



June 2024

PRIVATE WELLS

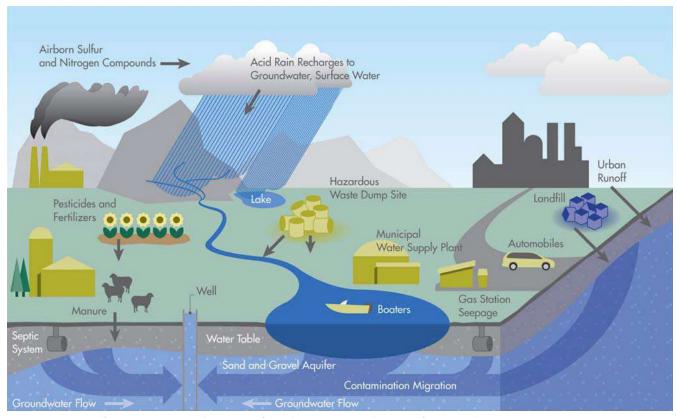
UNDERSTANDING YOUR SOURCE WATER

"Source water" is untreated water in streams, rivers, lakes, or underground aquifers which is used for the supply of raw water for drinking water systems.

Safe drinking water is water that is safe for human consumption and meets or exceeds the requirements of the Ontario Drinking Water Standards (ODWS). The ODWS were designed to set parameters on water quality related to treated drinking water. Any exceedances of the parameters set in the ODWS on raw water samples are considered poor quality. "Water quality" is a term used to describe the chemical, physical and biological characteristics of water, usually in respect to its suitability for a particular purpose, such as drinking.

When a well produces well water that does not meet one or more of the ODWS, the well owner may seek the advice of and take such measures directed by the local Medical Officer of Health at the **Thunder Bay District Health Unit (TBDHU)**.

Drinking water can be polluted by a variety of sources including households and businesses carrying out routine, everyday activities, as illustrated below. Pollutants can seep into the ground and contaminate the water table; rain can carry away wastes and chemicals to nearby streams and lakes. If pollutants reach drinking water intake areas, they can jeopardize the quality of the drinking water supply.



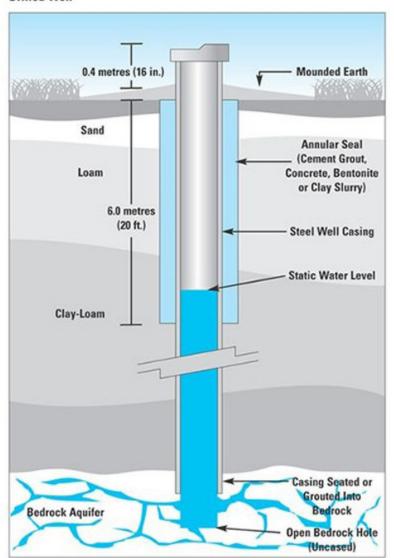
Human Activities Affecting Source Water (SOURCE: Safe Drinking Water Foundation - safewater.org)

GETTING TO KNOW YOUR WELL

There are different types of wells: dug, bored, drilled, sand point, and below grade. It helps to know what type of well you have because its design, construction, and maintenance have a direct effect on the quality and quantity of water you draw from it.

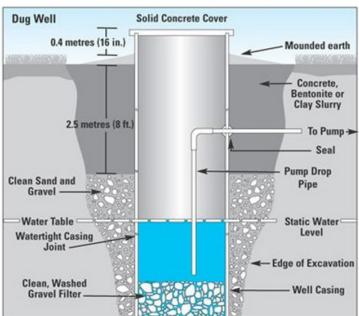
Most rural Ontarians rely on groundwater from dug or drilled wells for their private water supply. A **drilled** well consists of a hole bored deep into the ground, with a vermin-proof cap and a well casing that covers the entire depth, or a partial section of the well. A **dug** well is a shallow excavated hole and is more prone to contamination because of their shallow depths and non-vermin-proof cap. Shallow groundwater is more susceptible to contamination compared to deeper groundwater. An ideal location for a well is uphill and upgradient from any potential contaminant source.

