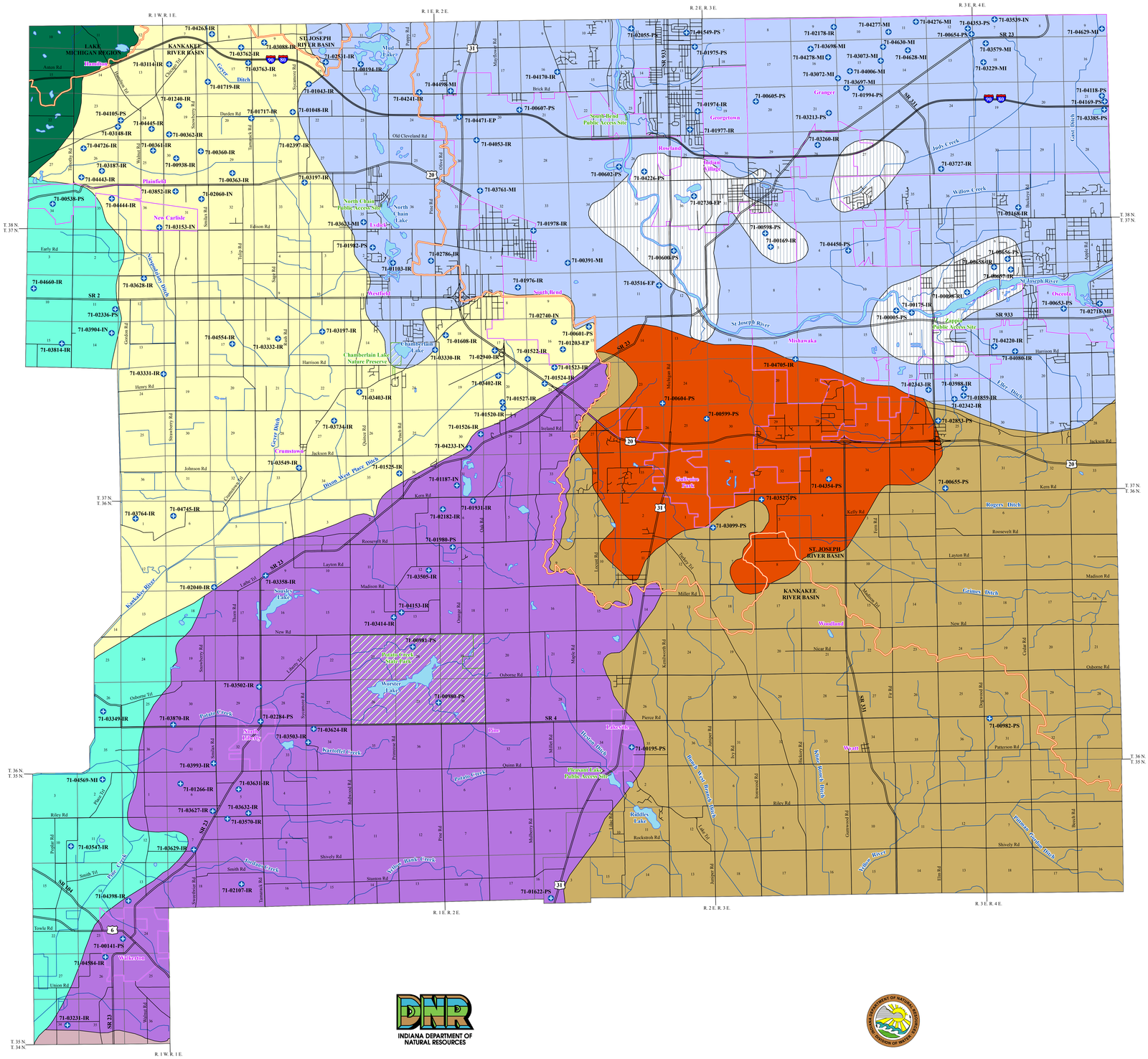
UNCONSOLIDATED AQUIFER SYSTEMS OF ST. JOSEPH COUNTY, INDIANA



The following is a summary of the availability of groundwater in St. Joseph County and was derived from the Indiana Department of Natural Resources 1987 publication Water Resource Availability in the St. Joseph River Basin, Indiana; the Indiana Department of Natural Resources 1990 publication Water Resource Availability in the Kankakee River Basin, Indiana, and the Indiana Department of Natural Resources 1994 publication Water Resource Availability in the Lake Michigan Region. Each report describes the availability, distribution, quality, and use of groundwater and surface water in the St. Joseph River Basin, the Kankakee River Basin, and the Lake Michigan Region. The full reports can be viewed and downloaded at http://www.in.gov/dnr/water.

