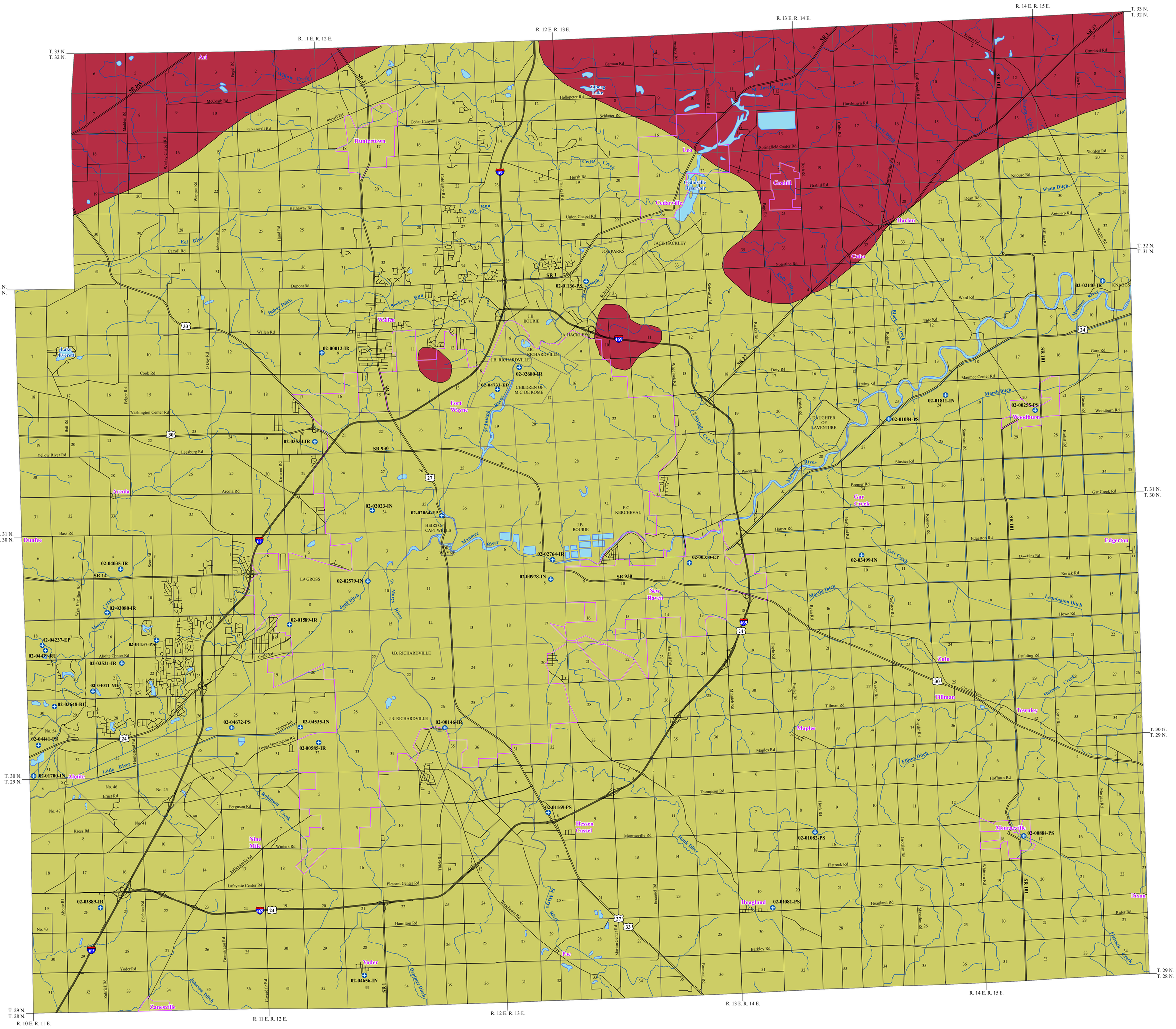
BEDROCK AQUIFER SYSTEMS OF ALLEN COUNTY, INDIANA



The occurrence of bedrock aquifers depends on the original composition of the geologic material 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 within Allen County: the Devonian and Mississippian age Coldwater, Ellsworth and Antrim Shales, and the Silurian and Devonian Carbonates. Bedrock wells represent approximately 42 percent of all wells completed in this county.

Allen 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 resulting unconsolidated sediments are quite variable in thickness; in the northwest corner of the county, the bedrock is covered by as much as 300 feet of glacial material, while in some areas of the southwestern part of the county, unconsolidated deposits are approximately 40 to 50 feet thick. In much of the eastern part of the county, depth to bedrock is about 30 to 50 feet below the surface.

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

In Allen County the Coldwater, Ellsworth and Antrim Shales subcrop in the northern third of the county, and in two relatively smaller areas located in the north central portion of the county. The Coldwater, Ellsworth and Antrim Shales Aquifer System is overlain by up to 260 feet of unconsolidated deposits. These shales are commonly considered an aquitard; therefore, the system is an extremely limited ground-water resource.

Due to the availability of the overlying unconsolidated resources few wells have been completed in the Coldwater, Ellsworth and Antrim Shales Aquifer System in Allen County. Well yields range from 10 to 30 gallons per minute (gpm) and reported static water levels are 12 to 115 feet below land surface. No significant ground-water withdrawal facilities have been reported in this aquifer system.

Because 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 throughout the majority of Allen County. This aquifer system consists primarily of the Silurian age Wabash Formation, and the middle Devonian age Muscatatuck Group.

Wells completed in the Silurian and Devonian Carbonates Aquifer System are generally capable of meeting the needs of most domestic and high-capacity users in this county. Reported domestic wells utilizing this system in Allen County have depths generally ranging from about 100 feet to over 200 feet. Typical yields for domestic wells range from about 10 to 100 gpm, and static water levels from 23 to 55 feet below land surface. There are 37 registered significant ground-water withdrawal facilities (83 wells) in this system. Reported yields from the individual wells are 15 to 1500 gpm. Uses for these facilities are primarily public supply, industry, and irrigation.

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

INDIANA DEPARTMENT OF NATURAL RESOURCES

EXPLANATION

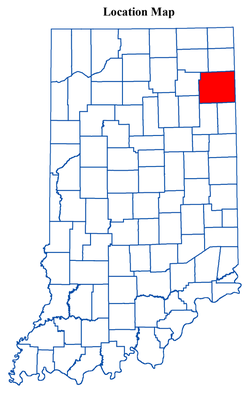
- Registered Significant Ground-Water Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- Lake & River

N W E S

1 0.5 0 1 Mile

1 0.5 0 1 Kilometer

Location Map



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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 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, 200004220 was from the Center for Advanced Applications in GIS at Purdue University.

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