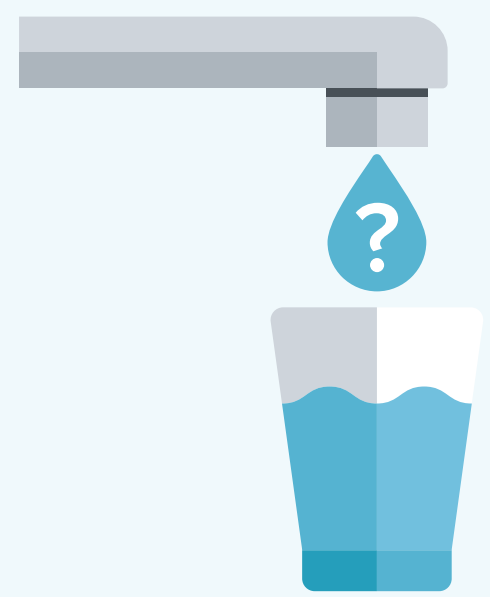


Where Does Memphis Get its Water?

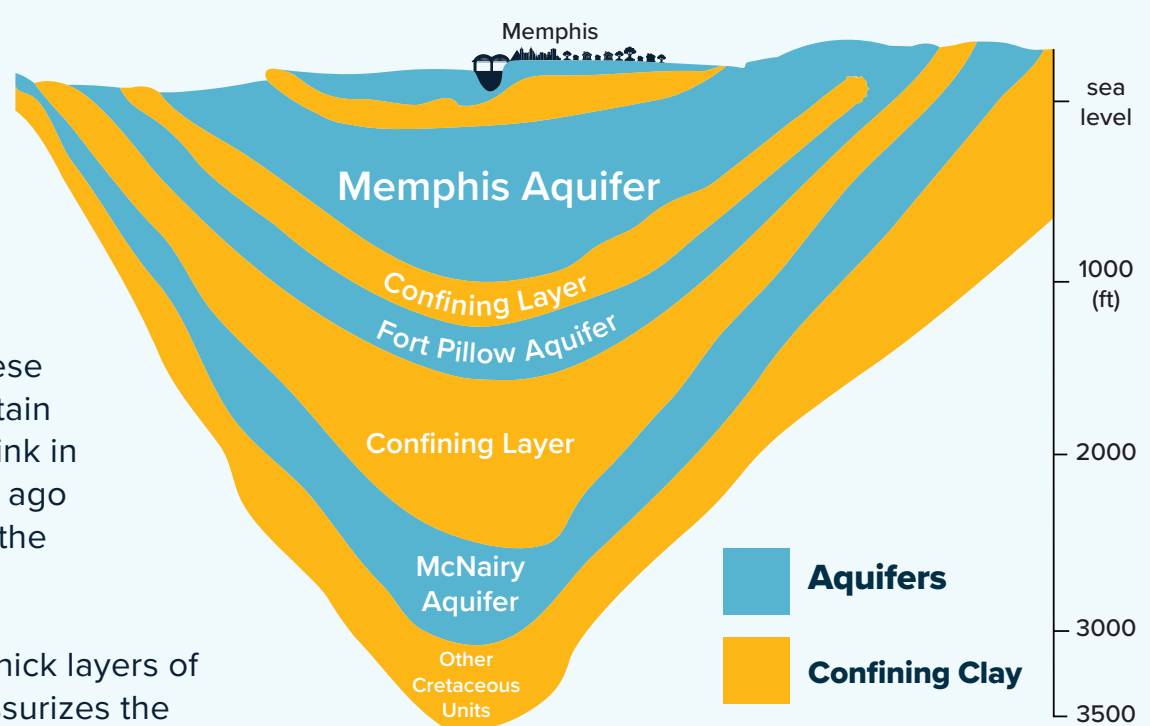


Memphis, Tennessee is the largest U.S. city that relies 100% on groundwater to meet its every need - and it tastes great. Where does this water come from?

Water Below Our Feet

West Tennessee gets its drinking water from deep underground in geologic structures called aquifers. Memphis pumps its water from the Memphis and Fort Pillow aquifers. These aquifers are made of sand, which contain groundwater. Most of the water we drink in Memphis fell as rain over 2,000 years ago and has slowly been filtering through the layers of sand!

