

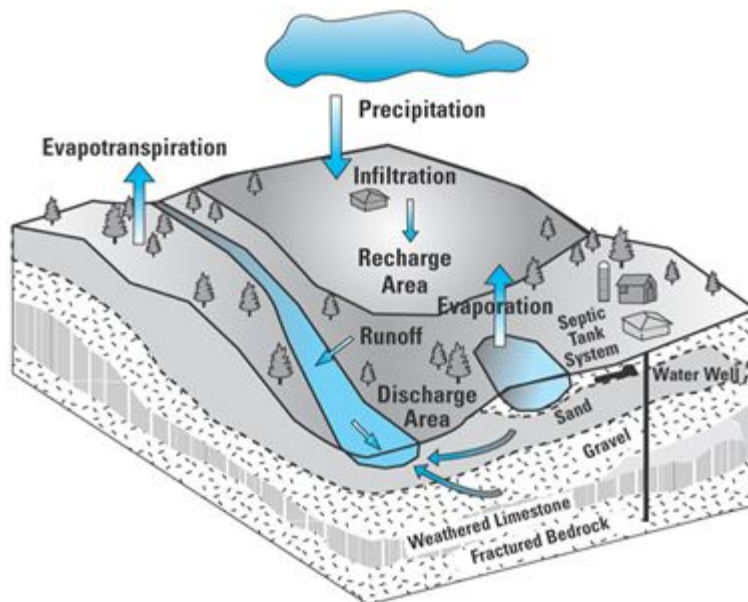
Water and Your Well

Where water comes from

The water we drink generally comes from surface water (above ground) or groundwater (underground). Only about 1% of the Earth's water is surface and groundwater.

The water cycle: Rain or melting snow can take several paths. It can runoff into streams, lakes or rivers. It can seep into the ground to be used directly by plants or to recharge groundwater. It can evaporate and return to the atmosphere. The cycle is complete when water in the atmosphere returns to earth as rain or snow. Groundwater from a deep well may have been in the ground for hundreds or thousands of years. In a shallow aquifer, the water may be a few weeks or years old.

The Hydrologic Cycle



How water moves

Groundwater flows from areas of higher elevation and/or pressure to lower elevation and/or pressure. It can flow horizontally or vertically upward or downward but usually in just one direction. This direction of natural flow can be affected or changed by pumping a well. How fast groundwater moves depends on how porous the soil or rock is, and whether the groundwater surface is sloped. The speed of water movement varies greatly.

The water table: The point at which the ground is saturated determines the water table. This level rises and falls depending on rainfall and local water use. Taking water out of the ground faster than it is recharged by the water cycle will lower the local water table.

Contamination

Is it clean? When an aquifer gets contaminated, the water may be unfit and unsafe to use. Groundwater can become contaminated in several ways:

- spills on the ground, e.g., fuel and pesticide spills
- injection into the ground, e.g., septic leaching beds, disposal of waste in wells, contaminated surface water running into poorly constructed or maintained wells
- improper handling of industrial solvents and chemicals
- waste leakage, e.g., manure storage, wastewater, septic tanks and landfills
- leaking underground and above-ground fuel storage tanks
- groundwater travelling from contaminated to clean aquifers
- over-application of manure, commercial fertilizers or pesticides

Whether the groundwater gets contaminated depends on:

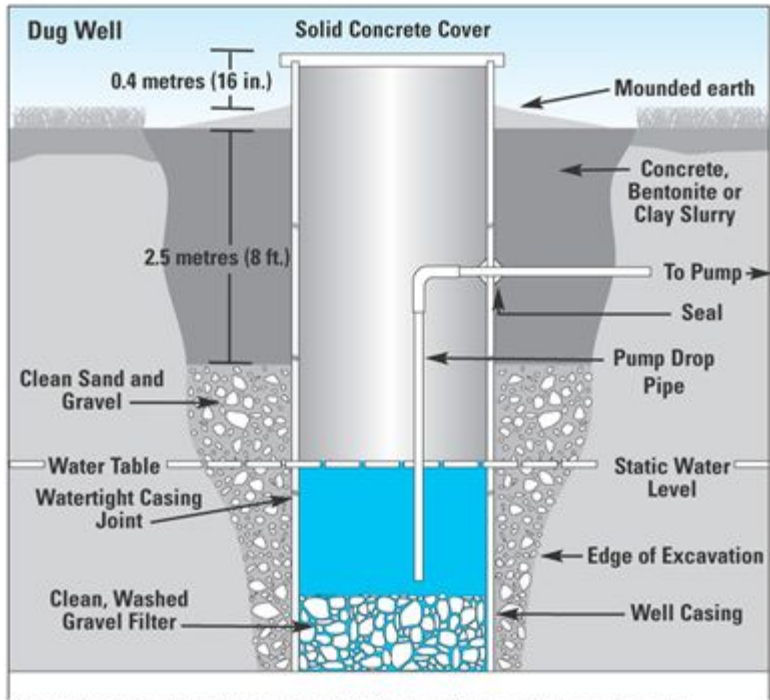
- the size or strength of the contamination source
- the ease with which the contaminant can move into or travel through the soil

