



# GROUNDWATER PROTECTION WORKBOOK

for Well & Septic Owners in the Cataraqui Region



CATARAQUI REGION  
CONSERVATION AUTHORITY

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## **Disclaimer**

This workbook is not a replacement for technical evaluation or in-person assessment by a professional of the safety of your drinking water supply. It is an educational tool drawing attention to important aspects of drinking water supply protection.

## Acknowledgments

This Groundwater Protection Workbook was produced by Cataraqui Region Conservation Authority staff with collaboration and review from:

- Kingston, Frontenac, Lennox and Addington Public Health
- Leeds, Grenville and Lanark District Health Unit
- Ontario Ministry of the Environment and Climate Change
- Public Health Ontario

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## Background

### Groundwater

Groundwater is water found beneath the earth's surface. When there is enough groundwater to provide a supply for use it is called an aquifer. Water on the surface flows downward between soil particles and cracks (fractures) in the bedrock until it reaches a zone of saturation. The top of the saturated zone is the water table (Figure 1).

### We live in a vulnerable groundwater area

Unlike some other parts of Ontario and the world, the groundwater in the Cataraqui area is highly susceptible to becoming polluted. Reasons for this sensitivity are: the water table is relatively close to the surface, there is little to no soil to slow or filter water that may be carrying pollution before it reaches the aquifer, and the bedrock has extensive fracture systems providing short-cuts for the transportation of pollution (Figure 2). If the groundwater in the Cataraqui area becomes polluted, it is not possible to construct a deeper well in the same location to find clean water and clean-up is often expensive and sometimes impossible.

### Proper care and maintenance of wells and septic systems is important

Groundwater is a limited freshwater resource and the primary source of drinking water for most rural properties. Wells not only tap into this resource, but can also be a shortcut for pollution to reach the groundwater if they are not properly constructed, maintained, and plugged when no longer in use. In areas with shallow and / or fractured bedrock, high water tables, and thin soils, groundwater is especially vulnerable. More than 90% of groundwater in the Cataraqui Source Protection Area is classified as highly vulnerable to contamination (Cataraqui Source Protection Authority, 2014).

One potential source of pollution is an improperly functioning septic system. It is important to know the location of your septic system and to inspect and maintain it. Tanks can corrode or crack, become overfull and filter beds can fail for various reasons, allowing pollution to enter the groundwater. Sewage odours, pooling, drain clogging or excess plant growth can indicate a problem with a system that if unresolved will release waste into local groundwater supplies. Proper care and maintenance of septic tanks can increase the lifespan of your system and reduce the risk of groundwater contamination on your property.

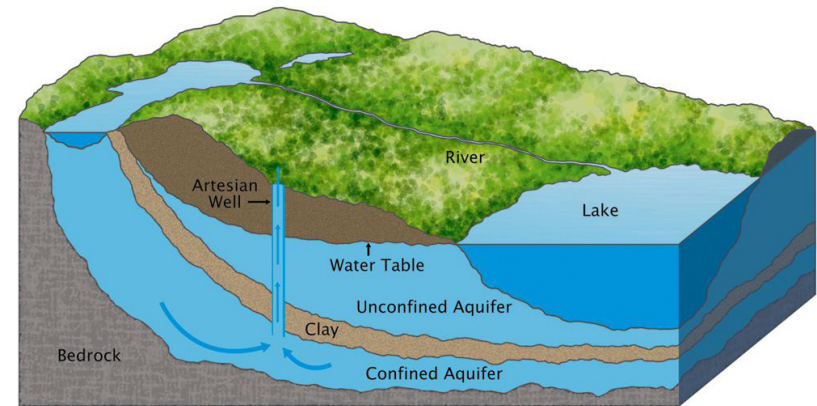


Figure 1: Illustration of an aquifer (Gunther, 2017)

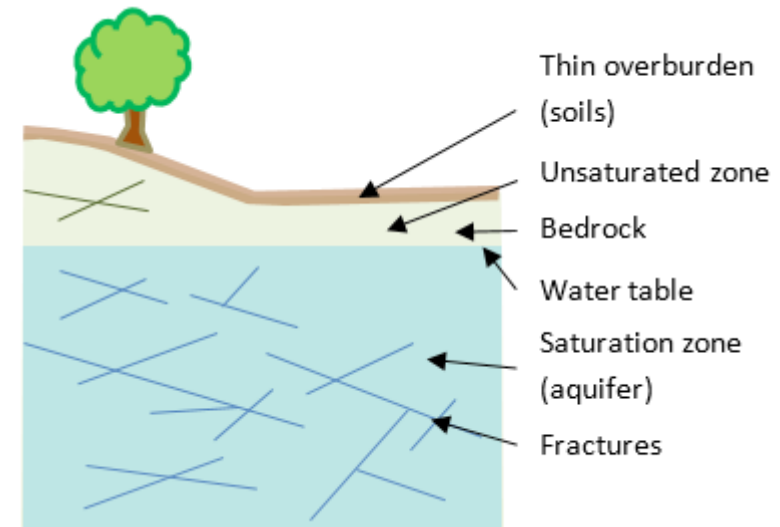


Figure 2: Factors affecting groundwater vulnerability

## Keep it Clean

Helping to protect drinking water sources is called 'source water protection' and it is the first barrier to increase water supply safety. Keeping drinking water pollution-free is far easier and less expensive than trying to 'clean it up' after the fact. While some types of pollution are easier to clean than others, it is still expensive and in some cases impossible. Preventative action, as outlined in this workbook, will help to increase the safety of groundwater used by you and your neighbours as a source of drinking water.

## Drinking Water Source Protection

Under the *Clean Water Act*, 19 source protection areas and regions in Ontario created detailed plans to help protect drinking water sources. Policies in these plans are co-operatively implemented by municipalities, provincial ministries, public health units and others who have an interest in drinking water protection.

On April 1, 2015, the Cataraqui Source Protection Plan came into effect within the Cataraqui Source Protection Area. Within the Cataraqui Source Protection Area there are 12 vulnerable areas including nine intake protection zones, three wellhead protection areas and extensive highly vulnerable aquifers. For more information and to access a copy of the Cataraqui Source Protection Plan, visit [www.cleanwatercataraqui.ca](http://www.cleanwatercataraqui.ca).



## About this Groundwater Protection Workbook

This Groundwater Protection Workbook was developed to help people in areas without municipal water and sewage services to determine the vulnerability of groundwater on their property. The information, questions, and recommendations are based on the Ontario Wells Regulation, as amended, and supporting Ministry guidance, as well as the Ontario Building Code, supporting resources and regional groundwater studies.

**The use of this workbook is voluntary and confidential.** None of the information will be collected or used by the Cataraqui Region Conservation Authority or any of the other partner organizations. Instead, it is a tool to communicate accurate groundwater, well, and septic information that can be tailored to each individual property.

This workbook will help to:

1. Determine groundwater vulnerability
2. Outline best practices for the operation and maintenance of your well and septic system
3. Specify contact information and additional material for reference
4. Provide well and septic system tracking sheets, as well as a space to keep important records all in one place

The workbook is split into four parts: (1) Plan Identification (2) Groundwater Vulnerability Self Assessment (3) Resources, and (4) Tracking Sheets.

Part 1 identifies where the self assessment applies.

Part 2 is a series of multiple choice questions about your property and its surroundings, ongoing activities, and well and septic system conditions. Each response has an associated score **generally from zero to four dependent on the risk of pollution to groundwater**. The lower the score, the lower the risk of groundwater pollution. Record each response score on the line beside each question. When finished, tally the question scores and score each page in the box provided at the top right of the page. Finally, add the total score for each section and enter them on the score summary page found after the reference maps. Based on the total scores for each section, a final grade for your property can be calculated. This grade is associated with a level of risk and recommended actions for groundwater protection.



How to effectively fill out the workbook:

1. Complete each section of multiple choice questions
2. Record scores by page and section
3. Add up total section scores for a final grade
4. Determine the vulnerability score for your property
5. Make note of recommended actions to improve groundwater protection on your property

Part 3 is a summary of contacts and resources.

Part 4 provides tracking sheets for well and septic monitoring, maintenance and repairs.

**Keep this workbook with your property records.** If any information should change, it is important to keep an up-to-date record to determine the best management practices for a safe drinking water supply. It is recommended to review the information in this workbook every three years.

Should you have any questions or require additional information, please contact the Cataraqui Region Conservation Authority at 613-546-4228 (toll free in 613 area code 1-877-956-2722), your local health unit or the Ontario Ministry of the Environment and Climate Change:

Kingston, Frontenac, Lennox & Addington Health Unit:  
1-800-267-7875

Leeds, Grenville and Lanark District Health Unit:  
613-345-5685

Ontario Ministry of the Environment and Climate Change Regional Office:  
613-549-4000 or toll free 1-800-267-0974



## Part 1: Plan Identification

Name(s):

---

Date Self Assessment Completed:

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Property Address:

---

Number of Acres:

<input type="checkbox"/> < 1	<input type="checkbox"/> > 10
<input type="checkbox"/> 1 - 5	<input type="checkbox"/> > 25
<input type="checkbox"/> 6 - 10	<input type="checkbox"/> > 50

Property Type:

<input type="checkbox"/> Farm	<input type="checkbox"/> Business	<input type="checkbox"/> Residential	<input type="checkbox"/> Other
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Number of Buildings on the Property:

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Number of Primary Residents on the Property:

(Note: If the number of residents on the property changes, re-evaluate the septic system capacity for additional effluent.)

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Additional Notes:

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## Part 2: Groundwater Vulnerability Self Assessment

### *Bedrock and Soil Conditions*

Bedrock and soil conditions are key determinants of groundwater quality and movement.

