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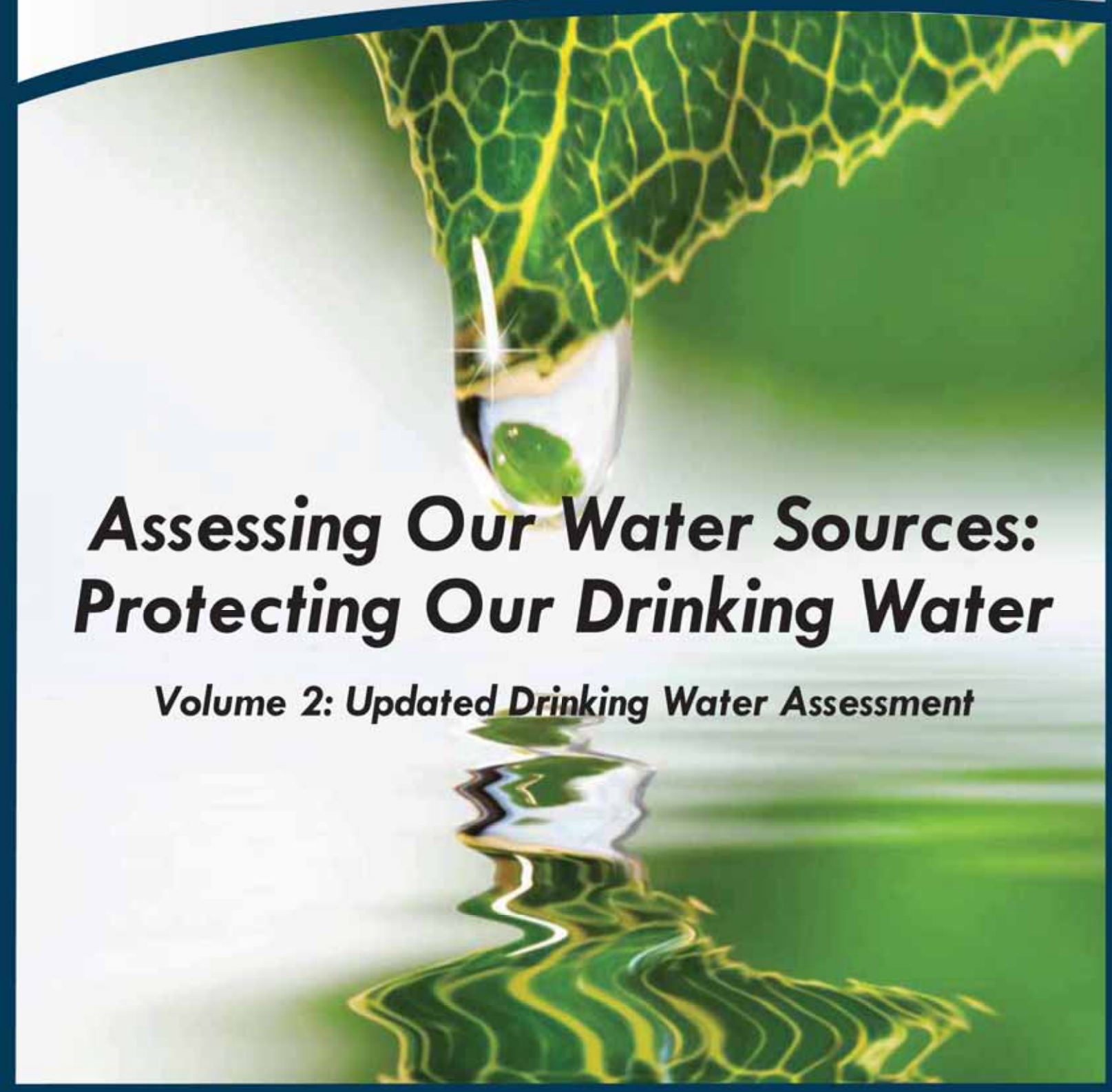

Assessing Our Water Sources: Protecting Our Drinking Water

Volume 2: Updated Drinking Water Assessment

Ontario

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CTC Source Protection Region

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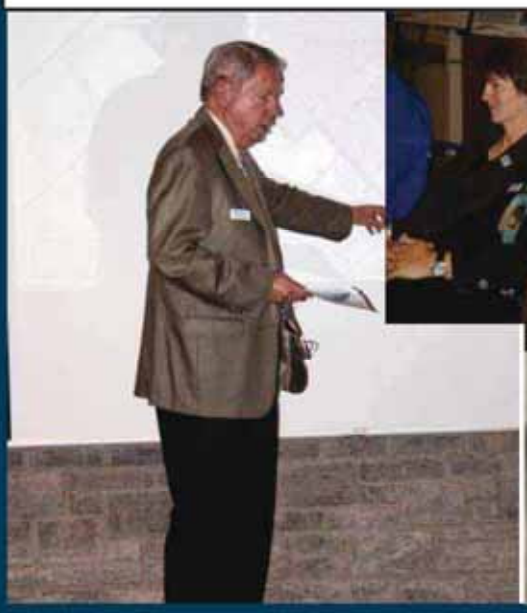
The CTC Source Protection Committee is a group of citizens, appointed under the *Clean Water Act, 2006,* representing general public, municipal, business and interest group sectors from across the Credit Valley, Toronto and Region, and Central Lake Ontario Source Protection Areas. The Committee is charged with creating Assessment Reports to identify and locate potential risks to local sources of drinking water in your community. Visit www.ctcswp.ca for more information.



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The tainted water tragedy at Walkerton in 2000 highlighted the dangers of not protecting the sources of our drinking water. Hundreds became ill and seven died when a municipal well was polluted. In 2002, Justice Dennis O'Connor recommended a number of changes be made to Ontario's drinking water sytem, the most comphrensive of which was Source Water Protection.

Protecting our Sources of drinking water before they are overused or polluted is the best, most cost effective way of ensuring the safety of our drinking water for generations to come.

This is a companion document to the Updated Assessment Reports approved by the Ministry of Environment in January, 2012. Three main sections were updated including:

- *Issue Contributing Areas*: where rising levels of contaminants were found in raw, untreated municipal water supplies
- *Water Quantity threats*: where the demand for water might exceed supply
- *Lake Ontario threats*: Activities that might contribute to threats in the drinking water quality of Lake Ontario

"The first barrier to the contamination of drinking water involves protecting the sources of drinking water. I recommend that the Province adopt a watershed-based planning process... to develop a source protection plan for each watershed in the province."