Sources of Well Water

Wells

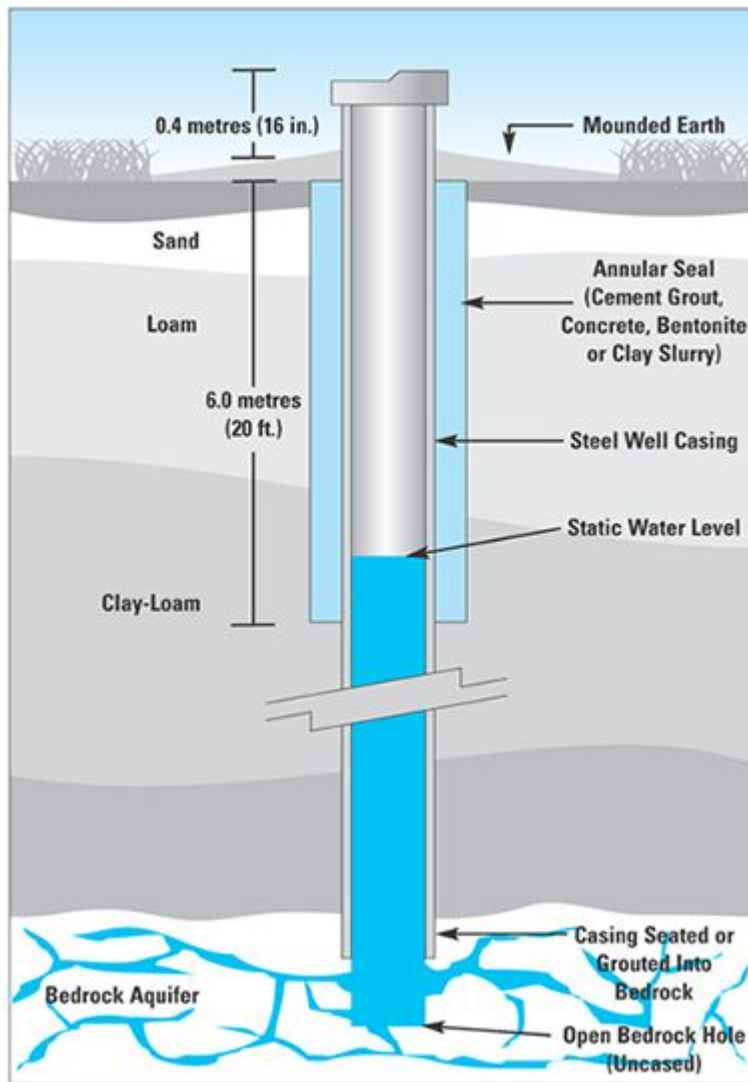
There are over 50,000 private wells in the Ottawa area. Well owners are responsible for ensuring that water from their wells is safe to drink, and that their wells are not contaminating the groundwater. Wells must be properly designed and maintained to ensure that drinking water is safe.

Common types of wells: Dug and bored wells (with casings 60 to 120 cm/24 to 48 in.) are less expensive to install than drilled wells. Like sand point wells, dug/bored wells are prone to near-surface contamination and shortages. Drilled wells (casings 10 to 20 cm/4 to 8 in.) cost more but penetrate deeper aquifers.



