

Water Resources and Use in DeKalb County

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

Withdrawal Location

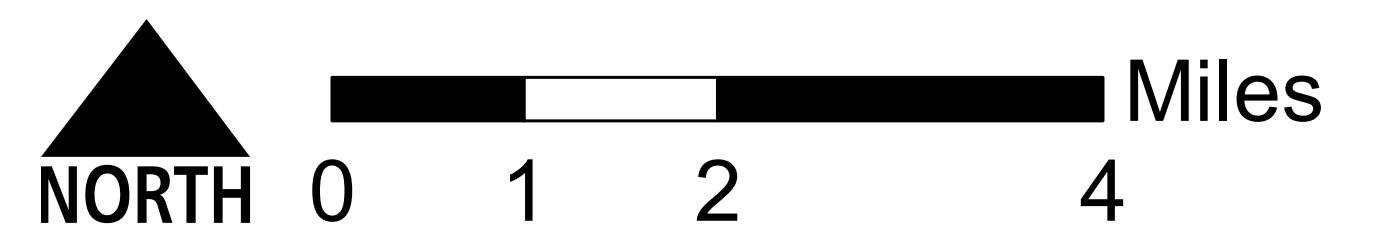
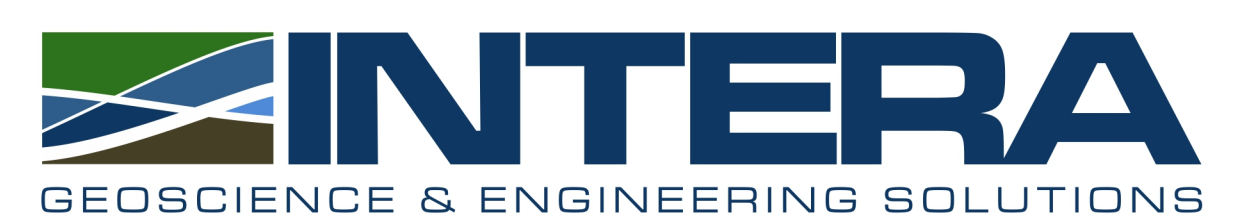
- | | | |
|-------------|---|---------------|
| WELL INTAKE | ▼ | Energy/Mining |
| ● | ▼ | Industry |
| ● | ▼ | Irrigation |
| ● | ▼ | Misc. |
| ● | ▼ | Public Supply |
| ● | ▼ | Rural Use |

