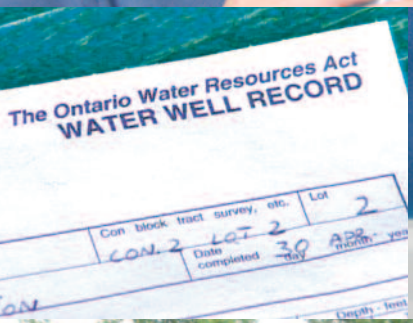
A guide to caring for your well and protecting your family's health.

WellAware.ca

Green Communities CANADA



by Green Communities Canada in partnership with the Ontario Ground Water Association. Financial support provided by the Ontario Ministry of the Environment.

Well Aware.ca

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Green Communities Canada is a national association of community organizations that create a healthier, greener world by helping Canadians make practical changes – at home, at work, and in their communities.

This booklet is for information only. Ontario's *Well Regulation 903* defines all legal requirements for household supply water wells. Please see www.ene.gov.on.ca for: technical bulletins, fact sheets and *Water Supply Wells - Requirements and Best Management Practices.*

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"the water is sick... and people need to really fight for that water, to speak for that water, to love that water"

Josephine Mandamin,
Mother Earth Water Walk

Cultural *Responsibility*

First Nations people share a unique perspective on water and their relationship to it. Elders have long stated that water is sacred and assert that water is life itself. Water is seen as intertwined with the survival of everything on earth. In addition to our own and all life's need for water, however, is the fact that First Nations people see water as being spiritually imbued, as being a living entity with its own set of obligations and responsibilities given to it by the Creator. In the Mushkegowuk tradition the word "sah-kemah-wapoye" or "spiritual water" refers to water as a living entity. By polluting and otherwise degrading water quality, humans are harming another living being and preventing it from carrying out its duties which include allowing us to drink, bathe, grow food, etc. Among the many responsibilities given by the Creator to humans are those which involve caring for the water and ensuring that it in turn may fulfill its roles.

First Nations see maintaining healthy relationships with water as a duty and responsibility that must be fulfilled to ensure present and future generations have clean healthy water. Water finds significance in the lives of First Nations people on personal, community and spiritual levels and water and must be protected and nurtured. In the Haudenosaunee tradition this concept of caring for the water is called "kanenhstats" which means "It is continually protected". This booklet provides guidance and insights for how First Nations well owners can continue to fulfill their traditional and cultural responsibilities to care for and protect water.

The *Ontario Wells Regulation* covers all aspects of drinking water supply wells as part of the Ontario Water Resources Act. This regulation exists to protect public health and drinking water supplies. The *Ontario Wells Regulation* is not enforceable on reserve lands. There is no equivalent federal regulation or legislation that applies to wells on federal lands.

To ensure that the drinking water supply for your family is protected now, and for future generations, we strongly recommend the use of *Ontario Wells Regulation* to guide you in best practices. Within this document where you see words like "you are legally responsible" or "it is your responsibility" or "must" such as "wells and well-related equipment must be sited...". This guide is referring to the *Regulation* and the situation off reserve across Ontario where the *Regulation* is enforceable.

Be *well aware*

Your family's health *depends* on it!

Your well taps into one of nature's treasures – cool, clean groundwater.

You and your family depend on this precious resource every day for cooking, washing, and a continuous supply of safe drinking water.

A *multi-barrier* approach

As a private water well owner, it is your responsibility to be well aware — to understand the basics of well maintenance and operation, and to take the necessary actions to keep your water wells in running order to provide drinkable water to your family. This booklet is a guide for individual household wells on constructing a new well, caring for an existing well, and plugging and sealing an unused well, all using a multi-barrier approach.

To improve your working knowledge of wells and the well life cycle, read the sections on groundwater basics, well basics, well construction, upgrading your well, and proper decommissioning of unused wells.

For an outline of your ongoing responsibilities as a well owner, read the sections on well maintenance, including protecting your well water and well inspection. An inspection and maintenance routine is recommended for every well on your property.

For a better understanding of well water quality issues and what to do about them, read the sections on groundwater basics, bacterial and other contaminants, water testing, and treatment systems.

The back of the booklet includes information about hiring a licensed contractor and using your well records. Additional resources and contacts are listed. Diaries for water testing and well maintenance are also included.

In Ontario it's the law. Ontario's *Wells Regulation* under the *Ontario Water Resources Act* sets out obligations for well owners. Once a well has been constructed, the well owner is responsible for ensuring that it is properly maintained.

Groundwater *basics*

Your well receives water from an underground water source called groundwater.

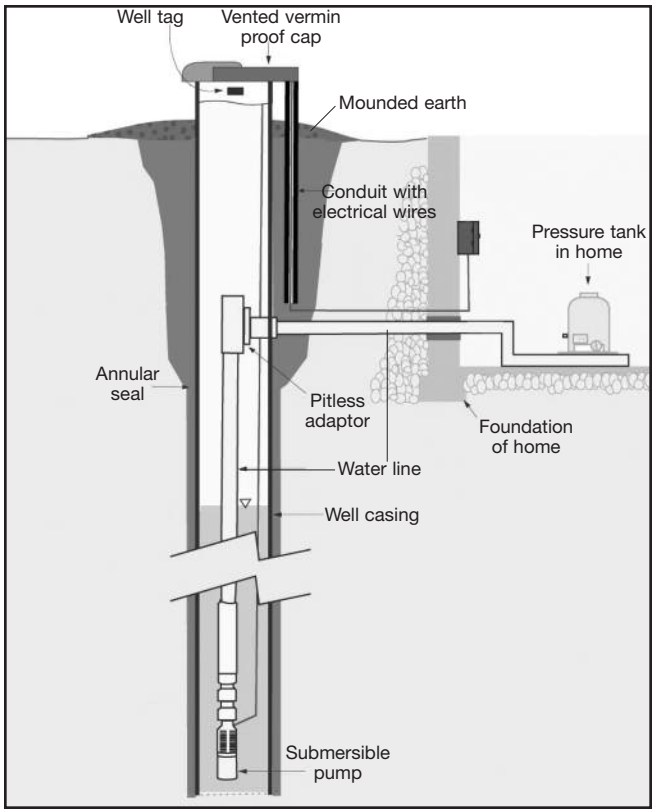
Groundwater originates from surface water and precipitation, including rain and melting snow. Water infiltrates the earth over a period of time from days to thousands of years. Saturated layers below the water table that store and transmit significant quantities of groundwater – e.g., enough to supply a well – are called *aquifers*.

Groundwater *flows*

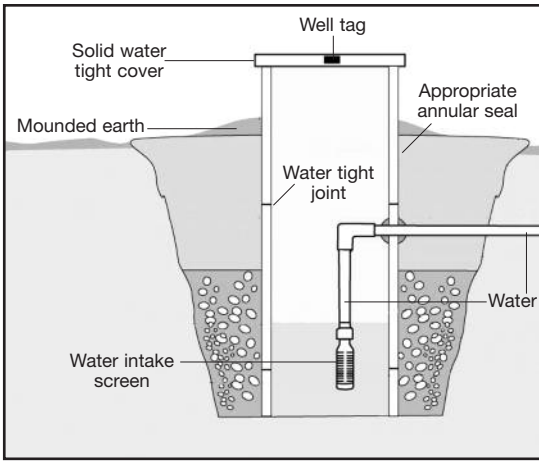
It is impossible to determine the direction of groundwater flow based on surface features alone. However, we do know that water in an aquifer near a pumping well will most likely flow toward the well.

