UNCONSOLIDATED AQUIFER SYSTEMS OF STARKE COUNTY, INDIANA

Five unconsolidated aquifer systems have been mapped in Starke County: the Eolian Sands; the Valparaiso Outwash Apron; the Kankakee / Plymouth Complex; the Kankakee; and the Wabash River and Tributaries Outwash System. Characteristics of the Kankakee, the Eolian Sands and the Valparaiso Outwash Apron have been described and mapped as part of the previously published regional basin study report; Water Resource Availability in the Kankakee River Basin, Indiana, IDNR, 1990. Although characteristics and descriptions of the basin study aquifer systems are generalized over large portions of northern Indiana, the descriptions of the aquifer systems have been modified here to accommodate the individuality of Starke County. Boundaries of all aquifer systems described are commonly gradational, and individual aquifers may extend across aquifer system boundaries.

Thicknesses of unconsolidated sediments that overlie bedrock are quite variable in Starke County. Total thickness ranges from approximately 35 feet in the southwest near the Kankakee River, to as much as 212 feet in the east-central portion of the county. Approximately 90 percent of all located wells are completed in unconsolidated deposits.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably due to variation within geologic environments. 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.

Eolian Sands Aquifer System

The Eolian Sands Aquifer System includes portions previously mapped as part of the regional basin study report; Water Resource Availability in the Kankakee River Basin, Indiana, IDNR, 1990, and is mapped throughout the central portion of Starke County from the Town of San Pierre and continuing northeast. General characteristics of this system involve windblown (eolian) sand at the surface with, in some areas, intermittent clay beneath that separates surface deposits from the deeper aquifer resource. In some isolated areas, either the upper windblown sands are not present, or, clay that separates the upper eolian sands from the lower outwash aquifer is not present.

Upper confining clay typically ranges from 1 to 50 feet thick with the overlying eolian sands generally ranging up to 30 feet thick. Wells completed in the Eolian Sands Aquifer System are typically from 50 to 105 feet deep. Aquifer thickness ranges from 7 to 40 feet.

This system is capable of meeting the needs of domestic and some high-capacity users. Domestic well yields are commonly 15 to 65 gallons per minute (gpm). Static water levels range from 5 to 15 feet below surface with reports of flowing wells. There are 25 registered significant groundwater withdrawal facilities (32 wells) utilizing this system with reported yields ranging from 75 to 1500 gpm.

This aquifer system is generally not very susceptible to surface contamination where intratill sand and gravel units are overlain by thick till deposits. However, areas where overlying clays are thin or absent are at moderate to high risk of contamination.

Valparaiso Outwash Apron Aquifer System

The Valparaiso Outwash Apron Aquifer System was previously mapped as part of the regional basin study report; Water Resource Availability in the Kankakee River Basin, Indiana, IDNR, 1990. Unconsolidated deposits are associated with the southern limit of a wide band of glacially derived outwash that overlies bedrock or clay. This system is mapped along much of the northwestern part of Starke County.

Total depth of wells completed in Starke County range from 17 to 148 feet with up to 94 feet of continuous aquifer sands and gravels. Where present, intermittent clay ranging from 3 to 120 feet thick separates upper outwash sands and gravels from the underlying aquifer.

This system is capable of meeting the needs of domestic and high-capacity users. Domestic well yields are commonly 10 to 60 gpm with static water levels that range from 2 to 28 feet below surface. There are 25 registered significant groundwater withdrawal facilities (61 wells) utilizing this system with reported high-capacity yields ranging from 138 to 1300 gpm.

This aquifer system is generally not very susceptible to surface contamination because intratill sand and gravel units are overlain by thick till deposits. However, wells that utilize the shallow sands and gravels are at moderate to high risk to surface contamination.

Kankakee / Plymouth Complex Aquifer System

The Kankakee / Plymouth Complex Aquifer System is mapped in portions of southern Starke County. Complex multiple glacial advances resulted in a sequence of multiple, stacked, till and outwash units that are quite variable in position and thickness. Characteristics of this system may include surface sands (primarily windblown deposits that are not used as an aquifer resource) that overlie a thick clay cap with discontinuous intratill sands and gravels above the primary aquifer unit. In places the system exhibits multiple sand and gravel deposits above the primary aquifer resource that are also a potential source of groundwater.

