



Presentation for the Well and Septic Information Session Lennox and Addington Stewardship Council Well Construction, Maintenance & Abandonment

Ministry of the Environment and Climate Change
January 15, 2018
Napanee, Ontario

Wells



Outline

- General Facts on Wells
- Legislative Overview
- Ontario's Wells Program
- Ministry of the Environment and Climate Change Resources (Ministry) on Wells
- Siting Wells and Contaminants
- New Well Construction – Casing and Sealing
- Well Caps, Covers, Vents and Connections
- Well Records and Well Tags
- Well Maintenance
- Well Abandonment
- Questions

General Facts on Wells

- It is estimated that 2.5 million people in Ontario rely on groundwater as their primary source of drinking water.
 - About 1.3 million people rely on private wells.
 - About 1.2 million people rely on municipal groundwater systems.
- About 790,000 well records (for various well construction, alteration and abandonment activities) have been forwarded to the Ministry of the Environment and Climate Change (ministry) in Ontario.
- An additional 15,000 to 24,000 well records for various well construction and abandonment activities are forwarded to the ministry each year.
- The ministry issues about 600 well contractor licences to businesses and about 1,000 well technician licences to persons who work at various well construction activities – drilling, digging, boring, driving/jetting wells and installing equipment (e.g., pumps) in or connected to wells. Licensing helps to ensure there are persons who have minimum knowledge, familiarity and experience working at wells to help protect a person's drinking water and the groundwater resource.

Wells – Provincial Legislative Overview

Key Legislation:

- Ontario Water Resources Act, R.S.O. 1990, c. O. 40 (OWRA)
- R.R.O. 1990, Regulation 903 (Wells) as amended made under the Ontario Water Resources Act, R.S.O. 1990, c. O. 40 (Wells Regulation)
- Provincial law typically does not apply to a Federal Lands (e.g., indigenous territories).

Purpose: To provide for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social and economic well-being.



Wells – Provincial Legislative Overview

Ontario Water Resources Act (OWRA) and Wells Regulation

- Regulatory framework that provides a multiple barrier approach to reduce the risk of a well acting as a pathway for contaminants to impair groundwater.
- Minimum requirements for well construction, maintenance and abandonment, documentation, reporting, and licensing.
- “**Well**” is defined in the OWRA as a hole made in the ground to:
 - locate or obtain groundwater,
 - test or obtain information about groundwater or an aquifer, or
 - a spring where equipment is installed and the water is likely to be used for human consumption.
- Therefore, it applies to domestic, municipal, agricultural, commercial, industrial and dewatering wells, and test holes.

Ontario's Wells Program

- Includes well licensing, construction, maintenance, abandonment, documentation and reporting requirements to help prevent contaminants from entering groundwater and other drinking water sources.
- Emphasis on protecting the water in the well and groundwater instead of automatically treating contaminated water as a result of poor well construction or maintenance.



Ministry Resources for Wells

- **Wells on Your Property:**

<https://www.ontario.ca/page/wells-your-property>

- Overview and plain language on the:
 - Law (e.g., Well Regulation)
 - Well construction, maintenance, abandonment, reporting and documentation
- Technical bulletins and manuals on well construction, maintenance, abandonment and reporting for the well industry and interested owners
- Obtaining well records from the Ministry
- A link to a well record search function on Ontario.ca to allow well owners and others to search for a well record
- A link to the Directory of Licensed Well Contractors in Ontario and other information on well licensing
- Links to information on bacterial water sampling and testing
- **Wells Help Desk**
 - 1-888-396-WELL (9355) or wellshelpdesk@ontario.ca.

Well Siting from Contaminants

- Persons who construct new water supply wells on provincial lands shall meet minimum separation distances from sources of contaminants to help protect the groundwater resource and the water in the well.
- In the photograph on the right, the driller has placed the new well within 15 metres of an existing sewage system. Sewage system components might move to the nearby well and impair the quality of the drinking water in the well and the groundwater resource used by others.



Well Siting from Contaminants

- In this case, the driller has placed the new well within a feed lot. Cattle manure components may move into the well and impair the quality of the drinking water in the well and the groundwater resource used by others.