The risk of well water contamination is greatest when the contaminant is close to the well. Yet, some contaminants have been known to spread over several kilometres.

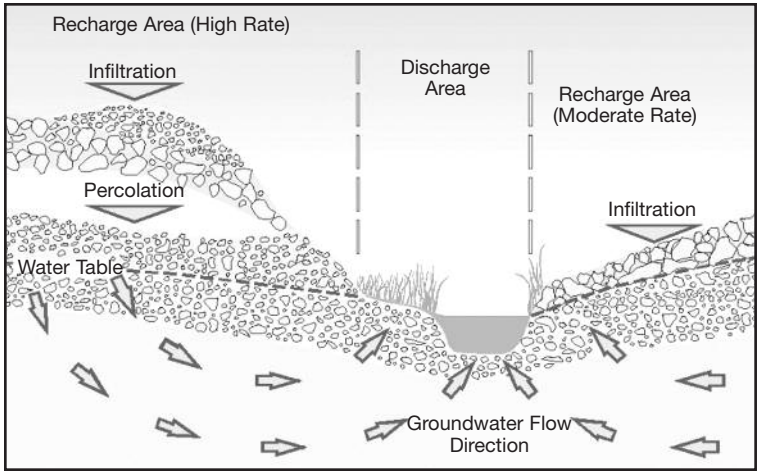
Common drilled well with submersible pump



Common dug well with shallo



Three common wells in Ontario which are constructed to protect the groundwater.

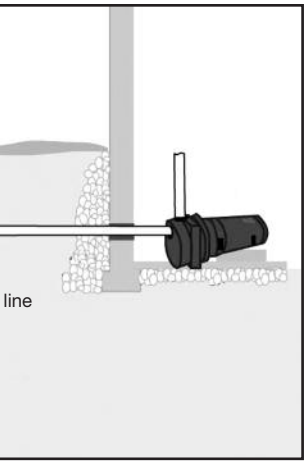


Compared to surface water, groundwater usually moves very slowly – from a few millimetres to a few metres a day. Groundwater affects the quality and quantity of surface water where it discharges into streams, rivers, wetlands, and lakes. Credit: BMP: Water Wells

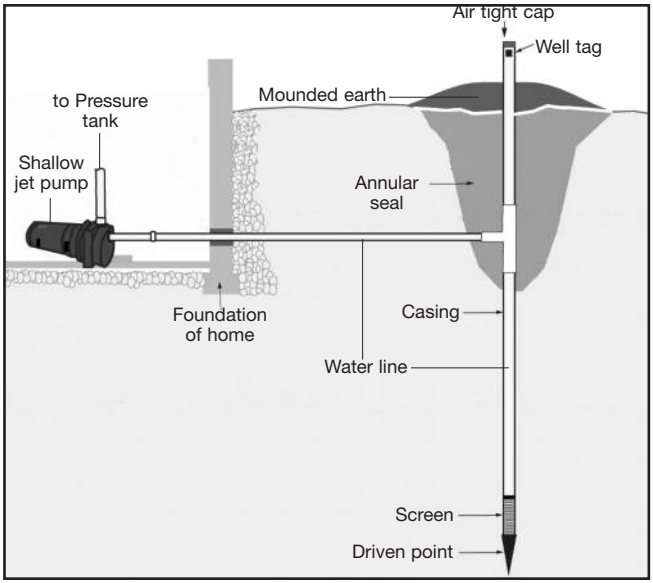
Local *geology*

The type of soil and rock can influence the speed at which surface water infiltrates the groundwater that your well taps into. Your well is at lower risk if these materials effectively prevent surface contaminants from reaching the aquifer. For example, thick deposits of fine soils like clay loams or silty clay can be more effective in preventing contamination from nearby surface activities than coarse soils like sand and gravel.

w lift pump



Driven point well with shallow lift pump



NOTE: Illustrations do not depict every circumstance and are not to scale.

These diagrams are for information purposes and do not depict *Wells Regulation* requirements. Please see www.ene.gov.on.ca for the *Wells Regulation*.

Well *basics*

New well *location*

Many different factors must be taken into account before choosing where to locate the well. These include:

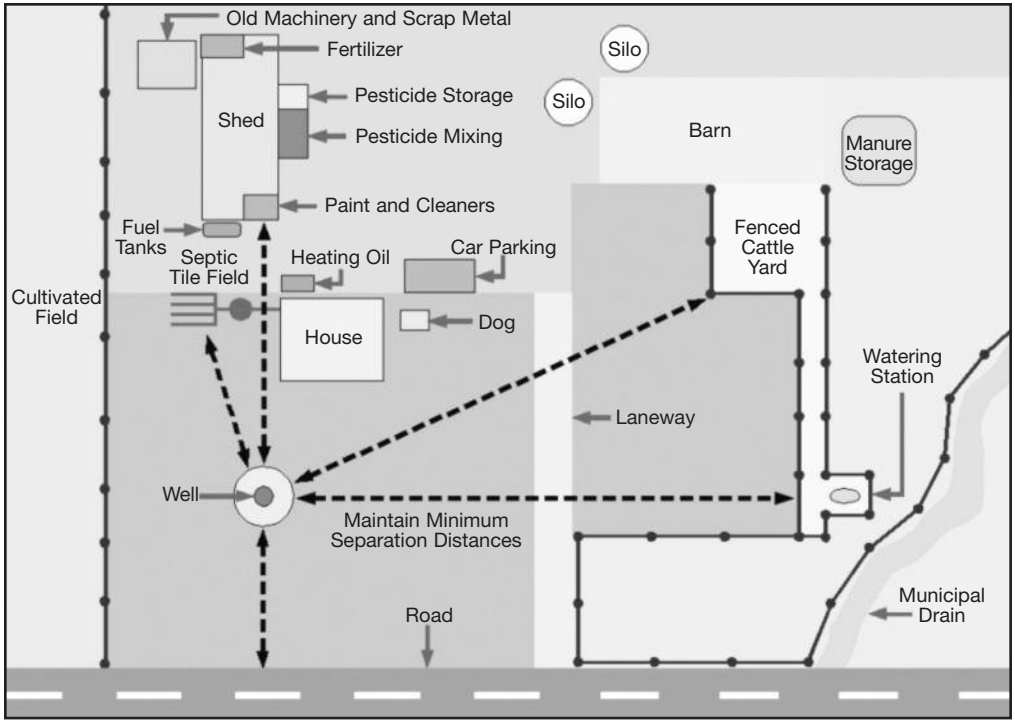
- natural features – such as the topography (land surface) of the site, the flow of groundwater, and the location of the aquifer
- potential sources of contamination - septic systems, chemical storage, etc.
- safety - presence of overhead power lines or buried utilities

Work with a Ministry of the Environment (MOE) licensed contractor to find the most suitable location on your property. Please see the section on **Hiring a Contractor** on page 28 for specific details on who can perform well construction and related activities.