Few wells are reported in the Kankakee / Plymouth Complex. Well depths, however, generally range from 38 to 123 feet. The sand and gravel deposits vary from thin to massive and are typically discontinuous and overlain by a thick till. Total accumulative unconsolidated thicknesses above the aquifer unit are generally 10 to 108 feet of clay with the discontinuous sands and gravels typically 7 to 22 feet thick. The deeper, more productive aquifer deposits range from 5 to 64 feet thick.

The Kankakee / Plymouth Complex Aquifer System is capable of meeting the needs of domestic and high-capacity users. Typical domestic yields range from 10 to 50 gpm. Static water levels commonly range from 5 to 28 feet below surface. There are 4 registered significant groundwater withdrawal facilities (5 wells) with reported yields that range from 700 to 1000 gpm.

This aquifer system is not very susceptible to contamination where clay deposits overlie aquifer materials. However, in places clay deposits are thin or not present; these areas are at moderate to high risk to surface contamination.

Kankakee Aquifer System

In Starke County the Kankakee Aquifer System is mapped in the northwestern and southwestern areas of the county and includes previously mapped portions as part of the regional basin study report; Water Resource Availability in the Kankakee River Basin, Indiana, IDNR, 1990.

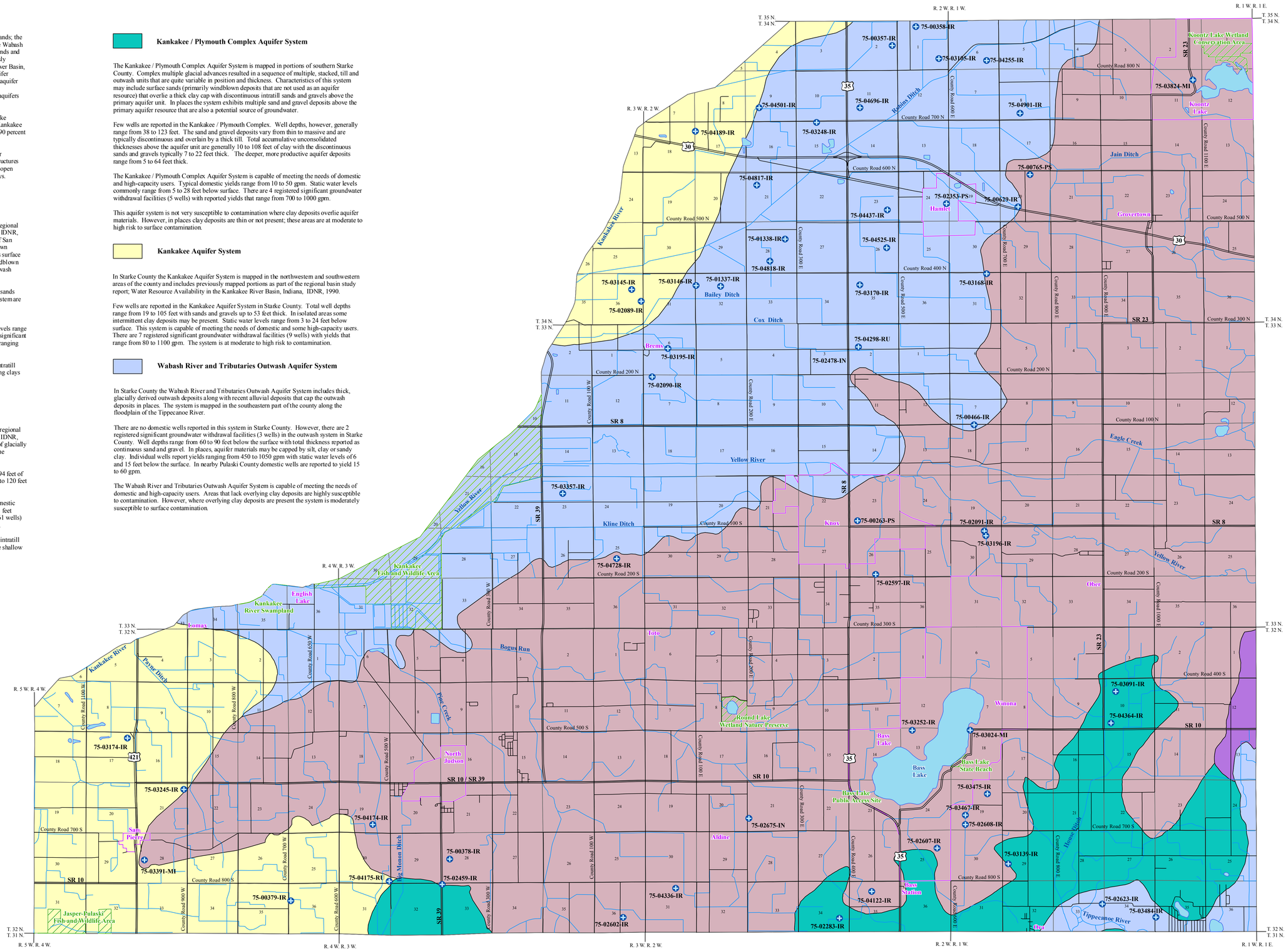
Few wells are reported in the Kankakee Aquifer System in Starke County. Total well depths range from 19 to 105 feet with sands and gravels up to 53 feet thick. In isolated areas some intermittent clay deposits may be present. Static water levels range from 3 to 24 feet below surface. This system is capable of meeting the needs of domestic and some high-capacity users. There are 7 registered significant groundwater withdrawal facilities (9 wells) with yields that range from 80 to 1100 gpm. The system is at moderate to high risk to contamination.

