

# **Bedrock Aquifer Systems of Fulton County, Indiana**

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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.

Unconsolidated deposits of varying thickness overlie bedrock aquifer systems in Fulton County. Thickness of unconsolidated deposits in Fulton County ranges from 200 to 350 feet. Most of the bedrock aquifers, therefore, 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 formation.

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 Fulton County. They are the Devonian and Mississippian Coldwater, Ellsworth and Antrim Shales; and the Silurian and Devonian Carbonates.

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

In Fulton County only the Antrim Shale subcrops in the Coldwater, Ellsworth and Antrim Shales Aquifer System. The Antrim Shale in Indiana is typically described as brownish-black shale and is commonly considered an aquitard; therefore, the system is an extremely limited ground-water resource. However, in some places the lower portion of the aquifer unit may contain some limestone.

The subcrop area for the Antrim Shale is present along the northern part of the Fulton County line and is generally less than 50 feet thick. Depth to bedrock ranges from 160 to 295 feet.

Due to the availability of the overlying unconsolidated resources very few wells have been completed in the Coldwater, Ellsworth and Antrim Shales Aquifer System in Fulton County. However, a few domestic wells have been reported. Total depths range from 200 to 220 feet with penetration into bedrock less than 25 feet. Reported yields are 10 and 20 gallons per minute (gpm).

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 is extensive throughout nearly all of Fulton County. The system includes Silurian age carbonate rock units of the Wabash Formation and Devonian age carbonate rock units of the Muscatatuck Group. Total thickness of the Silurian bedrock is up to 500 feet. Total thickness of Devonian bedrock is up to 100 feet. Depth to the bedrock surface ranges from about 110 to 350 feet. Total well depths range from 125 to 325 feet with penetration into bedrock commonly less than 10 feet.

Few wells utilize the Silurian and Devonian Carbonates Aquifer System due to prolific sand and/or gravel aquifer units that overlie the bedrock system. However, this system is capable of meeting the needs of domestic and some high-capacity users. Domestic yields range from 10 to 60 gpm with static water levels generally from 3 to 38 feet. There is one registered significant ground-water withdrawal facility (2 wells) with reported yields of 70 and 80 gpm. However, one industry test well record reports a yield of 400 gpm.

Most of the Silurian and Devonian Carbonates Aquifer System in Fulton County is overlain by thick clay deposits. This aquifer system is generally considered at low risk to contamination. However, there are areas where bedrock is overlain by thick alluvial and outwash deposits and thin clays. These areas, therefore, are at moderate to high risk to contamination.

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