DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

Thames-Sydenham and Region Threat Policy Discussion Paper

The Management of runoff that contains chemicals used in the de-icing of aircraft

1. What is the Threat to Drinking Water?

Under Canadian Aviation Regulations, aircraft that have frost, ice or snow on any of its critical structures (e.g. wings) are not permitted to attempt take-off. During weather conditions that would result in frost, ice or snow, aircraft may be sprayed with de-icing and/or anti-icing fluids prior to take-off.

The active ingredients in aircraft de-icing fluids are ethylene glycol, diethylene glycol or propylene glycol. While other formulations have been considered it is noted that glycol continues to be the major chemical used in this application. The toxicity associated with the de-icing chemical can originate from both the glycol formulation as well as the additives mixed into these formulations. This paper provides background information for prescribed drinking water threat 18 – **The management of runoff that contains chemicals used in the de-icing of aircraft.**

The primary consideration for reducing or eliminating drinking water threats related to the management of runoff that contains aircraft de-icing chemicals is to make sure it does not enter surface water and/or groundwater. Due to the seasonality of the requirements to de-ice planes, the release of de-icing materials occurs in the winter months. In some cases runoff is captured and processed in a closed loop system. De-icing fluids applied to aircraft drain on to the apron surface and, if not managed, will drain off the apron and seep into the surrounding ground or enter nearby watercourses. Once in the watercourse, glycols may decrease the oxygen concentration in the water suffocating fish and plant life. Management of runoff could include:

- the use of alternative de-icing products that are less toxic, such as propylene glycol;
- the use of mechanical de-icing technologies with less reliance on fluids; and,
- the collection and disposal or reuse of fluids.

NOTE TO THE READER

This document is one of a series of threat policy discussion papers for the Thames- Sydenham and Region in support of Source Protection Plan development. Each discussion paper looks at the nature of one or more types of drinking water threats, describes the local occurrence of those threats, assesses existing policies/programs, and introduces related 'policy concepts' for source protection planning. ***While every effort has been made to ensure the accuracy of the information in this document, it should not be construed as legal advice or relied on as a substitute for the legislation.***

This version is considered to be a ***working draft*** *because it will be revised as the policy development process progresses. This discussion paper represents the best information available to the SPC upon which they will base their policy decisions.*

Contents

2. What Causes this Activity to be a Drinking Water Threat?

The management of runoff that contains aircraft de-icing chemicals has only been identified as a chemical threat. The Ontario Ministry of the Environment (MOE) Tables of Drinking Water Threats identify dioxane-1,4 and ethylene glycol as contaminants that could make their way into surface and groundwater as a result of runoff containing aircraft de-icing materials being discharged to land or water (circumstances 192 to 199 – Ontario Ministry of the Environment, 2009). Ethylene glycol is a colourless, odourless liquid that completely mixes with water, biodegrades, and does not persist in the environment. It is the chemical of choice for de-icing and anti-icing fluids because of its superior characteristics and the necessity for lower quantities. 1,4-dioxane was previously added to anti-icing fluids as a wetting and dispersing agent. Manufacturers have removed it from their formulations, but it remains as an impurity in some de-icing fluids at trace concentrations. It is highly mobile in groundwater and has not been

shown to readily biodegrade in the environment. Environment Canada and Health Canada have completed a screening assessment of 1,4-dioxane and determined that, at the assessed levels of exposure, it is not harmful to the health of the general population, and the chemical is not entering the environment in a quantity or under conditions that constitute a danger to the environment (Halton-Hamilton Source Protection Committee, 2011).

