

## Chapter 8: Township of Ramara

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## 8 The Township of Ramara

### 8.1 Introduction

This chapter contains information on two drinking water systems for the Township of Ramara. ~~Various consultants have completed the work presented, which has also been reviewed by South Georgian Bay-Lake Simcoe Source Water Protection staff and members of the Technical Work Group or the Source Protection Committee. Various consultants have completed the work presented, all of which was reviewed by South Georgian Bay-Lake Simcoe Source Water Protection staff and members of the Technical Work Group.~~ In this chapter, each of the groundwater systems and surface water systems is discussed separately for easier readability.

Each municipal system section begins with an introduction of the characteristics of the drinking water system. This includes an overview of the location, number of people served, and source of the water supply. The sections following the system introductions are comprised of a Vulnerability Assessment and Issues and Threats evaluation of the system. The Vulnerability assessment includes the delineation of the Vulnerable Area(s) (Wellhead Protection Area or Intake Protection Zone), and the assignment of a Vulnerability Score for the delineated area. An Uncertainty Rating is also provided for the Vulnerable Area delineation and the Vulnerability Assessment as per Technical Rules 13-15 [Part I.4 – Uncertainty Analysis – Water Quality (MOE, 2008a)] to express the level of confidence in the results based on the information that was available for the study.

The Issues evaluation is intended to identify chemical parameters or pathogens 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. Any Issues identified for the systems will be listed in this section, along with a map illustrating the Issues Contributing Area if an Issue is known. The Threats evaluation identifies potential Significant Drinking Water Threats within the delineated Vulnerable Areas. This process includes creating lists for Drinking Water Threats for Activities and Conditions, generating maps showing areas that are or would be Significant, Moderate, or Low Drinking Water Threats, and a final enumeration of Significant Drinking Water Threats.

For more information, readers are encouraged to read Chapter 5: Methods Overview as well as the responsible consultant reports and memos (found in Appendix MO and R) for a more in depth description of the methods used, as well as the Glossary for any unfamiliar terms.

## **8.2 Drinking Water Systems**

The Township of Ramara, located in the northeastern portion of Simcoe County, operates groundwater based water supplies in four (4) communities and surface water based supplies in two (2). As shown in Table 8-1 and Figure 8-1 all of the groundwater supplies and the surface water supplies are within the South Georgian Bay-Lake Simcoe (SGBLS) Source Protection Region (SPR). Table 8-1 also indicates the SPR and corresponding lead Source Protection Authority (SPA) for the municipal water supplies.

**Table 8-1: Municipal Surface and Groundwater Supplies in the Township of Ramara**

Local Municipality	Groundwater / Surface Water	Community Water Supply	Drinking Water Information System (DWIS) Number	Source Water Body / Aquifer	Number of Intakes/ Wells	Source Protection Region; Source Protection Authority	Location where entire Assessment can be obtained
Township of Ramara	Surface Water	Lagoon City Surface Water Intake*	210001273	Lake Simcoe	1	SGBLS SPR; Lakes Simcoe and Couchiching / Black River SPA	Lake Simcoe Assessment Report (Chapter 12)
Township of Ramara	Surface Water	South Ramara Water Treatment Plant*	220010681	Lake Simcoe	1	SGBLS SPR; Lakes Simcoe and Couchiching / Black River SPA	Lake Simcoe Assessment Report (Chapter 12)
Township of Ramara	Groundwater	Bayshore Village*	220012724	Bedrock (Limestone)	3	SGBLS SPR; Lakes Simcoe and Couchiching / Black River SPA	Lake Simcoe Assessment Report (Chapter 12)
Township of Ramara	Groundwater	Val Harbour*	210010690	Bedrock (Limestone)	2	SGBLS SPR; Lakes Simcoe and Couchiching / Black River SPA	Lake Simcoe Assessment Report (Chapter 12)
Township of Ramara	Groundwater	Davy Drive Subdivision	220007141	Bedrock (Granite)	3	SGBLS SPR; Lakes Simcoe and Couchiching / Black River SPA	This chapter
Township of Ramara	Groundwater	Park lane Subdivision	210007132	Bedrock (Granite)	2	SGBLS SPR; Lakes Simcoe and Couchiching / Black River SPA	This chapter

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While still in the Township of Ramara and in the SGBLS Source Protection Region, the Brechin and Lagoon City and South Ramara Surface Water intakes, as well as the Val Harbour and Bayshore Village Water Supply systems, are located in the Lake Simcoe watershed and can be found in Part 1 of this report (Chapter 12).

Studies conducted for the Township of Severn have found that two surface water Intake Protection Zones, for intakes within Lake Couchiching, extend into the Town of Ramara (Table 8-2). Further information on these IPZs and the potential for threats to drinking water can be found in the Severn Sound SPA Assessment Report

**Table 8-2: IPZs that cross into the Township of Ramara in the SGBLS SPR.**

Local Municipality that IPZ extends into	Municipality where intake is located	Name of Water Supply	Source Protection Region / Lead Conservation Authority (CA)	Location where entire Assessment can be obtained
Township of Ramara	Township of Severn (Lake Couchiching)	Washago Water Treatment Plant	SGBLS SPR & Lakes Simcoe and Couchiching / Black River SPA	This Report (Chapter 9)
Township of Ramara	Township of Severn (Lake Couchiching)	Sandcastle Water Treatment Plant	SGBLS SPR & Lakes Simcoe and Couchiching / Black River SPA	This Report (Chapter 9)

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### 8.3 Davy Drive Subdivision Well Supply

The Davy Drive Well Supply is located on Lot 17, Concession 7, in the Township of Ramara and services an estimated population of 100 residents on 42 lots according to 2007 data. The Davy Drive Well Supply currently consists of three water supply wells: Well 1, Well 2, and Well 3. The municipal wells are located near the Water Works building in the Riverleigh Woods Subdivision.

The Davy Drive Well Supply operates under Permit To Take Water #1486-78SS7S which expires November 30, 2017. Well 1 is permitted to operate at a maximum rate of 25 L/min (14,550 L/day), Well 2 is permitted to operate at a maximum rate of 20 L/min (11,640 L/day), and Well 3 is permitted to operate at a maximum rate of 60 L/min (49,500 L/day). All three wells can operate up to a maximum combined taking of 75,690 L/day for the system.

Well 1 was drilled to a depth of 74.7 m below ground level (mbgl) into crystalline bedrock. The driller's log indicates 3.4 m of casing in the rock and the remainder of the well bore is without casing. Water-bearing fractures were intersected at 4.9, 24.4, and 64 m depth. In October 2000 the well was sleeved with 127 mm diameter casing to 6.7 m and the annulus was grouted with bentonite.

Well 2 was drilled to a depth of 76.2 mbgl into bedrock. The bedrock was encountered at 1.2 mbgl. A total of 6.7 m of nominal 152 mm diameter of steel casing was grouted into the rock.

Well 3 was drilled to a depth of 73.2 m into crystalline bedrock with water-bearing fractures reported at 16.8, 54.9 and 60.1 mbgl. Bedrock was found at 2.1 mbgl with clay overburden. The finished well was constructed with nominal 152 mm steel casing to a depth of 9.1 m. The water well record indicates that the well was sealed with Benseal from surface to 9.1 mbgl.

The Davy Drive wells are located in the igneous/metamorphic bedrock aquifer, which is covered by a thin (1.2 m), discontinuous, layer of clay overburden.

Information presented for the Davy Drive section of this Chapter is based on Genivar 2010a report.

#### 8.3.1 Ground Water Vulnerability

The Wellhead Protection Area (WHPA) is the primary Vulnerable Area delineated to ensure the protection of the municipal water supply wells. The Groundwater Vulnerability has been assessed to provide an indication, within the WHPA, which current (or future) Threats at the surface present the greatest risk to contaminate the water supply. The Vulnerability Analysis considers the WHPA and the Groundwater Vulnerability, as well as the potential for the vulnerability to be increased by man-made (anthropogenic) structures, through Transport Pathways, by developing a "Vulnerability Score" within the WHPA. Conversion of Vulnerability

categories (High, Medium, and Low) to Vulnerability Scores (10, 8, 6, 4, and 2) results in a new map for each WHPA that expresses the relative degree to which a Threat could affect the drinking water supply. A higher value Vulnerability Score will always be assigned to the immediate vicinity of the well and to any areas that are shown to be vulnerable.

The groundwater vulnerability for the Davy Drive groundwater supply has been delineated following the process recommended in the Technical Rules. The areas determined to contribute groundwater to the wells within 25 years were delineated as WHPA. The groundwater vulnerability within the WHPA was assessed and included consideration for the effects of man-made structures that may increase the vulnerability. The WHPA and the vulnerability were considered together as per the Technical Rules to determine a Vulnerability Score for the Davy Drive WHPA. Details of the methods for the vulnerability analysis are provided in Technical Memorandum A1 – Groundwater Vulnerability Assessment Methods (Appendix MO).

#### **8.3.1.1 Wellhead Protection Area (WHPA) Delineation**

The WHPA for the Davy Drive Well Supply was delineated in 2005 by Golder using a fixed-radius method. An updated survey of well locations was commissioned by SGBLS in 2009 to provide improved accuracy for delineation of the WHPA. A minor translation was required to adjust the Davy Drive well locations and the WHPA. The updated well locations and the WHPA are shown in Figure 8a-1. WHPA delineation and adjustment details are documented in Genivar, 2010a.

WHPA-A has been added to include the 100 m radius from each municipal well. The Golder (2005) study delineated time-of-travel zones (TOT) for 50 days, 2 years, 10 years, and 25 years. WHPA-C, representing the 5 year TOT zone, was re-calculated using the same calculation parameters as used by Golder and as documented in Technical Memorandum A2 – 5 year Time-of-Travel Estimation Methods (Appendix MO).

The WHPA appear as a series of nested, concentric circular zones centered on the mid-point of the wells. There is a relatively small difference in the radius of the WHPA for 2-year, 5-year, and 25-year time-of-travel that suggests that the WHPA is also close to representing the steady-state radius for the pumping rates used in the WHPA analysis.

#### **8.3.1.2 Groundwater Vulnerability**

The Davy Drive Well Supply draws water from the bedrock aquifer layer. The groundwater vulnerability for the bedrock aquifer in the area to the northeast of Lake Simcoe was determined following the methods outlined in Technical Memorandum A1 – Groundwater Vulnerability Assessment Methods (Appendix MO) for the areas where the hydrostratigraphic models are not available. The Groundwater Vulnerability has been based on available data for

overburden thickness with consideration for overburden materials where the overburden thickness is greater than 6 m. The regional Groundwater Vulnerability is illustrated in Technical Memorandum B1 – Regional Groundwater Vulnerability Mapping.

The Groundwater Vulnerability within the WHPA of the three municipal wells in the Davy Drive Well Supply is shown in Figure 8a-2. The Groundwater Vulnerability for the municipal water supply aquifers within the WHPA is considered to be High.

### 8.3.1.3 Transport Pathway Increase

Technical Memorandum A3 (Appendix MO) documents the consideration of Transport Pathways to increase the Vulnerability Rating as per the Technical Rules. The Vulnerability Rating can be increased from Medium to High, Low to Medium, or from Low to High in accordance with the potential for artificial Transport Pathways to increase the observed vulnerability.

Private wells, and particularly wells that either do not contain seals that will prevent water from moving down around the outside of the well pipe or wells that are no longer used and/or that have not been sealed, present the greatest potential for increasing the rated Vulnerability. The available data from the Provincial Water Well Information System (WWIS) database was screened to identify wells that penetrate to the water supply aquifers and have the potential to increase the Vulnerability of the natural stratigraphic profile. There is potential that other wells may exist that are not included in the database, particularly in areas now serviced by municipal water, that formerly obtained water supply from private wells.

The Groundwater Vulnerability map (Figure 8a-2) shows that the groundwater vulnerability for the municipal water supply aquifers within the WHPA is High and cannot be increased further. Figure 8a-2 is therefore proposed to be used to generate the Vulnerability Scores.

### 8.3.1.4 ~~WHPA-E/WHPA-F~~

None of the wells in this study have been identified as GUDI (Groundwater Under the Direct Influence), therefore delineation of a WHPA-E was not required. ~~Since a WHPA-E was not required for any of the wells, the delineation of a WHPA-F was also not required.~~

### 8.3.1.5 Vulnerability Score

The WHPA zones for the Davy Drive Water Supply, as shown in Figure 8a-1, and the Groundwater Vulnerability, as shown in Figure 8a-2, were used to assign a Vulnerability Score by using the matrix from Table 5.3 (Chapter 5: Methods Overview, Section 5.2.4). Figure 8a-3 illustrates the Vulnerability Scores for the Davy Drive Water Supply. Figure 8a-3 will be used to assess Drinking Water Threats in Section 8.3.3.

### 8.3.1.6 Uncertainty Rating

The Technical Rules require that an Uncertainty Rating of either High or Low be assigned with each Vulnerable Area as outlined in Technical Rules 13-15 (Part I.4 – Uncertainty Analysis – Water Quality (MOE, 2008a)). A component of the Uncertainty Rating is to be provided for the WHPA delineation by the technical peer review consultant. A second component of the Uncertainty Rating is to be provided in association with the Vulnerability Assessment.

The uncertainty delineation of the Davy Drive WHPAs was determined by peer reviewers from Dillon Consulting using a standard scoring matrix (Table 1, Appendix MO). The Uncertainty Rating assigned for the Davy Drive WHPA is High. The full results of the WHPA delineation Peer Review process for Davy Drive is available in Appendix R and discussed in Chapter 5 (Methods Overview).

The assessment of uncertainty for the Vulnerability Assessment considers the type, quantity, and quality of available data, the methods used to determine the Groundwater Vulnerability, and the nature of the groundwater flow system.

The Uncertainty Rating assigned for the Vulnerability Assessment Component for the Davy Drive WHPA is High. The Vulnerability Rating for the Davy Drive Water System has been determined using decisions and assumptions that would err on the conservative side (higher Vulnerability Scores). In this case, the High Uncertainty Rating reflects that additional data to describe the continuity, thickness, and types of soils within the delineated WHPA could potentially be used to improve the understanding of local hydrostratigraphy and to increase the confidence in the Vulnerability Analysis. For further information, refer to Technical Memorandum A1 (Appendix MO).

### 8.3.2 Drinking Water Issues Evaluation

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 either now or in the future. To be considered a Drinking Water Issue, a parameter needs to be at a concentration that may result in the deterioration of the quality of the water for use as a source of drinking water or if there is a trend of increasing concentrations of the parameter and a continuation of that trend that would result in the deterioration of the quality of the water as a source of drinking water (Technical Rule 114.(1)(a-b)). However, a parameter may not be considered an Issue in cases where it is naturally occurring or effective treatment is in place.

Available data describing raw water quality and treated water quality for the Davy Drive Well Supply have been reviewed to identify Drinking Water Issues that are considered likely to result in a deterioration of the quality of water for use as a source of drinking water. Details of the

Drinking Water Issues Evaluation for the Township of Ramara Groundwater are provided in Technical Memorandum M2 – Drinking Water Issues Evaluation – Ramara Groundwater (Appendix R).

**No Drinking Water Issues have been identified for the Davy Drive Water Supply.**

Several parameters were observed on occasion or in low concentrations that are consistently less than the Ontario Drinking Water Quality Standard (ODWQS) values, such as sodium and organic parameters such as 2,4-dichlorophenol. Trends of increasing concentrations that would exceed the ODWQS value within 50 years were not observed. Sodium concentrations have exceeded the guideline of 20 mg/L used by the Medical Officer of Health for sodium restricted diets but are not projected to exceed the ODWQS objective of 200 mg/L within 50 years.

The occasional presence of *E. coli* and coliform bacteria in raw or treated water is not considered to represent a specific drinking water as these parameters have not been detected consistently and are being treated effectively.

Several other naturally occurring water quality parameters are present in the water in concentrations that may exceed the aesthetic or operational guidelines of the ODWQS include colour, D.O.C., hardness, iron, manganese, organic nitrogen, and turbidity.

Lead concentrations were observed on rare occasions to be greater than the ODWQS value. The occurrence of lead was not consistent. Lead can be expected naturally in groundwater within the crystalline bedrock in Southern Ontario.

### **8.3.3 Drinking Water Threats Evaluation**

An assessment of Drinking Water Threats for the Davy Drive Water System was completed in accordance with the detailed methodology presented in Technical Memo – A5 (Appendix MO) . 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, and includes any Activity or Condition that is prescribed by the regulations as a drinking water threat.” An Activity is one or a series of related processes, natural or anthropogenic, that occurs within a geographical area and may be related to a particular land use, whereas a Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities. Therefore, it is not only presently existing Threats that must be regulated, but future ones as well.

