

Bedrock Aquifer Systems of Henry 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. In Henry County, rock types exposed at the bedrock surface are moderately productive limestones and dolomites with varying amounts of interbedded shales to poorly productive shale.

Bedrock aquifer systems in the county are overlain by unconsolidated deposits of varying thickness. Unconsolidated deposits range in thickness from less than 5 feet along the Big Blue River northeast of Knightstown to over 500 feet thick northwest of New Castle. 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 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.

Two bedrock aquifer systems are identified for Henry County. They are, from west to east and younger to older: the Silurian and Devonian Carbonates and the Maquoketa Group of Ordovician age. Only about 7 percent of all wells are completed in bedrock because of thick unconsolidated deposits over much of Henry County.

The quality of water in bedrock aquifer systems in this county is generally acceptable for domestic use. The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. However, 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.

Silurian and Devonian Carbonates Aquifer System

In Henry County this aquifer system consists of middle Devonian age carbonates of the Muscatatuck Group and underlying Silurian carbonates. However, the Muscatatuck Group is only present in the southwestern part of the county. 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. Total thickness of the Silurian and Devonian Carbonates Aquifer System in Henry County generally ranges from 100 to 200 feet.

Wells penetrating this system have reported depths ranging from 23 to 388 feet, but are commonly 100 to 225 feet deep. The amount of rock penetrated in the Silurian and Devonian Carbonate Aquifer System typically ranges from 10 to 55 feet, although some of the deeper wells also reach the upper portion of the underlying Maquoketa Group.

Water wells in the Silurian and Devonian Carbonates Aquifer System are generally capable of meeting the needs of domestic and some high-capacity users. In Henry County domestic wells typically yield 5 to 25 gallons per minute (gpm). Static water levels typically range from 35 to 140 feet below land surface with a few flowing wells reported in the county. However, a few dry holes have also been reported. There are 2 registered significant ground-water withdrawal facilities (5 wells) with reported yields from 150 to 210 gpm.

This aquifer system is not very susceptible to contamination due to thick clay deposits over most of the county. However, the aquifer system is highly susceptible in the vicinity of the Big Blue River valley where the unconsolidated materials are thin and clay aquitards are absent.

Ordovician -- Maquoketa Group Aquifer System

The outcrop/subcrop area of the Maquoketa Group occurs in buried pre-glacial valleys where the overlying Silurian and Devonian bedrock has been removed by erosion. The Maquoketa Group consists mostly of shales with interbedded limestone units. Although this system is approximately 650 to 750 feet thick in the county, typically little more than the top 100 feet is used for water production.

Wells completed in the Maquoketa Group Aquifer System are generally capable of meeting the needs of domestic users in Henry County. Reported well depths range from 105 to 540 feet, but are commonly 225 to 350 feet deep. The amount of rock penetrated in this system generally ranges from 10 to 70 feet. Typical yields for domestic wells range from 3 to 10 gpm and static water levels are commonly 25 to 50 feet below land surface. However, several dry holes have been reported. This aquifer system has a low susceptibility to surface contamination because of thick clay deposits which cover the outcrop/subcrop area.

Registered Significant Ground-Water Withdrawal Facilities

There are 2 registered significant ground-water withdrawal facilities (total of 5 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 150 to 210 gpm. Refer to the table for some details on the individual wells and to the map for the facility locations.

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