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.

Document Outline – Severn Sound Assessment Report

- **Assessment Report Front Material**

1. **Chapter 1 Introduction**
    - **1.1** Drinking Water Source Protection and the Clean Water Act, 2006
    - **1.2** The Source Water Protection Process
    - **1.3** The South Georgian Bay-Lake Simcoe Source Protection Region
    - **1.4** Participants in the process
    - **1.5** Purpose and Scope of This Report
    - **1.6** How This Report is Organized
    - **1.7** Information Gaps and Continuous Improvement
2. **Watershed Characterization**
    - **2.1** Introduction
    - **2.2** Watershed and Subwatershed Boundaries
    - **2.3** Physical and Natural Geography
    - **2.4** Human Geography – Population and Land Use
    - **2.5** Drinking Water Systems
    - **2.6** Interaction between Physical and Human Geography
    - **2.7** Data and knowledge Gaps
    - **2.8** List of Figures
3. **Water Budget**
    - **3.1** Conceptual Water Budget
    - **3.2** Tier One Water Budget and Water Quantity Stress Assessment
    - **3.3** Tier Two Water Budget Summary Methods
    - **3.4** Tier Two Water Budget and Water Quantity Stress Assessment – Penetanguishene and Tay Point, Midland Area, Wye River, and Tiny Costal Area Northwest
    - **3.5** Tier Three Water Budget – Midland, Penetanguishene, and Whip-Poor-Will Area
    - **3.6** Peer Review Process
4. **Assessing Regional Groundwater Vulnerability**
    - **4.1** Groundwater Vulnerability
    - **4.2** Highly Vulnerable Aquifer Mapping (HVAs)
    - **4.3** Significant Groundwater Recharge Area (SGRAs)
    - **4.4** Drinking Water Threats Evaluation
5. **Methods Overview**
    - **5.1** Overview of Assessing Vulnerability, Issues, and Threats
    - **5.2** Groundwater Vulnerability
    - **5.3** Surface Water Vulnerability
    - **5.4** Drinking Water issues Evaluation
    - **5.5** Drinking Water Threats Evaluation
    - **5.6** Acknowledgements
6. **City of Orillia**

Table of Contents – Front Material

List of Tables

List of Figures

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	• Laying the foundation • Establish source protection authorities • Establish source protection committees • Negotiate terms of reference
Year 2 (2009-10)	2	• Assessment of threats • Identify and assess threats to drinking water • Prepare Assessment Report
Year 3 – 5 (2010-12)	3	• Source Protection Planning • Prepare source protection plan, including policies to address significant threats to drinking water
Year 5+ (2012+)	4	• Implementation • Implement the source protection plan • Inspect and enforce • Monitor and report • Review plan

1.2 About this Document

This is a companion document to the Severn Sound Source Protection Area 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

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, 282 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.

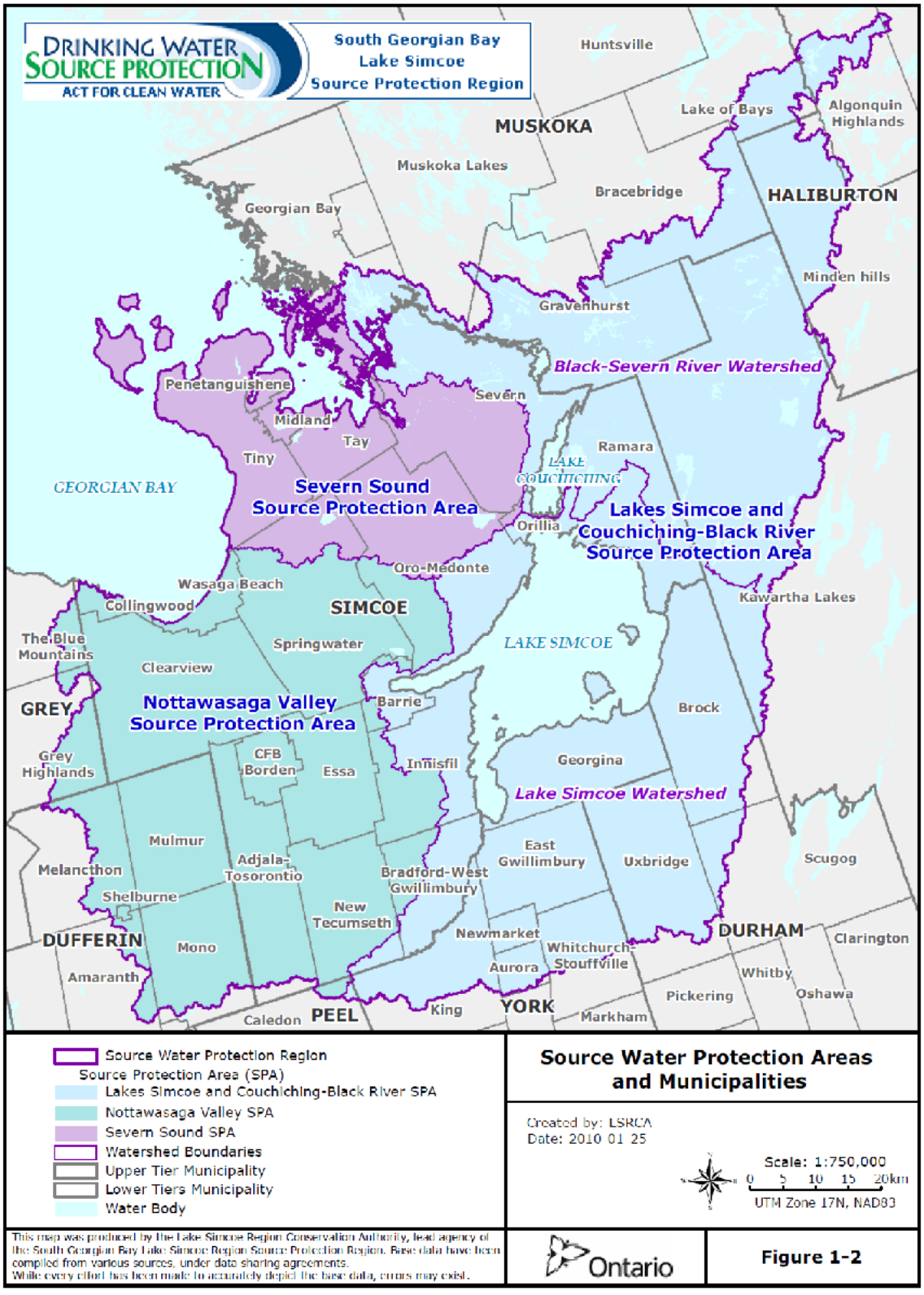

Figure 1-1 Map of the South Georgian Bay Lake Simcoe Source Protection Region

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)

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 Source Protection 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[1] 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.

[1] Now, the Ministry of the Environment, Conservation and Parks

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 Severn Sound Source Protection Area, 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.

2.1 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 Severn Sound Source Protection Area has 90 municipal supply wells and 2 surface water intakes providing water for 35 drinking water systems.

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	110	1
Severn Sound	36	90	2
Total	110 * (108)	289 **	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.

