aquifer that is 61 feet thick and the aquifers are capped by 11 and 13 feet of clay, respectively. The wells have reported yields ranging up to 1000 gpm and were developed for public water supply; however, they are currently not utilized. 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

The Wabash River and Tributaries Outwash Aquifer Subsystem is mapped along Wildcat Creek, portions of the Wabash River, Tippecanoe River, and Middle Fork Wildcat Creek in Carroll County. The system is made up of thick, glacially derived outwash deposits.

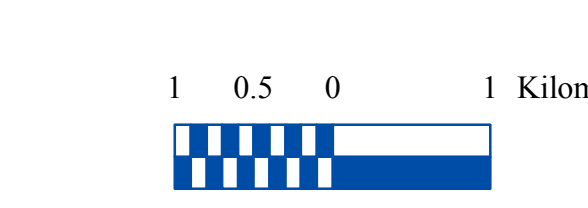
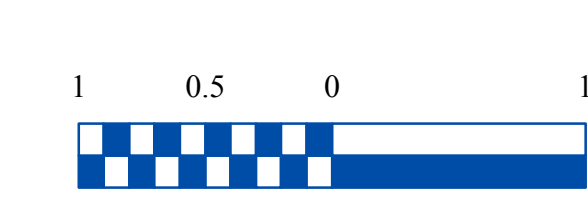
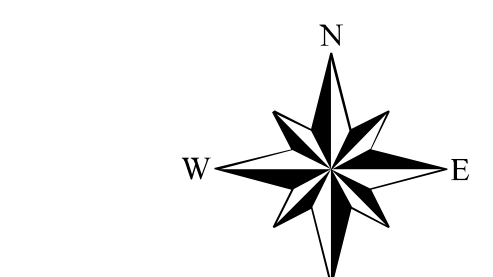
This subsystem is capable of meeting the needs of domestic users in the county. The few wells producing from the Wabash River and Tributaries Outwash Aquifer Subsystem are completed at depths ranging from 45 to 165 feet below surface with up to 25 feet of continuous sand and gravel. In places, aquifer materials are capped by silt or sandy clay ranging from 5 to 40 feet thick. Domestic wells typically yield 20 to 75 gpm with static water levels commonly 10 to 35 feet below surface. There is one registered significant ground-water withdrawal facility (5 wells) in this system in Carroll County. High-capacity well yields up to 100 gpm are reported.

In places, this system overlies segments of the Lafayette (Teays) Bedrock Valley System. The wells completed in this portion of the system produce from both upper and deep sand and gravel aquifers. The wells producing from the upper aquifer range in depth from about 60 to 95 feet. The deeper aquifer wells produce from depths up to 150 feet deep. In places, the total saturated thickness exceeds 30 feet.