Source: *Best Management Practices: Water Wells* (Ontario Ministry of Agriculture, Food and Rural Affairs/Agriculture and Agri-Food Canada)

Drilled Well



Source: *Best Management Practices: Water Wells* (Ontario Ministry of Agriculture, Food and Rural Affairs/Agriculture and Agri-Food Canada)

Preventing Well Water Contamination

How well water gets contaminated

Your well water can be contaminated by:

- openings in the well seal

- improperly installed well casing
- well casing not deep enough
- well casing not sealed
- a source of contamination not related to well construction (e.g. your septic system, pet waste or livestock waste, agricultural or road chemicals)

Preventing contamination

- do not allow liquids or wastes from garbage and manure piles to drain towards the well casing
- do not locate dog runs around the well casing
- do not treat the area around the well with pesticides or fertilizer
- do not flush oils, detergents, paints, solvents or other chemicals down the toilet

Proper installation and maintenance

- sanitary seal or well cap is securely in place and watertight
- cap is at least 30 cm above the ground
- joints, cracks and connections in the well casing are sealed
- surface drainage near the well is directed away from the well casing
- surface water does not pond near the well
- well pump and distribution systems are checked regularly
- changes in the quantity and quality of water are investigated immediately
- well water is tested for bacteria three times a year and after major plumbing work
- wells are chlorinated and tested after any major repairs

Abandoned wells should be carefully sealed to prevent pollution of groundwater and any safety hazards. Hiring a qualified well contractor to seal the well is strongly recommended.

Well Water Symptoms and Solutions

Common water quality problems

Problem	Possible Cause	Treatment
Health effects: diarrhea, stomach cramps	Bacteria, parasites, viruses	1. Chlorination/filtration method 2. Ultra-violet systems 3. Chlorination - injector units
Methaemoglobinemia (blue baby syndrome)	Nitrate	Reverse-osmosis units
High blood pressure	Sodium	Reverse-osmosis units
Scale build-up in kettles and water heaters. Soap scum, bathtub ring.	Hardness (hard water)	Water softeners
Red to brown slime in toilet	Iron bacteria	Chlorination/filtration units

tanks; iron staining; unpleasant taste or odors

Rusty black stains on fixtures, laundry	Iron and/or manganese	Filtration; greensand filters; water softeners; chlorination/filtration units
"Rotten-egg" smell and taste	Hydrogen sulphide and/or sulphate reducing bacteria	Chlorination/filtration units; greensand filters; aeration
Water has laxative effects	Sulphate	Reverse-osmosis units
Salty taste, corrosive	Chloride	Reverse-osmosis units
Gassy smell, gas bubbles escaping from water	Gases (methane)	Aeration; activated carbon filters
Cloudy water	Turbidity (clay)	Filters; alum treatment

Well Water Testing

Why should you test your well water?

Drinking contaminated water can make you sick and can even be fatal. Bacterial contamination causes stomach cramps and/or diarrhea as well as other problems. Chemical contamination is equally dangerous.

Make sure your water supply is safe to drink by testing it regularly - test for bacteria three times a year and after major plumbing work. We also recommend testing for nitrates. If you are in an agricultural area, you may also wish to test for pesticides, herbicides, gasoline and/or solvents.

Note: The bacterial stability of water cannot always be determined from a single sample. To establish drinking water quality, initially submit 3 samples at least one week apart. If the well shows acceptable coliform/E.coli counts, then sample three times a year. Do not send several samples at the same time.

How to sample your well water for bacteria

Bacterial testing for private wells is performed free of charge by the Ontario Ministry of Health Public Health Laboratory at 2380 St. Laurent Blvd. Sample bottles are available for pick-up at that laboratory, at the City of Ottawa Public Health Branch (495 Richmond Road) and at locations throughout the area. Call the City at 580-2400 for locations.

1. Obtain a water sample bottle.
2. Do not touch the bottle lip and do not rinse out the bottle.
3. Remove aerators and other attachments from your tap.
4. Let the cold water run for 2 to 3 minutes before sampling.
5. Fill the bottle to "fill line" directly from the tap without changing the flow of water.
6. Replace cap tightly. Complete the form that came with the bottle.
7. Return the sample and form to the health unit or laboratory within 24 hours of collection.

8. Samples must be refrigerated after collection. During transportation, put bottle in a cooler if possible.

Testing

Starting April 25, 2002 the City of Ottawa will be offering a [new service](#) to residents with private wells.

