Explanatory Document

This document contains the Explanatory Documents in support of the Source Protection Plan for the following Source Protection Areas:
Halton Region
Hamilton Region

Prepared on behalf of the
Halton-Hamilton Source Protection Committee
~~October 12~~ December 7, 2021

Explanatory Documents
to Support the

Source Protection Plans
for the
Halton Region Source Protection Area
and the
Hamilton Region Source Protection Area
Version ~~2.5~~3.1
~~October 12, 2017~~December 7, 2021

Prepared by: Ruth Victor and Associates and Halton-Hamilton Source Protection Region staff

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Additional copies of this Explanatory Document (combined into one document for both Source Protection Areas), the Source Protection Plan (combined into one document for both Source Protection Areas), and the Assessment Reports may be obtained by contacting:

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Please contact us if you require this document in another format.

For more information about the Clean Water Act, 2006 and how you can play a role in protecting drinking water sources in the Halton-Hamilton Source Protection Region, please visit our website: www.protectingwater.ca

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Halton-Hamilton Source Protection Committee 1
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The City of Guelph and Guelph/Eramosa Township, in the Lake Erie Source Protection Region, is completing a Tier 3 water budget and water quantity risk assessment for their wells. Results indicate that the water quantity wellhead protection areas extend into the Halton Region and the Hamilton Region Source Protection Areas. A process to assess threats to water quantity of the municipal system and write policies to ensure sustainability of the wells is underway. The results of their study will be included in amendments to the Assessment Reports and policies to protect the quantity of this water source will be added to the Plan, if warranted. 13
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1. INTRODUCTION

1.1 Background

In May 2000, seven people died and over 2,300 became ill in Walkerton, Ontario as a result of drinking contaminated water from the municipal water supply. This tragedy sparked a major government inquiry headed by Justice Dennis O'Connor. The inquiry highlighted the need to protect the health of Ontario's residents by protecting the province's drinking water.

The Ontario government subsequently passed new legislation to safeguard the province's drinking water supplies. The Clean Water Act, 2006 is one part of this legislation. The Act requires communities to develop collaborative, locally driven, science-based protection plans for their existing and future drinking water sources. You can read more about the Clean Water Act, 2006 and how you can play a role in protecting drinking water sources in your region on our website: www.protectingwater.ca.

The first stage in the development of these source protection plans was to ~~divide the province into~~establish 19 Source Protection Regions or Areas across Ontario. Each Region/Area then conducted a thorough assessment of the water resources within its boundaries. The resulting Assessment Reports identify stresses on water quantity, if any, that required further study. They also describe threats to water quality due to ongoing, potential, or past activities in each region.

The next stage in the process was a period of research, discussion, and consultation on the part of the Source Protection Committees. The final outcome of these consultations has been the development of specific policies that, in the opinion of the Source Protection Committee, address the existing and potential threats identified in the local Assessment Reports. These policies are included in the Source Protection Plan for the Halton Region and Hamilton Region Source Protection Areas. Because the Plans for the two Areas were very similar and to increase consistency and ease of implementation, they have been combined into one document (the Plan) for application across the entire Source Protection Region.

This document, which includes the Explanatory Documents for the Halton Region and the Hamilton Region Source Protection Areas, explains in detail the rationale for the policies in the Plan. It includes a detailed record of all information the Source Protection Committee considered and the entire process of consultation. As living documents, the Assessment Reports, the Source Protection Plan, and the Explanatory Document will be updated whenever new information becomes available.

Together, the Assessment Reports, the Source Protection Plan, and the Explanatory Document serve as a blueprint for drinking water source protection in the Halton-Hamilton Source Protection Region.
The Assessment Reports, Source Protection Plan and Explanatory Document are available on our website: www.protectingwater.ca.

All reports were prepared under the direction of the Halton-Hamilton Source Protection Committee. As part of the approval of the Source Protection Plan by the Minister of the Environment and Climate Change in 2015, an order was issued setting out the date of the periodic review and updating of the Assessment Reports and Source Protection Plan. As a result, a comprehensive work plan was submitted

to the province in 2018, per Section 36 of the Act. Upon a review of the workplan, in March 2019 the Minister amended the Order to provide direction on the updates to be made for the Assessment Reports and Source Protection Plan. This Explanatory Document is also updated to reflect updates made to the Source Protection Plan.