Access for new wells

Wells and well-related equipment must be sited so they can be easily reached at all times for cleaning, treatment, repair, testing, and visual examination. The person constructing the well is responsible for ensuring accessibility and identifying all structures and landscaping that may block access.

After construction, the well owner should ensure accessibility. Keep your well free and clear of debris and other obstacles such as decks, wishing wells and gardens.



Verify adequate separation from potential contaminants. Credit: *BMP: Water Wells*

Separation from *contaminants*

A person constructing a new well must locate a well at least the minimum separation distance (and preferably farther) from sources of contaminants as outlined in the Ontario Ministry of the Environment *Water Supply Wells - Requirements and Best Management Practices,* Siting the Well. Some of these sources could include: fuel storage, manure pile and septic systems. Site wells up hill and away from property lines.

Once the well is constructed, it is up to the well owner to maintain separation from these and other potential sources of contaminants, including a compost pile, garden, deck, or any structure.

If there are unique or complex features on your property, consider contacting a professional geoscientist to advise.

Depending on the type of soil or rock, groundwater may be filtered and very clean. But once an aquifer is contaminated, it may not recover for a very long time - if ever.

Risks to groundwater

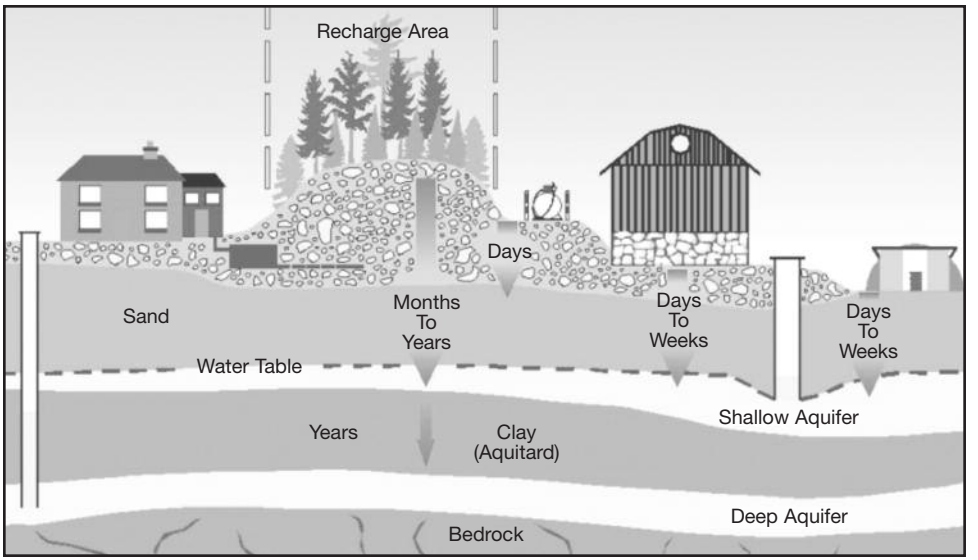
Surface spills of contaminants like fuel can infiltrate the soil and contaminate groundwater. The risk of contamination is greatest where the ground surface is highly permeable to the infiltration of water and other surface materials, e.g., in areas with coarse soils or fractured bedrock near or at the surface.

Groundwater can also be contaminated by underground sources, such as leaking fuel storage tanks or malfunctioning septic systems.

Poorly constructed or deteriorating wells can act as a direct pipeline for surface pollutants to contaminate the aquifer. Unused and unmaintained wells are a special concern if they haven't been safely plugged and sealed.

Deteriorating wells or unused, unsealed wells may:

- act as pathways for the movement of near-surface contaminants such as bacteria into aquifers
- pose a threat to children, adults, or animals who may fall into large diameter openings and become trapped or injured
- interconnect fresh groundwater with salty or mineralized groundwater zones and allow the mineralized water to enter into the fresh water zones
- present a hazard to farm machinery and vehicles
- flow uncontrollably at the surface resulting in groundwater waste, nuisance or flooding



Water infiltrating from the surface may reach a shallow aquifer in days to weeks. It could take years to reach a confined deeper aquifer. Credit: *BMP: Water Wells*

Well *construction*

A properly constructed well forms an effective barrier against surface run-off that may enter and contaminate the well.

Over the years, well design has improved to reflect advances in technology and our understanding of potential pathways of contamination. Ontario's *Wells Regulation* outlines minimum construction standards for all types of wells. Always hire a contractor licensed by the Ministry of the Environment (MOE) who is familiar with these standards.

Well upgrade in progress.

Flowing well that is not controlled.

Flowing wells

Flowing wells have a natural pressure resulting in a standing water level that is above the ground surface when the well is not in use. Flowing wells can occur in valleys or in areas where they are surrounded by ground with higher elevation. The presence of thick clay layers below the surface in these areas is another factor that can lead to a flowing well.

Flowing wells can be extremely challenging and dangerous. Contact an MOE-licensed well contractor who has experience with flowing wells.

Well screen.
Credit: *Fleming College*

Well *casing* and *screen construction* for new wells

A typical well structure includes a **well casing,** i.e., pipe, tubing or other material. The casing stabilizes the hole, prevents soil from entering the well, and accommodates pumping equipment. The casing material must be new and watertight to prevent surface water and run-off from entering the well.

Depending on well type and the environment, there are different requirements for casing length and height above ground that the person constructing the well must follow.

In addition to the casing, a new well may also have a **well screen,** i.e., slotted pipe or tubing, unsealed concrete tiles, or other material. The screen extends below the bottom end of the casing, filters out particulate matter, and provides a water intake zone.

The *Wells Regulation* prohibits the use of certain materials in new well construction:

- large diameter perforated corrugated pipe (culvert) not approved for potable water use,
- plastic that is not approved for potable water use
- hand lain stone, brick, wood, etc.

If your *existing* well is constructed with any of the above materials, contact an MOE-licensed well contractor to discuss your options.

The annular *seal*

When your well is constructed the hole in the ground is bigger than the well casing. The resulting gap – the annular space – must be filled with a watertight sealant such as bentonite slurry that does not shrink or crack under the ground.

The annular seal serves as a barrier to run-off, surface water, and near-surface waters that could otherwise travel down the outside of the casing and contaminate the aquifer.

See illustration of annular seal on page 4.

Faulty annular seal

Above: New style vermin proof cap for dug or bored wells. Below: Vermin proof cap for drilled wells.

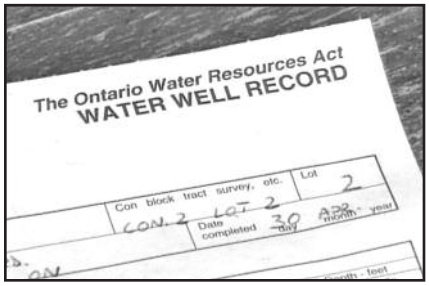
Well *cap*

Modern vermin-proof caps for all drilled wells have rubber gaskets and screened vents inside to prevent entry of surface water and "foreign material" such as vermin, insects, and decaying plant material. These new caps also accommodate the electrical wiring necessary for your pump. If your well has an ill-fitting cap, contact a local MOE-licensed well contractor to install a new vermin-proof cap.