The Drinking Water Threats Assessment for the Davy Drive Water System builds on the information from the Vulnerability Analysis and Issues Evaluation and includes the preparation of:

- A list of Drinking Water Threats for Activities,
- A list of Drinking Water Threats for Conditions,
- Maps showing areas that are or would be Significant, Moderate, or Low Drinking Water Threats for Activities,
- Maps showing areas that are or would be Significant, Moderate, or Low Drinking Water Threats for Conditions, and
- An enumeration of Drinking Water Threats.

#### **8.3.3.1 List of Drinking Water Threats – Activities**

The list of Prescribed Drinking Water Threats considered in the assessment for the Davy Drive drinking water supply is provided in Chapter 5, section 5.5.1.

***No additional Drinking Water Threats were identified for consideration. No local circumstances for prescribed Threats were identified.***

#### **8.3.3.2 List of Drinking Water Threats – Conditions**

The following information sources were consulted to identify existing Conditions that could affect the Davy Drive groundwater supply system:

- Files provided by the Ministry of the Environment, [Conservation and Parks](#) local offices pertaining to licenses and records of spills in the area of the delineated WHPA.
- Records available from the Ministry of the Environment, [Conservation and Parks](#) website containing registry of Brownfield Sites.
- Records from available technical studies and previous contaminant source inventories that identified situations that may qualify as conditions.
- Interviews of Township of Ramara staff to identify potential conditions within the identified WHPA for the drinking water supply.

***No confirmed Conditions have been identified for the Davy Drive Water Supply. No potential Conditions have been identified for consideration at this time.***

#### **8.3.3.3 Identifying Areas of Significant/Moderate/Low Threats – Activities**

The areas where Activities are or would be Drinking Water Threats are illustrated on a series of maps based on the Vulnerability Scores and Vulnerable Area delineations. [The maps combined with the Technical Rules threat circumstances can be used to correlate activities that are or would be Drinking Water Threats with the Vulnerability Scores. The circumstances can be](#)

~~found at: <https://threats.swpip.ca/>. The maps include references to a series of tables prepared by MOE to correlate activities that are or would be Drinking Water Threats with the Vulnerability Scores. The tables can be found at: <http://www.ene.gov.on.ca/en/water/cleanwater/provincialTables.php>~~

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#### 8.3.3.3.1 Pathogen Parameters

~~The Technical Rules can be used in conjunction with the Vulnerability Scores~~ ~~Key Table~~ on Figure 8a-4 ~~can be used in conjunction with the Vulnerability Scores~~ to identify the areas where Activities associated with pathogen threats are or would be Significant, Moderate, or Low Drinking Water Threats for the Davy Drive Well Supply. Activities that are or would be Significant Drinking Water Threats for pathogens can be observed within the areas where the Vulnerability Score is 10. Pathogens can also only be a Significant, Moderate, or Low Threat within WHPA-A and WHPA-B.

#### 8.3.3.3.2 Chemical Parameters

~~The Technical Rules can be used in conjunction with the Vulnerability Scores~~ ~~The Key Table~~ on Figure 8a-5 ~~can be used in conjunction with the Vulnerability Scores~~ to identify the areas where Activities associated with chemical threats are or would be Significant, Moderate, or Low Drinking Water Threats for the Davy Drive Well Supply. Activities that are or would be Significant Drinking Water Threats for chemicals can be observed within areas where the Vulnerability Score is equal to or greater than 8.

#### 8.3.3.3.3 DNAPL Chemical Parameters

Figure 8a-6 illustrates the area of the 5-year time-of-travel zone (WHPA-C) and areas with a Vulnerability Score of 6, where activities associated with DNAPL parameters are considered to be a Significant Drinking Water Threat for the Davy Drive Well Supply. ~~The Technical Rules can be used in conjunction with the Vulnerability Scores~~ ~~The Key Table~~ on Figure 8a-6 ~~can be used to~~ ~~can be used~~ to identify the circumstances in which these Activities would be Significant or Moderate Drinking Water Threats.

#### 8.3.3.4 Identifying Areas of Significant/Moderate/Low Threats – Conditions

Further to Section 8.3.3.2, no Conditions have been confirmed within the WHPA for the Davy Drive Water Supply.

A Condition or potential Condition that has not been identified would potentially be a Significant, Moderate, or Low Threat to Drinking Water based on the combination of the Hazard Rating and Vulnerability Rating as described in Section 5.5.5 (Chapter 5: Methods Overview) and Technical Memorandum A5 (Appendix MO). The Hazard Rating is dependent on whether

there is evidence the Condition is causing off-site contamination, and whether the Condition is located on the same property as the supply well.

A Condition would be a threat to municipal drinking water in the following situations:

- **Significant:** where the Vulnerability Score is  $\geq 8$  and there is evidence that the Condition is causing off-site contamination, and/or that the Condition is located on the same property as the supply well.
- **Moderate:** (1) where the Vulnerability Score  $\geq 6$  and  $< 8$ , and there is evidence that the Condition is causing off-site contamination, and/or that the Condition is located on the same property as the supply well; or (2) Where the Vulnerability Score is 10, and there is no evidence of off-site contamination.
- **Low:** Where the Vulnerability Score  $\geq 8$  and  $< 10$  and there is no evidence of off-site contamination.

Figure 8a-3 illustrates the Vulnerability Score map for Davy Drive Water Supply that can be used to determine where a Condition is or would be a Significant, Moderate, or Low Threat to Drinking Water.

#### **8.3.3.5 Enumerating Drinking Water Threats**

##### **8.3.3.5**

The number of Significant Drinking Water Threats for the Davy Drive Water System has been determined using the methodology outlined in Technical Memorandum A5 (Appendix MO). There are no Significant Threats associated with Conditions or Drinking Water Issues.

Table 8-3 documents the enumeration of existing activities that are considered to be potential Significant Drinking Water Threats within the WHPA for the Davy Drive Well Supply. Potential Significant Drinking Water Threats were identified within WHPA-A and for parcels within WHPA B and C that are identified as potentially having a threat related to DNAPL.

Thirty-nine (39) activities that are considered to be potential Significant Drinking Water Threats were identified in association with 32 land parcels in the WHPA for the Davy Drive Well Supply. Twenty-eight (28) parcels were identified as having significant threats relating to residential land use and the use of private individual sewage disposal systems and one (1) additional parcel was identified for a sewage system. One (1) threat activity and parcel has been included to represent the potential for subsurface storage of fuel for home heating purposes within the area where the Vulnerability Score is 10. There are 28 residential parcels within this area. Three (3) additional parcels were identified for potential fuel storage. One (1) parcel is identified as

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having potential for application of Agricultural Source Material and pesticides, as well as for storage of fertilizer and pesticides. Another parcel is identified for activities associated with livestock and storage of Agricultural Source Material.

**Table 8-3: Number of Significant Drinking Water Threats for the Davy Drive Drinking Water Supply.**

Threat Number	Threat	Significant threat counts Number of threats
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 collects, stores, transmits, treats or disposes of sewage.	29
3.	The application of agricultural source material to land.	1
4.	The storage of agricultural source material to land.	1
5.	The management of agricultural source material.	0
6.	The application of non-agricultural source material to land.	0
7.	The handling and storage of non-agricultural source material.	0
8.	The application of commercial fertilizer to land.	0
9.	The handling and storage of commercial fertilizer to land.	1
10.	The application of pesticide to land.	<del>2</del> 1
11.	The handling and storage of pesticide.	1
12.	The application of road salt.	0
13.	The handling and storage of road salt.	0
14.	The storage of snow.	0

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Threat Number	Threat	Significant threat counts Number of threats
15.	The handling and storage of fuel.	0
16.	The handling and storage of dense non-aqueous phase liquid.	4
17.	The handling and storage of an organic solvent.	0
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 safe aquifer or surface water body.	0
20.	Any activity that reduces the recharge of an aquifer.	0
21.	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard.	1
<u>22.</u>	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	<u>0</u>
-	<b>Totals:</b>	<b><u>4039 significant threats</u></b> <b><u>(on 33 properties)</u></b>

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**Note for the table above: The number of parcels identified will typically be less than the number of significant threats as multiple threats can be observed per parcel**

### 8.3.3.5.1 Managed Lands

Technical Rule 16(9) (~~August 2009~~) requires the Assessment Report to include maps showing the location of Managed Lands and the percentage of Managed Lands within a Vulnerable Area, including WHPA-A, -B, -C, -D, and -E. This mapping is not required where the Vulnerability

Scores for the area are less than the Vulnerability Score necessary for the Activity to be considered a Threat in the [Table of Drinking Water Threats Technical Rules](#).

Managed Lands were identified and the Managed Lands proportions were determined for the WHPA of the Davy Drive Well Supply as outlined in Technical Memorandum A5 (Appendix MO). The results from this analysis were used in the enumeration of Significant Drinking Water Threats (Section 8.3.3.5). The Managed Lands are used in the identification of threat activities associated with the application of Agricultural Source Material, Non-Agricultural Source Material, and commercial fertilizer.

Figure 8a-7 illustrates the proportion of Managed Lands within the delineated WHPA zones for the Davy Drive Well Supply where Vulnerability Scores were greater than 6 for WHPA-A to WHPA-D.

#### 8.3.3.5.2 Livestock Density

Technical Rule 16(10) ~~(August 2009)~~ requires the Assessment Report to include maps showing the Livestock Density within WHPA-A, -B, -C, -D, and -E. This mapping is not required where the Vulnerability Scores for the area are less than the Vulnerability Score necessary for the Activity to be considered a Threat in the [Table of Drinking Water Threats Technical Rules](#).

The Livestock Density was determined for the delineated WHPA zones of the Davy Drive Well Supply as outlined in Technical Memorandum A5 (Appendix MO). The results from this analysis were used in the enumeration of Significant Drinking Water Threats (Section 8.3.3.5). Nutrient units per farm are used in the identification of threat activities associated with the storage of Agricultural Source Material and the grazing and/or confinement of livestock.

Figure 8a-8 illustrates the distribution of Livestock Density within the delineated WHPA zones for the Davy Drive Well Supply where Vulnerability Scores were greater than 6 for WHPA-A to WHPA-D. The Livestock Density figure reflects the proportion of Agricultural Managed Lands as determined in accordance with Technical Memorandum A5 (Appendix MO).

#### 8.3.3.5.3 Impervious Surfaces

Technical Rule 16(11) ~~(August 2009)~~ requires the Assessment Report to include maps showing the percentage of surface area where road salt could be applied to Impervious Surfaces within WHPA-A, -B, -C, -D, and -E. This mapping is not required where the Vulnerability Scores for the area are less than the Vulnerability Score necessary for the Activity to be considered a Threat in the Table of Drinking Water Threats.

The proportion of Impervious Surfaces within the delineated WHPA zones for the Davy Drive Well Supply was determined in accordance with the methodology in Technical Memorandum

A5 (Appendix MO). [Methodology in Technical Memorandum A5.1 \(Appendix MO\) was used in 2023 to update the proportion of Impervious Surfaces within the delineated WHPA zones using the 2021 Technical Rules.](#) The results from this analysis were used in the enumeration of Significant Drinking Water Threats (Section 8.3.3.5). The Impervious Surfaces are used in the identification of threat activities associated with the application of winter de-icing agents (salt).

Figure 8a-9 illustrates the distribution of impervious surfaces within the delineated WHPA zones for the Davy Drive Well Supply where vulnerability scores were greater than 6 for WHPA-A to WHPA-D.

## 8.4 Park Lane Subdivision Well Supply

The Park Lane Water System is located on Lot 25, Concession L in the Township of The Park Lane Well Supply is located on Lot 25, Concession L in the Township of Ramara and serves an estimated population of 42 (19 lots) as of 2007 in the Park Lane Subdivision. The Park Lane Well Supply consists of two water supply wells: Well 1 and Well 2. Well 1 was drilled in 1973; Well 2 was drilled in 2002.

The water use is currently less than 50 m<sup>3</sup>/day and therefore a Permit to Take Water issued by the ~~MOE/MECP~~ is not required. Well 1 is equipped with the capacity to operate up to 68 L/min (98 m<sup>3</sup>/day) (SSEA & Tatham, 2006) but planned average use reported by Golder in 2005 was only approximately 15m<sup>3</sup>/day. Well 2 was put in place to serve as a back-up well in 2004. Well 2 has the equivalent capacity to Well 1.

Both wells were drilled into gneissic bedrock. Well 1 was drilled to a depth of 61 m below ground level (mbgl). A 2.5 m layer of sand till was observed above the contact with the bedrock. A steel casing was placed and grouted in the bedrock to a total depth of 5.6 m (3.1 m in rock). A water-bearing fracture was observed at 53.6 m bgl. Well 2 is drilled to a total depth of 24.3 m. A 2.4 m layer of clay is observed above the contact with the bedrock. A steel casing was placed and grouted to a depth of 9.6 mbgl. The water bearing fracture was observed at a depth of 22.9 m bgl.

Water is obtained from fractures within the open portions of the boreholes, below the steel casing. Data on static water level monitoring provided in the annual report suggest that the static water levels typically vary through the year by up to 2 m and are normally observed near the contact with the bedrock. The available information suggests that the gneissic bedrock is an unconfined aquifer.

Information presented for the Park Lane section of this Chapter is based on the Genivar 2010a report.

### 8.4.1 Ground Water Vulnerability

The Wellhead Protection Area (WHPA) is the primary Vulnerable Area delineated to ensure the protection of the municipal water supply wells. The Groundwater Vulnerability has been assessed to provide an indication, within the WHPA, which current (or future) Threats at the surface present the greatest risk to contaminate the water supply. The Vulnerability Analysis considers the WHPA and the Groundwater Vulnerability, as well as the potential for the vulnerability to be increased by man-made (anthropogenic) structures, through Transport Pathways, by developing a "Vulnerability Score" within the WHPA. Conversion of Vulnerability categories (High, Medium, and Low) to Vulnerability Scores (10, 8, 6, 4, and 2) results in a new

map for each WHPA that expresses the relative degree to which a Threat could affect the drinking water supply. A higher value Vulnerability Score will always be assigned to the immediate vicinity of the well and to any areas that are shown to be vulnerable.

The Groundwater Vulnerability for the Park Lane Water System has been delineated following the process recommended in the Technical Rules. The areas determined to contribute groundwater to the wells within 25 years were delineated as WHPA. The Groundwater Vulnerability within the WHPA was assessed and included consideration for the effects of man-made structures that may increase the Vulnerability. The WHPA and the vulnerability were considered together as per the Technical Rules to determine a Vulnerability Score for the Park Lane water supply. Details of the methods for the Vulnerability Analysis are provided in Technical Memorandum A1 – Groundwater Vulnerability Assessment Methods (Appendix MO).

#### **8.4.1.1 Wellhead Protection Area (WHPA) Delineation**

The WHPA for the Park Lane Well Supply wells were delineated in 2005 by Golder using a fixed-radius method. An updated survey of well locations was commissioned by SGBLS in 2009 to provide improved accuracy for delineation of the WHPA. A minor translation was required to adjust the Park Lane well locations and the WHPA. The updated well locations and the WHPA are shown in Figure 8b-1. WHPA delineation and adjustment details are documented in Genivar, 2010a.

WHPA-A has been added to include the 100 m radius from each municipal well. The Golder (2005) study delineated time-of-travel zones (TOT) for 50 days, 2 years, 10 years, and 25 years. In this case, the WHPA for WHPA-B, the 2-year TOT zone was observed to reflect a steady-state capture area and the WHPA was not bigger for the 5-year or 25-year calculations. For this reason only WHPA-A and WHPA-B are shown in Figure 8b-1.

#### **8.4.1.2 Groundwater Vulnerability**

The Park Lane Well Supply draws water from the bedrock aquifer layer. The Groundwater Vulnerability for the bedrock aquifer in the area to the northeast of Lake Simcoe was determined following the methods outlined in Technical Memorandum A1 – Groundwater Vulnerability Assessment Methods (Appendix MO) for the areas where the hydrostratigraphic models are not available. The Groundwater Vulnerability has been based on available data for overburden thickness with consideration for overburden materials where the overburden thickness is greater than 6 m. The regional Groundwater Vulnerability is illustrated in Technical Memorandum B1 – Regional Groundwater Vulnerability Mapping.

The Groundwater Vulnerability within the WHPA of the municipal wells in the Park Lane Well Supply is shown in Figure 8b-2. The Groundwater Vulnerability for the municipal water supply aquifers within the WHPA is considered to be High.

#### 8.4.1.3 Transport Pathway Increase

Technical Memorandum A3 (Appendix MO) documents the consideration of Transport Pathways to increase the Vulnerability Rating as per the Technical Rules. The Vulnerability Rating can be increased from Medium to High, Low to Medium, or from Low to High in accordance with the potential for artificial Transport Pathways to increase the observed vulnerability.