River

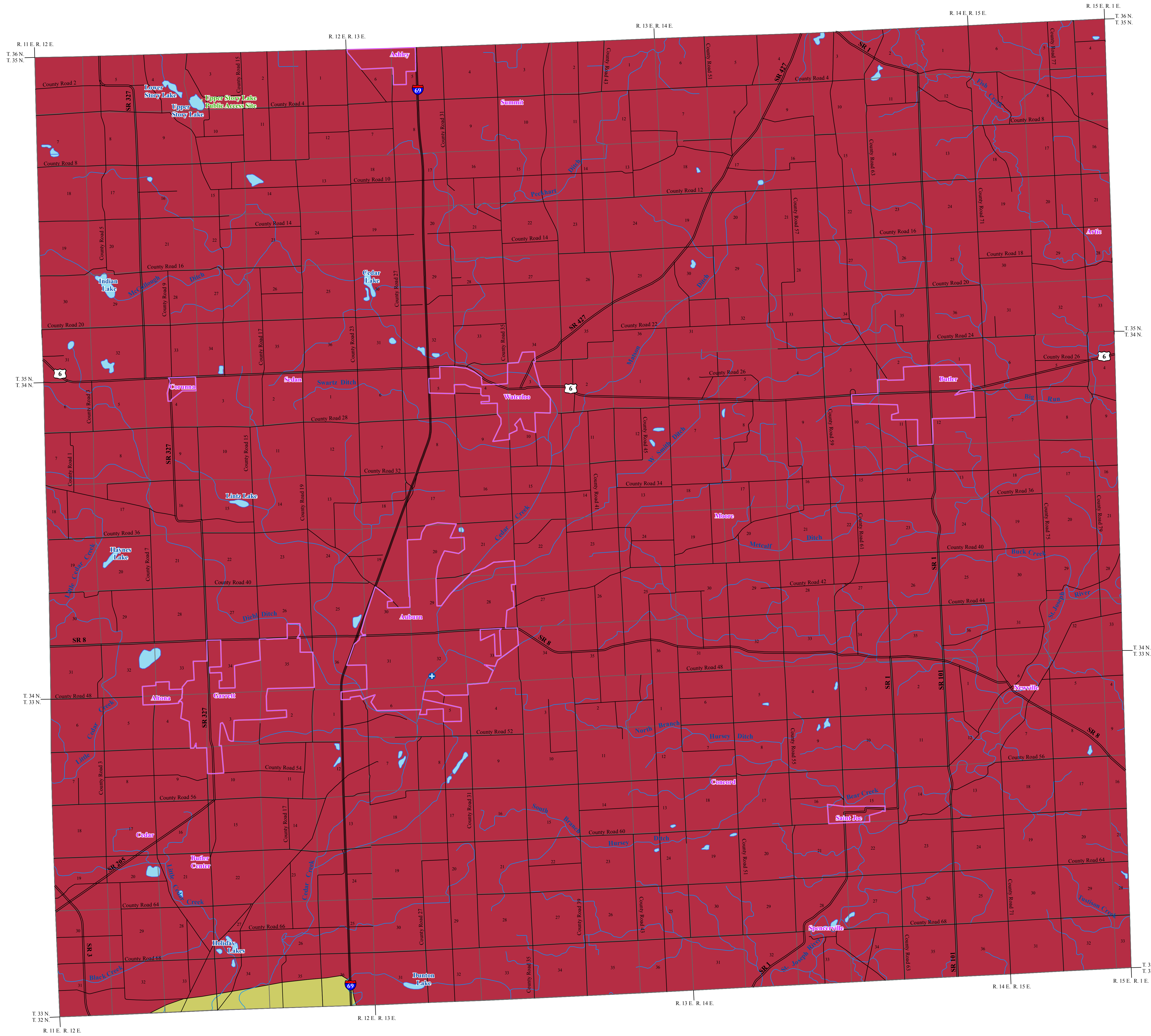
- | | | |
|----------------|---|---------------|
| 7Q2 Flow (MGD) | — | <10 MGD |
| 7Q2 Flow (MGD) | — | 10 - 50 MGD |
| 7Q2 Flow (MGD) | — | 50 - 100 MGD |
| 7Q2 Flow (MGD) | — | 100 - 500 MGD |
| 7Q2 Flow (MGD) | — | > 500 MGD |

Major Lakes

- | | |
|---|------------|
| — | Interstate |
| — | County |
| ⊠ | City |



BEDROCK AQUIFER SYSTEMS OF DEKALB 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.

Two bedrock aquifer systems are identified for DeKalb County: the Devonian and Mississippian age Coldwater, Ellsworth, and Antrim Shales, and the Silurian and Devonian Carbonates. Unproductive shales subcrop over nearly the entire county and thicken from south to north. A relatively small area of carbonate bedrock subcrops in southwestern DeKalb County and underlies the shale in the remainder of the county.

DeKalb County has a complex glacial history and was subjected to multiple glacial advances from the north, northeast, and east resulting in glacial sediment deposits completely covering the county. The thickness of unconsolidated sediments ranges from over 400 feet in northern DeKalb County to approximately 150 feet in the southeastern corner of the county. Major sand and gravel aquifers occur in these thick unconsolidated deposits overlying the bedrock. There are no known water wells utilizing bedrock aquifers in DeKalb County.

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. 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 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.

Devonian and Mississippian -- Coldwater, Ellsworth, and Antrim Shales Aquifer System

The Coldwater, Ellsworth, and Antrim Shales Aquifer System subcrops throughout nearly the entirety of DeKalb County; it is absent only in a relatively small area along the southwestern Allen County border. Oil and gas records show that the shales attain a thickness of over 200 feet near the center of the county and thicken to about 300 feet to the north. These shales are commonly considered an aquitard; therefore, the system is an extremely limited ground-water resource.

