

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

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Two bedrock aquifer systems are identified within Adams County: the Silurian and Devonian Carbonates, and the Maquoketa Group of Ordovician age. In Adams County, rock types exposed at the bedrock surface include moderately productive limestones and dolomites with varying amounts of interbedded shale, and unproductive shales with interbedded limestone. Bedrock wells represent approximately 79 percent of all wells completed in this county.

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.

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. Most of the bedrock aquifers in Adams County are under confined conditions; therefore, the potentiometric surface (water level) in most wells completed in bedrock rises above the top of the water-bearing zone.

Within the county, the bedrock aquifer systems are overlain by unconsolidated deposits typically between 25 and 125 feet thick; however, some deposits are up to 385 feet in depth over a buried bedrock valley. The depth to bedrock is approximately 50 feet or less northwest of Decatur in the north-central section of the county, to the area around Salem in the east-central part of the county, and to the east of Berne in the south-central portion of the county. Additionally, shallow bedrock is also present in the southwest and southeast portions of the county. A buried bedrock valley that trends northeast to southwest bisects these two shallow bedrock areas.

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 can be difficult to track and remediate.

## **Silurian and Devonian Carbonates Aquifer System**

The Silurian and Devonian Carbonates Aquifer System is extensive throughout nearly all of Adams County. The system includes limestone, dolomitic limestone, and dolomite. Depths to the bedrock surface range from 7 to 347 feet and are commonly 45 to 90 feet. Total well depths range from about 25 to 460 feet but are typically 90 to 160 feet. The wells penetrate into bedrock to a depth up to 435 feet. However, penetration into bedrock commonly ranges from 25 to 85 feet.

The Silurian and Devonian Carbonates Aquifer System in Adams County is capable of meeting the needs of domestic users. Typical domestic yields range from 5 to 25 gallons per minute (gpm). Static water levels range from 1 to 90 feet but are commonly 20 to 50 feet.

There are six registered significant ground-water withdrawal facilities (16 wells) using bedrock aquifers in Adams county. Each of these wells utilize the Silurian and Devonian Carbonates Aquifer System. Reported capacities for individual wells range up to 400 gpm. The dominant use for these facilities is public water supply. Other uses include industry and irrigation.

Most of the Silurian and Devonian Carbonates Aquifer System in Adams County is overlain by till deposits of variable thickness. Where overlying till materials are thick, this aquifer system is considered at low risk to contamination. However, there are localized areas where the bedrock surface is relatively shallow. Additionally, some well records describe cavities or solution channels up to 23 feet in height. These karst like features can be produced by the action of ground water dissolving the limestone, primarily along fractures or zones of weakness such as bedding planes. Therefore, these areas are at moderate to high risk to contamination.

## **Ordovician -- Maquoketa Group Aquifer System**

The Maquoketa Group Aquifer System is limited to the buried bedrock valley trending northeast to southwest in the south-central portion of the county. The Maquoketa Group consists of mostly interbedded shale and limestone units.

Few bedrock wells have been reported in this system in Adams County because adequate supplies are available from the overlying unconsolidated sand and gravel resources. Depths of the few wells drilled in the Maquoketa Group range from 115 to 385 feet with penetration into the rock from 2 to 40 feet. Yields of 15 and 45 gpm have been reported for these wells, and the static water levels have been recorded at 35 and 40 feet below the land surface. The overlying deposits may also contribute to the overall yield of wells completed in the Maquoketa Group Aquifer System.

Thick till deposits cap this aquifer system; therefore, the Maquoketa Group Aquifer System is not very susceptible to contamination from the land surface.

## **Registered Significant Ground-Water Withdrawal Facilities**

There are seven registered significant ground-water withdrawal facilities (16 wells) using bedrock aquifers in the county. These wells utilize the Silurian and Devonian Carbonates Aquifer System. Reported capacities for individual wells range from 25 to 400 gpm. The dominant use for these facilities is public water supply. Other uses include irrigation and industry. Refer to the table for additional well details, and to the map for facility locations.

## **Map Use and Disclaimer Statement**

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