Basics of Groundwater (Well Water)

USGS science for a changing world

The hydrologic cycle begins with rain falling to the ground in which about 30% of that water infiltrates into the local geology and is called groundwater. Groundwater is often called well water when used by private residents for drinking and other domestic uses. Well water can be a mix of groundwater that has been on the move in the surrounding geology for a short (days) or long (thousands of years) period of time. Movement of groundwater depends on the type of rock layers, known as aquifers, transmitting or containing the groundwater.

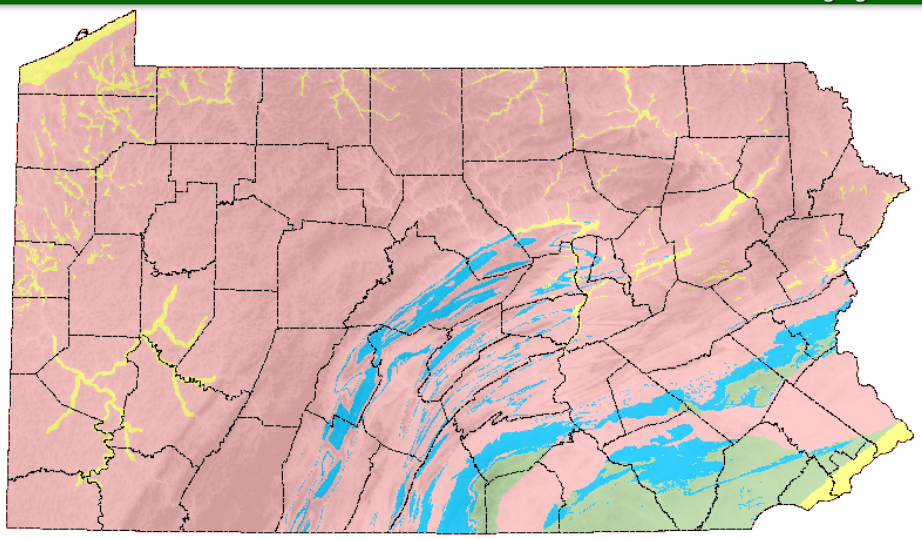

Figure 1. Pennsylvania's major aquifer types. (Modified from Lindsey and others, 1999)

The U.S. Geological Survey, in cooperation with the Pennsylvania Department of Agriculture, has grouped the complex geology in Pennsylvania into four major aquifer types (Figure 1):

- Carbonate (blue): limestone and dolomite
- Crystalline (green): schists or other metamorphic or igneous rocks
- Siliciclastic (pink): sandstones, siltstones, and shale
- Surficial (yellow): unconsolidated sands and gravels

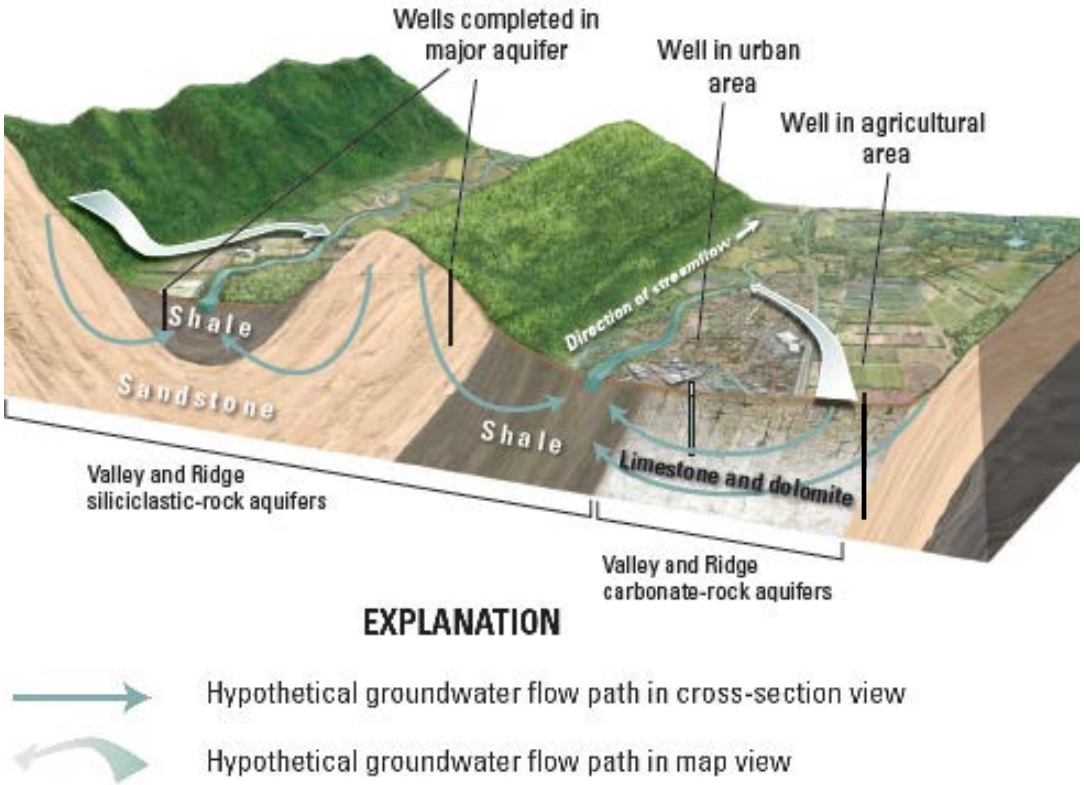

Figure 2. Wells completed in various aquifer types and land use areas. (Modified from Johnson and others, 2010)

Depending on where you live, it is possible for different aquifer types to overlap. For example, residents may have a well drilled in carbonate, siliciclastic, or both aquifer types. Water naturally picks up dissolved constituents (minerals, etc.) as it travels through aquifer materials over time. The quality of your well water is influenced by the contact time it has with the local geology, land use activities, and the well's construction quality (Figure 2).

For additional reading:

League of Women Voters (2002). Groundwater: A Primer for Pennsylvanians: Pennsylvania Citizen Education Fund (WP0001): 12. Accessed at http://wren.palwv.org/library/documents/Groundwater_Primer.pdf