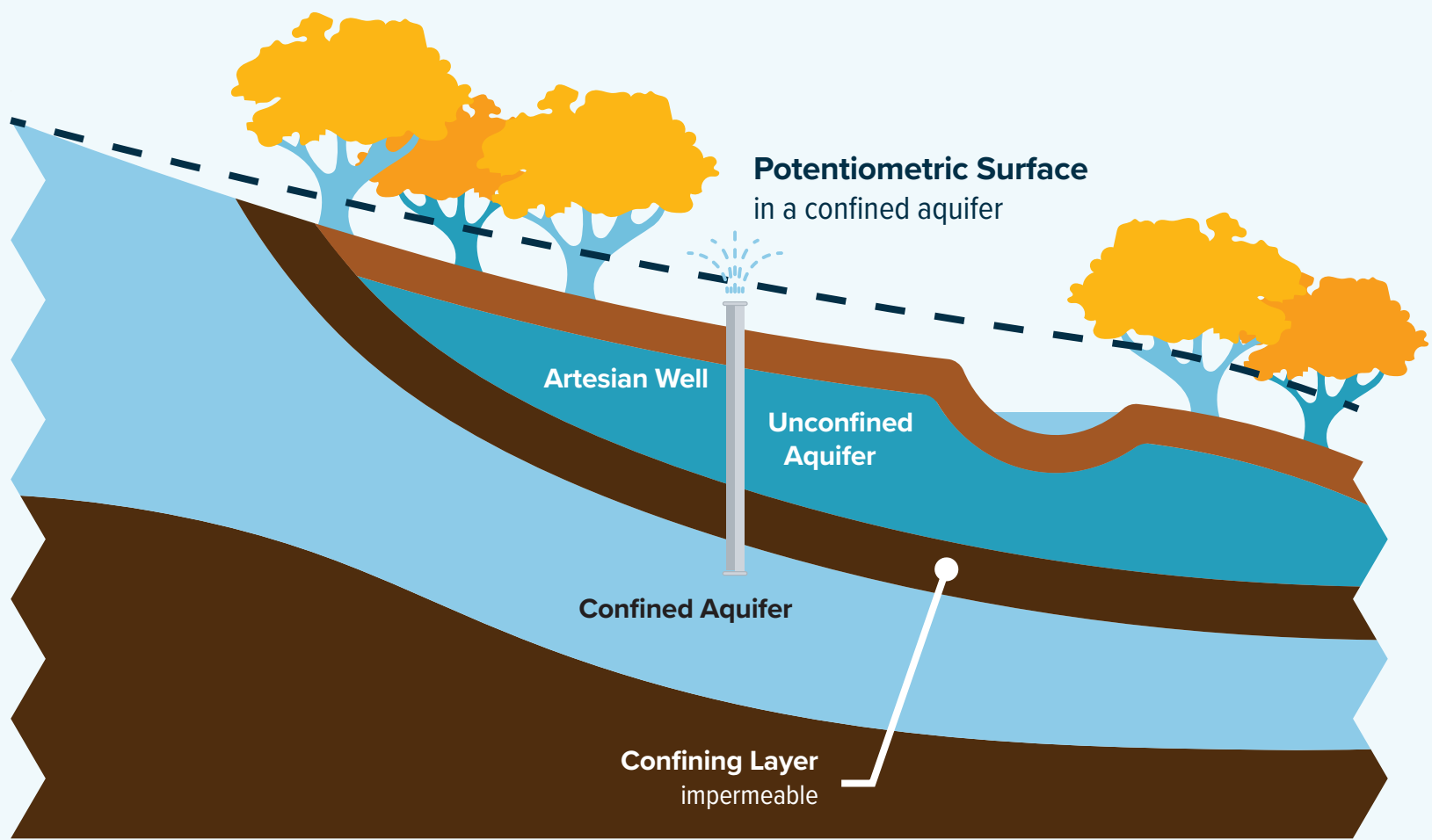
Separating these sandy aquifers are thick layers of clay as shown in yellow. The clay pressurizes the groundwater and protects it from contamination. When the clay is absent, the groundwater is more vulnerable to contamination.



