

Disclaimer

The information contained in this report has been compiled from various sources. The information gathered has been used to assess vulnerable areas across the region, and threats to municipal drinking water sources in accordance with prescribed methods of the *Clean Water Act* (2006) and the Technical Rules: Assessment Report (2008).

While every effort has been made to accurately depict the information, errors or omissions may exist. Given the size and complexity of this region, many of the assessments comprising this report were completed at a regional or watershed scale. As such, some site-specific details may not have been considered to date. Over time, this Assessment Report will be periodically updated and refined to reflect new and / or corrected information ([such as the 2021 Technical Rules](#)).

It should be noted that, where an activity has been classified as a significant threat in error, the forthcoming policy in the Source Protection Plan will not apply. Similarly, if a significant threat activity has been omitted in error, the forthcoming policy in the Source Protection Plan will apply.

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1 Executive Summary

1.1 Introduction

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

The Walkerton Inquiry, 2002

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 system, the most comprehensive of which was Source Water Protection. The province responded with the *Clean Water Act, 2006* (CWA) which was proclaimed into effect on July 3, 2007. The CWA introduced a new level of protection – **Source Water Protection** – for the Province's drinking water resources that will help communities across Ontario enjoy a safe and plentiful supply of clean drinking water.

The basic premise of Source Water Protection is simple:

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.

Though it is an easy concept, putting Source Water Protection into practice is a challenge because it involves gathering a vast amount of data, analyzing the data and communicating its findings. Water belongs to everyone and it is everyone's responsibility to protect it. Source Water Protection is designed to be a locally driven process and involves people from all across the province from all different sectors of society. This local involvement is a huge strength of the process. The province set out a 5-year plan to develop and enact source protection plans. This process started in 2008 and will continue well beyond the completion of source protection plans in 2012 to ensure safe, clean drinking water is available to residents of Ontario for years to come.

Table 1 Source Protection Process Timeline

Year	Stage	Tasks
Year 1 (2008-09)	1	<ul style="list-style-type: none"> • Laying the foundation • Establish source protection authorities • Establish source protection committees • Negotiate terms of reference
Year 2 (2009-10)	2	<ul style="list-style-type: none"> • Assessment of threats • Identify and assess threats to drinking water • Prepare Assessment Report
Year 3 – 5 (2010-12)	3	<ul style="list-style-type: none"> • Source Protection Planning • Prepare source protection plan, including policies to address significant threats to drinking water
Year 5+ (2012+)	4	<ul style="list-style-type: none"> • Implementation • Implement the source protection plan • Inspect and enforce • Monitor and report • Review plan

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1.2 About this Document

This is a companion document to the Lake Simcoe and Couchiching-Black River Source Protection Area (Part 2: Black-Severn River Watershed) Assessment Report. This document is designed to give the reader a high-level overview of the technical findings as well as direct them to the appropriate chapter for more information. This is an excellent starting place for people not familiar with Assessment Reports and what kind of information can be found therein. For more comprehensive information, the reader is directed to the full text of each Assessment Report which can be found on our website at www.ourwatershed.ca.

1.3 The South Georgian Bay Lake Simcoe Region

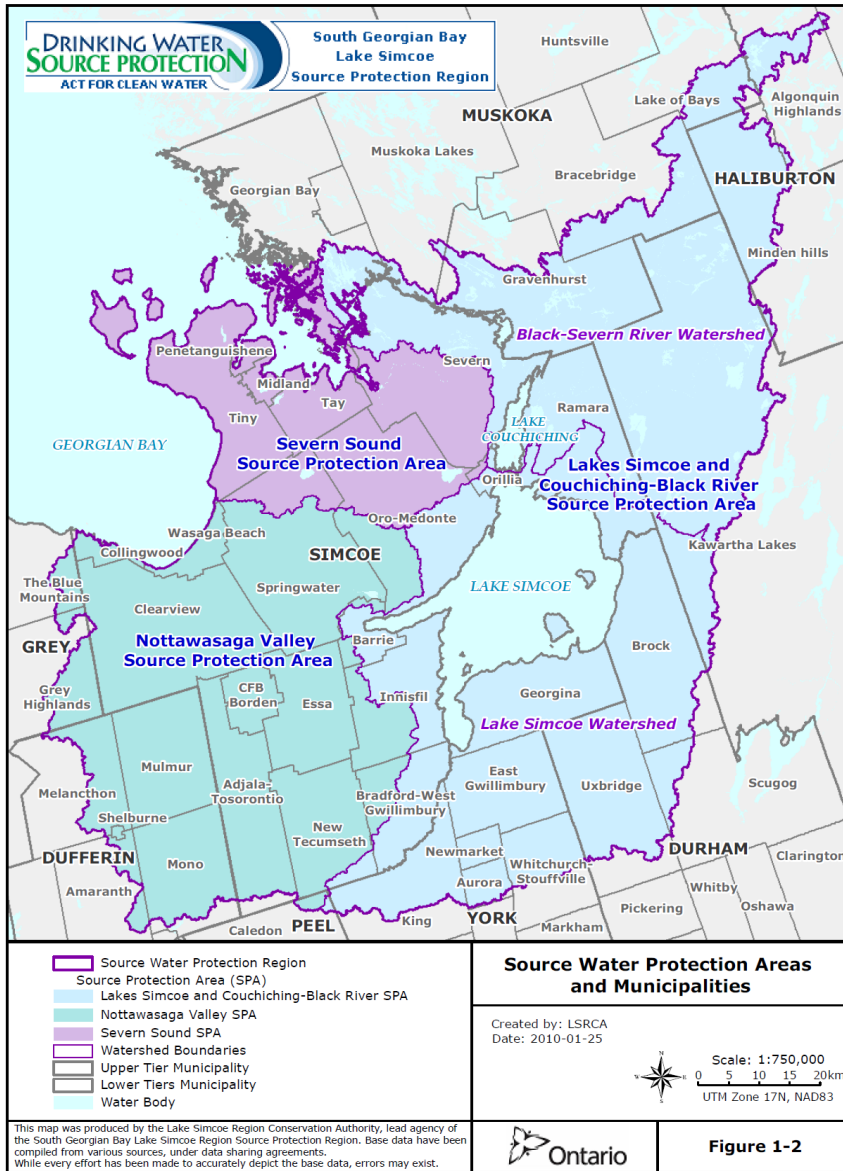


Figure 1. Map of the South Georgian Bay Lake Simcoe Source Protection Region

The South Georgian Bay-Lake Simcoe (SGBLS) Source Protection Region (SPR) is one of 19 Source Protection Regions across Ontario. It contains four watersheds that encompass fifty-two municipalities and three First Nations communities, with 107 drinking water systems, 275 municipal wells, 16 municipal surface water intakes, and more than 50,000 private wells. It stretches from the GTA in the south and as far north as Algonquin Park. It is one of the most diverse regions in the province in every respect: geography, population, land use, and geology. All told, the region has about one third of the municipal systems in the province!

The region is divided into three (3) **Source Protection Areas (or SPAs)**. These three SPAs follow the existing boundaries of The Lake Simcoe Region Conservation Authority (with the addition of the Black Severn River watershed), The Nottawasaga Valley Conservation Authority, and the Severn Sound Environmental Association. Each of these Source Production Areas belong to the South Georgian Bay-Lake Simcoe Source Protection Region. Each of the three Source Protection Areas are required to produce a separate Assessment Report. For ease, this document represents a composite of all three Assessment Reports presenting the key findings of each.

1.4 The Committee

Mission:

“The Source Protection Committee exists to ensure an open process is followed in the development of reasonable, science-based policies that protect municipal sources of drinking water now and into the future.”

The Source Protection Committee (SPC) is responsible for creating the Assessment Reports as well as the Source Protection Plan. The SPC is a reflection of the people who live in the watershed. Source Water Protection is designed to be a locally driven process, and so the committee is comprised of local residents who know and understand the concerns of residents in the Region. The committee represents a wide range of experience ranging from public interest and health, to municipal, agricultural, industrial and economic representatives all of which is integral to developing local, relevant, respected plans to protect drinking water. The committee members’ full biographies are available on the South Georgian Bay Lake Simcoe’s website at www.ourwatershed.ca.

The Source Protection Committee is responsible for developing three key pieces of documentation that will complete the Source Protection Planning process:

1. Terms of Reference

Lays out who will be responsible for what part of the Source Protection Plan and how the work will be conducted. (Approved June 29, 2009)

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2. Assessment Report

Describes the watershed and as well as identifies the number of potential threats to local drinking water sources. (This is the executive summary of this document)

3. Source Protection Plan

Includes policies to address threats to drinking water, including both voluntary and mandatory measures to reduce activities identified as risks. This will include broad consultation with the public. (Due in 2012)

The Source Protection Committee is supported by Conservation Authority staff and scientists as well as working groups who will help them in developing these documents.

The Lake Simcoe Region Conservation Authority (with representation from the Black River watershed), Nottawasaga Valley Conservation Authority and Severn Sound Environmental Association, all acting as Source Protection Authorities, are responsible for reviewing these documents and recommending them to the Ministry of Environment, [Conservation and Parks](#) for approval.

Once the Ministry of Environment, [Conservation and Parks](#) has granted approval, it will be up to municipalities to implement them.

1.5 Key Terms

Aquifer

Aquifers are underground water-bearing layer(s) of soil, sand, gravel, or rock that will yield usable quantities of water to a well. Aquifers can be layered, and, generally speaking, the deeper the aquifer the more protected it is. Most municipal wells draw from very deep aquifers.