There are also new caps for dug and bored wells that are ideal for replacing chipped or decaying cement inset caps.

Well *record* and *tagging*

Well records provide information about construction and water quantity and quality. The well tag is a unique identifier that links the well in the field with the well record. Together, they provide valuable information about your well. Tagging began in November 2003.



Well records and tags are used for new and altered wells and must be affixed by the person completing the work. The well tag must be visible at all times.

A record for properly plugging and sealing a well will support the original well record. See **Your Water Well Records,** page 29, for more details about this document.

Upgrading your well

If your well has a *water quality* or *quantity problem*

you may need to upgrade the well for the sake of your family's health and safety. Talk over your options with an MOE-licensed well contractor who is experienced with upgrades and familiar with conditions in your area.

Upgrade your well, *or construct a new one?*

If there are significant problems with your existing well, one option is to drill a new well. A new well may be the best way to go if your existing well is:

- poorly located, close to permanent sources of contamination, or at risk from flooding
- producing insufficient quantity for the intended use
- substandard and cannot be upgraded for technical or regulatory reasons (e.g., a brick-lined dug well)

Drilled well in a pit.
Credit: *Mary Jane Conboy*

Well *pits*

Prior to the mid-80s, well pits were commonly used to protect water line connections from freezing. Due to age and deterioration, some wells located in pits no longer provide potable water because the pit can fill with surface water and debris. This debris and surface water can be drawn into the water supply, leading to contamination. An MOE-licensed contractor can do a thorough assessment of your well to help you determine whether your well can be upgraded. Upgrading may involve extending the well pipe to the required height above grade and filling in the pit.

Decommissioning
(Plugging and sealing)

A well that is no longer used or maintained can become a direct pipeline to the aquifer for surface water or run-off. Unused and unmaintained wells threaten the groundwater that supplies your well, and possibly your neighbours' wells.

Properly closing off the pathway from the ground surface to the aquifer is the process of plugging and sealing a well, also known as decommissioning, or sometimes abandonment.

Do not try to seal your own well – it is not as easy as it seems. If you simply fill up your unused well with sand, gravel, stones, debris, or garbage, you won't prevent the flow of surface water or run-off into the well. The material in the unused well may even contribute to contamination.

A well owner must immediately decommission (plug and seal) a well if it is not being used or maintained for future use as a well, or if the following issues are not successfully resolved*:

- well water is mineralized, e.g., salty or sulphate-rich
- well water is not drinkable (potable)
- well allows natural gas, contaminants or other materials to move into any surface or ground water and potentially impair water quality

A new well needs to be decommissioned if it is dry or unfinished, or if it is not built according to the *Wells Regulation* and steps taken by the owner to rectify the situation fail.

Exceptions may apply. See Ontario's *Well Regulation* and the Ministry of the Environment (MOE) technical bulletins on well abandonment.

*seek immediate advice from your local health department in these situations.

Abandonment of a well is the same as _decommissioning_ a well. Both terms mean the plugging and sealing of unused or unwanted wells properly.

An unused and unmaintained well that hasn't been properly abandoned (plugged and sealed) poses health and safety hazards for animals and humans, especially children.

Protecting your well water

As a responsible well owner, you need to carry out a regular program of well maintenance. Taking care of your well is a three-step process:

1. protect your well water at the ground surface by avoiding, eliminating, or reducing contaminants

2. inspect your well regularly and keep your well in good running order

3. test your well water regularly and respond to contamination problems

The following sections of this booklet will show you how to examine your well and property to reduce risks to your groundwater.

Protecting source water is the first step in protecting your well water. Source protection is often the most cost-effective way to keep contaminants out of drinking water. Further, it is almost always less expensive to keep water clean than to try to deal with the consequences of contamination.

Well water protection *starts at home*

Start by looking around your own property to identify what could affect your well.

As part of your routine well maintenance schedule, walk the grounds within a 30-metre (100-foot) radius of your well. Look for potential threats. A complete search for potential contaminants is recommended at the same time as you inspect your well (see pages 18-19). You should also look for changes that could affect your well as part of your daily and weekly routines.

Keep these contaminants away from your well:

- pet and livestock wastes
- gasoline, diesel, home-heating fuels
- pesticides and fertilizers (chemical or natural)
- other hazardous chemicals, including paint, solvents, barbecue starter fluid, etc.
- de-icers (used to melt ice on roads, driveways, sidewalks)
- and any other substance you don't want in your family's drinking water.

Chemicals *and fuels*

Any chemical or fuel spills that infiltrate the ground can contaminate your drinking water source. Check that gasoline, pesticides, and other chemicals are stored in proper containers designed to help prevent spills or leakage. Don't store these materials anywhere near your well(s).

Refuel lawnmowers and other machinery a safe distance from the well. (One litre of gasoline can contaminate up to 1 million litres of groundwater.) Refuel over hard surfaces to help prevent infiltration of spills.

Change the oil in your vehicle on a sealed surface such as pavement or concrete, away from the well.

Clean up spills with an absorbent material (clean sand or kitty litter) and remove to a Household Hazardous Waste depository. Keep a bucket nearby for quick access when spills occur.

Never hose down spills.

Fuel and chemical leaks and spills can pollute groundwater

Septic *systems*

Malfunctioning septic systems are a leading cause of private well contamination. Ensure that your system conforms to the Ontario Building Code. Keep chemicals other than human waste out of the system. Pump out your septic tank every two to three years, or ask your pumper to specify the appropriate pump-out frequency. Keep your system in good running order.

See references in the back of this booklet that can help you learn more about operation and maintenance of your septic system.

Gardens

Eliminate gardens adjacent to your well. Plant a permanent low-growing ground cover such as grass. Don't use fertilizers, manure or pesticides.

Underground *storage tanks*

Underground storage tanks are used to store home heating fuel and large fuel supplies for equipment. These tanks, pipes and fittings may leak, especially if they are over 15 years old or lack corrosion protection. Underground storage tanks are a special concern if the water table is shallow or if the tank is close to your well (or surface water). If possible, replace underground tanks with above-ground storage that has proper spill/leak containment.

Look for evidence of tanks that pre-date your ownership, including pipes sticking out of the ground. A tank may still contain harmful liquids that will leak as the tank corrodes.

Above-ground *storage tanks*

If storage tanks are required, keep them as far as possible from your well. They should be at least 15-30 metres (50-100 ft) away, depending on well type. Check with your fuel supply company to ensure that your fuel storage tank is providing adequate protection against spill containment and security measures.

Animal *wastes*

Livestock and pet wastes are a serious potential threat to well water. Ensure that your livestock and pets are kept away from your well and that you clean up after them appropriately. Consider using municipal weekly garbage pickup for cat litter and for dog wastes.
An in-ground pet waste system from a reputable manufacturer is another option.

