

Water Resources and Use in Cass County

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

Withdrawal Location

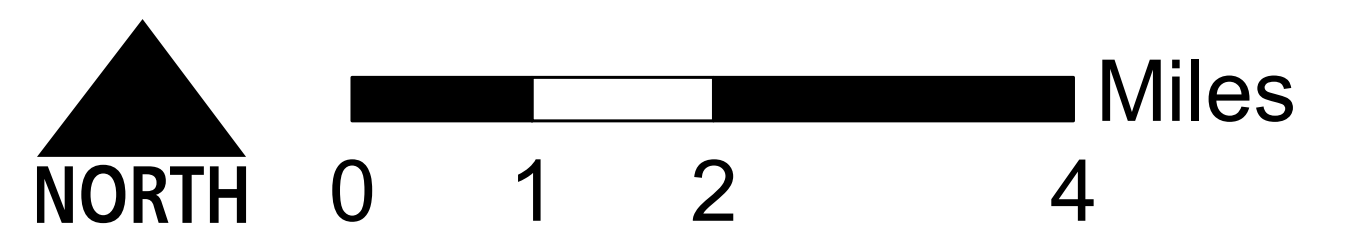
- | WELL INTAKE | |
|---------------------------------------|---------------|
| ● | Energy/Mining |
| ● | Industry |
| ● | Irrigation |
| ● | Misc. |
| ● | Public Supply |
| ● | Rural Use |

River

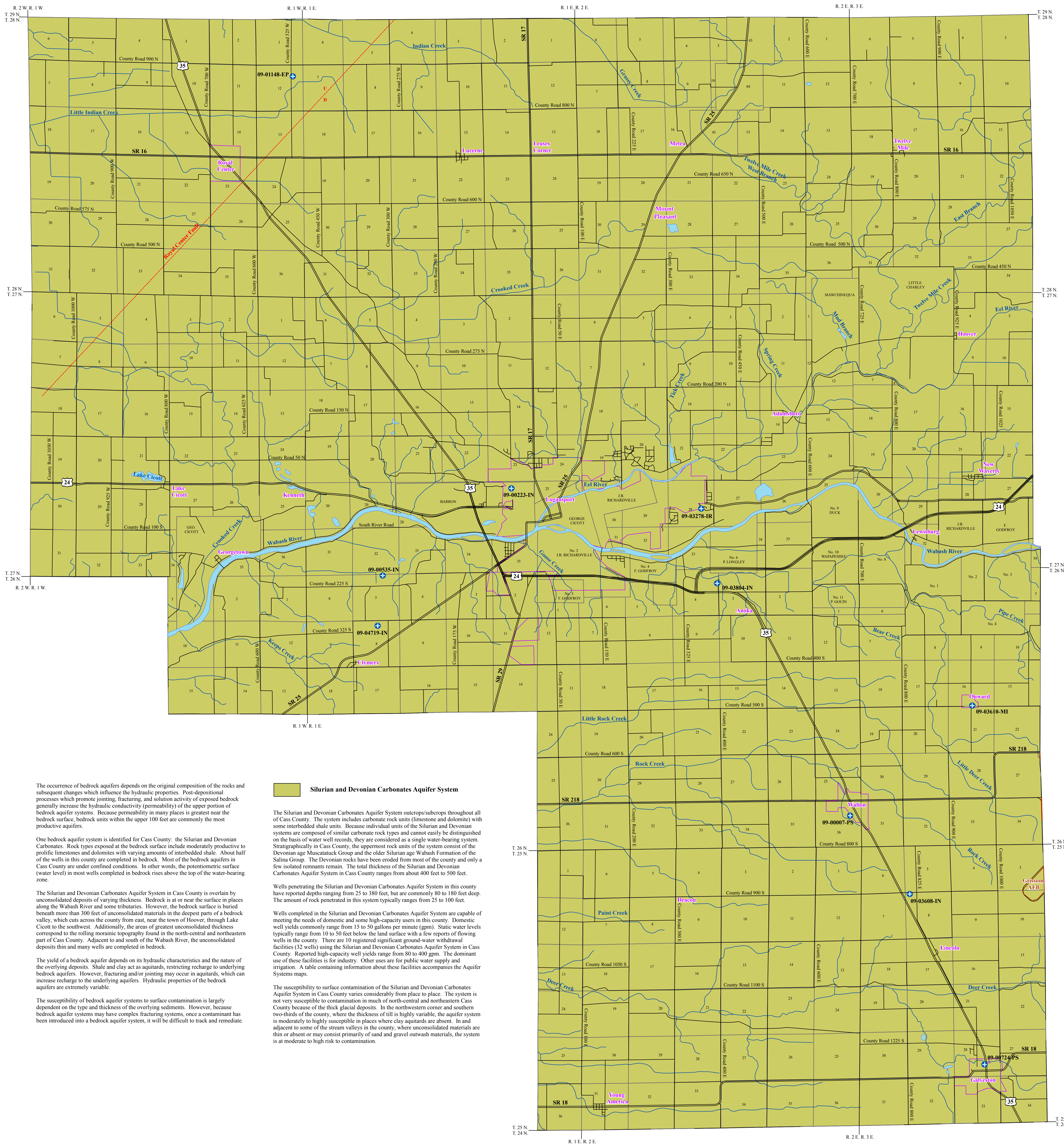
- | 7Q2 Flow (MGD) | |
|--|---------------|
| — (thin) | < 10 MGD |
| — (medium) | 10 - 50 MGD |
| — (thick) | 50 - 100 MGD |
| — (very thick) | 100 - 500 MGD |
| — (thick) | > 500 MGD |