Hazard Rating

This is the score that is associated with the threat activities. It is determined by threats tables provided to the committee by the Ministry of the Environment, [Conservation and Parks](#).

HVA

Highly Vulnerable Aquifers – These are aquifers that are more susceptible to contamination because of their location. In general, an HVA will consist of source granular aquifer materials (e.g. sand and/or gravel) or fractured rock that has a high permeability and is exposed near the ground surface with a relatively shallow water table.

IPZ

Intake Protection Zone – The area on the water and land surrounding a municipal surface water intake. It consists of three ‘zones’: IPZ-1 is a 1km radius around the intake; IPZ-2 is based on the

amount of time it takes a potential contaminant to reach the intake based on the time it takes the operator to shut down the plant (minimum two hours); and IPZ-3 is the area of the water and land that may lead to contaminants reaching an intake during an extreme event (such as a one in one hundred year rainfall).

SGBLS

South Georgian Bay- Lake Simcoe – The region which comprises the three Source Protection Areas: *Lakes Simcoe and Couchiching- Black Severn River Source Protection Area, Nottawasaga Valley Source Protection Area, and Severn Sound Source Protection Area*

SGRA

Significant Groundwater Recharge Areas –Recharge areas tend to be areas that are characterized by permeable soils, such as sand or gravel that allow the water to seep easily into the ground and flow to an aquifer. A recharge area is considered significant when it helps maintain the water level in an aquifer that supplies a community with drinking water, or supplies groundwater recharge to a cold water ecosystem that is dependent on this recharge to maintain its ecological function.

Significant (moderate, low) Drinking Water Threat

A drinking water threat is scored as significant if its threat score is over 80. This is determined by multiplying the hazard ranking by the vulnerability score. Scores between 60 and 79 are determined to be moderate drinking water threats while a score between 40 and 59 is considered a low drinking water threat. The source protection plan must make policies to reduce all significant drinking water threats.

Source Protection Plan

The Source Protection Plan is the culmination of all the work to date. It outlines policies that will outline how drinking water threats are to be mitigated. This can include existing legislation, risk management plans, education and outreach policies, and, in certain cases the committee can prohibit existing or future activities in a particular location.

Threat Score

The threat score is the product of the hazard score (how bad is the threat) and the vulnerability score (how vulnerable is the land).

Vulnerability Score

The vulnerability score of a parcel of land is determined by looking at how close it is to a well, how easily water can travel through it, as well as if there are any transport pathways (i.e. an improperly decommissioned well is a conduit to the aquifer and would be considered a “transport pathway”).

Vulnerable Area

The *Clean Water Act* states that there are four vulnerable areas which we must map as part of the Source Water Protection process. These are: Wellhead Protection Areas (WHPAs), Intake Protection Zones (IPZ), Highly Vulnerable Aquifers (HVA) and Significant Groundwater Recharge Areas (SGRAs)

Water Budget

A Water Budget is a tool that helps us ensure we have enough water. It measures how much water enters the system, how much leaves the system (through natural processes and human consumption) in order to determine if water being used is more than is available (water quantity stresses) within a watershed.

WHPA

Wellhead Protection Area – The area on the land around a municipal well, the size of which is determined by how quickly water travels underground to the well, measured in years.

1.6 Drinking Water Threats

Under the *Clean Water Act*, there are 21 categories of potential threats representing numerous activities which can negatively affect the quality and/or quantity of drinking water. The following activities are *prescribed as Drinking Water Threats*:

1. The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act.
2. The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.
3. The application of agricultural source material to land.
4. The storage of agricultural source material.
5. The management of agricultural source material.
6. The application of non-agricultural source material to land.
7. The handling and storage of non-agricultural source material.
8. The application of commercial fertilizer to land.
9. The handling and storage of commercial fertilizer.
10. The application of pesticide to land.
11. The handling and storage of pesticide.
12. The application of road salt.
13. The handling and storage of road salt.
14. The storage of snow.
15. The handling and storage of fuel.

16. The handling and storage of a dense non-aqueous phase liquid.
17. The handling and storage of an organic solvent.
18. The management of runoff that contains chemicals used in the de-icing of aircraft.
19. An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.
20. An activity that reduces the recharge of an aquifer.
21. The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard.
22. The establishment and operation of a liquid hydrocarbon pipeline.

Whether these activities are considered a Significant, Medium or Low Drinking Water Threat (or even a threat at all) depends on a scoring process that considers both the vulnerability of the well or surface intake to contamination (Vulnerability Score) and how hazardous the activity is (Hazard Rating). If, when you multiply the two scores together you get a number (Risk Score) higher than 80, then the activity is a Significant Drinking Water Threat. If the number scores between 60 and 79, it is considered a Moderate Drinking Water Threat, and between 40 and 59 it is considered a Low Drinking Water Threat.

Hazard Rating x Vulnerability Score = Risk Score

The Ministry of the Environment, Conservation and Parks has provided tables which outline the **Hazard Rating** of the “prescribed threats” (listed above), this rating depends on what is called the “circumstance” i.e. - how much, and how dangerous each of those 21 threats are. For example, storage of 10 tonnes of chemical A will have a higher Hazard Rating than one ton of the same chemical. Likewise, a 100 gallon underground fuel tank will have a lower Hazard Rating than a 1000 gallon one (e.g. a domestic fuel tank compared to a gas station).

The **Vulnerability Score** is determined by looking at the landscape around a water source and determining how the geology, geography, hydrogeology and soil (among other things) work together to affect how slowly or quickly the water is moving toward the source of drinking water. This is called intrinsic vulnerability. If the water moves quickly, it follows that a contaminant would also move quickly; therefore, that area will be more vulnerable. If it is more difficult for the contaminant to get to the source, the landscape is less vulnerable. Other factors are taken into consideration to determine the Vulnerability Score, such as old wells which may be a conduit for contamination to get quickly into the water underground (these are called transport pathways.)

2 Assessment Report Chapter Summaries

The Assessment Report both gives an overview of the watershed, its characteristics and the availability of water as well as gives specific information on where threats exist on the landscape and of what nature the threats are.

What follows is the summary, by chapter of the Assessment Report. For ease of reading, the highlights of the Lake Simcoe and Couchiching-Black River Source Protection Area, Part 2: Black-Severn River Watershed are compiled in this document.

The required components of an Assessment Report are as follows:

- **Characterization of the Source Water Protection Area watershed:** This includes descriptions of the natural and human geography;
- **A Conceptual water budget for the entire Source Water Protection Area and a Tier 1 water budget for each subwatershed:** Those systems identified as having a potential water quantity stress in the Tier 1 water budget, progress to a more detailed Tier 2 water budget, and Tier 3 risk assessment if needed;
- **Broad scale assessment of Regional Groundwater Vulnerability:** This aspect of the Assessment Report requires both Highly Vulnerable Aquifers (HVA) and Significant Groundwater Recharge Areas (SGRAs) be identified; and
- **Drinking water system assessment:** For each municipal drinking water system within the Terms of Reference, the Vulnerability of the supply wells or surface water intakes is assessed and any potential Significant Threats to the water quality are identified.

The content of the Assessment Report is based on the best available information and have been prepared to meet all the requirements of the *Clean Water Act* and Technical Rules. There are cases; however, where required information is either not available (a data gap) or the information provided is not based on the most recent data. The Assessment Report will be periodically updated so that any new data or information can be included.

1.7 **Chapter 1: Introduction**

This chapter introduces the reader to the South Georgian Bay- Lake Simcoe Source Protection region, its structure, committee and the municipal water systems therein.

As highlighted in the table below, within the Black Severn River watershed, there are 10 municipal supply wells that have been assessed, 6 Surface Intakes providing water for 10 Drinking Water Systems.

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Table 2. Number of Drinking Water Systems, Municipal Wells, and Surface Water Intakes by SPA

Source Protection Area	Number of drinking water Systems	Number of Municipal Supply Wells	Number of Municipal Surface Water Intakes
Lake Simcoe and Lake Couchiching – Black River - Lake Simcoe	30	79	7
Lake Simcoe and Lake Couchiching – Black River - Black-Severn	10	10	6
Nottawasaga Valley	34	109	1
Severn Sound	35	88	2
Total	109 * (107)	286 **	16

*Systems in Barrie and Orillia counted twice in the Total as the drinking water systems are in two Source Protection Areas.

** Number of wells in each SPA location, some wells are servicing communities in other SPAs.

1.8 Watershed Characterization

Watershed characterization is a snapshot of the entire watershed, including the physical and natural geography and the boundaries encompassing both human and natural features. Understanding the characteristics of a watershed is essential in understanding how quality and quantity of drinking water is affected by both human and natural interactions.

Relative to the other areas in the SGBLS region, the Black-Severn River watershed is sparsely populated (less than 54,000 residents) with few large urban or agricultural areas. The land use tends to be a blend of rural residential and crown land settings where population dramatically increases for the summer months as a result of a vibrant tourism industry and seasonal residents.

The Black-Severn River watershed lies in the north east portion of the SGBLS region. It contains three upper tier municipalities (Simcoe, Muskoka, and Haliburton), one separated city (Orillia), one single tier municipality (City of Kawartha Lakes) and nine lower tier municipalities (Gravenhurst, Bracebridge, Lake of Bays, Muskoka Lakes, Georgian Bay, Minden, Algonquin Highlands, Severn and Ramara).

