Updated Assessment Report
Niagara Peninsula Source Protection Area

Prepared for
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Executive Summary

In 2006, the Ontario legislature passed the Clean Water Act (CWA) to protect municipal drinking water sources throughout the province. The legislation was precipitated by recommendations from the O'Connor Inquiry which looked into the causes of the Walkerton drinking water tragedy. The CWA lays out the process for protecting this important resource, with a key focus being the preparation of a locally-developed and science-based Assessment Report (AR) and Source Protection Plan.

The AR marks the completion of a milestone in the source protection process. The AR was developed from a number of technical reports that have been completed under the CWA and source protection program. The report contents are specified by the Ontario Ministry of the Environment (MOE) Assessment Report Technical Rules (2009) (TR). The report covers the following study areas:

- Watershed Characterization
- Water Budget and Water Quantity Threats Assessment
- Groundwater Vulnerability and Threats Analysis
- Surface Water Vulnerability and Threats Analysis

The preparation of the AR and Source Protection Plan is lead by the locally-based Niagara Peninsula Source Protection Committee (SPC), which is made up of representatives from municipal government, industry, commerce, agriculture, and the general public. Technical and administrative support was provided by the Niagara Peninsula Conservation Authority for the overall program, and by Niagara Region for certain major technical tasks.

The purpose of the AR is to assess the quality and quantity of municipal drinking water supplies across the source protection area. The AR identifies significant threats including potential future threats that could impact our drinking water sources. Following a public consultation process and approval by the MOE, the AR is used as the foundation in preparing the Source Protection Plan. The purpose of the Source Protection Plan is to eliminate or reduce significant threats to municipal drinking water sources that are identified in the AR. The plan could use various types of policies ranging from outreach and education to incentive plans to risk management plans or even prohibition of certain activities.

Contents of the Assessment Report

Watershed Characterization

The Niagara Peninsula Source Protection Area (NPSP Area) overlies the same jurisdiction as the Niagara Peninsula Conservation Authority (NPCA). It has an area of 2,430 square kilometers (km^2) and over 450,000 residents.

The NPSP Area is divided into three major drainage areas; Lake Ontario, Niagara River (including Welland River), and Lake Erie Drainage Areas. The NPSP Area contains over 180 watersheds within these drainage areas, and 117 km of Great Lakes shoreline.

The NPSP Area is marked by several prominent physiographic features that have had a major effect on development in the area. These features include the Niagara Escarpment which runs east-west across the peninsula, the relatively flat Haldimand Clay Plain which dominates the central portion of the watershed, the Iroquois Shore Sand Plain along Lake Ontario, the Fonthill Kame-Delta Complex which contains the highest point in the peninsula, and the Onondaga Escarpment which runs east-west across the peninsula just north of the Lake Erie shoreline and is of relatively low topographical relief.

The soils in the large central portion of the peninsula are dominated by clays, silty clays, and silty clay loams, characteristic of the Haldimand Clay Plain. Sands and sandy loams are found extensively along the Lake Ontario shoreline. Wetlands in the NPSP Area include bogs, fens, swamps, and marshes and total almost 10% of the watershed.

Land uses can have a significant impact on the water quality and quantity. Approximately 64% of the NPSP Area is agricultural, and about 21% is rural wooded or natural. The remaining 15% is considered urban. The main urban centres include St. Catharines, Niagara Falls, and Welland. Urban growth is expected to be greatest along the Welland Canal corridor particularly in the southern portion of the peninsula.

There are six municipal water treatment plants (WTPs) with surface water intakes in the NPSP Area which supply over 80% of the population. There are no municipal wells in the NPSP Area.

Water Budget and Water Quantity Threats Assessment

A Water Budget and Water Quantity Stress Assessment analysis were completed for the NPSP Area. A water budget is an understanding and accounting of the movement of water throughout the watershed and also includes the interactions between groundwater and surface water.

As required under the CWA, a Water Budget Conceptual Understanding (Conceptual WB), and a Tier 1 Water Budget and Stress Assessment (Tier 1 WB) were completed for the NPSP Area. The Conceptual WB provided an initial overview of water movements in the NPSP Area and a description of the physical setting which the Tier 1 WB expanded on with more detail.

The purpose of the Tier 1 WB was to estimate the hydrologic stress of NPSP Area subwatersheds (i.e. the NPCA designated Watershed Planning Areas (WSPAs)). An overview of the findings from the Water Budget analyses is provided below.

Climate data indicates annual precipitation is lowest along the Lake Ontario shores, while precipitation is highest in Fort Erie, due to lake effects.

Paleozoic Era bedrock underlies the study area. This sedimentary bedrock consists mainly of interbedded limestone and dolostone carbonate materials, and shale. The bedrock units in the Niagara Peninsula are east-west trending and contain a slight dip to the south (to southwest) of about 4 to 6 m/km. The oldest bedrock units are found along Lake Ontario (i.e. Queenston Formation), and the youngest units found in the south along Lake Erie (i.e. Onondaga Formation).

The interactions between groundwater and surface water are limited by near-surface soils in the Haldimand Clay Plain. However, interactions between surface water and groundwater do occur in areas such as the Niagara Escarpment and the Fonthill Kame-Delta Complex.

The Tier 1 WB determined the potential water quantity stress for an area by comparing the volume of water demand to that which is practically available for use. To simulate surface water flows and partitioning of precipitation into the various flow components (i.e. evapotranspiration, infiltration, run-off, etc.), continuous hydrologic modelling was employed using Hydrologic Engineering Centre-Hydrologic Modelling System (HEC-HMS) computer models constructed for each watershed planning area. To simulate groundwater flows, a Darcy flow approach across watershed planning area boundaries was developed.

The Tier 1 WB stress assessment methodology was prescribed by the TR, and included the calculation of water supply, consumptive demand, and a water reserve as part of the stress calculations. Consumptive demand was estimated using the MOE's permit-to-take-water (PTTW) database, detailed agricultural statistics, and population statistics.

Generally, the Watershed Planning Areas in Niagara were classified as moderate or significant surface water stress levels. Six WSPAs were classified as having moderate surface water stress levels. Seven WSPAs were classified as having significant surface water stress levels. The monthly extent of potentially stressed conditions ranged from six months (in Beaver Dam and Shriners Creek WSPA) to one month (in the Central Welland River WSPA), but was on average three months. WSPAs with only low to no stress levels included Twelve Mile Creek, Upper Twelve Mile Creek, St. Catharines Urban, and Niagara Falls Urban.

The annual percent groundwater demand for WSPAs varied from 2 to 57%. Most WSPAs were assigned low groundwater stress levels. Moderate groundwater stress levels were only assigned to two of these sixteen subwatersheds, these being Fort Erie Creeks and Fifteen Sixteen Eighteen Mile Creeks WSPA (based on an annual criterion). Only one WSPA (Lake Erie North Shore) was assigned a significant groundwater stress level, based on annual and monthly criteria. The highest water demand component in the Lake Erie North Shore WSPA was for aggregate operations.

Groundwater Vulnerable Areas

Highly Vulnerable Aquifers (HVAs) and Significant Groundwater Recharge Areas (SGRAs) are two of the four types of vulnerable areas that must be delineated in the AR.

