STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

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 3-10 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). In the Millersburg area this cluster occurs at an elevation of about 780-800 msl and commonly thickens at the boundary where it blends into the outwash deposits of the major stream and river valleys. This aquifer system is present under the glacial till plain in western Elkhart and eastern St. Joseph Counties. This is an area of moderate to good ground-water availability (50-600 gpm). This system, exclusive of areas where surface and gravel is present, is only slightly susceptible to contamination.

THE ST. JOSEPH AQUIFER SYSTEM AND TRIBUTARY VALLEYS

The St. Joseph Aquifer System is composed of fine to medium sand with zones of coarse sand and gravel. Interspersed within these deposits are thin clay or glacial till units of limited areal extent. Locally at Elkhart and in several places in the South Bend-Mishawaka area thick clay deposits are present below the surficial sand and gravel. These clay or till units extend in places to near the bedrock surface. The St. Joseph Aquifer System varies from 20 to over 400 feet in thickness within the basin. The greatest known aquifer thickness is in the Elkhart area where a deeply cut buried bedrock valley is present. 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 an area of excellent ground-water availability (100-1500 gpm) and is highly susceptible to ground-water contamination.

The Tributary Valleys Aquifer System is similar to the main stem St. Joseph Aquifer System, but often contains coarser outwash deposits. In the vicinity of Goshen these deposits exceed 150 feet in thickness. In the Little Elkhart River Valley and northwest of Goshen in the Elkhart River Valley the surficial outwash ranges up to 60 feet in thickness. 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 Goshen, Middlebury and many industrial concerns. This area exhibits good to excellent ground-water availability (100-1000 gpm). The surficial sand and gravel deposits of this system are highly susceptible to contamination and the deeper aquifers are slightly susceptible.

ST. JOSEPH AQUIFER SYSTEM

Surficial sand and gravel of the St. Joseph Aquifer System is found above a moderately thick (20-100 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 South Bend area. The lower sand and gravel unit ranges in thickness from 20-50 feet, and contains localized zones of coarse sand and gravel. This is an area of major groundwater availability (500-1500 gpm). The aquifer is moderately susceptible to ground-water contamination.

ST. JOSEPH AQUIFER SYSTEM

This area is contained within the St. Joseph Aquifer System. This unit is composed of thick clay deposits which are overlain by the surficial outwash sand and gravel deposits of the St. Joseph Aquifer System. The clay deposits extend to bedrock in several places, but commonly will contain thin zones of sand and gravel prior to encountering the bedrock surface. Well depths are quite erratic in this area. This area is of minor ground-water availablity (0-50 gpm). The aquifer is moderately susceptible to ground-water contamination.

HILLTOP AQUIFER SYSTEM

Throughout the Hilltop system, sand and gravel units comprise 60-100 percent of the strata penetrated by existing water wells. To the north the St. Joseph Aquifer System (outwash valley) forms a distinct topographic contrast with the Hilltop Aquifer which occurs at a higher elevation. The south, east and west boundaries of the Hilltop Aquifer represent a gradational change from the sand/gravel rich Hilltop system deposits, to clay/till rich deposits typical of the Nappannee System. A poorly defined band surficial sand and gravel, often more than 100 feet thick, extends north-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 10-30 foot thick sand and gravel unit found at an elevation of 720-690 feet - virtually matching the elevation range of the St. Joseph surficial sand and gravel complex immediately to the north. Continuity of the various units becomes more erratic southward. Wells in the south half of the system are typcially completed in thick sand and gravel units ranging in elevation from approximatly 750-670 feet. This is an area of moderate ground-water availability (25-150 gpm). The aquifer is susceptible to ground-water contamination.

TOPEKA AQUIFER SYSTEM

The Topeka Aquifer System is located in two separate areas. The northernmost occurrence of this system is just south of Topeka, Indiana, in LaGrange County, and extends southward into Noble County. The other occurrence of the Topeka Aquifer System cover approximately five square miles in north central Noble County. The Topeka Aquifer System consists of up to 126 feet of near surface sand and gravel zone that overlies till. The till sequence that underlies this near surface sand and gravel consists of clay units alternating with up to four separate sand and gravel layers. In most areas of this system, however, there is only one (0-60 feet thick) sand and gravel zone at depth. The majority of existing wells in these regions utilize the more continuous deeper sand and gravel aquifer rather than the near surface deposits. In areas where there is more than one aquifer present, the minor aquifers are only locally continuous. Ground-water availability is generally good in this area (100-600 gpm). The surficial sand and gravel deposits are highly susceptible to contamination and the deeper aquifers are slightly susceptible.

