

Know your Water Well "Definitions"

Before getting deeper into our water wells, I think it is important that we understand the terminology that is commonly used in the description of well features and groundwater science. Therefore, this month I will present simplified definitions and some layman discussion of the most common terms:

Groundwater - water found below the ground surface (ie, underground water)

Aquifer - a geologic formation, or series of formations, which contains groundwater.

Basically, there are two types: (1) Confined Aquifer, also known as "artesian", which has a confining layer (ie, an impermeable formation through which water does not transmit) directly overlying it. As a result the water is under pressure (called geopressure) and will rise above the elevation of the upper confining layer. The pressure, also called "head", at any given point in a confined aquifer is a function of the elevation of the water source minus the friction loss as the water travels through the aquifer to the given point of reference. If the pressure, or head measured in feet, is greater than the depth of the well, the water will flow over the top but a well does not have to flow to be an artesian. A large majority of the hillside wells tap confined/ artesian aquifers. (2) Unconfined, also known as a water table aquifer, has no confining layer above it and, consequently, is exposed to atmospheric pressure. When tapped by a well the water level does not raise above the upper limit of formation saturation. There are very few water table/unconfined aquifer wells on the hillside because most water tables encountered are very shallow. Please note ---there is no one common water table covering the hillside and it is a serious error to depict the varying water levels found in wells as a water table.

Groundwater Gradient - the velocity of groundwater movement through an aquifer--usually described in feet per day in a stated direction; on the hillside, the overall gradient is generally downhill towards the inlet.

Pumping rate - pump output measured in gallons per minute (GPM)

Pumping Water Level (PWL) - the water level in a well when it is pumping (obviously this will vary with the pumping rate).

Static Water Level (SWL) - the water level in a well when it has not been pumped for a while, will vary with atmospheric pressure daily and with aquifer recharge seasonally.

Aquifer Recharge - precipitation "up the hill" which percolates down into the aquifer.

Drawdown (DD) - SWL minus PWL at a given/stated pumping rate; measured in feet

Specific Capacity - the pumping rate needed to lower the pumping level one foot; stated as GPM per foot of DD; important statistic used to describe a well's strength and in sizing a pump for the well.

Total Dynamic Head (TDH) - the amount of pump pressure (head) output required to deliver water at a given pressure at a given point (usually the highest fixture elevation in the house) or simply 60 PSI at the pressure tank.

Yield - the greatest amount of water that a well will produce on a sustained basis; measured in GPM.

Bedrock - consolidated geologic formation(s); the bedrock encountered in hillside wells is generally an impermeable siltstone/claystone which has been altered and fractured by the Chugach mountain building events; the groundwater in the bedrock travels through fractures (fracture zone seepage); bedrock wells usually have low yields and water levels that rise a few feet above the elevation at which the bedrock is encountered.

This is the second article that Wayne Westburg has submitted on water wells. In the next issue, Wayne will begin answering common questions about wells. If you have a question for him, email w44west@gci.net or halonewslettereditor@gmail.com