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

## EXPLANATION

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

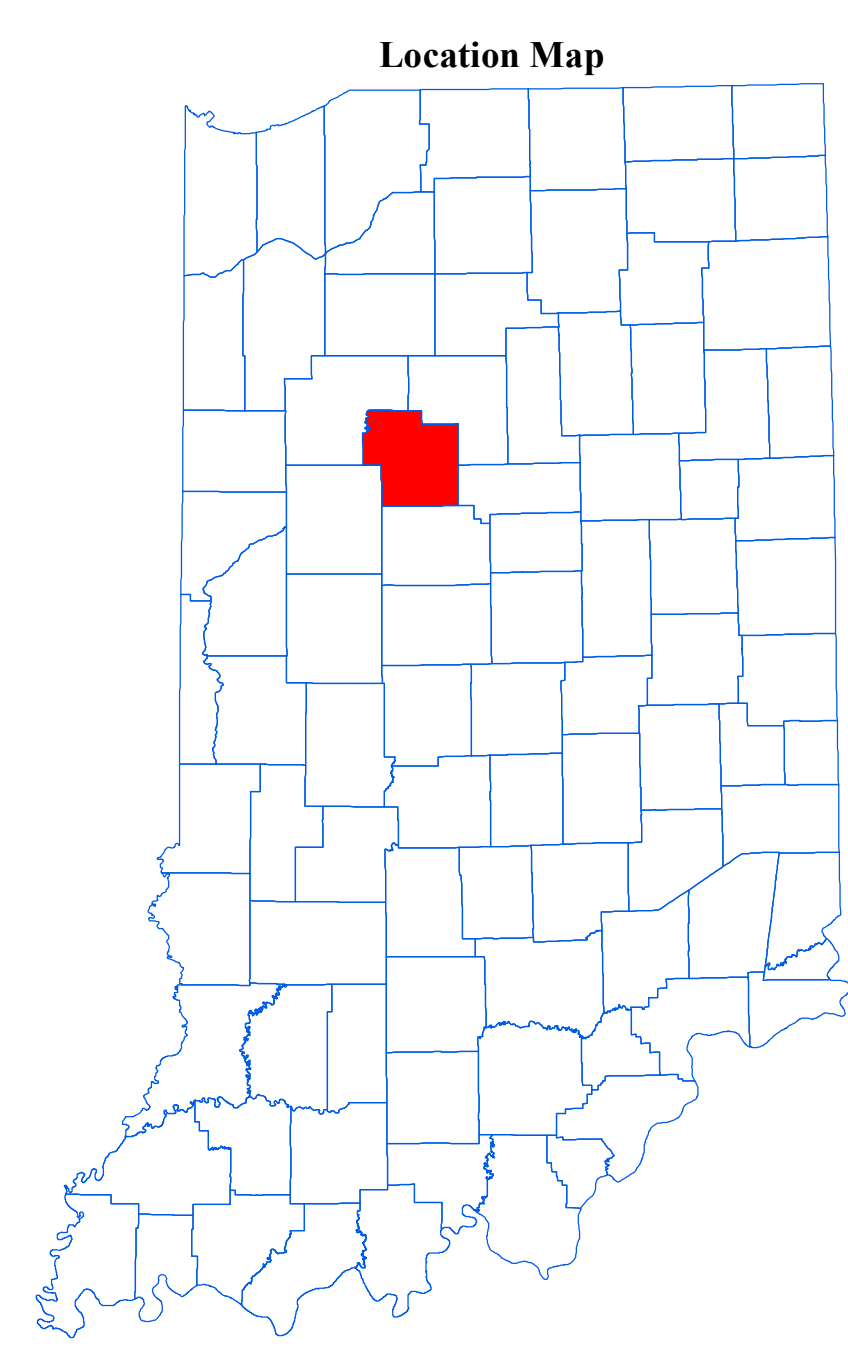
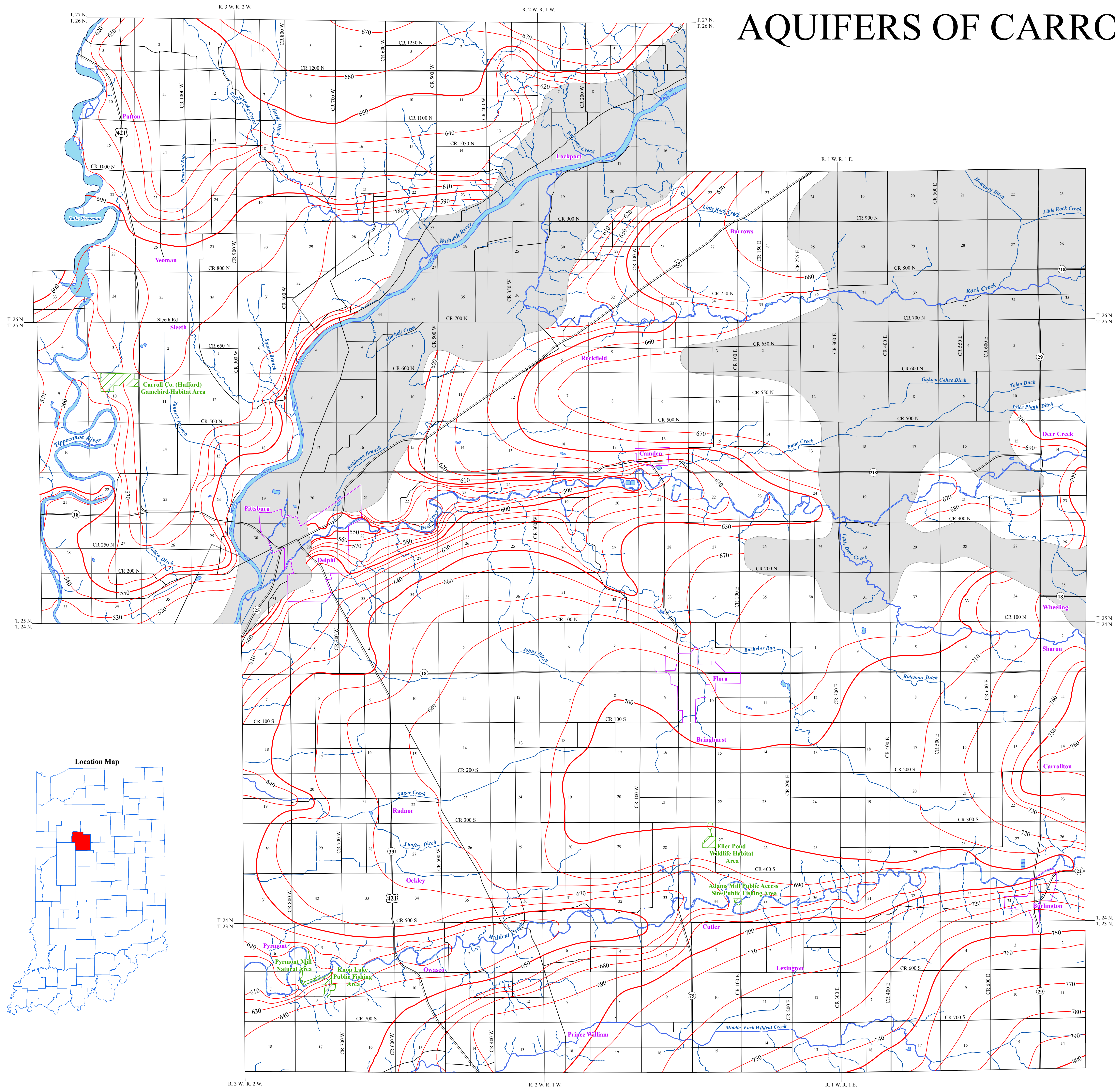
This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale. 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 shape file, various dates) was from IDNR. Unconsolidated aquifer systems coverage (Scott, 2009) was based on a 1:24,000 scale.