- Justice Dennis O'Connor
Walkerton Inquiry, 2002

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The CTC Source Protection Committee

The CTC Source Protection Committee (SPC) is established under the *Clean Water Act, 2006,* and is charged with leading the development of Assessment Reports and Source Protection Plans. The CTC Source Protection Region covers the Central Lake Ontario, Toronto and Region, and Credit Valley Source Protection Areas. The SPC is made up of 21 members plus Chair, who live and work in the CTC, and represent the general public, economic and municipal sectors. CTC SPC members' biographies are available online www.ctcswp.ca

What are the threats to drinking water?

The following activities could contaminate drinking water or reduce its supply as identified by the Ministry of Environment. Policies that correspond to each threat activity are labelled in capital letters and contained in the Draft Source Protection Plan.

Threat #	Threat Activity	Policy
1	The establishment, operation or maintenance of a **Waste** disposal site within the meaning of Part V of the Environmental Protection Act	WST
2	The establishment, operation or maintenance of aystem that collects, stores, transmits, treats or disposes of **Sewage**	SWG
3, 4, 5	Applicaiton, handling and storage of ASM, **Agricultural Source Material**	ASM
6, 7	Application, handling and storage of NASM, **Non-Agricultural Source Material**	NASM
8, 9	Application, handling and storage of **Fertilizer**	FER
10, 11	Application, handling and storage of **Pesticide**	PES
12, 13	Application, handling and storage of **Road Salt**	SAL
14	Storage of **Snow**	SNO
15	Handling and Storage of **Fuel**	FUEL
16	Handling and Storage of DNAPL, **Dense Non-Aqueous Phase Liquids**	DNAP
17	Handling and Storage of **Organic Solvents**	OS
18	Runoff management: chemicals to **De-Ice** aircraft	DI
19	Activity that takes from, but **does not return water** to the same aquifer or surface water body	DEM
20	Activity that reduces the **Recharge** of an aquifer	REC
21	Use of land as **Livestock** grazing, pasturing, outdoor confinement or farm animal yard	LIV

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What are Assessment Reports?

The Assessment Reports are the backbone of the Source Protection Plan. The Source Protection Plan is based on the scientific results of the Assessment Reports, which identify areas of land that require the most protection from activities that could contaminate the drinking water, or reduce its supply. The Assessment Reports inform the SPC where and how quickly water flows and how long it will take a contaminant to reach a drinking water well.

The basic premise is simple: *certain activities which pose a risk to drinking water should be managed or not allowed to happen near our sources of drinking water.*

There are four types of vulnerable areas that need protection from different activities which pose a threat to drinking water:

1. Wellhead Protection Areas
- areas around municipal groundwater wells

2. Intake Protection Zones
- areas around intakes in surface bodies of water

3. Significant Groundwater Recharge Areas
- areas where a high percentage of surface water seeps into the ground, replenishing our groundwater

4. Highly Vulnerable Aquifers
-areas where the ground water supply is not well protected, or shallow

Current Status of Updated Assessment Reports

In 2010, after six months of public consultation, the Drafts of the Assessment Reports for the Credit Valley, Toronto and Region and Central Lake Ontario Source Protection Areas were submitted to the Ministry of the Environment. However, there was still additional work underway that would require an update. These updated Assessment Reports were approved by the Ministry of Environment in January, 2012. This magazine, Volume II, is the companion to Volume 1 "Assessing our Water Sources: Protecting our Drinking Water" and provides updated information to the Assessment Reports for the CTC Source Protection Region.

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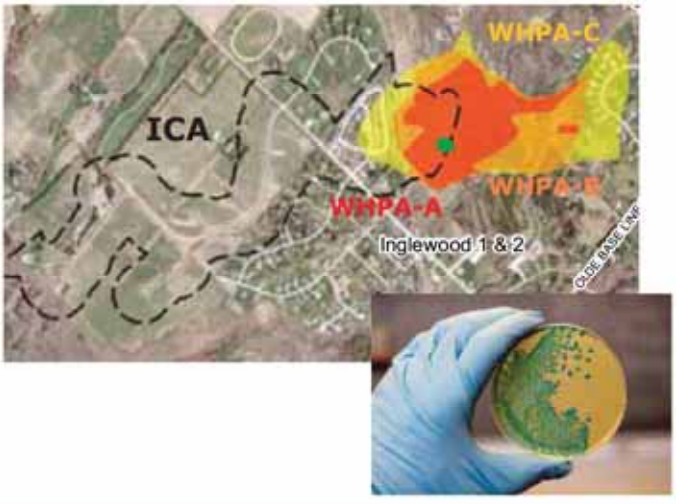
Issue Contributing Areas

What are Issue Contributing Areas?

When the water coming from a well (before treatment) shows an increasing trend of a contaminant, this is called an Issue. The water is/may still be safe to drink, but because the level of the contaminant is rising, the *Clean Water Act* compels the Source Protection Committee to determine the activities that cause the contamination and create policies to manage or prohibit these activities.

Issues can result from a chemical or pathogen, but are always linked to one or more threat activities.

The Assessment Reports define these areas based on data collected from wells, where increasing levels of a contaminant(s) could exceed safe drinking water standard levels. Issue Contributing Areas (ICA) are the areas where the contaminants are coming from, and are identified on maps within the black dash line. Each ICA map in the CTC identifies the Issue as: sodium and chloride, nitrates and/or pathogens.



There are many types of potential threats to water in rural and urban areas.

How is an Issue different than a threat?

Issues are caused by existing threats that make a current impact on water quality in the wells. Threats identify certain activities that have the potential to contaminate a drinking water source.

For example, a sodium and chloride Issue in the drinking water might be traced to the application of road salt, which would make that a threat in an Issue Contributing Area.

However, outside of an ICA, where there is no sodium Issue, the application of road salt still may be considered a threat because the salt is in one of the other vulnerable areas and could potentially impact the well.