This system is overlain by unconsolidated deposits ranging in thickness from 150 feet to over 400 feet. Because of the availability of the overlying unconsolidated resources, no water wells have been completed in the Coldwater, Ellsworth, and Antrim Shales Aquifer System in DeKalb County.

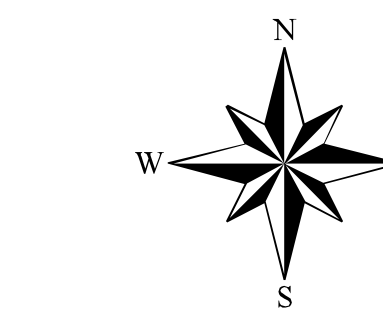
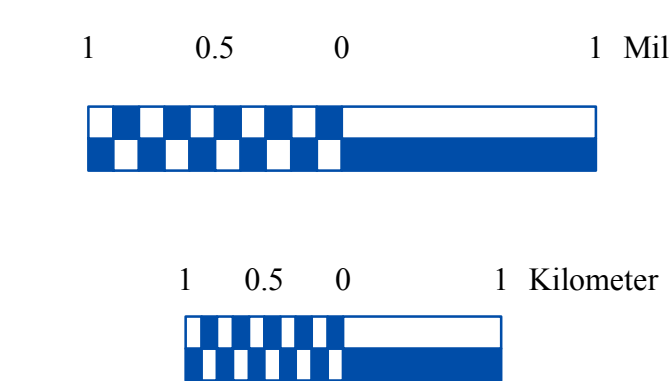
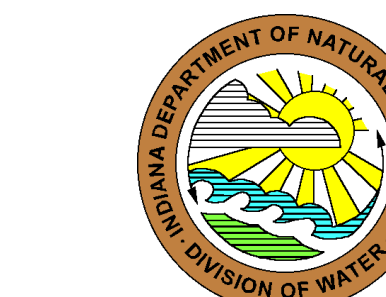
Since the permeability of shale materials is considered low and the overlying unconsolidated deposits are thick, susceptibility to contamination introduced at or near the surface is low.

Silurian and Devonian Carbonates Aquifer System

The Silurian and Devonian Carbonates Aquifer System subcrops along a small area of the southwestern county border. This aquifer system consists of the middle Devonian age Muscatatuck Group. 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.