Get involved in protecting sources of drinking water for your community. Contact your municipality for information.

Source protection – *the bigger picture*

Contaminant sources affecting your well are most often found in your own backyard. Address these first. However, you should also support actions to protect all sources of drinking water for your community.

Land-use plans typically identify vulnerable ground and surface waters. Some First Nations communities have land-use plans, community plans, or more specific source water protections plans. Check with your First Nation to see if there is a plan for your community. Also, if you are interested in finding out what is happening with source protection off-reserve, check with your neighbouring municipality, conservation area (if one exists locally) or the Ministry of Natural Resources.

Inspecting your well

Ontario's *Wells Regulation* requires that you maintain your well to keep out surface run-off and foreign materials.

It is recommended that you conduct an inspection of your well at least once a year, as outlined below, at the same time as you check for potential contaminants (see page 14).

If you have problems with your well water, or concerns about your well, have your well inspected by an MOE-licensed well contractor.

✓ Access

As part of your maintenance routine, keep your well head clear of brush, debris, and other obstructions.

✓ Well cap

Check the well cap for signs of cracking or damage, and have it fixed or replaced immediately if there is a problem. The well cap should be firmly attached to the casing. The vent should face the ground and be properly screened to keep out insects. Only air should enter. Clean the air vent regularly to remove debris and moisture.

✓ Annular seal

Look for problems with the sealant used to fill the annular space between the drilled hole and the well casing. A depression in the ground around the edge of the casing can indicate that the sealant has shrunk, collapsed, or cracked. If you can move the casing around by pushing it, that's a bad sign. Cracking and gaps allow run-off and surface water to move down the outside of the well casing and contaminate your drinking water. A faulty annular seal should be repaired.

✓ Well casing – condition

Look for any external signs of damage, cracking, or dislocation on your well casing, e.g., due to vehicle damage. If your well has been damaged, removing the cap is not recommended. Visibility is limited and you could cause contamination or further damage, especially if you have a submersible pump. Some MOE-licensed well contractors have a down-hole camera that can be used to inspect your casing.

If you have a structurally sound well - drilled, dug or bored - you can remove the lid with care. Be mindful of electrical wiring and debris falling into the well. Inspect the inside the casing using a strong flashlight. Look for holes, evidence of animal infestations, or stains from casing joints that may indicate water leaking into the well.

✓ Backflow prevention

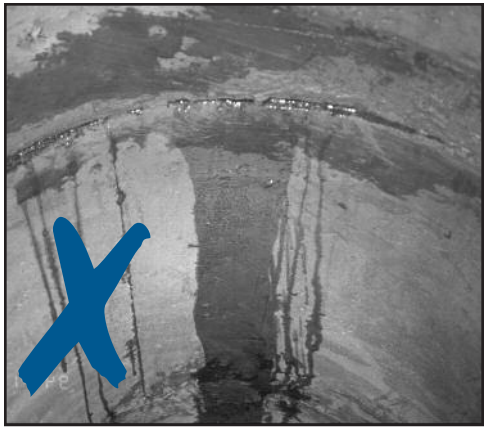
Under certain circumstances, contaminated water can flow backwards through your plumbing into your well. Backflow prevention devices are available from your MOE-licensed well contractor.

✓ Well pit

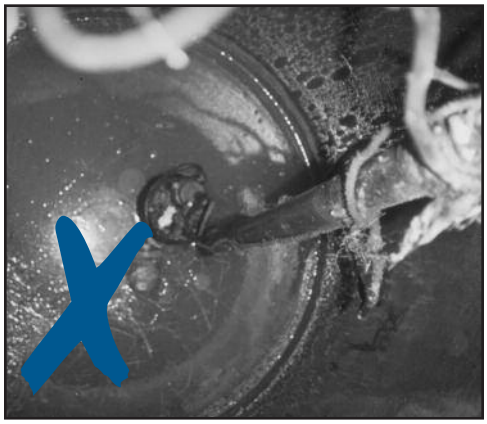
Remove the lid of your well pit and look for water, debris, vermin, etc. at the bottom of the pit. (Remove the cement outer cover, not the well cap inside the pit.)

Do not enter the pit or breathe the gases which may fill the pit. Take extra care to ensure children do not gain access to the well pit.

The pit should be clean and dry. If water or other material has entered the pit, your well water is at high risk of contamination. Consider upgrading or constructing a new well.



Leaky cement casing.



Surface water in well pit.

CODE CHANGES Talk to your plumber or water treatment professional about how you can meet the new standards forthcoming in the Ontario Plumbing Code.

Possible contaminants

What could be *wrong with my water?*

Even though your water may seem to be fine, there are many contaminants that you can't taste, see, or smell. See the following pages for information about water quality testing and solutions, and the Resources section for testing contacts.

See the *Safe Drinking Water Act, 2002* for a definition of "potable" water that meets the standard for human consumption, www.ene.gov.on.ca. If problems affecting potability are not remedied, decommissioning may be required (see page 13).

Drinking contaminated well water can make you and your family members seriously ill.

Bacterial contamination may cause stomach cramps, diarrhea, or vomiting.

Chemical contamination can also make you ill. The effects will vary depending on the particular chemical(s).

WHAT YOUR TEST RESULTS MEAN

TOTAL COLIFORMS

0: safe

1 - 5: unsafe, exercise caution and retest

6 - >80: unsafe, contact public health unit

E.COLI

0: safe

1 and above: unsafe, contact public health unit

Total coliforms Coliforms are bacteria associated with environmental sources such as vegetation, tree roots, insect infestation and soil, or possibly fecal material. Even a low count of total coliforms (1 - 5) may indicate the presence of other more harmful bacteria with similar lifecycles. Caution and retesting is recommended. A higher total coliform count (6 - >80) is a strong indicator that disease-causing micro-organisms may be present. Assume that your water is unsafe for drinking without treatment. Contact your public health unit.

E.coli Escherichia coli is a bacteria associated with human and animal fecal matter. Any detectable presence of E.coli in your well water means your water has been impacted by a fecal source and it is unsafe for drinking without treatment. Contact your public health unit.

Overgrown Sometimes water samples are heavily contaminated with bacteria often found in the environment, which interferes with the detection of coliforms or E. coli that may be present. The water may be unsafe to drink unless boiled or treated. Contact your public health unit.

Nitrate Nitrate is not bacteria; it is the end result of a chemical reaction. The presence of nitrate in your water can be the result of commercial fertilizers, human or animal wastes. Infants less than six months old can become sick from drinking water high in nitrate by itself or in formula or cereal. Nitrate reduces the amount of oxygen in the blood, resulting in blue baby syndrome.

Sodium Common domestic water softeners increase the level of sodium in drinking water. Individuals on salt-reduced diets should consult their physician if sodium levels in drinking water exceed 20 mg/litre (MOE standard). Salts used on roads, driveways and other paved areas may also contaminate groundwater.