Other vulnerable areas include Significant Groundwater Recharge Areas, and Highly Vulnerable Areas. More information is available online www.ctcswp.ca

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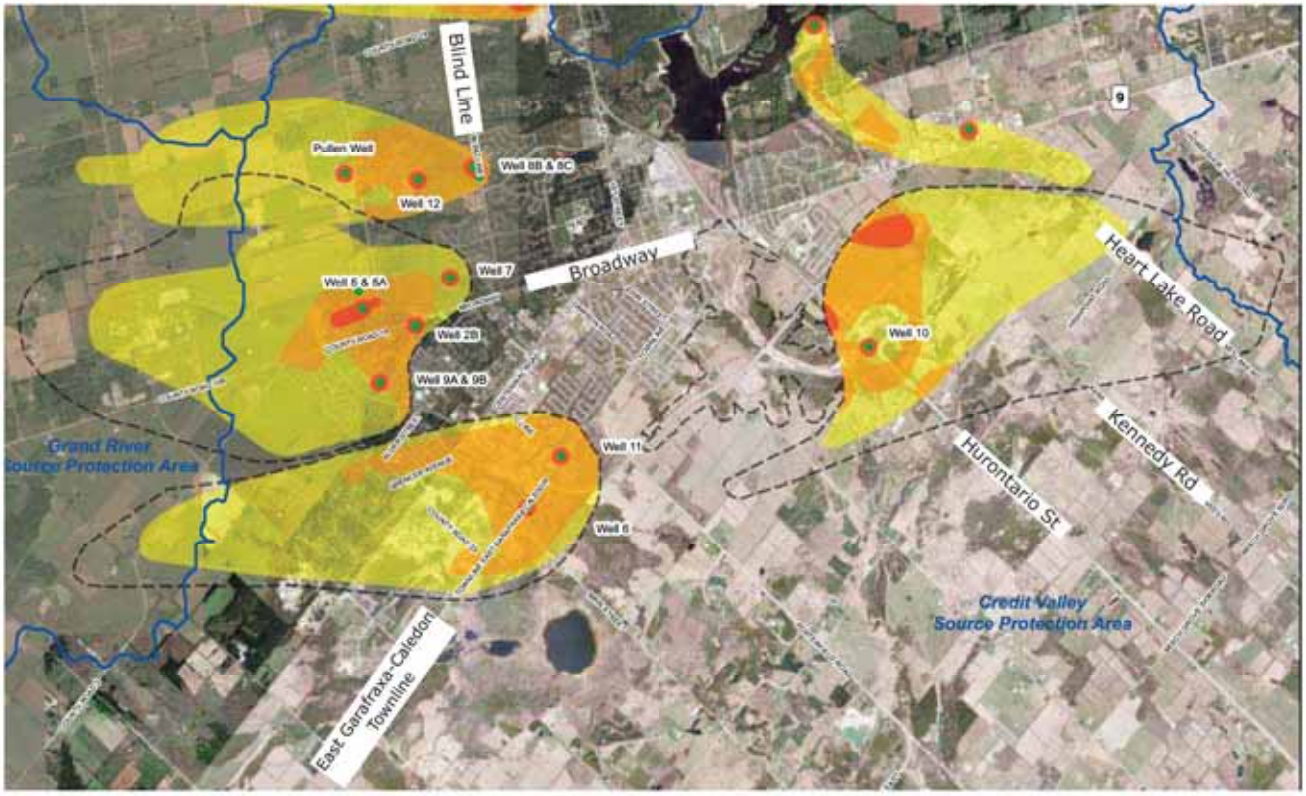
How is an Issue Contributing Area different from a Well Head Protection Area?

Issue Contributing Areas (ICA) are typically larger than the most vulnerable parts of a Well Head Protection Area (ie. WHPA-A or WHPA-B). The main difference is the effect of a threat in each of the areas and how that threat should be managed or prohibited.



Sodium and Chloride ICA in Dufferin County and Caledon

For example, in **Well Head Protection Areas (WHPA)**, an activity may be considered a Significant threat only in a WHPA-A, and therefore must be managed or prohibited, but the same activity may not be Significant in WHPA-C and therefore have no requirement to be managed or prohibited.

However, for an identified threat, related to the contaminants of conern, that is taking place within an **Issue Contributing Area (ICA)**, that activity is considered to be a Significant threat. It does not matter that the threat activity contributes large or small amounts fo the contaminant or is immediately located next to or far away from the well, only that it is taking place within the ICA. A Significant threat in an Issue Contributing Area is either managed or prohibited – consistently- within that ICA.

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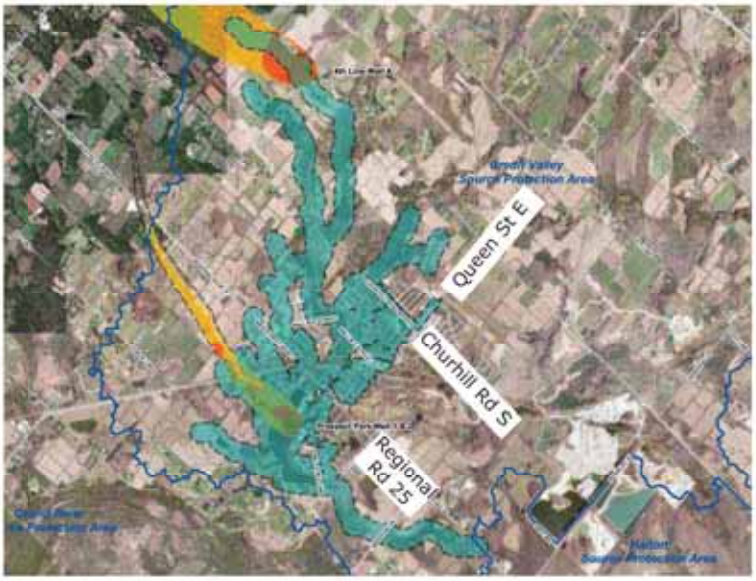
How do we find the source of the Issue?

Depending on the kind of Issue, the identified threat(s) may be directly linked to a specific activity or a range of activities that could be the cause.

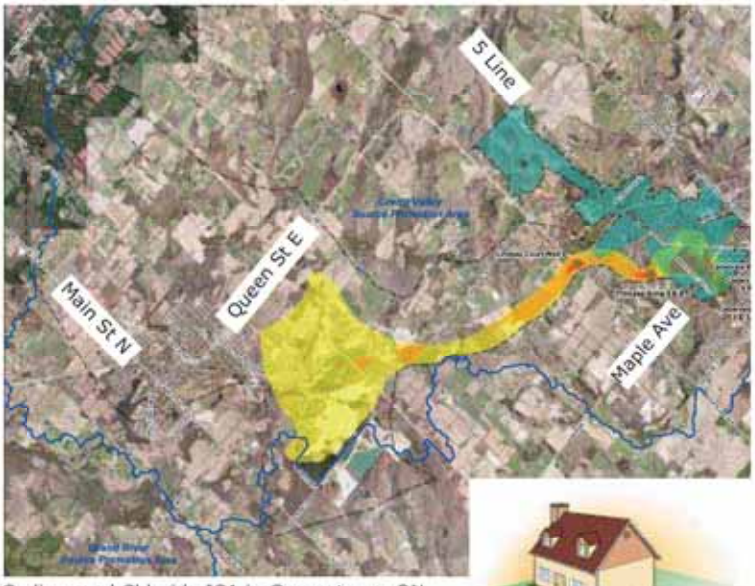
As soon as an Issue is identified, the SPC is required to determine where the source of contamination is coming from. Some of the sources of Issues have been identified and others are still undergoing study. More information will be included in future Updated Assessment Reports.