Wabash River and Tributaries Outwash Aquifer System

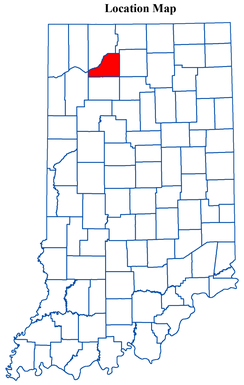
In Starke County the Wabash River and Tributaries Outwash Aquifer System includes thick, glacially derived outwash deposits along with recent alluvial deposits that cap the outwash deposits in places. The system is mapped in the southeastern part of the county along the floodplain of the Tippecanoe River.

There are no domestic wells reported in this system in Starke County. However, there are 2 registered significant groundwater withdrawal facilities (3 wells) in the outwash system in Starke County. Well depths range from 60 to 90 feet below the surface with total thickness reported as continuous sand and gravel. In places, aquifer materials may be capped by silt, clay or sandy clay. Individual wells report yields ranging from 450 to 1050 gpm with static water levels of 6 and 15 feet below the surface. In nearby Pulaski County domestic wells are reported to yield 15 to 60 gpm.

The Wabash River and Tributaries Outwash Aquifer System is capable of meeting the needs of domestic and high-capacity users. Areas that lack overlying clay deposits are highly susceptible to contamination. However, where overlying clay deposits are present the system is moderately susceptible to surface contamination.



Location Map



EXPLANATION

- Registered Significant Ground-Water Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Municipal Boundary
- State Managed Property
- Lake & River

N W E S

1 0.5 0 1 Mile

1 0.5 0 1 Kilometer

INDIANA DEPARTMENT OF NATURAL RESOURCES

INDIANA DEPARTMENT OF NATURAL RESOURCES DIVISION OF WATER STAFF

Map generated by Scott H. Dean
IDNR, Division of Water, Resource Assessment Section

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.

This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (pol ygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University. Managed Areas 96 (polygon shapefile, various dates) was from IDNR. Unconsolidated Aquifer Systems coverage was from IDNR (Water Resource Availability in the Kankakee River Basin, Indiana, 1990) (Modified, Maier 2010) and based on a 1:48,000 scale.

Unconsolidated Aquifer Systems of Starke County, Indiana

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

October 2010