Private wells, and particularly wells that either do not contain seals that will prevent water from moving down around the outside of the well pipe or wells that are no longer used and/or that have not been sealed, present the greatest potential for increasing the rated Vulnerability. The available data from the Provincial Water Well Information System (WWIS) database was screened to identify wells that penetrate to the water supply aquifers and have potential to increase the Vulnerability of the natural stratigraphic profile. There is potential that other wells may exist that are not included in the database, particularly in areas now serviced by municipal water that formerly obtained water supply from private wells.

The Groundwater Vulnerability map (Figure 8b-2) shows the Groundwater Vulnerability for the municipal water supply aquifer within the WHPA is already considered to be High and cannot be increased further. This map is therefore proposed to be used to generate the Vulnerability Scores.

#### 8.4.1.4 ~~WHPA-E/WHPA-F~~

None of the wells in this study have been identified as GUDI (Groundwater Under the Direct Influence), therefore delineation of a WHPA-E was not required. ~~Since a WHPA-E was not required for any of the wells, the delineation of a WHPA-F was also not required.~~

#### 8.4.1.5 Vulnerability Score

The WHPA zones for the Park Lane water supply, as shown in Figure 8b-1, and the Groundwater Vulnerability, as shown in Figure 8b-2, were used to assign a Vulnerability Score by using the matrix from Table 5.3 (Chapter 5: Methods Overview, Section 5.2.4). Figure 8b-3 illustrates the Vulnerability Scores for the Park Lane WHPA. Figure 8b-3 will be used to assess Drinking Water Threats in Section 8.4.3.

#### **8.4.1.6 Uncertainty Rating**

The Technical Rules require that an Uncertainty Rating of either High or Low be assigned with each Vulnerable Area as outlined in Technical Rules 13-15 (Part I.4 – Uncertainty Analysis – Water Quality (MOE, 2008a)). A component of the Uncertainty Rating is to be provided for the WHPA delineation by the technical peer review consultant. A second component of the Uncertainty Rating is to be provided in association with the Vulnerability Assessment.

The uncertainty delineation of the Park Lane WHPAs was determined by peer reviewers from Dillon Consulting using a standard scoring matrix (Table 1, Appendix MO). The Uncertainty Rating assigned for the Park Lane WHPAs is High. The full results of the WHPA delineation Peer Review process for Park Lane is available in Appendix R and discussed in Chapter 5 (Methods Overview).

The assessment of uncertainty for the Vulnerability Assessment considers the type, quantity, and quality of available data, the methods used to determine the groundwater vulnerability, and the nature of the groundwater flow system.

The Uncertainty Rating assigned for the Vulnerability Assessment Component for the Park Lane Water System is High. The Vulnerability Rating for the Park Lane Water System has been determined using decisions and assumptions that would err on the conservative side (higher Vulnerability Scores). In this case, the High Uncertainty Rating reflects that additional data to describe the continuity, thickness, and types of soils within the delineated WHPA or the nature of the fractured bedrock aquifer could potentially be used to improve the understanding of local hydrostratigraphy and to increase the confidence in the Vulnerability Analysis. For further information, refer to Technical Memorandum A1.

#### **8.4.2 Drinking Water Issues Evaluation**

The intent of the Issues Evaluation is to identify chemical or bacterial situations 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. To be considered a Drinking Water Issue, a parameter needs to be at a concentration that may result in the deterioration of the quality of the water for use as a source of drinking water or if there is a trend of increasing concentrations of the parameter and a continuation of that trend that would result in the deterioration of the quality of the water as a source of drinking water (Technical Rule 114.(1)(a-b)). However, a parameter may not be considered an Issue in cases where it is naturally occurring or effective treatment is in place.

Available data describing raw water quality and treated water quality for the Park Lane Well Supply have been reviewed to identify Drinking Water Issues that are considered likely to result in a deterioration of the quality of water for use as a source of drinking water. Details of the

Drinking Water Issues Evaluation for the Township of Ramara Groundwater are provided in Technical Memorandum M2 – Drinking Water Issues Evaluation – Ramara Groundwater (Appendix R).

***No Drinking Water Issues have been identified for the Park Lane Water Supply wells.***

Several parameters were observed on occasion or in low or trace concentrations that are consistently less than the Ontario Drinking Water Quality Standard (ODWQS) values, such as sodium, methane, and organic parameters such as dioxin and furan and benzene. Trends of increasing concentrations that would exceed the ODWQS value within 50 years were not observed. Sodium concentrations have exceeded the guideline of 20 mg/L used by the Medical Officer of Health for sodium restricted diets but are not projected to exceed the ODWQS objective of 200 mg/L within 50 years.

The occasional presence of *E. coli* and coliform bacteria in raw water is not considered to represent a specific drinking water as these parameters have not been detected consistently and are being treated effectively.

Several other naturally occurring water quality parameters are present in the water in concentrations that may exceed the aesthetic or operational guidelines of the ODWQS include colour, dissolved solids, hardness, iron, manganese, sulphate, and turbidity.

### **8.4.3 Drinking Water Threats Evaluation**

An assessment of Drinking Water Threats for the Park Lane Water System was completed in accordance with the detailed methodology presented in Technical Memo – A5 (Appendix MO). 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, and includes any Activity or Condition that is prescribed by the regulations as a drinking water threat.” An Activity is one or a series of related processes, natural or anthropogenic, that occurs within a geographical area and may be related to a particular land use, whereas a Condition refers to the presence of a contaminant in the soil, sediment, or groundwater resulting from past activities. Therefore, it is not only presently existing Threats that must be regulated, but future ones as well.

The Drinking Water Threats Assessment for the Park Lane water supply builds on the information from the Vulnerability Analysis and Issues Evaluation and includes the preparation of:

- A list of Drinking Water Threats for Activities,
- A list of Drinking Water Threats for Conditions,

- Maps showing areas that are or would be Significant, Moderate, or Low Drinking Water Threats for Activities,
- Maps showing areas that are or would be Significant, Moderate, or Low Drinking Water Threats for Conditions, and
- An enumeration of Drinking Water Threats.

#### **8.4.3.1 List of Drinking Water Threats – Activities**

The list of Prescribed Drinking Water Threats considered in the assessment for the Park Lane drinking water supply is provided in Chapter 5, section 5.5.1.

***No additional Drinking Water Threats were identified for consideration. No local circumstances for prescribed Threats were identified.***

#### **8.4.3.2 List of Drinking Water Threats – Conditions**

The following information sources were consulted to identify existing Conditions that could affect the Park Lane water supply system:

- Files provided by the Ministry of the Environment, [Conservation and Parks](#) local offices pertaining to licenses and records of spills in the area of the delineated WHPA.
- Records available from the Ministry of the Environment, [Conservation and Parks](#) website containing registry of Brownfield Sites.
- Records from available technical studies and previous contaminant source inventories that identified situations that may qualify as conditions.
- Interviews of Township of Ramara staff to identify potential conditions within the identified WHPA for the drinking water supply.

***No confirmed Conditions have been identified for the Park Lane Water System. No potential Conditions have been identified for consideration at this time.***

#### **8.4.3.3 Identifying Areas of Significant/Moderate/Low Threats – Activities**

The areas where Activities are or would be Drinking Water Threats are illustrated on a series of maps based on the Vulnerability Scores and Vulnerable Area delineations. [The maps combined with the table of drinking water threat circumstances can be used to correlate activities that are or would be Drinking Water Threats with the Vulnerability Scores.](#) ~~The maps include references to a series of tables prepared by MOE to correlate activities that are or would be Drinking Water Threats with the Vulnerability Scores.~~ The [circumstance tables](#) can be found at:

<https://threats.swpip.ca/>;

<http://www.ene.gov.on.ca/en/water/cleanwater/provincialTables.php>

Field Code Changed

#### 8.4.3.3.1 Pathogen Parameters

~~The Technical Rules can be used in conjunction with the Vulnerability Scores. The Key Table on Figure 8b-4 can be used in conjunction with the Vulnerability Scores~~ to identify the areas where Activities associated with pathogen threats are or would be Significant, Moderate, or Low Drinking Water Threats for the Park Lane Water System. Activities that are or would be Significant Drinking Water Threats for pathogens can be observed within the areas where the Vulnerability Score is 10. Pathogens can also only be a Significant, Moderate, or Low Threat within WHPA-A and WHPA-B.

#### 8.4.3.3.2 Chemical Parameters

~~The Technical Rules can be used in conjunction with the Vulnerability Scores. The Key Table on Figure 8b-5 can be used in conjunction with the Vulnerability Scores~~ to identify the areas where Activities associated with chemical threats are or would be Significant, Moderate, or Low Drinking Water Threats for the Park Lane Water System, Activities that are or would be Significant Drinking Water Threats for chemicals can be observed within areas where the Vulnerability Score is equal to or greater than 8.

#### 8.4.3.3.3 DNAPL Chemical Parameters

Figure 8b-6 illustrates the area of the 2-year time-of-travel zone (WHPA-B) and areas with a Vulnerability Score of 6, where Activities associated with DNAPL parameters are considered to be a Significant Drinking Water Threat for the Park Lane Water System. ~~Technical Rules can be used in conjunction with the Vulnerability Scores. The Key Table on Figure 8b-6~~ to identify the circumstances in which these Activities would be Significant or Moderate Drinking Water Threats.

#### 8.4.3.4 Identifying Areas of Significant/Moderate/Low Threats – Conditions

Further to Section 8.4.3.2, no Conditions have been confirmed within the WHPA for the Park Lane Water Supply.

A Condition or potential Condition that has not been identified would potentially be a Significant, Moderate, or Low Threat to Drinking Water based on the combination of the Hazard Rating and Vulnerability Rating as described in Section 5.5.5 (Chapter 5: Methods Overview) and Technical Memorandum A5 (Appendix MO). The Hazard Rating is dependent on whether there is evidence the Condition is causing off-site contamination, and whether the Condition is located on the same property as the supply well.

A Condition would be a threat to municipal drinking water in the following situations:

- **Significant:** where the Vulnerability Score is  $\geq 8$  and there is evidence that the Condition is causing off-site contamination, and/or that the Condition is located on the same property as the supply well.
- **Moderate:** (1) where the Vulnerability Score  $\geq 6$  and  $< 8$ , and there is evidence that the Condition is causing off-site contamination, and/or that the Condition is located on the same property as the supply well; or (2) Where the Vulnerability Score is 10, and there is no evidence of off-site contamination.
- **Low:** Where the Vulnerability Score  $\geq 8$  and  $< 10$  and there is no evidence of off-site contamination.

Figure 8b-3 illustrates the Vulnerability Score map for Park Lane well supply that can be used to determine where a Condition is or would be a Significant, Moderate or Low Threat to Drinking Water.

#### **8.4.3.5 Enumerating Drinking Water Threats**

##### **8.4.3.5**

The number of Significant Drinking Water Threats for the Park Lane Water System has been determined using the methodology outlined in Technical Memorandum A5 (Appendix MO). There are no Significant Threats associated with Conditions or Drinking Water Issues.

Table 8-4 documents the enumeration of existing activities that are considered to be potential Significant Drinking Water Threats within the WHPA for the Park Lane Well Supply. Activities that are considered to be potential Significant Drinking Water Threats were identified within the entire area of the delineated WHPA.

Activities that are considered to be potential Significant Drinking Water Threats were identified on a total of 93 land parcels that are within or are intersected by the WHPA. The majority of the Significant Threats identified are related to land parcels used for residential purposes. An estimated 91 parcels are considered to have private individual sewage systems.

One (1) Threat activity and parcel has been included to represent the potential for subsurface storage of fuel for home heating purposes within the area where the Vulnerability Score is 10. Potential for handling/storage of fuel was identified on one specific parcel within this area.

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**Table 8-4: Number of Significant Drinking Water Threats for the Park Lane Drinking Water Supply.**

Threat Number	Threat	Significant threat counts Number of threats
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 collects, stores, transmits, treats or disposes of sewage.	91
3.	The application of agricultural source material to land.	0
4.	The storage of agricultural source material to land.	0
5.	The management of agricultural source material.	0
6.	The application of non-agricultural source material to land.	0
7.	The handling and storage of non-agricultural source material.	0
8.	The application of commercial fertilizer to land.	0
9.	The handling and storage of commercial fertilizer to land.	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

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Threat Number	Threat	Significant threat counts Number of threats
14.	The storage of snow.	0
15.	The handling and storage of fuel.	2
16.	The handling and storage of dense non-aqueous phase liquid.	0
17.	The handling and storage of an organic solvent.	0
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 safe aquifer or surface water body.	0
20.	Any activity that reduces the recharge of an aquifer.	0
21.	The use of land as livestock grazing or pasturing land, and outdoor confinement area, or a farm-animal yard.	0
<u>22.</u>	<u>The establishment and operation of a liquid hydrocarbon pipeline</u>	<u>0</u>
<b>Totals:</b>		<b>93 significant threats (on 93 properties)</b>

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#### 8.4.3.5.1 Managed Lands

Technical Rule 16(9) ~~(August 2009)~~ requires the Assessment Report to include maps showing the location of Managed Lands and the percentage of Managed Lands within a Vulnerable Area, including WHPA-A, -B, -C, -D, and -E . This mapping is not required where the Vulnerability Scores for the area are less than the Vulnerability Score necessary for the Activity to be considered a Threat in the Technical Rules, Table of Drinking Water Threats.

Managed Lands were identified and the managed lands proportions were determined for the WHPA of the Park Lane Water System as outlined in Technical Memorandum A5 (Appendix MO). The results from this analysis were used in the enumeration of Significant Drinking Water Threats (Section 8.4.3.5). The Managed Lands are used in the identification of threat activities associated with the application of Agricultural Source Material, Non-Agricultural Source Material, and commercial fertilizer.

Figure 8b-7 illustrates the location and proportion of Managed Lands within the delineated WHPA zones for the Park Lane Water System where Vulnerability Scores were greater than 6 for WHPA-A to WHPA-D.

#### 8.4.3.5.2 Livestock Density

Technical Rule 16(10) (August 2009) requires the Assessment Report to include maps showing the Livestock Density within WHPA-A, -B, -C, -D, and -E. This mapping is not required where the Vulnerability Scores for the area are less than the Vulnerability Score necessary for the Activity to be considered a Threat in the [Technical Rules, Table of Drinking Water Threats](#).

The Livestock Density was determined for the WHPA of the Park Lane Water Supply as outlined in Technical Memorandum A5 (Appendix MO). The results from this analysis were used in the enumeration of Significant Drinking Water Threats (Section 8.4.3.5). Nutrient units per farm are used in the identification of threat activities associated with the storage of Agricultural Source Material and the grazing and/or confinement of livestock.

Figure 8b-8 illustrates the distribution of Livestock Density within the delineated WHPA zones for the Park Lane Water Supply where Vulnerability Scores were greater than 6 for WHPA-A to WHPA-D. The Livestock Density figure reflects the distribution of Agricultural Managed Lands as determined in accordance with Technical Memorandum A5 (Appendix MO).