Sodium and Chloride ICA in Acton, ON

What is likely causing the sodium and chloride Issues in some wells?

Sodium and Chloride Issues are generally related to septic systems and road salt. The Issue of road salt can be found where well head areas include urban, industrial, commercial land uses, roads and parking lots. Septic systems do not remove salt from wastewater, which is also further aggravated by water softeners to treat 'hard' water that is high in minerals. When septic systems backwash this water into the septic field, salt can enter the groundwater.



Sodium and Chloride ICA in Georgetown, ON

Note: the maps on this and the next page include a dark turquoise area which indicates WHPA-E(8), or Groundwater Under the Direct Influence (GUDI) of surface water. This is where surface water, such as creeks and rivers, have a direct and quick impact into a well head. Selected Water Quality policies for WHPAs apply within GUDIs and are indicated on local maps and within the wording of the policy.

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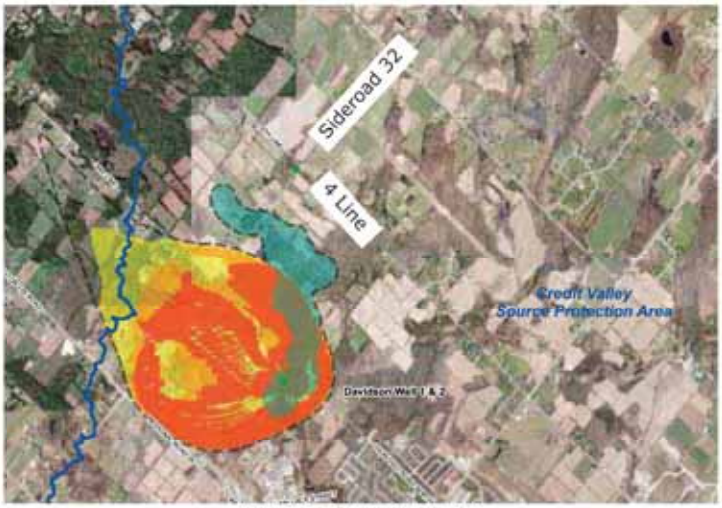
What is likely causing nitrates Issues in some wells?

Nitrates are chemical compounds that are generally found in agricultural and industrial operations, and urban and recreational areas. Agricultural operations that involve manure, Non-Agricultural Source Material (NASM) and fertilizer may be contributing to nitrates Issues. Industrial operations that release nitrogen into the atmosphere can return as precipitation back into the ground and surface water. Nitrogen can also leach into the ground from recreational facilities and golf courses that apply fertilizer. Septic systems are also a source of nitrates.



Nitrates ICA in Acton, ON

What is likely causing pathogen Issues in some wells?

The term pathogen includes a variety of disease-carrying organisms, such as a virus, bacteria, and fungus, and can thrive in water. In general, the source of pathogens includes manure from agricultural operations, sewage treatment plant outfalls and septic systems, storm sewers (combined and separated), and droppings from wildlife.

Pathogen ICA in Inglewood, ON

What are the policies for ICAs?

The Committee's policies that address ICAs are located in the Draft Source Protection Plan. Policies for each type of Issue are indicated within each of the following policies:

Sodium & Chloride	Nitrates	Pathogens
• SWG	• SWG	• SWG
• SAL	• ASM	• ASM
• REC	• LIV	• LIV
	• NASM	• NASM
	• FER	

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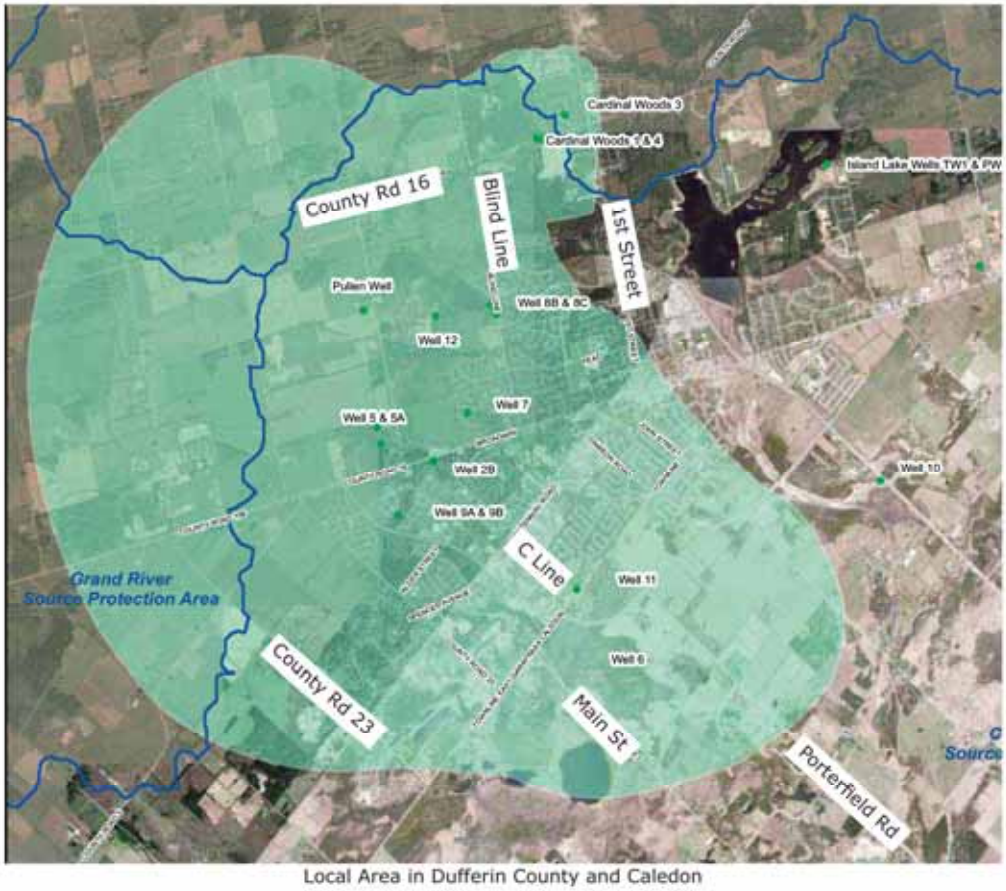
Water Quantity

Source Water Protection is not just about water quality – we have to make sure that we have enough water supply to ensure that we will have drinking water for years to come. The CTC Source Protection Committee is tasked with determining areas where there may be water quantity stresses. Studying water quantity stresses is different from water quality stresses. There are 3 separate tiers of "Water budget" studies that examine where drinking water supply is a concern.