2.2 Chapter 2: 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.

Human characteristics across this watershed vary from the built up urban centres found in the larger municipalities to the beautiful waterfront communities located along the coastline of Georgian Bay. Despite almost 75,000 people living in the watershed, natural vegetative features are the largest single land use in the watershed (52%), followed by agricultural practices.

The Severn Sound watershed lies within two upper tier municipalities – County of Simcoe and District of Muskoka; and nine lower tier municipalities. The permanent population is affected by the seasonal residential population that resides in the Severn Sound area each recreational season (especially during summer). Total population during this season could rise by 2 or 3 times the permanent population. Percentage change in the permanent population between the 2001 and 2006 census were highest in the Township of Tiny and the Township of Georgian Bay (District Municipality of Muskoka), due largely to infilling and conversion of seasonal residences to permanent residences. In general, urban areas are restricted to the larger municipalities within the watershed, while many of the settlement areas are waterfront communities. Some of these communities include; Orillia, Midland, Penetanguishene, Victoria Harbour and Port McNicoll. Although originally settlement in these areas occurred as a result of ease of transportation on waterways, current day development is due to a desire to live or vacation near a water body.

The Severn Sound watershed has a total drainage area of about 1,380 km^2, a maximum length of about 43 km in a northwest-southeast direction and a maximum width of about 46 km in a northeast-southwest direction. The Severn Sound watershed has been divided into 19 subwatersheds or hydrological units (excluding the Severn Sound islands).

The North River is the largest drainage system in the study area at 319 km^2. It is located within the Townships of Severn and Oro-Medonte and the City of Orillia.

The Severn Sound Watershed is located within three (3) regional-scale physiographic regions:

- Carden plain
- Simcoe uplands
- Georgian Bay fringe

The geology of the Severn Sound watershed can be generally described as being comprised of unconsolidated overburden, deposited during the Quaternary Period, overlying Paleozoic and Precambrian bedrock. Some bedrock outcropping occurs in the northern portion of the study area.

2.3 Chapter 3: 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**

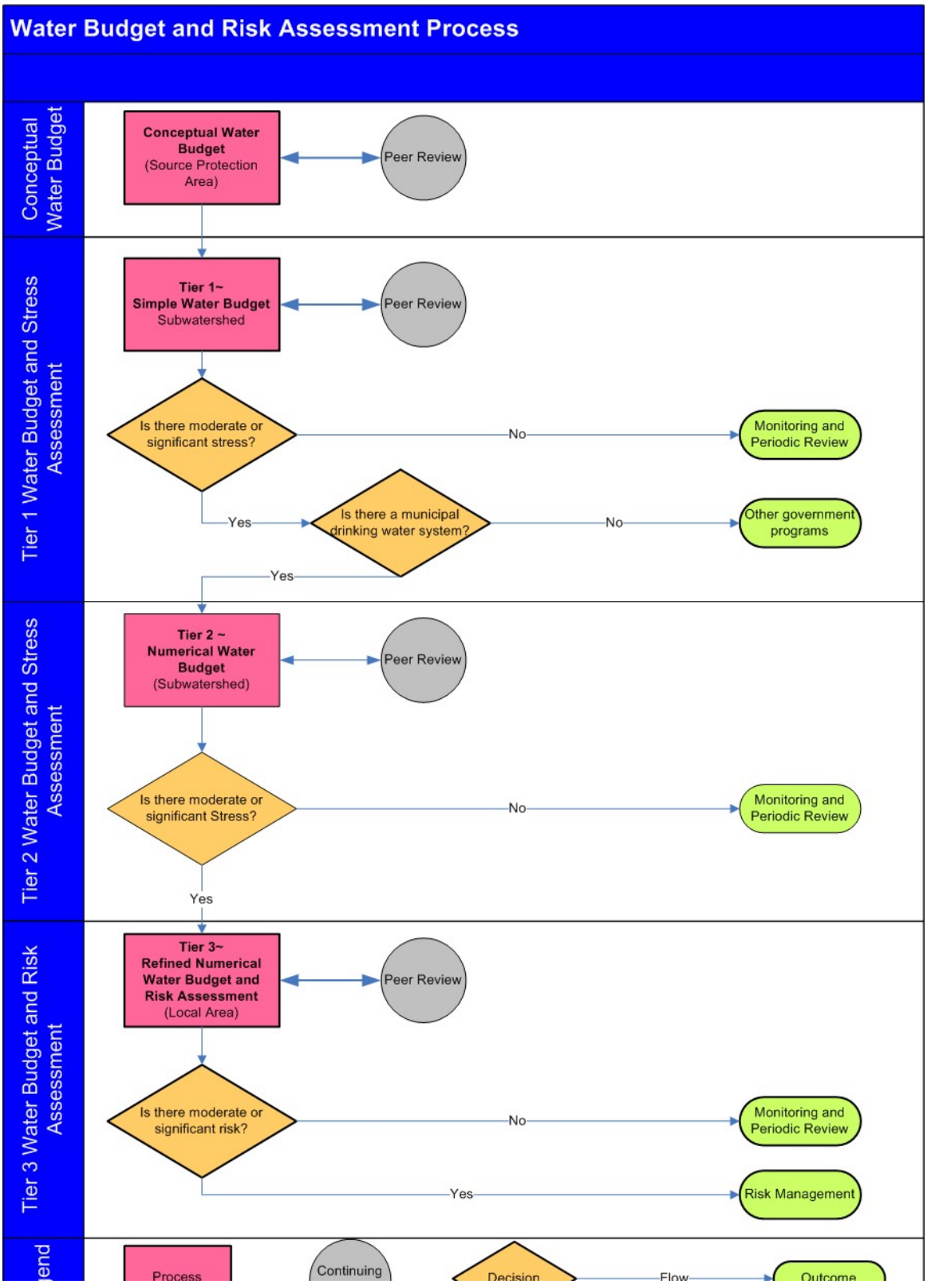

Figure 2-1 Tiered Water Budget and Risk Assessment Process

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 and Tier 1 Water Budgets were completed for the Severn Sound Source Protection Area. Additional water budget efforts (Tier 2 assessments) were necessary for four subwatersheds that were identified within the Tier 1 water budget as having water use that outweighed water availability within that subwatershed. Even further water budget analyses (Tier 3) were undertaken for municipal systems that were identified in the Tier 2 study as being stressed. These include water supply systems within the Town of Midland, Town of Penetanguishene, and the Whip-Poor-Will system in Tiny Township.

The following table of the Severn Sound Source Protection Area indicates which subwatersheds showed potential stress at a Tier One Level, and were advanced for further analysis.