There are three main types of bedrock in the Cataraqui area. Ordovician limestone in the west, Precambrian granite and gneiss (Canadian Shield) in the center and Ordovician sandstone, dolostone and shale in the east (Dillon Consulting Limited, 2008). The limestone and dolostone are more soluble than the hard rocks of the Canadian Shield. This means that wells in the west, and to a lesser extent in the east, often have naturally higher levels of hardness, salt, iron and sulphur. Another important aspect of the bedrock in the Cataraqui area is that it is highly fractured (i.e. cracked). These often interconnected fractures provide pathways for water to flow from one place to another more quickly than in areas where the bedrock is more solid (Figure 3).

A variety of soil types are also present in the area. Some soils have larger, more rounded particles (e.g. sand) that allow water to quickly infiltrate (i.e. soak in) to the groundwater while others are smaller or flatter (e.g. clay) so that it takes longer for water to move through them (Ontario Ministry of Agriculture Food and Rural Affairs, 2015a) (Figure 4). Deeper soils that slow the downward movement of water are best for protecting groundwater sources because there is time for any pollution to be cleaned up or to break down before it reaches the aquifer. In the Cataraqui area, soil is relatively thin and is absent in many areas affording little natural protection for the groundwater.

The lack of soil coupled with the fractured bedrock in the Cataraqui Region results in groundwater that is highly susceptible to contamination.



Figure 3: Fractured bedrock

Soil Texture & Associated Permeability		
SAND	SANDY LOAM	CLAY
RAPID	MODERATE	VERY SLOW

Figure 4: Water flow through various soil particle sizes (Ontario Ministry of Agriculture Food and Rural Affairs, 2015a)



## Group 1 Questions: Bedrock and Soil Conditions

Record your total  
page score here

**1. Is there any exposed bedrock on your property?** Exposed bedrock has no protective soil layer to slow water and any pollution it may be carrying before it reaches the aquifer. **Answer:** \_\_\_\_\_

1 = Yes      0 = No

**2. Overall, about how deep is the soil on your property? Refer to the, “Overburden Thickness” map (Reference Map #1) found on page 24.** Generally, deeper soil provides a thicker layer of protection for the groundwater. **Answer:** \_\_\_\_\_

3 = Almost no soil (less than 0.9 m)      2 = Thin (0.9 - 2 m)  
1 = Moderate (greater than 2, but less than 9)      0 = Deep (more than 9 m)

**3. What type of bedrock is on your property? Refer to the “MNDM Bedrock Geology” map (Reference Map #2) found on page 25.** Although bedrock may not be exposed at the surface, it is still an important factor for groundwater movement and quality (Trow and Associates Limited, 2007). **Answer:** \_\_\_\_\_

3 = Western Cataraqui: weathered limestone (Verulam, Bobcaygeon, Gull River Formations)  
2 = Central Cataraqui: Precambrian (Canadian Shield)  
2 = Eastern Cataraqui: weathered dolostone, shale, sandstone (Nepean, March, Oxford)

**4. Referencing the table below (Ontario Ministry of Agriculture Food and Rural Affairs, 2015a), determine the potential for groundwater pollution on your property. Refer to your water well record, the “Soils Overview” map (Reference Map #3) found on page 26 and the “Depth to Water Table” map (Reference Map #4) found on page 27.** Considering both soil type and the proximity of the groundwater to the surface is a good measure of how naturally susceptible to pollution a drinking water source is. **Answer:** \_\_\_\_\_

Soil	Depth to Water Table			
	Less than 0.9 m	0.9-4.5 m (use if depth unknown)	4.6-13.5 m	Greater than 13.5
Bedrock (within 0.9 m)	High	High	High	High
Muck / Organic	High	-	-	-
Rapid (sand)	High	High	High	Moderate
Moderate (loam, all types)	High	High	Moderate	Low
Slow (clay loam)	High	Moderate	Low	Very Low
Very Slow (clay)	High	Low	Very Low	Very Low

4 = High      3 = Moderate      2 = Low      1 = Very Low

## Surrounding Land Use and Practices

Land uses and activities in the vicinity of your well are important to determine the risk of groundwater pollution (Figure 5). Activities on and surrounding your property could impact the quality of the groundwater you and your neighbours rely on as a drinking water source.

Anything that can soak into the ground has the potential to impair groundwater quality. While some pollution like bacteria can break down over time, other types like some chemicals cannot. Groundwater pollution can be very expensive to clean-up and in some cases the pollution may be permanent. Taking steps to prevent pollution from entering the groundwater is the best action we can take to help protect our drinking water supplies. Protect the source.

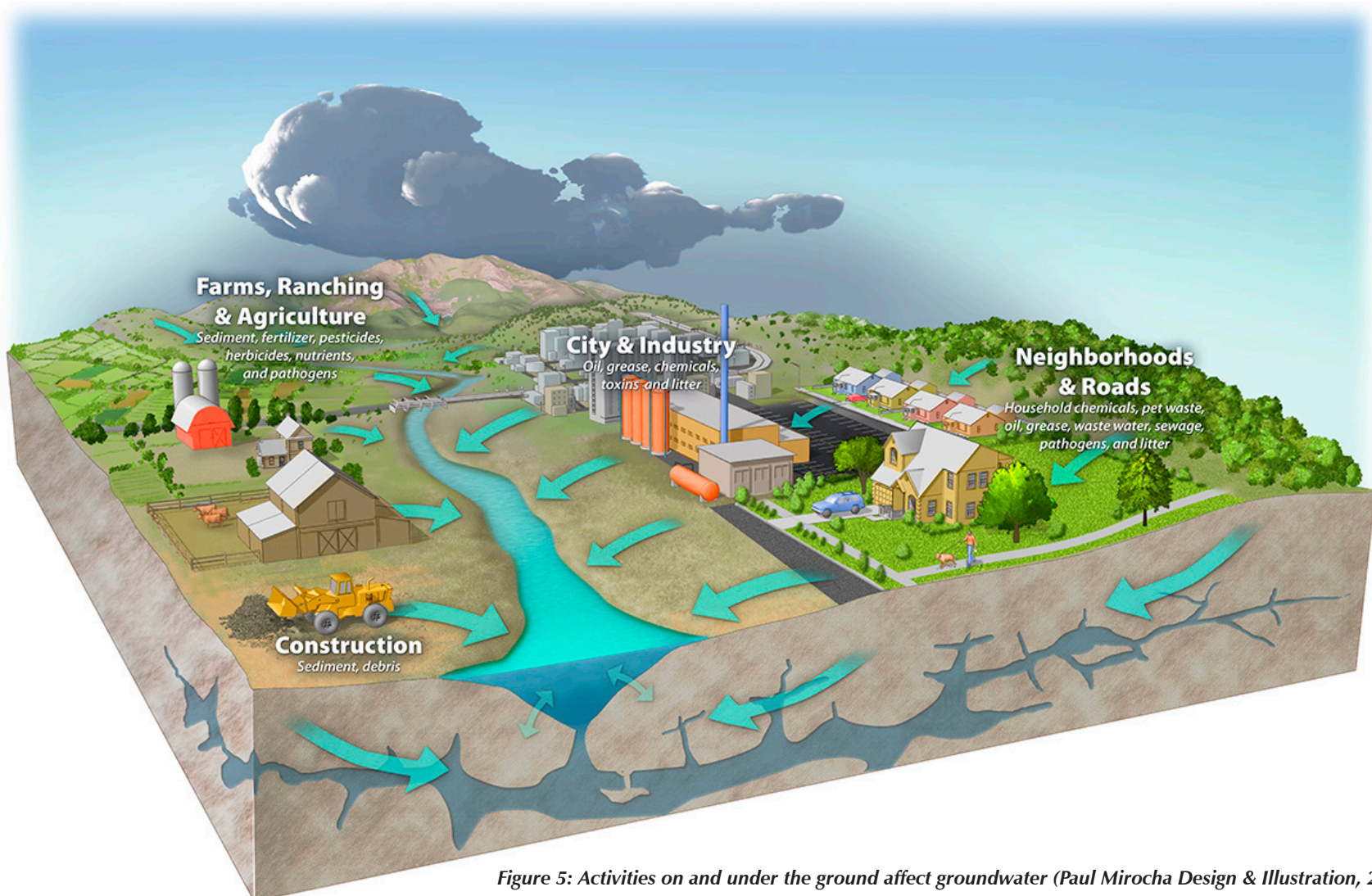


Figure 5: Activities on and under the ground affect groundwater (Paul Mirocha Design & Illustration, 2018)

## Group 2 Questions: Surrounding Land Use and Practices

Record your total  
page score here

**1. Review the list of land uses below and circle all the land uses that occur within a 100-metre radius of your well. The sum of all the land uses checked is your score for this question.** The area immediately surrounding your well is a zone requiring special care. Depending on the level of natural protection, any spill, leak or pollution may reach the water supply quickly.

Answer: \_\_\_\_\_ (total of all circled)

2 = Commercial / Industrial / Urban  
0 = Dry meadow / Uncultivated Field  
0 = Forest  
1.5 = Residential Neighbourhood

2 = Agriculture  
1 = Wetland  
2 = Industrial Land  
1 = Waterbody

**2. How close is your well to sources of pollution? Refer to the table below (Ontario Ministry of Agriculture Food and Rural Affairs, 2015a). Your score for this question is the highest that any one activity ranks. For example, if there is an outdoor fuel tank less than 15 m from your drilled well, then your score is 2.** Some common activities listed in the table below should not take place near your well because they could accidentally leak or spill and harm the water supply. It is also key to remember that a well should not be located close to a property line; as you cannot control what happens on neighbouring properties (Ontario Ministry of the Environment and Climate Change, 2017a).