Water Budgets
Water Budgets are studies that are based on scientific data that measures the amount of water that is entering, stored within and leaving a aquifer.

All aquifers that are a source of drinking water within the CTC Source Protection Region have undergone a Tier 1 and/or 2 Water Budget to determine where there might be stresses. When the results of these studies show stresses, they proceed onto the next level of analysis, a Tier 3 Water Budget.



Local Area in Dufferin County and Caledon

There are three areas within the CTC Source Protection Region that are undergoing Tier 3 Water Budgets. One area in Dufferin County is completed and the other two, in Halton Hills and York Region are still underway. The results of a Tier 3 Water Budget define a "Local Area" of vulnerability, where the demand to consume water and the ability to supply and store groundwater are under stress.

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What is a Tier 3 Water Budget?

A Tier 3 Water Budget focuses on the demand to use or consume water and the ability to "recharge" the supply back into the water system. It is the highest level of analysis in determining the stress on water supplies. It includes a complex analysis, refines the results of previous water budgets, and has a narrower geographic focus. Technical information on the Tier 3 Water Budget for Dufferin County is found in the Credit Valley Source Protection Authority Updated Assessment Report – Chapters 3 and 5. This report is available online at www.ctcswp.ca.

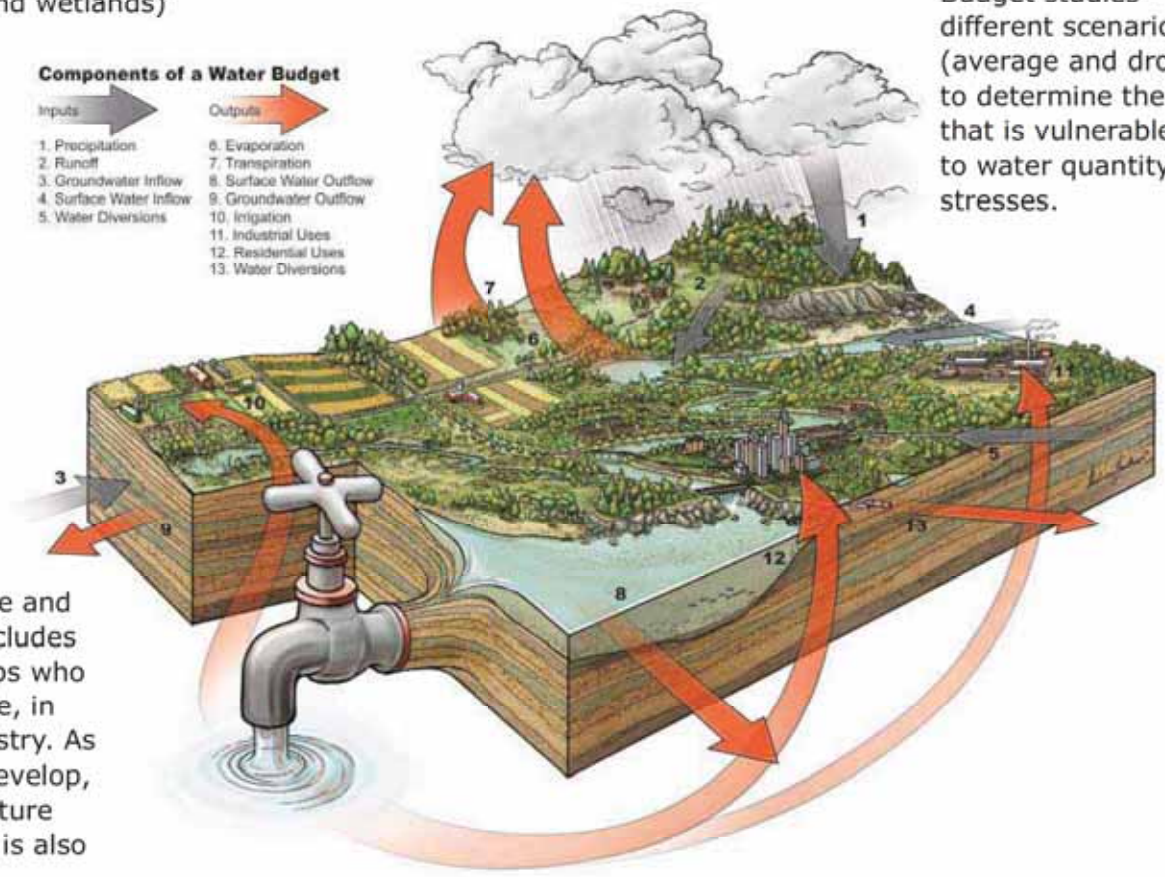
The Tier 3 Water Budget studies provides the following:

- The flow of surface and groundwater
- How water enters and leaves a watershed
- How much water is stored within the watershed
- How much water is available for human consumption
- How much water is required for natural heritage systems (ie. aquatic life and wetlands)

Recharge of water Supply

Underground aquifers are the source of well water, and need to be naturally "recharged" with more water, to continue to meet demands.

The Tier 3 Water Budget studies different scenarios (average and drought) to determine the area that is vulnerable to water quantity stresses.



Demands on water Supply

The demand to use and consume water includes the different groups who use water, at home, in business and industry. As towns grow and develop, the current and future demand for water is also included.

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Threats to Water Quantity

The results of the Tier 3 Water Budget defines the area that is vulnerable to water quantity threats. The two following Water Quantity threats are established by the Ministry of the Environment:

Threat #19

An Activity that takes from, but does not return water to the same aquifer or surface water body

When water is taken from, but not returned back to the same aquifer or water body, its supply begins to deplete. Depleting amounts of water can impair the long-term capacity of a local water system. Increasing or exceeding demand for that water supply could lead to a water shortage.