Table 3. Subwatershed and Municipal Summary of the Water Budget and Risk Assessment Process: Severn Sound

Subwatershed	Upper Tier Municipalities	Lower Tier Municipalities	Municipal Drinking Water System (Yes / No)	Conceptual / Tier 1	Tier 2	Tier 3
Coldwater River	Simcoe County	Township of Oro-Medonte	Yes (GW)	√	-	-
Coldwater River	Simcoe County	Township of Severn	Yes (GW)	√	-	-
Copeland Creek	Simcoe County	Township of Tay	Yes (GW)	√	-	-
Copeland Creek	Simcoe County	Town of Penetanguishene	Yes (GW)	√	-	-
Hog Creek	Simcoe County	Township of Oro-Medonte	No	√	-	-
Hog Creek	Simcoe County	Township of Tay	Yes (SW)	√	-	-
Hog Creek	Simcoe County	Township of Springwater	No	√	-	-
Hog Creek	Simcoe County	Township of Tiny	No	√	-	-
Honey Harbour to point Severn	Muskoka	Georgian Bay Township	No	√	-	-
Lafontaine Creek	Simcoe County	Township of Tiny	No	√	-	-
Midland Area	Simcoe County	Town of Midland	Yes (GW)	√	√	√

Subwatershed	Upper Tier Municipalities	Lower Tier Municipalities	Municipal Drinking Water System (Yes / No)	Conceptual / Tier 1	Tier 2	Tier 3
North River	Simcoe County	Township of Oro-Medonte	Yes (GW)	√	-	-
North River	Simcoe County	City of Orillia	Yes (GW)	√	-	-
North River	Simcoe County	Township of Severn	Yes (GW)	√	-	-
Penetang. Bay W	Simcoe County	Town of Penetanguishene	Yes (GW)	√	-	-
Penetang. Bay W	Simcoe County	Township of Tiny	Yes (GW)	√	-	-
Penetanguishene and Tay Point	Simcoe County	Town of Penetanguishene	Yes (GW)	√	√	√
Penetanguishene and Tay Point	Simcoe County	Town of Midland	Yes (GW)	√	√	√
Port Severn and Matchedash Bay N	Simcoe County	Township of Severn	No	√	-	-
Port Severn and Matchedash Bay N	Simcoe County	Township of Tay	Yes (SW)	√	-	-
Sturgeon river	Simcoe County	Township of Springwater	Yes (GW)	√	-	-
Tiffin Basin and Port McNicoll	Simcoe County	Township of Tay	Yes (SW)	√	-	-
Tiny Coastal Area NW	Simcoe County	Township of Tiny	Yes (GW)	√	√	-

Subwatershed	Upper Tier Municipalities	Lower Tier Municipalities	Municipal Drinking Water System (Yes / No)	Conceptual / Tier 1	Tier 2	Tier 3
Tiny Coastal Area S	Simcoe County	Township of Tiny	Yes (GW)	√	-	-
Tiny Coastal Area W Central	Simcoe County	Township of Tiny	Yes (GW)	√	-	-
Tiny Coastal Area NE	Simcoe County	Township of Tiny	Yes (GW)	√	-	-
Victoria Harbour Area	Simcoe County	Township of Tay	Yes (SW)	√	-	-
Waubaushene and Matchedash	Simcoe County	Township of Tay	Yes (SW)	√	-	-
Wye River	Simcoe County	Town of Midland	Yes (GW)	√	√	√
Wye River	Simcoe County	Township of Tiny	Yes (GW)	√	√	-
Wye River	Simcoe County	Township of Springwater	Yes (GW)	√	√	-

