

1. What is the Threat to Drinking Water?

Mining operations relate to the removal of all metallic minerals (ex. gold, silver and copper) and twenty (20) non-metallic minerals (ex. graphite, mica and phosphate rock) from the ground in accordance with the Mining Act. Mining operations do not include aggregate operations (ex. sand, gravel, limestone and granite) that require approval under the Aggregate Resources Act. This paper provides background information for the prescribed drinking water threat 1-the establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act. This drinking water threat relates specifically to the storage of these tailings from mining operations.

Tailings are the waste materials left over after processing ore to extract the mineral of interest. They are typically made up of waste ground rock, spent processing water and reagents. Some tailings are reactive and produce acid after they are deposited. Tailings are transported to the impoundment area as a slurry (water/waste mixture) and excess water is then released to the environment. The most common types of storage facility are pits and surface impoundment structures.

The main consideration for reducing, managing or eliminating drinking water threats related to the storage of tailings is to make sure that any discharge from the storage area does not contain contaminants in a volume or concentration that would threaten the quality of the receiving surface water or groundwater.

2. What causes this activity to be a drinking water threat?

The MOE Tables of Drinking Water Threats (Ontario Ministry of the Environment, 2009) identify a number of elements and chemicals as substances that could make their way into surface water and groundwater as a result of a discharge from a tailings storage area (circumstances 1533 to 1584). Table 1 provides a list of elements and chemicals could threaten the safety of drinking water sources in certain situations. All of these chemicals are by-products of processing ore to extract minerals.

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.

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Table 1: Elements and Chemicals That Could Threaten Safety of Drinking Water

Arsenic	Lead	Total Phosphorus
Silver	Cadmium	Chromium VI
Mercury	Hydrogen Sulfide	Nickel
Zinc	Copper	Nitrogen
Cyanide		

The classification of mine tailings can be considered either a significant, moderate or low drinking water threat and is dependent on its specific location (vulnerability score) as well as whether the mine tailings are stored according to the following circumstances:

- Mine tailing stored in a pit; and,
- Mine tailings stored using a surface impoundment.

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

Mine operations and associated tailings are most common in northern areas of the province. Currently there are no areas where mine tailings have been identified as significant threats in the Thames-Sydenham Source Protection Area. In order for this to become a significant threat in the Thames-Sydenham and Region Source Protection Region, mine tailings would have to be located in an area as follows:

- WHPA with a vulnerability score of 10; and,
- IPZ with a vulnerability score of 9 or greater.

Significant Threat

As a result based on vulnerability scores this would be considered significant in:

- all WHPA-A's
- Melrose - WHPA-B
- Ingersoll - WHPA-B
- Thamesford- WHPA-B
- Woodstock - WHPA-B
- Sebringville - WHPA-B
- St Marys - WHPA-B
- Dorchester - WHPA-B
- London - WHPA-B
- Wallaceburg – IPZ-1

Moderate/Low Threat

Mine tailings are considered a moderate or low drinking water threat in areas where the vulnerability score is between 4.2 and 8.1.

4. Applicable Legislation, Policies and Programs

The following section provides a summary of the applicable legislation, policies and programs (federal, provincial and municipal) that addresses the drinking water threat of storage, treatment and discharge of tailings from mines.

Table 2: Applicable Legislation, Policies and Programs

Level of Government	Applicable Legislation/Policy/Program
Federal	Fisheries Act <ul style="list-style-type: none"> • Metal Mining Effluent Regulations
Provincial	Mining Act
	Ontario Water Resources Act <ul style="list-style-type: none"> • Permit to Take Water • Industrial Sewage Works
	Environmental Protection Act <ul style="list-style-type: none"> • O. Reg. 347-General Waste • Effluent Monitoring Regulations • Effluent Limits Regulations
	Ministry of Northern Development and Mines Practitioner's Guide to Planning for and Permitting a Mineral Development Project in Ontario
	Ontario Environmental Assessment Act
Municipal	Land Use Planning

a) **Federal**

Fisheries Act

Fisheries and Oceans play an important role in ensuring that tailings from metal mines are managed accordingly to the Fisheries Act and the policy principle of no net loss of fish habitat (DFO, 2010). The Fisheries Act protects fish and fish habitat by prohibiting the alteration or destruction of fish habitat. Under Section 36(3) of the Fisheries Act, 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 water body frequented by fish (Government of Canada, 1985). The deposition of any deleterious substance (contaminant) is in contravention of the legislation. In general, the Fisheries Act is enforced by Fisheries and Oceans Canada; however, the section that applies to contamination is under the authority of Environment Canada.