Metals and minerals* Metals and minerals in your water can come from natural sources, or from landfills, road salts, septic systems, agriculture, golf courses, mining, and construction. Lead and copper can leach out of your plumbing. Chloride, which comes from many of these sources, can be an early indicator of further contamination.

Methane and hydrogen sulphide gases* These occur naturally in many aquifers in Ontario. If you experience either of these get advice from a local MOE-licensed contractor or public health unit.

Gasoline, oil and diesel fuels Test for these if you've had a spill, have a buried fuel tank near your well, or detect fuel odours or films.

Solvents Test for these if you are concerned about chemical spills, nearby solvent use, or a strong chemical odour. Solvents have been linked to cancer.

Pesticides Test for these if you are concerned about past or present use of pesticides near your well, if you've had a spill or leak, or if you are concerned about possible backflow through your plumbing into your well during mixing of pesticides.

* Please refer to decommissioning section on page 13.

Water *testing*

See the Resources section of this booklet for information about testing, including public health units and accredited laboratories.

Test for *bacterial contamination*

It is recommended that you test your well water regularly for total coliforms and E.coli (see page 20). For advice and free water testing contact your local band office, community health representative (CHR) or Health Canada Environmental Health Officer (EHO). You can also contact your local health unit or public health laboratories accredited by the Ontario Agency for Health Protection and Promotion. Keep a careful record of well testing results (see page 30).

Testing at least three times a year for bacteria is recommended by the Ontario Government.

Early spring is a good time to test your well water for bacteria. Another good time is the day after a heavy rainfall. Melting snow and running water can carry surface contaminants into your well water. If your well water is safe under these conditions, it is most likely to be safe the rest of the year.

Test regularly even if your water seems fine, because you can't always taste, smell or see bacteria or other contaminants. Don't rely on your neighbour's test results – wells that are only a few steps apart usually have different water quality.

Besides routine testing, you should also test:

- after major plumbing work or well repairs
- if you detect changes in water quality, including taste, odour, and appearance
- if regular well users experience unexplained health problems that may be water-related (e.g., stomach cramps, diarrhea or vomiting)
- after flooding. (If flooding is common in your area you may want to upgrade your well. Contact an MOE-licensed well contractor.)

Initial *testing for bacteria*

A single test for total coliforms and E.coli is not always enough to determine the quality of your well water. If your well has not been tested regularly, submit three samples at least one to three weeks apart. Do not send several samples at the same time. If the well consistently shows acceptable total coliform and E.coli counts, sample at least three times each year.

How to *sample* for bacteria

The following rules apply to routine sampling for coliforms and E.coli.
For other tests, follow the sampling rules provided by the testing laboratory.

- Use the water sample bottle provided by your testing facility to collect your sample. A preservative, sodium thiosulphate, in solid or liquid form, is in the bottle. It is intended to be there. This material may cause a reaction if ingested or inhaled; therefore bottles should not be handled by young children.
- Select a non-swivel tap – remove aerators and other attachments from your tap. Disinfect the end of the faucet with one part household bleach to ten parts water. Disinfecting the tap with a flame is not recommended because this can damage the faucet.
- Run cold tap water for two or three minutes.
- Examine the lid. If the tamper-evident ring has separated from the cap use another collection kit. Remove the sample bottle lid.
- Do not touch the inside of the bottle lid, or inside of the bottle – never set the lid down.
- Do not rinse out the bottle.
- Fill the sample bottle to the indicator line directly from the tap without changing the flow of the water. Overflowing the bottle risks losing the preservative that comes in the bottle.
- Replace the cap tightly and complete the form that came with the bottle.
- Refrigerate the sample after collection (do not freeze) and, if possible, transport it in a cooler.
- Return the sample and form to the designated drop off location or laboratory within 24 hours of collection.

Bacterial *contamination*

If you receive a serious adverse test result – or have any reason to believe your water is dangerously contaminated – take immediate action by contacting your public health unit. The measures specified by the public health unit, such as water treatment devices, must be functional and maintained at all times.

Use bottled water or eliminate harmful bacterial contaminants by sterilizing your water.

Use one, not both, of the following methods to eliminate bacterial contaminants:

Bring water to a rolling boil and then boil it for at least one full minute. (A rolling boil is a vigorous boil that cannot be stopped by stirring the water.) Note that although boiling is an effective method of eliminating bacterial contamination it may actually concentrate other types of chemical contamination such as nitrate, or other metals and minerals.

– or –

Mix 1.25 mL (1/4 teaspoon) of liquid household chlorine bleach to 4.5 L (1 gallon) of water. Let stand for 30 minutes. There should be a faint chlorine smell to the water. Use fresh unscented chlorine containing 5.25 per cent sodium hypochlorite.

Refrigerate boiled or treated water in clean food-grade containers.

Bottled or sterilized water is safe for drinking. It is also recommended for food washing and preparation (unless the water will be boiled as noted above), brushing teeth, bathing children, and washing dishes. Ontario's health ministry recommends alternative approaches for washing dishes and bathing children.

Untreated well water can be used with caution for baths, showers, and laundry – if you disinfect your hands afterwards.

Well *disinfection*

A well contaminated by bacteria can be disinfected by "shocking" it with NSF-60 certified chlorine bleach or hydrogen peroxide. A newly constructed well will be disinfected by the MOE-licensed contractor at time of construction.

Shock chlorination involves adding the correct amount of chlorine to the water in the well and leaving it in place with the correct residual levels to ensure that it is active for 12 hours. Hiring an MOE-licenced contractor to do this is strongly recommended.

Shocking is a temporary method of disinfection used to eliminate a one-time case of bacterial contamination. Shocking should **not** be used repeatedly. It is not a substitute for eliminating an ongoing source of contamination or a defect in your well.

Shocking your well is a complicated exercise that requires care and skill. You may want to engage professional assistance. Your band office, community health representative, environmental health officer, or local public health unit is a source for more detailed instructions.

Eliminate *the cause*

If you have contaminated water, begin by considering the possible sources of contamination. Reducing or eliminating contaminants at the source is the best place to start.

Next, take a closer look at your well. If your well water repeatedly exceeds drinking water standards for bacteria, there is likely an ongoing source of bacteria affecting your well. Are there defects in the location, construction, or maintenance of your well that could account for the contamination? See the previous sections of this booklet. Address any problems you identify.

If you can't detect the cause of the problem, bring in an MOE-licensed well contractor right away.

Correcting the source of the problem could be a lot cheaper than buying a home water treatment device. Treatment may be beneficial – and even necessary in some circumstances. But treatment should be the final option, after taking steps to reduce contaminants and improve your well.

Treatment *systems*

For bacteria

If your water is contaminated, it is better to remove the source of the contamination. However, if the problem cannot be solved at the source, a number of water disinfection systems are available. Each system requires routine maintenance. Refer to the owner's manual. Regular testing of your water must continue.

Chlorinators continuously add chlorine to your water distribution system, allowing sufficient contact time for the chlorine to kill the bacteria. These units must be checked often to ensure that the right amount of chlorine is being added.