1.2 The Source Protection Areas

The Halton Region and the Hamilton Region Source Protection Areas are generally equivalent to the watersheds managed by Halton Region Conservation Authority (Conservation Halton) and Hamilton Region Conservation Authority (Hamilton Conservation Authority), respectively. However, minor adjustments to watershed boundaries were made to reflect the drainage within those watersheds. The two Source Protection Areas were joined to form the Halton-Hamilton Source Protection Region (see Figure 1).

Unless otherwise noted, when we refer to the "Source Protection Region" or "Region" in this document, we are referring to the Halton-Hamilton Source Protection Region. "Halton Area" or "Hamilton Area" refers to the two Source Protection Areas.

1.2.1 Halton Region Source Protection Area

The Halton Region Source Protection Area includes about 970 square kilometres on the north shore at the western end of Lake Ontario. It stretches from the City of Mississauga in the east to the City of Hamilton in the west, and north to the Township of Puslinch and the Town of Halton Hills. In addition, because it juts 50 kilometres into Lake Ontario to the international border, the Area includes approximately 590 square kilometres of Great Lakes water (see Figure 1).

The Halton Area is partially served by Lake Ontario and well-based drinking water systems operated by Halton Region and the City of Hamilton. Assessments of threats to the sources of water that supply these systems were completed and based on the assessment criteria, well-based systems could be affected by threats classed at a significant risk level. Wellhead protection areas were delineated and threats assessed for the municipal wells located in Freelton, Carlisle, Campbellville, and Milton (Kelso and Walkers Line).

The neighbouring Central Lake Ontario, Toronto and Region, Credit Valley (CTC) Source Protection Region completed assessments for the Cedarvale well field in Georgetown. The wellhead protection area for this well field extends into the Halton Area. A rising trend of chloride concentrations was identified in wells # 1A, 4 and 4A as a water quality issue, and an issue contributing area was mapped.
For lake-based systems —Burlington, Burloak and Oakville — modelling of spill events was completed to demonstrate significant risk.

1.2.2 Hamilton Region Source Protection Area

The Hamilton Region Source Protection Area includes about 447 square kilometres of land at the western end of Lake Ontario. It is a long, thin Area, about 52 kilometres in length and generally about 11 kilometres wide. The Source Protection Area stretches from the Township of Puslinch in the northwest to the Town of Grimsby in the east and is primarily within the City of Hamilton. In addition, because it juts up to 11 kilometres into Lake Ontario to the international border, the Area includes approximately 130 square kilometres of Great Lakes water (see Figure 1).

The Hamilton Area is partially served by Lake Ontario and well-based drinking water systems operated by the City of Hamilton. Assessments of threats to the sources of water that supply these systems were completed. Based on the assessment criteria, the Greensville well-based municipal system could be affected by threats classed at a significant risk level. For the Woodward, lake-based system, modelling of spill events was completed to demonstrate significant risk.

Insert Figure 1 – HH SPR

1.2.3 Significant Threats

Ontario Regulation 287/07, section 1.1 (1), lists ~~21~~ 22 activities prescribed to be drinking water threats. Of these, two are water quantity threats and ~~19~~ 20 are water quality threats. Based on the prescribed circumstances for significance, one of the prescribed water quality threats can never be a significant risk to drinking water sources in the Region. The Assessment Reports outline the process followed to identify vulnerable areas within the Source Protection Areas where significant threats to drinking water sources exist or would exist if the activity were occurring.

Water quantity threats are assessed when local area stress assessments indicate a municipal well-based supply is stressed due to demand. The Kelso, Campbellville and Greensville municipal well water sources have been found to be moderately or significantly stressed and required further study at the local level. The more focused studies indicated no significant threats to water quantity exist for the Kelso, Campbellville and Greensville well fields.

The Clean Water Act also provided for inclusion of threats identified locally. In the first round of source protection planning, t~~T~~he Halton-Hamilton Source Protection Committee identified the conveyance of oil in pipelines that cross open bodies of water as a threat to surface water sources of drinking water. Modelling, as summarized in the Assessment Reports, was used to demonstrate significance of this threat for existing pipelines. In 2018, the Ontario Regulation 287/07 was amended to add the "establishment and operation of a liquid hydrocarbon pipeline" to the list of prescribed drinking water threat activities. This change is reflected in the Assessment Reports through an updated water quality threats risk assessment and in the Source Protection Plan through updated policies. The modelled existing significant threats are retained.

