Drilled Well Construction and Maintenance

Planning a Water Supply

Before investing in new farm infrastructure, plan for the water supply. A new building isn't worth much without an adequate supply of potable water. As part of the plan, assess the local geology, determine how much water is needed and what separation distances are appropriate.

The Nova Scotia Well Logs Database provides valuable information on more than 100,000 water wells in the province, including information on well locations, geology, well depths and yields. The database can be searched on-line or downloaded from the Nova Scotia Environment and Climate Change (NSECC) website. Well logs can be searched by community and provide insight into the variability of water sources in the area.

Well Construction

In Nova Scotia, under the *Well Construction Regulations*, anyone constructing or repairing a water well must have a current certificate of qualification from Nova Scotia Environment and Climate Change. A searchable list of certified well drillers, diggers and pump installers is available on the NSECC website.

Drilled Wells

Drilled wells usually obtain water from deep aquifers. A typical depth is about 60 m (200 ft), but well depths can range from under 30 m to over 120 m. When a drilled well is constructed, a hole is bored into the aquifer. The upper part is lined with casing to prevent the collapse of the borehole walls. The casing also provides housing for the pump and pipe that moves the water to the surface. Below the casing, the lower portion of the borehole is the intake through which water enters the well from the aquifer. The intake may be an open hole in solid bedrock (*Figure 1*), or it may be screened and gravel-packed, depending upon the location.

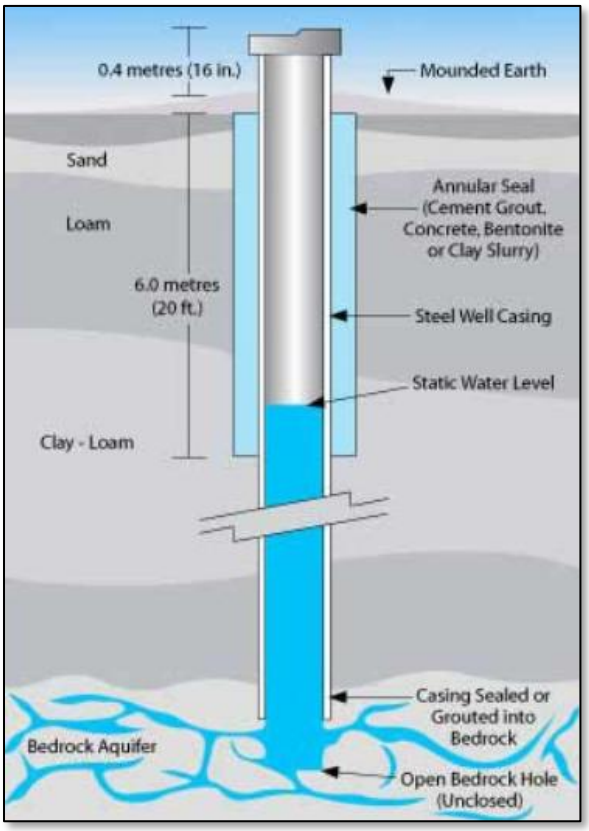

Figure 1: Drilled well (into bedrock)

Regulatory requirements for drilled wells include the following specifications, although variances may be granted under some conditions.

- The casing must be of new material, with an inside diameter of at least 152 mm (6 in), minimum length 6.1 m (20 ft), and must extend at least 15 cm (6 in) above the ground upon completion.
- The casing must have a drive shoe attached to the bottom. Grouting is not required, but if there is potential for contamination, the casing should have a cement or bentonite grout seal at least 25 mm (1 in) thick.
- Upon completion of the well, all debris should be removed and the well should be disinfected.
- The well must be sealed or capped until a pump is installed. The minimum requirement is a vermin-

proof, vented, pitless well cap (*Figure 2*). The cap is fitted with a rubber gasket for sealing and attaching to the top of the casing. A screened vent at least 12 mm (0.5 in) diameter is required so air can enter.

Pitless Well Construction

In the past, it was common to cap a drilled well below ground. Many wells had a well pit to gain access to well pipe connections below the frost line. However, well pits are generally unsanitary and could allow surface water and possible contaminants into the well through a worn or damaged cap seal. Upgrading these wells to a pitless adaptor greatly reduces the possibility for contaminated water to enter the system. It is attached to the well casing to provide a sanitary and frost-proof seal between the casing and the water line.

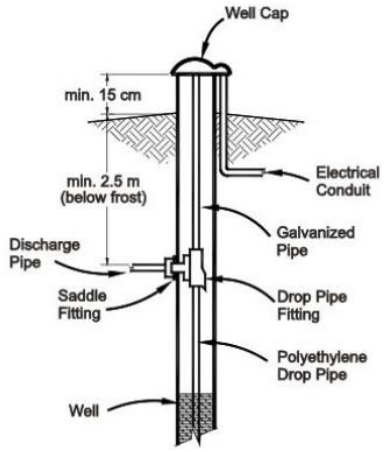

Figure 2: Pitless adaptor for a drilled well

Advantages of Drilled Wells

- Can access deeper, confined aquifers
- Increased protection from surface sources of contaminants and bacteria
- Reduced vulnerability to drought conditions
- Can increase depth of well to increase water column and/or available storage
- Higher maximum yields (for public or industrial supplies)

Disadvantages of Drilled Wells

- The cost of installation is typically high
- Can penetrate formations that yield water of undesirable quality
- Health related contaminants, such as arsenic or uranium, that are more common in bedrock formations can be present, requiring treatment
- Maximum yields are sometimes low, regardless of depth, depending on geologic conditions
- Drawdown can be large impacting adjacent wells in aquifers with low permeability
- Higher electricity cost of pumping deep water

Importance of Water Testing

After proper disinfection following construction, a drilled well should provide a potable supply of water without the need for water treatment, e.g. UV light. However, it is important to test water quality for bacteria on an annual basis, or following any well maintenance, to ensure that the water supply is safe. Typically, on-farm food safety programs (i.e. CanadaGAP) only require bacteria testing to be completed. Mineral quality, including nitrate, should also be tested every two years.

NSECC has produced the Drop on Water factsheet series. These factsheets provide information on different water quality parameters, such as bacteria and chemicals, that may be present in well water, as well as general information to protect drinking water supplies.

The Drinking Water Interpretation Tool compares water sample results to Health Canada drinking water quality guidelines and provides links to additional sources of information.

Water Use - Water Withdrawal Approvals

Under the *Environment Act*, a Water Withdrawal Approval is required if water use exceeds 23,000 L (5060 gal) per day from a single water source (if more than two weeks).

References:

- Before You Construct a Water Well – NSECC publication
- The Drop on Water – NSECC Fact Sheets
- Well Water Basics – New Brunswick