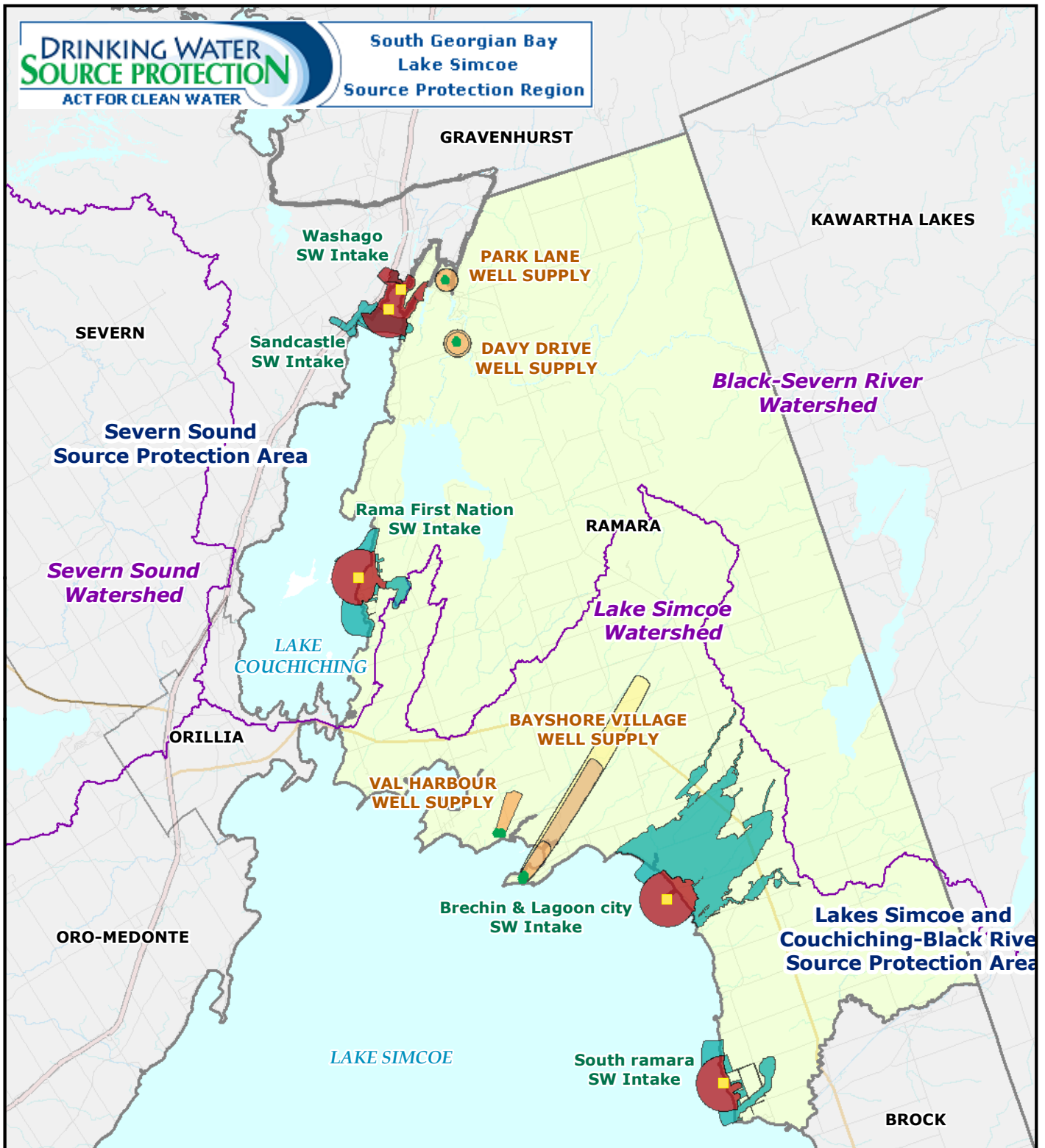
#### 8.4.3.5.3 Impervious Surfaces

Technical Rule 16(11) (August 2009) requires the Assessment Report to include maps showing the percentage of surface area where road salt could be applied to Impervious Surfaces within WHPA-A, -B, -C, -D, and -E. This mapping is not required where the Vulnerability Scores for the area are less than the Vulnerability Score necessary for the Activity to be considered a Threat in the Table of Drinking Water Threats.

The proportion of impervious surfaces within the delineated WHPA zones for the Park Lane Water Supply was determined in accordance with the methodology in Technical Memorandum A5 (Appendix MO). [Methodology in Technical Memorandum A5.1 \(Appendix MO\) was used in 2023 to update the proportion of Impervious Surfaces within the delineated WHPA zones using](#)

[the 2021 Technical Rules](#). The results from this analysis were used in the enumeration of Significant Drinking Water Threats (Section 8.4.3.5). The Impervious Surfaces are used in the identification of threat activities associated with the application of winter de-icing agents (salt).

Figure 8b-9 illustrates the distribution of Impervious Surfaces within the delineated WHPA zones for the Park Lane Water Supply where Vulnerability Scores were greater than 6 for WHPA-A to WHPA-D.



- Municipal Surface Water Intakes
- IPZ-1 (1000m on water or 120m inland)
- IPZ-2 (2 hr time of travel)
- Municipal Supply Well
- WHPA-A (100m)
- WHPA-B (2 years tot)
- WHPA-C1 (10 years tot)
- WHPA-D (25 years tot)

**Drinking Water System  
Vulnerable Areas in  
Township of Ramara**

Created by: LSRCA  
Date: 2011-05-03

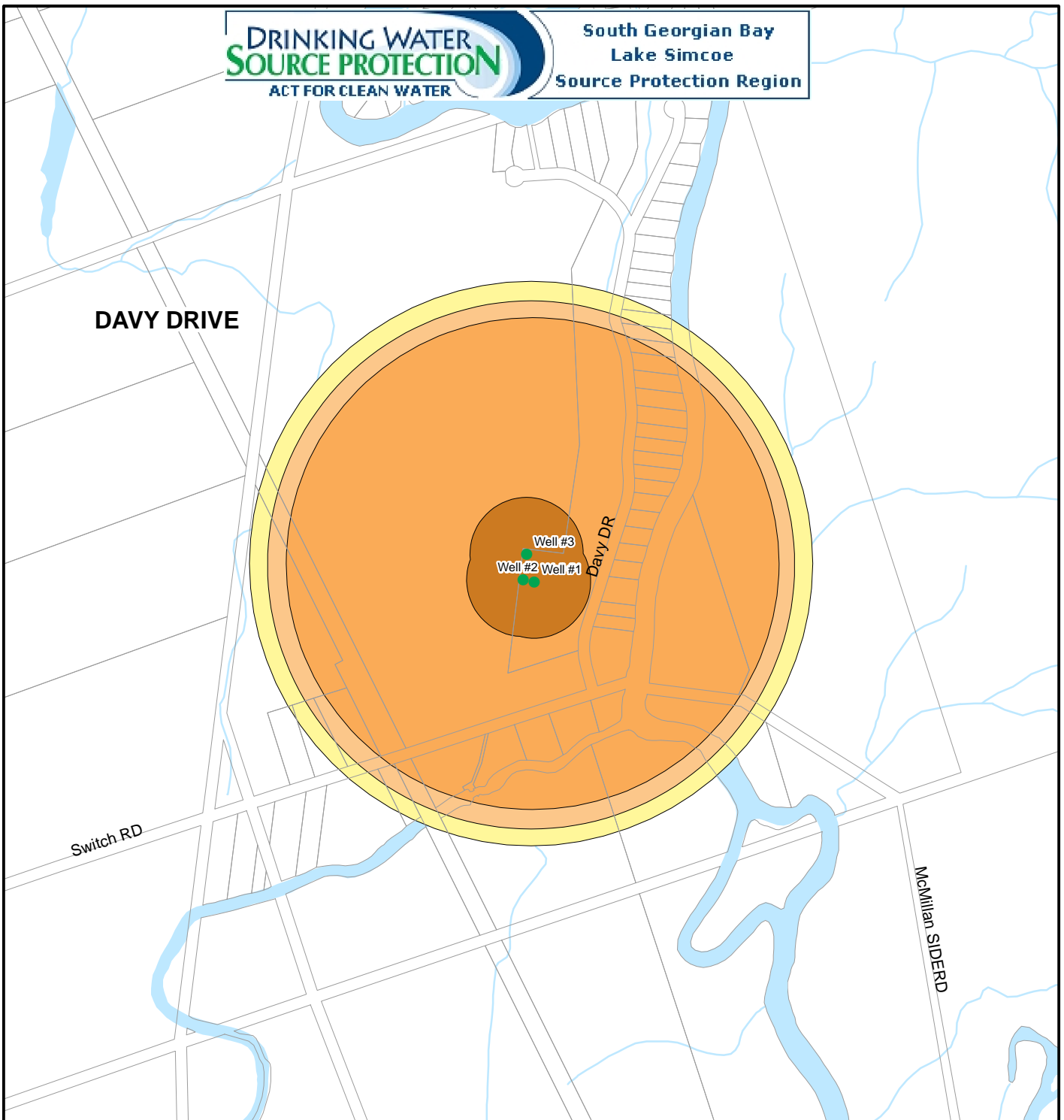


Scale: 1:200,000  
0 2.5 5km  
UTM Zone 17N, NAD83

This map was produced by the Lake Simcoe Region Conservation Authority, lead agency of the South Georgian Bay Lake Simcoe Region Source Protection Region. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



**Figure 8-1**



**Legend**

- MUNICIPAL WELL LOCATION
- WHPA-A: 100 m RADIUS
- WHPA-B: 2-YEAR TIME-OF-TRAVEL
- WHPA-C: 5-YEAR TIME-OF-TRAVEL
- WHPA-D: 25-YEAR TIME-OF-TRAVEL



**WELLHEAD PROTECTION AREAS -  
DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

DATE: JUNE 2010

SCALE: 1:10000

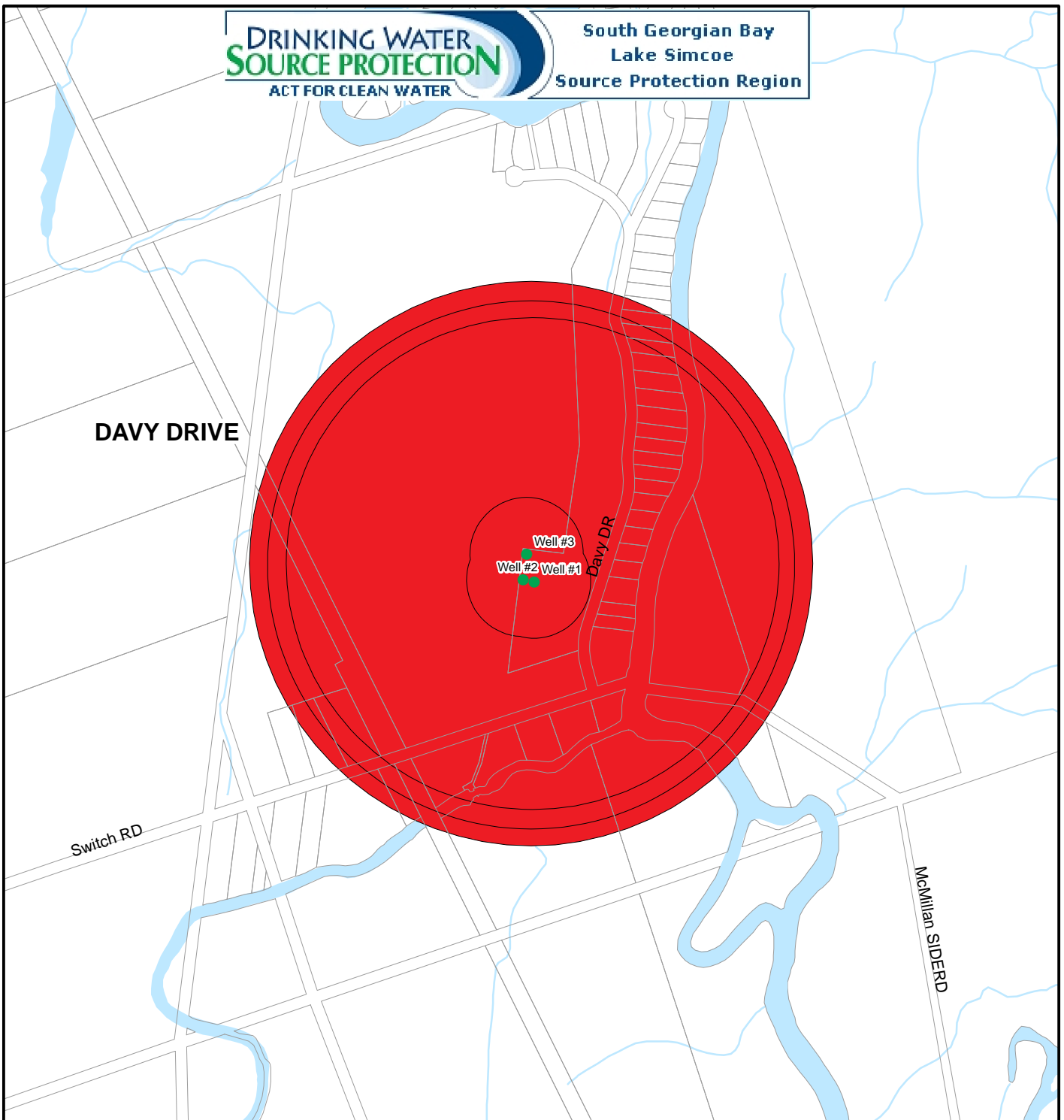
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FILE. NO.: 0-07194808F14.4-1

This map was produced for the South Georgian Bay Lake Simcoe Source Protection Region for the purposes of completing the South Georgian Bay Lake Simcoe Assessment Report. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



FIGURE  
**8a-1**



**Legend**

● MUNICIPAL WELL LOCATION

**AQUIFER VULNERABILITY INDEX**

- HIGH VULNERABILITY
- MEDIUM VULNERABILITY
- LOW VULNERABILITY



**GROUNDWATER VULNERABILITY -  
DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

DATE: JUNE 2010

SCALE: 1:10000

PROJECT: 0-071948.08

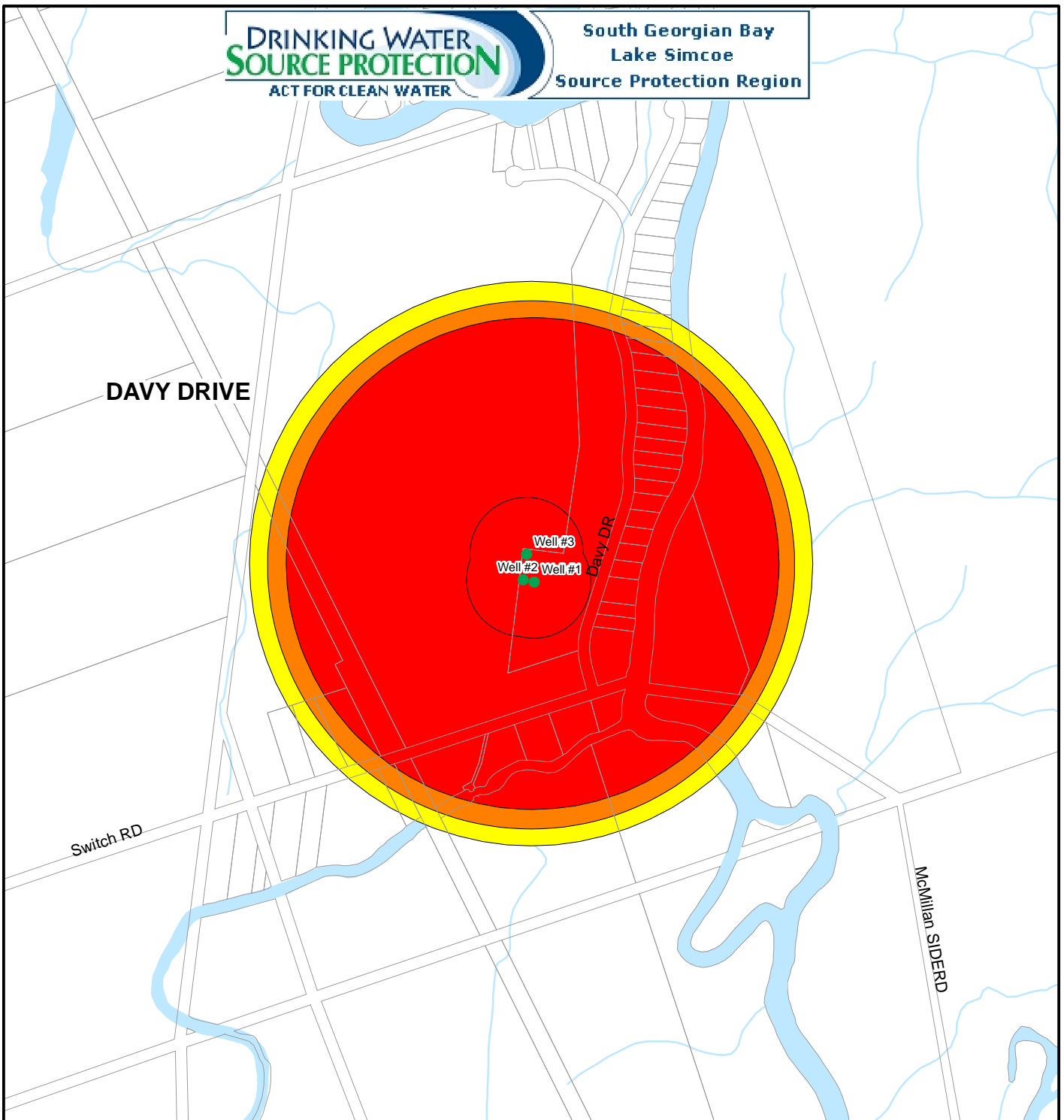
FILE. NO.: 0-07194808F14.4-2

This map was produced for the South Georgian Bay Lake Simcoe Source Protection Region for the purposes of completing the South Georgian Bay Lake Simcoe Assessment Report. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