The vulnerable areas where significant threats could occur and policies will apply have been mapped. Appendix B includes maps for all the areas within the Halton-Hamilton Source Protection Area where policies to address significant threats to municipal wells and intakes could occur, and includes maps of vulnerable areas where low, moderate and significant threats to groundwater could occur because of the application of road salt.

1.3 Scope of the Explanatory Document

The Explanatory Document summarizes all information considered by the Source Protection Committee as the rationale for the policies developed. The Document includes background information on each topic, provides a description of each prescribed threat or concern, includes maps showing where each threat would be significant, and where the application of road salt would be a low, moderate or significant threat and discusses each chosen policy.

The combined Explanatory Document was produced to support the policies included in the combined Source Protection Plan document for the two Areas. It provides the rationale of the Source Protection Committee for development of the policies included in the Plan.

During the first round of source protection planning when source protection plan policies were first developed, ~~A summary of information considered by the Planners' Working Group and the Source~~

~~Protection Committee is provided, answering questions as to why the policies are needed and how the policies were developed. The~~ a Planners' Working Group was established to assist source protection staff and advise the Source Protection Committee on practical, implementable and cost effective policies to address drinking water threats. Planners from municipalities and conservation authorities within the Halton-Hamilton Source Protection Region were chaired by a planning consultant and informed by advisors from the Source Protection Committee and knowledgeable persons from agencies, groups, and municipalities that attended meetings to speak on and discuss threat topics. A summary of information considered by the Planners' Working Group and the Source Protection Committee is provided, answering questions as to why the policies are needed and how the policies were developed.

A second round of source protection planning was initiated primarily due to subsequent changes to the technical framework under the Clean Water Act in 2017-2018, and also by a detailed workplan submitted by the Source Protection Region and Committee to update the Assessment Reports and Source Protection Plan. An amended Order was then issued in 2019 by the Minister, Ministry of the Environment and Climate Change (MOECC). The Minister's amended Order confirmed the comprehensive updates to be carried out. Updates are made accordingly to this document in 2021. Note that MOECC is now called the Ministry of the Environment, Conservation and Parks (MECP).In this document, the two names are used interchangeably and to the best of our ability based on the time period during which the ministry was called one or the other.

The ~~20~~ prescribed drinking water threats that can be significant in the Halton-Hamilton Source Protection Region are discussed in detail in Section 3 of this report, especially as they relate to mapped vulnerable areas where they are or would be significant threats within the Source Protection Areas. ~~The one local threat is also discussed in relation to how it was identified and its potential effect on the Region.~~ The section is organized into ~~14~~ the possible causes of drinking water contamination and ~~2 possible causes of~~ water quantity impacts. Each topic includes:

- background information
- a description of the activities that are designated prescribed threats
- identification of areas within the Source Protection Areas where significant threats exist or are possible and where low and moderate threats for the application of road salt are possible
- a summary of the policy options considered by the Source Protection Committee and Planners' Working Group
- an explanation of the policy directives arrived at during those discussions
- any additional direction provided by the Source Protection Committee in finalizing the policies

For example, Section 3.3, "Agricultural Source Material," provides background research and information related to two activities that are prescribed threats - its application to land and its storage and handling.

In addition to the mandatory policies developed to address the significant threats mentioned above, the Source Protection Committee has also developed a few policies for the application of road salt that apply in areas of low and moderate threat, and optional policies. The optional policies are outlined in Section 4 under the categories of transport pathways; climate data; disposal or use of ~~imported excess~~ fill/excess

soil including contaminated soil; spills prevention, contingency and emergency response plans; and Lake Ontario outreach.

2. POLICY DEVELOPMENT

2.1 Objectives of the Source Protection Plan

The background research, discussions on policies, and the consultations with stakeholders summarized in this document support the policies developed to meet the objectives of the Source Protection Plan with a focus on municipal drinking water sources. Ontario Regulation 287/07, section 22 (1) lists the following two objectives for all Plans developed in Ontario:

- To protect existing and future drinking water sources in the Source Protection Area.
- To ensure that, for every area identified in an Assessment Report as an area where an activity is or would be a significant drinking water threat,
- the activity never becomes a significant drinking water threat, or
- if the activity is occurring when the Source Protection Plan takes effect, the activity ceases to be a significant drinking water threat.

2.2 The Source Protection Planning Process

Under the Clean Water Act, 2006, the Halton-Hamilton Source Protection Committee was required to develop policies for every area identified in the Assessment Reports where an activity is or would be a significant drinking water threat. The Committee had the option of developing polices for threats of moderate or low risk and chose to extend the application of road salt policies to these risk levels. The Committee acknowledged the need for additional policies that will benefit drinking water source protection through actions taken and have included these under the header of "other" policies. You can read more about the Source Protection Committee on our website www.protectingwater.ca and in the Assessment Reports.