Answer: \_\_\_\_\_

Activities	Drilled Well with casing that extends to a depth of more than 6 metres	Any Other Well	Rank
Outdoor fuel tanks, Septic system or holding tank Chemical storage in outbuildings, Roads, Barnyards, Manure spreading or storage, Other agricultural source material spreading or storage, Fertilizer spreading or storage, Pesticide application or storage, Water softener discharge, Sump outflow, Road salt storage or spreading, Vehicle washing, repair and maintenance	Less than 15 metres	Less than 30 metres	2 = High
	15 - 24 metres	30-47 metres	1 = Moderate
	Greater than 24 metres	Greater than 47 metres	0 = Low

**3. Is your well positioned to avoid runoff from sources of contamination? Select the description that best describes drainage near your well.** It is not only important to think about how close potential sources of pollution are to your well, but also whether runoff from the sources could have an impact on the groundwater. Depending on the location of your well in relation to water flow, there is a risk of pollution and possible structural damage from erosion.

Answer: \_\_\_\_\_

2 = My well is downslope from a source of pollution  
1 = My property is level, so there isn't much runoff from any  
0 = My well is upslope from any source of pollution source of pollution



## My Well Part 1

Wells are the primary source of drinking water for many homes, businesses and institutions in the Cataraqui area. The *Ontario Water Resources Act* and the *Wells Regulation* are designed 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. This includes requiring well owners to properly maintain and abandon wells to protect groundwater resources that are used as a source of drinking water. While the majority are drilled wells, dug wells are more common in the western area because deeper drilled wells in this area usually have less water (Dillon Consulting Limited, 2008) and are of poorer quality (e.g. salt and sulphur) (Cataraqui Source Protection Authority, 2018) (Figure 6-7). It is important to note that the lower yields and poorer quality are generally due to the type of bedrock formation, not because of activities. In Ontario, if you have a well on your property, you are legally required to take responsibility for maintenance, and if necessary, properly abandon wells to protect the safety of drinking water and the groundwater resource in your area. For more information on your legal requirements, refer to the **Wells on Your Property website maintained by the Ontario Government.**

### **DRILLED WELLS:**

Well constructed with a steel casing and possibly with a screen to remove debris. From 15 to 20 cm (6 to 8 inches) in diameter.

### **DRIVEN OR JETTED WELLS:**

Shallow well, often 8 m (25 ft) below ground, in sandy areas with groundwater near the surface (i.e. a highwater table). From 1.25 to 5 cm (0.5 to 2 inches) in diameter. Vulnerable to pollution from surface sources.

### **DUG WELLS:**

Large-diameter well constructed with concrete tile, stone or steel pipe 60-120 cm (24 to 48 inches). Average depth 9 m (30 ft) for dug wells. Vulnerable to pollution from nearby surface sources.

(Ontario Ministry of Agriculture Food and Rural Affairs, 2015b)



Figure 6: Drilled well (Ontario Ministry of the Environment and Climate Change, 2017b)



Figure 7: Dug well (North Central District Health Department, 2018)

## Group 3 Questions: My Well

Record your total  
page score here

**1. Do you have a water well(s) on your property?** If you live in a rural area without a municipal drinking water system, your drinking water most likely comes from a private groundwater well or surface water intake (a pipe or a shore well).

Answer: \_\_\_\_\_

2 = Unknown

1 = Yes

0 = No

**2. What type of well(s) do you have?** There are three main types of wells (Ontario Ministry of Agriculture Food and Rural Affairs, 2015b). Some are more susceptible to pollution than others. Learning about your well is the first step toward protecting it.

Answer: \_\_\_\_\_

2 = sandpoint

2 = dug

1 = drilled with less than 6 metres of water tight casing

0.5 = drilled without at least 6 metres of water tight casing

**3. Do you have a copy of your water well record?** A water well record provides information about a well's location, construction and general water quality and quantity.

Answer: \_\_\_\_\_

1 = No

0 = Yes

**4. Are there any unused wells on your property?** Any well that is not being used or maintained for future use must be properly plugged and sealed to prevent the vertical movement of contaminants, water, natural gas and other materials (Ontario Ministry of the Environment and Climate Change, 2017a). There are many unused wells within the Cataraqui Region. Each one poses health and safety, environmental, and liability concerns for a well owner and their neighbours' wells. If you have or find an unused well, retain a properly licensed well contractor and have the well properly plugged and sealed in accordance with the Wells Regulation.

Answer: \_\_\_\_\_

1 = Yes

1 = Yes, there were, and an unlicensed person filled the well

0 = There were and a licensed contractor properly plugged and sealed the well(s)

0 = No

**5. My well was constructed before August 1, 2003.** Not only do components of your well degrade over time, water well regulations in Ontario have evolved to afford better drinking water protection.

Answer: \_\_\_\_\_

0 = No

1 = Yes



## My Well Part 2

Each part of a well acts to supply and protect the drinking water (Figure 8 and 9). Poorly maintained wells are short-cuts for pollution on the grounds surface to quickly enter the water supply (Well Aware, 2017a) (Figure 10). This includes bacteria, chemicals, and even small animals (Ontario Ministry of Agriculture Food and Rural Affairs, 2015b) (Figures 8-10). One of the most effective ways to protect your drinking water is to properly maintain the well to prevent the entry of surface water and other foreign materials (e.g. leaves, insects, mice, snakes).

Proper initial construction, age and maintenance are key factors to consider with regard to well condition.

The following series of “yes” and “no” questions are to identify whether there are any issues requiring further investigation.

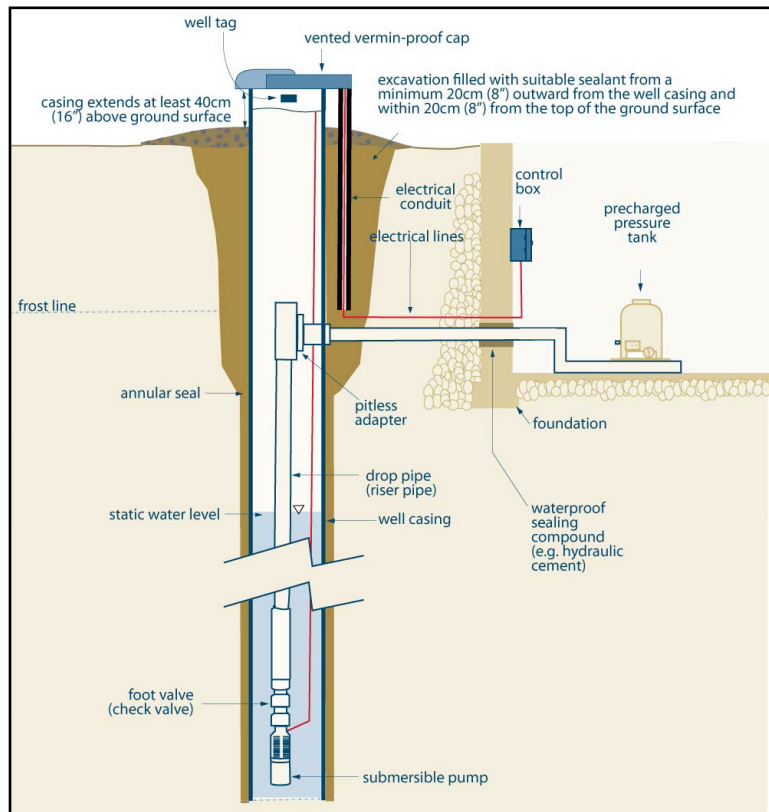


Figure 8: Drilled well components (Ontario Ministry of the Environment and Climate Change, 2017a)

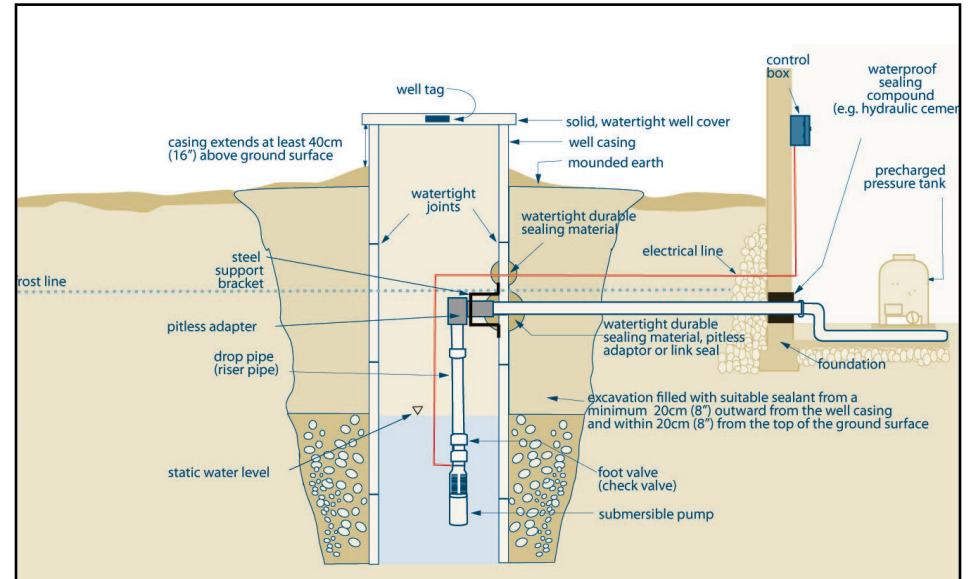


Figure 9: Dug well components (Ontario Ministry of the Environment and Climate Change, 2017a)



Figure 10: Drilled well with a poor or absent annular seal (Well Aware, 2017b)



Figure 11: Commercial vermin-proof Cap (Ontario Ministry of the Environment and Climate Change, 2017c)

### Well component definitions:

**Annular seal:** an impervious material such as clay or cement that is between the outside of the well casing and the surrounding soil and / or rock.

**Casing:** pipe, tubing or other material installed in a well to support its side.

**Vermin-proof cap:** a commercially manufactured well cap that prevents the entry of foreign materials into the well.



### Group 3 Questions: My Well (continued)

Record your total  
page score here

**SAFETY NOTE:** Inspecting your well can be dangerous work. If you are not familiar with wells, hire an experienced and licensed contractor. Before inspecting a well, make sure to:

- Shut off the power supply to the pump
- Assess the structure of the well and nearby ground to make sure they are stable before approaching the well
- Carefully remove the well cap and take all necessary precautions to make sure people and animals cannot fall into the well

**6. Does your well have casing above the ground?** It is important for a well to extend above the ground so that its location is known, it is accessible for inspections and to help prevent surface water runoff and other foreign materials directly entering the top of the well (Ontario Ministry of the Environment and Climate Change, 2017d).