FIGURE

**8a-2**



**Legend**

● MUNICIPAL WELL LOCATION

**VULNERABILITY SCORING**

- 10
- 8
- 6
- 4
- 2



**VULNERABILITY SCORE -  
DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

DATE: JUNE 2010

SCALE: 1:10000

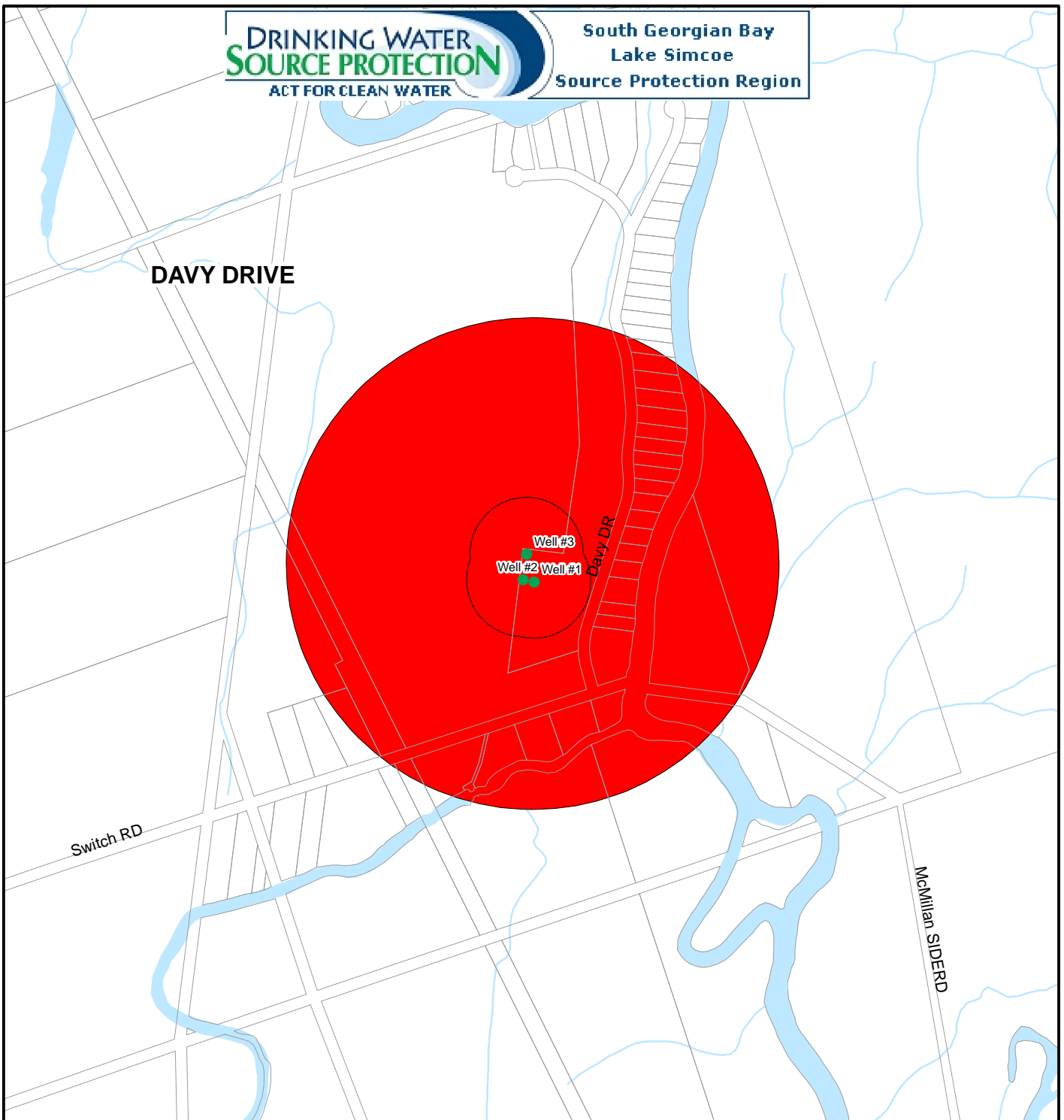
PROJECT: 0-071948.08

FILE. NO.: 0-07194808F14.4-3

This map was produced for the South Georgian Bay Lake Simcoe Source Protection Region for the purposes of completing the South Georgian Bay Lake Simcoe Assessment Report. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



FIGURE  
**8a-3**



- LEGEND**
- MUNICIPAL WELL LOCATION
  - VULNERABILITY SCORING**
  - 10
  - 8
  - 6



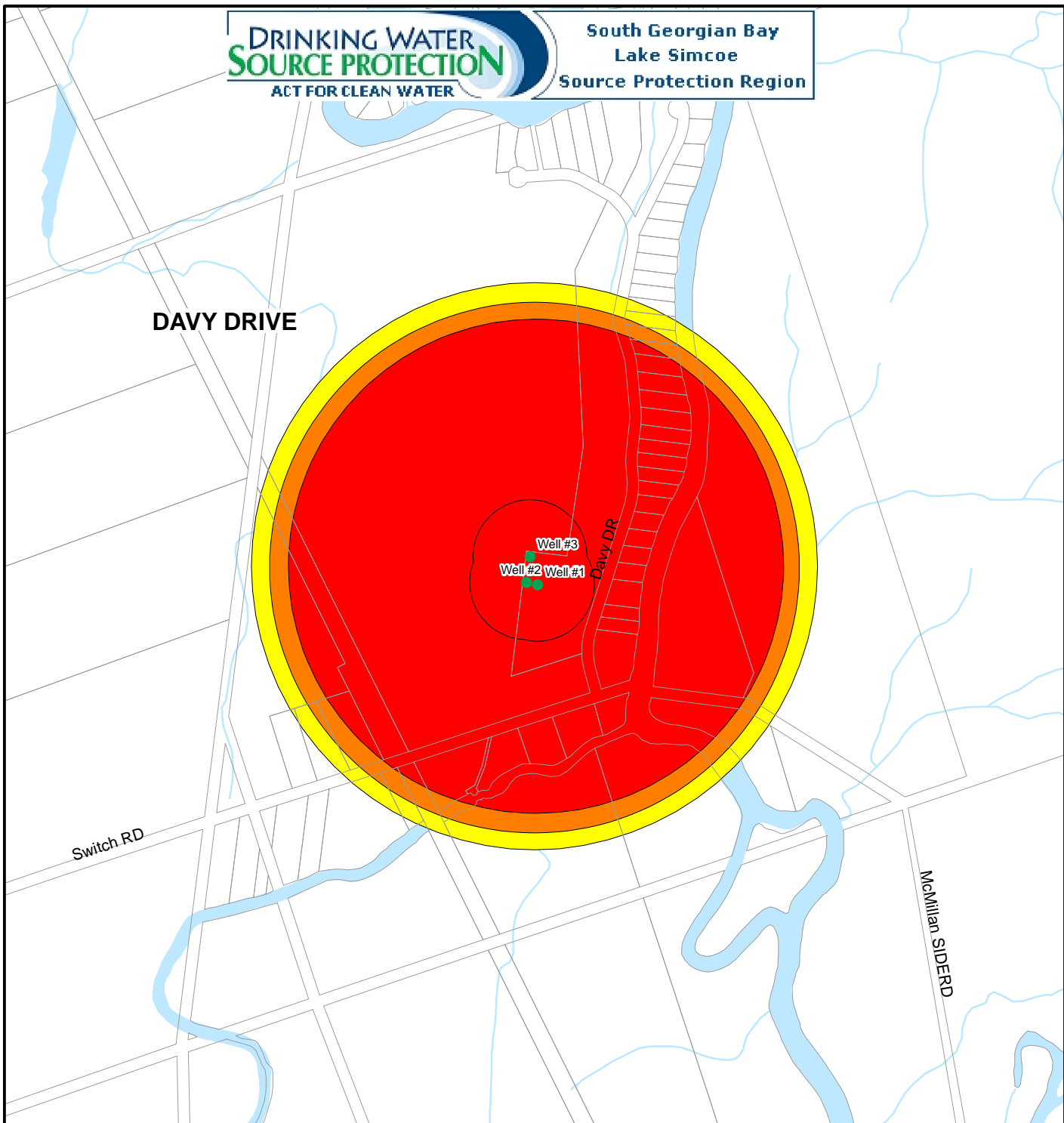
**AREAS WHERE PATHOGENS ARE OR WOULD BE SIGNIFICANT, MODERATE, OR LOW THREATS - DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

This figure is to be used to identify the areas where a landuse activity is or would be a drinking water threat based on the Technical Rules. The key table is intended to correlate the vulnerability score with circumstances that are significant, moderate, or low threats in the Table of Drinking Water Threats. The table shows the number of circumstances and references the table designation in the Provincial Tables of Circumstances for each threat category.

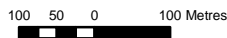
DATE: JUNE 2010	SCALE: 1:10000
PROJECT: 0-071948.08	FILE. NO.:0-07194808F14.4-4

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**LEGEND**

- MUNICIPAL WELL LOCATION
- VULNERABILITY SCORING**
- 10
- 8
- 6



**AREAS WHERE CHEMICALS ARE OR WOULD BE SIGNIFICANT, MODERATE, OR LOW THREATS - DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

This figure is to be used to identify the areas where a landuse activity is or would be a drinking water threat based on the Technical Rules. The key table is intended to correlate the vulnerability score with circumstances that are significant, moderate, or low threats in the Table of Drinking Water Threats. The table shows the number of circumstances and references the table designation in the Provincial Tables of Circumstances for each threat category.

DATE: JUNE 2010

SCALE: 1:10000

PROJECT: 0-071948.08

FILE. NO.: 0-07194808F14.4-5

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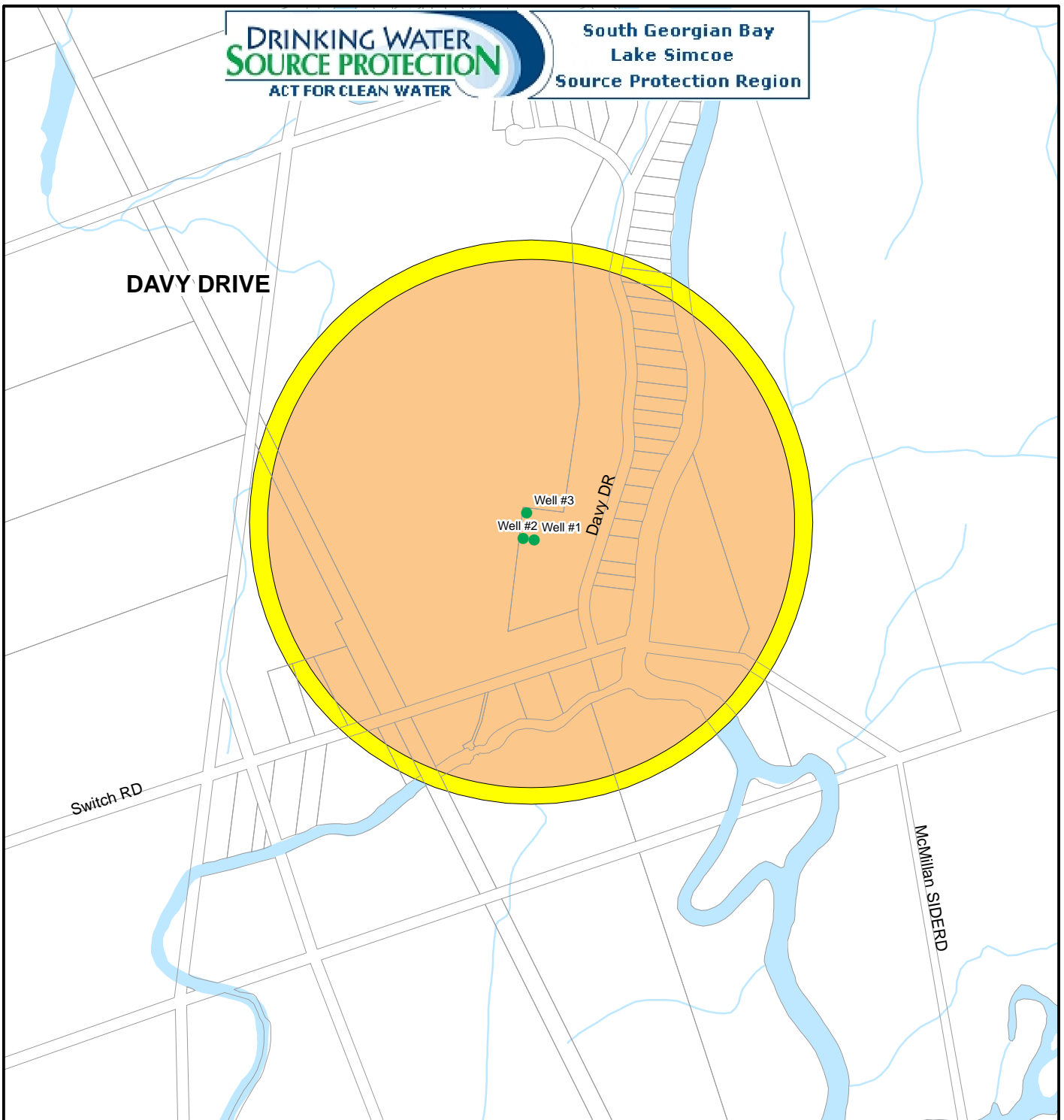
**GENIVAR**



Ontario

FIGURE

**8a-5**



**LEGEND**

- MUNICIPAL WELL LOCATION
- WHPA-C: 5 YEAR TIME-OF-TRAVEL

VULNERABILITY SCORING  
6



100 50 0 100 Metres

**AREAS WHERE DNAPLS ARE OR WOULD BE SIGNIFICANT, MODERATE, OR LOW THREATS - DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

This figure is to be used to identify the areas where a landuse activity is or would be a drinking water threat based on the Technical Rules. The key table is intended to correlate the vulnerability score with circumstances that are significant, moderate, or low threats in the Table of Drinking Water Threats. The table shows the number of circumstances and references the table designation in the Provincial Tables of Circumstances for each threat category.

DATE: JUNE 2010

SCALE: 1:10000

PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.4-6

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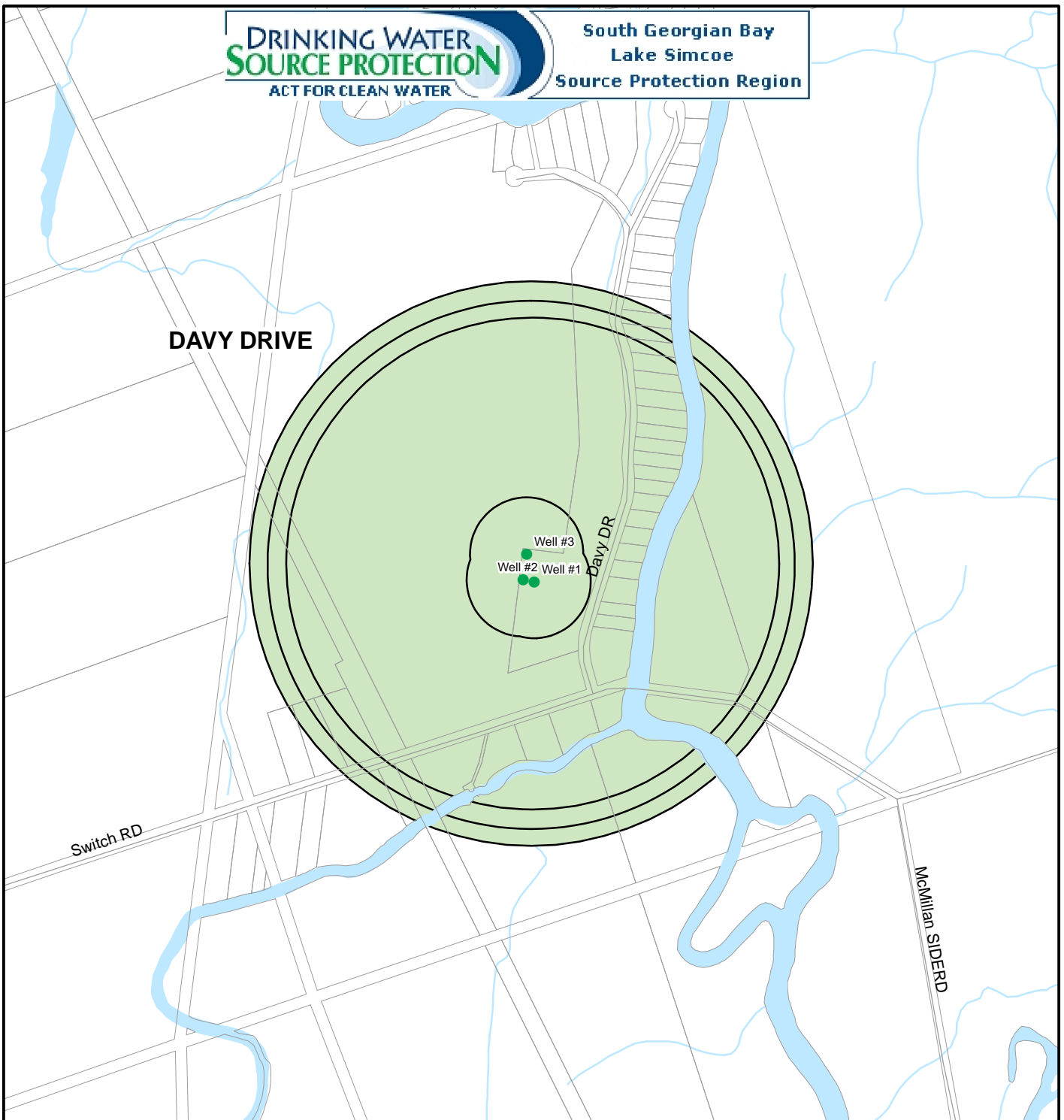
**GENIVAR**



Ontario

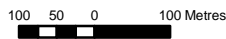
FIGURE

**8a-6**



**Legend**

- MUNICIPAL WELL LOCATION
- MANAGED LANDS (<40%)
- MANAGED LANDS (40-80%)
- MANAGED LANDS (>80%)



**MANAGED LANDS - DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

The Managed Land proportion is illustrated for the parts of WHPA A-D where the vulnerability score is greater than 6.