Unconsolidated deposits of glacial sands and gravels are the principle source of groundwater in St. Joseph County. Eight unconsolidated aquifer systems have been mapped and defined on the basis of geologic environments and aquifer characteristics. They are: the Nappanee Aquifer System, the Hilltop Aquifer System, the Eolian Sands Aquifer System, the Maxinkuckee Moraine Aquifer System, the Valparaiso Moraine Aquifer System, the Valparaiso Outwash Apron Aquifer System, the Kankakee Aquifer System, and the St. Joseph Aquifer System and Tributary Valleys. Due to the availability of prolific unconsolidated aquifer systems and the extreme limitations of shale materials, the underlying bedrock is generally not used as an aquifer resource.

Nappanee Aquifer System

This aquifer system is composed of interbedded medium to coarse sand and gravel zones contained within a thick till sequence. The individual layers of sand and gravel range from 3 to 10 feet in thickness. Individual aquifers thicken locally to 30 feet or more but are seldom more than one to two square miles in area. It is not uncommon to have two or more of the aquifer units at an approximate elevation of 750 feet mean sea level (msl). This aquifer system is present under the glacial till plain in eastern St. Joseph County. This is an area of moderate to good groundwater availability (50 to 600 gallons per minute (gpm)).

There are 4 registered significant groundwater withdrawal facilities (6 wells) with yields from 50 to 250 gpm. This system, exclusive of areas where surface sand and gravel is present, is only slightly susceptible to contamination.

Hilltop Aquifer System

In St. Joseph County the Hilltop Aquifer System is located in a small area southeast of South Bend. To the north, the St. Joseph Aquifer System (outwash valley) forms a distinct topographic contrast with the Hilltop Aquifer System which occurs at a higher elevation. The south, east, and west boundaries of the Hilltop Aquifer System represent a gradational change from the sand and gravel rich Hilltop Aquifer System deposits, to clay/till rich deposits typical of the Nappanee Aquifer System. A poorly defined band of surface sands and gravels, often more than 100 feet thick, extends north and south through the middle of the system. Clay/till units thicken to the east and west; however, they seldom exceed 40 feet in thickness. Many wells located in the northern third of the system are completed in a sand and gravel unit that is 10 to 30 feet thick and is found at an elevation of 720 to 690 feet msl, virtually matching the elevation range of the St. Joseph surface sands and gravels complex immediately to the north. Continuity of the various units becomes more erratic southward. Wells in the south half of the system are typically completed in thick sand and gravel units ranging in elevation from approximately 750 to 670 feet msl. Static water levels are relatively deep in the Hilltop Aquifer System ranging from 40 to 60 feet below ground surface. Domestic wells generally yield 10 to 60 gpm.

In most areas of the Hilltop Aquifer System, high-capacity wells can be expected to yield 50 to 250 gpm. There are 5 registered significant groundwater withdrawal facilities (8 wells) with yields reported up to 2000 gpm. The surficial sand deposits are highly susceptible to contamination, but the intratill deposits are only slightly susceptible.

Eolian Sands Aquifer System

The Eolian Sands Aquifer System occurs in the southwestern tip of St. Joseph County. This aquifer system is a drift complex which contains intratill lenses of sand and gravel and a characteristic blanket of windblown sand on the surface. Aquifers within this system include surficial sands, and intratill sand and gravel lenses. The aquifer units vary in thickness from 4 to 72 feet, but most wells produce from aquifers 10 to 30 feet thick. Well depths range from 24 to 211 feet, but most wells are between 50 and 120 feet deep. Static water levels throughout the system range from 0 to 48 feet; however, most static water levels are between 5 and 20 feet deep. High capacity wells in nearby counties have produced up to 1200 gpm, but expected yields range from 100 to 600 gpm.

There are no registered significant groundwater withdrawal facilities utilizing this system in St. Joseph County. The surficial sand deposits are highly susceptible to contamination, but the intratill deposits are only slightly susceptible.

Maxinkuckee Moraine Aquifer System

This aquifer system is a complex mixture of thin intratill sand and gravel units within a thick till deposit and in places, locally thick, coarser grained surficial deposits. Most of the aquifers are between 3 and 35 feet thick. Wells depths range from 26 to 273 feet; however, most wells are 50 to 150 feet deep. Wells less than 40 feet deep typically are completed in surficial sand and gravel deposits. Static water levels range from 0 to 90 feet deep, but in most areas are 10 to 50 feet deep. Domestic wells may produce from 4 to 80 gpm, although yields of 10 to 25 gpm are most common.

There are 32 registered significant groundwater withdrawal facilities (43 wells) with high-capacity yields from 70 to 2260 gpm. The aquifer system is moderately to highly susceptible to surface contamination.

Valparaiso Moraine Aquifer System

This aquifer system, which forms the southern slope of the Valparaiso Moraine, is a deposit of fine to medium grained sand interbedded with gravel rich zones and clay lenses. Shale rich gravel lenses are scattered throughout the apron. The outwash apron occurs in the southwestern corner and the northwestern edge of St. Joseph County.

Most wells are completed in the upper aquifer unit and have depths ranging from 30 feet to more than 100 feet. The wells completed in the lower aquifer unit typically exceed 50 feet deep and may be more than 150 feet deep. The depth to the static water level typically is less than 20 feet deep, but at higher surface elevations, depths may exceed 40 feet. Yields in the upper and lower aquifer units are similar, ranging from 15 to 60 gpm for domestic wells.