Metal Mining Effluent Regulations (MMER)

The Metal Mining Effluent Regulations (MMER) were enacted in 2002 under S.36 of the Fisheries Act to regulate the deposit of mine tailings and other waste produced during mining operations in waters occupied by fish. The MMER apply to mines that a) exceed effluent flow rates of 50 m³/day based on final discharge and b) deposit a deleterious substance in any water or place that is referenced to under s.36(3) of the Fisheries Act (Government of Canada, 2002). These regulations are enforced by Environment Canada.

b) **Provincial**

Mining Act

The Mining Act regulates the acquisition and maintenance of mineral rights (claim staking, prospecting, mineral exploration and mine development related to mining land tenure), and the safe, environmentally sustainable closure of mining operations. It has limited application in the day-to-day activities of operating mines.

Historically, provincial legislation did not address the closure and rehabilitation of mines. As a result there are more than 5 700 known abandoned mine sites located within Ontario. Approximately 30 to 40 percent of these sites are located on Crown land, while the remainder is located on privately owned or municipal land (MNDMF, 2010). These sites are scattered throughout Ontario and could potentially be hazardous to public health and safety as well as the environment (MNDMF, 2010). A requirement under the Mining Act (Part VII-Rehabilitation of Mining Lands) has been introduced to address the rehabilitation of a mine. A closure plan is required before the proponent starts advanced exploration and must include financial assurance, a plan for site rehabilitation and consider the following four objectives:

1. Protection of public health and safety;
2. Alleviation or elimination of environmental damage;
3. Achieve a productive use of the land, or a return to its original condition or an acceptable alternative; and,
4. To the extent achievable, provide for sustainability of social and economic benefits resulting from mine development and operations (Government of Ontario, 1990a).

Ontario Water Resources Act (OWRA)

The Ontario Water Resources Act (OWRA) focuses on conservation, protection and management of both surface water and groundwater. This Act prohibits the discharge of materials that may impair water quality. Specific sections of the act deal with Permits to Take Water and Industrial Sewage Works, which are associated with the storage, treatment and discharge of mine tailings. Section 34 of the OWRA is a prescribed instrument in the source protection planning process (Government of Ontario, 1990b).

Permit to Take Water

Section 34 of the OWRA requires anyone taking more than a total of 50,000 litres of water in a day (50 cubic metres, 10,000 gallons per day) from a lake, stream, river or groundwater source, to obtain a permit. The trigger for the permit is in respect to the capacity of the water-taking equipment, not the actual amount of water taken or transferred (Government of Ontario, 1990b). Reviews of Permits to Take Water (PTTW) take into account the impact on the environment (i.e. impacts on habitat that depend on waterflow, water levels, interrelationships between groundwater and surface water).

Industrial Sewage Works

An industrial wastewater facility (sewage works, under the OWRA) for a mine or advanced exploration program may include mine wastewater treatment systems, settling ponds, stormwater collection and treatment systems, mill process wastewater treatment and discharge, tailings (processed ore) effluent facilities, spent cooling, water discharge or other wastewater treatment and management systems. A Certificate of Approval under section 53 of the OWRA is required to establish, alter, extend or replace any new or existing industrial sewage works that release or discharge, store or transport any wastewater to a groundwater, surface water or the surface of the ground (Government of Ontario, 1990b). These Certificates of Approval are prescribed instruments in the source protection planning process.