The policies evaluated and discussed within this Explanatory Document are the result of a comprehensive consultation and review process carried out by the Halton-Hamilton Source Protection Committee between fall 2010, ~~and~~ November 2014, ~~and again in~~ fall 2017, and in 2021.

Landowners and other stakeholders were consulted with on policy development. Initially, a notice that the Halton-Hamilton Source Protection Committee was beginning to prepare source protection plans under the Clean Water Act was sent out in mid-June 2011 to all landowners within the vulnerable areas where significant threats are possible, municipal clerks and conservation authorities. The letters included an overview of source protection planning, listed the identified significant threat activities occurring on each property, if any, and invited the landowners to contact source protection staff to discuss the program, the municipal well supplies, and the significant threat activities identified. Additional letters were sent to the appropriate landowners in 2014 when the wellhead protection areas for the Kelso and Campbellville well fields changed and in 2017 when the wellhead protection area for the Greensville well field changed. Placeholder for after public consultation: letters to be sent to relevant landowners in the updated Freelton wellhead protection areas in 2021.

A working group comprised of municipal and conservation authority planners was established to provide advice to the Source Protection Committee on practical and implementable water quality policy

approaches. The Planners' Working Group provided advice to the Source Protection Committee on practical, implementable, and cost effective policy directives that could address the water quality threats to drinking water sources identified in the Region. The Source Protection Committee discussed and amended the policy directives on June 14, 2011 and directed staff to develop policies based on these directives. Draft groundwater significant threat policies and a few other policies deemed necessary to achieve the Plan's objectives were discussed and amended by the Source Protection Committee on August 23, 2011 and endorsed for pre-consultation with those parties designated as implementers of the policies. The Committee continued to discuss and amend these policies throughout the autumn. The members of the Planners' Working Group requested a four-month consultation period to provide sufficient time to inform their councils. The planning representatives received the Committee endorsed draft policies on August 28, 2011 and pre-consultation with municipalities continued until early January 2012. Meetings were held with municipal staff in mid-September 2011 to assist those tasked with reviewing the draft policies to understand source protection planning.

The Committee discussed policies developed to address threats to Lake Ontario-based municipal source water from activities modelled that demonstrated significant risk. These policies were endorsed for pre-consultation on November 8, 2011 and consultation continued until early January 2012.

The formal pre-consultation period with all implementing bodies began in early October and continued until early January, 2012. The relevant policies were sent to the municipalities, agencies, and stakeholders responsible for their implementation to provide the parties an opportunity to evaluate the practicality of the policies and the ability of the parties to implement the policies as written. The parties consulted with as part of this process include: all local municipalities; the Ministries of the Environment, Natural Resources, Consumer Services, Agriculture Food and Rural Affairs, Transportation, and Municipal Affairs and Housing; Conservation Halton and Hamilton Conservation Authority; Niagara Escarpment Commission; Environment Canada; Transport Canada; National Energy Board, Ontario Energy Board and Technical Standards and Safety Authority; Hamilton Port Authority; de-icing contractors; Suncor Energy Inc.; Trans Northern Pipeline Inc.; and neighbouring Source Protection Authorities.

On January 24, 2012, the Source Protection Committee re-evaluated policies based on the comments received and endorsed the draft policies for public consultation purposes. The comments received are discussed where appropriate in Sections 3 and 4 of this document.

The policies were incorporated into the Draft Proposed Source Protection Plan document, which was endorsed by the Committee for public consultation on February 21, 2012. To provide Halton Region more time for Plan review, the Committee agreed to extend the public consultation period to 60 days and to hold the public meetings near the end of the consultation period. Consultation was held between February 27 and April 26 with four public meetings, two in each Source Protection Area, held between April 16 and 19, 2012. Notification letters and e-mails were sent to landowners, municipal clerks, conservation authorities, the Planners' Working Group, other interested parties, neighbouring source protection areas, implementing bodies, and operators of facilities with significant threat activities. A media release and newspaper advertisements were also distributed to local newspapers in March and April.

