



Over-pumping Your Well

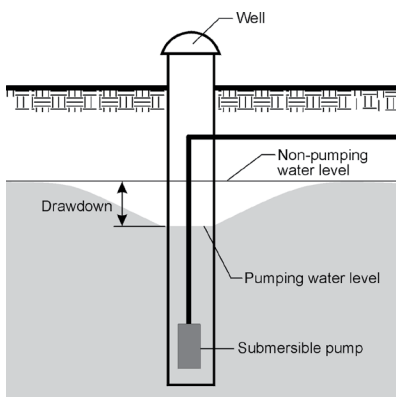
Over-pumping is considered to be the number one cause of well failure.

What is over-pumping?

Pumping your well influences the surrounding aquifer. During pumping, the water level in the well is drawn down as stored water in the casing is removed. Once water in the casing is removed, the pump then pulls water directly from the aquifer. As groundwater in the aquifer immediately surrounding the well is drawn in, distant water moves in slowly to replace the water that entered the well. When the rate of water being pumped from the well is greater than the natural rate of groundwater movement within the aquifer, a cone of depression, or a lower pressure zone around the well is created. This depression is deepest at the well and gets shallower with increased distance away from the well (Figure 1).

The longer and harder you pump the well, the greater the depth and distance of this zone. If you install a pump that has a greater capacity than the aquifer, groundwater is removed at a faster rate than the aquifer can naturally replenish itself and, over time, “dewatering” occurs. Dewatering is also caused by extended over-pumping.

Figure 1:
Pumping and non-pumping water levels



How can over-pumping harm my well?

When the pump is operating, the water level in the well draws down. This is called the pumping water level (Figure 1). The pumping rate should always be restricted to stabilize the drawdown of the pumping water level to above the intake part of the well, adjacent to the perforations or the screen.

Pumping water down to a level which exposes the perforations may increase the amount of oxygen in the aquifer and enhance the growth of iron or sulphate-reducing bacteria, eventually plugging the well.

Plugging can also occur if water enters the well too quickly, causing the naturally dissolved minerals in the groundwater, such as iron and calcium, to precipitate out of solution and deposit as mineral incrustation. Heavy pumping can also draw in sediment with the water.

What can I do to prevent over-pumping?

When a well is drilled, the licenced water well contractor records the static water level and recommends a pumping rate and an optimal depth for pump placement on the drilling report.

It is up to you to operate the well as directed by the licenced water well contractor and to regularly monitor the well, to identify any changes in water levels (see the *Measuring Well Water Levels* fact sheet for more information). Just like a vehicle needs regular oil changes, tune ups and proper tire pressure to run properly, your well needs to be monitored, checked and maintained.

Regular, systematic inspections and treatment of problems, if they arise, will ensure longevity of your well.

How much water do I really need?

Assess your current and future water needs to determine peak demand. Peak time for a household is usually in the morning when everyone rises or at night when everyone is at home. Peak time for livestock watering is usually at feeding time. Once you have calculated the volume of water needed during your peak demand periods you can plan your water system to effectively meet those needs.

The average daily and annual water requirement numbers can be used to estimate the amount of water used on a farm or in a household (Table 1).

Table 1:

Calculating water volumes needed

Type of Use*	GDP** per Unit	X	Number of Units	=	Total Volume
Cow with calf	12				
Dry cow	10				
Sow (farrow to finish)	20				
Laying hens	0.055				
Horse	10				
Sheep	2				
Household (per person)	60				

* For a more detailed list of uses, please refer to the *Water Wells that Last* publication.

**Gallons Per Day

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Sizing up your equipment

When a well is completed in an aquifer capable of supplying the volume of water you need, an appropriately sized pump can be installed to raise the water from the well and deliver it to a pressure tank in your home where it is held until you need it (Figure 2).

Figure 2:
Pressure tank



If the aquifer cannot supply enough water on demand, a reserve potable water storage tank and a second pump must be added to your water system to ensure no damage to the well or aquifer is incurred (Figure 3).

Figure 3:
Tank and pump for low producing well



To avoid over-pumping, the pump must be sized correctly and the flow controlled so that it never draws water from the well at a rate higher than the aquifer is capable of providing. The water from the well is then

directed to the storage tank and the pump is turned on and off by a float switch inside the tank.

A second pump can be controlled by a pressure switch to move the stored water to your pressure tank during peak times when you need the higher water volumes. Installation of run-dry protection is advised on both of these pumps.

Sometimes large diameter, bored wells completed in aquifers that yield only small amounts of water can still meet water needs because the large diameter of the casing provides for storage of the groundwater.



Ensure your pump is sized correctly and flow controlled so it cannot pull water from the aquifer faster than the rate at which the aquifer is capable of transmitting water. If you do, you will over-pump the well and, over time, this will cause damage to the well and the aquifer. Check your drilling report for the recommended pumping rate for your well. If you do not have a drilling report you should hire a licenced water well drilling contractor to perform a yield test on your well to establish a recommended pumping rate.



Most wear and tear on a well pump occurs when it starts and stops. If you increase your water storage capacity with a larger pressure tank or a cistern you can reduce the number of times the pump has to cycle. This will prolong the life of your pump. Variable speed pumps are another alternative to pump cycling.



Always disinfect your well after any repair work or alterations are done to your well and pumping equipment. See the *Shock Chlorinating Your Well* fact sheet for more information.



Contact your licenced water well contractor to discuss options for increasing the capacity of an inadequate water supply.

FOR MORE INFORMATION:

Working Well
workingwell.alberta.ca

Water Wells That Last
<https://open.alberta.ca/publications/9781460143414>

A comprehensive water well management guide

Alberta Water Well Drilling Association
<https://www.awwda.ca/>

For a list of licenced water well drillers in your area, visit the Association's website.

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