Examples:

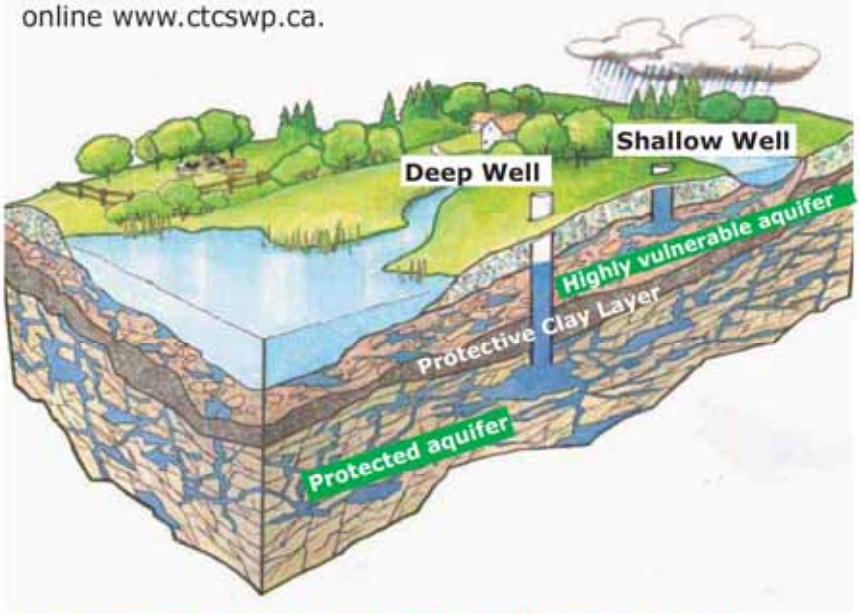
- municipal and private wells
- agriculture, golf courses, aggregate and other industrial operations

Threat #20

Activity that reduces the recharge of an aquifer

Similar to Threat #19, activities that reduce the recharge of water into an aquifer can impair the long-term viability of a water system. The impervious surfaces of built developments impact the recharge of an aquifer, because water cannot enter the ground to recharge the aquifer. Typical examples of this threat activity include land use developments, such as residential subdivisions, employment areas, or any land conversions to an impervious surface such as paved parking lots.

To learn more about Significant Groundwater Recharge Areas, see Volume I of the magazine, available online www.ctcswp.ca.



What are the policies for Water Quantity threats?

With the results of the Tier 3 Water Budget completed in the Dufferin County/Caledon area, the Source Protection Committee developed policies to address water quantity stresses in that Local Area. The policies that address water quantity are located in the Draft Source Protection Plan.

Policies for threat #19 are labeled "DEM" for Demand, and threat #20 are labeled "REC" for Recharge. These policies apply within the Local Area map, to those residents, landowners and businesses that are carrying out these two threats.

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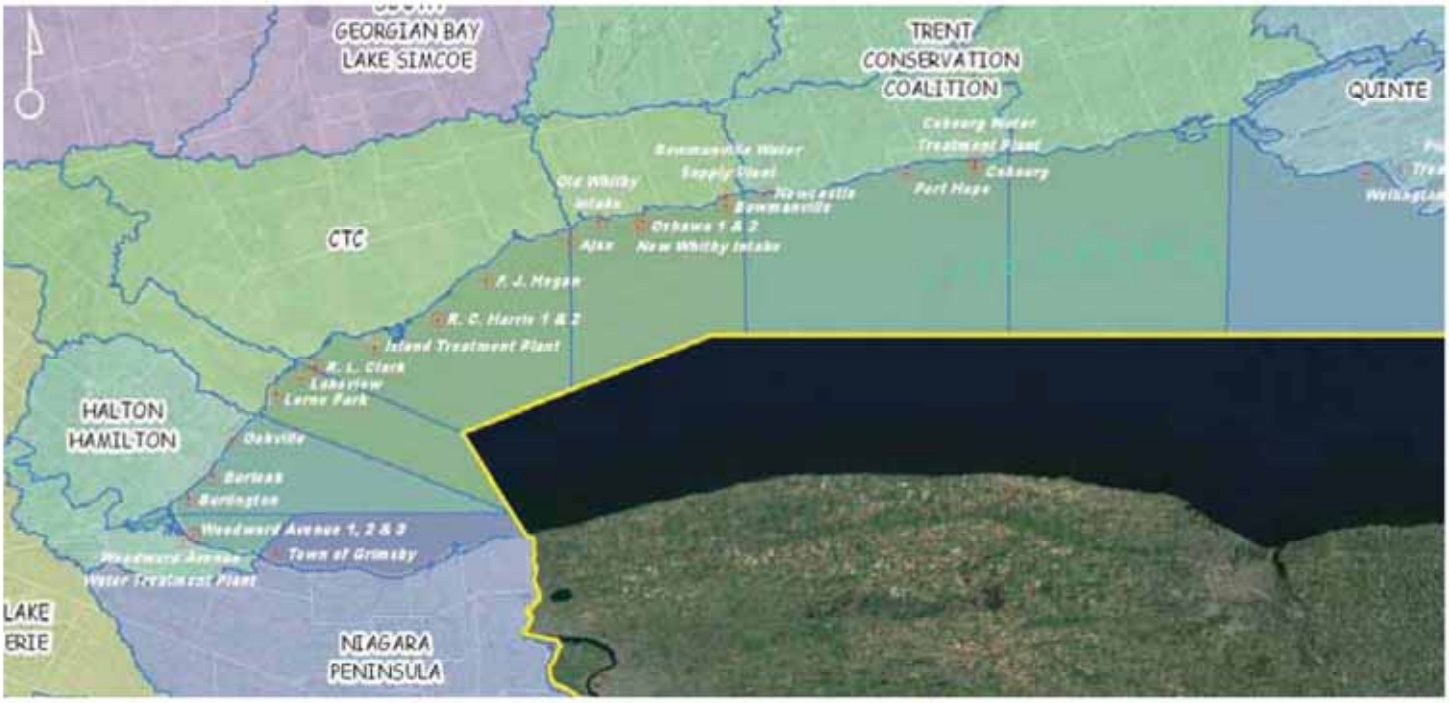
Lake Ontario

Approximately 80% of Ontario residents get their drinking water from Lake Ontario. Its abundance and high quality makes it possible for municipalities to deliver safe water at a low cost. Within the CTC Source Protect Region, Lake Ontario water is supplied to residents in Halton, Peel, Toronto, Durham and York Region. It is essential that Lake Ontario water remains a safe, economical and reliable source of drinking water because our health, economy and future well-being depend on it.

Lake Ontario Collaborative (LOC)
Municipalities from five Source Protection Regions obtain their water from Lake Ontario. The Lake Ontario Collaborative was formed to study the water quality of Lake Ontario. The Collaborative is made up of a Chair and experts from Source Protection Committees from the Niagara to the Quinte Source Protection Areas. A separate set of technical studies were carried out to evaluate the possible threats to Lake Ontario. The main focus of these studies was the area around all the municipal water intake pipes.