***GW = groundwater, SW = surface water**

2.4 Chapter 4: 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.

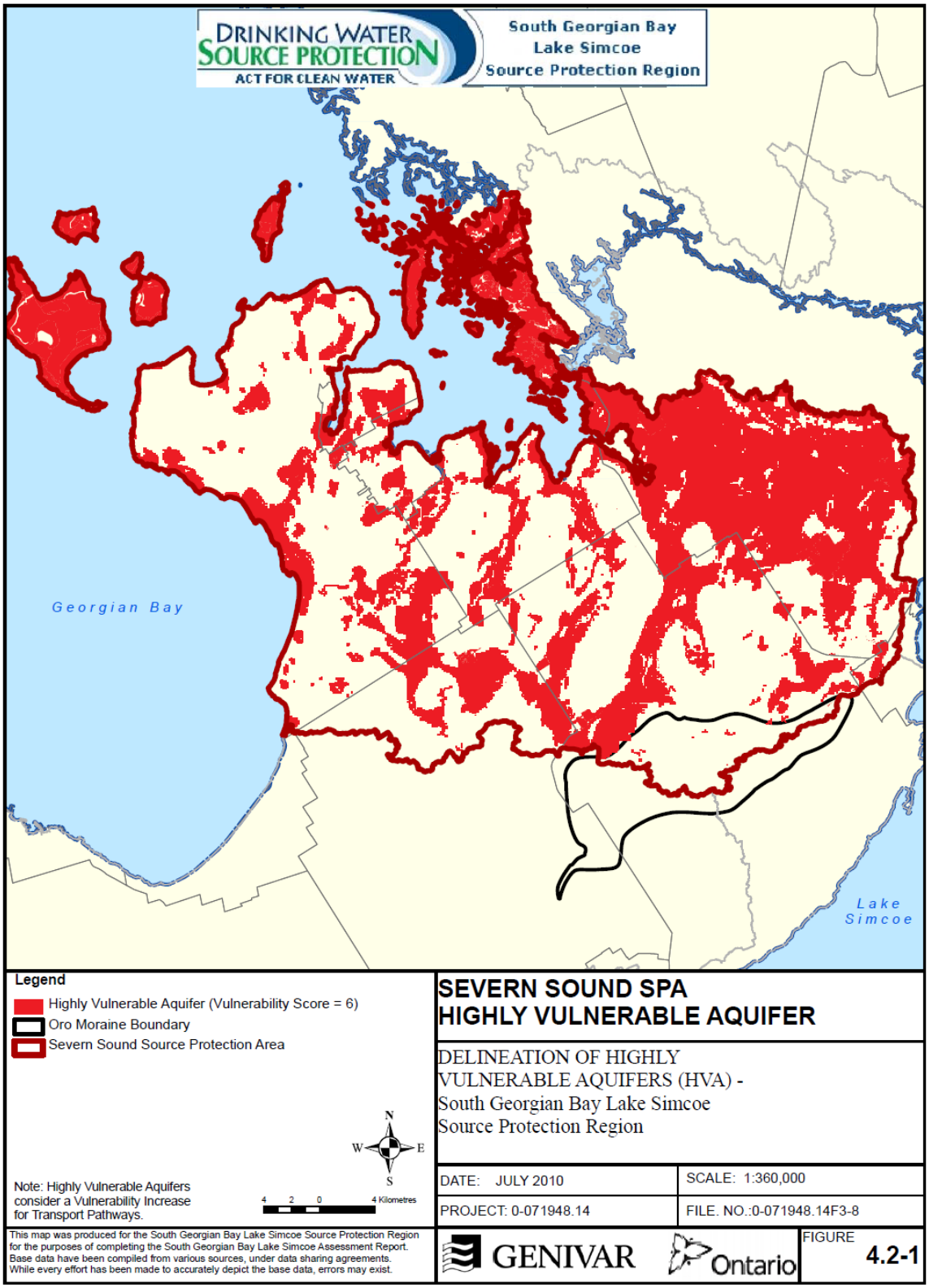

Figure 2-2 Map of Highly Vulnerable Aquifers: Severn Sound Watershed

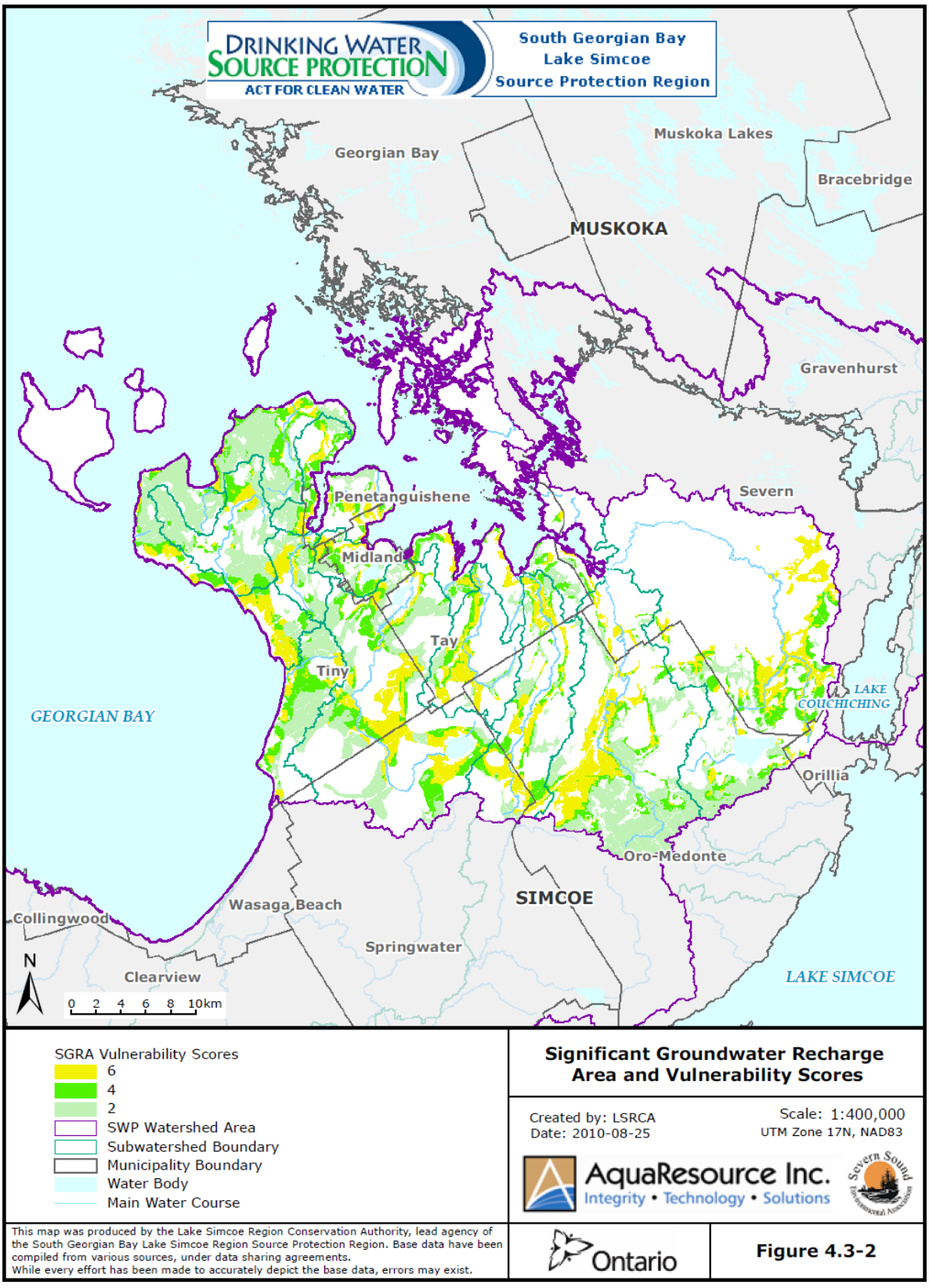

Figure 2-3 Significant Groundwater Recharge Areas: Severn Sound Watershed

2.5 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.

2.6 Chapters 6-onwards: Threats by Municipality

2.6.1 Town of Midland

Drinking Water Systems and their Vulnerable Areas

There is one drinking water system in Town of Midland that services approximately 16,400 people. The water supply system is located within the 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 information).

Midland Well Supply:

- 9 wells are located in the Town of Midland, close to the shores of Georgian Bay. This system services approximately 16,400 people.

- The WHPAs extend westward away from Georgian Bay and the denser parts of the Town.

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.

Midland - 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 Midland Water Supply. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 27 parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Midland – 31 Significant Threats were identified in association with **27** land parcels. The Significant Threats reflect a variety of commercial and residential land uses.

Table 4 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Midland Drinking Water Supply System

Threat Number	Significant Threat	Number of 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	6
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	0
11	The handling and storage of pesticide	0
12	The application of road salt	0
13	The handling and storage of road salt	0

Threat Number	Significant Threat	Number of Parcels
14	The storage of snow	0
15	The handling and storage of fuel	2
16	The handing and storage of dense non-aqueous phase liquids	20
17	The handling and storage of organic solvent	3
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 surface)	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0
-	**Total number of parcels***	**27***

*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.

2.6.2 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 30,900 people. The system is located within the Severn Sound Source Protection Area and Black-Severn 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 6 for further information).

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 30,900 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

West Orillia Groundwater System:

- Three wells are located in the City of Orillia, west of Lake Couchiching. This system services approximately 30,900 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 12 parcels were identified as potentially having one or more Significant Threat Activities.

Number of Significant Threats

Orillia Water Filtration Plant – 3 Significant Threats were identified in association with **3** land parcels. The Significant Threats are associated with sewer outfalls.

Groundwater System – 10 significant threats were identified in association with **9** 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 Orillia Drinking Water System

Threat Number	Significant Threat	Orillia Well Supply Number of Parcels	Orillia WTP Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0

Threat Number	Significant Threat	Orillia Well Supply Number of Parcels	Orillia WTP Number of Parcels
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	0
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

Threat Number	Significant Threat	Orillia Well Supply Number of Parcels	Orillia WTP Number of Parcels
14	The storage of snow	0	0
15	The handling and storage of fuel	1	0
16	The handing and storage of dense non-aqueous phase liquids	7	0
17	The handling and storage of organic solvent	0	0
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 surface)	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0
-	**Total number of parcels***	**9***	**3**

*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.

2.6.3 Township of Oro-Medonte

Drinking Water Systems and their Vulnerable Areas

There are twelve drinking water systems in the Township of Oro-Medonte, six of which are in the Severn Sound watershed and service approximately 3,900 people. One system is located in the Nottawasaga Valley watershed, while the other five are located in the Lake Simcoe watershed. Information on these systems can be found on the Nottawasaga Valley Assessment Report (AR) and Lakes Simcoe and Couchiching-Black River (Part 1) AR, respectively.

Areas that are vulnerable to contamination have been delineated, these are known as Wellhead Protection Areas (WHPA) for wells. 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.

Braestone

• Two wells are located in the central portion of the Township. This system will service approximately 800 people at full build-out.

• The WHPA extends towards the south away from the subdivision.

Horseshoe Highlands Subdivision:

- Three wells located in the central part of the Township in the vicinity of the Horseshoe Valley and Horseshoe Highlands ski and golf facilities. This system services over 1000 people
- The WHPA extends to the southeast going through a portion of the community.

Medonte Hills:

- Two wells are located in the community of Moonstone (north part of the Township). This system services about 350 people.
- The WHPA curves from west to south, avoiding most of the community.

