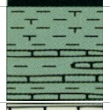
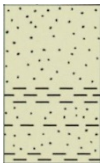
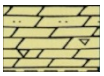
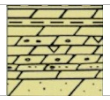
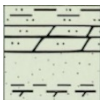
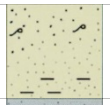
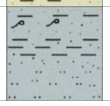
Where Does Our Drinking Water Come From?

Dakota County Groundwater and Geology

Geologic Formation	General Lithology	Presence & Use of Water
Quaternary deposits Surface deposits of sand and gravel; erodes easily		May contain water used for domestic, commercial, and irrigation purposes; Easily contaminated
Decorah Shale Clay-like shale with thin fossil-bearing limestone		Helps to protect underlying aquifers from contamination
Platteville and Glenwood Formations Fossil-bearing limestone and sandy shale		Supplies very limited amounts of water to northern Dakota County
St. Peter Sandstone Poorly-cemented, granular sandstone		Supplies limited amounts of water to Dakota County; Easily contaminated in central and southern portions of the County
Prairie du Chien Formation Limestone		Primary source for municipal, industrial and high capacity irrigation wells
Jordan Sandstone Poorly-cemented, granular sandstone		
St. Lawrence-Tunnel City Formation Shaley sandstone or siltstone		Produces small amounts of water in eastern Dakota County
Wonewoc Sandstone Silty to coarse-grained sandstone		Seldom used aquifer
Eau Claire Formation Siltstone, fine sandstone, and shale		Helps to protect underlying aquifers from contamination
Mt. Simon-Hinkley Formation Fine to coarse-grained sandstone		The deepest high-yielding aquifer in Dakota County; Protected for future use with a restriction on new well drilling

Groundwater supplies 95 percent of total domestic, municipal, and industrial water used in Dakota County.

Groundwater is contained in aquifers – layers of bedrock saturated with water. Physical characteristics of surface and bedrock geology can affect groundwater quality and quantity. The depth of the bedrock from the surface of the land and the ease with which water moves through the bedrock layers are two important characteristics. These traits and others help determine where aquifers are located, how they are recharged, and whether or not they are at risk of contamination.

The bedrock geology of Dakota County consists of alternating layers of limestone, dolomite, sandstone, and shale. Ancient seas advanced and retreated over the land depositing sediments which eventually formed these bedrock layers. Sand accumulated near shores in sand bars, on beaches, and in sand dunes. Silt and clay created mud flats or settled in quiet waters farther from shore. Decomposed shells accumulated in small banks and reefs. Over time, these deposits were compressed and hardened to form the sandstone, shale, and dolomitic limestone of today.

About 10,000 years ago when the last glacier retreated, rocks and sands were left covering the bedrock. This material is called “glacial drift” and is considered the “surface geology” of the area. Many of the rivers and lakes existing today were created by meltwater from the retreating glacier.

Bedrock Layers and Aquifers Underlying Dakota County

Surface (Quaternary) Deposits
Surface deposits are also referred to as Quaternary or “glacial drift” deposits. These deposits contain poorly-cemented sand and gravel left by glaciers. Aquifers found in surface deposits can supply moderate quantities of water for domestic wells. In deeper surface deposits, water may be available for commercial and irrigation wells. Aquifers occurring in surface deposits can be easily contaminated.

Decorah Shale
The Decorah Shale bedrock layer is a pale, blue-green shale containing thick layers of fossil-bearing limestone. The Decorah Shale was created when mud and silt were deposited in the quiet, off-shore waters of an ancient sea which covered the County. The Decorah Shale underlies parts of the cities of Mendota, Mendota Heights, and West St. Paul. It can be a barrier between rock layers and protects underlying aquifers from contamination.