HVA delineations were based largely upon earlier vulnerability mapping completed as part of the 2005 NPCA Groundwater Study. This earlier mapping combined two vulnerability assessment methods: (i) intrinsic susceptibility index (GwISI) and (ii) aquifer vulnerability index (AVI). Transport pathways, such as abandoned private wells, were also considered as they can increase groundwater vulnerability. Once delineated, the HVAs (i.e. areas of high groundwater vulnerability) were assigned a vulnerability score of 6. The Figure below shows the locations of the HVAs.

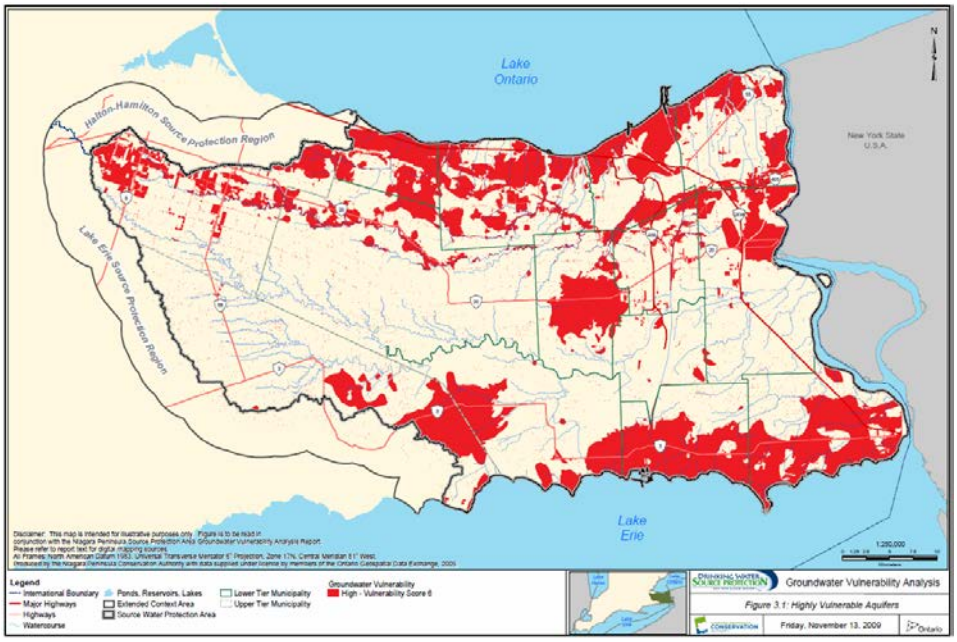

Figure I: Highly Vulnerable Aquifers (HVAs) Map

Groundwater recharge areas are classified as "significant" when they supply more water to an aquifer (which is used as a drinking water source) than the surrounding area. SGRAs were identified where groundwater is recharged by a factor of 1.15 or more the average recharge rate for the whole watershed (TR 44(1). This method is recommended where recharge rates are fairly homogenous such as is generally the case for the Niagara Peninsula. The average recharge rate for the NPSP Area is 46 mm/year and the TR criterion was then 53 mm/yr. The SGRAs calculated using this method cover 22% of the entire NPSP Area, or 542 m^2. Approximately 50% of the SGRAs are also mapped as Highly Vulnerable Aquifers, and as a result are assigned a Vulnerability Score of 6 as shown by the red shaded areas in the figure below.

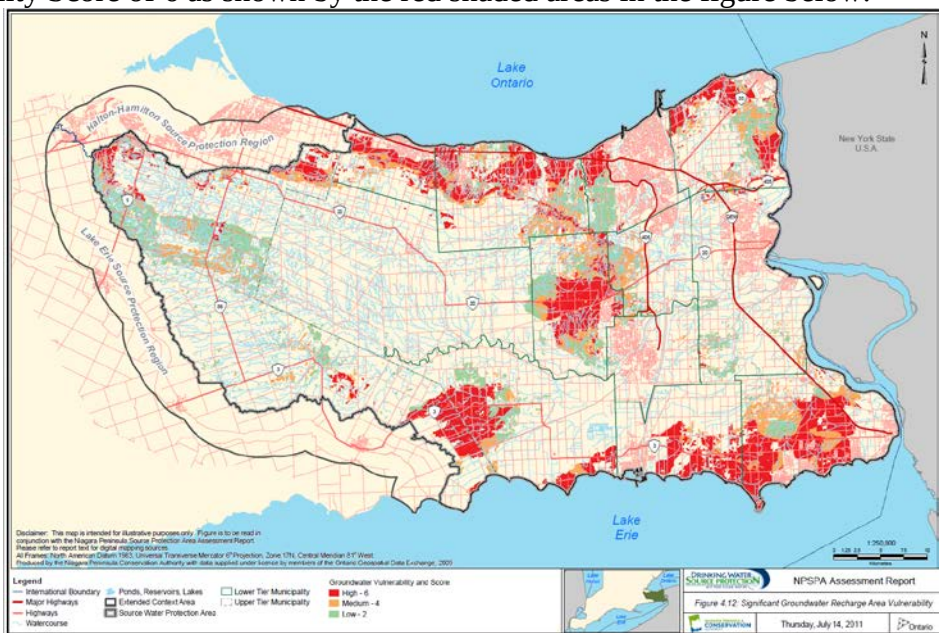

Figure II: Significant Groundwater Recharge Areas (SGRAs) Map

Surface Water Vulnerable Areas and Water Quality Threats Analysis

The process used to assess existing and potential surface water quality threats that could impact source water for each Water Treatment Plant (WTP) intake involved the following tasks:

1. Classification of each municipal drinking water intake;
2. Delineation of the vulnerable areas around the intake known as Intake Protection Zones one, two or three or IPZ-1, IPZ-2 and IPZ-3;
3. Assignment of vulnerability scores for IPZ-1 and IPZ-2;
4. Identification of activities and conditions that are or would be drinking water threats within each IPZ;
5. Enumeration of existing drinking water quality threats (significant and moderate);
6. Evaluation of raw water quality for each intake to determine if there are current issues or 'challenges' with the source water;
7. Evaluation of sources of uncertainty; and
8. Identification of knowledge and data gaps; and
9. Identification of items for future consideration.

A brief description of these tasks is presented below followed by results of the Surface Water Vulnerable Areas and Water Quality Threats Analysis for each WTP intake.

Intake Classification

The classification of each WTP intake within the NPSP Area is shown below along with information on its source water and the population serviced.

Table I : WTP Intake Classifications

WTP	Population Serviced	Source Water	Intake Classification
Grimsby WTP	55, 177	Lake Ontario	Type A - Great Lake
Rosehill (Fort Erie) WTP	27, 000	Lake Erie	
DeCew Falls WTP (all 3 intakes)	166, 557	Welland Canal	Type B - Connecting Channel
Welland WTP	50, 587	Welland Recreational Canal (Old Welland Canal)	
Port Colborne WTP	15,092	Welland Canal	
Niagara Falls WTP	78,000	Niagara River	

IPZ Delineation

A primary intake protection zone (IPZ-1) and secondary intake protection zone (IPZ-2) were delineated for each WTP intake. The IPZ-1 for Great Lakes Type A intakes generally consists of a circle 1,000 m in diameter around the intake. The IPZ-1 for Type B Connecting Channel intakes consist of a semi-circle that has a radius of 1,000 m extending upstream from the intake and 100 m downstream. The IPZ-1 may be reduced to reflect local conditions and is truncated after extending onto land 120 m or the regulated limit.