Testing is free. Sample bottles are available at several locations across the city including:

Public Health

- 495 Richmond Road
Main Entrance, Reception Desk

Ontario Provincial Laboratory

- 2380 St-Laurent Blvd.
Ottawa

Cumberland/Navan Area

- [Orléans Client Service Centre](#)
- J.T. Bradley Convenience
1220 Colonial Road, Navan

Osgoode/Metcalf Area

- [Metcalf Client Service Centre](#)
- Larry's Grocer, Greely
- Beveridges Independent Grocer
5577 Main St.
Osgoode

Rideau

- [North Gower Client Service Centre](#)
- Rideau Valley Conservation Authority
1127 Mill St. Manotick

Nepean

- [Ben Franklin Client Service Centre](#)
- Barrhaven Fire Hall
1075 Greenbank Road
- Viewmount Drive Fire Hall

Kanata

- [Kanata Client Service Centre](#)
- Riddell Road Fire Hall
- Teron Road Fire Hall
- Eagleson Road Fire Hall

West Carleton

- [Kinburn Client Service Centre](#)
- Younghusbands/Pronto, Dunrobin

Goulbourn Area

- Fire Hall
1643 Main St. Stittsville
- Munster Community Police Office
- Richmond Police Office
6179 Perth St.

What the Test Results Mean

Water quality test results

You will receive the results by mail in approximately seven days. Results are also available at the laboratory four days after submission.

If you need help interpreting the results, please contact the City's Environmental Health Program at 722-2200 or the provincial laboratory at 736-6800.

Bacterial test results

See the next page for interpretation of numeric results.

Total coliforms

This group of bacteria is always present in animal wastes and sewage, but is also found naturally in soil and on vegetation. The presence of these bacteria in your well water may indicate that surface water is getting into your well.

Escherichia coli (E.coli)

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 feedlot.

Nitrates

Nitrates are the end result of a chemical reaction; they are not bacteria. The presence of nitrates in your well water is usually the result of residential yard or agricultural fertilizers or seepage from septic tanks.

Infants less than six months old can become sick from drinking formula made with water high in nitrates. The nitrates in the formula reduce the amount of oxygen carried by the blood and could cause "blue baby syndrome" (Methaemoglobinemia). If you have an infant less than six months, it is recommended to use bottled water.

Sodium

Well water should be analyzed for the presence of sodium. Individuals who are on a sodium (salt) reduced diet should consult with their physician if the level of sodium in their well water exceeds 20 mg/L.

Most domestic water softeners increase the level of sodium in the drinking water. In order to reduce sodium consumption, a separate unsoftened water supply (by-passing the water softener) should be provided for drinking and cooking purposes.

How to Interpret Bacterial Testing Results

Bacteriology interpretation

Drinking water is tested for the presence of two groups of bacteria: total coliform bacteria and E.Coli. Total coliforms exist in animal waste, soil and vegetation. The presence of these bacteria in you well may suggest that surface water is seeping into your well

E.Coli bacteria are in human and animal digestive systems. Their presence in your well suggests your water may be contaminated by manure or sewage from a local septic system or feedlot. E.Coli can be dangerous to your health.

This scale does not apply to testing of surface water used for swimming.

Total	E.Coli	What It Means
1 to above 80	1 to above 80	Unsafe for drinking. This water is contaminated and should not be used for drinking under any circumstances.
6 to 80	0	Unsafe for drinking. Contamination is not likely to be of sewage origin unless it is far removed from the water source or unless there has been a delay in receipt of the sample. Common in new wells before disinfection and shallow dug wells that are not properly sealed.
1-5	0	Safety is doubtful on the basis of a single test. Safe for drinking only if testing of three samples collected one to three weeks apart shows no higher and the condition is judged stable, and the well is protected and located at least 30 m (100 ft.) away from any source of human or animal waste.
0	0	SAFE for drinking. Maintain regular testing.
0/G	0	Safety is doubtful. Not recommended for drinking. No coliform bacteria could be detected because the sample was overgrown with other bacteria. This condition frequently occurs with new wells, dug wells receiving soil drainage, or wells that have been idle for some time. Disinfect the well and collect another sample, clearly identified as "repeat sample".

If Your Well Water is Contaminated

How to sterilize your drinking water

If your drinking water results show that your well water is contaminated and unsafe to drink, follow these guidelines until your water supply is safe again.