Robin Crest:

- Two wells are located in the community of Moonstone (north part of the Township). This system services about 400 people.
- The WHPA extends towards the southeast away from the community

Sugar Bush:

- Three wells located in the central part of the Township, off of Horseshoe Valley Rd. and the 6th Line North. This system services over 850 people.
- The WHPAs extend to the south away from the community. The WHPA-C and -D for the three wells merge together.

Warminster:

- Two wells located in the northeastern part of the Township, west of Orillia. This system services over 500 people.

- The WHPAs extend to the southwest and across nearby 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 Oro-Medonte systems (within Severn Sound 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 Oro-Medonte Water Supplies that are within the Lake Simcoe watershed. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 37 parcels were identified as potentially having one or more Significant Threat Activities.

Number of Significant Threats

Braestone – 8 Significant Threats were identified in association with 8 land parcels. All of the Significant Threats identified are associated with private sewage systems.

Horseshoe Highlands Subdivision - 7 Significant Threats were identified in association with **7** land parcels. The majority of the Significant Threats identified are associated with private sewage systems.

Medonte Hills - 10 Significant Threats were identified in association with **10** land parcels. The majority of the Significant Threats identified are associated with private sewage systems.

Robin Crest – 8 Significant Threats were identified in association with **8** land parcels. The majority of the Significant Threats identified are associated with private sewage systems.

Sugar Bush – 27 Significant Threats were identified in association with **27** land parcels. The majority of the Significant Threats identified are associated with private sewage systems.

Warminster - 0 Significant Threats were identified in association with **0** land parcels. The Significant Threats are associated with agricultural land use.

Table 6 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Township of Oro-Medonte Drinking Water Supply System

Threat Number	Significant Threat	Braestone Number of Parcels	Horseshoe Highlands Number of Parcels	Medonte Hills Number of Parcels	Robin Crest Number of Parcels	Sugarbush Number of Parcels	Warminster Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	8	5	9	7	25	0
3	The application of agricultural source material to land	0	0	0	0	0	0
4	The storage of agricultural source material	0	0	0	0	0	0
5	The management of agricultural source material	0	0	0	0	0	0

Threat Number	Significant Threat	Braestone Number of Parcels	Horseshoe Highlands Number of Parcels	Medonte Hills Number of Parcels	Robin Crest Number of Parcels	Sugarbush Number of Parcels	Warminster Number of Parcels
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0	0	0	0
8	The application of commercial fertilizer to land	0	0	0	0	0	0
9	The handling and storage of commercial fertilizer	0	0	0	0	0	0
10	The application of pesticide to land	0	1	0	0	0	0
11	The handling and storage of pesticide	0	0	0	0	0	0
12	The application of road salt	0	0	0	0	0	0
13	The handling and storage of road salt	0	0	0	0	0	0

Threat Number	Significant Threat	Braestone Number of Parcels	Horseshoe Highlands Number of Parcels	Medonte Hills Number of Parcels	Robin Crest Number of Parcels	Sugarbush Number of Parcels	Warminster Number of Parcels
14	The storage of snow	0	0	0	0	0	0
15	The handling and storage of fuel	0	1	1	1	2	0
16	The handing and storage of dense non-aqueous phase liquids	0	0	0	0	0	0
17	The handling and storage of organic solvent	0	0	0	0	0	0
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	0	0	0	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	0	0	0	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	0	0	0	0	0

Threat Number	Significant Threat	Braestone Number of Parcels	Horseshoe Highlands Number of Parcels	Medonte Hills Number of Parcels	Robin Crest Number of Parcels	Sugarbush Number of Parcels	Warminster Number of Parcels
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0	0	0	0
-	**Total number of parcels***	**8**	**7**	**10**	**8**	**27**	**0**

*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.

2.6.4 Town of Penetanguishene

Drinking Water Systems and their Vulnerable Areas

There are three drinking water systems in the Town of Penetanguishene that service approximately 6,800 people. The water supply systems are located within the 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 8 for further information).

Lepage Subdivision:

- Two wells located in west end of the Town, close to Penetanguishene Harbour. This system services approximately 65 people.
- The WHPA extends towards the west, away from the Harbour and into the Township of Tiny.

Payette:

- Three wells in the centre of the Town close to Penetanguishene Harbour. This system services approximately 6,700 people.
- The WHPAs extend to the east, south and west, away from the shoreline and across the community.

Robert Street West:

- Two wells located at the southern end of the Town and are currently not in use.
- The WHPA extends southwest away from the Harbour into the Township of Tiny.

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.

Lepage - No Issues.

Payette - No Issues.

Robert Street West – Trichloroethylene (TCE) was identified as a Drinking Water Issue. Note: These wells are currently not in use. Before these wells are brought back online, a treatment facility will be constructed.

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

Lepage - No Conditions.

Payette - No Conditions.

Robert Street West – Two Conditions have been identified for the Robert Street water supply. The first Condition is related to the TCE found at the Robert Street Wells 2 and 3, while the other Condition is related to the TCE found in the immediate vicinity of the former MPT (Midland, Penetanguishene and Tiny) landfill site (located within the Robert Street WHPA-D).

Activities:

A total of 31 parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Lepage – 14 Significant Threats were identified in association with **14** land parcels. The Significant Threats reflect a variety of commercial, residential and agricultural land uses.

Payette – 8 Significant Threats were identified in association with **8** land parcels. The Significant Threats are associated with a variety of land uses, the majority of which are related to the handling and storage of Dense Non-Aqueous Phase Liquid (DNAPLs).

Robert Street West – 11 Significant Threats were identified in association with **9** land parcels. The Significant Threats reflect a variety of land uses, the majority related to the handling and storage of Dense Non-Aqueous Phase Liquids (DNAPL).

Table 7. Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Town of Penetanguishene Drinking Water Supply System

Threat Number	Significant Threat	Lepage Number of Parcels	Payette Number of Parcels	Robert Street West Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	13	2	1
3	The application of agricultural source material to land	0	0	0
4	The storage of agricultural source material	0	0	0
5	The management of agricultural source material	0	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0
8	The application of commercial fertilizer to land	0	0	0

Threat Number	Significant Threat	Lepage Number of Parcels	Payette Number of Parcels	Robert Street West Number of Parcels
9	The handling and storage of commercial fertilizer	0	0	0
10	The application of pesticide to land	0	0	0
11	The handling and storage of pesticide	0	0	0
12	The application of road salt	0	0	0
13	The handling and storage of road salt	0	0	0
14	The storage of snow	0	0	0
15	The handling and storage of fuel	1	0	2
16	The handing and storage of dense non-aqueous phase liquids	0	6	7
17	The handling and storage of organic solvent	0	0	1
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	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	0

Threat Number	Significant Threat	Lepage Number of Parcels	Payette Number of Parcels	Robert Street West Number of Parcels
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0
-	**Total number of parcels***	**14**	**8**	**9**

*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.

2.6.5 Township of Severn

Drinking Water Systems and their Vulnerable Areas

There are six drinking water systems in Township of Severn, two of which are in the Severn Sound watershed and service over 1,500 people. The other four systems are located within the Black-Severn River watershed and information on these can be found in the Lakes Simcoe and Couchiching-Black River Assessment Report (Part 2).