Discharging more the 50,000 litres per day will also trigger the Clean Water Regulations under the Ontario Environmental Protection Act (Government of Ontario, 1990b)

Environmental Protection Act

The Environmental Protection Act (EPA) prohibits the discharge of contaminants into the natural environment. Under the EPA, the term “waste disposal site” is broad, and includes facilities where waste is only temporarily handled, stored or processed as well as sites where waste is permanently deposited (Government of Ontario, 1990c).

Any abnormal discharge of a contaminant into the natural environment is considered a spill and requires immediate notification to the MOE and others under Part X of the Environmental Protection Act. The owner or controller of the pollutant also has the duty to act to restore the natural environment and prevent any adverse effects.

O.Reg. 347 General Waste

Ontario Regulation 347, made under the Environmental Protection Act, specifies the standards for the location, maintenance and operation of waste disposal sites. Activities associated with mine tailings are described under the EPA, however as stated in O. Reg. 347-General Waste, rock fill or mill tailings from a mine are designated wastes in S.2 (1) (5) but in S.3 (1)(6) are specifically exempt from Part V-Waste Management (i.e. certificates of approval) (Lake Erie Source Protection Committee, 2011).

Effluent Monitoring and Effluent Limits Regulations

A mining operation that is a metal mining or industrial minerals facility may also be subject to one of the industrial sector specific effluent monitoring and effluent limits regulations. The monitoring relevant Municipal/Industrial Strategy for Abatement (MISA) regulations that commonly apply to mining projects are:

- Ontario Regulation 561/94 (Effluent Monitoring and Effluent Limits – Industrial Minerals Sector)- The industrial minerals sector regulation only applies to the existing industrial mineral mining and processing facilities specifically named in the regulation. The types of facilities include plants that produce cement, lime, magnesium, graphite talc, gypsum, salt and some other materials.
- Ontario Regulation 560/94 (Effluent Monitoring and Effluent Limits – Metal Mining Sector)-The metal mining sector regulation applies to any existing or future mining operation that meets the definition of a “metal mining plant”. Subsequent reductions of the plant’s total effluent volume to below 50,000 litres per day do not relieve the plant from the regulatory requirements unless the plant permanently closes.

Ministry of Northern Development and Mines Practitioner’s Guide to Planning for and Permitting a Mineral Development Project in Ontario

In conjunction with the federal and municipal governments, the province has developed regulations for the mining sector in order to prevent possible contamination of the natural environment and the infringement on the interests of local communities (SENES, 2008). “A Practitioner’s Guide to Planning for and Permitting a Mineral Development Project in Ontario” provides guidance on permits and approvals associated with the exploration, production and closure of mines. A minimum of 53 permits and approvals under various legislation could be required over the lifetime of a mining project depending on the location, type and size of the project.

Ontario Environmental Assessment Act

The Ontario Environmental Assessment Act (EAA) provides the mechanism to make decisions promoting good environmental planning by assessing the potential effects of certain activities on the natural and human environment. Under the EAA, the risks of mining operations should be addressed. This Act also addresses issues beyond the natural environment.

c) Municipal

Land Use Planning

Many municipalities have policies regarding mining operations in their official plans. In general, these policies identify locations of active and abandoned mines as well as mineral reserves. Policies found within Official Plans and zoning by-laws can provide direction on the preservation of the natural and urban environment as well as the establishment of certain facilities such as mining operations.

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 storage, treatment and discharge of tailings from mines.

Table 3: Existing Gaps in the Legislation, Policies and Programs

Level of Government	Applicable Legislation/Policies/Programs	Gaps
Federal	Fisheries Act	<ul style="list-style-type: none"> • This legislation is reactionary
Provincial	Mining Act	<ul style="list-style-type: none"> • This legislation does not include setback distances from drinking water sources
	Environmental Protection Act	<ul style="list-style-type: none"> • Many waste disposal sites in general are exempted from the C of A process under S.39 of the EPA; inconsistencies in the regulation due to the many exemptions • Mine tailings identified as a designated waste in O. Reg. 347/07 but are exempt from waste management (i.e. C of A)
	Environmental Assessment Act	<ul style="list-style-type: none"> • Should be reviewed and enhanced to address risks associated with mining operations
General		<ul style="list-style-type: none"> • Threats listed in the MOE drinking water threats table do not take into consideration other types of mining operations that can be environmentally damaging (i.e. drill hole water from advanced exploration, storage of waste rock) • Specific information needs to be provided to the regulators of various legislative instruments (both prescribed and non-prescribed) to alert them of drinking water sources and vulnerable areas