The Black-Severn River watershed is part of the Trent-Severn Waterway. As such, water levels and flows throughout the Severn River drainage basins, including the Black River subwatershed, are managed by Parks Canada, which is an Agency of Environment Canada.

Overall, 1,682 km² of the Black-Severn River watershed is considered natural vegetative cover, or approximately 60% of the total area. The Black River watershed is located within four regional-scale physiographic regions:

- Number 11 Strip, characterized by deposits of clays, silts and fine- to medium-grained sands that occupy hollows and depressions within the bedrock of the Canadian Shield.
- Carden Plain, which is a limestone plain that extends from the Kawartha Lakes to Lake Couchiching and typically has silt to silty-sand soils less than 1 ~~metre~~metre in depth.
- Simcoe Lowlands, which extends from the Dalrymple area to north of Kahshe Lake and adjacent to the Black River, is characterized by flat, low-lying plains composed of clays, silts and fine- to medium-grained sands.
- Georgian Bay Fringe, which borders Georgian Bay and is characterized by exposed bedrock with little soils.

1.9 Water Budget

A consistent supply of drinking water is vital for the people living within the Lake Simcoe watershed to live and conduct business. Within the watershed, drinking water is obtained from municipal and private wells, and surface water taken directly from Lake Simcoe or Lake Ontario. Groundwater wells and surface water intakes supply the agricultural industry with the large volume of water needed for livestock watering and crop irrigation. The recreation, commercial and industrial industries also require ground and surface water to continue to be viable. In addition, water is required for natural processes for habitat, and food for wildlife in the area. Therefore, it is important to understand where our drinking water is coming from, and how abundant or limited the supply may be in some regions of the watershed.

A water budget analysis is used to manage the quantity of existing and future sources of drinking water. The water budget aims to determine the location and quantity of water within the various components of the hydrologic system, and uses data to characterize how the water moves through the watershed. A water budget is used to determine how much water enters the watershed, how much is stored within the watershed and how much water leaves it (through natural or human processes). The analysis helps determine the amount of water available for human use while ensuring enough is left for natural processes to maintain ecological needs. It also aids in the management of future water needs within the watershed.

The water budget component for the Assessment Report has been conducted on a tiered approach, which can consist of up to four levels of analysis depending on the potential stress level of each tier. As you proceed from one tier to the next, the scope of study narrows, and the science becomes more complex:

- **Conceptual Water Budget**
- **Tier 1**
- **Tier 2**
- **Tier 3**

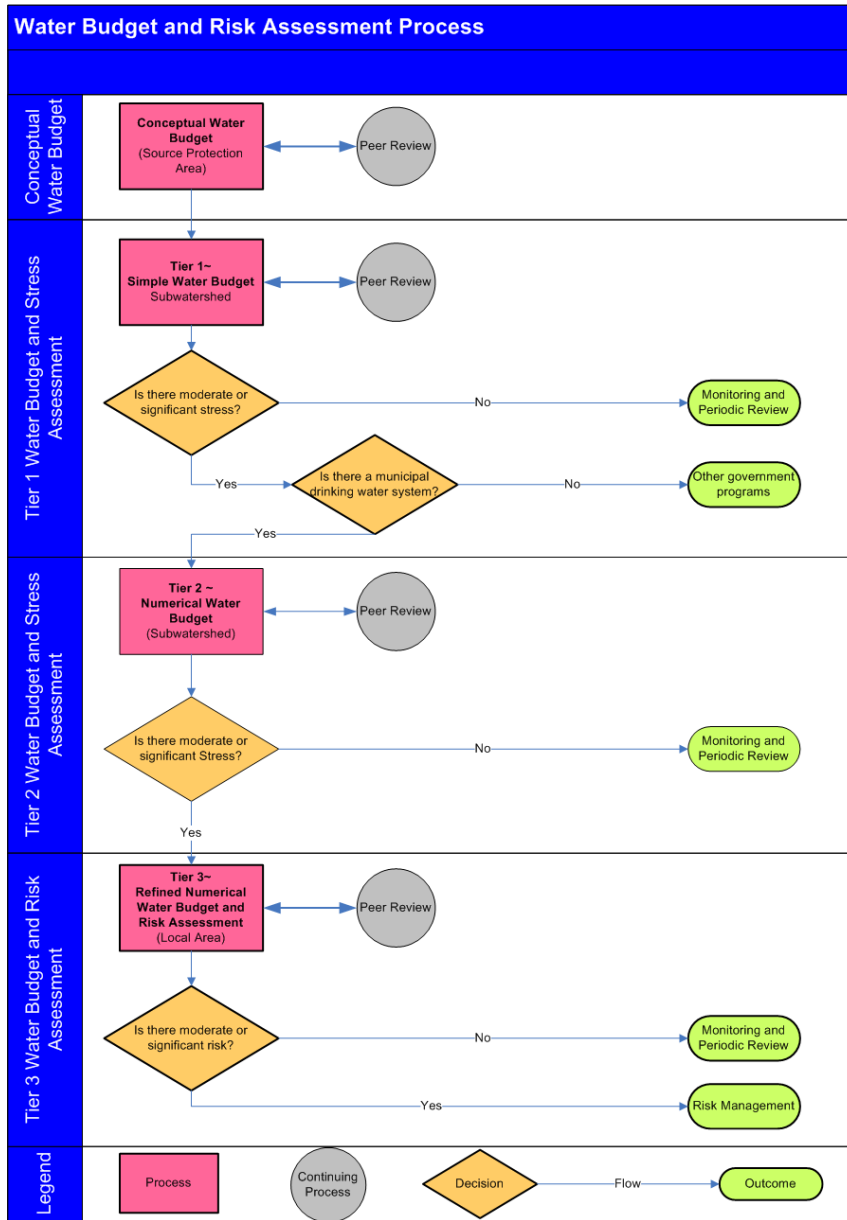


Figure 2 Tiered Water Budget and Risk Assessment Process

All subwatersheds are required to undergo a Conceptual water budget and Tier 1 water budget analysis in the Assessment Report. If any subwatersheds are found not to be stressed from a water quantity perspective or do not contain a municipal drinking water system, they are excluded from further study in the source protection planning process.

If a subwatershed is identified as exceeding the proscribed threshold for potential stress and contains municipal drinking water systems, it advances to a more complex Tier Two water budget analysis. The goal of the Tier Two assessment is to confirm or negate the stress assignment completed in the Tier One using a more detailed approach that includes complex numerical modeling. The Tier Three Water Budget and Water Quantity Risk Assessments are carried out for municipal groundwater systems that are located within subwatersheds that have been assigned a Tier Two moderate or significant potential level of stress.

Water quantity risk refers to the likelihood that threats to water quantity may render an existing or planned drinking water source impaired, unusable or unsustainable. The objective of the Tier Three assessment is to evaluate the risk that a community may not be able to meet its current or future water demand from a water source (e.g., stream, lake, or aquifer). Several subwatersheds in the Region have been identified for further evaluation and are currently undergoing Tier Three Water Budget and Water Quantity Risk Assessments.

The above flow chart depicts how a decision is made to move to the next Tier in the water budget and risk assessment process. It is important to note that an essential component in the water budget process is that each study is required to be peer reviewed by a team of qualified professionals. Each of the water budget studies discussed within the chapter were subsequently peer reviewed by qualified professionals. The objectives of the peer review team include:

- 1) To ensure consistency with the expectations of the Technical Rules for completion of the Assessment Report.
- 2) To ensure appropriate methodologies are utilized, and that the technical assumptions are necessary and reasonable.
- 3) To ensure scientifically defensible products.

The Conceptual Water Budget and Tier 1 assessment was completed for the Black-Severn watershed. Additional water budget efforts (Tier 2 assessments) were not necessary for any of the subwatersheds identified within the Tier 1 water budget since water availability outweighed water use within those subwatersheds. The following table identifies the level of analysis required for each subwatershed and drinking water system within the Black-Severn River watershed.

The following table of the Black-Severn River watershed, indicates which subwatersheds showed potential stress at a Tier One Level, and have proceeded for further analysis.

Table 3 Subwatershed and Municipal Summary of the Water Budget and Risk Assessment Process: Black Severn River

Subwatershed	Upper Tier Municipalities	Lower Tier Municipalities	Municipal Drinking Water System (Yes / No)	Conceptual / Tier 1	Tier 2	Tier 3
Lake Couchiching/St. John	Simcoe County	Orillia	Yes (GW) & (SW)	√	-	-
Severn River	Simcoe County	Severn	Yes (GW)	√	-	-
Severn River	Simcoe County	Ramara	Yes (GW)	√	-	-
Upper Talbot River	Kawartha Lakes	Kawartha Lakes	Yes (GW)	√	-	-
Black River	Haliburton	Algonquin Highlands	No	√	-	-
Black River	Haliburton	Minden Hills	No	√	-	-
Black River	Kawartha Lakes	Kawartha Lakes	No	√	-	-
Black River	Simcoe County	Ramara	No	√	-	-
Black River	Muskoka	Gravenhurst	No	√	-	-
Head River	Haliburton	Minden Hills	No	√	-	-
Head River	Kawartha Lakes	Kawartha Lakes	No	√	-	-
Head River	Simcoe County	Ramara	No	√	-	-

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Subwatershed	Upper Tier Municipalities	Lower Tier Municipalities	Municipal Drinking Water System (Yes / No)	Conceptual / Tier 1	Tier 2	Tier 3
Kashe/Gartersnake River	Muskoka	Bracebridge	No	√	-	-
Kashe/Gartersnake River	Muskoka	Gravenhurst	No	√	-	-
Kashe/Gartersnake River	Kawartha Lakes	Kawartha Lakes	No	√	-	-
Upper Black River	Haliburton	Dysart Et Al	No	√	-	-
Upper Black River	Haliburton	Algonquin Highlands	No	√	-	-
Upper Black River	Haliburton	Minden Hills	No	√	-	-
Upper Black River	Muskoka	Lake of Bays	No	√	-	-
Upper Black River	Muskoka	Bracebridge	No	√	-	-
Upper Black River	Kawartha Lakes	Kawartha Lakes	No	√	-	-

Note: All subwatersheds are required to undergo a Conceptual and Tier 1 analysis. Subwatersheds that are not moving beyond a Tier 1 analysis do not have a municipal groundwater system, and/or were found not to be stressed.

