CE 40

Buying a House With a Well and Septic System

In rural areas, many homes do not have connections to municipal water and sewer lines. Homeowners rely upon privately owned or communal (shared) wells as their drinking water source, and individual septic systems to treat and discharge their wastewater. Homeowners must ensure that their well water is safe to drink, and that their well and septic systems are properly maintained. A malfunctioning well or septic system can pose a health risk to your family and neighbours, and can be expensive to repair or replace. It is therefore important to conduct a detailed inspection of both the well and septic systems prior to purchasing a home. This document will describe how well and septic systems function and how to inspect them.

WELLS

When you are purchasing a home with a private water supply (a well), there are three key items to consider:

- well system
- water quantity
- water quality

Well systems

There are three common types of wells: dug, bored and drilled.

Dug and **bored wells** (60-120 cm/ 24-48 in. diameter) are commonly used to produce water from shallow surface aquifers (less than 15 m/ 50 ft. deep); and are prone to contamination from surface water infiltration and to water shortages (see Figure 1 on page 2). An **aquifer** is an underground formation of permeable rock or loose material, which can produce useful quantities of water when tapped by a well. Another type of well used in surface aquifers is a **sand point well** (2.5-5 cm/1-2 in. diameter), which is a pointed well screen connected to a small diameter pipe driven into water-bearing sand or gravel.

Drilled wells (10-20 cm/4-8 in. diameter) are commonly used to penetrate deeper aquifers (15 to greater than 60 m/50 to greater than 200 ft. deep), are more costly to construct, but generally provide a safer source of drinking water (see Figure 2).

Common features of well systems include:

Casing—structure around the well hole, which keeps it from collapsing. It could be a steel casing, concrete rings or an open hole in the bedrock.

Inlet—allows water to enter the well from the bottom. There might be a screen at the inlet to prevent fine particles from entering the well and a foot-valve (check valve) to maintain the system's prime and pressure.

Pumping system—includes pump, piping and necessary electrical connections to pump water from the well into the house, and a pressure tank to maintain constant water pressure in the house. Submersible pumps are usually used in drilled wells, while shallow wells usually use centrifugal pumps, which are located out of the well, most likely in the basement or in a pump house.

Surface protection—prevents surface water and contaminants from entering the well. It includes: a watertight seal placed around

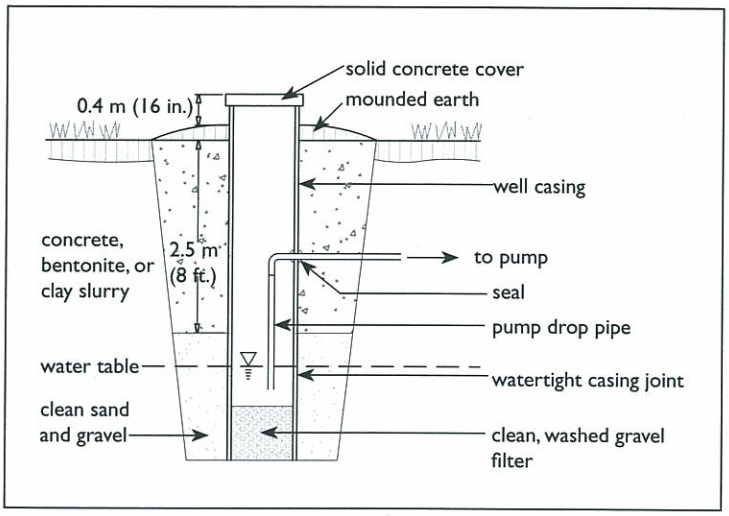

Figure 1 Dug well

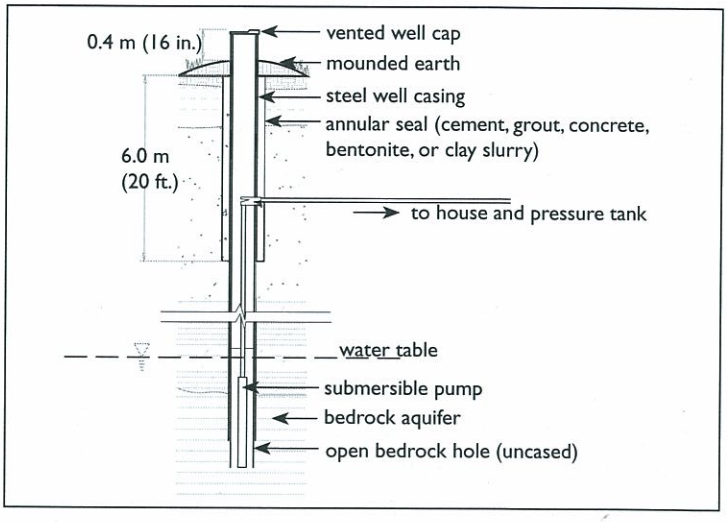

Figure 2 Drilled well

the casing (annular seal), a well cap 0.3-0.4 m (12-16 in.) above the ground, and mounded earth around the top of the well casing to divert rainwater.

Well inspection checklist

The well should be inspected before the house is purchased. If there is a problem with the physical state of the well (for example, cracked seals, settled casing), contact a licensed well contractor to correct the problem. Check the Yellow Pages™ under "Water Well Drilling and Service" to find a local licensed well contractor.