All comments received during the public consultation period on the Draft Proposed Source Protection Plan, which occurred between February 27 and April 26, 2012, were considered by the Source Protection Committee before the Proposed Plan was finalized. The Proposed Plan was endorsed and released to the Source Protection Authority for public consultation between June 8 and July 19, 2012. All comments received during this consultation period were sent with the Proposed Plan to the Minister of the Environment in August 2012.

Following a thorough review of the Plan by the Ministry of the Environment and Climate Change (now called the Ministry of the Environment, Conservation and Parks), the Source Protection Authority and Source Protection Committee received recommendations for consideration to improve the clarity, accuracy and usefulness of the Plan to the reader. The Source Protection Committee met in December 2013, January and February 2014 to discuss the recommendations and to revise the Plan accordingly.

The Planners' Working Group was updated on the recommendations received on January 14, 2014.
The revised documents included provision for the Cedarvale vulnerable areas that extend into the Halton Region Source Protection Area. As such, a public consultation period was held for 30 days in March and April, 2014 and a public meeting in Georgetown held. During this public consultation period, the Ministry of the Environment and Climate Change informed the Source Protection Authority that their request for additional funds to complete the redelineation of the Kelso and Campbellville wellhead protection areas using the fully integrated flow model developed for the Tier 3 water budget and water quantity risk assessment was granted. The threat activities in the new geographic area were also assessed.

This work was completed and is incorporated into the Assessment Report for the Halton Region Source Protection Area. The findings of the Tier 3 water budget and water quantity risk assessment are also included, as are policies in the Plan to address future water quantity threat activities.
The updated documents, including this Explanatory Document, were released for a 60-day public consultation period in December 2014 and January 2015. Following consideration of comments received and finalization of the documents, they were submitted to the Source Protection Authorities, who endorsed their submission to the Ministry of the Environment and Climate Change for review and approval.

Following resubmission of the Plan to the Ministry of the Environment and Climate Change, the Source Protection Committee met on June 18, 2015 to discuss changes to a policy as requested by Halton Region and changes to the Assessment Reports as requested by the Ministry. A follow-up e-mail survey responded to a change the CTC Source Protection Committee made to the Cedarvale Issue Contributing Area that affected the Halton-Hamilton policies. This change was the removal of septic systems as significant threats within the Issue Contributing Area for chloride. The Plan and Assessment Reports were approved for finalization and resubmission to the Ministry for review and approval on July 24, 2015.

Following approval of the Plan on August 5, 2015, the Plan took effect on December 31, 2015. At that time, the technical studies for the Greensville well field were incomplete. As these studies are now complete, the Plan, Assessment Report for the Hamilton Region Source Protection Area and this

document were updated in 2017 to include the findings of the Greensville water quality and quantity studies.

As mentioned earlier, a second round of source protection planning was initiated primarily due to subsequent changes to the technical framework under the Clean Water Act in 2017-2018, and also by a detailed workplan submitted by the Source Protection Region and Committee in 2018 to MECP, to update the Assessment Reports and Source Protection Plan. The workplan for the Halton and Hamilton source protection areas was approved by MECP in March 2019. The Section 36 workplan is available at the website: https://bit.ly/3k6pyu0 An amended Order was then issued by the Minister, MECP, that confirmed the comprehensive updates to be carried out. It includes tasks to review both science and policies, to support the continued protection of drinking water sources.

During the development of the Section 36 workplan in 2017-2018, users of the Source Protection Plan requested amendments to provide clarity, make the plan more easily understood, and to address implementation challenges.

Amendments made in 2020-2021 provided clarity on vulnerable area geographic references and the legal effect of each policy. Formatting was required to ensure compliance with the Accessibility for Ontarians with Disabilities Act, 2005 (AODA). HHSPR staff reviewed policy formats in the plans of the Lake Erie Region, CTC Region, and Niagara Peninsula Area. In early February 2021, a format was presented to municipal staff for their input. There was mutual consensus on the content. It was noted that the plan should state that the “policy” portion is the legal policy text, while other details are added to provide clarity and to make the plan more easily understood for readers. Further some of the policies contain both legally binding and non-binding parts. Staff recommended that these policies be separated out based on the legal effect and where possible, threat level addressed (i.e. significant separate from moderate and low), to ensure clarity for policy implementers and streamline the annual progress reporting process. The addition of the “establishment and operation of a liquid hydrocarbon pipeline” to the list of prescribed threats in 2018, resulted in policy revisions and development that are described in detail later in this document. Several implementation challenges, concerns and viable solutions were discussed with municipalities through 2020 and 2021. In March and June 2021, the Committee discussed and endorsed the changes to the policies prior to early engagement and the consultation process.