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1.10 Assessing Regional Groundwater Vulnerability

The *Clean Water Act, 2006* requires that all sources of drinking water must be assessed for vulnerability from a water quantity and water quality perspective. This chapter assesses how vulnerable the groundwater is across the region. The vulnerability of groundwater is an expression of the relative ease through which the aquifer could become contaminated by threat activities occurring on or beneath the ground surface. An aquifer that can easily become contaminated is considered to be vulnerable.

The regional groundwater vulnerability is demonstrated by delineating Significant Groundwater Recharge Areas (SGRAs), and Highly Vulnerable Aquifers (HVAs). This is a complex technical process that identifies areas that contribute water to regional aquifers (recharge areas) and to assess the vulnerability of these areas to activities at surface that may contaminate the groundwater and aquifer.

Not all Vulnerable Areas are equally vulnerable, so within these areas numeric vulnerability scores are attached to denote the Intrinsic Vulnerability in each case. Generally, the faster water is able to flow through the ground to an aquifer, the more vulnerable the area is to contamination. The vulnerability scores are determined by factors such as:

- How deep/thick the aquifer and overlying aquitard is;
- What type(s) of soils are present;
- How quickly water can travel through the ground, and
- What type of man-made transport pathways are present (i.e. improperly decommissioned wells.)

The resulting vulnerability rating can then be used to delineate and score the HVAs and SGRAs within the South Georgian Bay-Lake Simcoe Source Protection Region.

This process is summarized below:

Step 1: Delineating Groundwater Vulnerability: The first step in determining both HVAs and SGRAs is to delineate the groundwater vulnerability using a methodology that will categorize vulnerability as “High”, “Medium” or “Low” as prescribed by Technical Rules 37 and 38 (MOE, 2008a), and discussed in Section 4.1.1 of Chapter 4.

Step 2: Vulnerability Scoring for Highly Vulnerable Aquifers (HVAs): The second step is to classify the areas categorized as “High” in Step One above as Highly Vulnerable Aquifers (HVAs).

Step 3: Delineating Significant Groundwater Recharge Areas (SGRAs): Recharge rates across the study area are determined using a surface water model (PRMS or HSP-F), which is discussed in great detail within Chapter 3 and Appendix WB-4. SGRAs were determined by using Technical Rule 44(1) (MOE, 2008a), which specifies SGRAs are the areas where the recharge is 15% greater than the average recharge across the study area.

Step 4: Vulnerability Scoring SGRAs: Using the categorized groundwater vulnerability delineated in Step One, the vulnerability within the SGRAs are categorized as “High”, “Medium” or “Low”.

Below are the results of this analysis.