- | | |
|---|-------------|
| ■ | Major Lakes |
| — | Interstate |
| | County |
| X | City |

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS



BEDROCK AQUIFER SYSTEMS OF CASS 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.

One bedrock aquifer system is identified for Cass County: the Silurian and Devonian Carbonates. Rock types exposed at the bedrock surface include moderately productive to prolific limestones and dolomites with varying amounts of interbedded shale. About half of these in this county are completed in bedrock. Most of the bedrock aquifers in Cass 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 Silurian and Devonian Carbonates Aquifer System in Cass County is overlain by unconsolidated deposits of varying thickness. Bedrock is at or near the surface in places along the Wabash River and some tributaries. However, the bedrock surface is buried beneath more than 300 feet of unconsolidated materials in the deepest parts of a bedrock valley, which cuts across the county from east, near the town of Hoover, through Lake Cicott to the southwest. Additionally, the areas of greatest unconsolidated thickness correspond to the rolling morainic topography found in the north-central and northeastern part of Cass County. Adjacent to and south of the Wabash River, the unconsolidated deposits thin and many wells are completed in bedrock.

The yield of a bedrock aquifer depends on its hydraulic characteristics and the nature of the overlying deposits. Shale and clay 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 extremely variable.

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

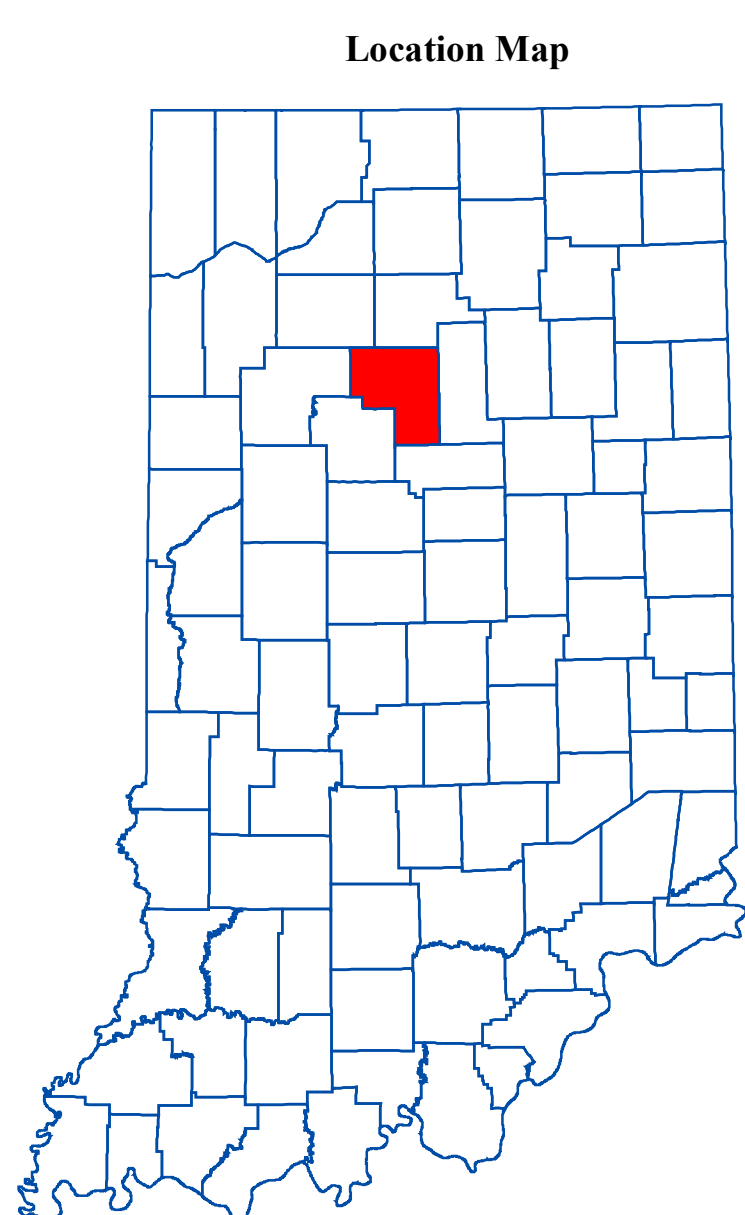
Silurian and Devonian Carbonates Aquifer System