Siting Contaminants Away from Existing Well

- In this case, the a person has placed a fuel oil tank on top of a drilled well. If the tank leaks, petroleum hydrocarbon components could migrate into the well and impair the quality of the drinking water in the well and the groundwater resource used by others.
- Consider moving sources of contaminants such as fuel oil or pesticide storage containers, manure piles, animals away from existing well supplies.



Siting Buildings Over Existing Wells

- In this case, the person built a structure over their well. The top of the well extended into the basement. A major fire took place that destroyed the structure. The fire department poured water and chemicals onto the fire. Acting like a drain, the water including contaminants moved down the well to the groundwater resource. The contaminants moved with the groundwater and contaminated other off-site wells.



New Well Construction

- To help protect the well from contaminants and allow pumping equipment be installed in the well, a well's structure is made up of five key parts:
 - A casing - a tube of steel, concrete, plastic or other material designed to prevent overburden (soil) and sometimes rock from collapsing into the hole and prevents contaminants from entering the well.
 - Possibly a well screen - a slotted or perforated pipe that allows groundwater into the well but not the overburden (soil).
 - A sealing material (cement or a manufactured clay called bentonite) that bonds the casing to the subsurface material.
 - A well cap/cover that seals the top of the casing and well.
 - A watertight connection to allow the waterline to enter the well.

New Well Construction - Casing

- Drilled well casing – common types are steel (left) and plastic (right)



New Well Construction - Casing

- Dug well casing – commonly made up of concrete tiles [Note – shown with non-compliant well cover]



New Well Construction

- Dug well casing and well screen – plastic



New Well Construction - Casing

- If casing section joints are not properly sealed or casings have holes or openings, surface water (left) or other foreign materials such as tree roots (right) can enter the well and may impair the quality of the drinking water in the well and groundwater resource.



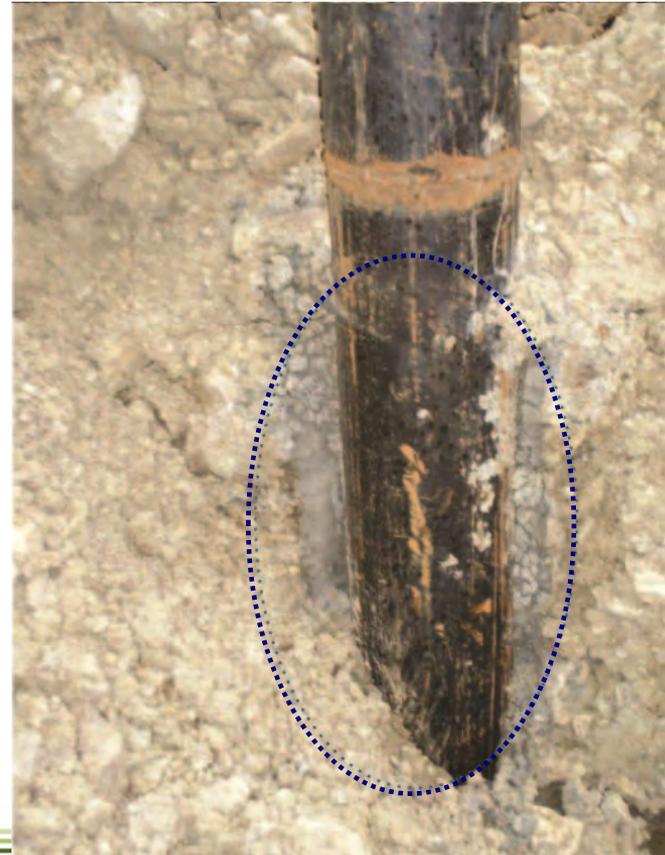
New Well Construction - Casing

- If the top of the casing is flush, close to the ground surface or buried, surface water or other foreign materials (such as insects or animals) can enter the well and may impair the quality of the drinking water in the well and groundwater resource.



New Well Construction - Sealing

- Sealing Materials (cement and bentonite) are used to bond casing to formation to help prevent contaminants from migrating down the outside of the well's casing (Example shown is for a drilled well).