Answer: \_\_\_\_\_

1 = No

0 = Yes

**7. Is the portion of the casing that is above the ground in good condition?** A well casing provides structural stability to the hole, enables the well to have a cap, and is one of two components used to seal out near surface inflow. The casing should not be leaning, have any holes, cracks or staining.

Answer: \_\_\_\_\_

1 = No

0 = Yes

**8. Does your well have a commercial vermin-proof cap?** The well cap prevents anything from falling into the well and can be easily removed with hand tools to inspect its condition. A vermin-proof cap with a tight seal is required.

Answer: \_\_\_\_\_

1 = No

0 = Yes

**9. Is the annular seal in good condition?** An annular seal is clay or cement material around the outside of the well casing preventing surface water from flowing down along the casing to the water supply. NOTE: If there is space around the well casing at the ground surface it is likely that there is a problem with the annular seal or it is missing.

Answer: \_\_\_\_\_

1 = No

0 = Yes

**10. Is there at least 3 metres (10 feet) of mowed grass around the well?** Unmowed areas allow trees and shrubs to grow (roots interfere with the well casing and lines) and tall grass can hide visible problems with the well and provide habitat for animals that could physically damage the well or cause pollution.

Answer: \_\_\_\_\_

1 = No

0 = Yes

**11. Is the soil mounded up around the well casing to prevent any ponding?** Water collecting around the well can erode the annular seal and transmit surface pollution to the drinking water.

Answer: \_\_\_\_\_

1 = No

0 = Yes

## Water Quality and Quantity

Having a clean, safe, reliable source of drinking water is a necessity. Understanding the factors affecting groundwater quality and adequate testing will improve the confidence you have in your drinking water supply. Water quality is variable dependent on weather, water use, and activities in the surrounding area. Even if you haven't been ill and you do not think there is a problem with the water quality of your well, it is important to verify through testing. You and others drinking the water regularly may have a resistance to any bacterial pollution; however, visitors to your home, especially the very young or elderly, could become ill.



Figure 12: Bacteria sample bottle (Haldimand-Norfolk Health Unit, 2017)

The only way to know for sure whether your water is safe to drink is to have it tested. Testing for bacteria (*Escherichia coli* and total coliforms) is free and easy. Sample bottles and detailed instructions are available through your local health unit (Figure 12). Contact information is provided in Part 3 of this workbook. Results will determine whether your drinking water supply is free of the bacteria that can cause illness.

Drinking water supplies with any trace of *E. coli* or with more than six total coliforms are considered unsafe to drink (Leeds, Grenville and Lanark District Health Unit, 2017b). Further, drinking water supplies with any trace of *E. coli* or total coliforms are considered “not potable” water under the Wells Regulation. If you receive a result with any trace of *E. Coli*. or total coliforms you, as a well owner, must contact your local health unit and follow their advice. In many cases, the health unit will contact you if an adverse test result is identified by a laboratory. In the event that the advice of the health unit is not taken or you fail to contact the health unit, the Wells Regulation requires that the well with the *E. coli* or total coliforms be immediately abandoned. This is to ensure drinking water safety and responsible action by well owners. If you do not wish to contact or follow the advice of the health unit, you could contact the Director of the Wells Regulation and seek a written consent not to

abandon the well. (Ontario Ministry of the Environment and Climate Change, 2017a).

Following a water sample test that identifies *E. Coli* or total coliforms you should inspect your well and surrounding area for any visible problems (e.g. no well cap). You will be able to address simple improvements like moving a pet away from the well, but a licensed professional is needed to resolve structural well or sewage system issues.

Be sure to retest the well following any improvements or repairs to know whether the water is now safe to drink. If unsafe water quality conditions persist, disinfecting your well may be the next step (Leeds, Grenville and Lanark District Health Unit, 2017b). For more information see the resources section of this workbook, including how to interpret your bacterial water sample results.

Testing for other parameters like nitrate and sodium is also advisable. Accredited private laboratories provide proper sample bottles and accurate testing for drinking water supplies. Refer to Part 3 for a list of accredited laboratories.

It is important to note that although some water supplies in the Cataraqui area may not taste good (e.g. high levels of sulphur or iron), it does not necessarily mean they are not safe to drink. Some parameters are a health

concern, while others are aesthetically undesirable. Generally, both groups of parameters can be treated to provide a safe and good-tasting supply.

Having enough water to meet demand is easier in some areas than it is for others. The variability of supply throughout the region is primarily due to the type of bedrock formation and the permeability of the rock. The western area has the lowest well yields, the central portion is variable, and the eastern area has the highest yields (Dillon Consulting Limited, 2008). Regardless of the amount of water available, conservation practices should be a priority. Not only will there be more water available in times of drought, but less clean water will flow down sinks and toilets where it mixes with sewage.

## Group 4 Questions: Water Quality and Quantity

Record your total  
page score here

### 1. Do you have a water treatment system that is maintained as per the manufacturer's specifications?

Following source water protection, a properly maintained treatment system designed for the water quality conditions of a particular well is the second barrier to stop water pollution from affecting your drinking water.

1 = No

0 = Yes

Answer: \_\_\_\_\_

**2. Does your water appear cloudy or brown or taste earthy?** Water that is not clear or has an earthy smell or taste could be an indication that dirty surface water is flowing quickly into the water supply. Surface water that quickly reaches a drinking water supply can have illness-causing bacteria and pathogens.

1 = Yes

0 = No

Answer: \_\_\_\_\_

**3. Do you test your water quality regularly?** Water quality conditions change because of periods of wet or dry weather, changes in surrounding land use and changes in water use. Testing your well water once or infrequently is not enough to be confident of the quality.

3 = No testing

2 = Once in a while for bacteria and / or other parameters

1 = At least three times per year for bacteria and / or other parameters

0 = Minimum three times per year, as well as other times when water quality may have been impaired (e.g. flooding, heavy rain, following well maintenance or repair, post gastrointestinal illness)

Answer: \_\_\_\_\_

### 4. Do the results from the water quality sampling come back within an acceptable health range?

Understanding the results is as important as taking the samples.

1 = No

1 = Don't know

0 = Yes

Answer: \_\_\_\_\_

**5. Does your water supply ever run low or run out?** Portions of the Cataraqui Region have low groundwater supplies. In times of drought, some supplies can become dry. Water conservation is required and other measures such as well replacement could be considered. Filling dug wells with water from a water truck is a practice some people use for temporary water shortage relief, but this is not recommended since this can introduce contamination to the drinking water supply.

1 = Yes

0 = No

Answer: \_\_\_\_\_

## My Septic System Part 1

Properties without municipal sewage treatment rely on private sewage systems to dispose and treat sewage. Properly used and maintained systems pose a lower risk to drinking water supplies (Figure 12). Septic system components must be located a minimum distance from wells, property lines and other features to reduce the risk of affecting water quality and / or septic system function (Government of Canada and Government of Ontario) (Figure 13). Note that these are only minimum distances; additional separation is better.

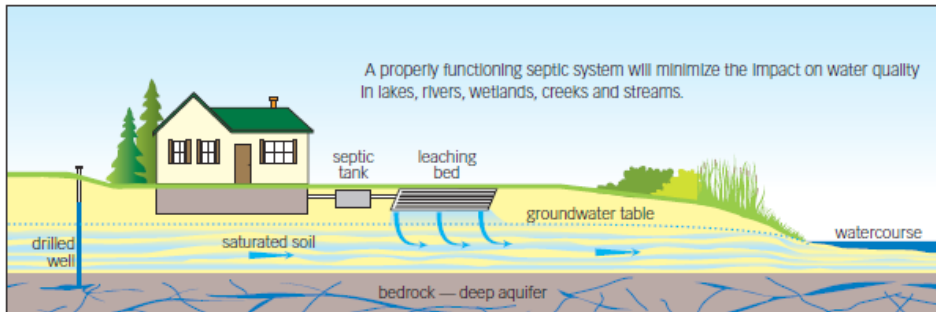


Figure 12: Septic systems recharge the groundwater (Government of Canada and Government of Ontario)

### Main Types of Private Sewage Systems:

- Leached bed system
- Filter bed system
- Holding tank
- Advanced treatment systems

