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PUMP SIZING

UNDERSTANDING A GROUNDWATER WELL

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Groundwater may be the most reliable water source on Earth and it typically requires less treatment than surface water. However, its correct management is vital to ensure its supply for the future. Unfortunately, groundwater measurements are fairly complicated because the water's flow is hidden. You need to track the availability of groundwater carefully to avoid problems such as supply limitations, pump wear, clogging and over-pumping.

A well is an opening that stretches from the ground surface to the underground aquifer where the groundwater is located. The depth of the well may vary from a few meters to several hundred meters.

Because of the depth of the well and the distance to the water it also requires more pumping power. The depth to water can be seen as the suction lift of a pump installed on the ground surface.

Groundwater wells are typically drilled with special drilling equipment that can penetrate the various layers of ground, such as sand, clay and bedrock. Inside the drilled hole, a casing (pipe) is installed, which prevents the well from collapsing around the pump.

Below the casing and in line with the aquifer is another casing with fine slots. This is the well screen, where the slots allow the water to enter the well. The screen holds back sand and larger particles from entering the well.
To improve the filtering function, the borehole features a diameter that is 2-3" larger than the casing. A fine sand gravel pack filter is placed between the casing and the aquifer. Some casings come with a pre-made gravel pack filter. If made correctly, this filtering method prevents sand and silt from entering the well.

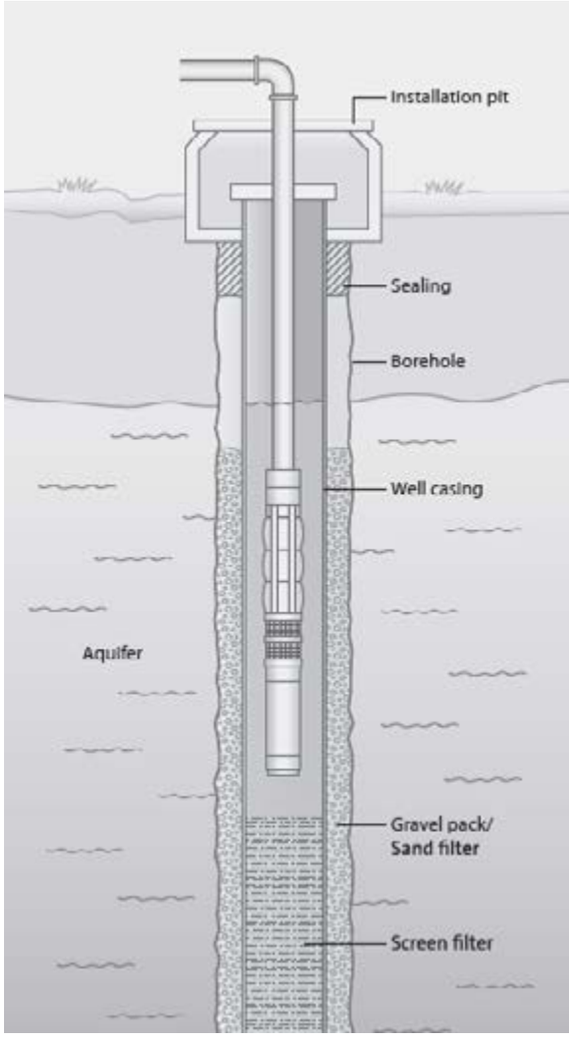
The US EPA and National Water Works Association recommend the following sand limits in well water:

- 1 ppm in water for drip and microspray application
- 10 ppm in water for sprinkler irrigation systems
- 15 ppm in water for flood irrigation

A well must be developed before it is put into operation. A new well will always produce some sand and silt in the beginning. Well development is the process of pumping water from a new well, and this water should be free from sand and silt. This is done by pumping with a very high flow, which draws the fine particles in the aquifer into the filter of the well. This slowly makes the filter more effective. After approximately one day of pumping, the well is normally pumped clean and is ready for norm al operation.

The pump used for well development wears out relatively quickly because of the high sand content, and it should, therefore, always be replaced with a new pump as soon as the well does not produce any more sand.

The submersible pump must always be installed above the screen area of the casing. This ensures that the water is forced past the motor, providing adequate motor cooling. If the pump cannot be installed above the screen filter, we recommend that a cooling sleeve be used to create the necessary flow along the motor for proper cooling.



Submersible Pump

The drawdown for each specific well can be tested by using a test pump with the same flow rating as the production pump that is installed in the well. The groundwater level is recorded, and the equilibrium point is reached when the water level becomes constant. This level is called the dynamic water level.

The drawdown is the difference between the static and the dynamic water level. The water produced by the well is pushed through the aquifer and the well screen by the pressure differential that is present between the static and the dynamic water level. The higher the flow, the bigger the drawdown. For this reason it is often better, considering operating costs, to use two or more small pumps (and wells), instead of one large pump. With smaller pumps, the drawdown is limited and the elevation lift is reduced. Some aquifers have so much resistance that the water flow to one well is not enough to cope with the irrigation needs. In such a scenario, a second and third well may be the only solution to get the amount of water required.

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