Platteville and Glenwood Formations
The Platteville bedrock layer is a fine-grained, fossil-bearing limestone which does not erode easily. The underlying Glenwood bedrock layer is a pale green, sandy shale. These sediments were deposited in the waters of an ancient sea. The Platteville aquifer supplies very limited amounts of water for domestic use in Mendota Heights, West St. Paul, and Inver Grove Heights. These two bedrock layers have been eroded from most areas of the County.

St. Peter Sandstone
The St. Peter bedrock layer consists of poorly-cemented, granular sandstone that was deposited near the shore of an ancient area. The St. Peter Sandstone contains groundwater and is found throughout much of Dakota County. The aquifer supplies limited amounts of water for domestic and use in the northern portion of the County. In the central and southern portions of the County where the bedrock comes close to the surface, the aquifer is very susceptible to contamination.

Prairie du Chien Formation
The bedrock layers that make up the Prairie du Chien Formation consist of limestone which was deposited in the near-shore waters of an ancient sea. Together, the Prairie du Chien and Jordan aquifers (see below) are the primary source of drinking water in the County. Most domestic and municipal wells and most high-volume irrigation wells use the Prairie du Chien and Jordan aquifers. In some areas where surficial cover is minimal, the Prairie du Chien is more susceptible to contamination. New drinking water wells are prohibited in these areas. These aquifers underlie the majority of the County.

Together, the Prairie du Chien and Jordan aquifers (see below) are the primary source of drinking water in the County.

Jordan Sandstone
The Jordan Sandstone bedrock layer is made up of poorly-cemented, granular sandstone which was deposited near the shore of an ancient sea. Because water in the Prairie du Chien aquifer is more susceptible to contamination, most new wells for municipal and domestic use in Dakota County are being drilled in the Jordan aquifer. The St. Lawrence shale layer separates the Jordan aquifer from the underlying Tunnel City Formation. This shale layer helps to protect underlying aquifers from contamination.

St. Lawrence-Tunnel City Formation
The St. Lawrence-Tunnel City (formerly known as St. Lawrence-Franconia) bedrock layer consists of shaley sandstone and siltstone and underlies all of Dakota County. The St. Lawrence-Tunnel City Formation supplies a moderate amount of water for domestic use in eastern Dakota County.

Wonewoc Sandstones
The Wonewoc Sandstones (formerly known as Ironton-Galesville) bedrock layers consist of a thin, silty- to coarse-grained sandstone. Wonewoc Sandstones is a seldom used aquifer.

Eau Claire Formation
The Eau Claire bedrock layer consists of siltstone, fine sandstone, and shale. It can be a barrier between rock layers and protects underlying aquifers from contamination.

Mt. Simon-Hinkley Formation
The Mt. Simon-Hinkley bedrock layer is composed of fine- to coarse-grained sandstone. The Mt. Simon-Hinkley aquifer is the deepest high-yielding aquifer in Dakota County. The aquifer is used for some high volume industrial and municipal wells. It is not used for domestic water supplies because other, shallower sources of water are available. There is a moratorium on further development of the Mt. Simon-Hinkley aquifer; no new wells will be allowed without approval from the Minnesota Department of Health.

Suggested technical references:

Minnesota Geologic Survey, Geologic Atlas, Dakota County, 1990

Dakota County Groundwater Protection Plan

Minnesota's Geology. Ojakangas, Richard and Charles Matsch. Minneapolis: University of Minnesota Press, 1982.

For further information about Dakota County's groundwater and geology, call:

Dakota County Environmental Resources Department – 952-891-7000

- Groundwater quality and quantity
- Sources and areas of contamination
- Wellhead protection areas
- Dakota County geology
- Well construction, sealing, and water tests
- County ordinances and state rules

For regional and statewide information about groundwater and geology, call:

Minnesota Pollution Control Agency – 651-296-6300

- Groundwater quality
- Chemical spills and clean-up

Minnesota Geologic Survey – 612-627-4780

- Groundwater/geologic maps
- Groundwater levels

www.dakotacounty.us, search *water resources*

Dakota COUNTY