Drilled Well



Drilled Well (SOURCE: Best Management Practices: Water Wells; Ontario Ministry of Agriculture, Food and Rural Affairs; Agriculture and Agri-Food Canada)





Dug Well (SOURCE: Best Management Practices: Water Wells; Ontario Ministry of Agriculture, Food and Rural Affairs; Agriculture and Agri-Food Canada)



BACK HOW WATER GETS TO YOUR WELL

Wells of all types collect water from underground. Groundwater circulates as a component of the water cycle and originates from surface water (lakes, rivers, wetlands, streams) and precipitation (rain, snow) that filters through the ground and saturates (pools) in cracks or pore spaces between rock, sand and soil particles. This underground area of water saturation is called an aquifer. A groundwater recharge area is the area where an aquifer is replenished from surface water or precipitation. Groundwater may flow into streams, rivers, marshes, lakes and oceans, or it may discharge in the form of springs and flowing wells. Groundwater circulates back to the surface and returns to the atmosphere through evaporation and transpiration.

The level of groundwater rises and falls depending on the season, temperature, amount of precipitation that percolates through the ground, and the amount of water withdrawn from the aquifer.



PROTECTING YOUR GROUNDWATER

In Ontario, 80% of the population has access to municipal water which is regularly monitored and treated by professionals. However, the other 20% of Ontarians depend on non-municipal water supplies which are not protected by the government's multi-barrier approach (Clean Water Act, 2006, Nutrient Management Act, 2002, Safe Drinking Water Act, 2002).

Protecting water at the source is a shared responsibility and an important way to ensure the health of humans, ecosystems, and economies. Our actions today affect the quantity and quality of water available for future uses, as protecting sources of water is essential to ensuring human health.

Drinking water source protection for private wells and drinking water systems is the responsibility of private landowners with direction from the Ministry of the Environment, Conservation and Parks, the Ministry of Health and Long-Term Care and District Health Units.

Certain activities can pose a risk to drinking water if pollutants are released to the environment. Pollutants, also called contaminants, are either **chemicals** (such as fuels, solvents, metals and pesticides) or **biological pathogens** (such as bacteria and viruses).

Soil can act as a natural filter for pathogens, so some private well owners do not treat the water in their wells. But groundwater can still become contaminated when chemicals or pathogens are released on or into the ground from human activity. For

example, fuel can leak from heating oil tanks, and bacteria from faulty on-site sewage systems can leach through the soil into groundwater, contaminating the well.

There are many factors that determine how long it takes for water to move underground to the well and how much the area surrounding the wellhead should be protected. These factors include topography, amount of water being pumped from the well, aquifer type, soil type surrounding the well, and direction and speed of groundwater travel. Generally, the farther away a source of contamination is, the less likely it is to become a problem for drinking water.

Groundwater is a naturally replenishing source. However, there can be times when your well may run low, or dry. It is important to conserve water whenever possible in your home and in your yard to lower the chance of your well becoming dry. The average person in Ontario uses 285 liters of water per day. We can save water through a variety of efforts including:

- Install low-flow shower heads and toilets.
- Minimize time spent in the shower.
- Turn the tap off while brushing your teeth, shaving, or washing your face.
- Install rain barrels and use that water for your gardens and lawn.
- Detect and repair leaks in hoses and sprinklers outdoors.
- Try to spread water use throughout the course of the week, especially laundry.



Find out more on protecting our sources of drinking water and how you can help at **protectingwatermatters.ca**.





CARING FOR YOUR PRIVATE WELL

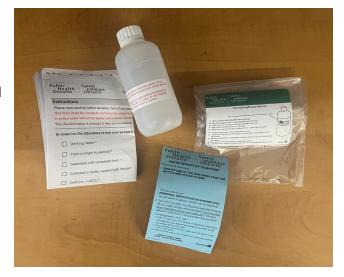
Best practices for drinking water source protection have been created for landowners with private wells and drinking water systems. Private drinking water systems do not undergo the same treatment and testing practices that municipal systems do. It is the responsibility of the landowner to care for their private systems. Following best practices can protect human health and environment, extend the life of your drinking water system, avoid the costs of needing to treat contaminated drinking water sources or finding a new source of drinking water, and increase public awareness and accountability of drinking water stewardship.