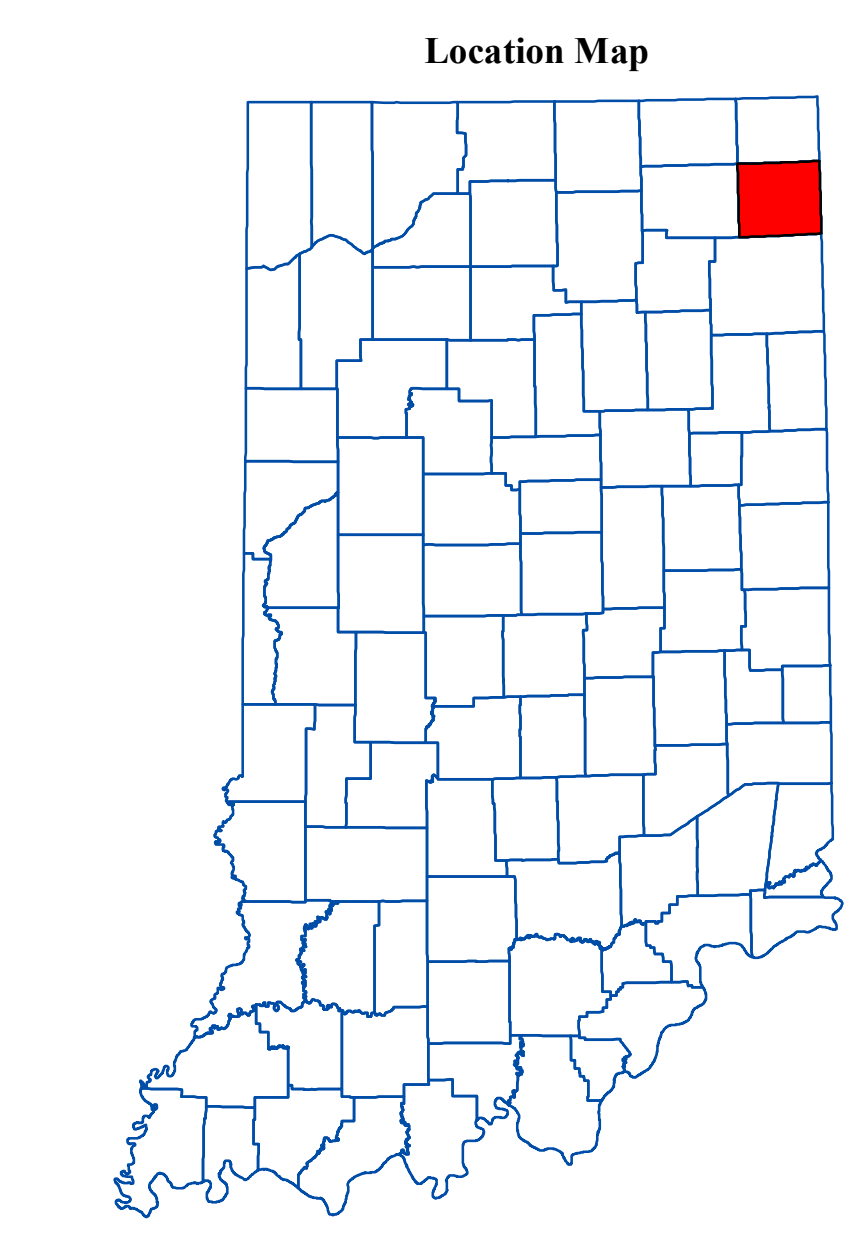
No wells have been completed in the Silurian and Devonian Carbonates Aquifer System in DeKalb County because of the availability of the overlying sand and gravel aquifers. Wells completed in the Silurian and Devonian Carbonates Aquifer System in adjoining Allen County to the south are generally capable of meeting the needs of most domestic and some high-capacity users. Reported yields for domestic wells are commonly 10 to 100 gallons per minute (gpm) and static water levels are 23 to 55 feet below the land surface. High-capacity well yields range from 80 to 1500 gpm.

In DeKalb County, the Silurian and Devonian Carbonates Aquifer System has a low susceptibility to surface contamination because thick clay deposits overlie the system.



EXPLANATION

- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- State Managed Property
- Lake & River



