

Bedrock Aquifer Systems of Wells 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.

One bedrock aquifer system is identified for Wells 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. Bedrock wells represent about 90 percent of all wells completed in this county. Most of the bedrock aquifers in Wells 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 bedrock aquifer system in Wells County is overlain by unconsolidated deposits of varying thickness, ranging from less than one foot to approximately 170 feet. However, for about one-half of the county the depth to bedrock is 50 feet or less. This shallow area of bedrock primarily trends northwest to southeast across the county from just south of Zanesville to near Liberty Center.

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 Wells County. The system includes Silurian age carbonate rock units (limestone and dolomite) with some interbedded shale units. The total thickness of this system in the county ranges from about 200 feet to 500 feet.

Wells penetrating the Silurian and Devonian Carbonates Aquifer System in this county have reported depths ranging from 35 to 450 feet, but are commonly 75 to 180 feet deep. The amount of rock penetrated in this system typically ranges from 30 to 120 feet. Some well records describe cavities or solution channels up to 15 feet in height (see map). These karst features are produced by the action of ground water dissolving the limestone, primarily along fractures or zones of weakness such as bedding planes.

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 40 gallons per minute (gpm). Static water levels typically range from 15 to 40 feet below the land surface. There are 11 registered significant ground-water withdrawal facilities (32 wells) utilizing the Silurian and Devonian Carbonates Aquifer System in Wells County. Reported high-capacity well yields range from 108 to 600 gpm.

This aquifer system is generally not very susceptible to surface contamination due to thick clay deposits over most of the county. However, in many places the bedrock surface is quite shallow. In addition, solution features such as caves are described in several well records suggesting some karst development in places. Therefore, these areas are at moderate to high risk to contamination.

Registered Significant Ground-Water Withdrawal Facilities

There are 11 registered significant ground-water withdrawal facilities (total of 32 wells) using bedrock aquifers in the county. All of these wells tap the Silurian and Devonian Carbonates Aquifer System. Reported capacities for individual wells range from 10 to 600 gpm. The dominant use for these facilities is public water supply. Other uses are for industry and irrigation. Refer to the table for some details on the wells and to the map for the facility locations.

Map Use and Disclaimer Statement

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