- Test your well water for bacteria at least 3 times per year, seasonally when snow is not present (spring, summer, fall), and look for changes in the water's characteristics (e.g. colour, taste, odour).
- **Keep a record** of well test results and any well maintenance performed.
- Know exactly where your well is located and keep potential contamination sources and activities away from your well.
- **Keep an inventory** of potential activities that could contaminate your drinking water. For example, the use of fertilizers, pesticides, or fuel spills nearby your well.
- Implement a groundwater protection zone around your well, with a radius of 100 metres, or to the boundary of your property line, whichever one you reach first.
- Nothing but water should enter your well, and it should only enter from underground.
 - Make sure the ground around your well slopes away from your well.
 - Make sure that your well's casing extends at least 40 cm (16 in.) above the mounded earth.
 - Watch for ground settling or water pooling around the outside of the well casing. (This could indicate that surface water could be accessing your well.)
 - Consider replacing your concrete dug well lid with a new lid that has a sealed access hatch.
 - Keep surface water (e.g. rainfall runoff) and contaminants or foreign materials (e.g. insects and mice) from entering your well by securing the well cap in place.
 - Keep vehicles, pet waste, salt and fertilizer away from the well.
- Keep sources of E. coli bacteria away from your well.
 - Keep animal and kitchen waste away from your well, and do not allow liquids from contaminant sources to drain towards your well, especially during spring thaw.
 - Do not tie your pet up near the well and clean up pet waste.
- Keep other sources of bacteria away from your well.
 - Do not bury brush piles, stumps, or use bark mulch or wood chips near or uphill from your well.
- Proper fuel and chemical storage.
 - Place drip trays underneath storage containers to prevent spills and use double-walled tanks.
 - Ensure that lawn mowers and snow blowers are not leaking fuels near your well.
- If a spill occurs, clean it up with an absorbent material such as cat litter or sawdust and scoop the contaminant into a container and dispose of it properly.
- Fertilize lightly or not at all. This is especially true if you live close to the water. Nitrates, which are found in fertilizer, can run off or leach into drinking water sources.
- Use eco-friendly alternatives for road salts such as sand, beet juice, alfalfa meal, cat litter, coffee grinds, or products

such as EcoTraction (available at standard retailers) using all-natural

volcanic minerals.

- Having vegetation on your property (native trees, shrubs, and herbaceous species) contributes to improved water quality and quantity by decreasing the speed of overland water flow and erosion, increasing evapotranspiration and intercepting rainfall, and increasing infiltration to shallow groundwater areas.
- Inspect your wellhead area (e.g. 100 meters around the well) and water supply system at least annually to ensure everything is functioning properly. Early spring after snow melt is a good time.
- Ensure your well is always accessible for testing, inspection, maintenance, cleaning, treatment and repairs.
- **Have the well and plumbing disinfected** with a chlorine solution by a licensed well technician after any work is done inside the well, or on pumping equipment.





- If you own a well, you are legally required by the Ontario Regulation 903: Wells (Wells Regulation) to always maintain it in a way that prevents surface water and other foreign materials from entering the well. Proper well maintenance protects the groundwater supply.
- A poorly maintained or constructed well can result in the **bacterial or chemical contamination of groundwater**. A problem in a single well can contaminate an entire aquifer and affect the lives of many people.

 One of the most common causes of contamination is foreign materials and surface water having direct access into the well. For example, contamination can occur if the annular seal around the outside of the casing is not watertight, if there are openings in the casing or well cover, or if casing joints are not made waterproof.
- There are many **serious dangers** that must be considered when maintaining and rehabilitating a well, including falling into the well, exposure to explosive gases and the risk of electrocution. Improper construction of a well and developing a dense distribution of wells near private septic systems and other wells has the potential to allow for groundwater contamination. For these reasons, when you are building, repairing, modifying, or abandoning a well, you should hire a **licensed well contractor** who is knowledgeable of these hazards.
- Once problems are encountered with a well, it may be possible to rehabilitate it. However, that is not always the case. Well owners should be aware that there are many instances when improper maintenance, no usage, an elevated substance identified in a water quality test, or presence of natural gas may require a well to be abandoned in accordance with the Wells Regulation. Unused wells also pose a physical hazard to people and animals on your property due to the possibility of falling into a large diameter opening. There are many dangers to consider when working on abandoned wells and the equipment, materials and expertise needed to correctly abandon a well often exceed a well owner's abilities. It is strongly recommended that you hire a licensed well contractor who uses licensed well technicians.
- Wells constructed before 1990 may require upgrades to bring them up to the current standards according to the Wells Regulation. Many wells constructed prior to 1990 were permitted to be constructed with well pits. Therefore, a large portion of Ontario wells do not meet the current standards and are more susceptible to contamination. Please visit the Ministry of the Environment, Conservation and Parks' Maintenance & Repair website for more information and examples of well maintenance and repairs that you can use to upgrade your well to meet the current standards: https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices/maintenance





