Aquifers, Groundwater, and Their Importance

The Atlantic Coastal Plain of South Carolina stretches from the Piedmont to the Atlantic Ocean and offshore under the Atlantic sea floor. This area was formed by sediments deposited from erosion of the Appalachian Mountains along with marine deposits as the ocean retreated from about 66 million years ago to present day. Geologically this is known as a sedimentary or alluvial formation. Layers of sand in these sedimentary formations created aquifers or water bearing layers of unconsolidated but tightly packed material like sand and gravel. Groundwater fills the pore space between the grains of sand and moves under gravity from higher to lower altitudes.

Contrary to popular belief, there are no underground rivers in these sedimentary formations, water is held more like in a sponge and moves very slowly in feet per year. These aquifers can be extensive, as is the Middendorf Aquifer, also known as the Charleston Aquifer. The Middendorf Aquifer is under most of the South Carolina Coastal Plain. It begins along the Fall Line (the geologic boundary between the igneous and metamorphic rocks of the Piedmont and the Coastal Plain sediments) and gradually deepens and thickens as it approaches the ocean. In Mount Pleasant, the Middendorf is about 1,800 to 2,000 feet deep and about 200 feet thick. Mount Pleasant Waterworks has six wells drilled into this aquifer. The groundwater pumped from the Middendorf is treated with state of the art reverse osmosis technology.

When wells are drilled into the aquifers and water is pumped out of the ground, water moves to the well as the water levels decline and create a cone of depression. This hydraulic gradient can only be sustained by water moving to replace the water pumped out. This water can come from storage in the aquifer or from other aquifers above or below the well. Water can also come from the recharge when rain soaks into the soil along the Fall Line and gradually moves into the aquifer. Currently, there is no way of knowing the volume of recharge into the Middendorf. However, based on carbon dating, USGS has determined the water we drink in Mount Pleasant today is at least 45,000 years old. So, the groundwater in the Middendorf Aquifer is ancient and certainly preindustrial, with no man-made contaminants in the water, it is pristine.

MPW has spent the last 30 years working to protect this ancient, pristine resource. It is important for the citizens of South Carolina to understand how aquifers work, the importance they play in supplying groundwater, and how we can protect them.