## Unconsolidated Aquifer Systems of Carroll County, Indiana

by  
Robert A. Scott  
Division of Water, Resource Assessment Section

February 2009

# POTENTIOMETRIC SURFACE MAP OF THE UNCONSOLIDATED AQUIFERS OF CARROLL COUNTY, INDIANA



Carroll County, Indiana is located in the north-central section of the state and lies within the Upper Wabash River Basin. The Potentiometric Surface Map (PSM) of the unconsolidated aquifers of Carroll County is mapped by contouring the elevations of 1832 static water-levels reported on well records received primarily over a 50 year period. These wells are completed in aquifers at various depths, and typically, under confined conditions (bounded by impermeable layers above and below the water bearing formation). However, some wells are completed under unconfined (not bounded by impermeable layers) settings. The mapped potentiometric surface contours are primarily for the upper 100 feet of the unconsolidated materials and utilize data for wells 100 feet or less in depth. If the shallow data was sparse or unavailable in an area, deeper wells are used to complement the mapping.

The potentiometric surface is a measure of the pressure on water in a water bearing formation. Water in an unconfined aquifer is at atmospheric pressure and will not rise in a well above the top of the aquifer, in contrast to groundwater in a confined aquifer which is under hydrostatic pressure and will rise in a well above the top of the water bearing formation.

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 pumping. Therefore, measured static water-levels in an area may differ due to local or seasonal variations. Because fluctuations in groundwater are typically small, static water-levels can be used to construct a generalized PSM. As a general rule, but certainly not always, groundwater flow approximates the overlying topography and intersects the land surface at major streams.