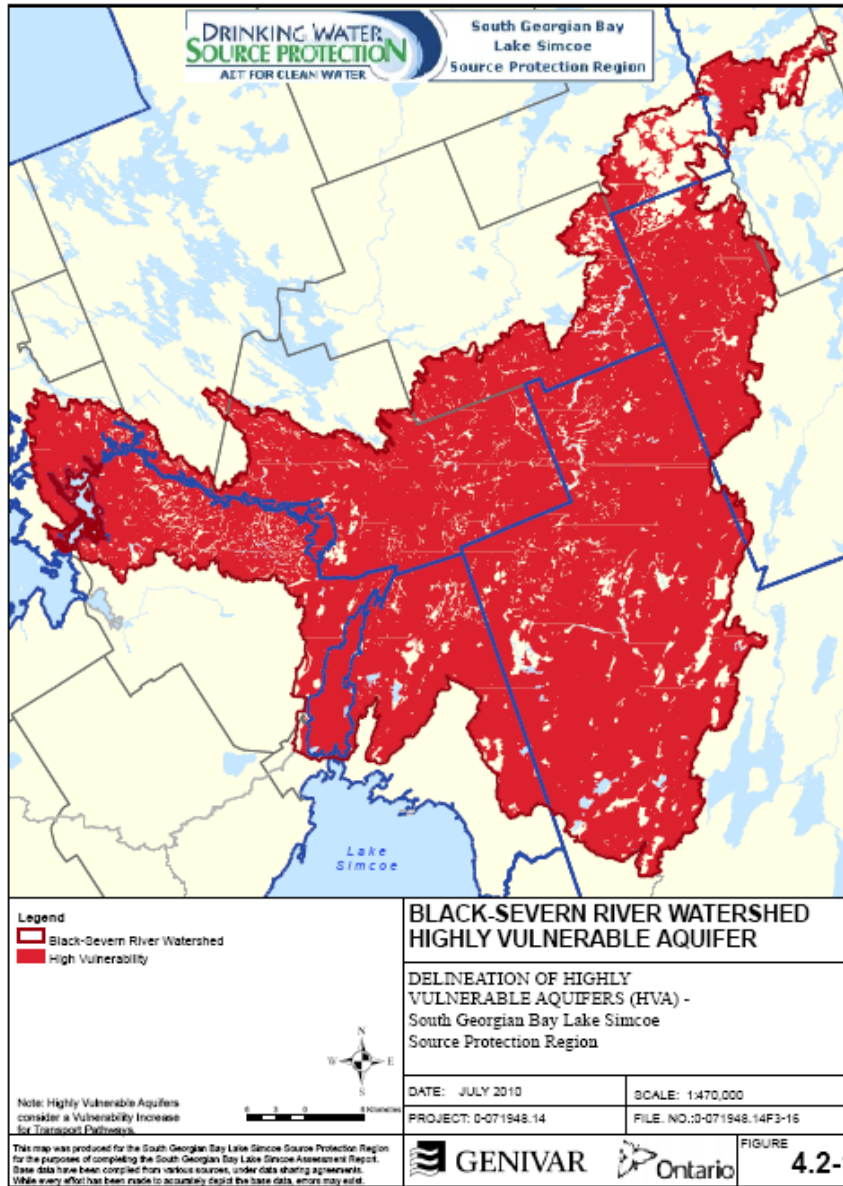


Figure 3 Map of Highly Vulnerable Aquifers: Black Severn River Watershed

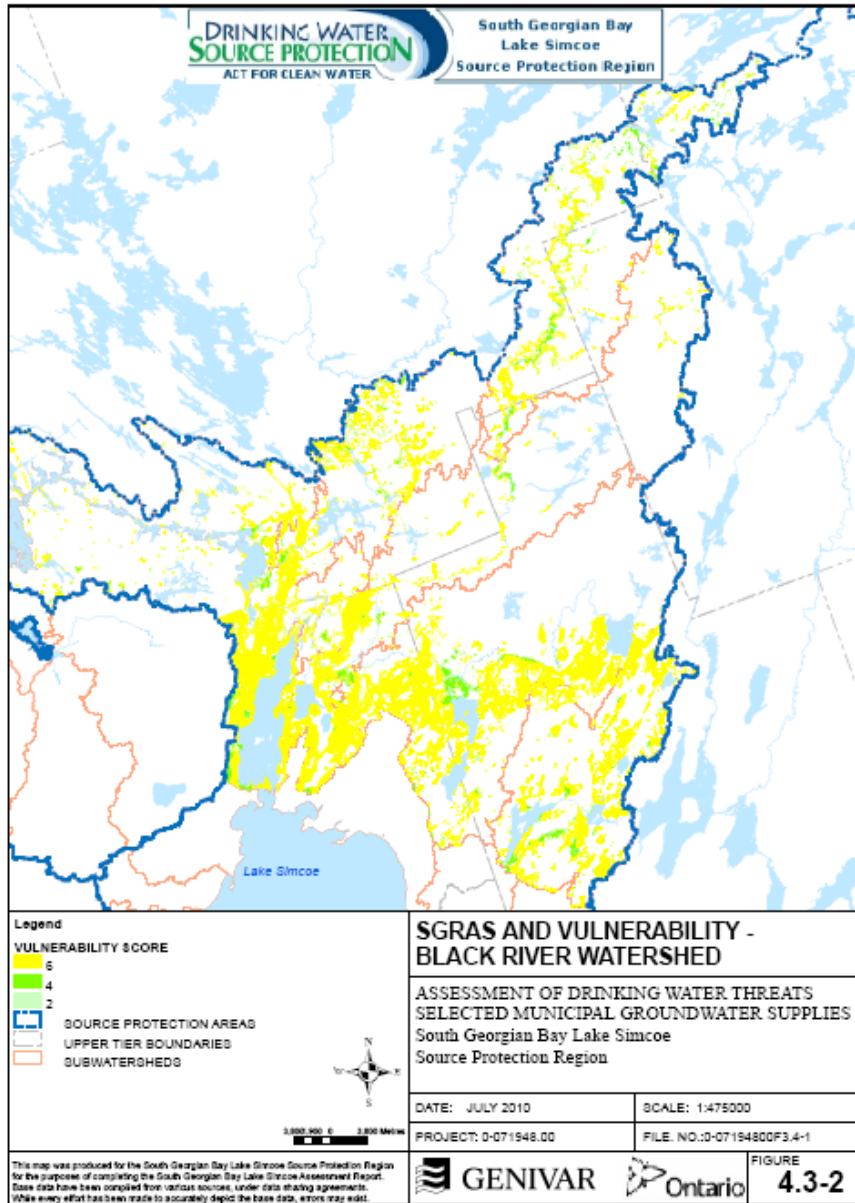


Figure 4 Significant Groundwater Recharge Areas: Black Severn River Watershed

1.11 Chapter 5: Methods Overview

This chapter provides an overview of the approaches and rules used in the South Georgian Bay-Lake Simcoe Source Protection Region to assist the reader in interpreting the municipal Vulnerability and Threats chapters that summarize the Drinking Water Threats to the South Georgian Bay Source Protection Region's 109 drinking waters systems. Assessing and reporting threats to drinking water systems can be complex and at times confusing due to the nature of work to be undertaken, the many steps involved and the rules that need to be followed. This chapter is divided into several sections. The first few sections are a brief summation on the steps taken to assess Vulnerability, Issues and Threats for groundwater and surface water systems, and are expanded on in the later sections of the chapter. Following sections include descriptions of Wellhead Protection Areas (WHPAs) and Intake Protection Zones (IPZs), as well as the methods by which they were delineated and used throughout the report. The final section of this chapter explains how Drinking Water Issues and Drinking Water Threats are evaluated and describing how areas are designated as having Significant, Moderate and/or Low Drinking Water Threats.

1.12 Chapters 6-onwards: Threats by Municipality

1.12.1.1 City of Kawartha Lakes

Drinking Water Systems and their Vulnerable Areas

There are 15 drinking water systems in City of Kawartha Lakes, three of which are in the South Georgian Bay-Lake Simcoe Source Protection Region. One of these (Western Trent/Palmina) is in the Black-Severn River watershed and services almost 300 people. The Woodville and Woods of Manilla system is located in the Lake Simcoe watershed and information for that system can be found in Part 1 of this Assessment Report. It should be noted that the Woods of Manilla system is only partially within the South Georgian Bay-Lake Simcoe Source Protection Region and the Trent Conservation Coalition Source Protection Region.

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells and Intake Protection Zones (IPZ) for surface water intakes. A WHPA is the area around the wellhead where land use activities have the greatest potential to affect the quality of the water flowing into the well. An IPZ is the area of water and land where activities have the potential to affect the quality of water being taken up by the surface water intake. [\(See Chapter 6 for further details\).](#)

Western Trent/Palmina:

- Two wells located east of Bolsover Road in the City of Kawartha Lakes, at the southern border between the Lake Simcoe and Black-Severn River watersheds. This system services approximately 300 people.
- The WHPAs extend southeast and go across a good portion of the nearby communities.

Issues

The intent of the Issues Evaluation is to identify parameters (e.g. chemicals or pathogens) in the raw drinking water that will limit the ability of the water to serve as a drinking water source now, or in the future.

Western Trent/Palmina – No Issues

Threats (please see table below for full list of threats for each Drinking Water System)

A Drinking Water Threat is defined as “an Activity, or Condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. An Activity is one or a series of related processes that occurs within a geographical area and may be related to a particular land use. A Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities.

Conditions

No confirmed Conditions have been identified for the Woodville and Woods of Manilla Water Supplies. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 1723 parcels were identified as potentially having one or more Significant Threat Activities.

Number of Significant Threats

Western Trent/Palmina – 1732 Significant Threats were identified in association with 1732 land parcels. The majority of the Significant Threats identified are associated with septic tanks.

Table 4 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Town of Kawartha Lakes (Western Trent/Palimina) Drinking Water Supply System

Threat Number	Significant Threat	# Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	168
3	The application of agricultural source material to land	0
4	The storage of agricultural source material	0
5	The management of agricultural source material	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0
8	The application of commercial fertilizer to land	0
9	The handling and storage of commercial fertilizer	0
10	The application of pesticide to land	10
11	The handling and storage of- pesticide	0
12	The application of road salt	0
13	The handling and storage of road salt	0
14	The storage of snow	0
15	The handling and storage of fuel	1
16	The handling and storage of dense non-aqueous phase liquid	0
17	The handling and storage of organic solvent	0

Threat Number	Significant Threat	# Parcels
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0
19	An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body (i.e. food processing)	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surfaces)	0
21	The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard	3
22	<u>The establishment or operation of a liquid hydrocarbon pipeline</u>	0
Total Number of Parcels*		1732*

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*Note: The total number of parcels accounts for the fact that some parcels may have more than one Significant Threat, and have only been counted once in the overall total.

1.12.1.2 District Municipality of Muskoka

Drinking Water Systems and their Vulnerable Areas

There is one drinking water system in the District Municipality of Muskoka that services approximately 500 people. The water supply system is located within the Black-Severn River watershed.

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells and Intake Protection Zones (IPZ) for surface water intakes. A WHPA is the area around the wellhead where land use activities have the greatest potential to affect the quality of the water flowing into the well. An IPZ is the area of water and land where activities have the potential to affect the quality of water being taken up by the surface water intake. [\(See Chapter 10 for further details\)](#)

Port Severn WTP:

- Located on the western shore of Little Lake. This system services approximately 500 people in the community of Port Severn.
- The IPZ extends along shoreline on both sides of Little Lake and is elongated upstream because of flow into Little Lake from Severn River.

Issues

The intent of the Issues Evaluation is to identify parameters (e.g. chemicals or pathogen) in the raw drinking water that will limit the ability of the water to serve as a drinking water source either now, or in the future.

Port Severn WTP - No Issues

Threats (please see table below for full list of threats for each Drinking Water System)

A Drinking Water Threat is defined as “an Activity, or Condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. An Activity is one or a series of related processes that occurs within a geographical area and may be related to a particular land use. A Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities.

Conditions

No confirmed Conditions have been identified for the Port Severn WTP. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 109 parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Port Severn WTP – 1142 Significant Threats were identified in association with **11009** land parcels. The majority of Significant Threats are associated with residential and commercial sewage systems, storage of fuel and the handling and storage of Dense Non-Aqueous Phase Liquid (DNAPLs).

Table 4. Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Muskoka (Port Severn) Drinking Water Supply System

Threat Number	Significant Threat	Number of Parcels
<u>1</u>	<u>The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act</u>	<u>1</u>
<u>2</u>	<u>The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage</u>	<u>105</u>

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<u>Threat Number</u>	<u>Significant Threat</u>	<u>Number of Parcels</u>
<u>3</u>	<u>The application of agricultural source material to land</u>	<u>0</u>
<u>4</u>	<u>The storage of agricultural source material</u>	<u>0</u>
<u>5</u>	<u>The management of agricultural source material</u>	<u>0</u>
<u>6</u>	<u>The application of non-agricultural source material to land (i.e. compost, biosolids)</u>	<u>0</u>
<u>7</u>	<u>The handling and storage of non-agricultural source material (i.e. septic systems)</u>	<u>0</u>
<u>8</u>	<u>The application of commercial fertilizer to land</u>	<u>0</u>
<u>9</u>	<u>The handling and storage of commercial fertilizer</u>	<u>0</u>
<u>10</u>	<u>The application of pesticide to land</u>	<u>0</u>
<u>11</u>	<u>The handling and storage of pesticide</u>	<u>2</u>
<u>12</u>	<u>The application of road salt</u>	<u>0</u>
<u>13</u>	<u>The handling and storage of road salt</u>	<u>0</u>
<u>14</u>	<u>The storage of snow</u>	<u>0</u>
<u>15</u>	<u>The handling and storage of fuel</u>	<u>4</u>
<u>16</u>	<u>The handling and storage of dense non-aqueous phase liquids</u>	<u>2</u>
<u>17</u>	<u>The handling and storage of organic solvent</u>	<u>0</u>
<u>18</u>	<u>The management of runoff that contains chemicals used in the de-icing of aircraft</u>	<u>0</u>

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<u>Threat Number</u>	<u>Significant Threat</u>	<u>Number of Parcels</u>
<u>19</u>	<u>An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body (i.e. food processing)</u>	<u>0</u>
<u>20</u>	<u>An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)</u>	<u>0</u>
<u>21</u>	<u>The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard</u>	<u>0</u>
<u>22</u>	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	<u>0</u>
<u>=</u>	<u>Total number of parcels*</u>	<u>110*</u>

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*Note: The total number of parcels accounts for the fact that some parcels may have more than one significant threat and have only been counted once in the overall total.

1.12.1.3 City of Orillia

Drinking Water Systems and their Vulnerable Areas

There is one mixed drinking water system in City of Orillia, consisting of one surface water intake and a groundwater system. The Orillia Water Supply System services approximately 31,716 people (as of 2010). The system is located within the Black-Severn watershed and Severn Sound Source Protection Area

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells and Intake Protection Zones (IPZ) for surface water intakes. A WHPA is the area around the wellhead where land use activities have the greatest potential to affect the quality of the water flowing into the well. An IPZ is the area of water and land where activities have the potential to affect the quality of water being taken up by the surface water intake. [\(See Chapter 7 for further details\)](#)

Orillia Water Filtration Plant:

- The Intake is located on the south western shore of Lake Couchiching in the city of Orillia. This system services approximately 31,716 people in conjunction with the groundwater supply.
- The IPZ extends along the shoreline of the City of Orillia and inland, for a short distance, along two unnamed tributaries

Groundwater:

- Three wells are located in the City of Orillia, west of Lake Couchiching. This system services approximately 31,716 people in conjunction with the surface water supply.
- The WHPAs extend westward, away from Lake Couchiching and across a portion of the City of Orillia.