There are 8 registered significant groundwater withdrawal facilities (16 wells) with yields from 10 to 1200 gpm. Because there is no clay rich cap, the aquifer system is highly susceptible to surface contamination.

Valparaiso Outwash Apron Aquifer System

This aquifer system, which forms the southern slope of the Valparaiso Moraine, is a deposit of fine to medium grained sand interbedded with gravel rich zones and clay lenses. Shale rich gravel lenses are scattered throughout the apron. The outwash apron occurs in the southwestern corner and the northwestern edge of St. Joseph County.

Most wells are completed in the upper aquifer unit and have depths ranging from 30 feet to more than 100 feet. The wells completed in the lower aquifer unit typically exceed 50 feet deep and may be more than 150 feet deep. The depth to the static water level typically is less than 20 feet deep, but at higher surface elevations, depths may exceed 40 feet. Yields in the upper and lower aquifer units are similar, ranging from 15 to 60 gpm for domestic wells.

There are 8 registered significant groundwater withdrawal facilities (16 wells) with yields from 10 to 1200 gpm. Because there is no clay rich cap, the aquifer system is highly susceptible to surface contamination.

Kankakee Aquifer System

The Kankakee Aquifer System is an unconfined deposit of well-sorted fine to medium grained sand, which is interbedded with gravel lenses in the tributary valleys. In places the aquifer system thickness ranges from less than 20 feet where the unit overlies bedrock highs to more than 150 feet in tributary valleys. However, the thickness is about 30 feet in most areas.

Static water levels are shallow in the Kankakee River floodplain, and are usually less than 20 feet deep. Wells typically are shallow, and few exceed depths of 50 feet. In the tributary valleys, however, the depth to the water table may exceed 50 feet and well depths may exceed 150 feet. Domestic wells usually produce from 15 to 50 gpm.

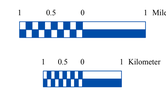
There are 52 registered significant groundwater withdrawal facilities (87 wells) with high-capacity yields from 100 to 2500 gpm. Due to the absence of clay deposits, the aquifer system is highly susceptible to surface contamination.

St. Joseph Aquifer System and Tributary Valleys

The St. Joseph Aquifer System is composed of fine to medium grained sand with zones of coarse sand and gravel. Interspersed within these deposits are thin clay or till units of limited areal extent. Locally at the South Bend area and the Mishawaka area, thick clay deposits are present below the surface sands and gravels. These clay or till units extend, in places, close to the bedrock surface. The St. Joseph Aquifer System varies from 20 feet near the southern boundary of the St. Joseph River Basin to approximately 400 feet thick over the buried bedrock valley at the western edge of Elkhart County. Numerous high capacity industrial, municipal, and irrigation wells obtain water from this aquifer which constitutes one of the major aquifer systems in the state. This aquifer system is generally an area of excellent groundwater availability (100 to 1500 gpm). The aquifer is highly susceptible to groundwater contamination. There are 62 registered significant groundwater withdrawal facilities (134 wells) with yields from 7 to 2800 gpm.

The Tributary Valleys Aquifer System is similar to the main stem St. Joseph Aquifer System, but often contains coarser outwash deposits. This unit is underlain by a thick clay/till which in turn is underlain by a sand and gravel aquifer ranging up to 50 feet in thickness. The deeper aquifers are utilized by many industrial concerns. This area exhibits good to excellent groundwater availability (100 to 1000 gpm). The surficial sand and gravel deposits of this system are highly susceptible to contamination and the deeper aquifers are slightly susceptible.

In northeastern St. Joseph County around South Bend, this area is contained within the St. Joseph Aquifer System and is composed of surficial sand and gravel above a moderately thick (20 to 100 feet) clay/glacial till zone which is underlain by a sand and gravel aquifer that is extensively used by industrial and municipal wells in the southern South Bend area. The lower sand and gravel unit ranges in thickness from 20 to 50 feet, and contains localized zones of coarse sand and gravel. This is an area of major groundwater availability (500 to 1500 gpm). There are 11 registered significant groundwater withdrawal facilities (36 wells) with yields from 90 to 2820 gpm. The aquifer is moderately susceptible to groundwater contamination.



EXPLANATION

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

Location Map

INDIANA DEPARTMENT OF NATURAL RESOURCES

Map generated by Scott H. Dean, February 2010
IDNR, Division of Water, Resource Assessment Section

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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 (polyg on 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 shape file, various dates) wa s from IDNR. Unconsolidated Aquifer Systems coverage was from IDNR (Water Resource Availability in the St. Joseph River Basin, Water Resource Availability in the Kankakee River Basin, Indiana, 1990, and Water Resource Availability in the Lake Michigan Regi on, Indiana, 1994) and based on a 1:48,000 scale.

Unconsolidated Aquifer Systems of St. Joseph County, Indiana

by

Division of Water
1987, 1990, 1994