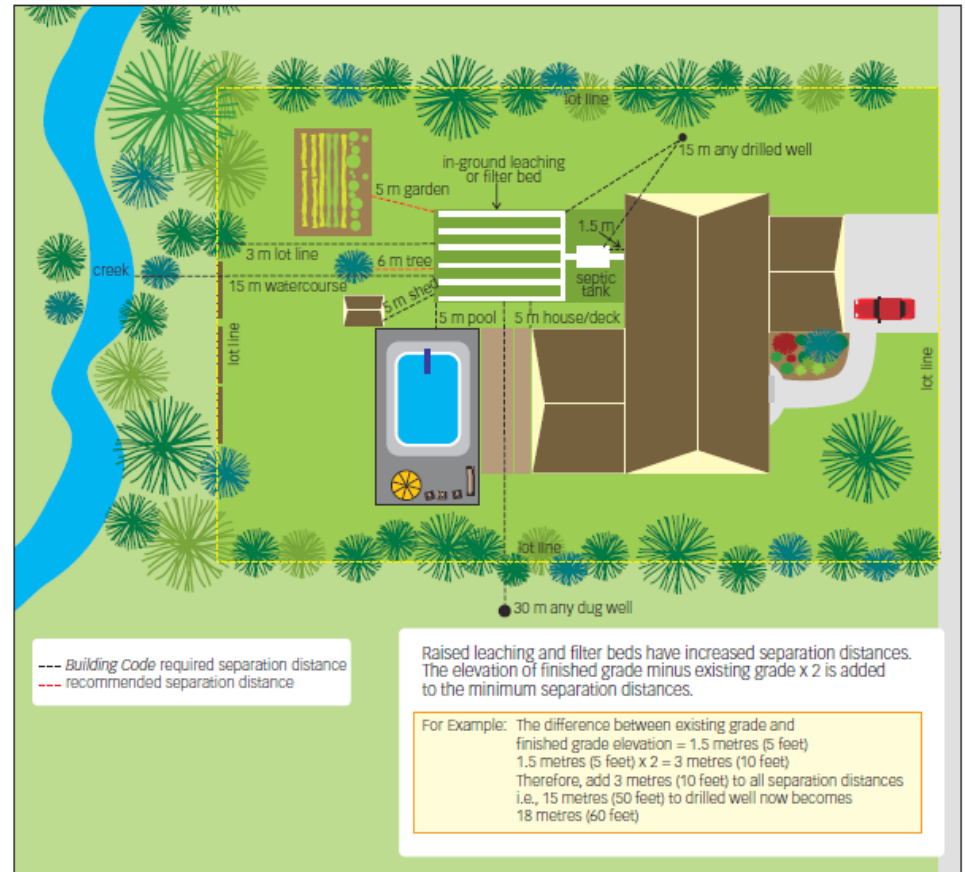


Figure 13: Minimum setbacks for conventional septic system (Government of Canada and Government of Ontario)

## Group 5 Questions: My Sewage System

Record your total  
page score here

**1. Do you have a sewage system on your property?** Most rural homes and businesses have sewage systems to treat both grey (sink and shower) and black (toilet) water.

2 = Unknown

1 = Yes

0 = No, my sewage is treated by a municipal system

Answer: \_\_\_\_\_

**2. Do you know what type of sewage system you have?** Maintenance requirements are not the same for all types of sewage systems. To reduce the risk of pollution, you must perform specific maintenance requirements and only dispose of suitable waste.

1 = No

0 = Yes

Answer: \_\_\_\_\_

**3. Do you have a copy of your sewage system permit?** Your permit will show you the location of the system components and will detail the design capacity. Contact your local health unit if you would like a copy or more information.

1 = No

0 = Yes

Answer: \_\_\_\_\_

**4. What is the age of your sewage system?** Most systems are expected to last for at least 15 years.

2 = more than 45 years old

1 = 21 to 45 years old

0 = less than 20 years old

Answer: \_\_\_\_\_

**5. Are more people living in and / or using the building serviced by the sewage system since it was designed and constructed?** Sewage systems have a design capacity. If more people are using it than intended, it can become overwhelmed and fail.

1 = Yes

0 = No **OR** Yes, but a Building Official determined that the sewage system's capacity was adequate when a permit was issued to increase living space.

Answer: \_\_\_\_\_

**6. Does your sewage system meet the minimum setback from the closest well and / or surface water (i.e. lake, river, stream, wetland)?** The setback distance is more than 15 m for drilled wells / surface water (lakes / streams) and more than 30 m for any other wells. It is also important to remember that you cannot control what happens on neighbouring properties. It is good practice to maintain good separation distance to property lines as well.

1 = No

0 = Yes

Answer: \_\_\_\_\_

**7. When was the date of your last sewage system inspection?** An inspection will identify any problems so they can be addressed to optimize sewage treatment and reduce pollution.

2 = never

1 = more than 5 years ago

0 = within the last 5 years

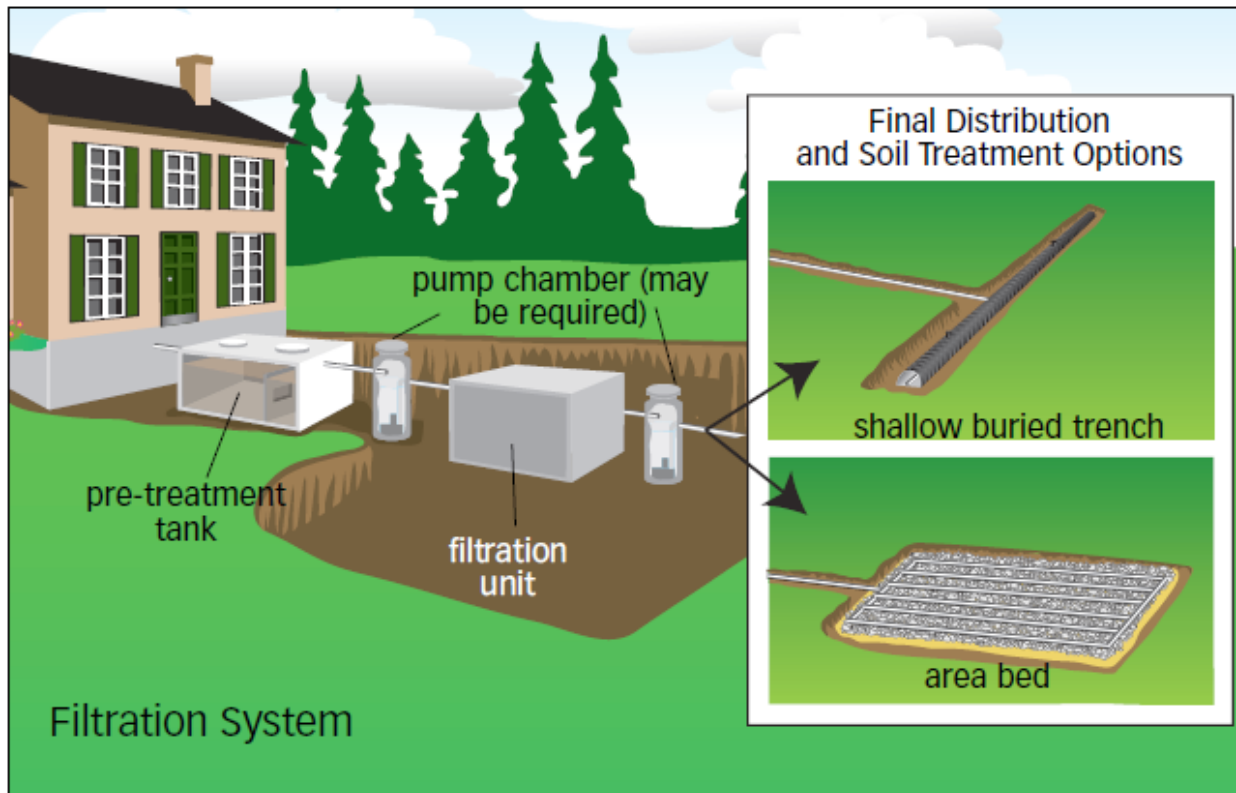
Answer: \_\_\_\_\_



## My Septic System Part 2

Conventional leaching bed or filter bed systems have two main parts: the septic tank and the leaching bed (Figures 14-16). Sewage flows to a two-compartment septic tank where heavier solid materials sink to the bottom and lighter scum (fats, oils and grease) rise to the top. This allows the clearer middle portion of the wastewater to flow through the baffles into the second compartment of the tank for further settling of particles and separation of scum. Bacteria in the tank breakdown the waste and, if present, an effluent filter catches any larger items that could clog the leaching bed. The now partially treated wastewater flows to the leaching bed where it filters through gravel and sand and is further broken down by bacteria (Government of Canada and Government of Ontario).

Advanced treatment systems are similar to conventional leaching bed system, but more treatment occurs in a pre-treatment tank, than in the leaching bed. These systems also require more maintenance (Government of Canada and Government of Ontario).



Effluent from a filtration unit can be distributed back into the native soil through a shallow buried trench or an area bed.

Figure 14: Advanced treatment system (Government of Canada and Government of Ontario)

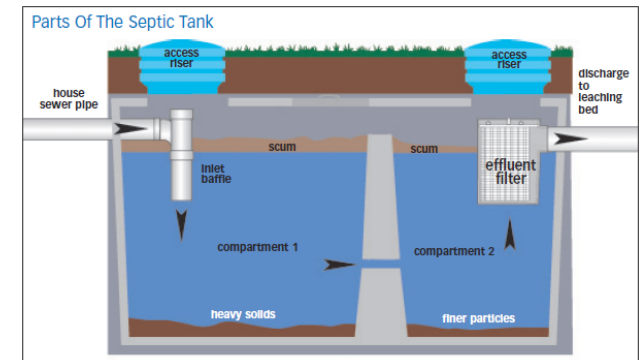


Figure 15: Parts of a septic tank (Government of Canada and Government of Ontario)



Figure 16: Septic system under construction (Government of Canada and Government of Ontario)



## Group 5 Questions: My Sewage System (continued)

Record your total  
page score here

**8. When was the last pump-out of your septic tank or repair of your sewage system?** Proper septic system maintenance can reduce the risk of groundwater pollution. This includes having the septic tank pumped out every three to five years.

2 = never / unknown

1 = more than 5 years ago

0 = between 0 and 5 years ago

Answer: \_\_\_\_\_

**9. Have there been any problems with the sewage system (i.e., back up, system freezing, slow drains or toilets) or is there a noticeable “bad” smell in your home or near your leaching bed?** These occurrences are clues that your sewage system may not be functioning properly. A noticeable smell could signal that the sewage system’s no longer treating the sewage. There could be a problem with a clogged septic tank or effluent filter or the tank may be damaged. Contact a licensed septic inspector for more information.

1 = Yes

0 = No

Answer: \_\_\_\_\_

**10. What does the ground look like near your sewage system?** Spongy areas near the leaching bed may be a sign of a clogged septic tank or a failed leaching bed (Government of Canada and Government of Ontario).