Issues

The intent of the Issues Evaluation is to identify parameters (e.g. chemicals or pathogens) in the raw drinking water that will limit the ability of the water to serve as a drinking water source now, or in the future.

Surface Water Intake - No Issues

Groundwater System - 2 Drinking Water Issues have been identified

- Tetrachloroethylene (or perchloroethylene (PCE)) and trichloroethylene (TCE) were both identified as Drinking Water Issues for Well 1 and Well 2 (currently being treated by the municipality)

Threats (please see table below for full list of threats for each Drinking Water System)

A Drinking Water Threat is defined as “an Activity, or Condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. An Activity is one or a series of related processes that occurs within a geographical area and may be related to a particular land use. A Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities.

Conditions

No confirmed Conditions have been identified for the Orillia ground and surface water supplies. No potential Conditions have been identified for consideration at this time.

Activities:

A total of ~~1812~~ parcels were identified as potentially having one or more Significant Threat Activities.

Number of Significant Threats

Orillia Water Filtration Plant – ~~63~~ Significant Threats were identified in association with ~~36~~ land parcels. The Significant Threats are associated with sewer outfalls.

Groundwater System – ~~139~~ significant threats were identified in association with ~~129~~ land parcels. The Significant Threats identified are associated with septic tanks, handling and storage fuel and the handling and storage of dense non-aqueous phase liquid (DNAPLs).

Table 5 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the City of Orillia Drinking Water System

Threat Number	Significant Threat	Orillia Water Supply System # Parcels	Orillia WTP # Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	30	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	2	3
3	The application of agricultural source material to land	0	0
4	The storage of agricultural source material	0	0
5	The management of agricultural source material	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0
8	The application of commercial fertilizer to land	0	0
9	The handling and storage of commercial fertilizer	0	0
10	The application of pesticide to land	0	30
11	The handling and storage of pesticide	0	0
12	The application of road salt	0	0
13	The handling and storage of road salt	0	0
14	The storage of snow	0	0
15	The handling and storage of fuel	1	0
16	The handling and storage of dense non-aqueous phase liquid	7	0
17	The handling and storage of organic solvent	0	0

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Threat Number	Significant Threat	Orillia Water Supply System # Parcels	Orillia WTP # Parcels
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	0
19	An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body (i.e. food processing)	0	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surfaces)	0	0
21	The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard	0	0
22	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	0	0
	Total Number of Parcels*	129*	63

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*Note: The total number of parcels accounts for the fact that some parcels may have more than one significant threat and have only been counted once in the overall total.

1.12.1.4 Township of Ramara

Drinking Water Systems and their Vulnerable Areas

There are six drinking water systems in the Township of Ramara, two of which are in the Black-Severn River watershed and service over 100 people. The other four systems are located in the Lake Simcoe watershed and information on them can be found in Part 1 of this Assessment Report.

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells and Intake Protection Zones (IPZ) for surface water intakes. A WHPA is the area around the wellhead where land use activities have the greatest potential to affect the quality of the water flowing into the well. An IPZ is the area of water and land where activities have the potential to affect the quality of water being taken up by the surface water intake. (See Chapter 8 for further details).

Davy Drive Subdivision:

- Three wells are located on Lot 17, Concession 7 in the Township of Ramara. This system services approximately 100 people.
- The WHPA is circular in shape and covers only a portion of the nearby subdivision.

Park Lane Subdivision:

- One well is located on Lot 25, Concession L in the Township of Ramara. This system services around 40 people.
- The WHPA is circular in shape and covers an area of higher density subdivisions.

Issues

The intent of the Issues Evaluation is to identify parameters (e.g. chemicals or pathogens) in the raw drinking water that will limit the ability of the water to serve as a drinking water source now, or in the future.

All Ramara systems (within the Black-Severn watersheds) – No Issues

Threats (please see table below for full list of threats for each Drinking Water System)

A Drinking Water Threat is defined as “an Activity, or Condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. An Activity is one or a series of related processes that occurs within a geographical area and may be related to a particular land use. A Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities.

Conditions

No confirmed Conditions have been identified for the Ramara Water Supplies that are within the Lake Simcoe watershed. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 12~~65~~ parcels were identified as potentially having one or more Significant Threat Activities.

Number of Significant Threats

Davy Drive Subdivision - ~~4039~~ Significant Threats were identified in association with **33~~2~~** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial.

Park Lane Subdivision - 93 Significant Threats were identified in association with **93** land parcels. The majority of the Significant Threats identified are associated with sewage systems.

Table 6 Number of Parcels with confirmed or potential Drinking Water Threats for the Township of Ramara Drinking Water System

<u>Threat Number</u>	<u>Significant Threat</u>	<u>Davy Drive Subdivision Number of Parcels</u>	<u>Park Lane Subdivision Number of Parcels</u>
<u>1</u>	<u>The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act</u>	<u>0</u>	<u>0</u>
<u>2</u>	<u>The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage</u>	<u>29</u>	<u>91</u>
<u>3</u>	<u>The application of agricultural source material to land</u>	<u>1</u>	<u>0</u>
<u>4</u>	<u>The storage of agricultural source material</u>	<u>1</u>	<u>0</u>
<u>5</u>	<u>The management of agricultural source material</u>	<u>0</u>	<u>0</u>
<u>6</u>	<u>The application of non-agricultural source material to land (i.e. compost, biosolids)</u>	<u>0</u>	<u>0</u>
<u>7</u>	<u>The handling and storage of non-agricultural source material (i.e. septic systems)</u>	<u>0</u>	<u>0</u>
<u>8</u>	<u>The application of commercial fertilizer to land</u>	<u>0</u>	<u>0</u>
<u>9</u>	<u>The handling and storage of commercial fertilizer</u>	<u>1</u>	<u>0</u>
<u>10</u>	<u>The application of pesticide to land</u>	<u>2</u>	<u>0</u>
<u>11</u>	<u>The handling and storage of pesticide</u>	<u>1</u>	<u>0</u>
<u>12</u>	<u>The application of road salt</u>	<u>0</u>	<u>0</u>
<u>13</u>	<u>The handling and storage of road salt</u>	<u>0</u>	<u>0</u>
<u>14</u>	<u>The storage of snow</u>	<u>0</u>	<u>0</u>
<u>15</u>	<u>The handling and storage of fuel</u>	<u>4</u>	<u>2</u>

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<u>Threat Number</u>	<u>Significant Threat</u>	<u>Davy Drive Subdivision Number of Parcels</u>	<u>Park Lane Subdivision Number of Parcels</u>
<u>16</u>	<u>The handling and storage of dense non-aqueous phase liquids</u>	<u>0</u>	<u>0</u>
<u>17</u>	<u>The handling and storage of organic solvent</u>	<u>0</u>	<u>0</u>
<u>18</u>	<u>The management of runoff that contains chemicals used in the de-icing of aircraft</u>	<u>0</u>	<u>0</u>
<u>19</u>	<u>An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body (i.e. food processing)</u>	<u>0</u>	<u>0</u>
<u>20</u>	<u>An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)</u>	<u>0</u>	<u>0</u>
<u>21</u>	<u>The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard</u>	<u>1</u>	<u>0</u>
<u>22</u>	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	<u>0</u>	<u>0</u>
<u>-</u>	<u>Total number of parcels*</u>	<u>33</u>	<u>93</u>

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*Note: The total number of parcels accounts for the fact that some parcels may have more than one significant threat and have only been counted once in the overall total.

1.12.1.5 Chippewas of Rama First Nation

Drinking Water Systems and their Vulnerable Areas

There is one surface water drinking system for the Chippewas of Rama First Nation, serving 625 residents of the Rama First Nation Reserve #32.

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells and Intake Protection Zones (IPZ) for surface water intakes. A WHPA is the area around the wellhead where land use activities have the greatest potential to affect the quality of the water flowing into the well. An IPZ is the area of water and land where activities have the potential to affect the quality of water being taken up by the surface water intake. [\(See Chapter 11 for further details\).](#)

Rama First Nation Water Treatment Plant:

- The intake is located on the east shore of Lake Couchiching by the Rama First Nation Reserve #32, approximately 5 km north east of Orillia. This system services approximately 625 people.
- The IPZ extends along the shoreline of the community and inland, for a short distance.

Issues

The intent of the Issues Evaluation is to identify parameters (e.g. chemicals or pathogens) in the raw drinking water that will limit the ability of the water to serve as a drinking water source now, or in the future.

Rama First Nation WTP – No Issues

Threats (please see table below for full list of threats for each Drinking Water System)

A Drinking Water Threat is defined as “an Activity, or Condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. An Activity is one or a series of related processes that occurs within a geographical area and may be related to a particular land use. A Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities.

Conditions

No confirmed Conditions have been identified for the Rama First Nation WTP that are within the Lake Simcoe watershed. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 138 parcels were identified as potentially having one or more Significant Threat Activities.

Number of Significant Threats

Rama First Nation WTP - 139 Significant Threats were identified in association with **138** land parcels. The majority of the Significant Threats identified are associated with sewage systems.