The classification of this activity as a significant, moderate or low drinking water threat is dependent on the classification of the airport as follows:

- Remote: An airport that serves a community where air transportation is the only reliable method of year round transportation between the community and other population centers;
- Small: An airport that does not have regular scheduled services to other airports and is not a remote airport;
- Regional: An airport with an annual passenger traffic that is less than 200,000 persons and that is not a remote or small airport. The management aircraft de-icing fluid at a regional arirport would be a significant drinking water threat in WHPA-E with a vulnerability score of 10 and IPZ with a vulnerability score of 10; and,
- National: An airport that serves the national capital region or Greater Toronto Area or an airport with annual passenger traffic of 200,000 persons or more. According to the MOE Tables of Drinking Water Threats, the management of aircraft de-icing fluid at a national airport would be a significant drinking water threat in:
    - Well Head Protection Area (WHPA)-A ;
    - WHPA-B with a vulnerability score of 10;
    - WHPA-E with a vulnerability score of 9 or 10; and
    - an Intake Protection Zone (IPZ) with a vulnerability score of 9 or 10.

3. What is the Local Scale of the Drinking Water Threat?

There are three airports located within the Thames-Sydenham and Region SPA. These airports are London International Airport (national airport); Sarnia Chris Hadfield Airport (regional airport); and Stratford Municipal Airport (regional airport). The London airport is located within a highly vulnerable aquifer, while the Sarnia Chris Hadfield Airport is the only airport within the SPA that is located within a vulnerable area (Petrolia IPZ-2) however the vulnerability score is 6.3. As a result of their locations and designations, management of aircraft de-icing is not a significant threat with the Thames-Sydenham and Region.

4. Applicable Legislation, Policies and Programs

The following section provides a summary of the applicable legislation, policies and programs (federal, provincial, municipal and other) that address the management of runoff that contains chemicals used in the de-icing of aircraft.

Table 1: Applicable Legislation, Policies and Programs

Level of Government	Applicable Legislation/Policies/Programs
Federal	Canadian Aviation Regulations
	Canadian Environmental Protection Act 1999 • Glycol Guidelines • Priority Substance List
	Canadian Environmental Assessment Act 1992

Level of Government	Applicable Legislation/Policies/Programs
	Transport Canada • Guidelines for Aircraft Ground Icing Operations
	Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Above Ground and Underground Storage Tanks Systems Containing Petroleum and Allied Petroleum Products (2003)
	Canadian Council of Ministers of the Environment (CCME) Canada Water Quality Guidelines
	Fisheries Act
Provincial	Airports and related activities are regulated under the federal government.
Municipal	Land Use Planning
	Municipal Sewer Use By-Law

a) Federal

Canadian Aviation Regulations

The Canadian Aviation Regulations (CARs) are a compilation of regulatory requirements designed to enhance the safety and competitiveness of the Canadian aviation industry. Under CAR 602.11 "no person shall conduct or attempt to conduct a take-off in an aircraft that has frost, ice or snow adhering to any of its critical surfaces" (Transport Canada, 2011). As a result, airline operators are required to establish an approved ground icing programs.

Canadian Environmental Protection Act 1999

The Canadian Environmental Protection Act, 1999 was developed to prevent pollution and protect the environment and human health (Environment Canada, 2004). A key aspect of this Act is the prevention and management of risks posed by toxic and other harmful substances. Two key pieces identified under this Act, the Glycol Guidelines and the Priority Substance List are further described below.

Glycol Guidelines

Under the Canadian Environmental Protection Act, Glycol Guidelines were developed to monitor the release of ethylene glycol, diethylene glycol and propylene glycol at federal airports. These guidelines are applicable to all airports owned or operated by the federal government and the acceptable level to protect human health and the environment has been established (Transport Canada, 2006). This level is a total glycol discharge limit of 100 mg/L. Yearly reports containing results from monitoring are required after each de-icing season (Transport Canada, 2006).

Priority Substance List

The Priority Substance List under the Canadian Environmental Protection Act assesses the potential environmental and human health risks posed by exposure to chemicals. In 1995 ethylene glycol was added to this list. A report released in 2000 by Environment Canada and Health Canada concluded that harmful environmental effects as a result of ethylene glycol were possible near some Canadian airports but only a very small percentage of time and under maximum loading conditions (Halton-Hamilton Source Protection Committee, 2011).