THE KENDALLVILLE AQUIFER SYSTEM

The Kendallville Aquifer System occurs in the eastern portion of the St. Joseph River Basin and is characterized by fairly thin sand and gravel lenses contained within a thick clay sequence. Individual sand and gravel aquifers are usually 5 to 30 feet in thickness although they may be up to 50 feet thick in localized areas. The depth to a productive aquifer is quite variable although it is usually at least 90 feet below the ground surface. In some local areas where the clays are thick, depths to the aquifers may be over 200 feet. Surface and near surface sand and gravel is largely absent although it does occassionally occur as localized discontinuous patches. The Kendallville Aquifer System grades into the Natural Lakes and Moraines Aquifer System to the west and is distinguished from the western system by the lack of surface and near surface sand and gravel deposits, and by the less continuous and more variable deeper deposits. Due to the discontinuous nature of sand and gravel deposits and the lack of surficial sand and gravel, the Kendallville Aquifer System is less prone to contamination. This is an area of limited to good ground-water availability (25-600 gpm).

THE NATURAL LAKES AND MORAINES AQUIFER SYSTEM

The Natural Lakes and Moraines Aquifer System normally contains at least two potential sand and gravel aquifers, one near the surface, the other at depth. The surface and near surface aquifers vary from 10 to 50 feet in thickness and typically occur within 100 feet of the ground surface. These surface sand and gravel layers are often continuous over many square miles and may be related to the thick surficial outwash deposits to the west. Often, the near surface aquifers are directly connected to areas of surficial sands and gravels and thus are more prone to contamination than are the deeper sand and gravel aquifers.

The deeper sand and gravel aquifers of the Natural Lakes and Moraines Aquifer System are more variable in depth and thickness, and typically occur as discontinuous lenses and layers below a thick clay layer. They are usually 10 to 30 feet thick and occur at depths of 100 feet or more. Because these deeper sands and gravels occur below or within thick clays, they are less susceptible to surface contamination. Most of the wells in the Natural Lakes and Moraines Aquifer System are completed at depths shallower than the deeper aquifers of this system. This is an area of irregular, but generally good ground water availability (25-800 gpm). The system, exclusive of surficial and near surface sand gravel, is moderate to slightly susceptible to contamination.

HOWE OUTWASH AQUIFER SYSTEM

The Howe Outwash Aquifer System occurs in the northern third of LaGrange County and in northwestern Steuben County. The prevailing character of this aquifer system is moderately thick near surface sand and gravel deposits that overlie an altered till plain. The near surface outwash deposits are the most extensive granular deposits in this system and vary from 15-135 feet in thickness. Within the underlying till sequence, clay zones alternate with sand and gravel layers. These sand and gravel layers average 5-25 feet in thickness, although some localized lenses reach thicknesses of 100 feet. The tops of the sand and gravel lenses characterisitically occur between 800-850 feet mean sea level (msl) in the western portion of this aquifer system. This system typically occurs at progressively higher elevations to the east, two or more sand and gravel deposits often occur at depth within the till sequence, but are only continuous locally. This is an area of good to excellent ground-water availability (100-1000 gpm). The surficial deposits are highly susceptible to contamination and the deeper sand and gravels are moderately so.

An anomaly in the Hower Aquifer System is present around Pigeon Lake, North and South Twin Lakes, and Still Lake west of Howe. Surrounding this group of lakes is an unexpectedly thick clay sequence within the aquifer system. Surficially, this region is similar to the remainder of the Howe Aquifer system in that it is underlain by sand & gravel. However, below this upper zone, the lake area contains clay layers ranging from 25 to 180 feet in thickness, which is much greater than the depth in the Howe System. This is an area of moderate ground-water availability (5-100 gpm). This system, exclusive of the surficial sand and gravel, is only slightly susceptible to contamination.

Prepared by the Division of Water
Indiana Department of Natural Resources

AQUIFER DESIGNATION MAP

Base map compiled from USGS 1:24000 scale topographic maps.
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