Table 7 Number of Parcels with confirmed or potential Drinking Water Threats for the Rama First Nation Drinking Water System

<u>Threat Number</u>	<u>Significant Threat</u>	<u>Water Treatment Plant Number of Parcels</u>
<u>1</u>	<u>The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act</u>	<u>0</u>
<u>2</u>	<u>The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage</u>	<u>137</u>
<u>3</u>	<u>The application of agricultural source material to land</u>	<u>0</u>
<u>4</u>	<u>The storage of agricultural source material</u>	<u>0</u>
<u>5</u>	<u>The management of agricultural source material</u>	<u>0</u>
<u>6</u>	<u>The application of non-agricultural source material to land (i.e. compost, biosolids)</u>	<u>0</u>
<u>7</u>	<u>The handling and storage of non-agricultural source material (i.e. septic systems)</u>	<u>0</u>
<u>8</u>	<u>The application of commercial fertilizer to land</u>	<u>0</u>
<u>9</u>	<u>The handling and storage of commercial fertilizer</u>	<u>0</u>
<u>10</u>	<u>The application of pesticide to land</u>	<u>0</u>
<u>11</u>	<u>The handling and storage of pesticide</u>	<u>0</u>
<u>12</u>	<u>The application of road salt</u>	<u>0</u>
<u>13</u>	<u>The handling and storage of road salt</u>	<u>0</u>
<u>14</u>	<u>The storage of snow</u>	<u>0</u>

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<u>Threat Number</u>	<u>Significant Threat</u>	<u>Water Treatment Plant Number of Parcels</u>
<u>15</u>	<u>The handling and storage of fuel</u>	<u>2</u>
<u>16</u>	<u>The handling and storage of dense non-aqueous phase liquids</u>	<u>0</u>
<u>17</u>	<u>The handling and storage of organic solvent</u>	<u>0</u>
<u>18</u>	<u>The management of runoff that contains chemicals used in the de-icing of aircraft</u>	<u>0</u>
<u>19</u>	<u>An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body (i.e. food processing)</u>	<u>0</u>
<u>20</u>	<u>An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)</u>	<u>0</u>
<u>21</u>	<u>The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard</u>	<u>0</u>
<u>22</u>	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	<u>0</u>
<u>-</u>	<u>Total number of parcels*</u>	<u>138*</u>

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*Note: The total number of parcels accounts for the fact that some parcels may have more than one significant threat and have only been counted once in the overall total.

1.12.1.6 Township of Severn

Drinking Water Systems and their Vulnerable Areas

There are six drinking water systems in Township of Severn, four of which are in the Black-Severn River watershed and service approximately 2,700 people. The other two (Bass Lake and Coldwater) are located within the Severn Sound watershed and information on these can be found in the Severn Sound Assessment Report.

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells and Intake Protection Zones (IPZ) for surface water intakes. A WHPA is the area around the wellhead where land use activities have the greatest potential to affect the quality of the water flowing into the well. An IPZ is the area of water and land where activities have the potential to affect the quality of water being taken up by the surface water intake. [\(See Chapter 9 for further details\)](#).

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Severn Estates:

- One is well located on Lot 13, Concession 15, just north of Lake Couchiching. This system services approximately 60 people.
- The WHPAs extend radially in all directions, covering nearby subdivisions.

Sandcastle Estates WTP:

- The intake is located on the north shore of Lake Couchiching near the community of Sandcastle Estates. This system services approximately 170 people.
- The IPZ extends along the shoreline of the community and inland, for a short distance, along a few tributaries.

Washago WTP:

- The intake is located on the north shore of Lake Couchiching in the community of Washago. This system services approximately 300 people.
- The IPZ extends along shoreline of the nearby communities and inland, for a short distance, along the unnamed tributaries.

West Shore WTP:

- The intakes is located on the east shore of Lake Couchiching near the Harbour Canal in the community of Cumberland Beach. This system services approximately 2,200 people.
- The IPZ extends along shoreline of the community and inland, for a short distance, along a couple tributaries.

Issues

The intent of the Issues Evaluation is to identify parameters (e.g. chemicals or pathogen) in the raw drinking water that will limit the ability of the water to serve as a drinking water source either now, or in the future.

All Severn systems (within the Black-Severn River watershed) – No Issues

Threats (please see table below for full list of threats for each Drinking Water System)

A Drinking Water Threat is defined as “an activity, or condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. An Activity is one or a series of related processes that occurs within a geographical area and may be related to a particular land use. A Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities.

Conditions

No confirmed Conditions have been identified for the Severn Water Supplies within the Black-Severn River watershed. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 21~~10~~ parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Severn Estates - 69 Significant Threats were identified in association with **69** land parcels. The Significant Threats are associated with sewage systems and the handling and storage of fuel.

Sandcastle Estates WTP - No Significant Threats were identified for this system.

Washago WTP – 14~~43~~ Significant Threats were identified in association with **14~~21~~** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial

West Shore WTP – No Significant Threats were identified for this system.

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Table 8 Number of Parcels with confirmed or potential Drinking Water Threats for the Severn Drinking Water Systems

<u>Threat Number</u>	<u>Significant Threat</u>	<u>Severn Estates Number of Parcels</u>	<u>Sandcastle WTP Number of Parcels</u>	<u>Washago WTP Number of Parcels</u>	<u>West Shore WTP Number of Parcels</u>
<u>1</u>	<u>The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
<u>2</u>	<u>The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage</u>	<u>68</u>	<u>0</u>	<u>132</u>	<u>0</u>
<u>3</u>	<u>The application of agricultural source material to land</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>4</u>	<u>The storage of agricultural source material</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>5</u>	<u>The management of agricultural source material</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>6</u>	<u>The application of non-agricultural source material to land (i.e. compost, biosolids)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>7</u>	<u>The handling and storage of non-agricultural source material (i.e. septic systems)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>8</u>	<u>The application of commercial fertilizer to land</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>9</u>	<u>The handling and storage of commercial fertilizer</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
<u>10</u>	<u>The application of pesticide to land</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

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<u>Threat Number</u>	<u>Significant Threat</u>	<u>Severn Estates Number of Parcels</u>	<u>Sandcastle WTP Number of Parcels</u>	<u>Washago WTP Number of Parcels</u>	<u>West Shore WTP Number of Parcels</u>
<u>11</u>	<u>The handling and storage of pesticide</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>12</u>	<u>The application of road salt</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>13</u>	<u>The handling and storage of road salt</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>14</u>	<u>The storage of snow</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>15</u>	<u>The handling and storage of fuel</u>	<u>1</u>	<u>0</u>	<u>9</u>	<u>0</u>
<u>16</u>	<u>The handling and storage of dense non-aqueous phase liquids</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
<u>17</u>	<u>The handling and storage of organic solvent</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>18</u>	<u>The management of runoff that contains chemicals used in the de-icing of aircraft</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>19</u>	<u>An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body (i.e. food processing)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>20</u>	<u>An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>21</u>	<u>The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

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<u>Threat Number</u>	<u>Significant Threat</u>	<u>Severn Estates Number of Parcels</u>	<u>Sandcastle WTP Number of Parcels</u>	<u>Washago WTP Number of Parcels</u>	<u>West Shore WTP Number of Parcels</u>
<u>22</u>	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>=</u>	<u>Total number of parcels*</u>	<u>69</u>	<u>0</u>	<u>142*</u>	<u>0</u>

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*Note: The total number of parcels accounts for the fact that some parcels may have more than one significant threat and have only been counted once in the overall total.

1.13 The Assessment Report in Context: Final Chapter

Climate Change

Over the past twenty years, there has been a great deal of concern around the world over climate change, its causes and potential impacts on humans and the environment. One of the potential impacts of climate change will be related to water supply. It is; therefore, important to look at climate change in the context of Source Water Protection.

Climate change can change both the quality and quantity of drinking water sources. Warmer temperatures can raise the temperature of surface water sources creating ideal habitats for bacterial growth. Warmer temperatures also indicate that more evaporation and evapotranspiration will be occurring. The increased evaporation rates mean that less water is available to infiltrate the ground, to recharge the groundwater system. An increased frequency in storm events inherently leads to an increase in runoff, potentially introducing harmful pollutants to watercourses. Other potential impacts of climate change are introduced throughout this Chapter. Climate change has the potential to broadly impact many areas of our life, from agriculture to recreation and animal habitat to forest cover. Understanding how climate change has the potential to affect our water sources is imperative in protection of the resource for future generations.

The following tables show how climate change is anticipated to impact the region’s air temperature and precipitation.

Table 9 Summary of projected increase in Source Protection Region average annual temperature (°C) in the 2050s compared with 1961-1990

Season	Projected Air Temperature Change (°C) – GHG Emission	Projected Air Temperature Change (°C) – GHG Emission	Projected Air Temperature Change (°C) – GHG Emission
	Scenario	Scenario	Scenario
	Low	Medium	High
Annual	2.3	2.7	3.0
Winter	2.5	3.0	3.4
Spring	2.2	2.5	2.8
Summer	2.2	2.6	2.9
Autumn	2.3	2.6	2.8

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Table 10 Summary of projected increase in Source Protection Region precipitation (%) in the 2050s compared with 1961-1990.

Season	Projected Change in Precipitation (%) – GHG Emission	Projected Change in Precipitation (%) – GHG Emission	Projected Change in Precipitation (%) – GHG Emission
	Scenario Low	Scenario Medium	Scenario High
	Annual	5.15	5.45
Winter	9.38	10.19	10.76
Spring	8.58	9.1	9.65
Summer	0.92	0.11	-0.62
Autumn	3.06	3.79	3.82

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The projected increase in air temperature, winter precipitation, storm intensity and frequency are some of the effects of climate change that could change the quantity of water available for surface intakes and well supplies.