The IPZ-2 was delineated based on a minimum of a 2-hour time-of-travel (TOT) to the intake. Each IPZ-2 was delineated by modeling three components of the IPZ-2; (1) the in-water component; (2) the up-land areas component; and (3) the up-tributary components.

Hydraulic flow models (e.g. HEC-RAS^{TM} and/or ECOMSED$^{TM)}$ were used to delineate the in-water portions of the IPZ-2s. Where the IPZ-2 touched land, an upland area was determined using a set-back of 120m or the regulated limit, which ever was greater. The upland areas could be extended where man-made transport pathways were present (i.e. storm sewers). An up-tributary component was included where a natural pathway could contribute water to the intake within a 2-hour TOT. The up-tributaries were delineated using analytical modeling so that the combined TOT for the in-water and up-tributary components totalled 2-hours.

Tertiary Zones, otherwise known as IPZ-3s were also delineated for three WTP intakes: DeCew Falls Highway 406, Welland and Port Colborne. Diesel/gasoline fuel handling, storage and transportation were identified as significant drinking water threats in the IPZ-3s. This was based upon event-based numerical modeling of fuel spills that could negatively impact a WTP. These activities are also designated significant drinking water threats where modelled downstream in the IPZ-2s and IPZ-1s. IPZ-3s for Grimsby, Niagara Falls and Rosehill WTPs may be completed as part of future AR updates. No IPZ-3 was delineated for DeCew Falls Main Intake as event-based numerical modelling did not identify diesel fuel as a significant threat activity for the volumes modelled.

Vulnerability Scoring

Once the IPZs were delineated for each intake, a Vulnerability Score was then calculated as:
Vulnerability Score = (Area Vulnerability Factor) x (Source Vulnerability Factor)

The Area Vulnerability Factor reflects the vulnerability of the particular intake protection zone based on a number of factors (e.g. permeability of land). The Source Vulnerability Factor reflects the vulnerability of the WTP intake (e.g. depth of intake).

Threats Assessment

Under the CWA, a drinking water threat includes an activity or condition that is prescribed by the regulations as a drinking water threat. Essentially, a drinking water threat is an activity that (1) could adversely affect the quality or quantity of a source of drinking water, or (2) could result in the raw water supply failing to meet the prescribed water quality/quantity standards. A condition is an existing situation as a result of a past activity (i.e. contaminated sediment).

The TR require consideration of the following activities and conditions:

- Activities that are prescribed as drinking water threats in O.Reg. 287/07,
- Non-prescribed, locally based activities, and
- Conditions resulting from past land use activities.

Subsection 1.1(1) of O.Reg. 287/07b prescribes the categories of activities that are to be considered drinking water threats under the CWA. These threat categories are shown in Section 5.4.1 of this report and cover activities such as:

- operation of waste disposal sites or sewage treatment/collection systems;
- application/storage/management of agricultural source material, non-agricultural source material, commercial fertilizer, pesticides, or road salt;
- storage of snow;
- handling and storage of dense non-aqueous phase liquid (DNPL), fuel, or organic solvents;
- management of run-off from aircraft de-icing; and
- the use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard

The water quality threat activities are further divided into 1,920 Prescribed Threat Circumstances which are presented in the MOE's Tables of Drinking Water Threats (TDWT). To determine potential surface water quality threats for each IPZ, the prescribed threat circumstances in the TDWT are cross-referenced with the vulnerability score to determine which circumstances could be significant threats if they occurred within a given IPZ. Appendix C contains the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for each vulnerable area (both chemical and pathogen).

Non-prescribed, locally based activities (i.e. Transportation Threats)

The Source Protection Committee chose to include non-prescribed transportation threat activities. An example of a significant transportation threat activity is the transportation of non-agricultural source materials (e.g. biosolids) in the Port Colborne IPZ-1.

Enumeration of Significant Threats

The TR require the enumeration of locations at which:

- A person is engaging in an activity that is or could be a <u>significant</u> threat; and
- A condition resulting from past a past activity is a <u>significant</u> drinking water threat.

An activity that "*could be*" a significant threat is one, for example, where there is already infrastructure in place to carry out the activity.

Conditions

Conditions resulting from past land use activities may also be considered a drinking water threat if certain criteria are exceeded. An inventory of past land uses was conducted including searches for Brownfield sites, and sediment sampling, etc.

Issues

A drinking water issue is present if a parameter is at a concentration or increasing towards a concentration that may adversely affect drinking water quality. Raw water data were compared to the Ontario Drinking Water Quality Standards for *treated water* since no raw water standards exist. While some non-health related parameters such as temperature were identified, they were all naturally occurring and therefore were not considered a drinking water issues. One exception may be organic nitrogen which was identified and may be due to human activity, but this needs further study.

Summary of Surface Water Vulnerable Area and Water Quality Threats Analysis Results - by WTP

Welland WTP Intake:

The Welland WTP intake is a Type B intake and is located on the Old Welland Canal. The delineation of the IPZ-1 for the Welland WTP is shown in Figure III. No IPZ-2 is identified since it is completely encompassed by the IPZ-1. However the IPZ-3 extends from the IPZ-1 north along the Welland Recreational Canal and then south on the Welland Canal to Clarence Street in Port Colborne. Table II provides the vulnerability score for the IPZ and the Appendix C reference numbers for the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for the IPZ. Further details are provided in the Chapter 6 of this report.