Canadian Environmental Assessment Act 1992

Environmental assessment is a process that identifies possible environmental effects, proposes measures to mitigate adverse effects and predicts whether there will be significant adverse environmental effects even after mitigation has been implemented (CEAA, 2011). The Canadian Environmental Assessment Act (CEAA) sets out the responsibilities and procedures to carry out environmental assessments. This Act integrates environmental factors into federal planning and decision making that takes into account public values. Under Section 5 of CEAA, an environmental assessment is triggered when a federal department or agency:

- proposes a project;
- provides money or other financial assistance to a project;
- grants an interest in, or transfers control of, land to enable a project to proceed;
- exercises a regulatory duty in relation to the project, such as issuing a licence, permit, or other approval;
- promotes environmental assessment in a manner that is consistent with purposes of the Act; and;
- ensures opportunities are provided for public participation in the environmental assessment process (CEAA, 2011).

In 1994 the Comprehensive Study List Regulations were enabled. These Regulations list projects or classes of projects that must undergo a comprehensive study type of environmental assessment because it has been determined that they will likely have significant adverse environmental effects. Airports are included under Part IX-Transportation of this Regulation. Any concerns regarding the activity of the management of de-icing chemicals and its potential impact on municipal drinking water supplies in vulnerable areas would be addressed through this process (Halton-Hamilton Source Protection Committee, 2011).

Transport Canada

Transport Canada is responsible for transportation policies and programs. It ensures that air, marine, road and rail transportation are safe, secure, efficient and environmentally responsible.

Guidelines for Aircraft Ground Icing

Under the Canadian Aviation Regulations, airport operators, service providers and local airport authorities are to prepare detailed glycol management plans and procedures. Guidance for the preparation of a Glycol Management Plan is found in the Transport Canada TP 14052 - Guidelines for Aircraft Ground Icing Operations. This plan outlines the deicing operation and the methods used to prevent environmental damage from the deicing operation. At a minimum, a glycol management plan addresses the following issues:

- General Information on the companies that will be operating and using the deicing facility;
- Details of the area where the deicing operation will take place;
- Details on the storage and handling of deicing fluids;
- Application Details including operator training;
- How the effluent will be contained;
- How the effluent will be disposed;
- Contingency plans for spills and accidents;
- Safety Issues;
- Deicing fluid inventory control; and

- Reporting details (Transport Canada, 2006).

As another layer of prevention, an emergency response plan, which includes procedures and plans to protect the environment in the event of an emergency (i.e. spills, vehicle accidents, discharge of holding tanks) is to be developed. This can be a separate document or included within the glycol management plan (Transport Canada, 2006).

Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Above Ground and Underground Storage Tanks Systems Containing Petroleum and Allied Petroleum Products (2003)

The Canadian Council of Ministers of the Environment (CCME) environmental code of practice for above ground and underground storage tanks systems containing petroleum and allied petroleum products is a set of technical requirements to protect the environment from existing, new or proposed storage tank systems. This code promotes environmentally sound management of products through the application of uniform performance standards (CCME, 2003). De-icing fluids are to be stored, handled and managed according to requirements set out within this code.

Canadian Council of Ministers of the Environment (CCME) Canada Water Quality Guidelines

The Canadian Council of Ministers of the Environment (CCME) develops national strategies and guidelines that can be used across Canada. One such guideline is the Canadian Water Quality Guideline, which provides science based goals for the protection of the quality of atmospheric, aquatic and terrestrial ecosystems (CCME, 2011). The CCME has prepared guidelines for the three type of glycol that have been identified as components in aircraft de-icers. These guidelines are:

- Ethylene glycol-3 mg/L;
- Diethylene glycol-31 mg/L; and,
- Propylene glycol-74 mg/L (CCME, 2011).