The Silurian and Devonian Carbonates Aquifer System outcrops/subcrops throughout all of Cass County. The system includes carbonate rock units (limestone and dolomite) with some interbedded shale units. Because individual units of the Silurian and Devonian systems are composed 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. Stratigraphically in Cass County, the uppermost rock units of the system consist of the Devonian age Muscatatuck Group and the older Silurian age Wabash Formation of the Salina Group. The Devonian rocks have been eroded from most of the county and only a few isolated remnants remain. The total thickness of the Silurian and Devonian Carbonates Aquifer System in Cass County ranges from about 400 feet to 500 feet.

Wells penetrating the Silurian and Devonian Carbonates Aquifer System in this county have reported depths ranging from 25 to 380 feet, but are commonly 80 to 180 feet deep. The amount of rock penetrated in this system typically ranges from 25 to 100 feet.

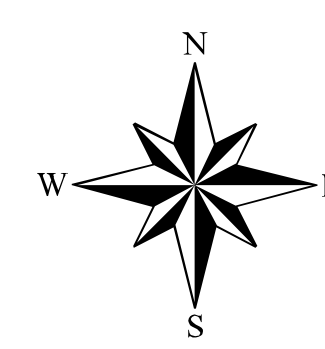
Wells completed in the Silurian and Devonian Carbonates Aquifer System are capable of meeting the needs of domestic and some high-capacity users in this county. Domestic well yields commonly range from 15 to 50 gallons per minute (gpm). Static water levels typically range from 10 to 50 feet below the land surface with a few reports of flowing wells in the county. There are 10 registered significant ground-water withdrawal facilities (32 wells) using the Silurian and Devonian Carbonates Aquifer System in Cass County. Reported high-capacity well yields range from 80 to 400 gpm. The dominant use of these facilities is for industry. Other uses are for public water supply and irrigation. A table containing information about these facilities accompanies the Aquifer Systems maps.

The susceptibility to surface contamination of the Silurian and Devonian Carbonates Aquifer System in Cass County varies considerably from place to place. The system is not very susceptible to contamination in much of north-central and northeastern Cass County because of the thick glacial deposits. In the northwestern corner and southern two-thirds of the county, where the thickness of till is highly variable, the aquifer system is moderately to highly susceptible in places where clay aquitards are absent. In and adjacent to some of the stream valleys in the county, where unconsolidated materials are thin or absent or may consist primarily of sand and gravel outwash materials, the system is at moderate to high risk to contamination.



EXPLANATION

- Registered Significant Ground-Water Withdrawal Facility
- Stream
- County Road
- Royal Center Fault
- State Road & US Highway
- Municipal Boundary
- U.S. Military Base
- 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.