It is important to test for the indicators of bacterial contamination:

- Coliforms: These bacteria are often found in animal waste, sewage, as well as soil and vegetation. If they are in your drinking water, surface water may be entering your well.
- E. coli (Escherichia coli): These bacteria are normally found only in the digestive systems of people and animals. If they are in your drinking water, it usually means that animal or human waste is entering your well from a nearby source. However, this bacteria can also occur naturally in the soil. E.coli contamination makes groundwater unsafe to drink.

A private well owner should test for bacteria:

- At least three times per year for a drilled well, with one of those samples done in the spring after the snow melts. The other two tests should be done in the summer and fall.
- At least four times per year for a dug well, with one of those samples done in the spring after the snow melts. The other three tests should be done in the summer and fall.
- More frequently than three times per year **if you know of problems**, if you have a **highly vulnerable water supply**, or if you are in a **critical recharge area**, which tends to be very sandy or full of gravel. The Provincial Groundwater Monitoring Network provides information online about groundwater levels and chemistry conditions: https://data.ontario.ca/en/dataset/provincial-groundwater-monitoring-network
- Additional testing is recommended after heavy rainfalls or flooding, as there is a greater risk of surface water entering
 into your well (drilled or dug).
- After major plumbing or septic work.

Repeated detection of bacteria in the well water samples means that there is a source of bacteria affecting the well water (e.g., surface water, septic system, animal waste). Measures should be taken to identify the source and prevent it from accessing the well. A licensed well technician working for a licensed well contractor should be hired to inspect and rehabilitate the well if needed. A water treatment specialist may also be consulted to remove the contaminant from the drinking water, however, the problem will not be resolved if water treatment is pursued without identifying and addressing the source of contamination.

* HOW CAN I TEST MY WATER FOR BACTERIA?

Free bacterial testing is available for private well owners through Ontario's Public Health Laboratory. To have your water tested, it must be collected with care in a proper **water collection kit**. Water samples submitted for bacterial testing to Ontario's Public Health Laboratory are **not tested for metals or chemical contaminants**.

You can get a bacterial testing kit from:

- The Thunder Bay District Health Unit (TBDHU) main office at 999 Balmoral Street in Thunder Bay
- Ontario's Public Health Laboratory at 336 South Syndicate Avenue in Thunder Bay
- Any TBDHU branch office in the district communities

What should I do if my well tests positive for bacterial contamination?

- Stop drinking the water and find other sources such as bottled water or municipal water if it's available
- If you must use the well water, bring it to a rolling boil for at least one minute before using it for consumption or hygiene purposes. Keep boiled water in the fridge until you use it.
- Disinfect your well. Instructions for how to disinfect your well can be found by visiting: https://www.publichealthontario.ca/en/Laboratory-Services/Well-Water-Testing/Well-Disinfection-Tool or https://www.ontario.ca/page/wells-regulation-well-disinfection-technical-bulletin.
- Call the TBDHU for help with carrying out the instructions you will get from the Ontario's Public Health Laboratory. You can reach a public health inspector at (807) 625-5900 or toll-free at 1-888-294-6630, Monday through Friday from 8:30 am to 4:30 pm.

WELL TESTING FOR CHEMICALS

Private well owners can pay to have their well water tested for non-bacterial metals and chemical contaminants by a private laboratory. Water samples should be submitted to a laboratory licensed under the Safe Drinking Water Act to analyze the well samples for the chemical and radiological parameters. To obtain accurate results, a well owner needs to follow the sampling and preserving procedures provided by the laboratory.