Map Use and Disclaimer Statement

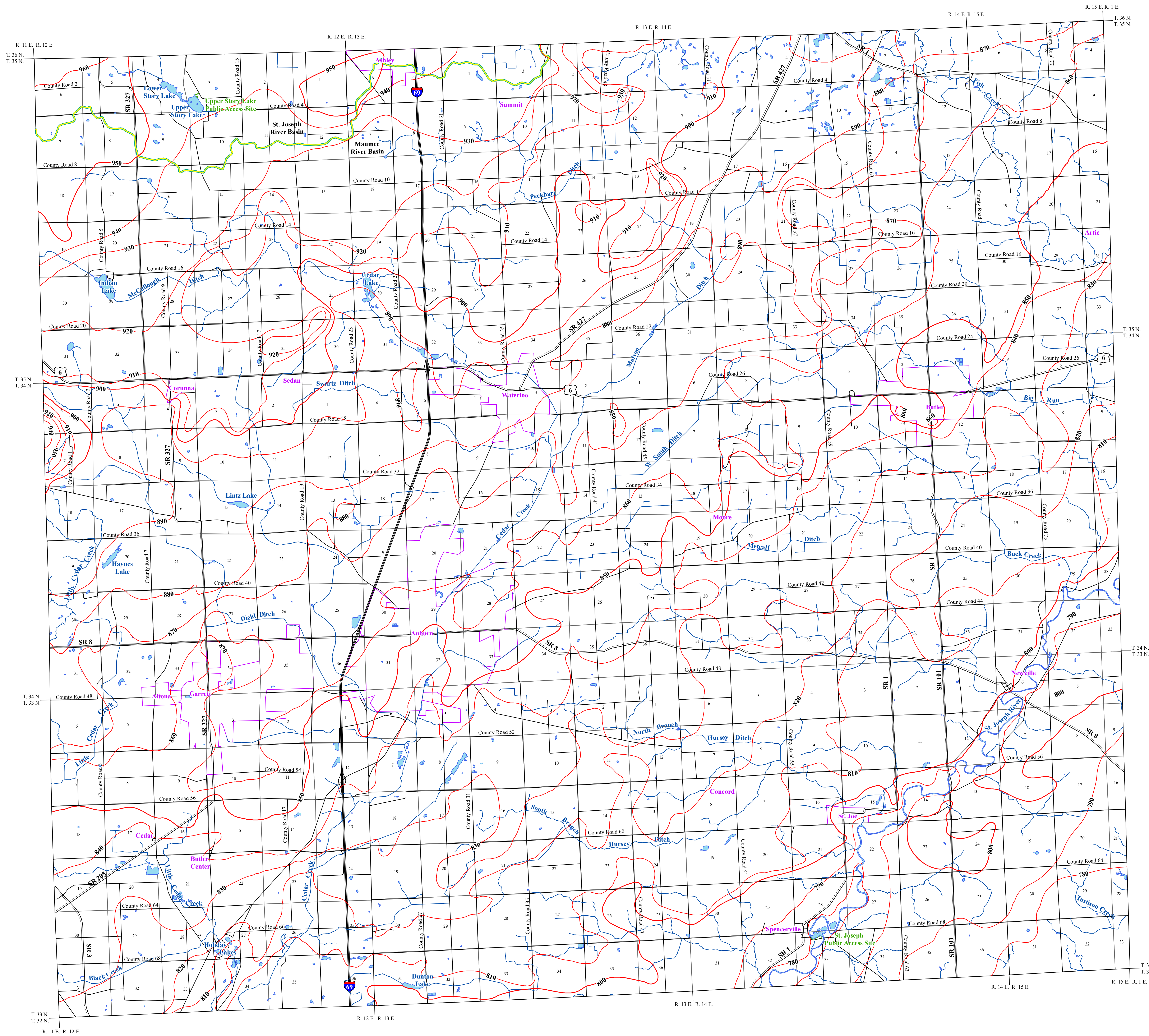
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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were from 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 DeKalb County, Indiana
by
Division of Water
1987, 1996

Map generated by Scott H. Dean, April 2009
IDNR, Division of Water, Resource Assessment Section