DATE: JUNE 2010

SCALE: 1:10000

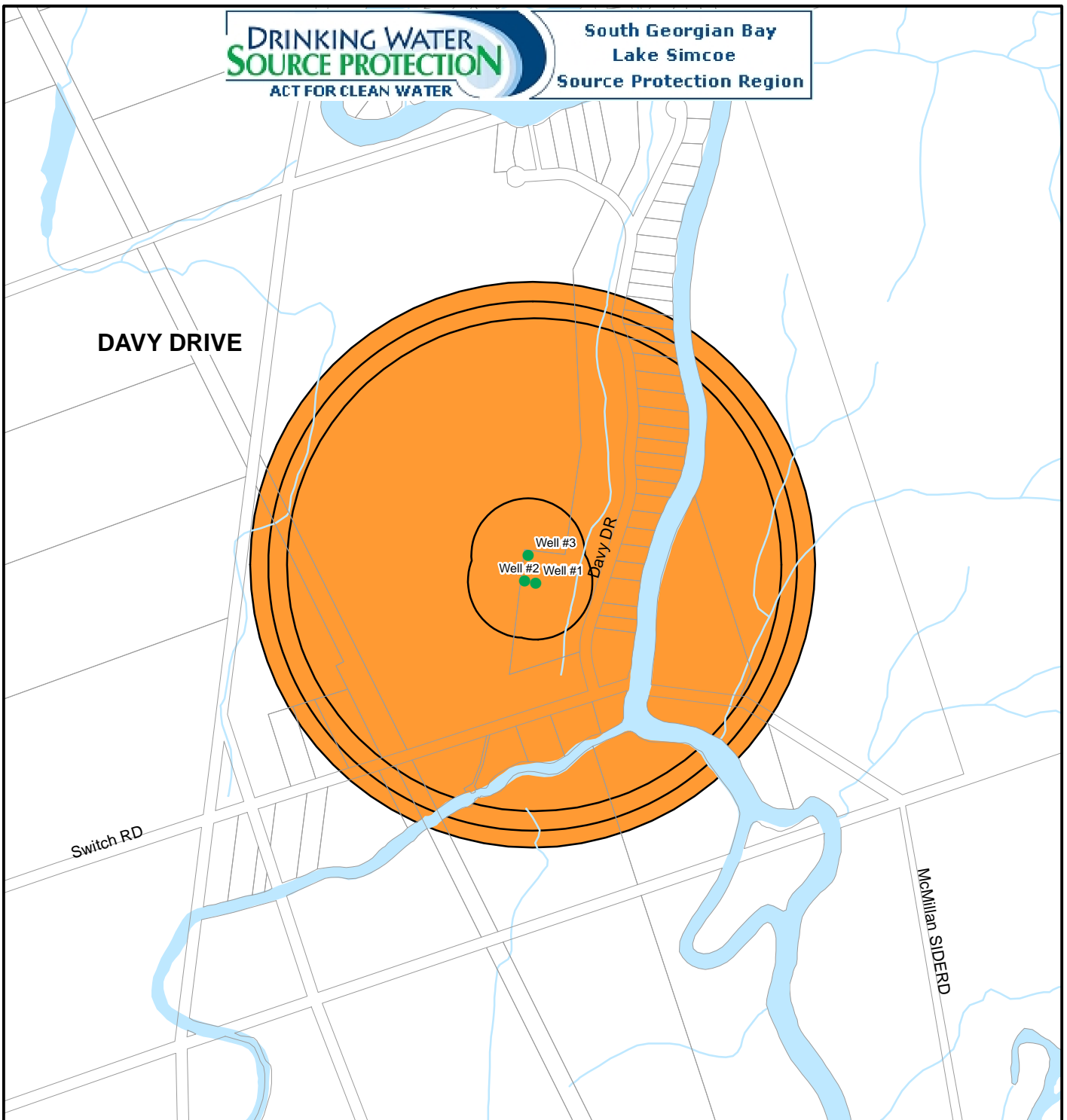
PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.4-7

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FIGURE  
**8a-7**



**Legend**

- MUNICIPAL WELL LOCATION
- LIVESTOCK DENSITY (<0.5 NUTRIENT UNITS/ACRE)
- LIVESTOCK DENSITY (0.5-1.0 NUTRIENT UNITS/ACRE)
- LIVESTOCK DENSITY (>1.0 NUTRIENT UNITS/ACRE)



100 50 0 100 Metres

**LIVESTOCK DENSITY -  
DAVY DRIVE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

The Livestock Density proportion is illustrated for the parts of WHPA A-D where the vulnerability score is greater than 6.

DATE: JUNE 2010

SCALE: 1:10000

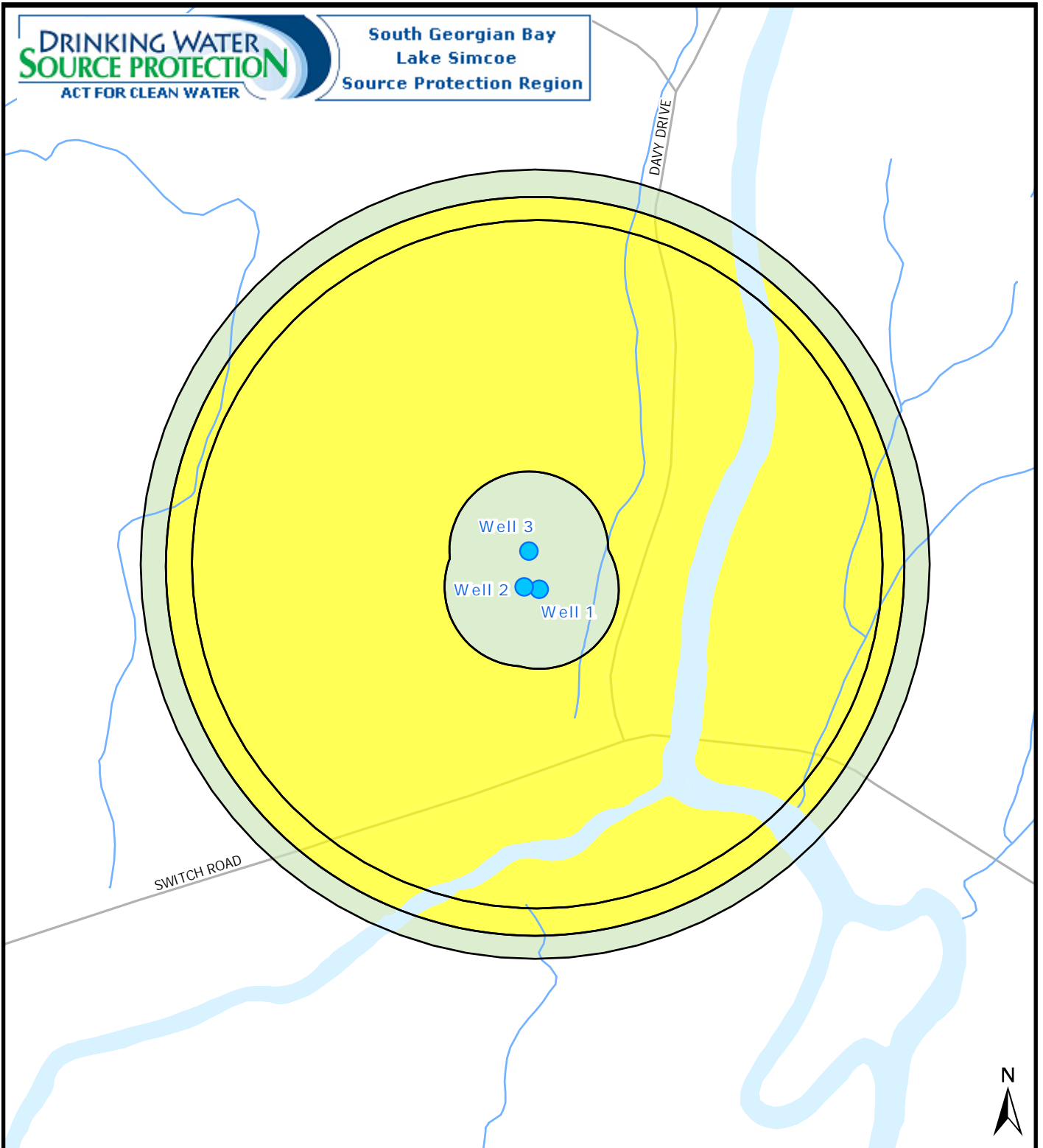
PROJECT: 0-071948.08

FILE. NO.: 0-07194808F14.4-8

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FIGURE  
**8a-8**

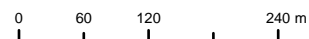


- Well
- Impervious Surfaces in WHPA**
- < 1%
  - = 1 - < 6%
  - = 6 - < 8%
  - = 8 - < 30%
  - > 30%

**Impervious Surfaces - Davy Drive WHPA**

Created by: LSRCA, 2025-08-05

Scale 1: 7,000



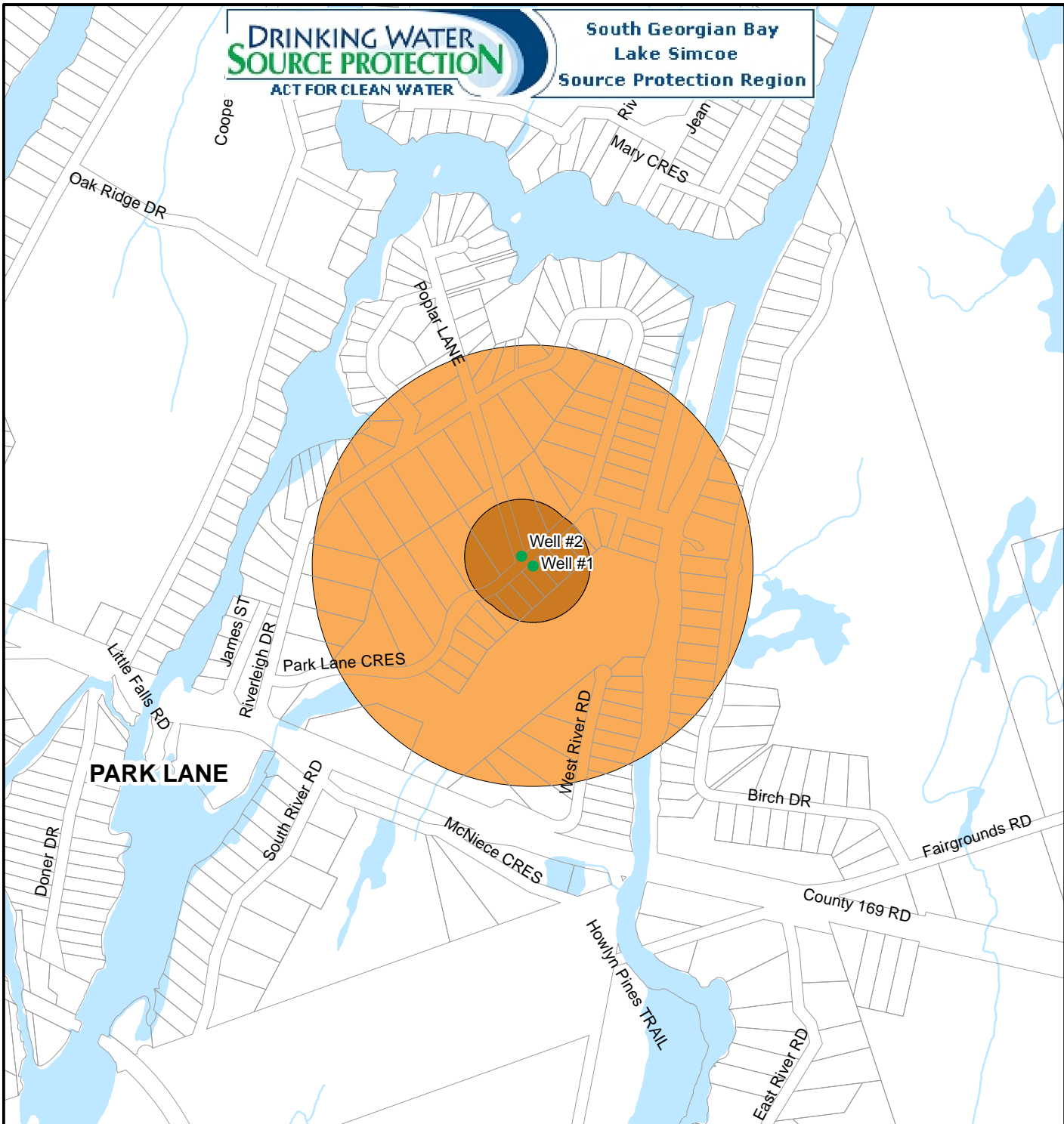
UTM Zone 17N, NAD83



This map was produced by the Lake Simcoe Region Conservation Authority, lead agency of the South Georgian Bay Lake Simcoe Region Source Protection Region. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



Figure 8a-9



**Legend**

- MUNICIPAL WELL LOCATION
- WHPA-A: 100 m RADIUS
- WHPA-B: 2-YEAR TIME-OF-TRAVEL



**WELLHEAD PROTECTION AREAS - PARK LANE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

DATE: AUGUST 2010

SCALE: 1:10000

There are no WHPA B or WHPA C zones as steady state is reached.

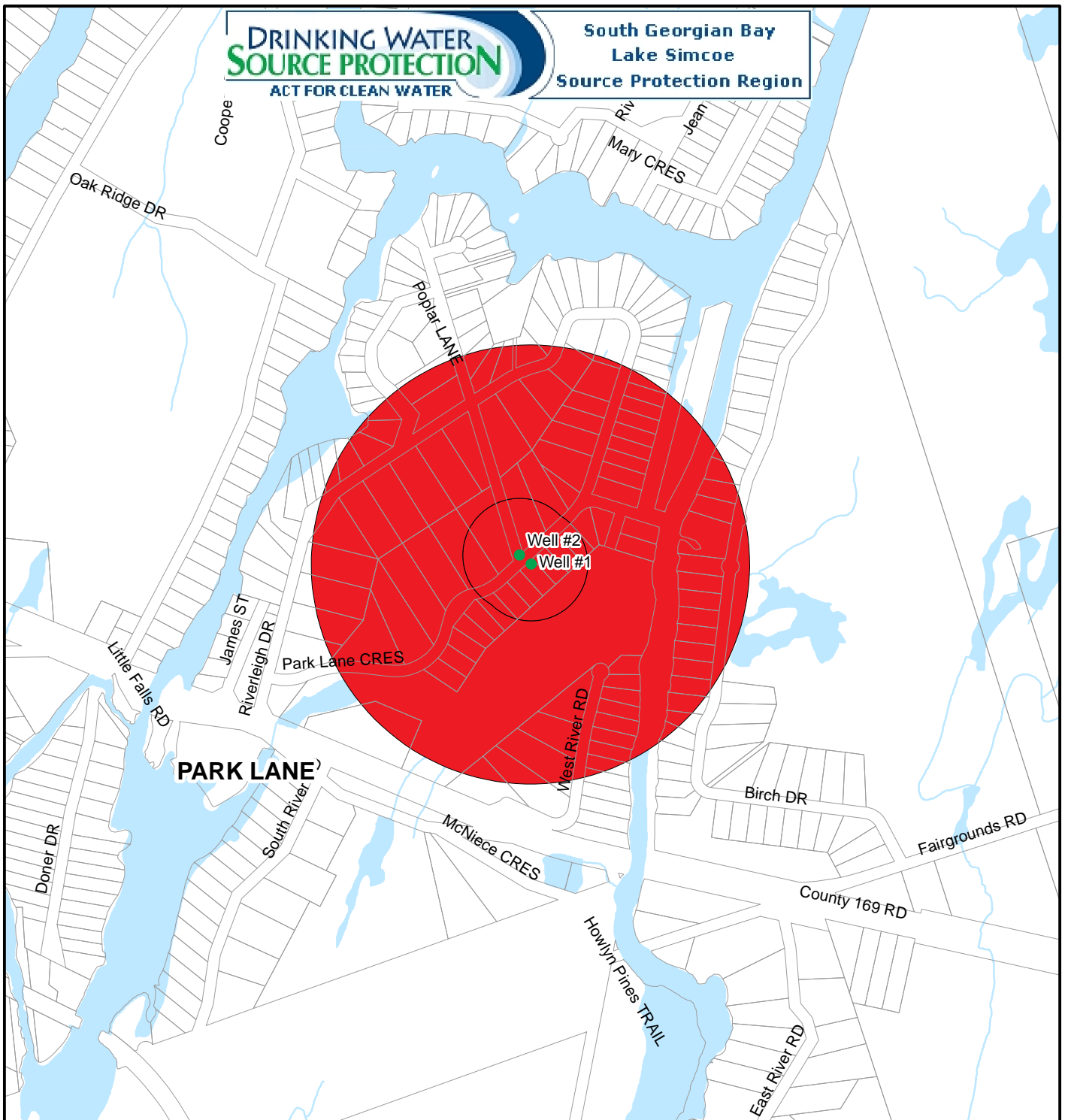
PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.5-1