6. *Policy Considerations*

- The number and scope of the approvals required for a mining operation, and the classification of the activity in HVAs and SGRAs as a low threat, suggest that there are limited opportunities for improvement through the source protection plan.
- Clean Water Act Part IV tools interim risk management plans, risk management plans, prohibition, and restricted land uses cannot be used for waste disposal sites, which include the storage of tailings from a mining operation.

- In certain instances the “would be” drinking water threats are unlikely to occur. However, the source protection plan will still need to address those situations through a high-level policy approach (“a catch-all policy”).

7. Proposed Policy Ideas

For discussion purposes, this section of the report provides examples of policy ideas that could be applicable to the subject threat in the Thames-Sydenham and Region. It is not an exhaustive list. Each policy tool is discussed separately in the table below.

Threat:	The Establishment, operation or maintenance of a waste disposal site
Sub- Threat	The storage of tailings from a mine operation
Circumstances	<ul style="list-style-type: none"> • Mine tailing stored in a pit • Mine tailings stored using a surface impoundment

Policy Tool	Policy ideas
Education and Outreach	<ul style="list-style-type: none"> • Consider programs to decommission abandoned mines and any associated tailing storage • Educate land owners about protecting groundwater quality in mine areas resulting from mines as transport pathways
Incentive Programs	<ul style="list-style-type: none"> •
Land Use Planning	<ul style="list-style-type: none"> • Prohibit the storage of mine tailings through zoning by-laws in vulnerable areas where it may result in a significant threat
Prescribed Instruments	<ul style="list-style-type: none"> • Require\encourage MOE to recognize vulnerable areas when reviewing applications for mine sites • Develop policies which use prescribed instruments to manage threats • Require notification to RMO for spills relating to mine activities through existing MOE requirements
S. 57 Prohibition	<ul style="list-style-type: none"> • Not Applicable
S. 58 Risk Management Plans	<ul style="list-style-type: none"> • Not Applicable
S.59 Restricted Land Use	<ul style="list-style-type: none"> • Not Applicable
S. 26 p.1 Other-Specify Action (Municipal Operations/Infrastructure)	<ul style="list-style-type: none"> • Encourage mining operations to share spills response plans, site sampling and monitoring • Include\notify RMO of any plans for new or changes in existing mine operations in vulnerable areas • Encourage use of containment structures, subsurface barriers and leak detection methods

8. Reference List

- Fisheries and Oceans Canada (DFO). 2010. Metal Mining Effluent Regulations. www.dfo-mpo.gc.ca/habitat/role/141/1415/14156-eng.htm
- Government of Canada. 1985. Fisheries Act.
- Government of Canada 2002. Fisheries Act. Metal Mining Effluent Regulation. <http://laws.justice.gc.ca/en/showtdm/cr/SOR-2002-222>
- Government of Ontario. 1990a. Mining Act. www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90m14_e.htm
- Government of Ontario, 1990b. Ontario Water Resources Act. http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o40_e.htm
- Government of Ontario. 1990c. Environmental Protection Act. www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90e19_e.htm
- Lake Erie Source Protection Committee. 2011. Drinking Water Threat: The Establishment, Operation or Maintenance of a Waste Disposal Site within the Meaning of Part V of the Environmental Protection Act Discussion Paper. http://www.sourcewater.ca/plandev/Waste_DiscussionPaper_Final.pdf
- Ministry of Northern Development, Mines and Forestry (MNDMF). 2010. Abandoned Mines/Mine Hazards. http://www.mndmf.gov.on.ca/mines/mg/abanmin/default_e.asp
- SENES Consultants. 2008. Practitioners Guide to Planning for and Permitting a Mineral Development Project in Ontario. www.mndm.gov.on.ca/mines/mg/mindev/practitionersguide.pdf

Appendix A – Significant Threat Tables

There are no potential significant threats associated with operation of a waste disposal site with regards to the storage, treatment and discharge of tailings from mines in the Thames Sydenham and Region Source Protection Region.

