
ENVIRONMENTAL Fact Sheet



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Water Supply Options During Droughts

This fact sheet provides information to homeowners about what to do when a well is failing to provide an adequate water supply due to drought conditions.

Groundwater levels in New Hampshire may vary seasonally, with the highest levels typically occurring in the spring and the lowest levels occurring in the late fall. Periods of little rainfall reduce recharge, which decreases groundwater levels. Lower periods of rainfall, especially when coupled with warmer temperatures, can cause an increase in vegetative evaporation and transpiration, and cause people to increase their outdoor water use, which applies an additional stress to groundwater levels. Typically, dug wells, shallow bedrock wells, wells located near topographic high points and wells constructed in areas where bedrock is close to the ground surface are more susceptible to failing when drought conditions are present.

If you experience water outages, sudden drops in water pressure, or surges; observe air bubbles coming out of non-aerated faucets; or water suddenly becomes cloudy or heavily silted, your well may be having trouble keeping up with demand for water. Other problems associated with valves, waterlines, pumps, well casing or pressure tanks can also cause some of these types of problems to occur also, so it is important to work with a licensed pump installer and/or well driller to diagnose the problem and determine the appropriate corrective action to take.

A homeowner can estimate the depth to the water in their well by removing the cap, dropping an ice cube into the well and measuring the time in seconds it takes to hit water in the well based on sound. The depth to water in feet can then be estimated by completing the following calculation:

$16 \times (\text{time measured in seconds}) \times (\text{time measured in seconds}) = \text{Approximate Depth to Water in Feet}$

For example, if it takes four seconds for an ice cube to fall into water in the well, the depth to water would be calculated as follows: $16 \times (4 \text{ seconds}) \times (4 \text{ seconds}) = 256 \text{ feet}$.

Obtaining Information About Water Supply Wells

A state law enacted in 1984 requires that well drillers fill out and submit a well completion report for each well they construct. Records for wells may be found under the OneStop icon at www.des.nh.gov. Additionally, copies of well records may be obtained by contacting the New Hampshire Geological Survey at (603) 271-1973. Records of wells constructed prior to 1984 may be available from the original well driller. Pump contractors that previously provided maintenance on the well pump may also have information about the depth of the well and pump.

Conserving Water and Timing Water Use

If your well cannot keep up with demand, curtailing discretionary water uses and implementing water conservation practices may mitigate the problem. Visit the DES Water Conservation Program's webpage for indoor and outdoor water conservation advice. Bathing, shower times and outdoor water uses should all be adjusted to minimize water use. Spreading out the timing of water use so that multiple high water uses do not co-occur is another action that can be implemented to reduce stress on a well.

Possible Actions to Address Water Supply Shortages Associated with Bedrock Wells

The activities described below may be implemented to deal with a water supply shortage during a drought scenario. It should be noted that none of the activities can guarantee that a water supply shortage will be mitigated. Often, a number of these activities has to be implemented at a given property until the water supply shortage is remedied.

- **Lowering the Pump or Pump Intake Into Your Well.** In many bedrock wells, pumps can be lowered within the existing well. Lowering the pump in the well, while not necessarily increasing the overall yield of the well, will allow the pump to access the water stored within the well borehole. Each foot of a saturated 6-inch well borehole stores 1.5 gallons of water. Utilizing borehole storage may enable the owner to meet their water needs if the well slowly recovers during low use periods such as during the overnight hours. Changing the elevation of the pump or intake may require a different size pump. Lowering the pump in the borehole and utilizing the borehole storage in some instances could affect water quality in the well because water bearing fractures and the face of the rock within the borehole will be exposed to air as storage in the borehole is lowered, potentially causing chemical reactions to occur.
- **Changing the Pump Size.** A larger pump may be able to be installed to offset the impacts of a lower water level in the well and pump water at the desired rate. A licensed pump installer should be consulted to determine your specific needs. Too large of a pump without the proper low-water shut-offs could cause irreparable damage to the pump.
- **Increase Pressure Tank Size.** A larger (or additional) pressure tank will provide additional water storage. For a well with a slow recovery rate, the additional storage will reduce demands on the well during high water use periods and store water extracted from the well during lower use periods.
- **Deepen the Existing Well.** The existing well may be able to be deepened. Deepening the well may increase the yield of the well if new water bearing fractures are encountered. However, the frequency of the occurrence of water bearing fractures often, but not always, decreases with depth. Deepening the well and lowering the pump will increase the usable storage in the borehole as described above.
- **Hydro-fracturing an Existing Well.** Hydro-fracturing, a technique that uses high-pressure water to flush out and open fractures in surrounding rock and thereby increase water flow, may improve the yield of a well. Some factors that may affect the success of hydro-fracturing include:
 1. Whether the well was hydro-fractured in the past. If the well was previously developed by hydro-fracturing and the yield has again diminished, while the process may be temporarily successful a second time, it will likely not be sustained over time.
 2. The depth of the well. It is recommended that shallow bedrock wells be deepened to 400 or 500 feet to obtain additional supply prior to considering hydro-fracturing. This provides adequate surface area in the well borehole to develop deeper, more sustainable water-bearing fractures, providing a good chance of increasing yield.