The Freelton wellhead protection areas were updated in 2021, and did not necessitate further updates to the policies.

2.3 Guiding Principles

The Source Protection Committee discussed and analyzed each policy option in terms of the suitability of its approach and its merits. The group then weighed each policy option against any possible alternatives, cost implications, and the availability of regulatory and non-regulatory tools and instruments.
The guiding principles developed by the Halton-Hamilton Source Protection Committee for use in the policy evaluation process and used to assess policy options are:

- Fairness
- Is the policy equitable and fair in theory as well as practice to all stakeholders and the public?
- Flexibility
- Does the policy provide opportunities for staggered implementation, if required?
- Does it encourage stakeholders and the public to share their knowledge and experience?
- Effectiveness
- Will the policy be successful in reducing the risk to source water?
- Timeliness
- Is the schedule for implementing the solution workable?
- Education and Stewardship
- Does the policy provide options and possibilities for public involvement and understanding?
- Consistency
- Is the policy consistent with approaches being used by other Source Protection Regions and municipalities?
- Cumulative Impacts
- Will the policy address any cumulative impacts from threats?
- Cost
- Are the financial implications for landowners and municipalities acceptable?

These criteria guided discussion and development of policy directives. The evaluation matrix is included as Appendix A.

~~Ontario Regulation 287/07 requires that potential financial implications and climate change be~~

2.3.1 Financial Considerations

One of the specific requirements of Ontario Regulation 287/07 for an Explanatory Document is to advise how consideration of the potential financial implications for parties who will be implementing or will be affected by the Source Protection Plan influenced the development of the policies. The other requirement is that climate change be considered during policy development.
The potential impact of programs and initiatives on landowners, municipalities, and other policy implementers was given serious consideration by the Planners' Working Group and the Source Protection Committee while developing policy directives and draft policies. Based on concerns raised, the policy development approach was pragmatic, with selected directives focused on utilizing and enhancing existing programs where appropriate, minimizing new programs to be implemented by the municipalities, and building upon the experience and knowledge of stakeholders.

2.3.2 Climate Change Considerations

Existing knowledge of the climate and potential future climate changes within the Halton-Hamilton Source Protection Region are discussed in the Assessment Reports. Water quantity risk assessments for the Kelso, Campbellville and Greensville municipal drinking water sources indicated the municipal wells are sustainable at their pumping rates for average climatic and drought conditions. The Kelso and Campbellville well fields are classed as under moderate risk due to impacts on other water uses in the natural environment. Policies addressing potential future significant threat activities that could impact the quantity of available water are included in an amended Source Protection Plan. The Greensville well field is classed as under low risk of sustainably meeting demand and no policies apply to its source water. The City of Guelph and Guelph/Eramosa Township, in the Lake Erie Source Protection Region, is completing a Tier 3 water budget and water quantity risk assessment for their wells. Results indicate that the water quantity wellhead protection areas extend into the Halton Region and the Hamilton Region Source Protection Areas. A process to assess threats to water quantity of the municipal system and write policies to ensure sustainability of the wells is underway. The results of their study will be included in amendments to the Assessment Reports and policies to protect the quantity of this water source will be added to the Plan, if warranted.

2.4 Tools to Address Drinking Water Threats

The Clean Water Act defines the tools available for use to achieve the objectives of the Plan. These tools are in addition to the legislation, guidelines, and protocols already in use. In addition to existing tools, such as land use planning approaches, the Act provides new tools for consideration. Some of the tools rely on voluntary participation, while others regulate the activity. The Source Protection Committee was charged with assessing which tool or tools were required to protect the municipal drinking water sources now and in the future. The Committee selected each tool to use based on the existing regulatory framework and the need for additional protective measures.

Voluntary approaches include education and outreach and incentive programs. These tools are used to inform the public and stakeholders and increase awareness about the importance of drinking water source protection and/or actions that could reduce the risk of a particular threat. Some incentive programs already exist, and policy can support continuation of these programs or suggest the creation of a new, targeted program.

Regulatory tools work within the existing regulatory framework of the:

- Planning Act
- Condominium Act
- Environmental Protection Act
- Ontario Water Resources Act
- Pesticides Act
- Safe Drinking Water Act
- Aggregate Resources Act
- Environmental Assessment Act
- Nutrient Management Act

Policies that use the Planning Act or Condominium Act may affect municipal planning tools, such as official plans, zoning by-laws, and site plan controls. These tools can be used to regulate future threat activities as they relate to land uses. When these tools are used to prohibit or manage significant drinking water threats, planning decisions must conform to the threat policies in the Source Protection Plan.