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	1B-1
Sub- Threat(s)	Storage, treatment and discharge of tailings from mines
Circumstance	<ul style="list-style-type: none"> • Mine tailing stored in a pit • Mine tailings stored using a surface impoundment
Vulnerable Area	<ul style="list-style-type: none"> • WHPA-A, B with vulnerability of 10 • IPZ with vulnerability score of 9 or greater
Risk	Significant, Moderate and 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	Existing and Future
Land Use	All land use which could be associated with the storage, treatment and discharge of tailings from mines.
Legal Effect	Conform (Significant), Strategic (Moderate and Low)
Policy Tool	Education and Outreach
Policy	<p>Develop new or where possible expand on existing education and outreach programs to complement incentive and regulatory approaches as well as promote Best Management Practices to protect drinking water sources from the risks associated with the storage, treatment and discharge of tailings from mines including:</p> <ul style="list-style-type: none"> • Area-wide education programs focused on protecting groundwater quality targeted to landowners within mine areas since abandoned mines can be a direct pathway to groundwater. • Area-wide education programs focused on abandoned mines and associated tailings storage targeted to private landowners. This program may involve working with the Ministry of Northern Development and Mines to properly decommission these 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 can be involved in the program development and delivery depending on their individual needs; however the program(s) would be developed in a consistent manner across the region.

Appendix B – Policy Examples

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 tracking the uptake by the target audience will also be included in this report.

Policy Number	1B-2
Sub- Threat(s)	Storage, treatment and discharge of tailings from mines
Circumstance	<ul style="list-style-type: none"> • Mine tailing stored in a pit • Mine tailings stored using a surface impoundment
Vulnerable Area	<ul style="list-style-type: none"> • WHPA-A, B with vulnerability of 10 • IPZ with vulnerability score of 9 or greater
Risk	Significant
Body Responsible for Implementing	Municipality
Threat Status	Future
Land Use	All land use which could be associated with the storage, treatment and discharge of tailings from mines.
Legal Effect	Conform
Policy Tool	Land Use Planning
Policy	Municipalities through land use planning (zoning by-laws) shall prohibit the storage of mine tailings in vulnerable areas where it may be a significant threat.
Implementation schedule	From the date of the Source Protection Plan approval, all planning decisions shall be in conformity. Updates shall be initiated in all Official Plans within 6 months of the Source Protection Plan approval with the goal to be completed within 2 years of the SPP approval date. Zoning by-laws shall be updated with the goal to be completed within 3 years of the SPP approval date.
Monitoring Policy	Municipalities shall report to the CA on new policies incorporated in Official Plans and any new by-laws relevant to source water protection. All municipalities must report even if it is to indicate that no changes were required. Where no changes were required, the report is to describe how the existing OP and bylaws meet the requirements of this policy.

Policy Number	1B-3
Sub- Threat(s)	Storage, treatment and discharge of tailings from mines
Circumstance	<ul style="list-style-type: none"> • Mine tailing stored in a pit • Mine tailings stored using a surface impoundment
Vulnerable Area	<ul style="list-style-type: none"> • WHPA-A, B with vulnerability of 10 • IPZ with vulnerability score of 9 or greater
Risk	Significant
Body Responsible for Implementing	MOE
Threat Status	Existing and Future
Land Use	All land use which could be associated with the storage, treatment and discharge of tailings from mines.
Legal Effect	Conform
Policy Tool	Prescribed Instruments-Environmental Protection Act
Policy	When amending or issuing new Certificates of Approval or for mine operations, MOE shall be required to take into consideration the location of vulnerable areas and the effects of the mining operations on these areas.
Implementation schedule	<p>For existing C of As, this policy would be effective within 1 year of the effective date of the SPP.</p> <p>For new C of As, this policy shall be implemented immediately once the SPP has come into effect.</p>
Monitoring Policy	MOE shall report to the CA the number of Certificate of Approval applications that they have reviewed and the number that have incorporated vulnerable areas considerations.

