

# **Unconsolidated Aquifer Systems of Perry County, Indiana**

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Four unconsolidated aquifer systems have been mapped in Perry County: the Unglaciaded Southern Hills and Lowlands; the Alluvial, Lacustrine, and Backwater Deposits; the Ohio River Outwash; and the Ohio River Outwash Subsystem. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

Although Perry County lies within the unglaciaded region of Indiana, the effects of glacial meltwaters had a large influence on the ground-water resources of the county. In places within the main valley of the Ohio River, sand and gravel were deposited of sufficient thickness and extent to make up an aquifer capable of supplying large municipal, industrial, and irrigation needs. Outside of the main valley of the Ohio River, nearly the entire county has less than 50 feet of unconsolidated materials overlying the bedrock, and ground-water resources from unconsolidated deposits are minimal.

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. In general, the unconsolidated aquifer systems of the county are most vulnerable to contamination from surface sources where thick clay layers are lacking.

## **Unglaciaded Southern Hills and Lowlands Aquifer System**

The Unglaciaded Southern Hills and Lowlands Aquifer System covers most of Perry County. This aquifer system is relatively high in clay and silt content and fragmented rock, although thin deposits of sand and/or gravel are present in places. Included in this system are relatively thin deposits of alluvium, colluvium, and lacustrine materials within a few of the stream valleys.

The total thickness of the Unglaciaded Southern Hills and Lowlands Aquifer System in Perry County typically ranges from less than 1 foot to 50 feet. This system has the most limited ground-water resources of the unconsolidated aquifer systems in the county. Potential yields of conventionally drilled wells in the Unglaciaded Southern Hills and Lowlands Aquifer System in Perry County are generally known to be so small that wells are commonly completed in the underlying bedrock. Because of the generally low permeability of the near-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 mapped adjacent to and in a few of the valleys tributary to the Ohio River. The materials in this aquifer system come from two major sources. One source is alluvium deposited by the streams along with colluvium eroded from the valleys walls and upland areas. The second source is glaciolacustrine sediment, which accumulated in bodies of relatively stagnant lake water. These silts and clays were deposited when the Ohio River valley was choked with coarser material carried by glacial meltwater that effectively dammed tributary streams, creating lakes. Thick deposits of silt and clay, sometimes called “slackwater clay,” mark the former locations of these glacial lakes.

The Alluvial, Lacustrine, and Backwater Deposits Aquifer System is not regarded as a major ground-water resource in this county. There are areas in this system however where the thickness of unconsolidated materials exceeds 100 feet; for example, in the Ohio River cutoff loop at Dexter and within the lower valley of the Anderson River. Well data are sparse in the Anderson River valley, but wells drilled in the cutoff loop area at Dexter commonly yield sufficient water for domestic needs.

Well depths in the Alluvial, Lacustrine, and Backwater Deposits Aquifer System in Perry County range from 60 to 150 feet, but wells are commonly completed at depths of about 100 to 125 feet. Reported static water levels are typically 25 to 50 feet below the land surface. The wells completed in the system have been tested at rates ranging from less than 1 to 12 gallons per minute (gpm). However, very few wells can sustain a pumping rate over 10 gpm. The Alluvial, Lacustrine, and Backwater Deposits Aquifer System in Perry County is marked by thick deposits of soft silt and clay that have a low susceptibility to surface contamination.

## **Ohio River Outwash Aquifer System**

The Ohio River Outwash Aquifer System occupies portions of the main valley of the Ohio River. Great quantities of outwash from the melting glaciers were transported within this valley during the Wisconsin and pre-Wisconsin glacial periods. This aquifer system contains large volumes of sand and gravel that partially fill the main river valley. As the glaciers melted, the sediment contained within them was delivered to the Ohio 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 glaciers continued to provide sediment in quantities too large for the stream to transport farther downstream, the valley continued to be filled. This valley-filling process formed the most prolific aquifer system in the county.

Total thickness of the Ohio River Outwash Aquifer System ranges from about 40 feet near the edge of the valley to 160 feet. The saturated sand and gravel (aquifer) thickness of the Ohio River Outwash Aquifer System is typically between 40 and 75 feet. Commonly, 20 to 35 feet of silty to sandy clay overlie the aquifer materials. However, in some areas this layer is absent.

The Ohio River Outwash Aquifer System has the potential to consistently meet the needs of domestic and high-capacity water users. Domestic well yields range from 20 to 50 gpm and

static water levels range from 40 to 70 feet below the land surface. There are six registered significant ground-water withdrawal facilities (17 wells) in this system in Perry County. Reported capacities range from 180 to 900 gpm. Static water levels are typically 30 to 35 feet below the land surface.

This aquifer system is highly susceptible to contamination in areas that lack overlying clay layers. Areas within the system that are overlain by thick layers of clay or silt are moderately susceptible to surface contamination.

### **Ohio River Outwash Aquifer Subsystem**

In Perry County, the Ohio River Outwash Aquifer Subsystem is generally mapped as a transitional zone, contiguous to the outwash system. The one exception where the outwash subsystem is mapped independently from the outwash system is along the Ohio River near Troy. The saturated thickness of sand and gravel in the outwash subsystem is generally less than 15 feet. In some areas silty or sandy clay, with a typical thickness ranging from 10 to 30 feet, overlie the aquifer materials.

Well depths in the Ohio River Outwash Aquifer Subsystem in Perry County range from 58 to 183 feet, but wells are commonly completed at depths of about 60 to 150 feet. Domestic wells completed in the subsystem typically yield 10 to 20 gpm, with static water levels generally 30 to 55 feet below the land surface. Prospects of completing high-capacity wells in this aquifer system are limited to areas with sufficient saturated thickness and optimal well-field design. Areas within this aquifer system that have overlying clay or silt deposits are moderately susceptible to surface contamination; whereas, areas that lack overlying clay or silt deposits are highly susceptible to contamination.

### **Coal Mine Spoil Aquifer System**

The Coal Mine Spoil Aquifer System covers less than 1 percent of Perry County. This aquifer system was formed during the process of mining coal by surface-mining methods. The overburden was typically broken up by blasting and moved aside to uncover the desired coal seam. In Perry County, there are no known wells actually producing from the Coal Mine Spoil Aquifer System. Information from surface coal mine areas in other counties indicate that the quality of ground water in this system is probably much poorer than that in the overburden before mining took place. Very generally, it is expected that aquifers in old spoil that was not graded and capped with compacted soil is highly susceptible to surface contamination, whereas new spoil areas benefiting from modern reclamation methods are likely to be only moderately susceptible.

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

Currently there are six registered significant ground-water withdrawal facilities using unconsolidated aquifers in the county. All of these facilities (total of 17 wells) utilize the Ohio River Outwash Aquifer System for public water supply or industrial use. Refer to Table 1 for some details on the wells and to the map for facility locations.

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