

# Artesian Water and Artesian Wells

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 [usgs.gov/special-topic/water-science-school/science/artesian-water-and-artesian-wells](https://www.usgs.gov/special-topic/water-science-school/science/artesian-water-and-artesian-wells)

Artesian water is really not different from other groundwater, except for the fact that it flows to the land surface because pressure in the rocks underground force it to the surface. But, having water flow to the surface naturally is a handy way to tap groundwater resources.

*Credit: Alan Cressler, USGS*

Maybe you've heard advertisements by water companies wanting to sell you "artesian-well drinking water." Is this water different from other bottled water taken from **springs**?



The water may not be different, but it comes to the earth's surface a bit differently. Groundwater in **aquifers** between layers of poorly permeable rock, such as clay or shale, may be confined under pressure. If such a confined aquifer is tapped by a **well**, water will rise above the top of the aquifer and may even flow from the well onto the land surface. Water confined in this way is said to be under artesian pressure, and the aquifer is called an artesian aquifer. The word artesian comes from the town of Artois in France, the old Roman city of Artesium, where the best known flowing artesian wells were drilled in the Middle Ages. The level to which water will rise in tightly cased wells in artesian aquifers is called the potentiometric surface.

Deep wells drilled into rock to intersect the water table and reaching far below it are often called artesian wells in ordinary conversation, but this is not necessarily a correct use of the term. Such deep wells may be just like ordinary, shallower wells; great depth alone does not automatically make them artesian wells. The word artesian, properly used, refers to situations where the water is confined under pressure below layers of relatively impermeable rock. The picture to the right shows an artesian well with the potentiometric surface being just above the land surface, but, as the picture above shows, artesian pressure can be very strong!

## Example of an aquifer system with artesian wells

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*Artesian wells can be sometimes flow to the land surface naturally because of underground pressure.*

This diagram shows a conceptual aquifer system having both unconfined and confined aquifers. Generally, the upper layer of an aquifer system is the unconfined aquifer, which does not have a confining layer of solid material above it. The top altitude of this aquifer is called the "water table", below which the ground and rock has all the spaces and voids full of water. Water from this aquifer must be pumped out in a well to get to the land surface.

In some locations there can exist confined aquifers below the unconfined aquifers. These confined aquifers have layers of solid material above and below them and are thus under pressure from the rock weight. As this diagram shows, for water to recharge these aquifers, it must seep down from the surface at a distance away and travel somewhat horizontally into the confined aquifer.

Wells that tap these confined aquifers are "artesian wells". If altitude that the pressurized aquifer pushes water up a well tapping it is the "piezometric level". If this level is below the land surface altitude (right side artesian well in the diagram) the water will not shoot out of the well at the land surface...the well is called an artesian well. But if the piezometric level is higher than the well head altitude at the land surface (the left side artesian well in the diagram), the water will be pushed upward in the well and emerge at the land surface, with no pump needed. This kind of well is a flowing artesian well.

***Want to learn more about artesian water and artesian wells?***  
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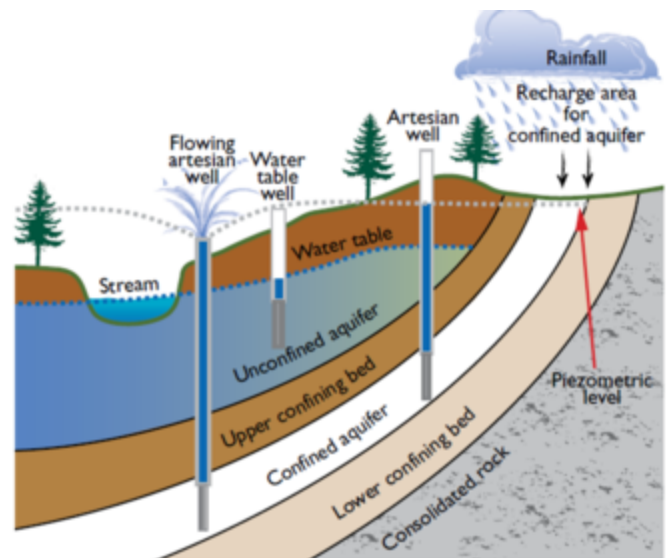
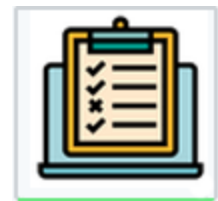


Figure 1. Geological and topographical controls affecting artesian and flowing artesian wells.