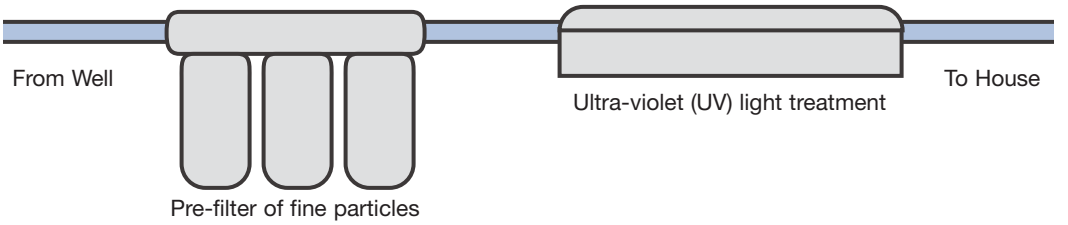
Ultra-violet (UV) light can inactivate harmful microorganisms such as bacteria, viruses, moulds or parasites. These inactivated microorganisms are not removed from the water. A Class A system is required (NSF 55) for visually clear water. Pre-filtration of water is generally required for this treatment to work properly. The light needs to be replaced regularly. Drinking water needs to be refrigerated after treatment.

Distillers boil water, then condense the vapour and collect it in another compartment. Bacteria and minerals are removed, and some chemicals. Hard water should be pre-treated to prolong the life of your distiller. Standard is NSF 62.

Ozonators inject small amounts of ozone gas into water to kill most bacteria. Treated drinking water should be refrigerated.

CODE CHANGES Talk to your plumber or water treatment professional about how you can meet the new standards forthcoming in the *Ontario Plumbing Code.*

Household Water Treatment System



For other contaminants

WARNING: the following treatment systems do not kill bacteria.

Reverse osmosis removes dissolved solids, salts, minerals that cause hardness, organic chemicals and other impurities – but not bacteria – by passing water through a membrane. Reverse osmosis can also improve the taste of water. However, the process wastes large amounts of water, which could be a concern if water supplies are limited or the septic tank is over-burdened. Reverse osmosis is commonly used only for drinking water. Regular maintenance is required. Pre-treatment may be necessary.

Activated carbon filters can be used with well water to improve taste and remove some contaminants, but there is a concern that bacteria can quickly become trapped and multiply. This concern applies to pitcher style, tap-mounted, and under-sink filters. Therefore, Health Canada recommends that activated carbon filters be used for well water only in conjunction with chlorination. And it is essential to flush the filter for at least 30 seconds before each use, change filters/units frequently, and carefully follow manufacturer's instructions. Water not consumed immediately after filtering should be refrigerated.

WARNING: bacteria can be trapped and multiply in a carbon filter. Regular maintenance is required.

Water softeners are the most common form of treatment. Hard water contains large amounts of calcium and magnesium that leave scum and residue in appliances and water pipes. Hardness can be removed with a water softening unit that replaces the calcium and magnesium with sodium and potassium. Your water can have different levels of hardness, which will determine the model and size of unit you need. Softened water easily lathers and can prolong the efficiency of your appliances and water pipes. Ensure that your water softener unit regenerates when required, which is determined by usage. Standard is NSF 44.

Hiring a *contractor*

Always hire an MOE-licensed contractor

Be sure the technician working on your well has the appropriate licence as required in Ontario's *Wells Regulation.* Different licences are required for different work.

Ask to see the licence. Confirm that the licence is up to date with the Ontario Ministry of the Environment.

Get more than one licensed contractor to provide you with advice, a detailed written description of the proposed work (e.g., expected well depth, unit rates, extra services), and an estimate of the total cost.

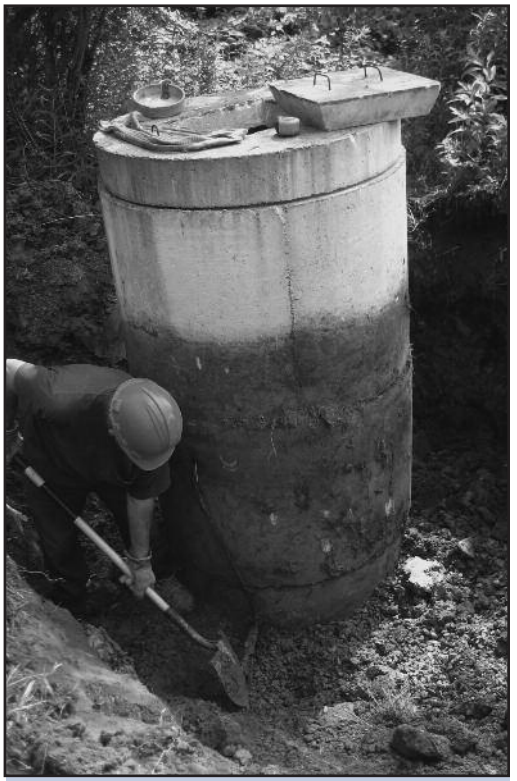
Get references and review past work before making a final decision. Ask licensed contractors about the expectations of water quality and quantity in your area and confirm this with your neighbours.

Get a signed agreement in writing if there are any changes in the work and cost.

Pay promptly when the work is completed as described in the agreement.

Contact the Ontario Ground Water Association and/or your Ontario Ministry of the Environment district office if you have any questions or concerns about the qualifications or work procedures of contractors. Be sure the technician working on your well has the appropriate licence as required in Ontario's *Wells Regulation.* Different licences are required for different work.

Keep all documents relating to your well, pump, pumping test, and maintenance.



The word "construction" means bore, dig, drill or otherwise make, extend or alter. Construction also includes installing equipment in or connected to a well.

Your *water well* records

Within two weeks of finishing your new well – or in some cases making alterations to an existing well – the person constructing the well must provide you with a copy of your water well record. Each well must have its own well record. Contents include construction details, water yield test results, static water level, and a geological log that describes the soil and/or bedrock conditions and geographic location.

If you don't have the record for your existing well, order a copy from the Ontario Ministry of the Environment, 1-888-396-9355. Well records are entered under the name of the original well owner or by the well tag number attached to the well.

Keep your well records in a safe place, in a file with all papers relating to the well. Make copies to give to contractors. Keep them with test results, invoices and descriptions of work completed, filter and treatment system manuals, service records, and reference materials like this booklet.

Records should be provided to new owners upon sale of the property.

Ontario Ministry of the Environment

Well Record

Well Tag No. (Place Sticker and/or Print Below)

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☐ Imperial

Well Owner's Information

First Name | Last Name / Organization | E-mail Address | ☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name) | Municipality | Province | Postal Code | Telephone No. (inc. area code)

Well Location

Address of Well Location (Street Number/Name) | Township | Lot | Concession

County/District/Municipality | City/Town/Village | Province: Ontario | Postal Code

UTM Coordinates | Zone | Easting | Northing | Municipal Plan and Sublot Number | Other

NAD ☐ 83 ☐

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour | Most Common Material | Other Materials | General Description | Depth (mbgl) From | To

Annular Space | Depth Set at (mbgl) From | To | Type of Sealant Used (Material and Type) | Volume Placed (m³/ft³)

Method of Construction ☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use ☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason

Pump intake set at (mbgl)

Pumping rate (l/min / GPM)

Duration of pumping: ____ hr + ____ min

Final water level end of pumping (mbgl)

If flowing give rate (l/min / GPM)

Recommended pump depth (mbgl)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Time	Water Level (mbgl)	Time	Water Level (mbgl)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Construction Record - Casing | Inside Diameter (cm/in) | Open hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Grade | Wall Thickness (mm/in) | Depth (mbgl) From | To

Status of Well ☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, (specify)

Construction Record - Screen | Outside Diameter (cm/in) | Material (Plastic, Galvanized, Steel) | Grid No. | Depth (mbgl) From | To

☐ Other, specify

Map of Well Location Please provide a map below following instructions on the back.