Fisheries Act 1985

The aim of the Fisheries Act is to protect fisheries in Canada by prohibiting activities that could directly or indirectly affect fish species and their habitat. S. 36 (3) of the Fisheries Act states that no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place where the deleterious substance could enter a body of water frequented by fish. The runoff that contains chemicals used in the de-icing of aircraft could be considered a deleterious substance and would be in contravention of this Act.

b) Provincial

Airports and related activities are regulated by the Federal government.

c) Municipal

Land Use Planning

Municipal land use planning is not directly used when determining the site of an airport since airports are federally regulated; however municipal Official Plans and zoning by-laws contain policies and guidelines for development within the vicinity of the airport.

Municipal Sewer Use By-law

Municipal sewer use by-laws can regulate the inputs to the sanitary sewer systems and provide limitations on certain chemicals that would be discharged.

5. Gaps in Existing Legislation, Policies and Programs

The following table provides the gaps that exist in the legislation, policies and programs that are currently associated with the management of runoff that contains chemicals used in the de-icing of aircraft. It is important to note that this is not an exhaustive list.

Table 2: Gaps in Applicable Legislation, Policies and Programs

Level of Government	Applicable Legislation/Policies/Programs	Gaps
Federal	Fisheries Act	• Legislation is reactive
Municipal	Land Use Planning	• Land use planning does not have the ability to regulate the locations of airports since they are federally regulated
	Sewer Use By-laws	• Municipal sewer use by-laws are created by a municipality on a voluntary basis and there is no minimum standard • Sewer use by-laws may vary from municipality to municipality

6. Policy Considerations

- REMINDER: The primary consideration for reducing or eliminating drinking water threats related to the management of runoff that contains aircraft de-icing chemicals is to make sure it does not enter surface water and/or groundwater.
- Airports and related activities are regulated by the Federal government.
- The source protection plan will need to include a high-level policy approach ("a catch-all policy") to address those "would be" drinking water threats that may occur in a given vulnerable area, such as new airports or the reclassification of an existing airport's status due to changes in passenger service.
- Policy development will need to take into consideration applying provincial legislation to a federal entity.
- While airports are regulated federally, it is possible to affect decision-making on airport lands, provided that the functioning of the site is not impeded. Although the federal government has immunity from provincial law, the federal government can waive that immunity by contract/agreement or conduct. Where a municipality has the responsibility for entering into Risk Management Plans, a SPP policy can direct a municipality to negotiate a RMP under the CWA with the airport authority.

7. Proposed policy ideas

Threat: The Management of runoff that contains chemicals used in the de-icing of aircraft

Sub- Threat N/A

Circumstances

- Remote – serves remote areas with year round service
- Small – no regular serve but not remote
- Regional/Local - <200,000 passengers per year
- National - >200,000 passengers per year

Policy Tool	Policy ideas
Education and Outreach	• Provide effective communication to airport authorities to inform operators regarding mandate of Source Water Protection and impact on vulnerable areas
Incentive Programs	• Not Applicable
Land Use Planning	• Not Applicable
Prescribed Instruments	• Not Applicable
S. 57 Prohibition	• Prohibit development of new airports in vulnerable areas where they would be a significant threat
S. 58 Risk Management Plans	• Develop policies to ensure that current tools are up to date, enforced and are effective in managing and mitigating the risk in vulnerable areas including preventing low and moderate threats from becoming significant • Suggest that airport authorities consult with RMO when preparing glycol management plans
S. 59 Restricted Land Use	•
S. 26 Other-Specify Action (Municipal Operations/ Infrastructure)	• Suggest to municipalities to develop policies to manage moderate and low threats • Encourage the monitoring of run-off from airport sites into storm sewers and watercourses • Use sewer use bylaws to regulate chemical discharges • Encourage policies to support BMP's

8. Reference List

Canadian Council of Ministers of the Environment (CCME). 2011. Canada Water Quality Guidelines Website. http://www.ccme.ca/publications/ceqg_rcqe.html