2 = Ground is frequently wet or spongy with odours

1 = Ground is seldom wet or spongy with some odours

0 = Ground is firm with no odours

Answer: \_\_\_\_\_

**11. How does water drain near your sewage system?** Water drainage away from your sewage system ensures the decomposition (bacterial breakdown) of sewage is not disrupted and your system is working effectively. Sewage treatment systems are designed to operate in dry locations. Wet areas impede sewage treatment and can wash sewage-related pollution toward drinking water sources (Government of Canada and Government of Ontario).

1 = water drains toward the sewage system

0 = water drains away from the sewage system

Answer: \_\_\_\_\_

**12. Is there only grass cover on or near your sewage system?** Planting grass around your septic system increases evaporation and prevents erosion. Larger trees and shrubs may disrupt the bed with their roots.

1 = No

0 = Yes

Answer: \_\_\_\_\_

**13. Are vehicles ever driven or parked over the sewage system area?** Excess weight on the leaching bed may cause pipes and other parts to break (Government of Canada and Government of Ontario).

1 = Yes

0 = No

Answer: \_\_\_\_\_

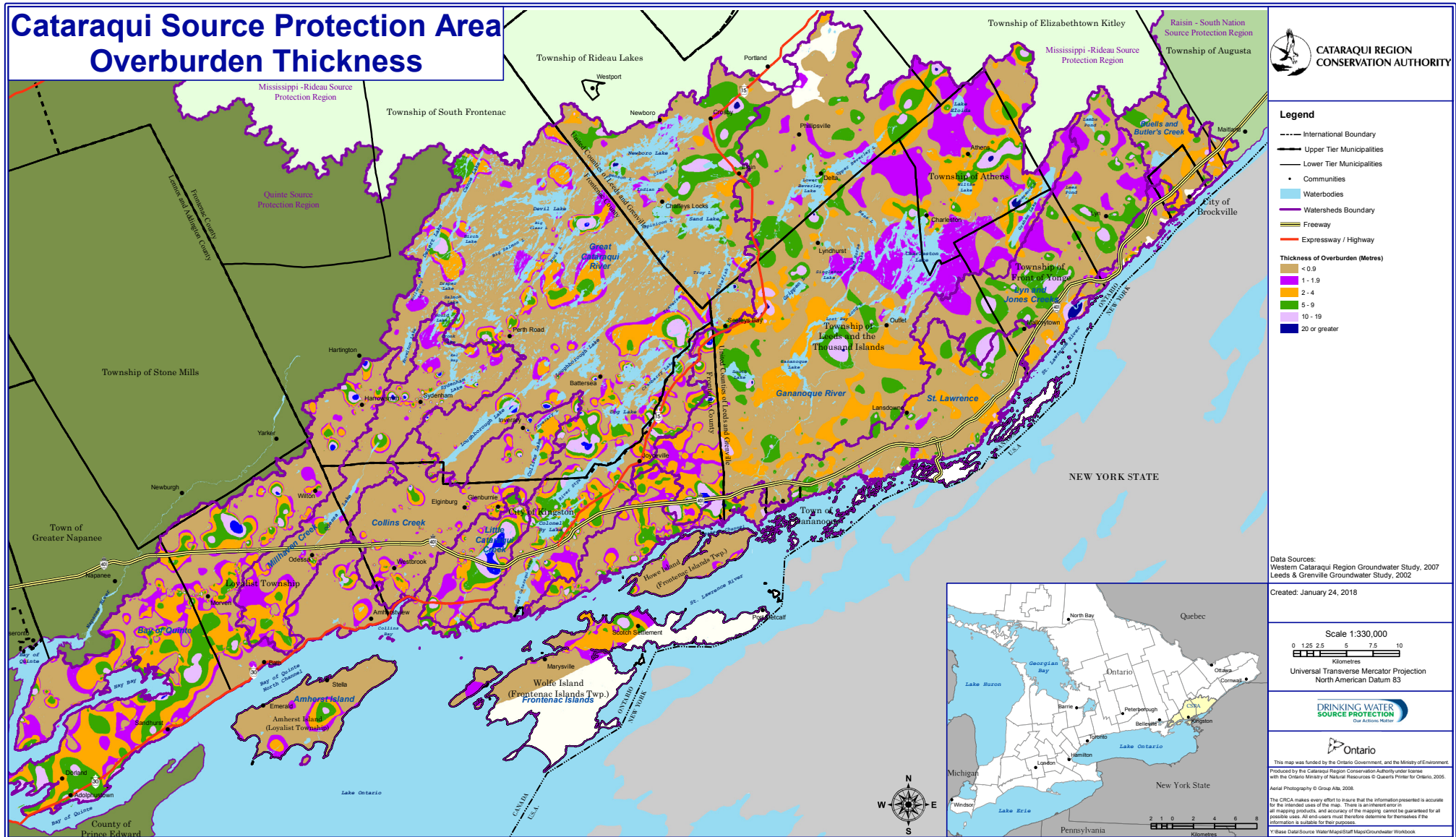
**14. Do you dispose of cigarette butts, water softener backwash discharge, coffee grounds, disposable diapers, facial tissue, or non-biodegradable materials into your sewage system?** Dumping unwanted materials into toilets, sinks, and the ultimately the septic bed can clog your system, promoting contaminant transport into the ground and chemicals entering your groundwater source.

1 = Yes

0 = No

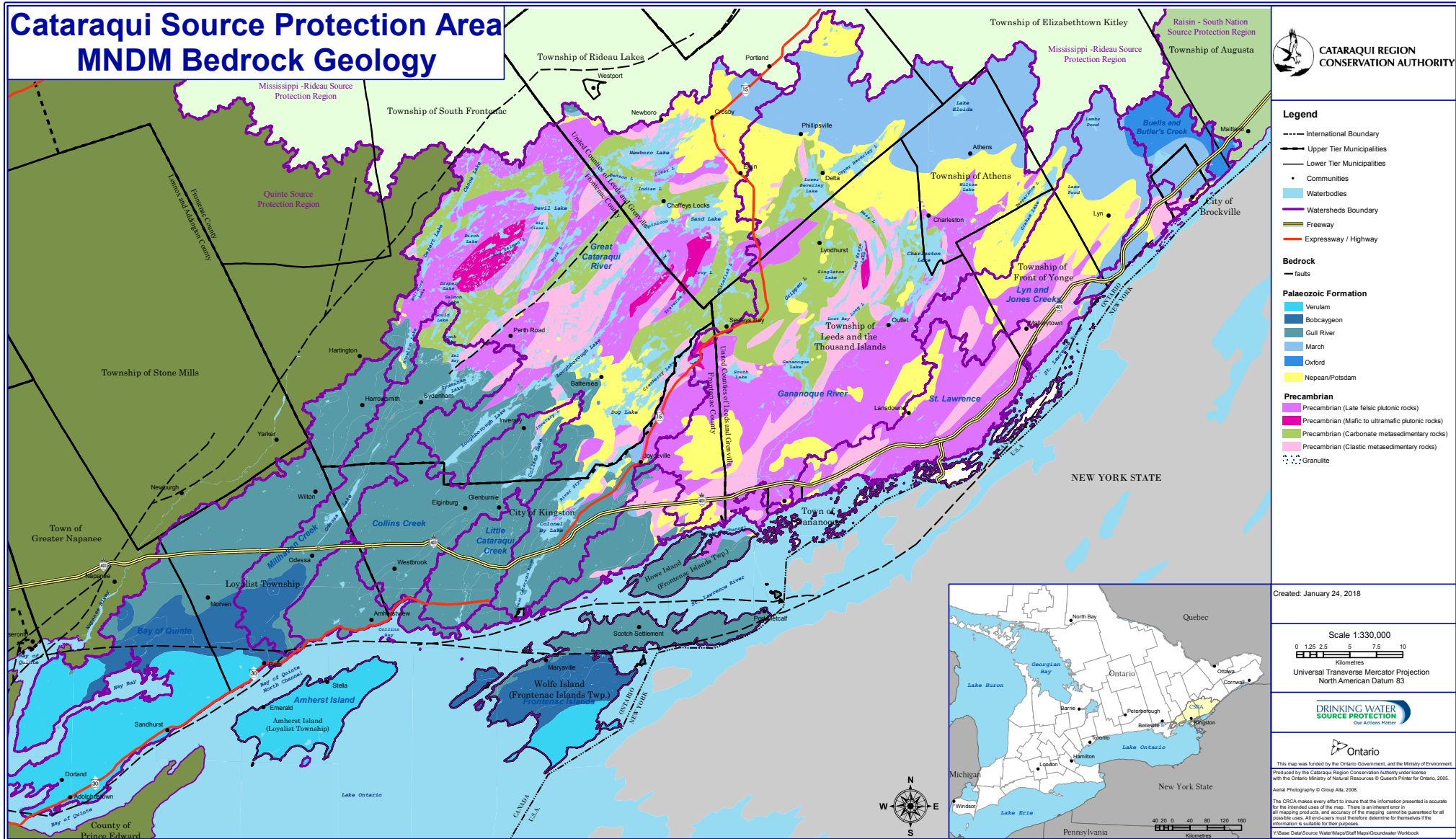
Answer: \_\_\_\_\_

# Reference Map #1



(Cataraqui Source Protection Authority, 2008)