Summer groundwater recharge rates could be reduced as a result of the projected increased intensity of summer storm events, causing more water too runoff at the surface. Reduced recharge to groundwater could cause a significant decline in aquifer levels. This could result in shallow wells drying up and/or municipal wells needing to be drilled deeper into the aquifer, or find an alternate source of water to sustain consumption rates. On the other hand warmer conditions in the fall and winter will delay ground frost; therefore, enhancing infiltration during wet months. Similarly, an earlier spring will allow for more infiltration to occur, as the winter snowpack thaws.

Average annual precipitation is projected to increase by 5%, and the pattern of fall is predicted to change to fewer, more intense storms. Flooding puts a strain on existing storm sewers, with most pipes designed to accommodate a 25 year storm event, but it is highly likely that there will be many more storms exceeding this intensity. In Ontario alone, there were ten 100 year storm events that occurred between the years 2000 to 2005. Upgrades may be necessary to avoid flooding such as that observed in Barrie in 2005, Newmarket in 2006, Angus in 2008, and Coldwater in 2009.

In addition to concerns about the quantity of water available, climate change may have an impact on the quality of water as well. Increased severity and frequency of weather events may lead to more accidental releases of contaminants due to factors such as:

- damage to buildings or infrastructure housing contaminants resulting in their release;
- overflow of retention areas – some activities rely on retention areas to hold contaminants until they can be processed (for example waste treatment facilities or storm management ponds), during extreme events the capacity of the retention areas may be exceeded due to the volume of water entering , leading to overflow and contamination of local waterways; and
- mobilization of surface contaminants – in many cases a contaminant may not be considered a hazard as it is relatively immobile. However, with sufficient surface flow or flooding these, contaminants can be transported into local waterways where they impact water quality.

How the Great Lakes Were Considered

Section 14 of the *Clean Water Act, 2006* requires that if a Source Protection Area contains water that flows into the Great Lakes a consideration of the following documents must occur during the completion of Assessment Reports and Source Protection Plans. The documents are as follows:

- 1) The Great Lakes Water Quality Agreement of 1978 between Canada and the United States of America signed at Ottawa on November 22, 1978, including any amendments made before or after this section comes into force.
- 2) The Great Lakes Charter signed by the premiers of Ontario and Quebec and the governors of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin on February 11, 1985, including any amendments made before or after this section comes into force.
- 3) The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem 2002 entered into between Her Majesty the Queen in Right of Canada and Her Majesty the Queen in Right of Ontario, effective March 22, 2002, including any amendments made before or after this section comes into force.

- 4) Any other agreement to which the Government of Ontario or the Government of Canada is a party that relates to the Great Lakes Basin and that is prescribed by the regulations. 2006, c.22, s.14 (1).

Within the South Georgian Bay-Lake Simcoe Source Protection Region (SGBLS SPR) all three Source Protection Authorities have waters which drain directly into the Great Lakes. For further information on how the Great Lakes agreements were considered in the work undertaken to complete the Assessment Report, please refer to the respective chapter within the Report.

Additional Items Raised by the Source Protection Committee.

Committee has the authority to request additional information be included or excluded within the Assessment Report. The following points describe areas where the Technical Rules explicitly state that a SPC ruling is required:

- Technical Rule 119: The intent of Technical Rule 119 is to enable the SPC to include activities that are not prescribed in [the Technical Rules \(2021\)](#)~~the Table of Drinking Water Threats~~ in the assessment. To be considered by the Director any activity has to be identified as a potential threat to a drinking water system.
 - At this stage the SPC has not requested additional activities be considered, however, as noted below a number of activities have been identified that may be considered for future versions.
- Technical Rule 15.1: Use of alternate methods or approaches for gathering information or for performing tasks that depart from those described in the rules (Rule 15.1). The following alternate methods were requested and approved under this rule.
 - Rules require a separate 1km² grid for each Source Protection Area when determining the total impervious surface area. Alternate method approved by the Director allows a single grid to be used for the entire Source Protection Region.
 - Rules require livestock numbers to be calculated by interpreting aerial photography to estimate the capacity of a farm to house livestock. Alternate method approved by the Director allows livestock density to be determined using Census of Canada livestock data within the Source Protection Region, with the census data of actual animal numbers being converted to nutrient units for the use of the calculations. This method was used to assess the livestock density for regional vulnerable areas (HVA and SGRA) only, while drinking water system vulnerable areas were assessed using the prescribed approach.

Letters with Director's Approval for the above mentioned Rule changes are available in Appendix ARC.

- Species at Risk assessment should only be included if the SPC is of the opinion that the watershed characterization should include a discussion for the purposes of informing the public about species at risk in the Source Protection Area.
 - The SPC carried the motion that Species at Risk should not be included in the Assessment Report.

Throughout the process of completing the Assessment Report members of the SPC have also identified a number of items that do not directly fit within the Assessment Report framework but do warrant mention. These items are:

- Orillia Multi-Use recreational Facility (MURF)
- Contaminants treated at a water supply facility may not be identified as an Issue
- Transportation Corridors (Roads and Highways)

Information on these items can be found in the respective chapter within the Assessment Report.

3 Moving towards Source Protection Plans

The Assessment Reports will be the basis for the next stage of the Source Protection process – developing Source Protection Plans and making local policy decisions for protecting the quality and quantity of drinking water. Source Protection Plans will outline how significant threats are to be mitigated. It builds on the science of the Assessment Report and the input from stakeholders and residents. Plans will be a powerful tool to make sure that our water is protected forever. It will dictate the methods by which all the different threats identified can be made less harmful. It will also put policies in place to make sure that if no threat exists, that it never can. It protects our health and our environment from the overuse of water supplies. You are encouraged to follow the development of the source protection plans at www.ourwatershed.ca over the next two years.

4 List of Acronyms

ADCP	Acoustic Doppler Current Profiler
AES	Atmospheric Environment Service
AET	Actual Evapotranspiration
AO	Aesthetic Objective
ANSI	Areas of Natural and Scientific Interest
AR	Assessment Report
ASM	Agricultural Source Material
AVI	Aquifer Vulnerability Index
BMPs	Best Management Practices
CA	Conservation Authority
CAMC-YPDT	Conservation Authorities Moraine Coalition- York, Peel, Durham, Toronto
CWA	Clean Water Act, 2006
CWB	Conceptual Water Budget
DNAPLS	Dense Non -Aqueous Phase Liquids
DWSP	Drinking Water Source Protection
ELC	Ecological Land Classification
ET	Evapotranspiration
GIS	Geographic Information System
GAC	Granular Activated Carbon
GUDI	Groundwater Under the Direct Influence of Surface Water
HVA	Highly Vulnerable Aquifer
HYDAT	Hydrometric Data
HWM	High Water Mark
ICA	Issues Contributing Area (Now WHPA-ICA or IPZ-ICA)
IPZ	Intake Protection Zone
IPZ-ICA	Intake Protection Zone – Issue Contributing Area
ISI	Intrinsic Susceptibility Index
LIO	Land Information Ontario

LIS	Laurentide Ice Sheet
LSRCA	Lake Simcoe Region Conservation Authority
LSEMS	Lake Simcoe Environmental Management Strategy
mASL	Meters above sea level
mbgs	Meters below ground surface
<u>MECP</u>	<u>Ministry of the Environment, Conservation and Parks (Previously, the Ministry of the Environment [MOE])</u>
MECP LUT	Ministry of the Environment, Conservation and Parks Look Up Table
<u>MNR</u>	<u>Ministry of Natural Resources</u>
<u>MOE</u>	<u>Ministry of the Environment (Now, the Ministry of the Environment, Conservation and Parks [MECP])</u>
MOVE.1	Maintenance of variance extension type 1 (linear regression method)
MPAC	Municipal Property Assessment Corporation
MW	Municipal Well
NAICS	North America Industrial Classification System
NVCA	Nottawasaga Valley Conservation Authority
ODWS	Ontario Drinking Water Standards
OGS	Ontario Geological Society
PCB	Polychlorinated Biphenyls
PGMN	Provincial Groundwater Monitoring Network
PTTW	Permit To Take Water
PWQMN	Provincial Water Quality Monitoring Network
PWQO	Provincial Water Quality Objectives
QCP	Quality Control Program
SCS	Soil Conservation Science
SGBLS	South Georgian Bay-Lake Simcoe
SGBWLS	South Georgian Bay- West Lake Simcoe
SGRA	Significant Groundwater Recharge Area
SSEA	Severn Sound Environmental Association

SSGW	South Simcoe Groundwater Study
SPA	Source Protection Area
SPC	Source Protection Committee
SPR	Source Protection Region
STP	Sewage Treatment Plant
SWP	Source Water Protection
SWAT	Surface to Well Advection Time
TAC	Thornccliffe Aquifer Complex
TCC	Trent Conservation Coalition
TCE	Trichloroethylene
TR	Technical Rules
ToR	Terms of Reference
TOT	Time of Travel
TSSA	Technical Standards and Safety Authority
TWCA	Total Water Contributing Area
UTM	Universal Transverse Mercator
WHPA	Wellhead Protection Area
WHPA-ICA	Wellhead Protection Area – Issue Contributing Area
WSC	Water Survey of Canada
WSS	Water Supply System
WTP	Water Treatment Plant
WWIS	Water Well Information System