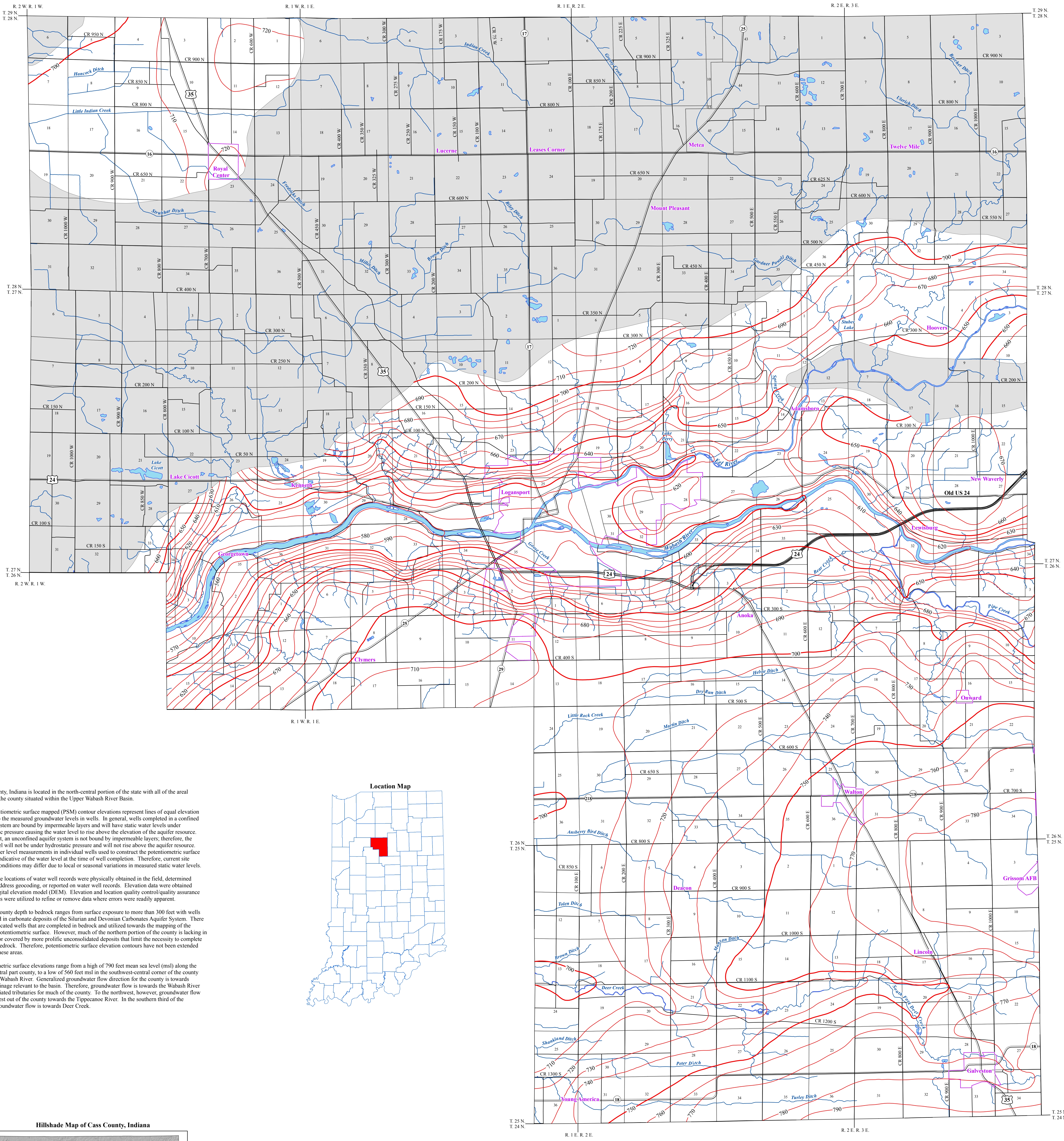
This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 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, 2005), 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. Structural Features of Indiana (line shapefile, 20020718) was from the Indiana Geological Survey and based on various scales.

Bedrock Aquifer Systems of Cass County, Indiana

by
Gerald A. Unterreiner
Division of Water, Resource Assessment Section

August 2008

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



Cass 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.