Source: Brahana, 1987

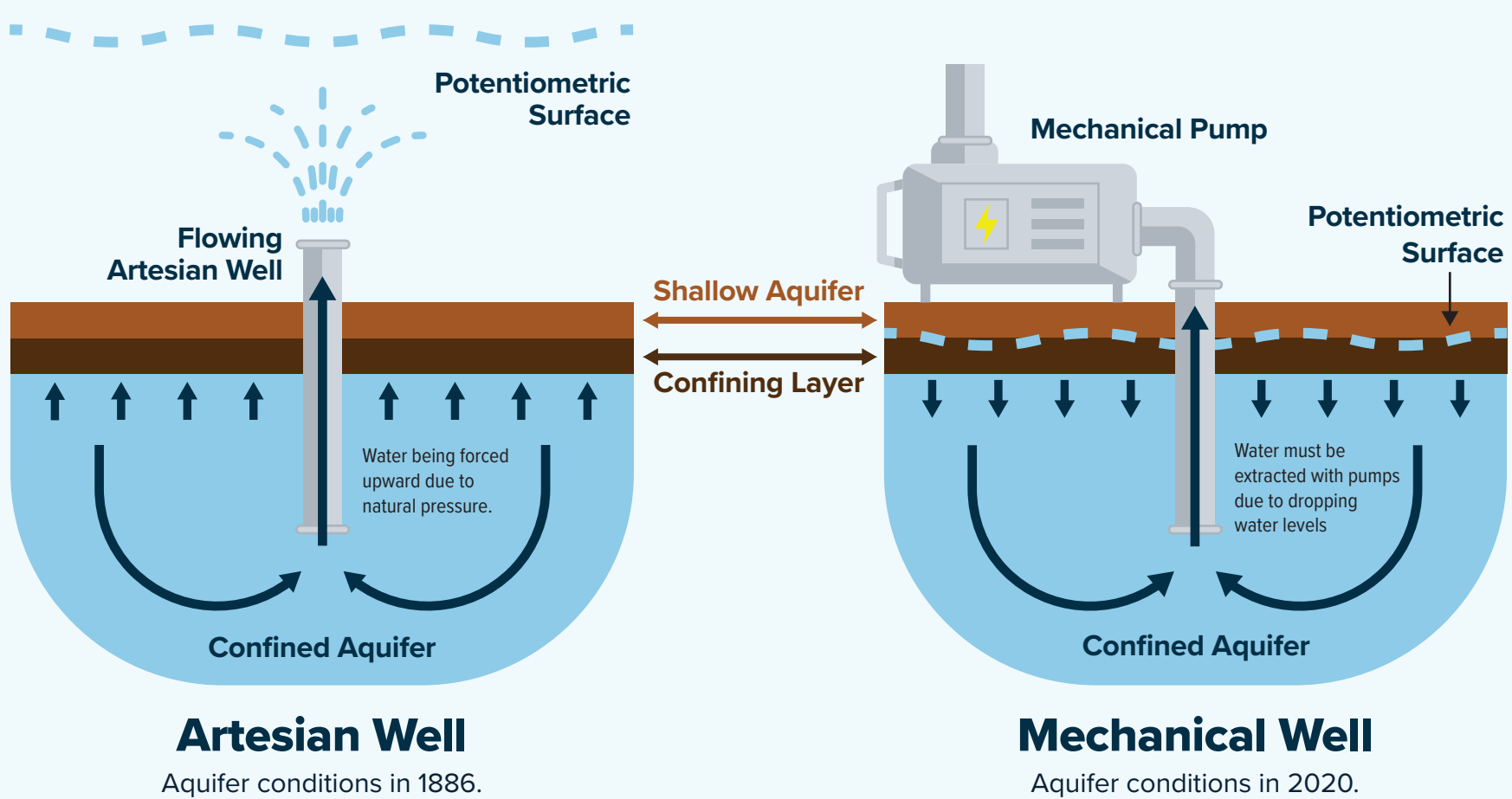
What is an Aquifer? Confined vs. Unconfined

An aquifer is a layer of sand, silt, or rock underground that contains water. The aquifers in our area are primarily composed of sand, where the spaces in between sand grains hold water. There are two types of aquifers to know: **confined** and **unconfined**. A **confined** aquifer describes most of the Memphis aquifer because there is confining clay above and below it, keeping the water under constant pressure. The level of water in a confined aquifer is called the potentiometric surface where pressurized water can naturally rise into wells and springs. An **unconfined** aquifer is closer to the land surface where water can infiltrate directly into the aquifer. The top of the unconfined water level is called the water table.



Artesian Water in Memphis? Then and Now

When the Memphis aquifer was discovered in 1886, a well punctured through the confining clay and clear, cold water sprang to the surface naturally! No effort was needed in 1886 to obtain Memphis aquifer water because of the underground pressure and the artesian effect. Now, we need mechanical pumps to bring the water to the surface. Aquifer levels have dropped over 100 feet in some areas of Shelby County.



Artesian Well
Aquifer conditions in 1886.

Mechanical Well
Aquifer conditions in 2020.

Water Distribution in the City

Once the groundwater is extracted by wells, it is sent to a water treatment plant. The aquifer water in Memphis requires minimal treatment compared to surface water! In the treatment plant, water cascades over an aerator to remove iron and add oxygen. Chlorine, fluoride, and phosphate are added to meet drinking water standards. The drinking water is then sent to homes, businesses, and industrial users. After the water is used, it heads down the drain. The pipes shown in red take the water to a wastewater treatment plant where major solids and bacteria are removed and the water is released in to nearby rivers.



The Center for Applied Earth Science and Engineering Research (CAESER) at the University of Memphis is a multi-disciplinary research center and experts in the hydrology of the aquifer system in West Tennessee.