Canadian Council of Ministers of the Environment (CCME). 2003. Environmental Code of Practice for Above Ground and Underground Storage Tanks Systems Containing Petroleum and Allied Petroleum Products. www.ccme.ca/assets/pdf/pn_1326_eng.pdf

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Ontario Ministry of the Environment. 2009. Tables of Drinking Water Threats. 2008, as amended in 2009. www.ene.gov.on.ca/publications/cw/7561e03.pdf

Transport Canada. 2011. Canadian Aviation Regulations. www.tc.gc.ca/eng/civilaviation/regserv/cars/menu.htm

Transport Canada. 2006. TP 14052 - Guidelines for Aircraft Ground - Icing Operations www.tc.gc.ca/eng/civilaviation/publications/tp14052-menu-314.htm

Appendix A – Significant Drinking Water Threat Tables

There are no potential significant threats associated with the management of runoff that contains chemicals used in the de-icing of aircraft in the Thames-Sydenham and Region Source Protection Area.

Appendix B-Policy Examples

Appendix B will be added when the SPC gets to the appropriate stage in the policy discussions. The draft policies presented in appendix B are placeholder policies based on the policy ideas noted above. They are presented in this document to facilitate policy discussion at the upcoming SPC meeting. And subsequent review and comment by the Municipal Source Protection Policy Advisory committee.

Policy Number	18-1
Sub- Threat(s)	N/A
Circumstance	• Regional/Local - <200,000 passengers per year • National - >200,000 passengers per year
Vulnerable Area	• Regional o WHPA-E with a vulnerability score of 10 o IPZ with a vulnerability score of 10 • National o WHPA-A, B with a vulnerability score of 10 o WHPA-E with a vulnerability score of 9 or 10 o IPZ with a vulnerability score of 9 or 10
Risk	Significant, Moderate, Low
Body Responsible for Implementing	Municipal Watershed partnership with Conservation Authority to lead. The implementation of this policy in this manner builds on the strengths and efficiencies of the Conservation Authorities as a partnership of the municipalities in the watershed.
Threat Status	Future
Land Use	All land use that could be associated with the management of runoff that contains chemicals used in the de-icing of aircraft.
Legal Effect	Conform (Significant); Strategic (Moderate/Low)
Policy Tool	Education and Outreach
Policy Idea	Enhance existing education and outreach programs, or if they do not exist, develop new programs to promote Best Management Practices to protect drinking water sources related to the management of runoff that contains chemicals used in the deicing of aircraft including: • Providing effective communication to airport authorities to inform operators regarding the mandate of Source Water Protection and impact on vulnerable areas. • The implementation of this policy through the existing municipal partnership of the Conservation Authority will allow these programs to be built on existing watershed education and outreach in an efficient manner. The municipalities will be encouraged to be involved in the program development and delivery depending on their individual

	needs, however the program(s) should be developed in a consistent manner across the region.
Implementation schedule	Within 2 years of the approval of the Source Protection Plan
Monitoring Policy	The implementing body shall report to the SPA the number of educational packages offered as well as a description of the actions/measures they have taken to implement the education/outreach in the previous year. Measures of tracking of the uptake by the target audience will also be included in this report.

Policy Number	18-2
Sub- Threat(s)	N/A
Circumstance	• Regional/Local - <200,000 passengers per year • National - >200,000 passengers per year

Vulnerable Area	• Regional
	  o WHPA-E with a vulnerability score of 10
	  o IPZ with a vulnerability score of 10
	• National
	  o WHPA-A, B with a vulnerability score of 10
	  o WHPA-E with a vulnerability score of 9 or 10
	  o IPZ with a vulnerability score of 9 or 10

Risk	Significant
Body Responsible for Implementing	Municipality
Threat Status	Future
Land Use	All land use that could be associated with the management of runoff that contains chemicals used in the de-icing of aircraft.
Legal Effect	Conform
Policy Tool	S. 57 Prohibition
Policy Idea	Municipalities shall work with the federal government in order to prohibit the development of new airports in vulnerable areas where the management of runoff that contains chemicals used in the de-icing of aircraft would be a significant threat.
Implementation schedule	The policy takes effect upon the approval date of the first source protection plan.
Monitoring Policy	The municipality shall submit a report to the CA which includes whether they have identified new airports that would be in contravention of this policy.