5 Source Protection Regions in the Lake Ontario Collaborative

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Municipal Water Intake Pipes

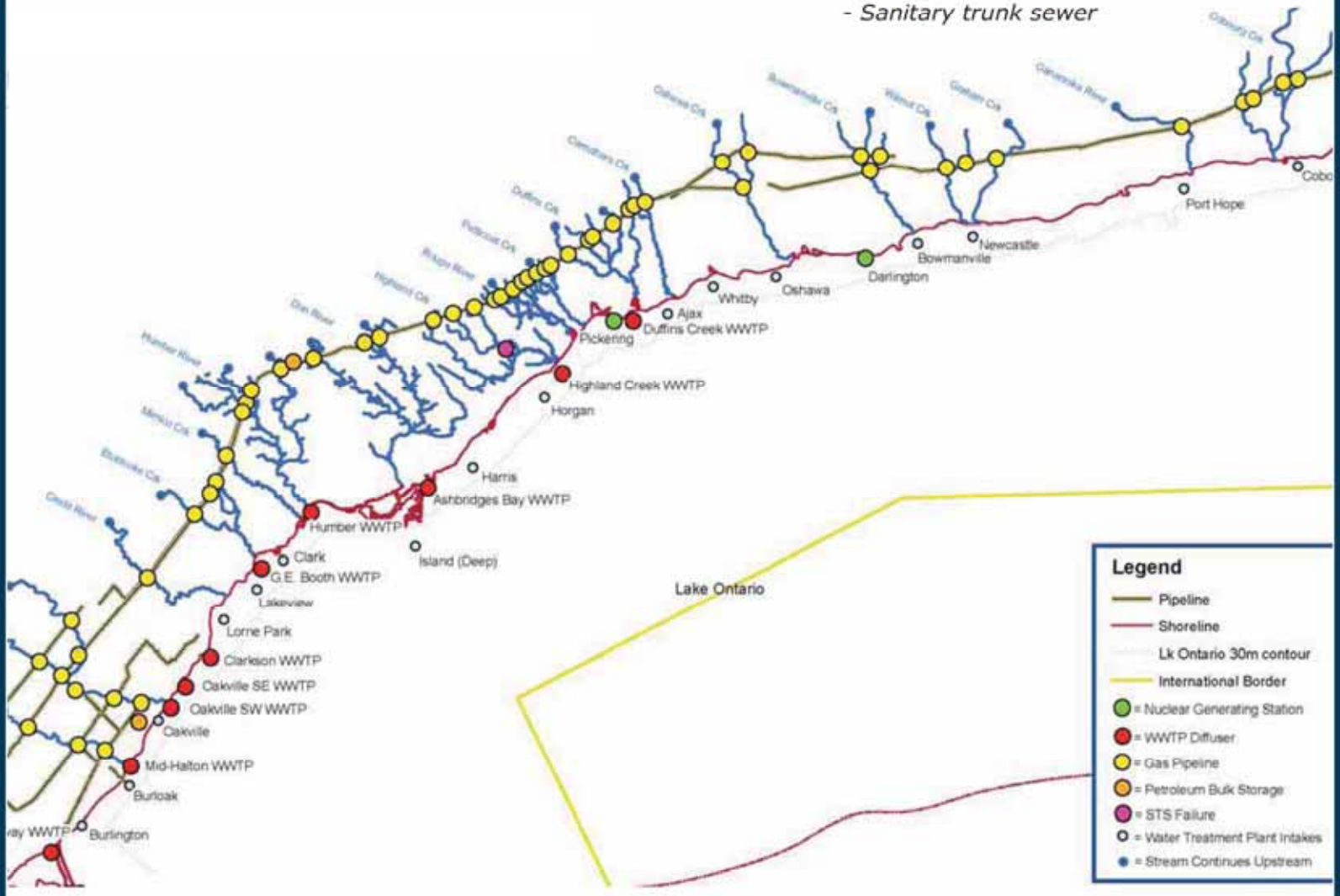
An intake is a pipe that pulls water from a surface water body to a municipal water treatment plant. Policies to manage or prohibit activities that threaten water quality around municipal intakes was determined by each Source Protection Committee, not the Lake Ontario Collaborative.

This maps shows the locations of threats and the areas that need to be protected.

In the Lake: - *municipal intake pipes*
- *wastewater treatment plant outfall*

On the Shore: - nuclear generating stations

Inland: - *bulk petroleum storage*
- *gas pipelines and*
- *Sanitary trunk sewer*



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What are the threats to drinking water in Lake Ontario?

Two of the 19 water quality threats, #2 Sewage (includes wastewater and sanitary sewage) and #15 Fuel, are relevant in Lake Ontario.

The CTC Source Protection Committee also added two Local Threats which were approved by the Ministry of Environment: Petroleum pipelines and nuclear power stations (specifically, tritiated deuterium). All threats were identified by modeling spills based on past, real events.

The model (called MIKE-3) demonstrated that **possible spill events from each threat, would exceed raw drinking water standards at the intake**. This means that the threats are considered to be Significant, so the SPC must make policies to manage or prohbit the threat.

The location of possible spill events included the shore of Lake Ontario, as well as upstream in the watercourses that drain into the lake. The spills are considered to be Significant if their contaminants reach the intake at levels over the raw drinking water standards.

What are the policies for Lake Ontario threats?

The CTC Source Protection Committee developed policies to address each of these threats. They are labeled with "LO". Policies also include recommendations about continuing to study and model the lake, and collaborative approaches for all levels of government to manage these threats.

Why is sewage a threat in Lake Ontario? (threat #2)

Wastewater treatment plants removes or disinfects the physical, chemical and biological contaminants from wastewater, and then the treated water is returned to the water system. The main concern of a failure at a wastewater treatment plant is *E. coli,* which in some strains can impact human and ecosystem health.

In conjunction with wastewater treatment plants, ***sanitary sewers*** are also a threat because they carry wastewater underground to the treatment plants.

Sanitary sewers in the CTC travel across watercourses, which drain into the lake. Some sanitary sewers are also located near the shore of Lake Ontario.

A break in these sewers could release *E. coli* into the streams and empty into lake. Modeling spills at wastewater treatment plants and where sanitary sewers cross water courses showed that discharges of *E. coli* from sewer lines in the CTC could flow into the intake at levels exceeding raw drinking water standards.

Please note that the operations of each threat are regulated and have plans for emergency situations. These risk management regulations were ***not*** considered in the evaluation or modeling of spill scenarios.