This map was produced for the South Georgian Bay Lake Simcoe Source Protection Region for the purposes of completing the South Georgian Bay Lake Simcoe Assessment Report. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



FIGURE  
**8b-1**

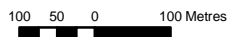


**Legend**

● MUNICIPAL WELL LOCATION

**AQUIFER VULNERABILITY INDEX**

- HIGH VULNERABILITY
- MEDIUM VULNERABILITY
- LOW VULNERABILITY



**GROUNDWATER VULNERABILITY -  
PARK LANE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

DATE: AUGUST 2010

SCALE: 1:10000

PROJECT: 0-071948.08

FILE. NO.: 0-07194808F14.5-2

This map was produced for the South Georgian Bay Lake Simcoe Source Protection Region for the purposes of completing the South Georgian Bay Lake Simcoe Assessment Report. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



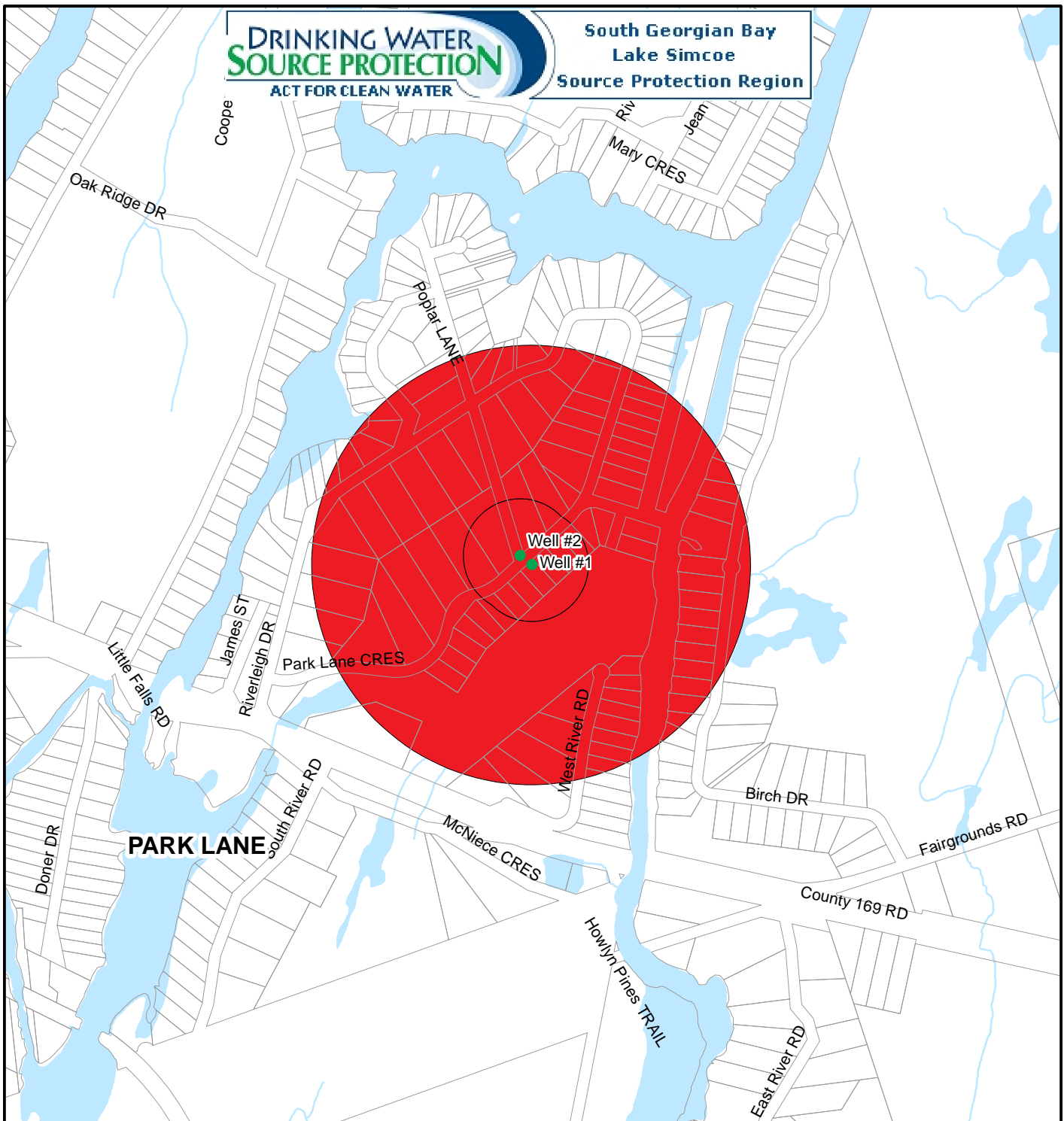
**GENIVAR**



Ontario

FIGURE

**8b-2**



**Legend**

● MUNICIPAL WELL LOCATION

**VULNERABILITY SCORING**

- 10
- 8
- 6
- 4
- 2



**VULNERABILITY SCORE -  
PARK LANE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

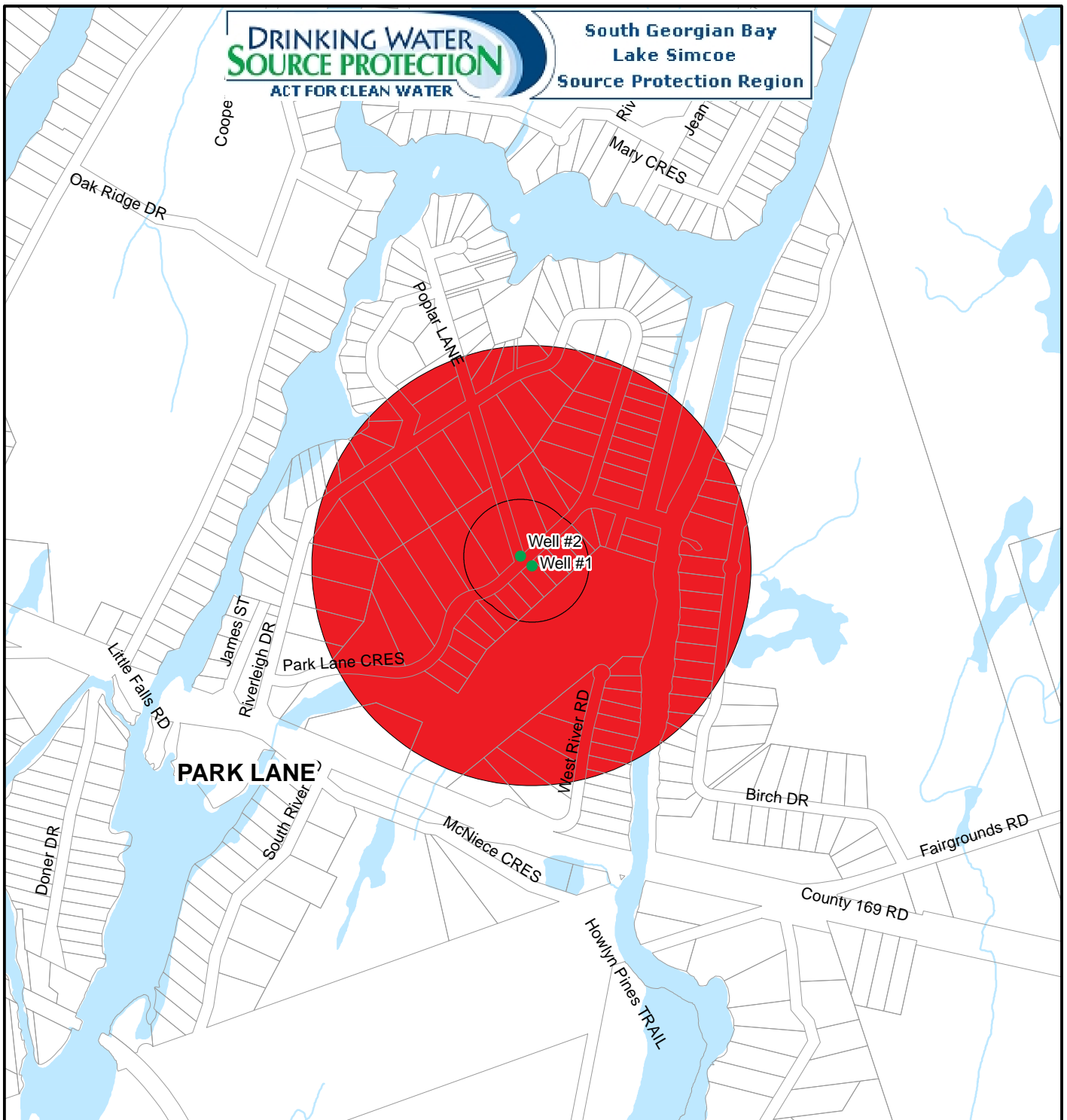
DATE: AUGUST 2010

SCALE: 1:10000

PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.5-3

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**LEGEND**

- MUNICIPAL WELL LOCATION
- VULNERABILITY SCORING**
- 10
- 8
- 6



100 50 0 100 Metres

**AREAS WHERE PATHOGENS ARE OR WOULD BE SIGNIFICANT, MODERATE, OR LOW THREATS - PARK LANE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

This figure is to be used to identify the areas where a landuse activity is or would be a drinking water threat based on the Technical Rules. The key table is intended to correlate the vulnerability score with circumstances that are significant, moderate, or low threats in the Table of Drinking Water Threats. The table shows the number of circumstances and references the table designation in the Provincial Tables of Circumstances for each threat category.

DATE: AUGUST 2010

SCALE: 1:10000

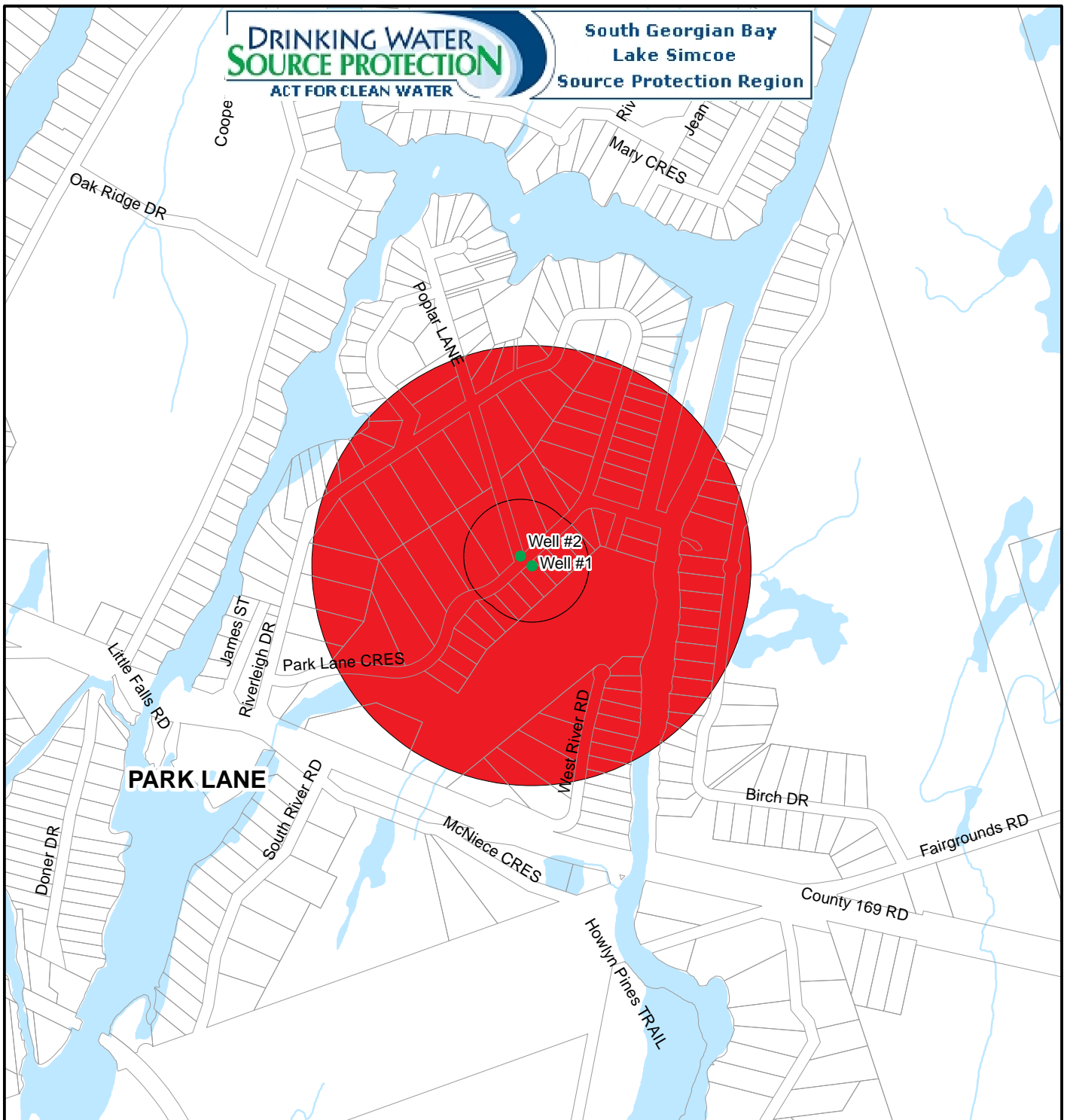
PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.5-4

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FIGURE  
**8b-4**



**LEGEND**

- MUNICIPAL WELL LOCATION
- VULNERABILITY SCORING**
- 10
- 8
- 6



100 50 0 100 Metres

**AREAS WHERE CHEMICALS ARE OR WOULD BE SIGNIFICANT, MODERATE, OR LOW THREATS - PARK LANE**

**ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES**

South Georgian Bay Lake Simcoe  
Source Protection Region

This figure is to be used to identify the areas where a landuse activity is or would be a drinking water threat based on the Technical Rules. The key table is intended to correlate the vulnerability score with circumstances that are significant, moderate, or low threats in the Table of Drinking Water Threats. The table shows the number of circumstances and references the table designation in the Provincial Tables of Circumstances for each threat category.