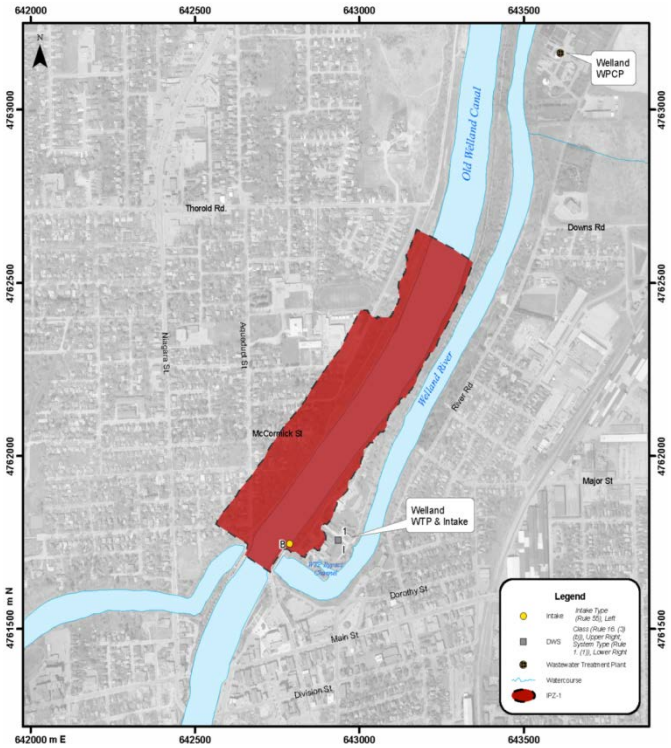

Figure III: Welland WTP IPZ-1

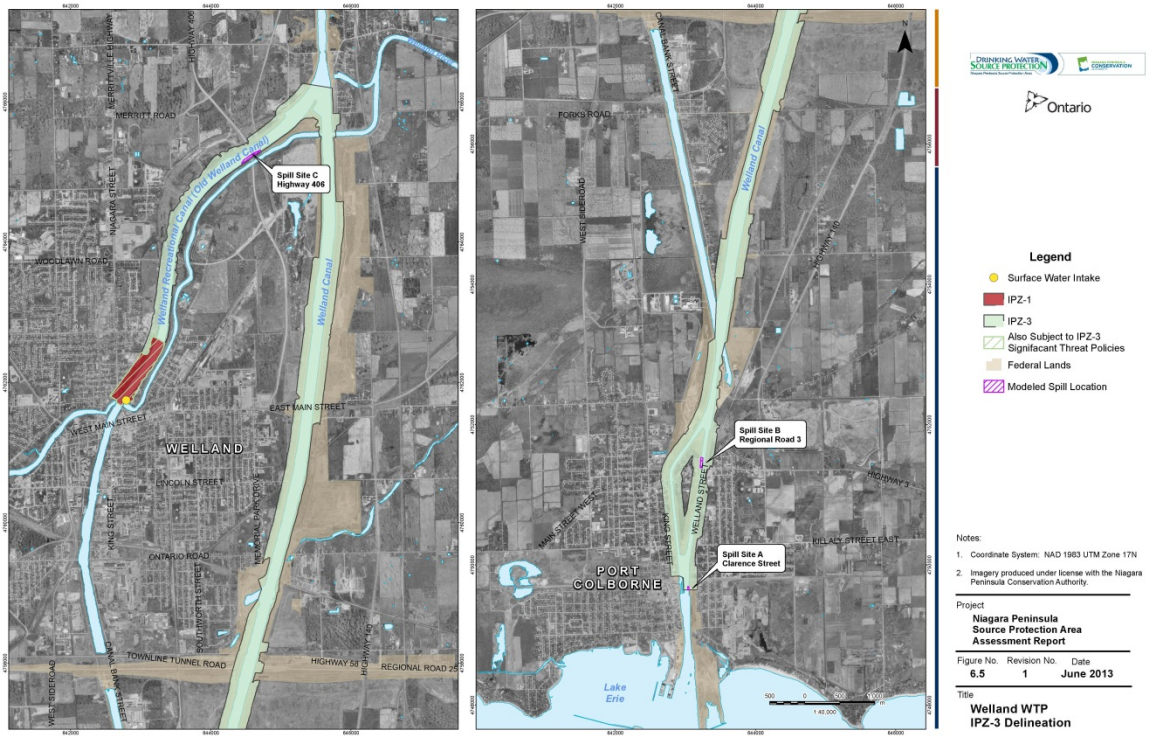

Figure IV: Welland WTP IPZ-3

Table II: Welland WTP References for Provincial Tables of Circumstances							
IPZ	**Vulnerability Score**	**Provincial Table Reference - Chemical Threats**			**Provincial Table Reference - Pathogen Threats**		
		Sig.	**Moderate**	**Low**	**Sig.**	**Moderate**	**Low**
1	7.0	--	Appendix C.7	Appendix C.12	--	Appendix C.21	Appendix C.26
2	N/A (no IPZ-2)	--	--	--	--	--	--

No prescribed significant threat activities were enumerated in the IPZ-1 for the Welland WTP intake, and no conditions were identified in the IPZ-1. However diesel/gasoline fuel transportation, storage and handling were identified as significant threats in the Welland WTP IPZ-3 and the IPZ-1.

DeCew WTP Intakes

The DeCew WTP has three intakes; (1) the main intake on the lower reservoir, (2) the diversion structure at Highway 406, and (3) the Lake Gibson Alternate Intake. The IPZ-1 and IPZ-2 for each of these intakes are shown in the figures below. Also shown are the IPZ-3 for the Highway 406 intake and the portion of Lake Gibson intake where diesel/gasoline fuel transportation, handling and storage are a significant drinking water threat. The following table shows the Vulnerability Score for each IPZ and the Appendix C reference numbers for the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for the IPZ. Further details are provided in the Chapter 7 of this report.