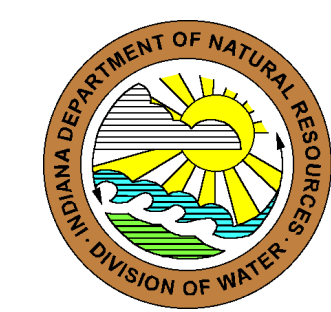
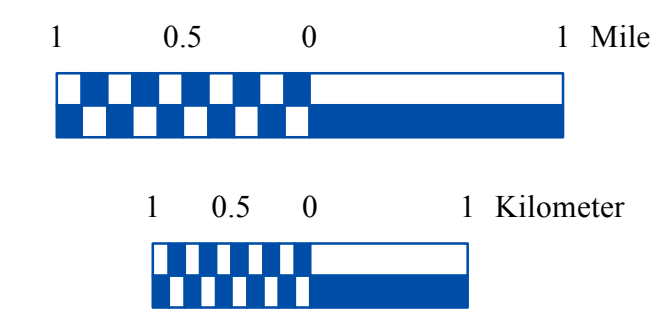
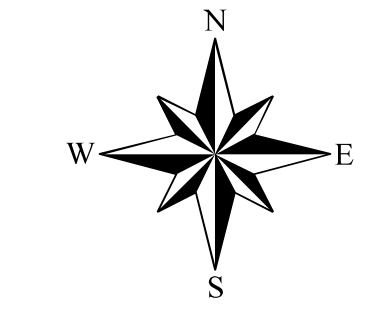
Universal Transverse Mercator (UTM) coordinates for the water wells are either physically obtained in the field, determined through address geocoding, or reported on water well records. The location of the majority of the water well records used to make the PSM are field verified. Elevation data are obtained from a digital elevation model. Quality control/quality assurance procedures are utilized to refine or remove data where errors are readily apparent.

Potentiometric surface elevations range from a high of 800 feet mean sea level (msl) in the southeastern corner of the county, to a low of 520 feet msl along the Wabash River in the west-central portion. The potentiometric contour lines crossing through Lake Freeman represent the potentiometric surface of the groundwater in the immediate area, not the water level of the reservoir, which is a man-made feature. Groundwater flow direction in the west-central and north-central portions of the county is generally towards the Wabash River and trends toward the southwest. In the northwestern part of the county, groundwater flow direction is generally to the west-southwest toward the Tippecanoe River, and in the central and southern portions of the county the flow is generally westward, or towards Wildcat Creek, Deer Creek and Rock Creek. In the northeast and north-central portions of the county, where data is lacking and/or covered by thin or unproductive deposits, potentiometric surface elevation contours have not been extended through these areas.

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.

### 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



Hillshade Map of Carroll County, Indiana



Vertical Exaggeration 3X



### 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 is 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), are all from the Indiana Geological Survey and based on a 1:24,000 scale. Roads (TIGER and NDOT) (line shapefile, 2005) is from the Indiana Department of Transportation and based on a 1:100,000 scale. System1 (line shapefile, 2005) is from the Indiana Department of Transportation and based on a 1:24,000 scale. Incorporated Areas in Indiana 2000 (polygon shapefile, 20021000) is from the U.S. Census Bureau and based on a 1:100,000 scale. Hydrography, Streams (NHDI) (line shapefile, 20081218), Rivers (NHDI) (polygon shapefile, 20081218), and Lakes (NHDI) (polygon shapefile, 20081218) are from the U.S. Geological Survey and based on a 1:24,000 scale. Managed Lands IDNR IN (polygon shapefile, 20100920) is 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). Carroll County Unconsolidated No Aquifer Material or Limited Data (polygon shapefile, Grove, 2013) and Potentiometric Surface Contours of the Unconsolidated Aquifers of Carroll County, Indiana (line shapefile, Grove, 2013) are based on a 1:24,000 scale.

### Potentiometric Surface Map of the Unconsolidated Aquifers of Carroll County, Indiana

by  
Glenn E. Grove

Division of Water, Resource Assessment Section

December 2013

# Carroll County