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



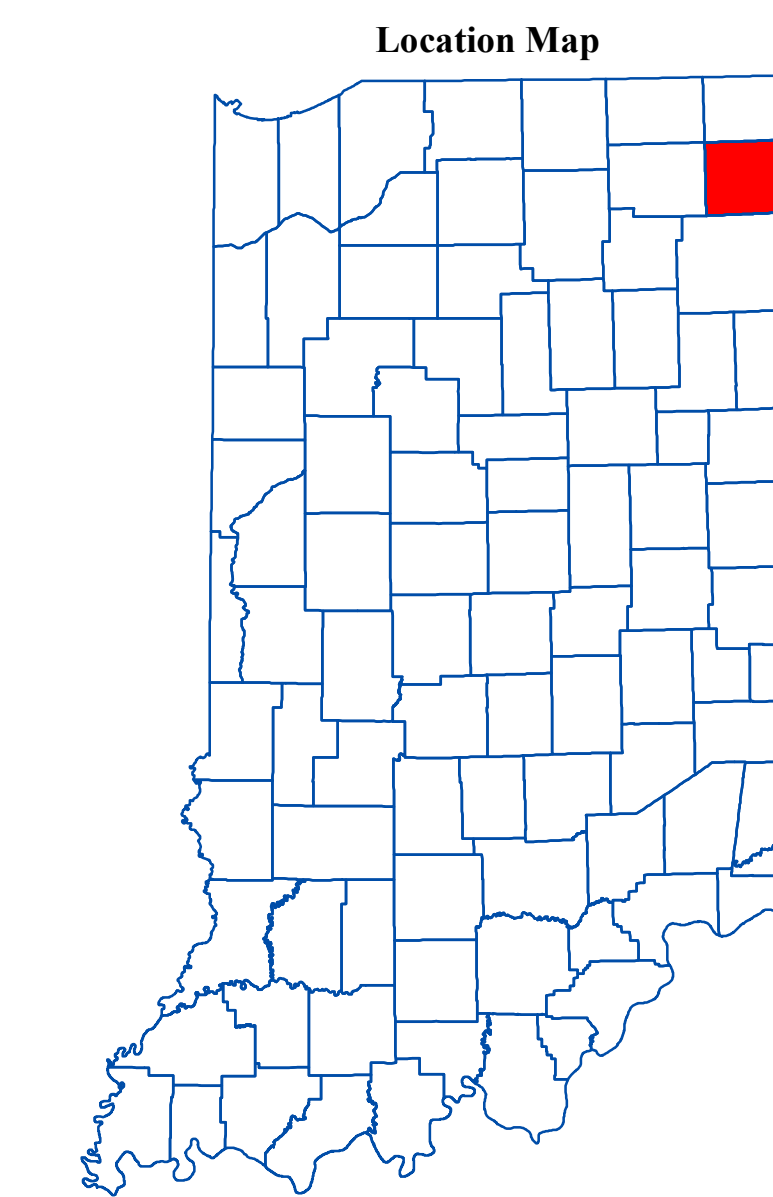
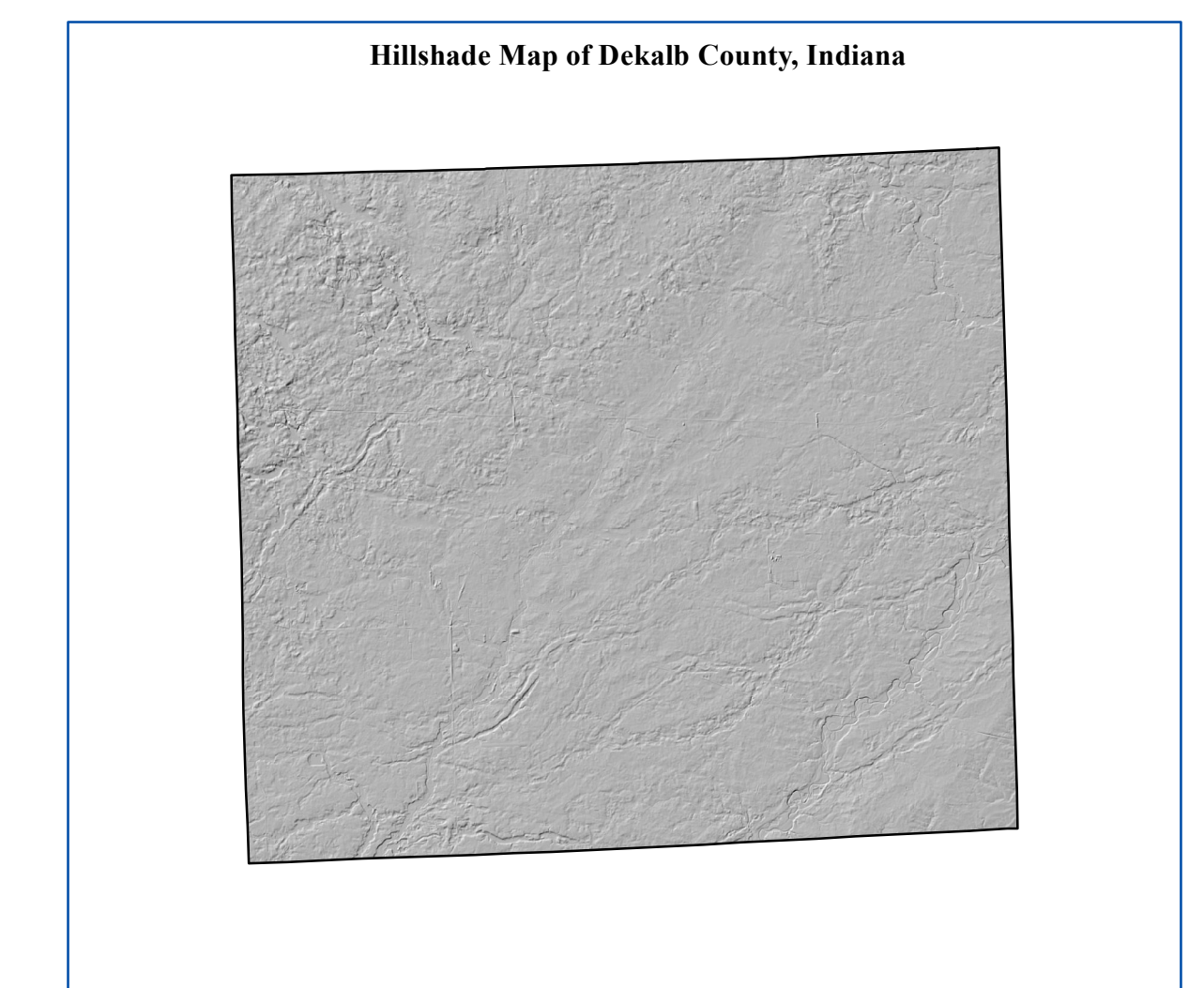
DeKalb County, Indiana is located in the northeastern portion of the state and is situated within two major drainage basins. A small portion of the northwest corner of the county is within the St. Joseph River Basin and the rest of the county is within the Maumee River Basin. Major drainage systems include the St. Joseph River and Cedar Creek along with several tributaries.