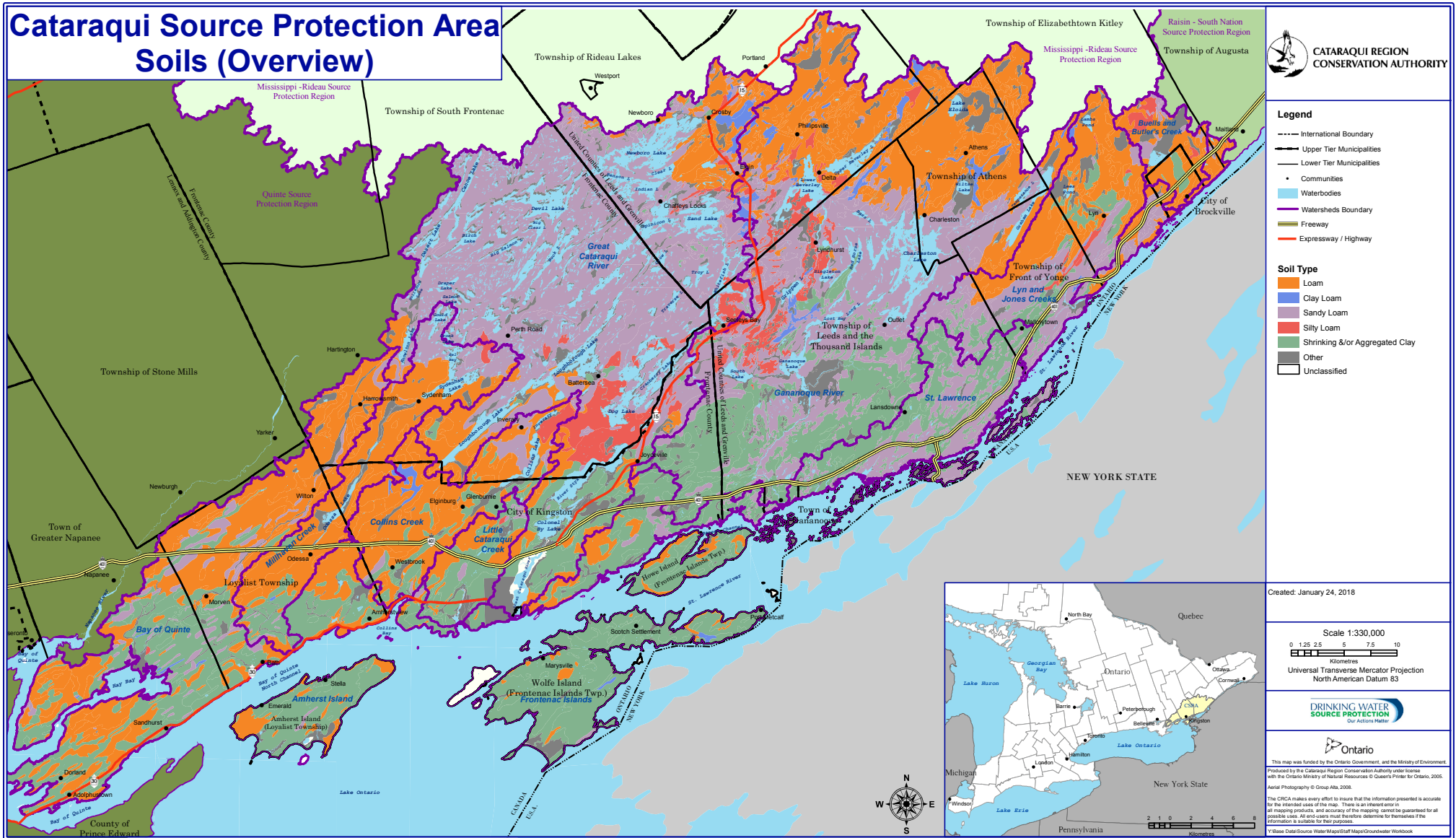
# Reference Map #2



(Cataraqui Source Protection Authority, 2008)

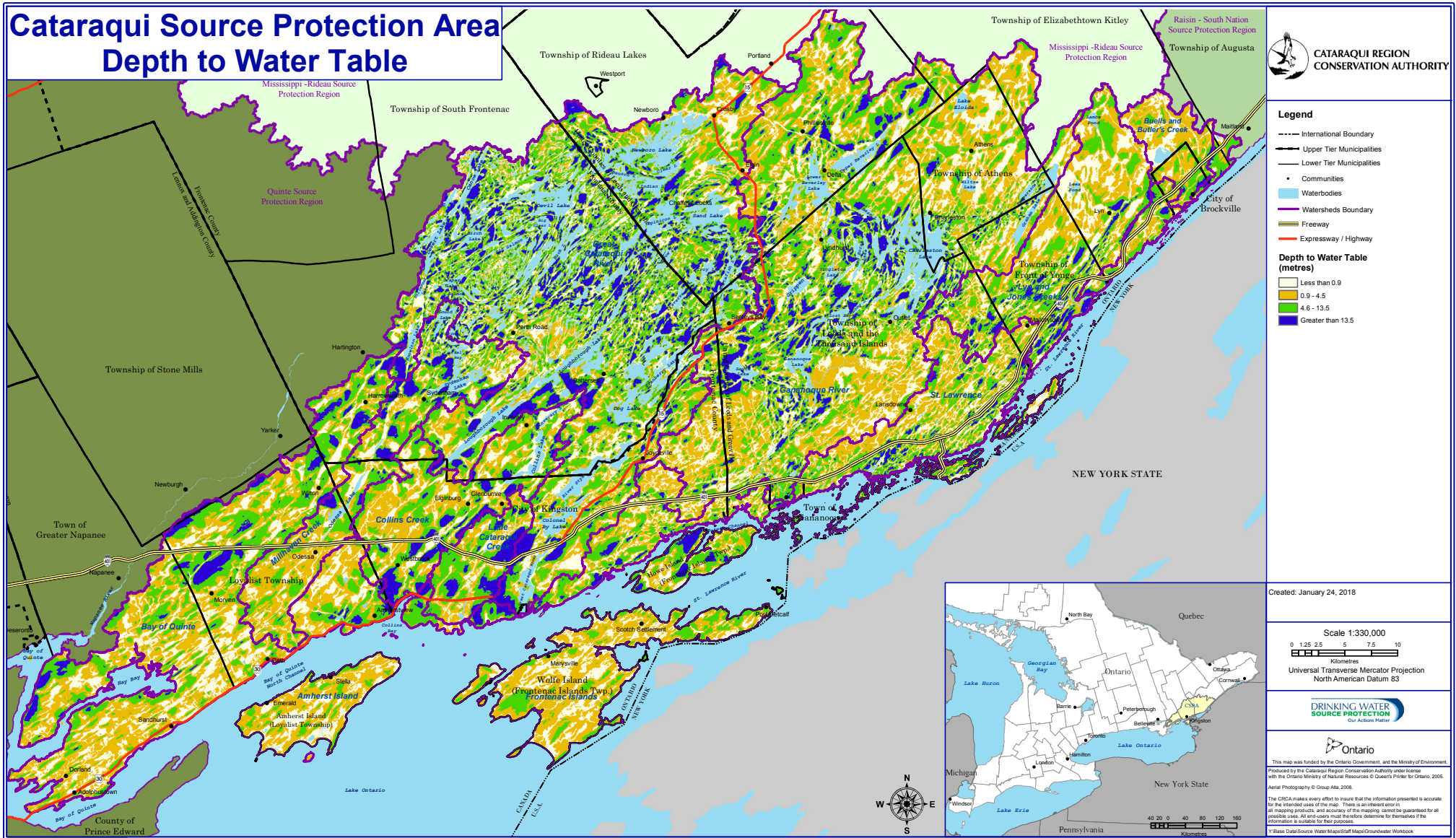


# Reference Map #3



(Cataraqui Source Protection Authority, 2008)

# Reference Map #4



(Cataraqi Source Protection Authority, 2008)



**Score Summary** - Enter each of the sub-totals from the five question groups and calculate an overall risk score for your drinking water supply.

Question Group	Total	Score	Ranking	Interpretation
1: Bedrock & Soil Conditions		9-11	Highly Vulnerable	Your property has almost no natural protection against groundwater pollution. You must take extra care to reduce the risk of polluting the drinking water supply.
		6-8	Vulnerable	Your property has some natural protection against groundwater pollution.
		0-5	Lower Vulnerability	Your property has good natural protection against groundwater pollution.
2: Land Uses & Practices		7+	Highly Vulnerable	The land uses and practices on and / or near your property may not have proper separation from your well and could cause groundwater pollution.
		4-6	Vulnerable	The land uses and practices on and / or near your property could cause groundwater pollution.
		0-3	Lower Vulnerability	The land uses and practices on and / or near your property do not pose much of a concern for groundwater pollution.
3: My Well		10-12	Highly Vulnerable	Your well is at risk. Measures must be taken to improve your well.
		6-9	Vulnerable	Your well may be at risk. Prioritize actions to make improvements.
		0-5	Lower Vulnerability	Your well is managed properly and is at low risk of pollution.
4: Water Quality & Quantity		6-7	Highly Vulnerable	Start testing your water and employ water conservation measures.
		3-5	Vulnerable	Make some changes to how often you test your water and look for additional ways to conserve water.
		0-2	Lower Vulnerability	Continue your good practices.
5. My Sewage System		11-19	Highly Vulnerable	Your sewage system poses a risk to the groundwater. Measures must be taken to improve.
		6-10	Vulnerable	Your sewage system could be improved and may pose a risk to the groundwater. Prioritize actions to make improvements.
		0-5	Lower Vulnerability	Your sewage system is in good condition. Continue proper use and maintenance.
<b>OVERALL TOTAL</b>		40+	<b>Highly Vulnerable</b>	You must consider making some changes to improve the aspects of groundwater vulnerability that you can control.
		26-40	<b>Vulnerable</b>	You are managing some aspects of groundwater vulnerability well, but there is room for improvement. Prioritize some changes to reduce the risk.
		5-25	<b>Lower Vulnerability</b>	You are doing a good job and may be lucky to have a more natural protection against groundwater pollution than some. Keep up the good work! Continue your good practices and make sure to monitor any changes.

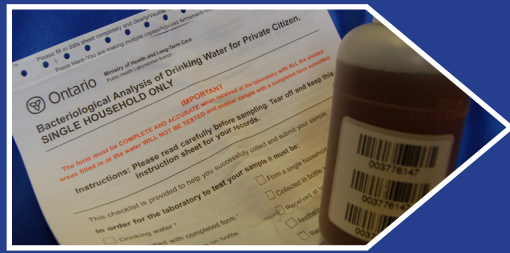


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## Part 3: Resources

### Five Practices to Reduce the Risk of Pollution



#### TEST YOUR WELL

Testing for bacteria and other parameters throughout the year can improve your confidence in a safe drinking water supply. Remember, water quality changes can result from heavy rain, snow melt, flooding, drought or other circumstances. Pick up sampling bottles from your nearest health unit or licensed laboratory and follow the instructions for sample collection and submission.