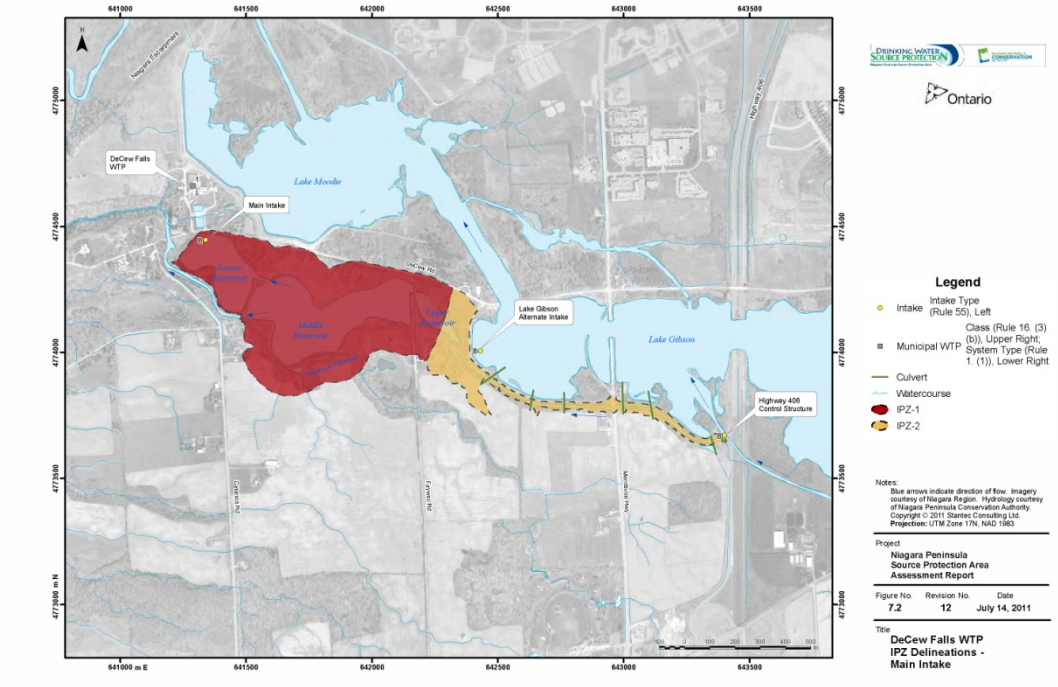

Figure V: Main Intake IPZ-1 and IPZ-2

DeCew Intake on Lower Reservoir

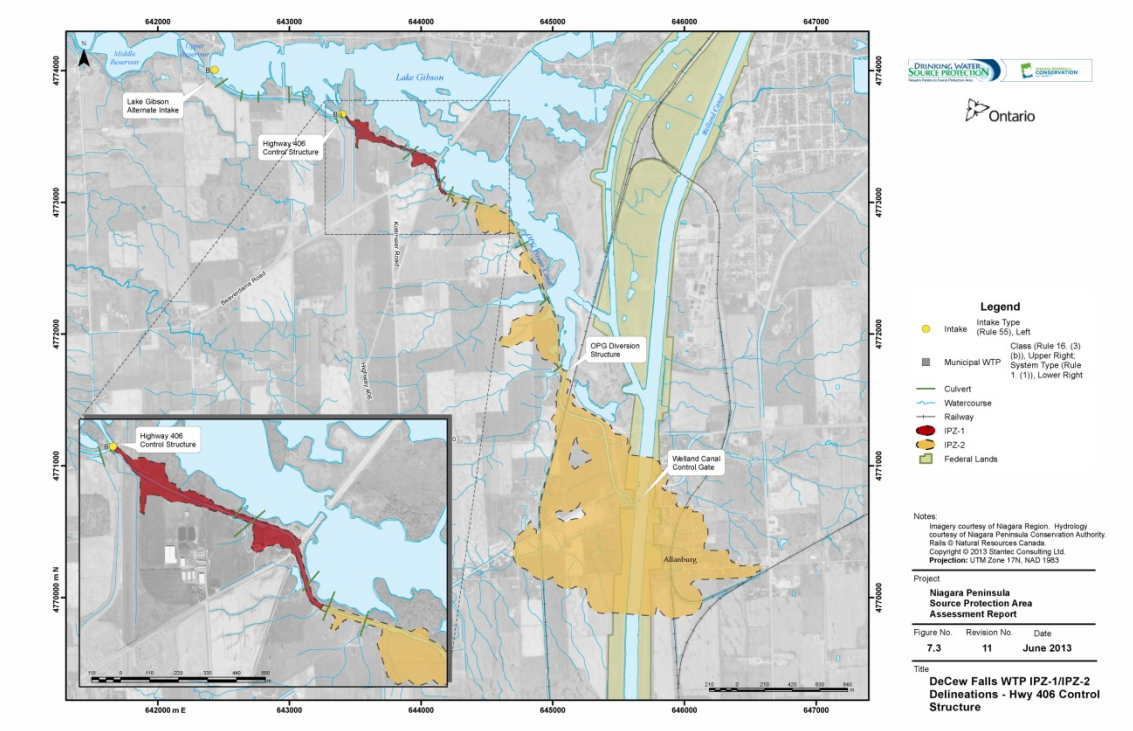

Figure VI: Hwy 406 IPZ-1 and IPZ-2

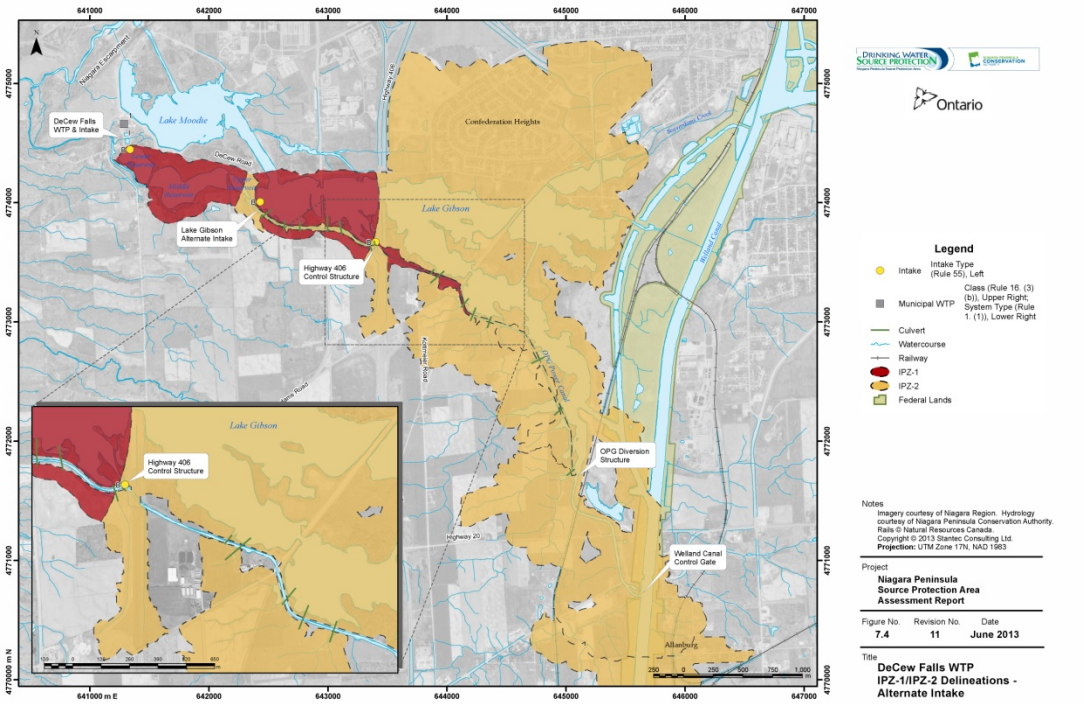

Figure VII: Lake Gibson Alternate Intake

Table III: DeCew WTP References for Provincial Tables of Circumstances							
IPZ	**Vulnerability Score**	**Provincial Table Reference - Chemical Threats**			**Provincial Table Reference - Pathogen Threats**		
		Sig.	**Mod.**	**Low**	**Sig.**	**Mod.**	**Low**
Main, Highway 406 and Lake Gibson							
1	8.0	Appendix C.3	Appendix C.6	Appendix C.11	Appendix C.17	Appendix C.20	Appendix C.25
Main							
2	6.4	--	Appendix C.8	Appendix C.13	--	Appendix C.22	Appendix C.27
Highway 406							
2	5.6	--	--	Appendix C.14	--	--	Appendix C.28
Lake Gibson							
2	6.4	--	Appendix C.8	Appendix C.13	--	Appendix C.22	Appendix C.27

Three locations were identified within the Main Intake IPZ-1 where prescribed significant threat activities (corresponding to Threat Categories 3, 4, and 21) were found to exist. Three prescribed significant threats were identified within the Lake Gibson IPZ-1, and two prescribed significant threats were identified within the Highway 406 Control Structure IPZ-1. The enumeration of prescribed threat activities that are or would be significant threats is summarized in Table IV.

Table IV : Enumeration of Locations At Which A Person is Engaging in An Activity That is Or Would Be A Prescribed Significant Threat		
Main Intake IPZ-1	Highway 406 Control Structure IPZ-1	Lake Gibson IPZ-1
3	2	3
3. Application of agricultural source material to land (TDWT Circumstance 1944) 4. Storage of agricultural source material (TDWT Circumstance 1962/1964) 21. Use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm animal yard (TDWT Circumstance 1945/1946)		

Diesel/gasoline fuel transportation, storage and handling were also identified as significant threats in the Highway 406 IPZ-3, IPZ-2 and IPZ-1 (Figure VIII) as well as in the event-based modelled portions of the Lake Gibson Alternate Intake IPZ-1 and IPZ-2 (Figure IX).