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).

Bass Lake Woodlands:

- Three wells are located in the southern part of the Township of Severn and services a community of approximately 360 people

- The WHPAs extend towards the south and; therefore, avoid a good portion of the community.

Coldwater:

- Three wells are located on Lots 21 and 22, Concessions 11 and 12 and service around 1,200 people.
- The WHPAs extend towards the south and; therefore, avoid most of the community.

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.

Bass Lake Woodlands – No Issues.

Coldwater – Trichloroethylene (TCE) was identified as a Drinking Water Issue for the Coldwater system. A granular Activated Carbon (GAC) filtration system was installed and began operating in 2008. The treatment system has been effectively reducing the concentrations of TCE in the groundwater supply.

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 43 parcels were identified as potentially having one or more Significant Threat activities.

Bass Lake Woodlands - 25 Significant Threats were identified in association with **25** land parcels. The Significant Threats are associated with private sewage systems, storage of fuel and the handling and storage of Dense Non-Aqueous Phase Liquid (DNAPLs)

Coldwater - 24 significant threats were identified in association with **18** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial

Table 8 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Township of Severn Drinking Water Supply System

Threat Number	Significant Threat	Bass Lake Woodlands Number of Parcels	Coldwater Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	21	11
3	The application of agricultural source material to land	0	2
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

Threat Number	Significant Threat	Bass Lake Woodlands Number of Parcels	Coldwater Number of Parcels
9	The handling and storage of commercial fertilizer	0	0
10	The application of pesticide to land	0	6
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	3
16	The handing and storage of dense non-aqueous phase liquids	3	2
17	The handling and storage of organic solvent	0	0
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 surface)	0	0

Threat Number	Significant Threat	Bass Lake Woodlands Number of Parcels	Coldwater Number of Parcels
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0
-	**Total number of parcels***	**25**	**18**

*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.

2.6.6 Township of Springwater

Drinking Water Systems and their Vulnerable Areas

There are ten drinking water systems in the Township of Springwater, three of which are in the Severn Sound watershed and will service over 7,384 people. The other six systems are located in the Nottawasaga Valley watershed and information on these systems can be found in the Nottawasaga Valley 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 11 for further information).

Cassell Drive:

- Two wells located north of Highway 400 and east of County Road 93, approximately 3 km south of the community of Hillsdale. This system is estimated to service approximately 4,584 people.
- The WHPA extends towards the south east and; therefore, avoids most of the settlement area of Hillsdale.

Elmvale:

- Two wells located at Lot 5, Concession 9 in the northern end of the Township. This system services approximately 1,700 people
- The WHPA extends towards the west and; therefore, avoids most of the community.

Hillsdale:

- Three wells located at Lot 57, Concession 1 in the northern end of the Township. This system services over 1,100 people.
- The WHPA is circular in nature and covers a large portion of the community.

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.

Cassell Drive – No issues

Elmvale - No issues

Hillsdale - 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 Springwater Water Supplies within the Severn Sound watershed. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 16 parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Cassell Drive – 5 Significant Threats were identified in association with 10 land parcels. The Significant Threats are associated with private sewage systems, the storage of fuel, the handling and storage of dense non-aqueous phase liquid, and the handling and storage of organic solvent.

Elmvale - 2 Significant Threats were identified in association with **2** land parcels. The Significant Threats are associated with the sanitary sewer connections and the storage of fuel.

Hillsdale - 4 Significant Threats were identified in association with **4** land parcels. The Significant Threats are associated with the private sewage systems and the storage of fuel.

Table 9 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Township of Springwater Drinking Water Supply System

Threat Number	Significant Threat	Cassell Drive Number of Parcels	Elmvale Number of Parcels	Hillsdale Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	2	1	3
3	The application of agricultural source material to land	0	0	0
4	The storage of agricultural source material	0	0	0
5	The management of agricultural source material	0	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0
8	The application of commercial fertilizer to land	0	0	0

Threat Number	Significant Threat	Cassell Drive Number of Parcels	Elmvale Number of Parcels	Hillsdale Number of Parcels
9	The handling and storage of commercial fertilizer	0	0	0
10	The application of pesticide to land	0	0	0
11	The handling and storage of pesticide	0	0	0
12	The application of road salt	0	0	0
13	The handling and storage of road salt	0	0	0
14	The storage of snow	0	0	0
15	The handling and storage of fuel	2	1	1
16	The handing and storage of dense non-aqueous phase liquids	4	0	0
17	The handling and storage of organic solvent	2	0	0
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	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	0

Threat Number	Significant Threat	Cassell Drive Number of Parcels	Elmvale Number of Parcels	Hillsdale Number of Parcels
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0
-	**Total number of parcels***	**10**	**2**	**4**

*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.

2.6.7 Township of Tay

Drinking Water Systems and their Vulnerable Areas

There are two drinking water systems in the Township of Tay that service over 7,300 people. The water supply systems are within the 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 12 for further details).

Rope Subdivision WTP:

- Located is the eastern part of Severn Sound, between Port Severn and Waubaushene. This system services approximately 70 people
- IPZ extends northward to approximately 200 m north of the Highway 400 crossing at Port Severn (1.4 km northeast of the intake). Its southern extent reaches 650 m south of the intake and contacts the shoreline from north of Highway 400 to just south of Bluff Point.

Victoria Harbour WTP:

- Located in Hog Bay off Bergie Point, in Severn Sound. This system services approximately 7,300 people
- IPZ extends along shoreline of the shore from south of Bergie Point to the west, and extends to the east across Crystal Beach into the small bay at MacKenzie's Park.

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.

Rope Subdivision WTP - No issues

Victoria Harbour 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 Tay Surface Water Supplies. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 7 parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Rope Subdivision WTP - 2 Significant Threat was identified in association with **2** land parcel. The Significant Threats identified are associated with the handling and storage of fuel.

Victoria Harbour WTP - 6 Significant Threats were identified in association with **5** land parcels. The Significant Threats identified are associated with storm water outfalls, municipal sanitary sewer system, and the handling and storage of Dense Non-Aqueous Phase Liquid (DNAPLs) and of fuel.

Table 10 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Township of Tay Drinking Water Supply System

Threat Number	Significant Threat	Rope Subdivision WTP Number of Parcels	Victoria Harbour WTP Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	0	2
3	The application of agricultural source material to land	0	0

Threat Number	Significant Threat	Rope Subdivision WTP Number of Parcels	Victoria Harbour WTP Number of Parcels
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	0
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	2	3
16	The handing and storage of dense non-aqueous phase liquids	0	1

Threat Number	Significant Threat	Rope Subdivision WTP Number of Parcels	Victoria Harbour WTP Number of Parcels
17	The handling and storage of organic solvent	0	0
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 surface)	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0
-	**Total number of parcels***	**2**	**5**

*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.

2.6.8 Township of Tiny

Drinking Water Systems and their Vulnerable Areas

There are 19 drinking water systems in the Township of Tiny that service over 7,500 people. The water supply systems are located within the 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 13 for further information).

Bluewater:

- Three wells are located in the southwest part of the Township, along the Georgian Bay shoreline. This system services over 200 people.
- The WHPAs extend towards the east and; therefore, avoid most of the community.

