

Unconsolidated Aquifer Systems of Lawrence County, Indiana

by
Randal D. Maier
Division of Water, Resource Assessment Section
September 2003

Three unconsolidated aquifer systems have been mapped in Lawrence County: the Unglaciaded Southern Hills and Lowlands; the Alluvial, Lacustrine, and Backwater Deposits; and the White River and Tributaries Outwash. Boundaries between the systems are relatively well defined.

With the exception of the White River and Tributaries Outwash Aquifer System, unconsolidated aquifers in the county do not have much potential for development of successful water wells. The majority of the county has less than 30 feet of unconsolidated material overlying bedrock. Drillers prefer to bypass the unconsolidated deposits in favor of the underlying bedrock. However, that too has relatively limited potential, and many county residents prefer to tap into a public water supply serving much of the county.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably from local reality. Variations within geologic environments can cause variation in susceptibility to surface contamination. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations, can provide contaminant pathways that bypass the naturally protective clays.

Unglaciaded Southern Hills and Lowlands Aquifer System

The Unglaciaded Southern Hills and Lowlands Aquifer System covers most of Lawrence County. It is the most limited groundwater resource of the unconsolidated aquifer systems in the county. The unconsolidated deposits generally involve weathered bedrock residuum with some eolian sand deposits in some areas near the White River. No known glacial till deposits exist in the county.

Total thickness of the unconsolidated materials overlying bedrock are up to 50 feet but are commonly from 10 to 35 feet. Thicker materials are present in areas near the East Fork White River where eolian sand and loess deposits overly clay materials, or where karst features are prevalent and sequences of "boulders and mud holes" or "broken limestone and mud" are reported by drillers.

Clay materials dominate this unconsolidated aquifer system. Thin sand or gravel materials may be present but are rare and commonly less than 3 feet thick. Some smaller stream valleys are also mapped in this system. These may include a few feet of colluvium, alluvium, and lacustrine silt and clay. In those valleys a thin sand layer may be encountered.

The Division has no record of drilled wells actually producing from this system. Where only bedrock residuum is present, the chances for completing a successful drilled well in these

materials are practically zero. A few old dug wells may still exist in the county, but their yields would be very small.

Because of the low permeability of the surface materials, this system is not very susceptible to contamination from surface sources.

Alluvial, Lacustrine, and Backwater Deposits Aquifer System

The Alluvial, Lacustrine, and Backwater Deposits Aquifer System is made up of heterogeneous bodies of alluvial, colluvial, and lacustrine materials within valley bottoms and terraces of some larger streams tributary to the East Fork White River.

Unconsolidated deposits within the system include Wisconsin and Holocene (Recent) silt, sand, and gravel along streams and terraces as well as pre-Wisconsin age colluvial, alluvial, and lacustrine silt, clay, and sand. The lacustrine deposits are older lake materials formed in bodies of relatively stagnant water. These deposits are attributed to the White River valley becoming choked with outwash from receding glaciers. The outwash deposits effectively dammed the tributary streams, thus creating lakes in which several feet of fine-grained glaciolacustrine deposits accumulated.

Total thickness of unconsolidated materials overlying bedrock in this system is commonly less than 50 feet. However, around the Town of Huron a few wells report thicker sequences of unconsolidated deposits with one well reporting up to 99 feet of clay, sand, and gravel. Most sand and gravel lenses, where present, are commonly less than 5 feet thick and may be confined within the glaciolacustrine deposits or directly overlie bedrock.

This aquifer system is an extremely limited resource and the Division has no records of wells actually producing from these deposits. Drillers prefer to bypass the unconsolidated deposits in favor of the underlying bedrock. The potential does exist, however, for completion of adequate domestic wells in some places where the unconsolidated deposits are thicker than 25 feet. Large-diameter bucket-rig wells are commonly successfully employed where other means of extracting seepage from limited or fine-grained deposits are not available.

This aquifer system is generally marked by surface deposits of soft silt and clay that have low susceptibility to surface contamination.

White River and Tributaries Outwash Aquifer System

The White River and Tributaries Outwash Aquifer System is located in the southern half of Lawrence County along the course of the East Fork White River. The system is made up of large volumes of outwash materials that were deposited within the river valley by the retreating continental ice sheets. As the ice sheets melted, the sediment contained within them was delivered to the East Fork White River in quantities too large for the stream to transport. As a result, the increased sediment load was stored in the valley as vertical and lateral accretionary deposits. As long as the retreating ice continued to provide sediment in quantities too large for

the stream to transport, the valley continued to be filled. This valley-filling process formed the most prolific aquifer system in the county.

This unconsolidated aquifer system overlies bedrock and typically ranges from 20 to 100 feet in total thickness. The sand and gravel deposits in some areas may be overlain by a silty clay or a clay-sand mixture that ranges from 8 to 35 feet thick. Sand and gravel deposits are reported up to 90 feet thick. Insufficient data are available to give a typical range for aquifer thickness and water levels in the county.

The White River and Tributaries Outwash Aquifer System has the greatest potential of any aquifer system in Lawrence County and can meet the needs of high-capacity water users. Data from the few well records available show that well yields of 125 to 550 gallons per minute (gpm) have been obtained in this aquifer system. Static water levels in those wells range from 8 to 23 feet below surface.

This aquifer system is generally unconfined and, therefore, is highly susceptible to surface contamination in areas where no clay cover exists. It is moderately susceptible where a clay cover is present.

Registered Significant Groundwater Withdrawal Facilities

Currently there are two registered significant ground-water withdrawal facilities using unconsolidated aquifers in the county (refer to Table 1 for facility details and to the map for facility locations). Both facilities are public water-supply systems with wells in the White River and Tributaries Outwash Aquifer System. South Lawrence Utilities, Inc has four registered wells with reported capacities of 125 to 300 gpm. North Lawrence Water Corporation has three registered wells with capacities ranging from 470 gpm to 550 gpm.

Map Use and Disclaimer Statement

We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water.

This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.