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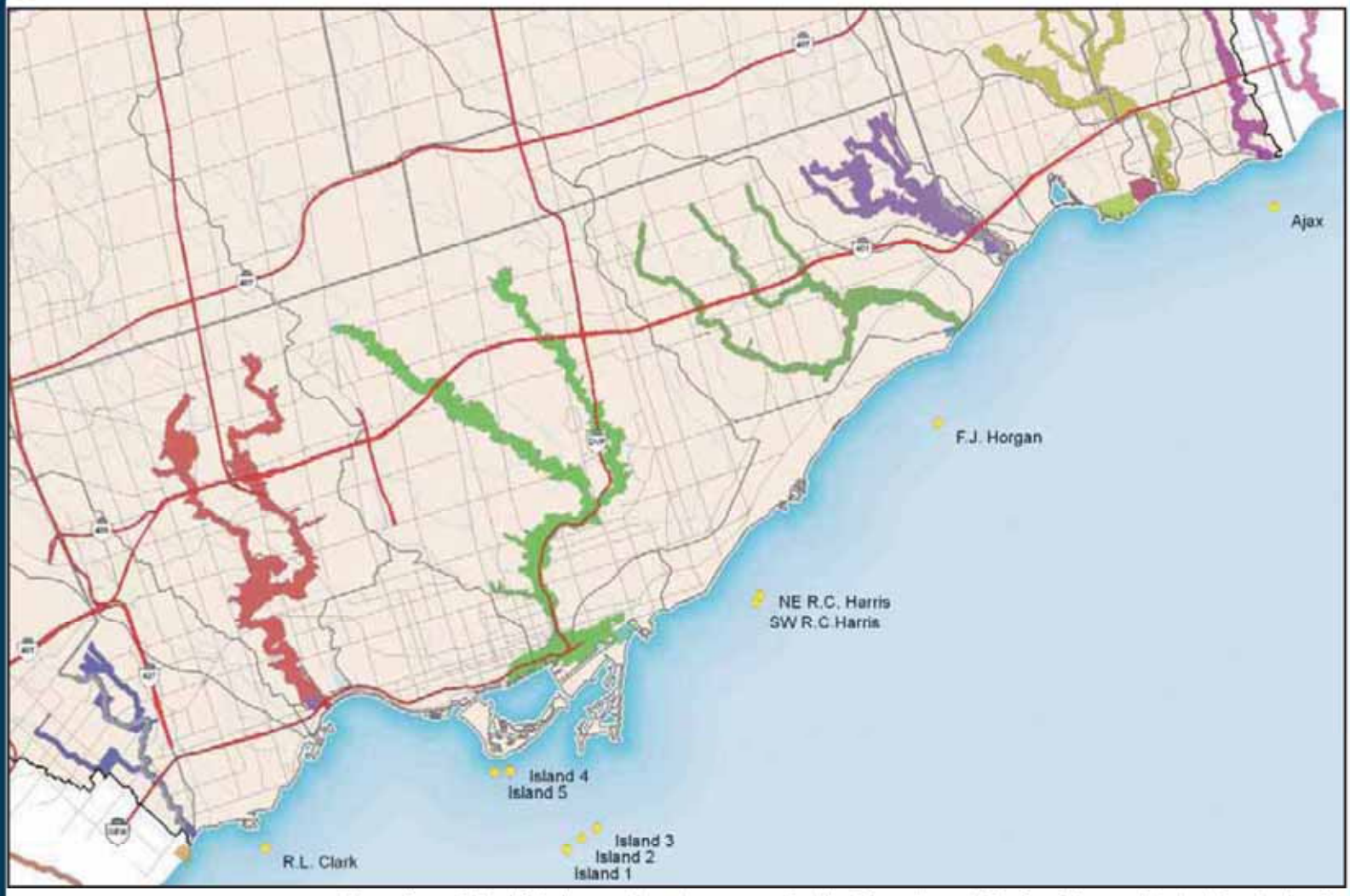

Map of municipal intakes and watercourses in the Toronto and Region Source Protection Authority

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Why is fuel a threat to Lake Ontario? (threat #15)

The bulk storage and handling of fuel is a threat because benzene, a petrochemical naturally found in petroleum, can cause severe illness and effects in human health. Facilities located in Oakville and North York were modeled, which showed that possible spills would reach intakes with levels of benzene above raw drinking water standards.

Why are petroleum pipelines a threat to Lake Ontario? (Local Threat)

Underground pipelines that transport petroleum were added as a Local Threat to Lake Ontario water quality. Petroleum pipelines travel across watercourses and a break in the pipelines at those sites would result in levels of benzene above the raw water drinking standard at intakes.

Humber River flows into the Lake Ontario

Why are nuclear power stations a threat to Lake Ontario? (Local Threat)

The operations at the nuclear power stations in Pickering and Darlington produce tritiated deuterium, a chemical that is combined with water and is used to cool generators. It is processed and released back into the lake at levels that are regulated by law.

Based on the modeling results, a spill at these plants would reach the intakes pipesat levels above the raw drinking water standards.

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Public Consultation on Draft Source Protection Plan

Public consultation is a key component to produce a practical and effective Source Protection Plan. Landowners, residents, businesses and the general public are invited to attend a number of open houses to learn what kinds of policies are being proposed by the SPC, and to discuss their concerns and questions with staff and Committee members. The SPC must make policies to manage Significant threats (so that they are no longer significant) and to prevent new significant threats – in order to keep our drinking water sources safe.

Open Houses in the CTC

The policies in the Draft Source Protection Plan are in the first draft version and may be changed by the SPC after reviewing the written comments from the public. It is important that these policies achieve the right balance to be effective in protecting drinking water; and to be practical for those who are affected by them. Seven open houses are scheduled across the CTC Source Protection Region during Spring, 2012.

Open houses will be advertised in local and regional newspapers, and landowners who may be affected by policies will receive notice in the mail. Copies of the Draft Source Protection Plan will be available online at www.ctcswp.ca and at conservation authority offices and local libraries.

Submitting your Comments

It is essential that comments from members of the public are submitted in writing, by email or mail, in order to obtain clear documentation and record. If you require assistance to submit written comments, please contact us.

The deadline to receive written comments that will be considered by the Source Protection Committee is **May 1, 2012** at 5:00 pm.

Next Steps

After the first round of public consultation in Spring, 2012, a second period of public consultation will be take place during Summer, 2012. The Proposed SPP will be made available online and in hard copy at Conservation Authorities and local libraries only. Members of the public can submit comments during this time, which will be attached submission of the Proposed Source Protection Plan to the Minister of Environment.

Source Protection Committees must submit their Proposed Source Protection Plan to the Minister of Environment by August 20, 2012. After August 20, 2012, the Minister of Environment will review the Draft Proposed Source Protection Plan to approve it or require changes be made. Once approved, the Source Protection Plan will be implemented, monitored and updated approximately every 5 years.

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The Assessment Reports for the CTC Source Protection Region are a requirement of the *Clean Water Act, 2006* (CWA).

Assessment Reports identify the location and nature of potential risks to sources of municipal drinking water supplies. These risks include activities that impact or could adversely impact drinking water quality or quantity from groundwater and/or surface water sources.

This document, Volume II, is a companion piece to the information that has been updated in the Assessment Reports, to help guide stakeholders through their cotent and results. Volume I of this magazine provides a general overview and is available online.

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