The generalized unconsolidated potentiometric surface map contour elevations represent lines of equal elevation to which groundwater levels will rise 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.

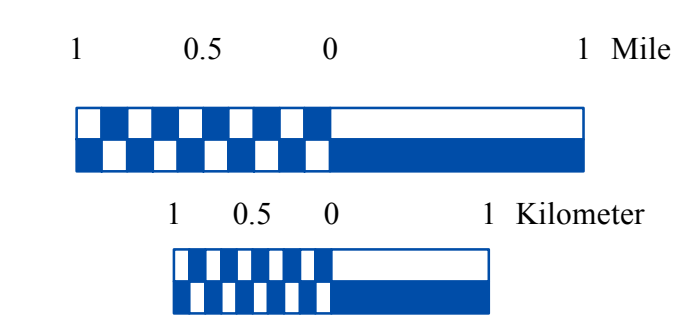
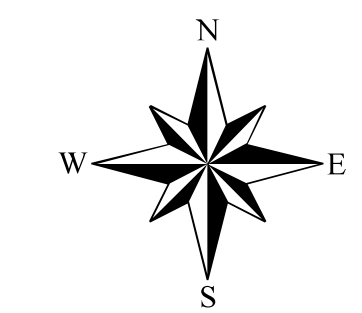
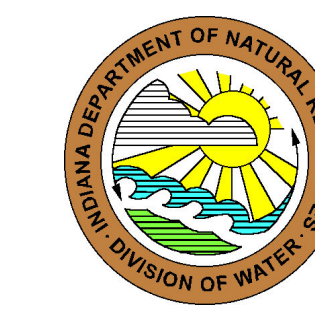
In DeKalb County well depths 100 feet or less were a priority in mapping the potentiometric surface. However, deeper wells were often compared and used in areas where data was sparse. There are approximately 4,411 water well records in the county of which, 2,204 (50%) are located. About 1,317 (60%) are wells less than 100 feet in depth. Potentiometric surface elevations range from a high of 960 feet mean sea level (msl) in the northwest, to a low of 780 feet msl in the southeast. Generalized groundwater flow direction, therefore, appears to be from northwest to the southeast for most of the county. Groundwater flow for the extreme northwest portion of the county that is within the St. Joseph River Basin appears to be to the northwest. However, this area is a groundwater high and some groundwater flow may be south and east.

In general, most of the potentiometric surface in DeKalb County is under confined conditions. However, some locations, such as positions close to the St. Joseph River, Cedar Creek and some tributaries, may be under semi-confined or unconfined conditions.



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



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

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

October 2011

Map generated by Scott H. Dean
IDNR, Division of Water, Resource Assessment Section

DeKalb County

