

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

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Three unconsolidated aquifer systems have been mapped in Hancock County: the New Castle Till; the White River and Tributaries Outwash Subsystem; and the New Castle Complex. All three systems comprise sediments deposited by, or resulting from, glaciers, glacial meltwaters, and post-glacial precipitation events. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries. However, a relatively distinct boundary occurs where the White River Outwash and Tributaries Subsystem abuts the relatively steep valley walls of the Big Blue River.

Outside of the valley of the Big Blue River, nearly the entire county has more than 100 feet of unconsolidated materials overlying the bedrock. Unconsolidated deposits are especially thick in the eastern third of the county where the sediments are commonly greater than 200 feet and in places (north of Cumberland) greater than 300 feet thick. However, in the Big Blue River valley there are a few areas where the unconsolidated deposits are less than 50 feet in thickness. Most unconsolidated deposits contain some sand or gravel and only a few dry holes have been reported in Hancock County. All the aquifer systems are typically capable of supplying domestic wells. The New Castle Till Aquifer System and the New Castle Complex Aquifer System are, in most places, capable of producing high-capacity wells. There are areas in the New Castle Complex where sand and gravel deposits are of sufficient thickness and extent to constitute major ground-water resources capable of supplying large municipal, industrial, and irrigation needs.

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.

## **New Castle Till Aquifer System**

The New Castle Till Aquifer System is mapped primarily as isolated areas in the north-western and eastern portion of the county. Due to the complex glacial history, the boundaries between the systems are gradational and may include some small areas of other aquifer systems. The New Castle Till Aquifer System is composed primarily of glacial tills that are separated by intratill sand and gravel aquifers of limited thickness and extent. Unconsolidated deposits typically range in thickness from 80 feet to 150 feet. Potential aquifer materials include sands and gravels that typically range from 5 to 10 feet thick.

This system is capable of meeting the needs of domestic and some high-capacity users. Reported well depths in this system range from 30 to 240 feet, but are commonly between 40 and 145 feet. Domestic well capacities are typically 10 to 15 gallons per minute (gpm). Static water levels commonly range from 10 to 40 feet below surface with some reports of flowing wells. There are two registered significant water withdrawal facilities (3 wells) that report well capacities ranging from 96 gpm to 250 gpm.

The New Castle Till Aquifer System has a low susceptibility to surface contamination because intertill sand and gravel units are generally overlain by thick low-permeability glacial till.

### **White River and Tributaries Outwash Aquifer Subsystem**

In Hancock County, the White River and Tributaries Outwash Aquifer Subsystem is mapped in the southeast corner of the county primarily in the valley of the Big Blue River. This valley carried outwash from the melting glaciers during Wisconsin and pre-Wisconsin glacial periods.

Few wells have been reported to utilize this aquifer system. Well depths typically range from 25 to 70 feet. Sand and gravel aquifer deposits within this system are generally 5 to 30 feet thick. In places, the sand and gravel is capped by a silt or clay 5 to 40 feet thick. Static water levels commonly range from flowing to 35 feet below the surface. In a few areas, the bedrock is shallow and some drillers bypass the unconsolidated sediments and complete the wells in bedrock. It is likely that the overlying sands and gravels contribute significantly to the well yield. This aquifer system has the potential to meet the needs of domestic users. There are no registered significant water withdrawal facilities in Hancock County in this subsystem.

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.

### **New Castle Complex Aquifer System**

The New Castle Complex Aquifer System is mapped over most of Hancock County. This system is characterized by unconsolidated deposits that are quite variable in materials and thickness. The primary aquifers within the system are generally thick intratill sands and gravels. These aquifers are highly variable in depth and lateral extent and are confined by variably thick clay or till sequences. Total thickness of unconsolidated deposits can be in excess of 300 feet.

Typical well depths range from 50 to 150 feet. Aquifer materials range from 3 to 89 feet in thickness but are typically 5 to 40 feet thick. The overlying till cap is generally 40 to 100 feet thick, but may be greater than 175 feet thick in places. In many areas, the aquifer materials are separated from shallow sand and gravel outwash deposits (not typically used as a resource) by till that commonly ranges from 20 to 60 feet thick. These shallow deposits are typically 5 to 40 feet thick. Static water levels range from 10 to 70 feet below surface with some reports of flowing wells.

This system is capable of meeting the needs of domestic and most high-capacity users. Domestic well capacities are commonly 10 to 40 gpm. Nine registered significant water withdrawal facilities (23 wells) report pumping capacities that range from 80 gpm to 1000 gpm. Many of these facilities are located along Brandywine Creek near Greenfield.

Within the New Castle Complex Aquifer System several isolated areas have the potential for greater yields. These areas are mapped primarily in or near a buried bedrock valley in the western half of Hancock County with unconsolidated deposits typically greater than 150 feet and in places more than 300 feet thick. The unconsolidated deposits generally have two or more thick sand and gravel seams separated by till. Total thickness of aquifer materials ranges from 20 to more than 50 feet. The thickest sand and gravel seams commonly overlie the bedrock. Five registered significant water withdrawal facilities (9 wells) report pumping capacities that range from 200 gpm to 1100 gpm.

The New Castle Complex Aquifer System is not very susceptible to contamination where overlain by thick clay deposits. However, in some areas where outwash is present at or near the surface and clay deposits are thin, the system is at moderate to high risk.

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

There are 16 registered significant ground-water withdrawal facilities (total of 35 wells) using unconsolidated aquifers in the county. Most of these facilities utilize the New Castle Complex Aquifer System (14 facilities, 32 wells). However, several facilities use the New Castle Till Aquifer System (2 facilities, 3 wells). Dominant uses for these facilities are irrigation and public supply. Refer to Table 1 for some details on the wells and to the map for facility locations.

### **Map Use and Disclaimer Statement**

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