Some of the instruments under the remaining Acts have been prescribed under the Clean Water Act. These instruments may be used to ensure that a prescribed activity ceases to be a significant threat or does not become one in the future. When policies are written to require use of a prescribed instrument to address significant threats, existing instruments and any future instruments must comply.
A decade ago, ~~It is noted that~~ the Province of Ontario modernized the approval process for prescribed instruments and, as a result, certificates of approval for sewage works approved prior to October 31, 2011 will continue under the Ontario Water Resources Act, while, current approvals are called environmental compliance approvals and are administered under the Environmental Protection Act. For consistency and ease of understanding of the background to policy development, these terms are used interchangeably in this document and in the Plan.

The ~~new~~ tools included for use under the Clean Water Act, 2006, are:

- prohibition
- risk management plans
- restricted land uses

One policy within the Source Protection Plan relies on prohibition under Part IV of the Clean Water Act, 2006. Typically, prohibition of threat activities has been achieved in policy through the use of land use planning tools and denial of provincial approvals.

Risk management plans ~~will be~~are developed through discussion between the landowner and the municipal risk management official. This tool can be used for all significant threats except those related to waste and sewage systems that require a prescribed instrument or fall under the Ontario Building Code. Risk management planning has been selected as the tool to manage many of the significant municipal drinking water threats.

Restricted land uses link~~s~~ the above tool to land uses where the prescribed activities could occur. A restricted land use policy is administrative in nature. It requires that applications for development related to the restricted land uses in the designated areas be reviewed by the municipal risk management official prior to proceeding with the planning application. This ensures that activities associated with the new development will not become a significant threat.

In addition to policies that address specific threats to drinking water sources, o~~O~~ther approaches allowed in regulation for policy development are strategic in nature, such as:

- Specified actions – actions to be taken to implement the Source Protection Plan or to achieve the Plan's objectives
- Establishment of stewardship programs
- Promotion of best management practices
- Establishment of pilot programs

- Government of research programs
- Collection of data on the climate conditions in the area
- Updating of spill prevention, spill contingency plans, or emergency response plans
- Management of transport pathways so they don't increase the risk to drinking water systems

Various policy development approaches were discussed by the Planners' Working Group and Source Protection Committee for each of the prescribed threats and optional policies. The practicality of the approach and the guiding principles were considered in the discussions.

The Planners' Working Group discussed the need for policies to assist implementers in applying policies contained in the Plan to matters, applications and proceedings that were in process before the Plan comes into effect but are not captured in the Plan's definition of existing threats. The planners were asked if they expected any development applications to be in-process when the Plan is expected to be approved, and Halton Region, the City of Hamilton and the County of Wellington indicated that none were expected. The areas where significant threats can occur are small and located typically within developed settlement areas or on conservation lands where development will be limited. Transitional policies are typically required when policies are used to prohibit new land uses or activities. In the Halton-Hamilton Source Protection Plan, prohibition has been used for future waste disposal sites, gas stations, road salt storage facilities of greater than 5,000 tonnes, and snow storage facilities in certain circumstances. The Plan only includes policies that address future occurrences of these threats because no existing significant threats based on these activities/land uses were identified during the threats assessment. The threats assessment completed for the Assessment Reports was thorough, and most threats were field verified. It is unlikely that an existing significant threat was missed in the first round of source protection planning. The Source Protection Committee believes that prohibition is the best tool to address the risk from these unlikely future significant threats. This approach is consistent with Halton Region's official plan that prohibits some waste related land uses and gas stations within an area in which it is expected that groundwater will reach the municipal wells within 10 years. At the same time, a cautious approach is warranted to make sure unintended prohibitions do not happen, given the high growth and development area that HHSPR is characterized by. In the second round of planning, it was discussed with the municipal working group to update the definition of "existing threat", where a proponent would need to demonstrate intent of continuing the activity and it would be subject to policies to manage risks. Examples of "demonstrated intent" could include but not limited to (not exhaustive): presence of infrastructure such as buildings, older documents indicating intent – applications, permissions, legal paperwork, etc. The policy implementer would expect written intent to be provided by the proponent.