Use only **one** of the following options for a safe supply of drinking water:

- Bring water to a rolling boil and then boil it for at least one full minute. A full rolling boil is a vigorous boil that can not be stopped by stirring the water). **OR**
- Mix 1/4 tsp. (1.25 mL) of liquid household bleach, such as Javex, to one gallon (4.5L) of water and let stand for 30 minutes. There should be a faint chlorine smell to the water. **OR**
- Use commercially bottled water.

Refrigerate boiled or treated water in clean containers.

What water to use for washing and to use for pets

Handwashing: Use bottled, boiled or treated water (as above) or use the usual supply for handwashing, then follow with an alcohol-based hand sanitizer.

Food Preparation: Use bottled, boiled or treated water to make juice or formula or to wash ready-to-eat foods such as fruits and vegetables. If the food will be boiled for longer than five minutes during the cooking process, it is not necessary to use treated water. Do not use ice cubes made with the unsafe water.

Bathing/showering: Adults may continue to use the usual supply, as long as no water is swallowed. After you bathe or shower, use treated water to wash your hands. Give sponge baths to children, using treated water.

Brushing teeth: Use boiled, bottled or treated water.

Laundry: Use your usual source of water.

Dishwashing: Use bottled, boiled or treated water.

Pets: Use bottled, boiled or treated water.

Livestock: Consult a veterinarian regarding water for livestock.

Garden: It is recommended that a vegetable garden or a fruit orchard be watered using treated or boiled water.

How to disinfect a well

You can easily disinfect your well contaminated with bacteria by "shock-treating" it with ordinary chlorinated household bleach containing 5.25 per cent sodium hypochlorite. Don't use scented bleach for this purpose. Buy fresh bleach to do this because the chlorine in bleach is unstable and evaporates over time. (Bleach loses half its strength in six months.)

Dug Wells (three feet (1 m) in diameter): Add one quart (one litre) of household bleach for every five feet (1.5 m) of water depth.

Drilled Wells (six inches (15 cm) in diameter): Add five ounces (142 mL) of household bleach for every 25 ft (7.5 m) of water depth.

Well Points (two inches (5 cm) in diameter): Add three ounces (85 mL) of household bleach for every 10 ft (3 m) of water depth.

Do not drink the water until you receive satisfactory water quality test results.

1. Refer to your well record to find out how deep your well is. If you don't know how deep the water is in the well, use the well depth to estimate how much bleach to add.
2. Remove or bypass any carbon filters in the system. (These filters will remove chlorine from the water, thus preventing the pipes beyond the filter from being disinfected.)
3. Pour the required amount of household bleach into the well air vent or by removing the well cover.
4. If possible, agitate or mix the well water by using a clean hose to pump the chlorinated water back into the well, flushing down the well casing and water lines above the water level.
5. Disconnect the pump filter, run water through all taps for 20 minutes until a strong chlorine smell is detected. (If there is no chlorine smell, repeat the chlorine treatment.)
6. Drain the water heater and fill with chlorinated water. Backflush the water softener and all filters except carbon filters. Then wait 12 hours.
7. Run the rest of the treated water through an outside hose away from the septic tank system (excess chlorine will kill the bacteria necessary for breaking down wastes) and away from surface water courses i.e. rivers and ditches.
8. Stop running the hose when the smell of chlorine is gone. Run clear water through the faucets.
9. Do not drink the water until test results prove it is safe to drink.
10. Retest 48 hours after chlorination is complete. Two bacteria-clear tests over one to three weeks is a strong indicator that the water is safe to drink.
11. If any test shows contamination, repeat the disinfection process from the beginning.

If shock chlorination doesn't correct the problem, you will need professional help to determine whether a new well (such as a drilled well instead of a dug well) is required, or whether an on-site water disinfection system will deliver the desired results.

Bleach required to disinfect a well

1) Drilled wells

Well Depth		Bleach Volume	
feet	meters	fluid oz.	ml
25	7	5	150
50	14	10	300
75	21	15	450
100	28	20	600
125	35	25	750
150	42	30	900
175	49	35	1050
200	56	40	1200

2) Dug wells

Well Depth		Bleach Volume
feet	meters	liters
5	1.5	1
10	3	2
15	4.5	3
20	6	4
25	7.5	5
30	9	6

Visit the [City-owned Wells](#) if you would like to know how we purify communal wells.

Source : http://city.ottawa.on.ca/city_services/water/wells/1_en.shtml