New Well Construction - Sealing

- The lack of sealing materials around the casing allows contaminants a pathway to enter the well and impair the quality of the drinking water.



Well Cap

- A manufactured vermin-proof well cap on top of a well casing provides protection from animals, insects and surface water.
- The vermin-proof well cap should have a properly sealed electrical conduit and a shielded and screened air vent.
- In the example on the right, the white aluminum manufactured vermin-proof cap is properly affixed to the top of the casing to prevent insects and other foreign materials from entering the well.



Well Cap

- Improperly installed well cap.
- In the example on the right, a gasket is missing to seal the cap to the side of the casing. The small opening between the cap and casing can allow insects carrying pathogens to enter directly into the well and impair the quality of the drinking water in the well and groundwater resource.



Well Cap, Waterline Connection and Air Vent

- Improperly installed well cap and vent.
- In the example, waterlines from the well are coming through an upside down coffee can. The waterlines were not properly sealed to the can and explosive methane gas is coming into the structure.
- Also an air vent has not been installed on the top of the well to safely disperse the methane gas out of the well and building



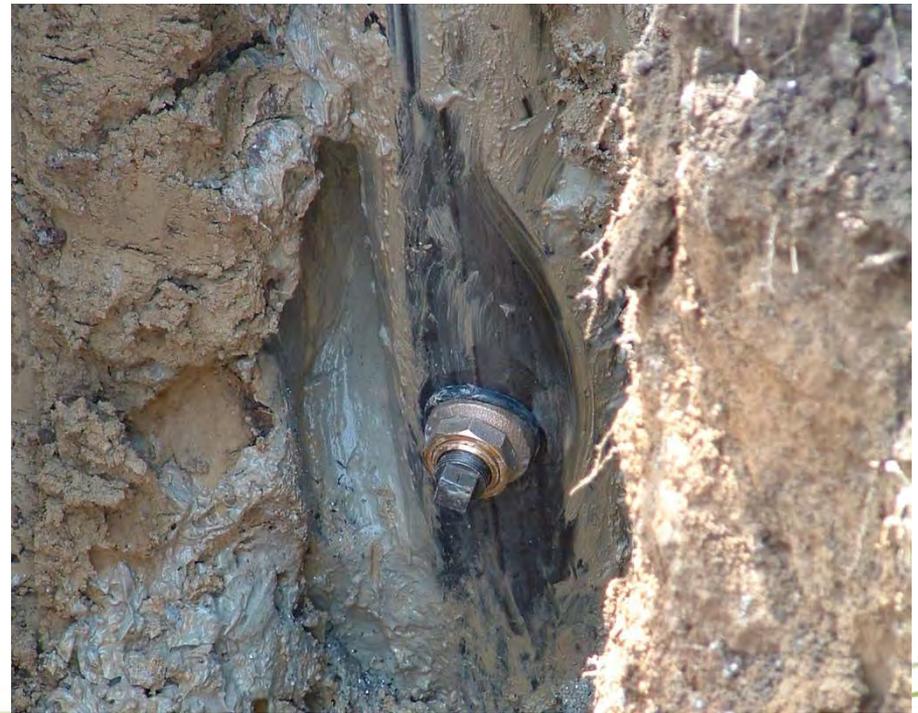
Well Cap, Waterline Connection and Air Vent

- Improperly installed well cap.
- In the example, electrical cables going between an upside down bowl and casing and into the well. The bowl is not sealed to the well casing. Insects and other foreign materials can enter the well through the unsealed bowl and impair the quality of the water in the well.
- The horizontal waterline connects to the vertical waterline in the well through a properly installed pitless adapter.



Waterline Connection – Pitless Adapter

- When properly installed, a pitless adapter connection offers a simple and, in most cases, a superior method of making an underground watertight connection to allow the horizontal waterline from the building to the well connect to vertical waterline in the well.