According to the Ontario "Water Supply Wells: Requirements and Best Practices," a well owner should:

- **Test for nitrates once every year**, or more often if you have livestock or lands with high fertilizer application. Nitrate is a form of nitrogen that is stable in groundwater but levels greater than 10mg per liter can lead to health problems, particularly in young children.
- Test for other metals and minerals at least every two years. Some common chemical parameters include sodium, chloride, conductivity, colour, turbidity, calcium, magnesium, manganese, hardness, alkalinity, pH, ammonia, nitrite, nitrate, phosphorus, fluoride, uranium, lead, antimony, arsenic, copper, iron, zinc and sulphate.
- **Test for common gases** such as hydrogen sulphide, methane and radon.
- Test for pesticides, volatile organic compounds (solvents), petroleum hydrocarbon parameters (benzene, toluene, ethylbenzene, xylenes and petroleum hydrocarbon fractions F1 to F4), heavy metals, and radionuclides if there is a reason to suspect that there may be a local problem such as nearby spills (e.g., gasoline station leak), landfills, industrial and mining activities, accidents, or land use changes.
- Test for specific a problem parameter if a contaminant is discovered in nearby provincial groundwater monitoring, municipal or communal wells.
- If there is no cause for concern, test for non-bacterial contaminants at least every five years.



1 TESTING FOR METALS AND OTHER CHEMICAL CONTAMINANTS

There are two private laboratories in Thunder Bay where you can pick up a homeowner kit to have your water tested for various parameters. A fee is charged for this service:

ALS Environmental

- 1081 Barton Street
- (807) 623-6463

Testmark Laboratories

- 131 Central Avenue
- (807) 333-0921



■ WELL WATER TREATMENT

Drinking water test results should be compared against the ODWS to determine if there are any parameter exceedances. If water test results have shown contaminant concentrations above the ODWS limit, it is recommended to consult with the TBDHU about the type of treatment for the specific problem. If previous water test results have shown contaminant concentrations close to the ODWS limit, a homeowner may wish to re-test more frequently.

No one treatment type solves all problems. There are many different treatment types for home use, including cartridge filters, chlorine pumps, permeable membrane systems, and ultraviolet light disinfection. Each treatment has a specific purpose to resolve a specific problem, and need regular monitoring and routine maintenance.

Some common problems can be treated easily and inexpensively. Others require treatment systems that can be expensive to install and operate. It may become necessary to find an alternative water supply, such as a deeper well, a well at another location, or treated surface water.

All chemicals and materials that come into contact with drinking water should be National Standards Foundation (NSF) certified. Equipment carrying the NSF certified trademark has been thoroughly checked for performance and the manufacturing facility is inspected annually.

TESTING YOUR DRINKING WATER

Groundwater quality in Ontario is generally quite good. However, as part of protecting your drinking water supply, it is important to test water quality in the well and to monitor its changes.

Standards have been set for **maximum acceptable concentrations** of microbiological, chemical, and radiological parameters in your drinking water. It is important to test your drinking water to ensure it meets these standards, if there has been contamination, and to protect yourself from unwanted health effects.

See **Ontario Drinking Water Quality Standards** with maximum acceptable concentrations here: www.ontario.ca/laws/regulation/030169

The possibility of experiencing unwanted health effects from your drinking water depends on the type of contamination, how much you have been drinking and how long you have been drinking it.

Aesthetic objectives have been established for drinking water parameters that may impair taste, odour or colour of water or which may interfere with good water quality control practices. An example of an aesthetic objective is excessive levels of iron in groundwater, which can cause the water to become a brownish colour, becoming evident on laundry or plumbing fixtures. Excessive iron may result in a bitter taste, but is not known to be toxic.