Cooks Lake:

- Two wells located in the northern part of the Township. This system services about 300 people.
- The WHPAs extend to the west and; therefore, avoid most of the lakeshore community.

Georgian Bay Estates:

- Three wells located at the north end of the Township and services around 780 people.
- The WHPAs extend south and avoid most of the near subdivisions on the Georgian Bay shore.

Georgian Highlands:

- One well located in the northwest part of the Township and services about 300 people
- The WHPAs extend to the east away from the shoreline community.

Georgian Sands:

- Four wells are located in the northwest part of the Township and services approximately 2,300 people
- The WHPAs extend to the northeast, away from the shoreline, covering parts of the community and overlapping the Lafontaine WHPA.

Lafontaine:

- Two wells located in the northwest part of the Township and services approximately 230 people.
- The WHPAs extend towards the northeast, away from the nearby subdivision.

Lefaive:

- Two wells located in the west-central part of the Township and services about 230 people.
- The WHPAs extend northeast, away from the shoreline, avoiding most of the community.

Pennorth:

- Two wells located in the west-central part of the Township and services over 100 people.
- The WHPAs extend northeast, away from the shoreline, avoiding most of the community.

Perkinsfield:

- Four wells located in the central part of the Township and services about 630 people.
- Two WHPAs extend slightly east, across the community while the others are circular in shape.

Rayko:

- Two wells are located in the southwest part of the Township, along the Georgian Bay shoreline and services around 120 people.
- The WHPAs extend towards the east and therefore avoid most of the community.

Sand Castle:

- Two wells located in the northwest part of the Township and services about 120 people.
- The WHPAs extend to the east away from the shoreline community.

Sawlog Bay:

- Two wells located at the north end of the Township and services approximately 140 people.
- The WHPAs extend towards the south away from Georgian Bay.

Tee Pee Point:

- Two wells located at the northeast end of the Township and services over 300 people.
- The WHPAs extend towards the west, covering parts of the community.

Thunder Bay:

- Two wells located at the north end of the Township and services about 70 people.
- The WHPAs extend towards the south, avoiding most of the shoreline community.

Tiny Cove Estates:

- Two wells located in the northwest part of the Township and services zero people as this is a planned system.
- The WHPAs extend to the east, crossing a portion of the nearby community.

Vanier Woods:

- Two wells located in the northwest part of the Township and services about 170 people.
- The WHPAs extend to the east away from the shoreline community.

Whip-Poor-Will II:

- Two wells located in the central part of the Township and services around 220 people.
- The WHPAs extend slightly south west across the local community.

Woodland Beach:

- Two wells located in the southwest part of the Township, along the Georgian Bay shoreline and service about 100 people.

- The WHPAs extend towards the east and generally avoid most of the community.

Wyevale:

- Five wells located in the south-central part of the Township and services approximately 800 people.
- The WHPAs curve west to both north and south, crossing over a large portion of the local community.

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 Systems (with the exception of the Georgian Sands and Lafontaine Well Systems) – No Issues

Georgian Sands – Nitrate was identified as a Drinking Water Issue.

Lafontaine – Nitrate was identified as a Drinking Water Issue.

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 Township of Tiny Water Supplies. No potential Conditions have been identified for consideration at this time.

Activities:

A total of 491 parcels were identified as potentially having one or more Significant Threat activities.

Number of Significant Threats

Bluewater - 14 Significant Threats were identified in association with **14** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Cooks Lake - 5 Significant Threats were identified in association with **5** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Georgian Bay Estates - 14 Significant Threats were identified in association with **14** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Georgian Highlands - 3 Significant Threats were identified in association with **3** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Georgian Sands - 373 Significant Threats were identified in association with **249** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial.

Lafontaine - 48 Significant Threats were identified in association with **29** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial.

Lefaive – 27 Significant Threats were identified in association with **27** land parcels. The Significant Threats are associated with septic systems, storage of Dense Non-Aqueous Phase Liquid (DNAPL) and fuel storage.

Pennorth – 9 Significant Threats were identified in association with **9** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Perkinsfield - 22 Significant Threats were identified in association with **22** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial.

Rayko - 11 Significant Threats were identified in association with **11** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Sand Castle - 5 Significant Threats were identified in association with **5** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Sawlog Bay - 6 Significant Threats were identified in association with **6** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Tee Pee Point - 23 Significant Threats were identified in association with **23** land parcels. The Significant Threats are associated with septic systems, storage of Dense Non-Aqueous Phase Liquid (DNAPL) and fuel storage.

Thunder Bay - 9 Significant Threats were identified in association with **9** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Tiny Cove Estates – 6 Significant Threats were identified in association with **6** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Vanier Woods - 15 Significant Threats were identified in association with **15** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Whip-Poor-Will II - 12 Significant Threats were identified in association with **12** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Woodland Beach- 12 Significant Threats were identified in association with **12** land parcels. The Significant Threats are associated with septic tanks and fuel storage.

Wyevale - 34 Significant Threats were identified in association with **34** land parcels. The Significant Threats reflect a variety of land uses, from residential to agriculture to commercial.

Table 11 Number of Parcels with confirmed or potential Significant Drinking Water Threats for the Township of Tiny Drinking Water Supply System

Threat Number	Significant Threat	Bluewater Number of Parcels	Cook's Lake Number of Parcels	Georgian Bay Estates Number of Parcels	Georgian Highlands Number of Parcels	Georgian Sands Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	12	4	13	2	218
3	The application of agricultural source material to land	0	0	0	0	0
4	The storage of agricultural source material	0	0	0	0	0
5	The management of agricultural source material	0	0	0	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0	0	0

Threat Number	Significant Threat	Bluewater Number of Parcels	Cook's Lake Number of Parcels	Georgian Bay Estates Number of Parcels	Georgian Highlands Number of Parcels	Georgian Sands Number of Parcels
8	The application of commercial fertilizer to land	0	0	0	0	1
9	The handling and storage of commercial fertilizer	0	0	0	0	142
10	The application of pesticide to land	0	0	0	0	0
11	The handling and storage of pesticide	0	0	0	0	0
12	The application of road salt	0	0	0	0	0
13	The handling and storage of road salt	0	0	0	0	0
14	The storage of snow	0	0	0	0	0
15	The handling and storage of fuel	2	1	1	1	6
16	The handing and storage of dense non-aqueous phase liquids	0	0	0	0	0
17	The handling and storage of organic solvent	0	0	0	0	0

Threat Number	Significant Threat	Bluewater Number of Parcels	Cook's Lake Number of Parcels	Georgian Bay Estates Number of Parcels	Georgian Highlands Number of Parcels	Georgian Sands Number of Parcels
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	0	0	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	0	0	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	0	0	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0	0	0
-	**Total number of parcels***	**14**	**5**	**14**	**3**	**249**

Threat Number	Significant Threat	Lafontaine Number of Parcels	Lefaive Number of Parcels	Pennorth Number of Parcels	Perkinsfield Number of Parcels	Rayko Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	24	25	8	17	10
3	The application of agricultural source material to land	2	0	0	0	0
4	The storage of agricultural source material	1	0	0	0	0
5	The management of agricultural source material	0	0	0	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0	0	0
8	The application of commercial fertilizer to land	15	0	0	0	0