#### MAINTAIN YOUR WELL

Ensure there are no leaks, pooling, or cracks on the exterior or adjacent to your well and fix any issues immediately. Ensure water drainage on your property is away from your well.



#### REDUCE THREAT ACTIVITIES

Inspect your oil / fuel tanks regularly.  
Limit the use of fertilizers, pesticides, road salts, and avoid spilling.  
Report any spill to the Spills Action Centre 1-800-268-6060



#### INSPECT YOUR SEPTIC SYSTEM

Check for signs of system failure, compacted or spongy areas, bad smells, or excessive vegetation and keep the area clear. Bring chemicals to your nearest hazardous waste site or local drop off. Keep solids (i.e. hygiene products, cigarettes etc.) out of your septic tank.



#### CONSERVE WATER

Replace leaking fixtures, use high efficiency faucets and low flush toilets, take shorter showers, reduce the loads of dishes and laundry, and collect rainwater for gardens.  
Reduce the amount of wastewater entering your sewage system to maximize efficiency.

## Contact Information

Organization / Individual	Phone	Website / Email
Drinking Water Source Protection		
Cataraqui Region Conservation Authority	613-546-4228	<a href="http://www.crca.ca">www.crca.ca</a> & <a href="http://www.cleanwatercataraqui.ca">www.cleanwatercataraqui.ca</a>
Local Health Organizations		
Kingston, Frontenac, Lennox and Addington Public Health	1-800-267-7875	<a href="http://www.kflaph.ca">www.kflaph.ca</a>
Leeds, Grenville and Lanark District Health Unit	613-345-5685	<a href="http://www.healthunit.org">www.healthunit.org</a>
Public Health Ontario	1-877-543-8931	
Ontario Provincial Ministries		
Ministry of the Environment and Climate Change	1-888-745-8888	<a href="http://www.ontario.ca/page/ministry-environment-and-climate-change">www.ontario.ca/page/ministry-environment-and-climate-change</a>
Ministry of the Environment and Climate Change - Kingston Office	1-800-267-0974	
Ministry of Housing and Municipal Affairs	1-866-220-2290	<a href="http://www.mah.gov.on.ca/index.htm">www.mah.gov.on.ca/index.htm</a>
Ministry of Health and Long-Term Care	1-866-797-0000	<a href="http://www.health.gov.on.ca">www.health.gov.on.ca</a>
Other Organizations		
Ontario Groundwater Association (OGWA)	519-245-7194	<a href="http://www.ogwa.ca">www.ogwa.ca</a>
Ontario Onsite Wastewater Association (OOWA)	1-855-905-6692	<a href="http://www.oowa.org">www.oowa.org</a>
Ontario Association of Sewage Industry Services	1-877-202-0082	<a href="http://www.oasisontario.on.ca">www.oasisontario.on.ca</a>
Ontario Water Works Association (OWWA)	7-866-975-0575	<a href="http://www.owwa.ca">www.owwa.ca</a>
Ontario Rural Wastewater Centre	613-692-3571	<a href="http://www.uoguelph.ca/orwc">www.uoguelph.ca/orwc</a>
Additional Contacts		
Wells Help Desk	1-888-396-9355	
Canadian Mortgage and Housing Corporation	1-800-668-2642	<a href="http://www.cmhc-schl.gc.ca">www.cmhc-schl.gc.ca</a>
List of Licensed Companies		
Ontario Licensed Well Contractor(s)	<a href="http://www.ontario.ca/page/find-licenced-well-contractors">www.ontario.ca/page/find-licenced-well-contractors</a>	
Ontario Licensed Laboratories	<a href="http://www.ontario.ca/page/list-licensed-laboratories">www.ontario.ca/page/list-licensed-laboratories</a>	

## Important Resources

Topic	Website
<b>Wells</b>	
Well Records	<a href="http://www.ontariogroundwater.com">www.ontariogroundwater.com</a> OR <a href="http://www.ontario.ca/environment-and-energy/map-well-records">www.ontario.ca/environment-and-energy/map-well-records</a>
Well Regulation 903 (O. Reg 331/13)	<a href="http://www.ontario.ca/laws/regulation/900903?search=well+regulation">www.ontario.ca/laws/regulation/900903?search=well+regulation</a>
Water Supply Wells: Technical Bulletins	<a href="http://www.ontario.ca/page/water-supply-wells-tchnical-bulletins">www.ontario.ca/page/water-supply-wells-tchnical-bulletins</a>
Private Wells	<a href="http://www.ontario.ca/page/wells-your-property">www.ontario.ca/page/wells-your-property</a>
Water Supply Wells: Requirements & Practices	<a href="http://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices">www.ontario.ca/document/water-supply-wells-requirements-and-best-practices</a>
Water Testing - Public Health Ontario	<a href="https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/Water-testing.aspx">https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/Water-testing.aspx</a>
Water Test Results Explanation - Public Health Ontario	<a href="https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/Water-Testing-UnderstandYourResults.aspx">https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/Water-Testing-UnderstandYourResults.aspx</a>
Well Aware	<a href="http://www.wellaware.ca">www.wellaware.ca</a>
Well Aware Booklet - Green Communities Canada	<a href="http://www.wellaware.ca/downloads/WA_Booklet_2011_FINAL%20july%202011.pdf">www.wellaware.ca/downloads/WA_Booklet_2011_FINAL%20july%202011.pdf</a>
University of Guelph: Buying a house with a well and septic system	<a href="http://www.uoguelph.ca/orwc/Resources/documents/cmhc_homewoner_septic_and_well_booklet.pdf">www.uoguelph.ca/orwc/Resources/documents/cmhc_homewoner_septic_and_well_booklet.pdf</a>
<b>Septic Systems</b>	
Septic Smart - Service Ontario	<a href="http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm">www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm</a>
Septic Smart - RVCA: Your home's septic system	<a href="http://www.rvca.ca/osso/things_to_know/septic_smart/setic_smart.pdf">www.rvca.ca/osso/things_to_know/septic_smart/setic_smart.pdf</a>
Septic Smart - RRCA: New ideas	<a href="http://www.rrca.on.ca/_files/file/Septic%2520Smart%5B1%5D.pdf">www.rrca.on.ca/_files/file/Septic%2520Smart%5B1%5D.pdf</a>
Ontario Septic Tank Information	<a href="http://www.ontarioseptictank.ca/about">www.ontarioseptictank.ca/about</a>
Sewage Handbook - Guide for shoreline residents in the 1000 Islands Region	<a href="http://www.savetheriver.org/index.cfm?page=app.helpSewageHandbook">www.savetheriver.org/index.cfm?page=app.helpSewageHandbook</a>

## Part 4: Tracking Sheets

### *My Well Testing Record*

Year Constructed: \_\_\_\_\_

Year Treatment System Installed (if applicable): \_\_\_\_\_

Testing Date	Parameters Tested*	Observations/Comments	Licensed Laboratory	Laboratory Results

\*Parameter (i.e. the component in the water that is being measured and reported).



## Part 4: Tracking Sheets

### *My Well Testing Record*

Year Constructed: \_\_\_\_\_

Year Treatment System Installed (if applicable): \_\_\_\_\_

Testing Date	Parameters Tested*	Observations/Comments	Licensed Laboratory	Laboratory Results

\*Parameter (i.e. the component in the water that is being measured and reported).

**My Well Inspection Record (self-inspection completed by the well owner)**

Well Type: \_\_\_\_\_

Well Construction Date: \_\_\_\_\_

Inspection Date	Reason for Inspection	Well Level	Cap, Cover, Seal Check	Well Water Condition	Ground Condition	Comments* (see footnote)	Required Action	Date Action(s) Completed
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality			Health				
	Other:							
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality			Health				
	Other:							
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality			Health				
	Other:							
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality			Health				
	Other:							

\* (i.e. notable taste, smell colour, health concerns, etc.)

**My Well Inspection Record (self-inspection completed by the well owner)**

Well Type: \_\_\_\_\_

Well Construction Date: \_\_\_\_\_

Inspection Date	Reason for Inspection	Well Level	Cap, Cover, Seal Check	Well Water Condition	Ground Condition	Comments* (see footnote)	Required Action	Date Action(s) Completed
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality		Health					
	Other:							
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality		Health					
	Other:							
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality		Health					
	Other:							
	Annual	Normal	Normal	Normal	Pooling			
	Weather	Dry	Leaks	Taste	Wet			
	Construction		Cracks	Smell	Dry			
	Well Repair		Staining	Colour	Settling			
	Water Quality		Health					
	Other:							

\* (i.e. notable taste, smell colour, health concerns, etc.)







*My Sewage System Inspection Record (self-inspection completed by the sewage system owner)*

Note: Semi-annual inspections of at least the bed are recommended. Tank inspections should occur at every pump-out.

Inspection Date	Reason for Inspection	Plumbing	Tank	Filter Bed	Required Action	Date Action(s) Completed
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		

*My Sewage System Inspection Record (self-inspection completed by the sewage system owner)*

Note: Semi-annual inspections of at least the bed are recommended. Tank inspections should occur at every pump-out.

Inspection Date	Reason for Inspection	Plumbing	Tank	Filter Bed	Required Action	Date Action(s) Completed
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
	Repair		Other:	Trees/shrubs		
	Requirement			Erosion		
	Pump-out	Normal	Cracks	Odour		
	Problem	Slow	Missing/damaged baffle	Soft		
	Upgrade		Clogged effluent filter	Ponding		
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	Requirement			Erosion		
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