

# WHAT IS GROUNDWATER?

Most people in northern Michigan depend on groundwater as a source of clean drinking water. In rural areas, virtually everyone uses a well to provide water. Many municipalities use wells to get the water their residents use. Most people, however, don't often think about how the water reaches their well, or about potential threats to the purity of their water. A brief description of the water cycle will help explain this vital resource.

## The Water Cycle

Water moves through the environment in a continuous cycle. Water evaporates from lakes, streams, the Great Lakes, and oceans. Water is also given off in large amounts by trees and other vegetation. This moisture returns to the earth as precipitation. As rain and snowmelt flow across the surface of the soil, some of the water flows into streams and lakes and becomes surface water. A large proportion of the water, however, seeps into the ground. Water that seeps below the surface is called groundwater.

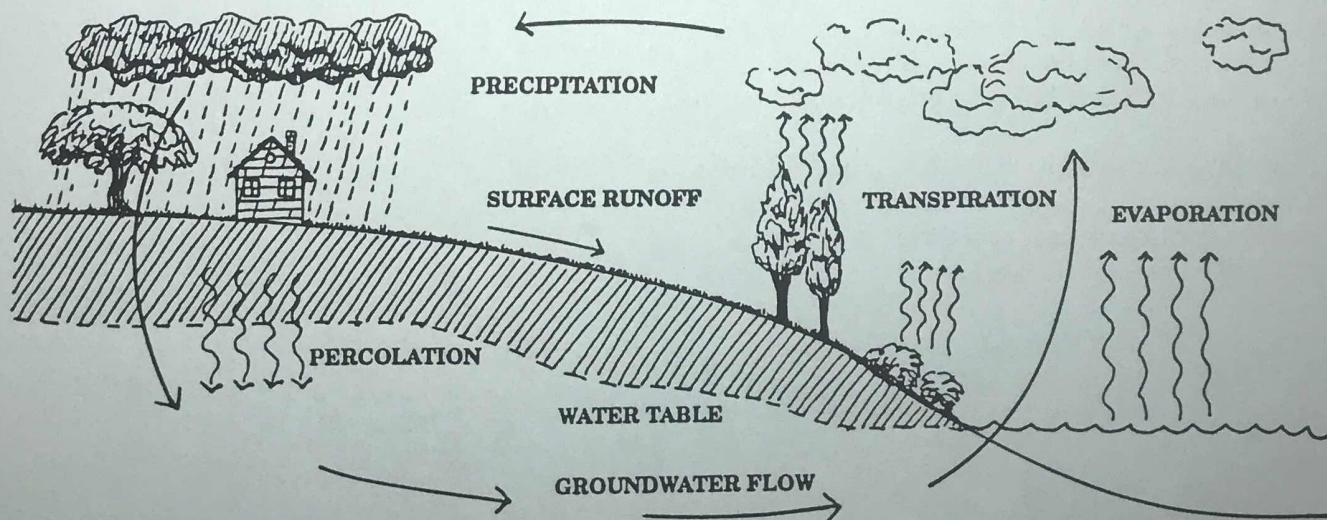
## The Water Table

Huge supplies of groundwater can be found under the surface throughout much of northern Michigan. Many people think that groundwater fills large

underground caverns that would resemble lakes if we could see them. These formations actually occur very rarely in nature. Instead, most groundwater is found in the pore spaces between soil or rock particles. Water seeping down from the soil surface fills these spaces. The downward flow of water is restricted by bedrock, or by dense soils such as clay or marl, which prevent the water from penetrating any deeper. When water saturates all the pore spaces in sand or gravel, or the cracks in rocks, the formation is called an aquifer. Aquifers can yield large amounts of water to wells or springs. The upper surface of the zone of saturation is called the water table.

## Groundwater Movement

Groundwater moves through the soil, sometimes for very long distances. Groundwater flows downhill just as surface water does, so in many areas the groundwater moves slowly through the soil toward lower elevations. The rate of movement depends on the slope of the water table and the size of pore spaces in the soil. Groundwater flows very slowly through clay soils, which have small pore spaces. In these areas, the water can move as slow as fractions of an inch per day. In soils with larger particles, like sand and gravel, water can move many feet per day.



## Groundwater Quality

Groundwater is an important resource because we need clean water to drink. Surface waters are easily contaminated by natural substances or pollution from human activities. Groundwater, on the other hand, is protected from some pollutants by the soil, which acts as a filter. Before people settled in this region, the filtering action of the soil protected groundwater from natural contaminants. Human activities, however, can pose a serious threat to the groundwater because the soil cannot filter out many of the pollutants we generate. If we protect our groundwater, we will have a readily available source of drinking water that we can count on to meet our needs.

## Groundwater Contamination

Groundwater is vulnerable to many different kinds of contamination. In some areas, the groundwater is close to the surface, and many substances can move through the soil to reach the water table. Other contaminants dissolve in water, and can be transported through the soil as surface water seeps down toward the water table.

Most of the serious groundwater contamination problems in northern Michigan result from human activities. In agricultural areas, fertilizers, pesticides, and animal wastes can contaminate groundwater. Most rural households have septic systems that can cause contamination if they are not properly sited or maintained. Many of the substances commonly used around the home, like cleaning products, automotive fluids, paints, and yard products, can contaminate the groundwater if not disposed of properly. Storage tanks for gasoline and other fuels can leak, causing groundwater contamination. Old dump sites can cause contamination from a wide variety of materials disposed there. In addition, many small businesses produce hazardous or toxic substances that must be very carefully handled to avoid groundwater contamination.

If we take appropriate care to avoid these problems, we can avoid the serious consequences of groundwater contamination that are already occurring in other areas of the state.

*For further information* about groundwater and potential contamination problems, see the other Groundwater Fact Sheets in this series listed below.

Other Groundwater Fact Sheets are available on these topics:

Nitrate Contamination	Number 2
Household Hazardous Wastes	Number 3
Septic Tank Maintenance	Number 4
Fuel Storage Tanks	Number 5

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