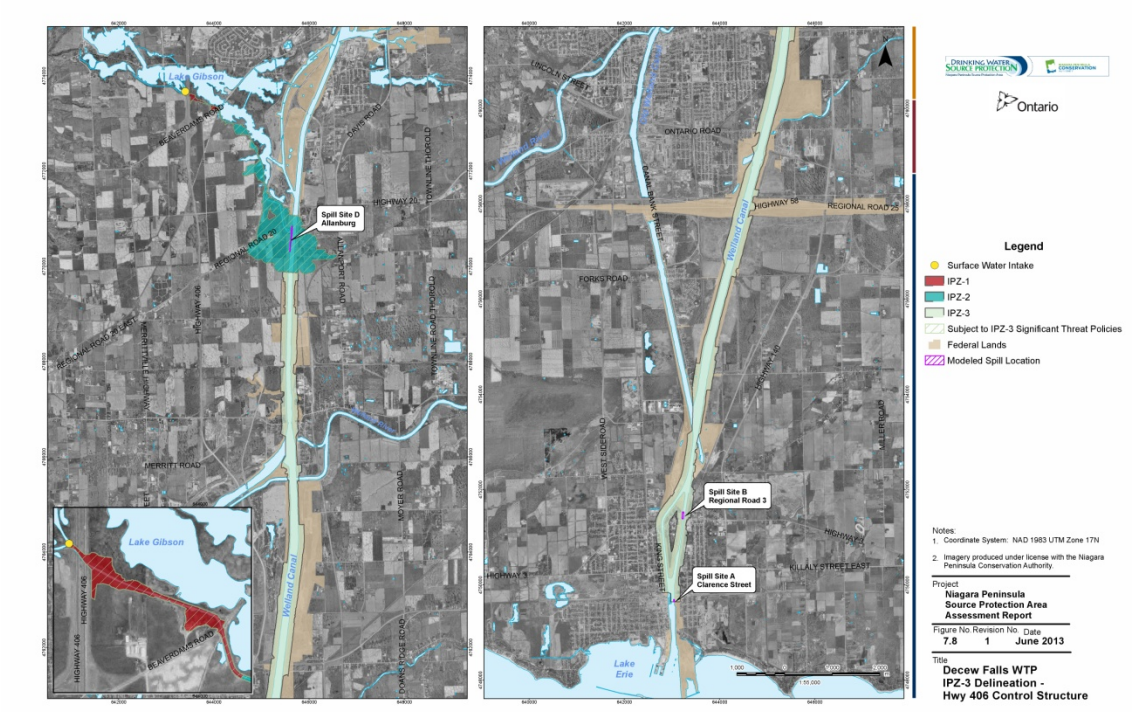

Figure VIII: Highway 406 IPZ-3

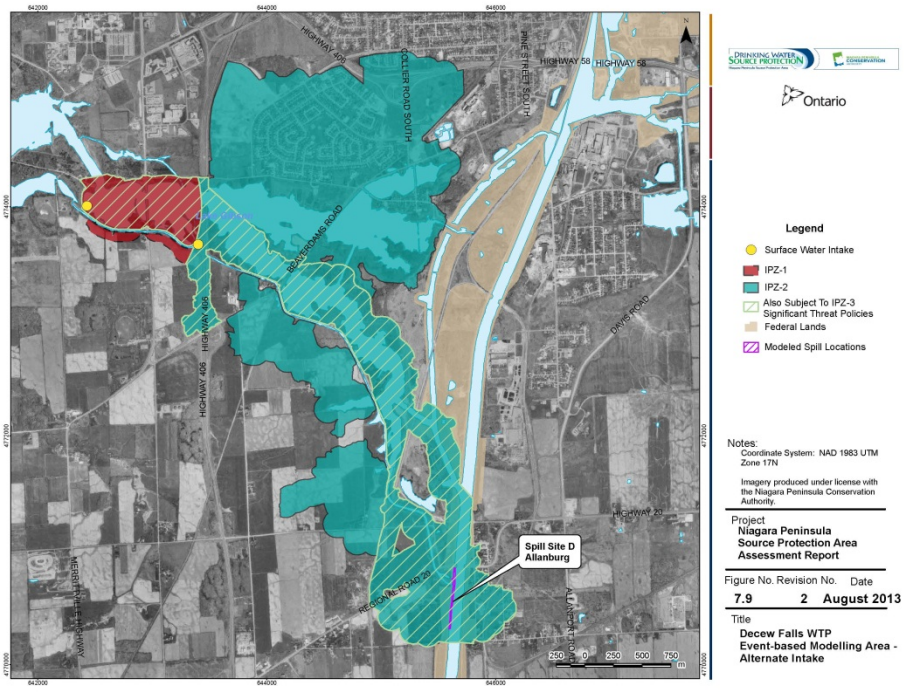

Figure IX: Lake Gibson Alternate Intake Event-based Modelling Area

Port Colborne WTP Intake

The Port Colborne WTP intake is a Type B intake and is located on the Welland Canal. The IPZ-1 and IPZ-2 for the Port Colborne WTP are shown in Figure X and the IPZ-3 in Figure XI. Table V shows the vulnerability score for each IPZ and the Appendix C reference numbers for the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for the IPZ. Further details are provided in the Chapter 8 of this report.