Well Covers

- Properly installed well cover with watertight sealed access lid for a large diameter dug well



Well Covers

- Improperly installed well cover with an unsealed access lid.
- Insects, surface water and other foreign materials can access the joint around the square access lid and enter the well.
- When the access lid is lifted, foreign materials and contaminants can enter the well.
- Also the access lid is not locked and can allow for unauthorized entry of the well.



Well Record and Tag

- Well records provide construction and general water quantity and quality information. The well tag is a unique identifier that links the well in the field with the well record. Well records and tags help to:
 - assist a person who is locating, repairing or abandoning a well,
 - provide information on the groundwater and geology of an area, including:
 - groundwater availability,
 - general idea of depth to water, and
 - possible flowing well or natural gas conditions,
 - provide information to manage the groundwater resources, and
 - assist in locating existing wells when purchasing a new property to ensure they are properly maintained or abandoned (plugged and sealed).

Well Maintenance

- Improperly maintaining a well can lead to contaminants entering the well and safety hazards.
- The example on the right shows a properly maintained drilled well with a watertight casing and sealed well cap.



Improper Well Maintenance

- The example on the right shows a rotted out casing and no well cap.
- The improperly maintained drilled well can allow foreign materials (e.g., dog waste and surface water) to enter the well and impair the quality of the drinking water and the groundwater resource used by others.



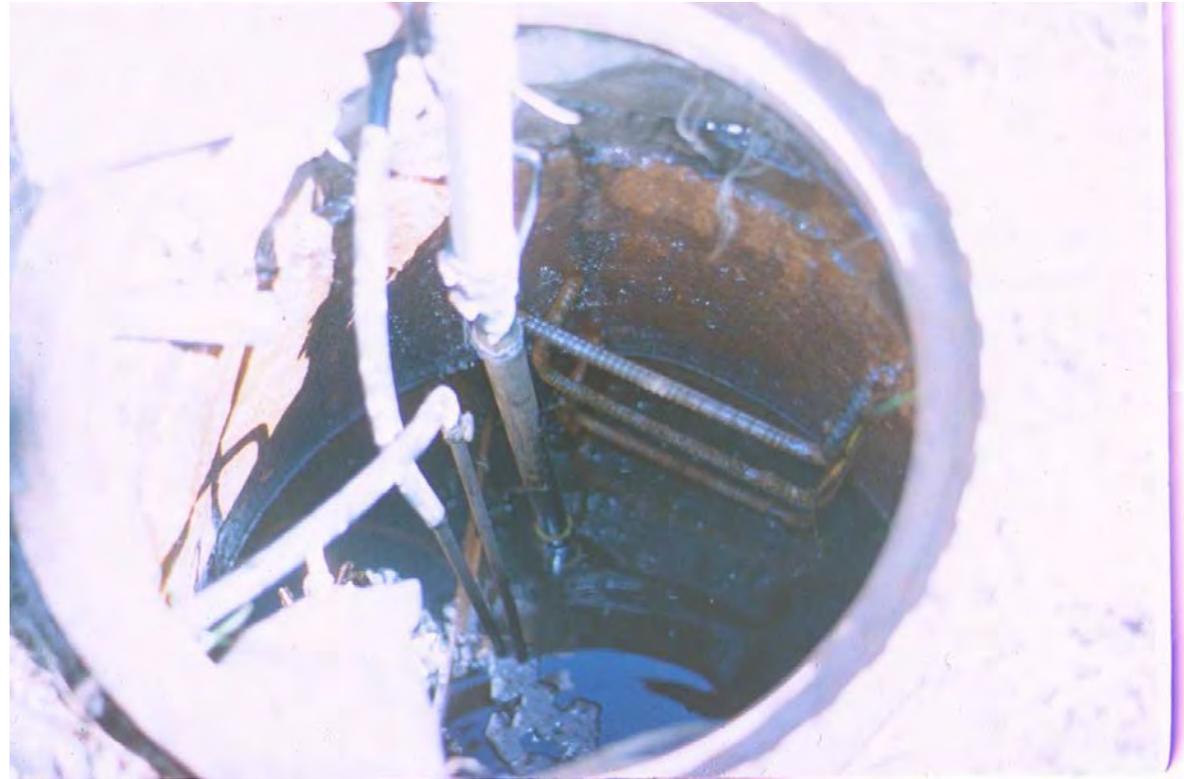
Improper Well Maintenance

- The example the top of a drilled well within a well pit
- The well cap is off the well.
- The improperly maintained drilled well can allow foreign materials (insects) to enter the well pit and subsequently the well and impair the quality of the drinking water and the groundwater resource used by others.