Threat Number	Significant Threat	Lafontaine Number of Parcels	Lefaive Number of Parcels	Pennorth Number of Parcels	Perkinsfield Number of Parcels	Rayko Number of Parcels
9	The handling and storage of commercial fertilizer	1	0	0	0	0
10	The application of pesticide to land	0	0	0	2	0
11	The handling and storage of pesticide	0	0	0	0	0
12	The application of road salt	0	0	0	0	0
13	The handling and storage of road salt	0	0	0	0	0
14	The storage of snow	0	0	0	0	0
15	The handling and storage of fuel	3	1	1	3	1
16	The handing and storage of dense non-aqueous phase liquids	1	1	0	0	0
17	The handling and storage of organic solvent	1	0	0	0	0
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	0	0	0	0

Threat Number	Significant Threat	Lafontaine Number of Parcels	Lefaive Number of Parcels	Pennorth Number of Parcels	Perkinsfield Number of Parcels	Rayko Number of Parcels
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	0	0	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	0	0	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0	0	0
-	**Total number of parcels***	**29**	**27**	**9**	**22**	**11**

Threat Number	Significant Threat	Sandcastle Number of Parcels	Saw Log Bay Number of Parcels	Tee Pee Point Number of Parcels	Thunder Bay Number of Parcels	Tiny Cove Estates Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	4	5	21	8	5
3	The application of agricultural source material to land	0	0	0	0	0
4	The storage of agricultural source material	0	0	0	0	0
5	The management of agricultural source material	0	0	0	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0	0	0
8	The application of commercial fertilizer to land	0	0	0	0	0

Threat Number	Significant Threat	Sandcastle Number of Parcels	Saw Log Bay Number of Parcels	Tee Pee Point Number of Parcels	Thunder Bay Number of Parcels	Tiny Cove Estates Number of Parcels
9	The handling and storage of commercial fertilizer	0	0	0	0	0
10	The application of pesticide to land	0	0	0	0	0
11	The handling and storage of pesticide	0	0	0	0	0
12	The application of road salt	0	0	0	0	0
13	The handling and storage of road salt	0	0	0	0	0
14	The storage of snow	0	0	0	0	0
15	The handling and storage of fuel	0	1	1	1	1
16	The handing and storage of dense non-aqueous phase liquids	1	0	1	0	0
17	The handling and storage of organic solvent	0	0	0	0	0
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	0	0	0	0

Threat Number	Significant Threat	Sandcastle Number of Parcels	Saw Log Bay Number of Parcels	Tee Pee Point Number of Parcels	Thunder Bay Number of Parcels	Tiny Cove Estates Number of Parcels
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	0	0	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	0	0	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0	0	0
-	**Total number of parcels***	**5**	**6**	**23**	**9**	**6**

Threat Number	Significant Threat	Vanier Woodlands Number of Parcels	Whip-poor-will Number of Parcels	Woodland Beach Number of Parcels	Wyevale Number of Parcels
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V or the Environmental Protection Act	0	0	0	0
2	The establishment, operation or maintenance of a system that collect, stores, transmits, treats or disposes of sewage	14	9	11	31
3	The application of agricultural source material to land	0	0	0	0
4	The storage of agricultural source material	0	0	0	0
5	The management of agricultural source material	0	0	0	0
6	The application of non-agricultural source material to land (i.e. compost, biosolids)	0	0	0	0
7	The handling and storage of non-agricultural source material (i.e. septic systems)	0	0	0	0
8	The application of commercial fertilizer to land	0	0	0	0

Threat Number	Significant Threat	Vanier Woodlands Number of Parcels	Whip-poor-will Number of Parcels	Woodland Beach Number of Parcels	Wyevale Number of Parcels
9	The handling and storage of commercial fertilizer	0	0	0	0
10	The application of pesticide to land	0	0	0	0
11	The handling and storage of pesticide	0	0	0	0
12	The application of road salt	0	0	0	0
13	The handling and storage of road salt	0	0	0	0
14	The storage of snow	0	0	0	0
15	The handling and storage of fuel	1	1	1	2
16	The handing and storage of dense non-aqueous phase liquids	0	0	0	0
17	The handling and storage of organic solvent	0	0	0	0
18	The management of runoff that contains chemicals used in the de-icing of aircraft	0	0	0	0

Threat Number	Significant Threat	Vanier Woodlands Number of Parcels	Whip-poor-will Number of Parcels	Woodland Beach Number of Parcels	Wyevale Number of Parcels
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	0	0
20	An activity that reduces the recharge of an aquifer (i.e. increase in impervious surface)	0	2	0	0
21	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard	0	0	0	0
22	The establishment and operation of a liquid hydrocarbon pipeline	0	0	0	0
-	**Total number of parcels***	**15**	**12**	**12**	**34**

*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.

Township of Tiny Drinking Water Supplies have been identified.

3 The Assessment Report in Context: Final Chapter

3.1 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 12 Summary of projected increase in Source Protection Region average annual temperature (°C) in the 2050s compared with 1961-1990

Season	Low GHG Emission Scenario	Medium GHG Emission Scenario	High GHG Emission Scenario
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

GHG = greenhouse gas(es)

Table 13 Summary of projected increase in Source Protection Region precipitation (%) in the 2050s compared with 1961-1990.

Season	Low GHG Emission Scenario	Medium GHG Emission Scenario	High GHG Emission Sceanario
Annual	5.15	5.45	5.51
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

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.

3.2 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 Greats 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.

3.3 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 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 $1km^2$ 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.
- Rules require that a surface water intake be classified at Type A if the intake is located in a Great Lake. Because of the unique characteristics of the Severn Sound intakes, Directors approval was given to classify the Victoria Harbour and Rope Subdivision surface water intakes as Type D.
- Rules require that the IPZ-3 for a Type D surface water intake be delineated according to Rule 70, which requires delineating the entire watershed as the IPZ-3. In the case of Victoria Harbour and Rope Subdivision this would include the entire Lake Huron watershed. Alternate method approved by the Director allows for Rule 68 to be applied to delineate IPZ-3 for these two systems.
- Rules require that the vulnerability of the groundwater within a source protection area be assessed using one or more of the four prescribed methods. Alternate method approved by the Director allows the consideration of local scale features such as 'windows' in the confining unit, which are not always accounted for in the regional nature of the AVI scoring. This includes the use of water quality information as a verification tool to reassess the groundwater vulnerability in the WHPAs and determine where the groundwater vulnerability should be amended. This alternative method was used in the Township of Tiny and the Towns of Midland and Penetanguishene.

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)
- Proposed Site 41 Landfill Site
- Lake Simcoe Regional Airport drinking water system in Oro-Medonte
- Transportation Corridors (Roads and Highways)

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

3.4 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.

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
CBW	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	Metres above sea level
mbgs	Metres below ground surface
MOE	Ministry of the Environment (Now, The Ministry of Environment, Conservation and Parks [MECP])
MECP	Ministry of the Environment, Conservation and Parks (Formerly, the Ministry of the Environment [MOE])
MOE LUT	Ministry of the Environment Look Up Tables
MNR	Ministry of Natural Resources
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
NASM	Non-Agricultural Source Material
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
SGWLS	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	Thorncliffe 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