

Ground water is the primary source of drinking water for most residents in rural areas of Maryland and a key source of drinking water for public water supply systems in many areas. Groundwater occurs in a variety of hydrogeologic settings, reflecting the geologic diversity of the State. This fact sheet describes groundwater and wells in the Coastal Plain physiographic province of Maryland, and the factors associated with well-water availability and quality.

Geology and ground water

Maryland's Coastal Plain aquifer system lies within the Atlantic Coastal Plain physiographic province which includes eastern and southern areas of Maryland (figure 1). A relatively thick wedge of largely unconsolidated sediments underlies Maryland's Coastal Plain. The sediments consist predominantly of sand, gravel, silt, and clay, ranging in age from Cretaceous to Quaternary, and overlie consolidated rocks of Precambrian, Lower Paleozoic, Jurassic(?), and Triassic age (Andreasen and others, 2013). The sediments dip gently to the east and southeast with thickness ranging from a few tens of feet near the Fall Line to approximately 7,200 ft at Ocean City, Maryland (figure 2).

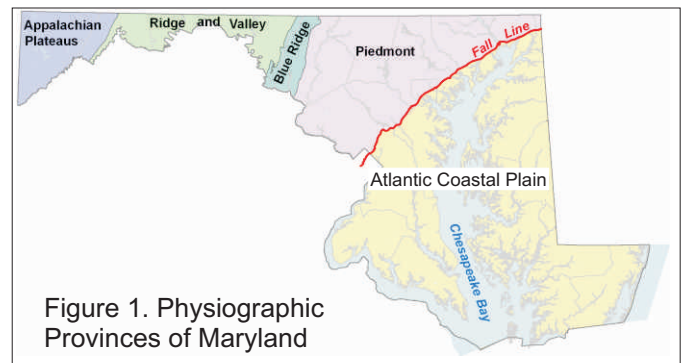


Figure 1. Physiographic Provinces of Maryland

The geologic setting controls the occurrence, movement, and quality of ground water. Sand and gravel layers, capable of yielding water to wells, form aquifers, while silt and clay layers impede the flow of water and form confining units. In the Coastal Plain physiographic province, ground water flows through pore spaces between sand and gravel particles. Ground water in aquifers occurs in two different conditions, unconfined and confined. Unconfined or water-table conditions occur where the aquifer is not covered by a confining layer and water from precipitation can percolate directly downward to the saturated zone. In confined or artesian conditions, water in the aquifer has moved beneath a confining layer and becomes confined under pressure. Most aquifers in the Coastal Plain are overlain by low-permeability clay layers (forming confined or artesian aquifers) which prevent surface contaminants from reaching the aquifers. In Maryland's Coastal Plain there are sixteen major aquifers (or aquifer systems), fourteen of which are confined aquifers and two of which are shallow water-table aquifers.

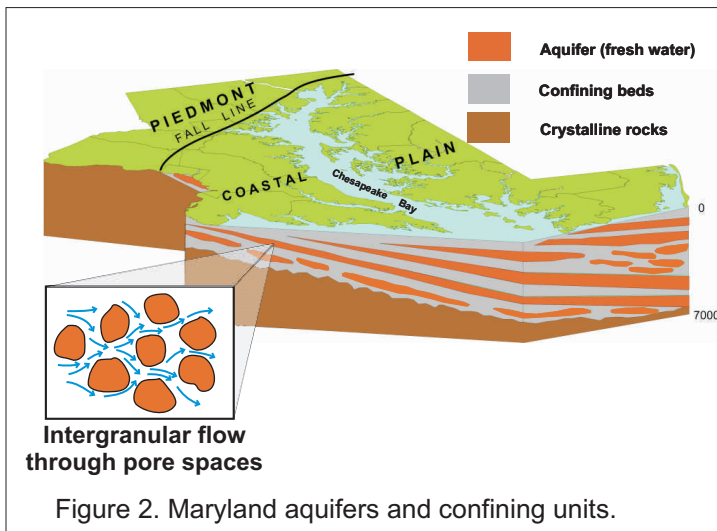


Figure 2. Maryland aquifers and confining units.

Where does ground water come from?

Ground water in Maryland's Coastal Plain is derived from rain and snow that falls within the outcrop area of the aquifers (that is, the area where the aquifers reach the surface). Infiltrating rain water and snowmelt percolates downward through the soil zone until it reaches the water table (the level below which the ground is saturated with water). The saturated zone below the water table forms the water-table (or surficial) aquifer. Water in the water-table aquifer flows slowly towards areas of discharge (streams, rivers, and ponds) and, to a lesser extent, to the deep confined aquifer systems. Ground water can reside in the aquifer system for as little as a few days to more than 1 million years.