3. Hydro-fracturing in water wells does not create new fractures; it enhances the productivity of existing fractures, joints and faults. A completely dry hole is not a particularly good candidate for hydro-fracturing because the well must have some water-bearing fractures to start with.
- **Constructing a New Well.** A new well may be constructed to augment or replace an existing water source. Drilling a well at an alternative location may or may not resolve a water supply shortage. It is generally not feasible for a residential homeowner and a well driller to determine whether an alternative location will produce a higher yielding water supply prior to drilling the well. It is advisable to check the well database on OneStop with respect to the depths and yields of other wells in the area prior to drilling. This information may be useful in locating the new well. The new well could be used in tandem with the existing well to alleviate the water supply shortage.

Possible Actions to Address Water Supply Shortages Associated with Dug Wells

Two actions are explained below for improving the yield of dug wells. Lowering the pump intake is the easiest, and deepening the well the more difficult. A homeowner is cautioned against entering a dug well to complete maintenance, especially when the well is constructed out of field stone. It is recommended that the well maintenance work be conducted by licensed water well contractors and pump installers.

- **Lowering the Pump Intake:** Lowering the present pump intake point and foot valve if somewhat high off the bottom of the well. An extension can be added to the suction line. Make sure the seal between the permanent pipe and the extension piece is air tight.

If a submersible pump is used in the well, fabricate a cradle so that the pump can be installed sideways, a few inches off the bottom of the well. Remember to raise the intake again when the drought abates to keep the intake away from sediment settling on the bottom of the well.

- **Deepening a Dug Well:** First, probe the bottom of the well to see whether the well can be deepened. This is often done by driving a thin steel rod into the bottom of the well. If only soils are found, deepening the well is possible. If rock is encountered, the well cannot be conveniently deepened. If the well can be deepened, contact a licensed water well contractor to determine whether alternative methods such as drilling within the dug well or installing drive points within the bottom of the well are viable.

Alternative Temporary Actions to Mitigate Temporary Water Supply Shortages

Sharing Water Between Homes. Water can be shared between homes, however, *this activity is not recommended by DES*. Sharing can be accomplished by connecting a garden hose from a home with adequate water supply to a home without. This will require modifying the delivery end of the garden hose with a female adaptor and feeding water into the exterior sill faucet of the receiving home. During freezing weather the hose will need to be insulated, and a small flow of water maintained within the receiving home to prevent freezing of the hose. This method likely cannot be used during extremely cold weather.

Sharing water between homes does present a risk of contamination to both homes. The connection of the plumbing systems of two homes via a garden hose could create a scenario

where water backflows from the plumbing system in the receiving home to the other home. If bacteria are present in the plumbing system in one home, it may spread to the plumbing system in the other through the garden hose connection. Additionally, the garden hose connecting the homes may have been exposed to bacteria or other contamination and is not necessarily designed to transmit potable water supply. It is not recommended that the homes sharing water via a garden hose use the water for drinking or cooking until the hose is disconnected and the wells and plumbing systems in both homes are disinfected; see WD-DWGB-4-11 Disinfecting a Private Well.

Filling Wells with Water Delivered by Truck. Water delivery by a tank truck to fill a well is usually ineffective in providing a sustained water supply and is a violation of Underground Injection Control regulations. This activity could damage the well and contaminate groundwater in the well being filled and other nearby wells.

Financial Assistance Options for Mitigating a Home's Water System

There are limited financial assistance options available explicitly to assist with mitigating a problem with a private water system. The US Department of Agriculture (USDA) has established a loan program that can be utilized to assist with water supply shortages (Rural Development Home Repair Loan/Grant Application Section 504). The loan program is only available for people who live in rural communities (population less than 20,000) and make less than 50 percent of the median household income in the area. In some instances grants are available to people that are over the age of sixty-two.

USDA also maintains another low-interest loan program called the Household Water Well System Grant Program. This program typically requires applications be submitted by an annual deadline (June 1 for 2010). Homeowners with private wells are eligible for low-interest loans under this program, but historically larger projects associated with private water systems have been funded by this program.

The Concord Office of the USDA, at (603) 223-6045 for more information regarding the availability of funds to assist with water supply shortages in a privately owned water supply.

For More Information

For additional information, please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit www.des.nh.gov, click on A-Z List and choose Drinking Water and Groundwater Bureau. All of the bureau's fact sheets are on-line at <http://des.nh.gov/organization/-commissioner/pip/factsheets/dwgb/index.htm>.

Note: This fact sheet is accurate as of August 2010. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.