Improper Well Maintenance

- An example of the top of a drilled well within a well pit covered by sewage and water
- The improperly maintained drilled well is allowing sewage/surface water to enter the well through an open air vent and impair the quality of the drinking water and the groundwater resource used by others.



Improper Well Maintenance

- An example of openings in the well allowing snakes to enter the well.
- The snakes impair the quality of the drinking water and the groundwater resource used by others.
- The issue also causes unwanted harm to Ontario's valuable creatures.



Well Maintenance

- To help a well owner properly maintain a well, the ministry has developed and posted (see next slide):
 - a maintenance checklist including what to inspect when looking at the well and performing simple water testing,
 - information on water sampling for bacterial parameters (free testing through local public health units) and chemical parameters (e.g., salt, iron, blackish water, hydrogen sulphide),
 - a chart for common well problems (e.g., blackish water), potential causes (iron sulphide) and possible solutions (well rehabilitation and treatment), and
 - suggestions on who to contact to assess a well problem, repair or upgrade a well and, if necessary, install appropriate treatment.

Well Maintenance

- For information on maintenance, go to the “Wells on Your Property” article page at Ontario.ca and access the Maintenance Technical Bulletin (<https://www.ontario.ca/page/well-regulation-well-maintenance-technical-bulletin>) and Chapter 11 of the Water Supply Wells – Requirements and Best Management Practices Manual (<https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices/maintenance>).
- If you have a bacterial or other quality problem, do not automatically consider chlorinating the well or installing water treatment. Have the well properly assessed and make a determination what steps will help protect the water in the well.
- If your well needs to be repaired, have an experienced and licensed well technician (driller, pump installer), who holds or works for the holder of a well contractor licence, assess the well and perform the repair or upgrade.

Well Abandonment

- An improperly abandoned well is one that has not been plugged and sealed and that is any of the following:
 - No longer used or maintained for use as a well
 - In such disrepair that its continued use for obtaining groundwater is impractical
 - A well that has been left incomplete
- The following slides provide some of the issues posed by improperly abandoned wells.

Improper Well Abandonment

- An example of an improperly abandoned well.
- The wooden cover has openings that can allow surface water and other foreign materials to access the well and groundwater resource.
- The cover is also a safety hazard as a child almost fell through the wooden cover.



Improper Well Abandonment

- An example of an improperly abandoned well.
- The lack of a cover for this abandoned well created a safety hazard and allowed a moose to fall into the large diameter well.



Improper Well Abandonment

- An example of an improperly abandoned well.
- The open area beside the abandoned well can allow surface water and other foreign materials to move down the side of the well's casing and access the well and groundwater resource.
- The large opening beside the well is also a safety hazard.



Improper Well Abandonment

- An example of an improperly abandoned flowing well that is no longer being used as a well.
- The flowing well is causing a flooding issue and wasting the area's groundwater resource.



Well Abandonment

- To help protect groundwater resources and the environment and to help eliminate safety hazards, the Wells Regulation requires a person abandoning the well to ensure an abandoned well is plugged and sealed in accordance with a nine step procedure.
- Plugging and sealing typically means:
 - removing all debris and equipment from the well,
 - plugging the well with cement or a manufactured clay called bentonite and,
 - if possible, removing all or a portion of the casing.
- If you identify an abandoned (unmaintained and no longer in use) well on your property have an experienced and licensed well technician (e.g., driller), who holds or works for the holder of a well contractor licence, assess the well and perform the plugging and sealing steps to properly abandon (decommission) the well.

Well Abandonment – Plugging & Sealing

- Filling of the hole with an abandonment barrier (left), cutting off the casing (centre) and backfilling the well opening with bentonite chips (right)



Questions