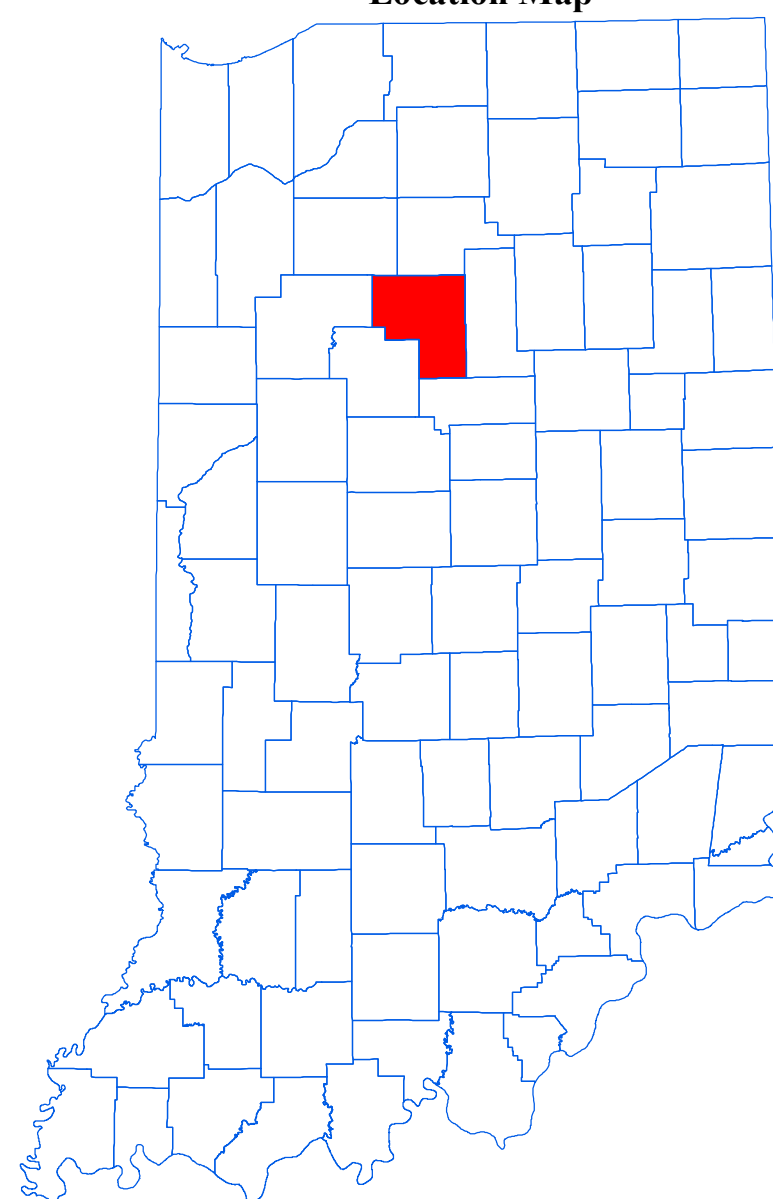
The potentiometric surface mapped (PSM) contour elevations represent lines of equal elevation relative to the measured groundwater levels in wells. In general, wells completed in a confined aquifer system are bound by impermeable layers and will have static water levels under hydrostatic pressure causing 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 obtained from 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 Cass County depth to bedrock ranges from surface exposure to more than 300 feet with wells completed in carbonate deposits of the Silurian and Devonian Carbonates Aquifer System. There are 941 located wells that are completed in bedrock and utilized towards the mapping of the bedrock potentiometric surface. However, much of the northern portion of the county is lacking in data and/or covered by more prolific unconsolidated deposits that limit the necessity to complete wells in bedrock. Therefore, potentiometric surface elevation contours have not been extended through these areas.

Potentiometric surface elevations range from a high of 790 feet mean sea level (msl) along the south-central part county, to a low of 560 feet msl in the southwest-central corner of the county along the Wabash River. Generalized groundwater flow direction for the county is towards major drainage relevant to the basin. Therefore, groundwater flow is towards the Wabash River and associated tributaries for much of the county. To the northwest, however, groundwater flow is southwest out of the county towards the Tippecanoe River. In the southern third of the county groundwater flow is towards Deer Creek.