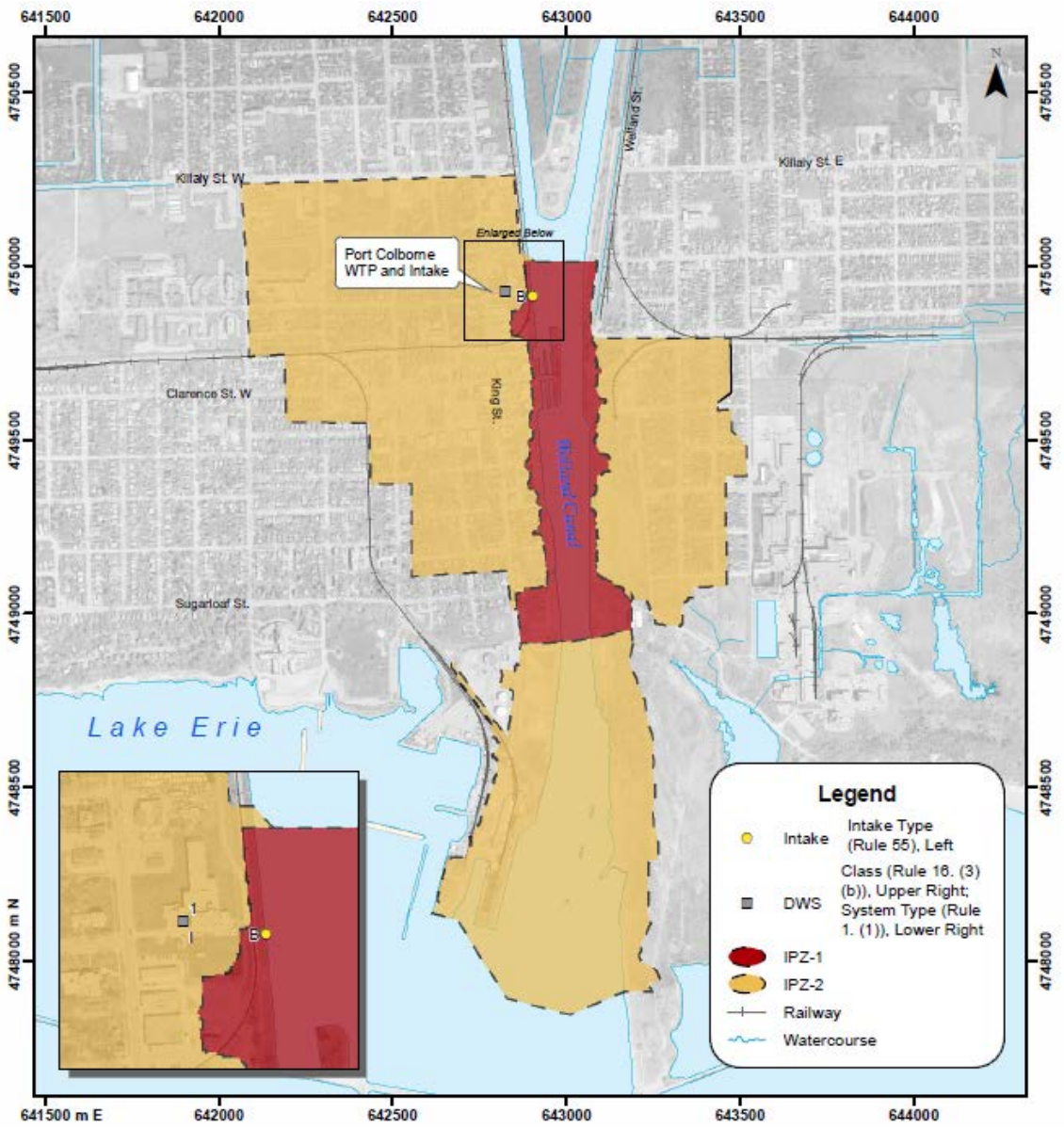

Figure X: Port Colborne IPZ-1 and IPZ-2

Table V: Port Colborne WTP References for Provincial Tables of Circumstances							
IPZ	**Vulnerability Score**	**Provincial Table Reference - Chemical Threats**			**Provincial Table Reference - Pathogen Threats**		
		Sig.	**Mod.**	**Low**	**Sig.**	**Mod.**	**Low**
1	9.0	Appendix C.1	Appendix C.4	Appendix C.9	Appendix C.15	Appendix C.18	Appendix C.23
2	8.1	Appendix C.2	Appendix C.5	Appendix C.10	Appendix C.16	Appendix C.19	Appendix C.24

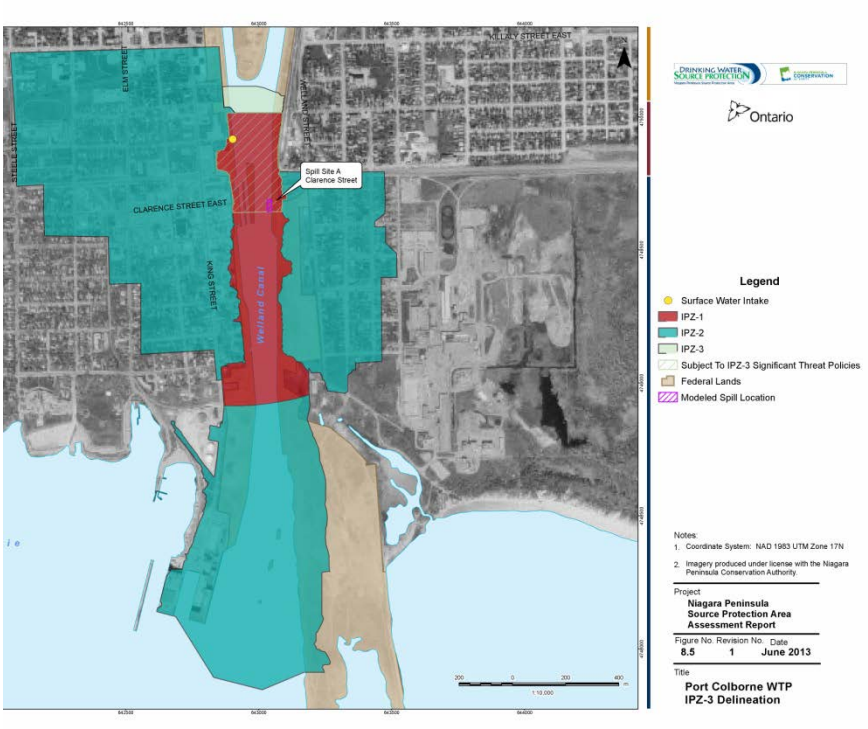

Figure XI: Port Colborne IPZ-3

Land use information and other data were obtained from various sources and compared to the MOE's Tables of Drinking Water Threats to determine which threats exist or could exist within each IPZ. Based on this analysis, no prescribed significant threats were found to exist within Port Colborne's IPZ-1 and IPZ-2. Diesel/gasoline fuel transportation, storage and handling were however identified as significant threats in IPZ-3 and as well as in the event-based modelled portion of IPZ-1 from the Clarence Street spill site. Transportation of agricultural and non-agricultural source material were identified as significant transportation (locally-adopted) threats in the Port Colborne IPZ-1.

No conditions were identified that represent a significant drinking water threat.

Niagara Falls WTP Intake

The Niagara Falls WTP intake is a Type B intake located on the west bank of the Welland River, just south of the Niagara River. Although located in the Welland River, the intake actually receives raw water from the Niagara River due to the unique man-made flow conditions at the mouth of the Welland River.

The IPZ-1 and IPZ-2 for the Niagara Falls WTP are shown in Figure XII. Table VI shows the vulnerability score for the IPZs and the Appendix C reference numbers for the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for the IPZ. Further details are provided in the Chapter 9 of this report.