Policy Number	18-3a
Sub- Threat(s)	N/A
Circumstance	• Regional/Local - <200,000 passengers per year • National - >200,000 passengers per year

Vulnerable Area	• Regional
	  o WHPA-E with a vulnerability score of 10
	  o IPZ with a vulnerability score of 10
	• National
	  o WHPA-A, B with a vulnerability score of 10
	  o WHPA-E with a vulnerability score of 9 or 10
	  o IPZ with a vulnerability score of 9 or 10

Risk	Significant
Body Responsible for Implementing	Municipality
Threat Status	Future
Land Use	All land use that could be associated with the management of runoff that contains chemicals used in the de-icing of aircraft.
Legal Effect	Conform
Policy Tool	S. 58 Risk Management Plans
Policy Idea	Municipalities shall work collaboratively with airport authorities to encourage the development of a risk management plan that ensure that current best management practices (e.g. preparation of glycol management plans) are up to date, enforced and effective in managing and mitigating the risk in vulnerable areas.
Implementation schedule	The policy takes effect upon the approval date of the first source protection plan.
Monitoring Policy	The Risk Management Official shall submit an annual report to the CA which would indicate the type of involvement, if any, in the preparation of glycol management plans.

Policy Number	18-4
Sub- Threat(s)	N/A
Circumstance	• Regional/Local - <200,000 passengers per year • National - >200,000 passengers per year

Vulnerable Area	• Regional
	  o WHPA-E with a vulnerability score of 10
	  o IPZ with a vulnerability score of 10
	• National
	  o WHPA-A, B with a vulnerability score of 10
	  o WHPA-E with a vulnerability score of 9 or 10
	  o IPZ with a vulnerability score of 9 or 10

Risk	Significant
Body Responsible for Implementing	Municipality
Threat Status	Future
Land Use	All land use that could be associated with the management of runoff that contains chemicals used in the de-icing of aircraft.
Legal Effect	Conform
Policy Tool	S. 59 Restricted Land Uses
Policy Idea	All land uses in the zoning by-laws within the Thames-Sydenham and Region Source Protection Area are designated for the purpose of S. 59 Restricted Land Uses under the CWA in all areas where the management of runoff that contains chemicals used in the de-icing of aircraft is or would be a significant threat.
Implementation schedule	The policy takes effect upon the approval date of the first source protection plan.
Monitoring Policy	N/A

Policy Number	18-5a
Sub- Threat(s)	N/A
Circumstance	• Regional/Local - <200,000 passengers per year • National - >200,000 passengers per year
Vulnerable Area	• Regional o WHPA-E with a vulnerability score of 10 o IPZ with a vulnerability score of 10 • National o WHPA-A, B with a vulnerability score of 10 o WHPA-E with a vulnerability score of 9 or 10 o IPZ with a vulnerability score of 9 or 10
Risk	Significant, Moderate, Low
Body Responsible for Implementing	Municipality
Threat Status	Future
Land Use	All land use that could be associated with the management of runoff that contains chemicals used in the de-icing of aircraft.
Legal Effect	Conform
Policy Tool	S.26 p.1 Other-Specify Action
Policy Idea	Municipalities shall consider monitoring where the runoff from airport sites into storm sewers and watercourses is a significant drinking water threat. Municipalities shall consider developing sewer use by-laws to regulate chemical discharges from aircraft de-icing.
Implementation schedule	The policy takes effect upon the approval date of the first source protection plan.
Monitoring Policy	Municipalities shall submit an annual report to the CA that would include whether sewer use by-laws have been created and the number of areas that have been monitored in terms of runoff. Municipalities shall indicate in these monitoring reports the considerations and reasons why this policy was not undertaken.