Location Map



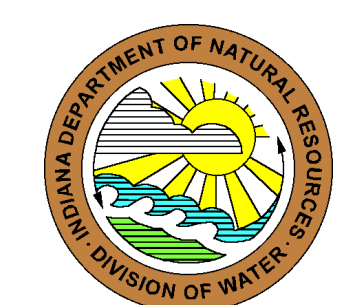
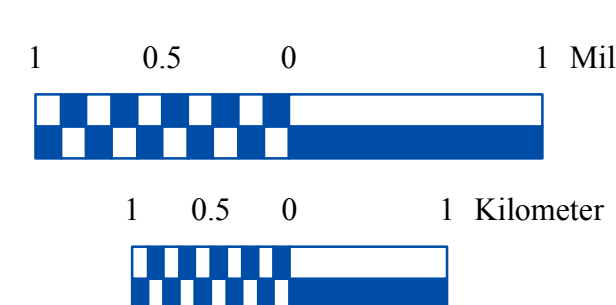
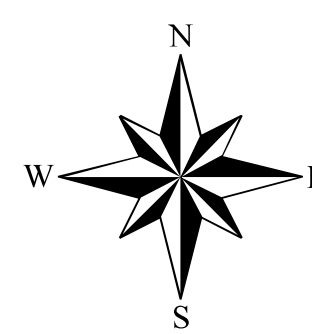
Hillshade Map of Cass County, Indiana



Vertical Exaggeration 3x

EXPLANATION

- 810 Line of equal elevation, in feet above mean sea level
- Potentiometric Contour interval 10 feet
- Stream
- County Road
- State Road
- US Highway
- Municipal Boundary
- 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.

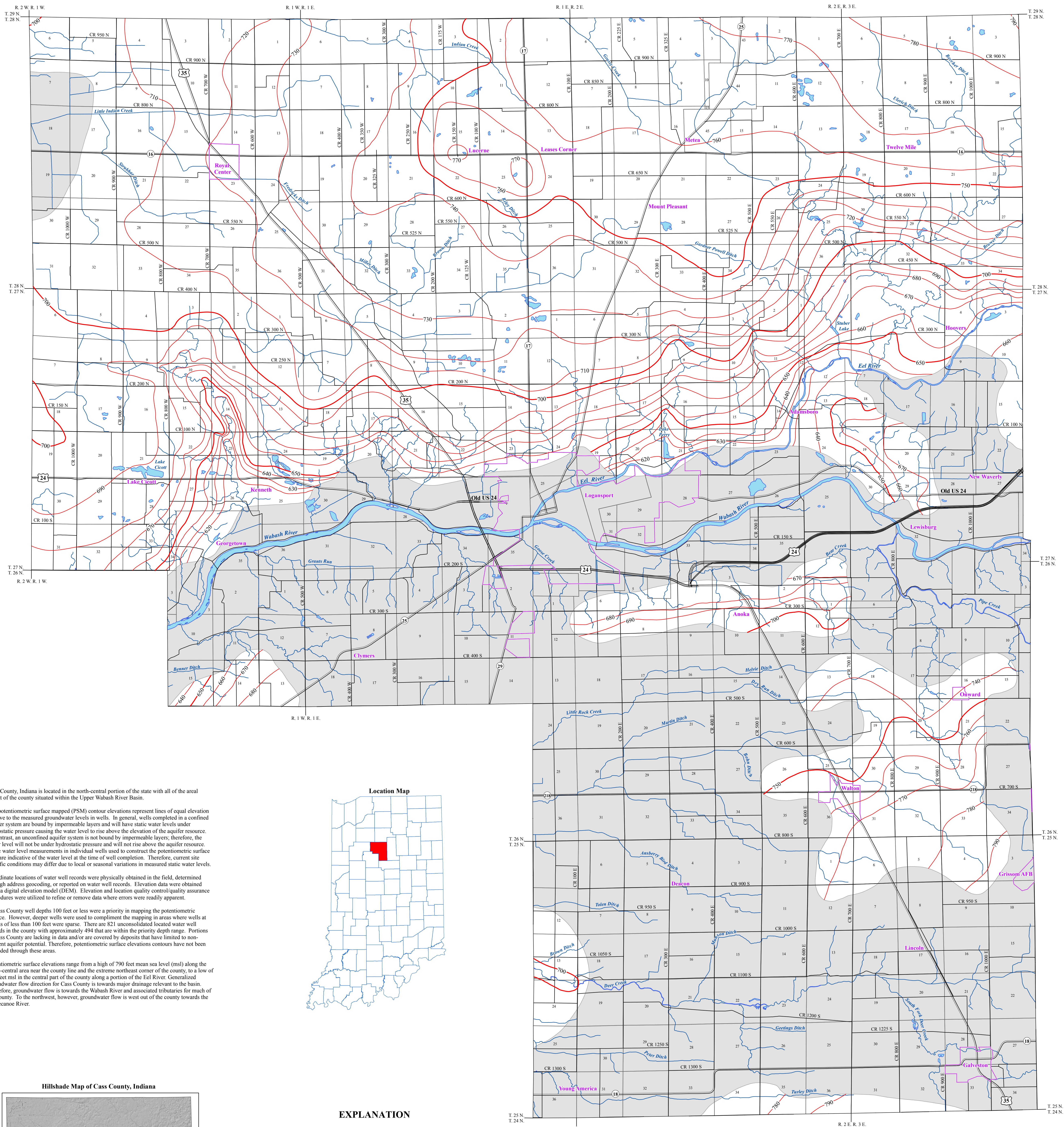
This map is created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), and County Boundaries of Indiana (polygon shapefile, 20020621), are all from the Indiana Geological Survey and based on a 1:24,000 scale. Roads (TIGER and INDOT) (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. Populated 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. Digital Elevation Model image is derived from the Indiana OrthoLIDAR Statewide Collection Program (2011). Cass County Bedrock No Aquifer Material or Limited Data (polygon shapefile, Maier, 2013) and Potentiometric Surface Contours of the Bedrock Aquifers of Cass County, Indiana (line shapefile, Maier, 2013) are based on a 1:24,000 scale.