Table VI: Niagara Falls WTP References for Provincial Tables of Circumstances

IPZ	Vulnerability Score	Provincial Table Reference - Chemical Threats			Provincial Table Reference - Pathogen Threats		
		Sig.	Mod.	Low	Sig.	Mod.	Low
1	8.0	Appendix C.3	Appendix C.6	Appendix C.11	Appendix C.17	Appendix C.20	Appendix C.25
2	6.4	--	Appendix C.8	Appendix C.13	--	Appendix C.22	Appendix C.27

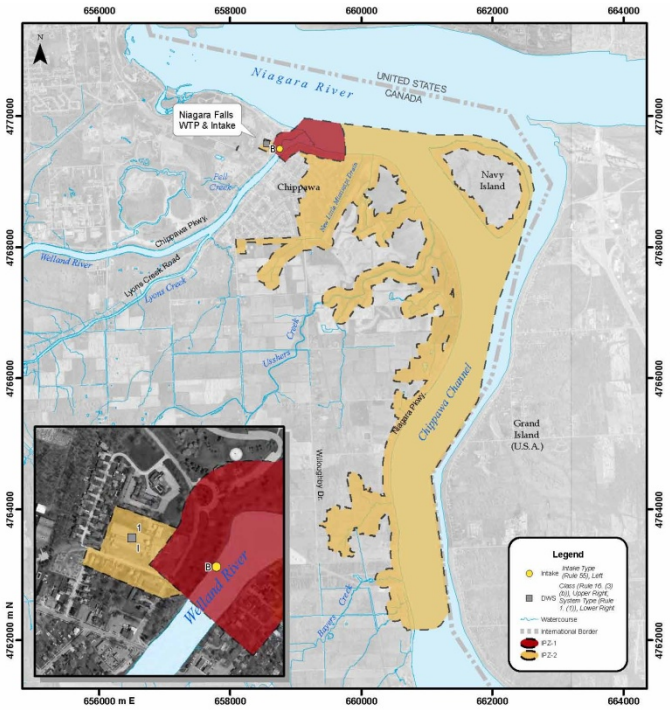

Figure XII: Niagara Falls IPZ-1 and IPZ-2

Land use information and other data were obtained from various sources and compared to the MOE's Tables of Drinking Water Threats to determine which threats exist or could exist within each IPZ. Based on this analysis, no significant threats were found to exist within Niagara Falls IPZ-1 or IPZ-2.

Rosehill WTP Intake

The Rosehill WTP is located in the Town of Fort Erie, and is a Type A intake located on Lake Erie. The IPZ-1 and IPZ-2 for the Rosehill WTP are shown in Figure XIII. Table VII shows the vulnerability score for the IPZs and the Appendix C reference numbers for the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for the IPZ. Further details are provided in the Chapter 10 of this report.

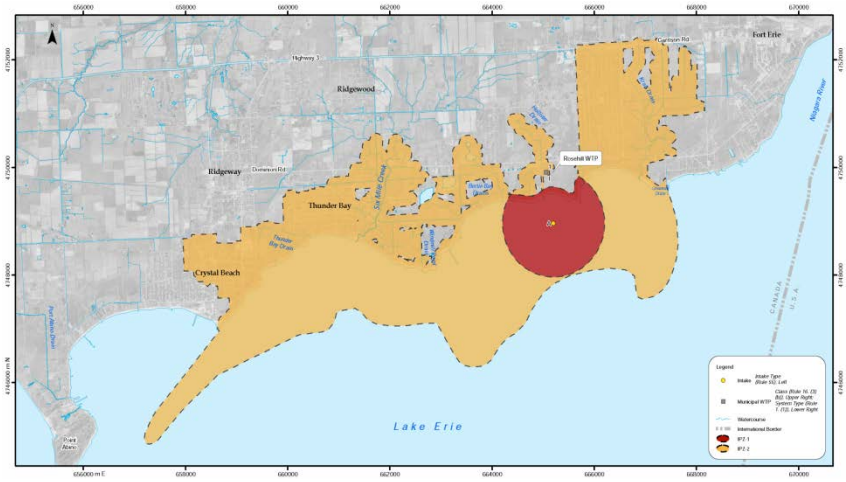

Figure XIII: Rosehill IPZ-1and IPZ-2

Table VII: Rosehill WTP References for Provincial Tables of Circumstances							
IPZ	**Vulnerability Score**	**Provincial Table Reference - Chemical Threats**			**Provincial Table Reference - Pathogen Threats**		
		Sig.	**Mod.**	**Low**	**Sig.**	**Mod.**	**Low**
1	7.0	--	Appendix C.7	Appendix C.12	--	Appendix C.21	Appendix C.26
2	5.6	--	--	Appendix C.14	--	--	Appendix C.28

There are no significant potential prescribed threats, because of the low vulnerability scores for the Rosehill IPZ-1 and IPZ-2. Land use information and other data were obtained from various sources and compared to the MOE's Tables of Drinking Water Threats to determine which threats exist or could exist within each IPZ. Based on this analysis and the fact that the vulnerability scores were below 8.0, no significant threats were found to exist within IPZ-1 or IPZ-2.

Grimsby WTP Intake

The Grimsby Water Treatment Plant (WTP) is a Type A intake located on Lake Ontario about 2 km from the shoreline. The IPZ-1 and IPZ-2 for the Grimsby WTP are shown in Figure XIV. Table VIII shows the vulnerability score for the IPZs and the Appendix C reference numbers for the Provincial Tables of Circumstances corresponding with significant, moderate and low threats for the IPZ. Further details are provided in the Chapter 11 of this report. There are also no potential significant prescribed threats because of the low overall vulnerability scores for the Grimsby IPZ-1 and IPZ-2.

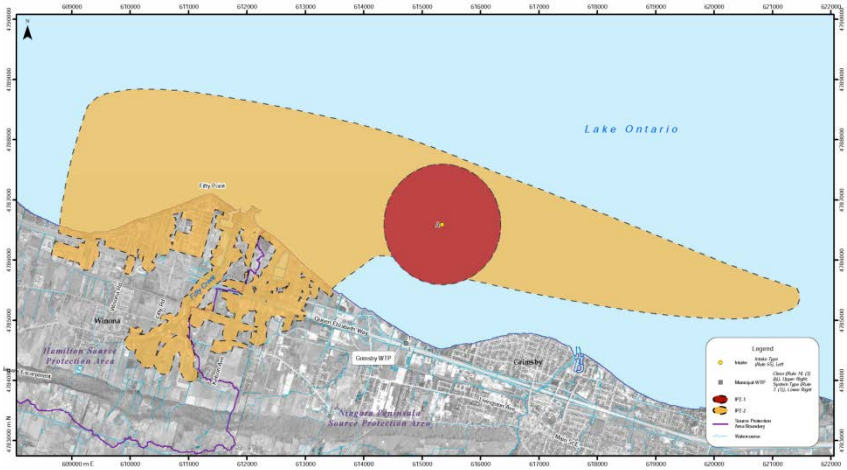

Figure XIV: Grimsby IPZ-1 and IPZ-2

Table VIII: Grimsby WTP References for Provincial Tables of Circumstances							
IPZ	**Vulnerability Score**	**Provincial Table Reference - Chemical Threats**			**Provincial Table Reference - Pathogen Threats**		
		Sig.	**Mod.**	**Low**	**Sig.**	**Mod.**	**Low**
1	5.0	--	--	App C.30	--	--	App C.29
2	4.0	--	--	--	--	--	--

Because of the low vulnerability scores in the IPZs, no significant or moderate threats were found to exist within the Grimsby IPZ-1 or IPZ-2.

NPSP Area and the Great Lakes

The Niagara Peninsula Source Protection Area contains water that flows into the Great Lakes and is therefore required to consider the following agreements (MOE, 2007):

- The Canada-United States Great Lakes Water Quality Agreement (GLWQA);
- The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem;
- Great Lakes – St. Lawrence River Basin Water Resources Compact; and
- The Great Lakes Charter.