Policy Number	18-5b
Sub- Threat(s)	N/A
Circumstance	• Regional/Local - <200,000 passengers per year • National - >200,000 passengers per year
Vulnerable Area	• Regional o WHPA-E with a vulnerability score of 10 o IPZ with a vulnerability score of 10 • National o WHPA-A, B with a vulnerability score of 10 o WHPA-E with a vulnerability score of 9 or 10 o IPZ with a vulnerability score of 9 or 10
Risk	Moderate and Low
Body Responsible for Implementing	Airport Authority
Threat Status	Future
Land Use	All land use that could be associated with the management of runoff that contains chemicals used in the de-icing of aircraft.
Legal Effect	Strategic
Policy Tool	S.26 p.1 Other-Specify Action
Policy Idea	Airport authorities are encouraged to develop glycol management plans to manage low and moderate threats with regards to the management of runoff that contains chemicals used in the de-icing of aircraft.
Implementation schedule	The policy takes effect upon the approval date of the first source protection plan.
Monitoring Policy	Airport authorities shall submit an annual report to the CA that would indicate if glycol management had been prepared for airports, where the runoff from deicing chemicals was not a significant threat.

Appendix C-Definitions

Drinking Water Threat: An activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water and includes an activity or condition that is prescribed by the regulation as a drinking water threat (Clean Water Act, 2006[1]).

Groundwater: Water related features in the earth's subsurface including recharge (discharge areas, water tables, aquifers and unsaturated zones) that can be defined by surface and subsurface hydrogeologic investigations (Provincial Policy Statement, 2005).

Intake Protection Zone (IPZ): Refers to a surface water intake protection zone, which is an area related to a surface water intake and within which it is desirable to regulate or monitor drinking water threats (General Regulation 287/07[2]). Intake Protection Zones are further delineated as:

- Intake Protection Zone 1 (IPZ-1), which is the immediate zone of 1 kilometer radius for a Great Lakes intake, drawn around the intake, until it touches the shore where it extends to a certain setback into the land;
- Intake Protection Zone 2 (IPZ-2), is delineated based on a 2 hour travel time to the intake under tributaries and creeks that drain into the lake within a 2 hour time of travel to the intake.

Moderate and Low Drinking Water Threats: Generally refer to prescribed activities deemed moderate or low drinking water threats based on the risk score.

Significant Threat: A significant drinking water threat means a drinking water threat that according to a risk assessment, poses or has the potential to pose a significant risk (Clean Water Act, 2006[1])

Surface Water: Features on the earth's surface including headwaters, rivers, stream channels, inland lakes, seepage areas, recharge/discharge areas, springs, wetlands and associated riparian lands that can be defined by soil moisture, soil type, vegetation or topographic characteristics.

Threat: Refers to an activity (land use) that poses a threat to drinking water quality or quantity.

Vulnerable Area: Significant groundwater recharge area, a highly vulnerable aquifer, a surface water intake protection zone or a wellhead protection area.

Vulnerability Score: A score assigned to a vulnerable area with a higher score indicating a higher vulnerability.

Wellhead Protection Area (WHPA): Refers to an area that is related to a wellhead and within which it is desirable to regulate or monitor drinking water threats (General Regulation 297/07[2]). Wellhead Protection Zones can be further delineated into:

- WHPA-A: 100 m fixed radius around each well;
- WHPA-B: 2 year time of travel to the well, excluding the area of WHPA-A
- WHPA-C: 2 to 5 year time of travel to the well;
- WHPA-D: 5 to 25 year time of travel to the well;
- WHPA-E: delineated if it is shown that a surface water system influence effectively bypass the aquifer's protection; and,
- WHPA-F: delineated if the well is subject to issues, which originate from outside the other parts of the Wellhead Protection Area.

[1]Clean Water Act, 2006 (http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_06c22_e.htm)

[2] Clean Water Act Ontario Regulation 287/07-General (http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_070287_e.htm)