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

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

December 2013

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



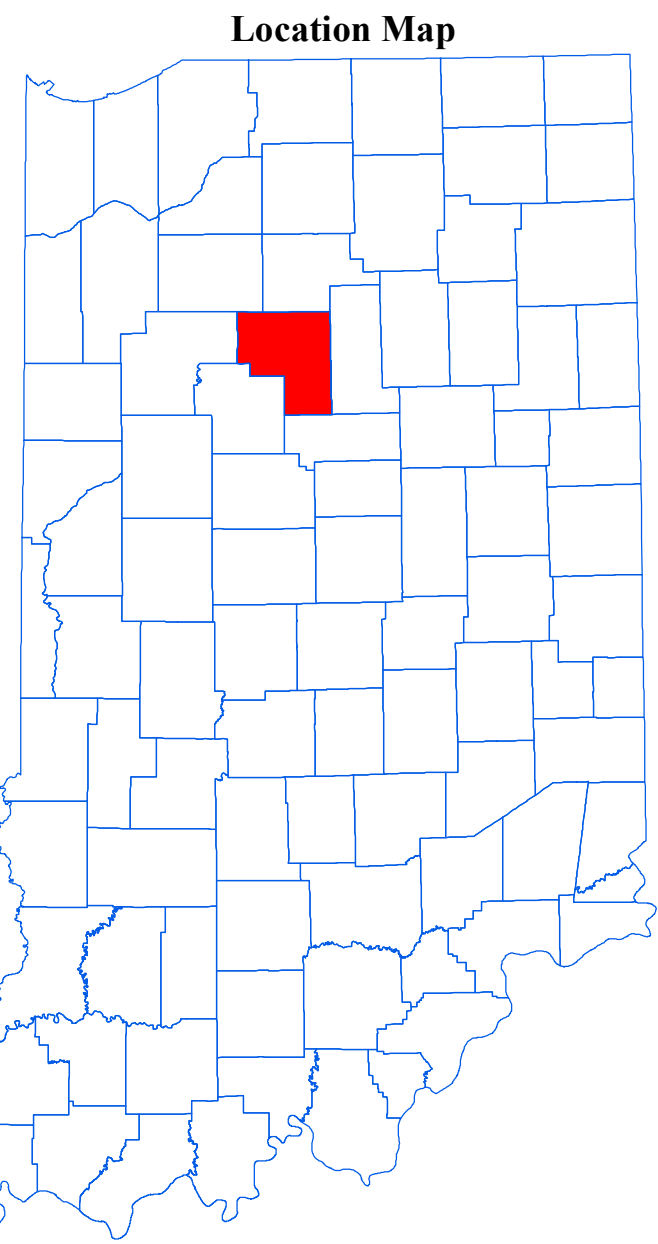
Cass County, Indiana is located in the north-central portion of the state with all of the areal extent of the county situated within the Upper Wabash River Basin.

The potentiometric surface mapped (PSM) contour elevations represent lines of equal elevation relative to the measured groundwater levels in wells. In general, wells completed to 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.