Policy Number	1B-4a
Sub- Threat(s)	Storage, treatment and discharge of tailings from mines
Circumstance	<ul style="list-style-type: none"> • Mine tailing stored in a pit • Mine tailings stored using a surface impoundment
Vulnerable Area	<ul style="list-style-type: none"> • WHPA-A, B with vulnerability of 10 • IPZ with vulnerability score of 9 or greater
Risk	Significant
Body Responsible for Implementing	Municipality
Threat Status	Existing and Future
Land Use	All land use which could be associated with the storage, treatment and discharge of tailings from mines.
Legal Effect	Conform
Policy Tool	S.26 p.1 Other-Specify Action
Policy	<p>Municipalities shall encourage mining operations to share spills response plans, site sampling and monitoring activities.</p> <p>Municipalities shall notify the RMO of any plans for new or changes in existing mine operations in vulnerable areas.</p> <p>Municipalities shall encourage the use of containment structures, subsurface barriers and leak detection methods.</p>
Implementation schedule	Within 1 year of the date when the Source Protection Plan comes into effect.
Monitoring Policy	<p>The municipality shall submit a report to the CA that would include:</p> <ul style="list-style-type: none"> • The number of applications for new mining operations within vulnerable areas • The number of applications for changes to mine operations within vulnerable areas • The number of notifications that have been received by the RMO • The number of mining operations that have shared their spill response plans and other activities (i.e. site sampling, monitoring) with the municipality • The number of mining operations within vulnerable areas that are using current BMP

Policy Number	1B-4b
Sub- Threat(s)	Storage, treatment and discharge of tailings from mines
Circumstance	<ul style="list-style-type: none"> • Mine tailing stored in a pit • Mine tailings stored using a surface impoundment
Vulnerable Area	<ul style="list-style-type: none"> • WHPA-A, B with vulnerability of 10 • IPZ with vulnerability score of 9 or greater
Risk	Significant
Body Responsible for Implementing	MOE
Threat Status	Existing and Future
Land Use	All land use which could be associated with the storage, treatment and discharge of tailings from mines.
Legal Effect	Strategic
Policy Tool	S.26 p.1 Other-Specify Action
Policy	Through existing protocols of the Spills Action Centre, MOE shall be encouraged to notify the RMO for spills related to mine activities that occur in vulnerable areas.
Implementation schedule	Within 1 year of the date when the Source Protection Plan comes into effect.
Monitoring Policy	MOE shall submit a report to the CA which would detail the number of times they notified the RMO when a spill occurred that was related to mining activities in a vulnerable area.

Appendix C-Definitions

Closure Plan: Based on definitions from the Ontario Mining Act, a closure plan means a plan to rehabilitate a site or mine hazard that has been prepared in the prescribed manner and filed in accordance with this Act and that includes provision in the prescribed manner of financial assurance to the Crown for the performance of the closure plan requirements.

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, 2006₁).

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 287/07₂). 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.

Mine: Based on definitions from the Ontario Mining Act, a mine refers to:

- (a) any opening or excavation in, or working of, the ground for the purpose of winning any mineral or mineral bearing substance,
- (b) all ways, works, machinery, plant, buildings and premises below or above the ground relating to or used in connection with the activity referred to in clause (a),
- (c) any roasting or smelting furnace, concentrator, mill, work or place used for or in connection with washing, crushing, grinding, sifting, reducing, leaching, roasting, smelting, refining or treating any mineral or mineral bearing substance, or conducting research on them,
- (d) tailings, wasterock, stockpiles of ore or other material, or any other prescribed substances, or the lands related to any of them, and
- (e) mines that have been temporarily suspended, rendered inactive, closed out or abandoned,

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, 2006₁)

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.

Appendix C – Definitions

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 297/07₂). 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.

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

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