PROBLEM	CONCERN	SIGNS
ACIDITY (low pH)	Aesthetic & Health (from increased dissolution of metals)	Green stains on copper pipes. Corrosion of pump.
ARSENIC	Health	No signs, requires water test. Consuming very high levels of arsenic over a lifetime can increase risk of cancer.
BACTERIA & VIRUSES	Health	Only detected by testing and may cause human health problems (fever, gastrointestinal diseases and parasites, stomach aches, diarrhea).
CALCIUM & MAGNESIUM	Aesthetic & hardness	Lime scale buildup on appliances, clogging plumbing fixtures and pipes. Dirty and stained laundry.
CHLORIDE	Aesthetic at ≤250 mg/L	Salty taste. Blackening and pitting of stainless-steel sinks. Corroded distribution system.
DECAYING NATURAL ORGANIC MATTER	Aesthetic	Musty, earthy or wood smell.
FLUORIDE	Aesthetic & Health (from increased dissolution of metals)	Mottled teeth at low doses, but at high concentrations can cause problems with bone development.
IRON	Aesthetic & clogs pipes	Rusty/black stains on laundry and plumbing fixtures. Rusty/black water. Metallic or bitter taste.
IRON & MANGANESE	Aesthetic & bio-fouling of well	Stains plumbing fixtures, cooking utensils and clothing. Red and black particles in water. Unpleasant tastes and colours. Reduced well yield. Encrustation and corrosion of wells, pumps, distribution lines, and treatment systems.
METHANE GAS	Aesthetic & Safety	No odour by itself, but offensive odour if present with sulphide gases. Gas bubbles in water. Explosion/fire risk if not properly vented.
NITRATE	Health	No signs, requires water test. Can cause methemoglobinemia (Blue Baby Syndrome).
NUISANCE BACTERIA	Aesthetic & clogs pipes	Red/brown slime in plumbing fixtures. Red filament-like particles in water. Unpleasant taste and odour. Decreasing well yield due to screen plugging.
SEDIMENT	Aesthetic	Water cloudy or gritty.
SODIUM	Health	Salty taste.
SULPHATE	Health	Water has laxative effect. May taste bitter. Combines with calcium to form adherent scale.
HYDROGEN SULPHIDE & SULPHATE-REDUCING BACTERIA	Health	"Rotten-egg" smell. Scale and black stains on pipes. Tarnished copper. Corroded plumbing.
URANIUM	Health	No signs, requires water test. Toxic. Elevated levels of uranium can affect the kidneys.

? TROUBLESHOOTING

Many issues can occur with water wells. Some of the most common issues include bacteria in wells, decreased yield, and a change of taste, odour, and/or colour. For a more comprehensive list of water quality issues, please view the Ministry of the Environment, Conservation and Parks' website for Well Problems and Rehabilitation: https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices/maintenance#section-6

To find a licensed well contractor:

Visit: www.ontario.ca/findwellcontractors

Wells Help Desk: <u>1-888-396-9355</u>

1 ADDITIONAL INFORMATION

- **The Wells Help Desk** is operated by the Ontario Ministry of the Environment, Conservation and Parks (MECP) to help ensure that information is available to the public. For more information about well licensing, construction, maintenance, abandonment, reporting and documentation:
 - Visit www.ontario.ca/propertywells
 - Call 1-888-396-9355 (WELL)
 - Email wellshelpdesk@ontario.ca
- Ontario MECP Public Information Centre: 1-800-565-4923
- To find a licensed well contractor: www.ontario.ca/findwellcontractors
- Lakehead Region Conservation Authority: https://lakeheadca.com/
- Thunder Bay District Health Unit: Thunder Bay District Health Unit (tbdhu.com)
 - Environmental Health program: (807) 625-5900 or toll-free at 1-888-294-6630
- Well Aware A Guide to Caring for Your Well: www.wellaware.ca
- Well Wise Resources and Research for Well Owners: www.wellwise.ca
- Ontario Well Owner Information Package: https://www.bblackburnltd.ca/wp-content/uploads/2018/10/Well-Owner-Info-Package-Ev1c.pdf
- **Well Records**: https://www.ontario.ca/page/well-records
- **Protecting Groundwater to Protect Health**: https://www.ontario.ca/page/protecting-groundwater-protect-health
- Water Supply Wells: Requirements and Best Practices: https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices
- Drinking Water Source Protection: www.sourcewaterinfo.on.ca
- Drinking Water and the Safe Drinking Water Act: www.ontario.ca/ONT/portal51/drinkingwater
- Ontario Ground Water Association: https://www.ogwa.ca/
- Canadian Ground Water Association: http://www.groundwatercanada.com/
- Spills Action Centre: 1-800-268-6060

Accessible formats available upon request, as per compliance with the Accessibility for Ontarians with Disabilities Act, 2005 (AODA).