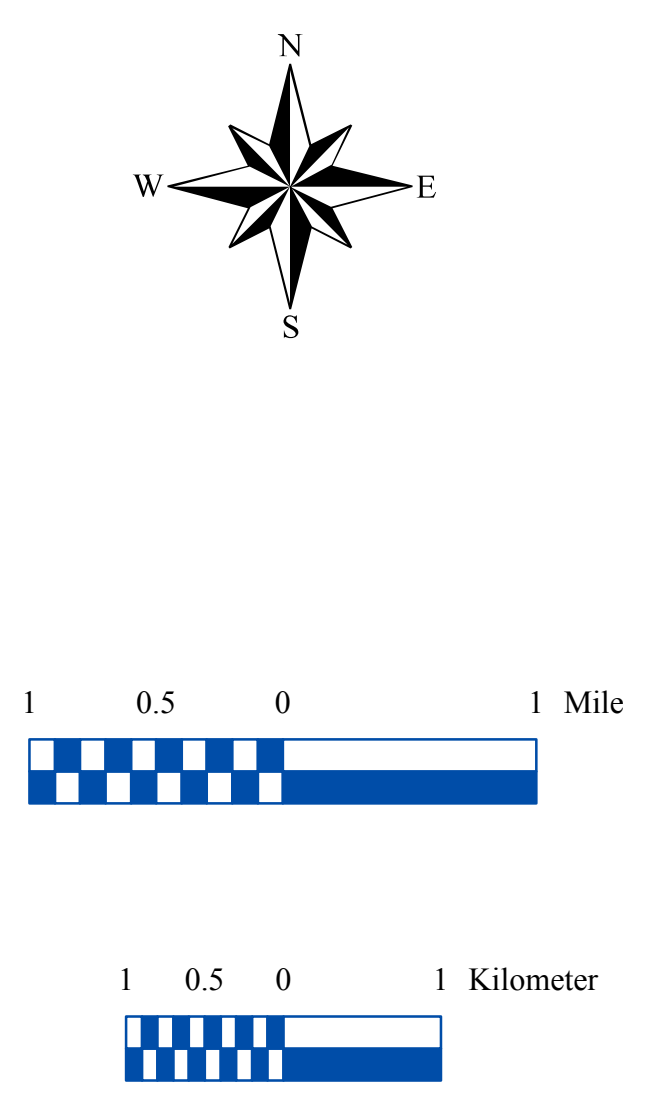
Coordinate locations of water well records were physically obtained in the field, determined through address geocoding, or reported on water well records. Elevation data were obtained from a digital elevation model (DEM). Elevation and location quality control/quality assurance procedures were utilized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

In Cass County well depths 100 feet or less were a priority in mapping the potentiometric surface. However, deeper wells were used to complement the mapping in areas where wells at depths of less than 100 feet were sparse. There are 821 unconsolidated located water well records in the county with approximately 494 that are within the priority depth range. Portions of Cass 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.

Potentiometric surface elevations range from a high of 790 feet mean sea level (msl) along the south-central area near the county line and the extreme northeast corner of the county, to a low of 620 feet msl in the central part of the county along a portion of the Eel River. Generalized groundwater flow direction for Cass County is towards major drainage relevant to the basin. Therefore, groundwater flow is towards the Wabash River and associated tributaries for much of the county. To the northwest, however, groundwater flow is west out of the county towards the Tippecanoe River.



- EXPLANATION**
- 710 Line of equal elevation, in feet above mean sea level
 - Potentiometric Contour interval 10 feet
 - Stream
 - County Road
 - 25 State Road
 - 24 US Highway
 - Municipal Boundary
 - 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 INDOT) (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. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) is 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), and Lakes (NHD) (polygon shapefile, 20081218) are from the U.S. Geological Survey and based on a 1:24,000 scale. Digital Elevation Model image is derived from the Indiana OrthoLiDAR Statewide Collection Program (2011). Cass County Unconsolidated No Aquifer Material or Limited Data (polygon shapefile, Maier, 2013) and Potentiometric Surface Contours of the Unconsolidated Aquifers of Cass County, Indiana (line shapefile, Maier, 2013) are based on a 1:24,000 scale.

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

by
Randal D. Maier
Division of Water, Resource Assessment Section
December 2013

Cass County