Water Details | Water Found at Depth (mbgl) | Kind of Water ☐ Fresh ☐ Untested ☐ Salty ☐ Other, specify

Hole Diameter | Depth (mbgl) From | To | Diameter (cm/in)

Well Contractor and Well Technician Information

Business Name of Well Contractor | Well Contractor's Licence No.

Business Address (Street Number/Name) | Municipality

Province | Postal Code | Business E-mail Address

Bus. Telephone No. (inc. area code) | Name of Well Technician (Last Name, First Name)

Well Technician's Licence No. | Signature of Technician and/or Contractor (use surname)

Comments:

Well owner's information package delivered ☐ Yes ☐ No

Date Package Delivered | Date Work Completed

Ministry Use Only | Audit No.

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Linking TK and scientific knowledge

One of the most important teachings Elders have recently provided about water is the need to link traditional knowledge and technical scientific knowledge to find ways to care for water. In Anishinaabemowin the concept "wiidokaaziiwin" means to support each other and using both TK and scientific/technical knowledge in unison will help us protect water. The well water booklet assists First Nations in fulfilling their responsibility to protect water by explaining how to care for their drinking water wells. Technical advice is provided on how to maintain and operate wells to ensure they are safe. It also describes how to protect source water to prevent contamination. Elders have often pointed out that water is our greatest medicine, but if water is not respected it can harm us as well. This booklet reminds us that water is interconnected to everything else and we cannot affect water without affecting ourselves. Traditional knowledge tells us that respecting water is paramount because of its importance in sustaining life.

Opening and closing by Dr. Deborah McGregor from Whitefish River First Nation.

Water quality testing diary

Date Tested:	Parameters:	Result:
2011-10-17 Sample	minerals / metals / bacteria	normal

Well maintenance diary

Date Completed:	Action:
2011-11-07 Sample	extended casing above ground, landscaped around

Resources

GENERAL RESOURCES

Well Aware. For further information and to contact your local Well Aware delivery agent.
Phone: (705) 745-7479, www.wellaware.ca

Ontario First Nations Technical Services Corporation. The OFNTSC is a technical advisory service corporation for all 134 First Nations in Ontario. See: www.ofntsc.org or call 416-651-1443 or 807-623-9595

Ontario Ground Water Association. Membership includes licensed well drillers and pump installers, manufacturers and suppliers, and groundwater scientists and engineers. Phone: (519) 245-7194 Fax: (519) 245-7196, www.ogwa.ca

Ontario Ministry of the Environment (MOE) Well-related publications available to rural homeowner. Phone: (800) 565-4923, www.ene.gov.on.ca/environment or any ServiceOntario location.

Canadian Water Quality Association provides information about water quality improvements for homes, businesses, industry and institutions. Phone: (866) 383-7617, www.cwqa.com (see *Ask an Expert*)

Canadian Mortgage and Housing Corporation has many detailed publications about rural water and wastewater. Phone: (613)748-2000, www.cmhc-schl.gc.ca

Conservation Ontario is the network of local watershed management agencies in partnership with government, landowners and other organizations. Phone: (905) 895-0716, www.conservationontario.ca

Complete Walkerton Inquiry report. www.attorneygeneral.jus.gov.on.ca

WATER TESTING

Public health units test for bacteria. For the health unit nearest you, look under "Health" in the blue pages of your telephone directory.
Phone: (866) 532-3161, www.health.gov.on.ca

Licensed private labs can provide packages that include pesticides, minerals, metals, solvents, and fuels for a fee. Phone: (800) 565-4923 www.ene.gov.on.ca/environment, search: laboratories licensed to perform drinking water testing in Ontario

WELL RECORDS

Ontario Ministry of the Environment has the records available for free. Tag number, lot and concession number, and last name of the original well owner are extremely helpful to track your record. Phone: (888) 396-9355, www.ene.gov.on.ca/environment or visit any ServiceOntario location.

WATER TREATMENT DEVICES

Health Canada provides information regarding treatment devices. Phone: (866) 225-0709, www.hc-sc.gc.ca, search: removal of taste, odours, and chemicals, and disinfection of water

Canadian Water Quality Association provides information about water quality improvement for homes, businesses, industry and institutions. Phone: (866) 383-7617, www.cwqa.com

SEPTIC SYSTEMS

Ontario Onsite Wastewater Association represents septic contractors for installers, engineers, contractors, regulators, septic pumpers, manufacturers, designers, and researchers. www.oowa.org

Ontario Association of Sewage Industry Services represents Septage Pumpers and Haulers, Sewage System Installers, Portable Toilet Renters Manufacturers and Professionals.
Phone: 1-877-202-0082, www.oasisontario.on.ca

A Guide to Operating and Maintaining Your Septic System. Available from Ministry of Municipal Affairs and Housing. Phone: 1-416-585-6666

Canadian Mortgage and Housing Corporation fact sheet *Your Septic System.* Phone: (613)748-2000, www.cmhc-schl.gc.ca

ENVIRONMENTAL FARM PLAN

Ontario Soil and Crop Improvement Association has information on the Environmental Farm Plan in your area. Phone: 1-800-265-9751, www.ontariosoilcrop.org

TRADITIONAL KNOWLEDGE AND WATER

Chiefs of Ontario. 2008. Water Declaration of the Anishinaabek, Mushkegowuk and Onkwehonwe in Ontario. www.coo.org

LaValley. G. 2006. Aboriginal Traditional Knowledge and Source Water Protection: First Nations Views On Taking Care of Water. www.coo.org

Be Well Aware

Checklist

- new wells are properly constructed and located a safe distance from contaminants
- existing wells are properly inspected, maintained, and upgraded as necessary
- potential contaminants are kept a safe distance from your well
- well water is regularly tested for bacteria, and is screened initially and periodically for other contaminants
- unused wells are properly plugged and sealed

Take care of your well and your groundwater – for the sake of your family, your neighbours, and future generations.

Green Communities CANADA

PUBLISHED BY: Green Communities Canada in partnerships with Ontario Ground Water Association.
SUPPORTED BY: OFNTSC, OFA, CWQA, CO, ASPHIO

Ontario Ground Water Association

Ontario First Nations Technical Services Corp.

OFA Ontario Federation of Agriculture

CWQA Canadian Water Quality Association

Conservation Ontario Natural Champions

ASPHIO Association of Supervisors of Public Health Inspectors of Ontario