- ❑ **Well Record**—Obtain a copy of the well record from the owner or the Ministry of the Environment. This should include: location of well, date of well drilling, depth and diameter of well, static water level, pumping water level, recommended pumping rate and the recommended pump setting.
- ❑ **Location**—A well should be located at least 15 m (50 ft.) from any source of contamination if the casing is watertight to a depth of 6 m (20 ft.); otherwise, the separation distance should be at least 30 m (100 ft.). Sources of contamination include: septic systems, manure storages, fuel storages, agricultural fields (manure or fertilizer runoff), and roads (salt runoff). Wells should be located at least 15 m (50 ft.) from a body of water (see Figure 3).
- ❑ **Well cap**—The cap should be at least 0.3 m (12 in.) above the ground. The well cap and seal should be securely in place and

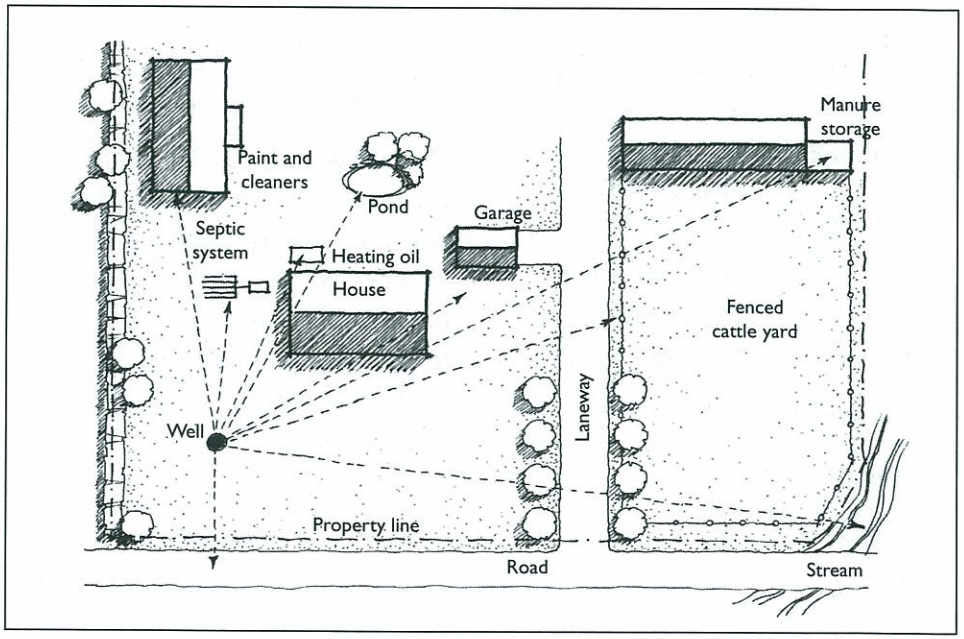

Figure 3 Well separation distances

Water recovery test

A licensed contractor can be hired to conduct a recovery test which involves pumping water out of a well and then giving it time to recharge. This can help you determine how much water you can draw from the well. A well should be able to pump 14 L/min (3.6 US gal/min) for 120 minutes or 450 L/person/day (119 US gal/person/day). *Source: MOE, Procedure D-5-5, 1996.*

Water quantity checklist

- ❑ Ask the owner, neighbours or a local well contractor if there have been any problems with the well or area wells running dry.
- ❑ Verify the depth of the well and pumping rate from the well record. A surface well is more likely to run dry in times of drought.
- ❑ Have a licensed well contractor conduct a recovery test, if necessary.

WATER QUALITY

The quality of the well water is very important. Poor water quality can lead to health problems, unpleasant taste and odour, costly treatment systems and/or the costly use of bottled water. Well water can be contaminated with bacteria and chemicals. Common sources of contamination include: infiltration from septic systems, manure runoff, pet waste, road chemicals as well as dissolved chemicals naturally present in the groundwater such as calcium, sulphur, chloride or iron.

Water sampling

Your offer of purchase should always include a requirement that closing is conditional upon an acceptable water quality evaluation. It would be ideal to take three water samples, about a week apart, with one of the samples taken after a rainstorm when surface water contamination is most likely. If possible, take the water samples yourself. The three samples should be analyzed for: total coliform, *E. coli*, and nitrate, while one of the samples should also be analyzed for: sodium, hardness, sulphate, chloride, lead, iron, manganese and pH. Ask the laboratory to indicate the drinking water standards along with the results. Additional analyses can be conducted including: metals scan, pesticides if the well is in an agricultural area with heavy pesticide use, or gasoline and solvents if the well is near a gas station or industrial area.

Contact your local public health office for instructions on where to obtain appropriate sterile sampling bottles and where to submit water samples for testing. Bacteria and nitrate are analyzed free of charge in some provinces through local public health or Ministry of Environment offices, while the additional parameters will have to be analyzed at a private analytical laboratory for a fee.

If possible, samples should be taken from a tap between the well pump and any water treatment units and/or pressure tank. Follow the directions on the sample submission form for proper water sampling procedures.

Test results—what do they mean?

If concentrations are higher than the limits described below, consult a water treatment systems supplier to determine if a water treatment technology is appropriate. It is preferable to get several quotations.

Health indicators

***Escherichia coli (E. coli)* or faecal coliform**

These bacteria are found only in the digestive systems of humans and animals. Their presence in your well water is usually the result of contamination by manure or human sewage from a nearby source such as a septic system or agricultural fields. Drinking water contaminated with *E. coli* or faecal coliform causes stomach cramps and/or diarrhoea as well as other problems and can even cause death. The drinking water standard for both *E. coli* and faecal coliform is **0 counts/100 ml**. A value of 1 or more indicates that the water is unsafe to drink.

Total coliform

This group of bacteria is always present in manure and sewage, but is also found naturally in soil and on vegetation. The presence of these bacteria in your well water may