Characteristics of wells and ground water in the Coastal Plain

- Typical wells in the Coastal Plain range in depth from tens to several hundred feet for domestic wells and up to two thousand feet for public supply and industrial wells.
- Well casing, either PVC or steel, extends from above land surface to the top of the well screen. The screen allows water to enter from the aquifer and prevents loose sediment particles from entering the well.
- The annular space between the borehole and the well casing above the screened interval is typically filled with cement grout or bentonite clay and must span part of the confining layer overlying the screened aquifer to prevent cross-communication between adjacent aquifers. The annular space surrounding the well screen is filled with clean well gravel.
- Well screens are installed in part or all of the target aquifer. Multiple aquifers can not be screened in one well.
- Typical well yields in the Coastal Plain range from less than 10 gallons per minute (gal/min) in small-diameter domestic wells to 2,000 gal/min or more in large-diameter public or industrial supply wells.
- Unconfined aquifers are more likely to be directly affected by drought and other climatic factors than confined aquifers; however, increased withdrawals of ground water from confined aquifers during drought—for example when used for irrigation to compensate for lack of precipitation—will affect water levels in the confined aquifers.
- Water quality in the Coastal Plain aquifers is generally good; however, in some areas and in some aquifers the water may be degraded by naturally-occurring iron, manganese, arsenic, radionuclides, and salt-water intrusion. The water-table (surficial) aquifer is more likely to be affected from surface contamination (e.g. nitrate from septic effluent and crop and lawn fertilizer, and chloride from road salt) as opposed to confined aquifers.

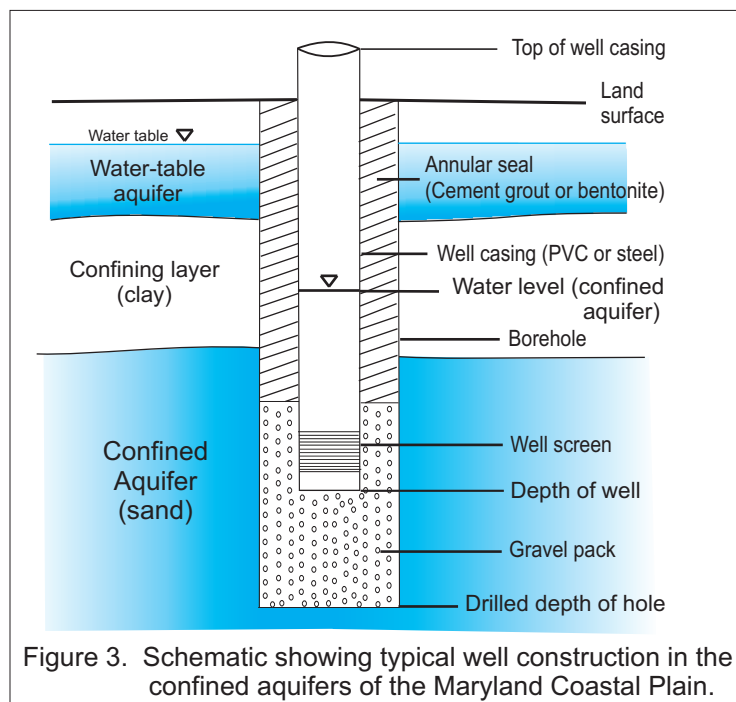


Figure 3. Schematic showing typical well construction in the confined aquifers of the Maryland Coastal Plain.

Obtaining information about my well

To ensure a clean and adequate supply of underground drinking water, the State carries out programs to prevent contamination of aquifers from improper well construction and well abandonment. All wells constructed in Maryland must be installed by a licensed well driller. Once the well is constructed the well driller must submit a well completion report to the County health department. This report gives details of the well construction (depth drilled, length of casing and screen installed, etc.) as well as a description of the sediment drilled through and well yield information. A copy of the well completion report can be obtained through the County health department by referencing the well tag number attached to the well casing.

For additional information, please contact

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References

Andreasen, D.C., Staley, A.W., and Achmad, G., 2013, Maryland Coastal Plain aquifer information system: Hydrogeologic framework: Maryland Geological Survey Open-File Report 12-02-

For more information about Coastal Plain ground water visit:

www.mgs.md.gov/groundwater

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