DATE: AUGUST 2010

SCALE: 1:10000

PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.5-5

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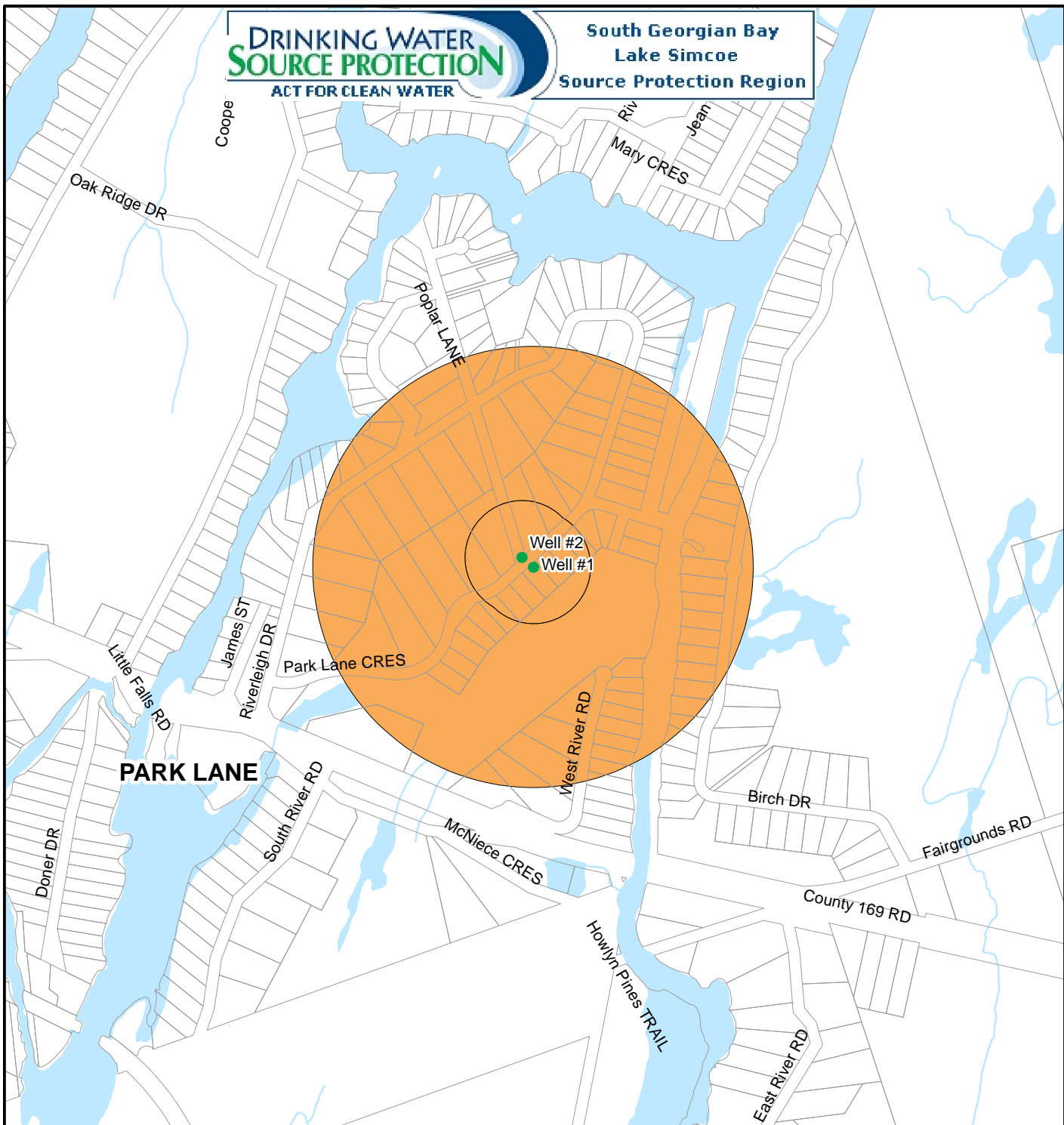
**GENIVAR**



Ontario

FIGURE

**8b-5**



**Legend**

- MUNICIPAL WELL LOCATION
- WHPA-B: 2-YEAR TIME-OF-TRAVEL



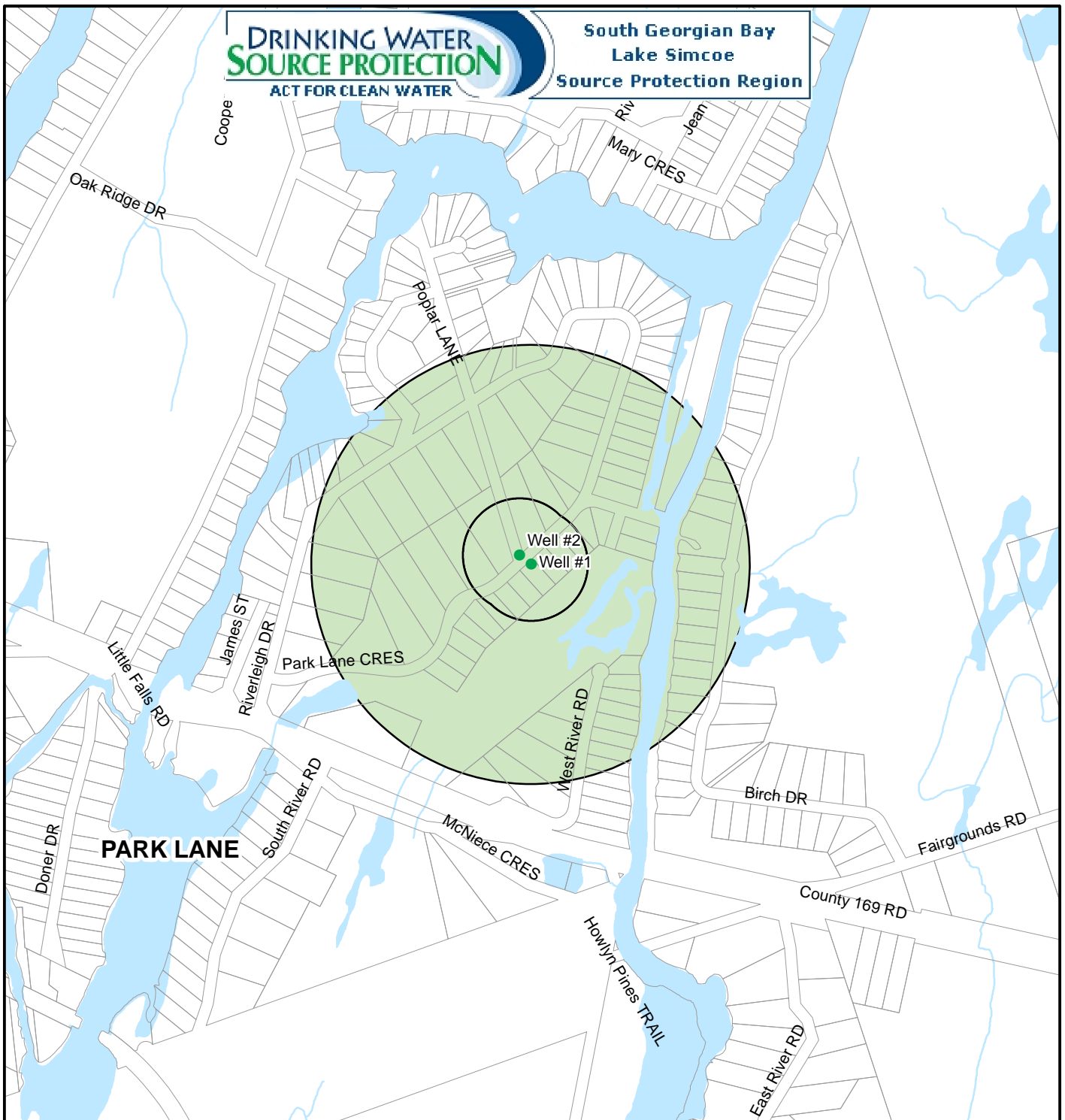
**AREAS WHERE DNAPLS ARE OR WOULD BE SIGNIFICANT, MODERATE, OR LOW THREATS - PARK LANE**

ASSESSMENT OF DRINKING WATER THREATS  
 SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
 South Georgian Bay Lake Simcoe  
 Source Protection Region

This figure is to be used to identify the areas where a landuse activity is or would be a drinking water threat based on the Technical Rules. The key table is intended to correlate the vulnerability score with circumstances that are significant, moderate, or low threats in the Table of Drinking Water Threats. The table shows the number of circumstances and references the table designation in the Provincial Tables of Circumstances for each threat category.

DATE: AUGUST 2010	SCALE: 1:10000
PROJECT: 0-071948.08	FILE. NO.:0-07194808F14.5-6

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**Legend**

- MUNICIPAL WELL LOCATION
- MANAGED LANDS (<40%)
- MANAGED LANDS (40-80%)
- MANAGED LANDS (>80%)



**MANAGED LANDS -  
PARK LANE**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

The Managed Land proportion is illustrated for the parts of WHPA A-D where the vulnerability score is greater than 6.

DATE: AUGUST 2010

SCALE: 1:10000

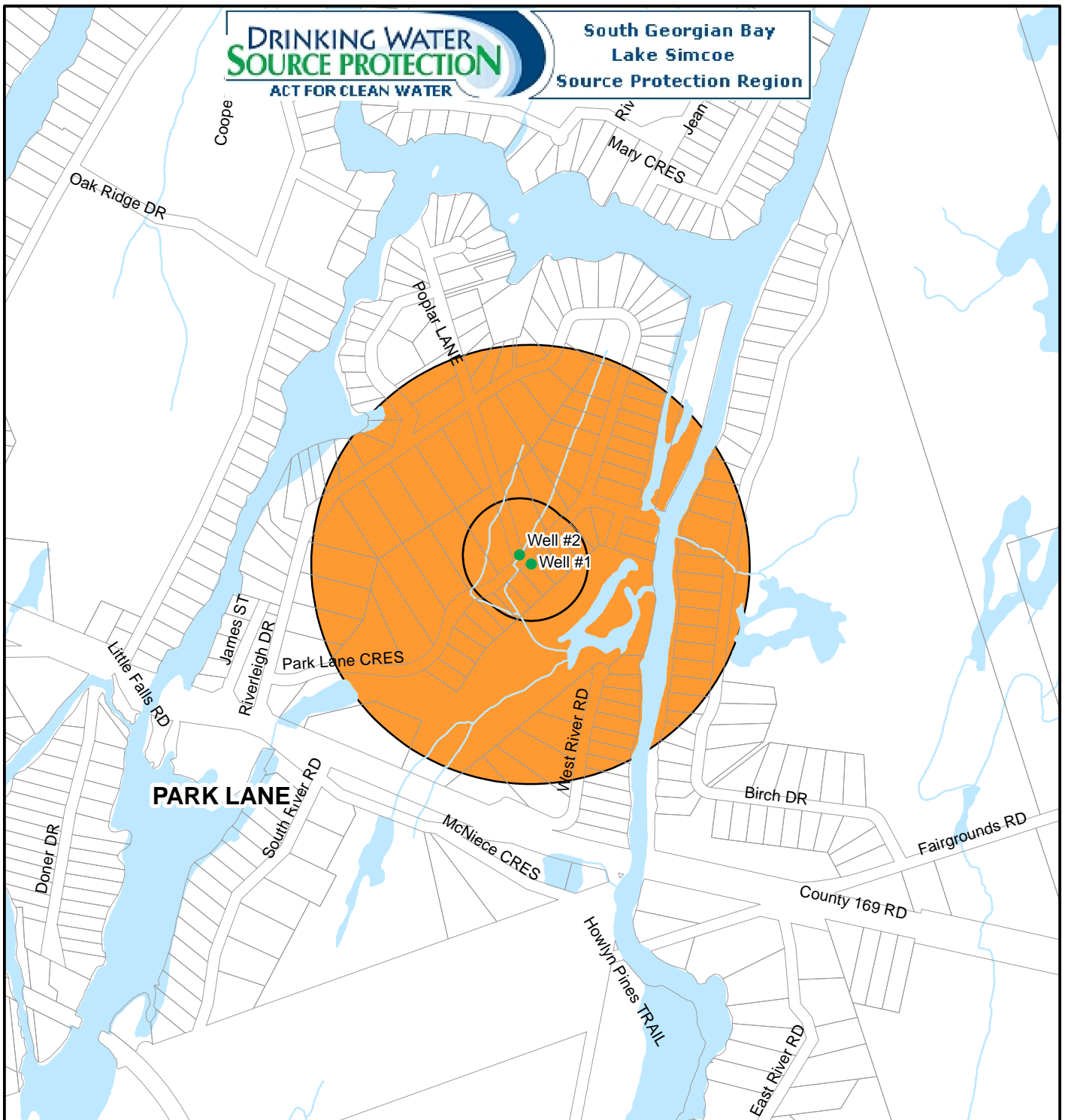
PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.5-7

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FIGURE  
**8b-7**



**Legend**

- MUNICIPAL WELL LOCATION
- LIVESTOCK DENSITY (<math><0.5</math> NUTRIENT UNITS/ACRE)
- LIVESTOCK DENSITY (0.5-1.0 NUTRIENT UNITS/ACRE)
- LIVESTOCK DENSITY (>1.0 NUTRIENT UNITS/ACRE)



100 50 0 100 Metres

**LIVESTOCK DENSITY**

ASSESSMENT OF DRINKING WATER THREATS  
SELECTED MUNICIPAL GROUNDWATER SUPPLIES  
South Georgian Bay Lake Simcoe  
Source Protection Region

The Livestock Density proportion is illustrated for the parts of WHPA A-D where the vulnerability score is greater than 6.

DATE: AUGUST 2010

SCALE: 1:10000

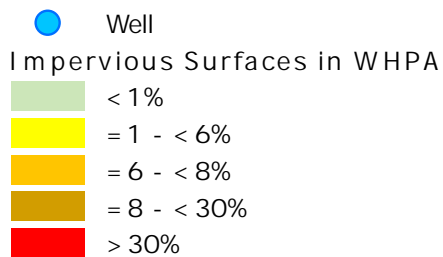
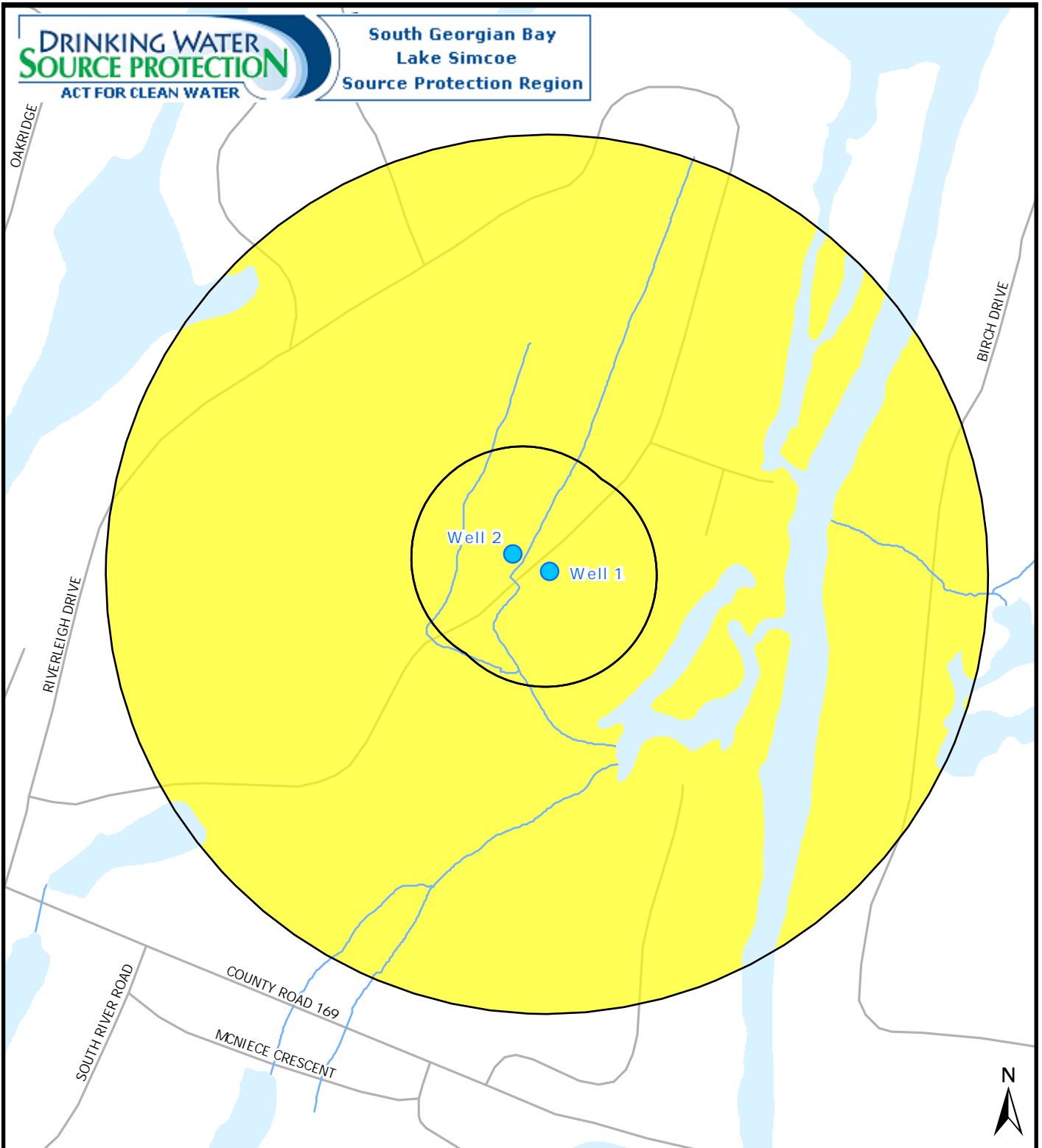
PROJECT: 0-071948.08

FILE. NO.:0-07194808F14.5-8

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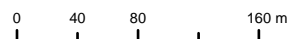
FIGURE  
**8b-8**



Impervious Surfaces - Park Lane  
WHPA

Created by: LSRCA, 2025-08-05

Scale 1: 5,000



UTM Zone 17N, NAD83



This map was produced by the Lake Simcoe Region Conservation Authority, lead agency of the South Georgian Bay Lake Simcoe Region Source Protection Region. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.



Figure 8b-9