The Clean Water Act requires that policies be developed for every area where significant threats could occur. Thus, every existing and future threat must be captured by a policy. Transitional policies would only be used to determine if a policy addressing existing or future threats apply. This approach is different from other provincial legislation where development applications can be approved based on the current legislation at the time of the application.

~~The province has been petitioned to prepare a regulation that provides clear and consistent province-wide rules governing transitional matters on how source protection plan policies apply to development~~

~~proposals and existing uses that were commenced before or after, or were lawfully in place prior to, the effective date of source protection plans. If such a regulation is developed, the Source Protection Committee will have to review the policies in the Plan to ensure the regulation does not inadvertently change the intent of the policies or to include policies for existing threats, if required.~~ Staff have asked the province to confirm if a transitional matters regulation was ever made. If yes, then this paragraph will be updated. If not, it will be deleted.

It is a requirement of the Clean Water Act, 2006, that activities that are or would be significant drinking water threats must be monitored and the implementation of significant threat policies evaluated. This monitoring and evaluation requires the introduction of additional policies. The monitoring policy follows its significant threat policy in the Plan and includes reporting requirements.

3. PRESCRIBED THREATS: POLICY DIRECTION AND CONSULTATION

The Plan contains in section 3.1 general policies that enable specific provisions under the Clean Water Act regarding regulated activities, restricted land uses, prohibition, prescribed instruments, and official plans. The provisions of the Act allow this language to be contained within the Source Protection Plan to set out the timing for when related policies come into effect as well as the scope of these provisions in terms of their application. These general policies are an integral component of the Plan and must be consulted to understand the full effect of the policies regarding significant drinking water threats.

These general policies were discussed with the Planners' Working Group and the timing provisions agreed to by them. Comments were received from various parties during pre-consultation and public consultation on the policies for regulated activities, prescribed instruments and official plan amendments.

Section 58(3) of the Clean Water Act provides the Source Protection Committee the authority to require that risk management plans for existing significant drinking water threats be established prior to a certain date. The date selected is five years from the Plan coming into full force and effect. ~~The municipalities can enforce the interim powers provided under section 56(1) and establish interim risk management plans should the time period be inadequate. These interim risk management plans could become the risk management plans once the Plan is in effect.~~ Policy G-3 was added to the Plan to conform with legal requirements to designate activities to which section 58(1)–regulated activities applies.

Similarly, a time period of two years was initially selected to have prescribed instruments reviewed and amended as required by policy. The Ontario Ministry of Agriculture, Food and Rural Affairs did not comment on this policy. The Ministry of the Environment and Climate Change requested a change to the policy wording to three years with discretion given to the Director to amend this date based on Ministry priorities for environmental compliance approval reviews. The Ministry is seeking consistency across Source Protection Regions to develop an operational procedure for the province. To provide assurance to the Source Protection Committee that the policy will be effective, a set timeframe of three years was used in the revised policy.

The municipal planners indicated that the official plan is the first document that will be reviewed prior to land development or land use changes and should reflect current land use provisions. Accordingly, it should be updated to reflect the requirements of the Plan policies. Thus, a two year time period for official plan amendments seemed appropriate at that time. Thereafter, there were agency, and subsequent municipal requests, to amend the two year time period to require compliance no later than the time of the next five year review required by section 26 of the Planning Act. The current planning cycles of the municipalities approximates the desired two year timeframe and accordingly, the policy change will provide a similar result. Although there are specific requirements already set out in the Planning Act for zoning by-law conformity, a policy was required.

Comments were received on the designation of land uses in Policy G-2 for application of section 59(1) of the Act – restricted land uses. A majority of the significant threats are not likely to occur on residential properties and the policy was changed to exclude this land use. This change will streamline the review of Planning Act and building permit applications.

Policy T-3-C regarding waste disposal sites was amended just prior to Plan approval to address Halton Region's policy implementation concerns with using land use planning tools for prohibition of certain activities listed under the waste disposal threat. The policy was modified to allow different approaches for the City of Hamilton and Halton Region regarding this prohibition. This policy change required the inclusion of a new policy, G-4, to designate the activity under section 57(1) of the Act – prohibited activities.

During the second round of source protection planning, further updates to the Source Protection Plan in 2021 were made as described below.

The assessment reports are updated from time to time through Clean Water Act, 2006 Section 34, 35, or 36 updates, and typographical and other minor edits through an O. Reg. 287/07 Section 51 update. New threats may be identified. Certain policies to address the threats must be implemented within a certain timeframe dependent upon the date that the updated plan takes effect. Therefore, CA staff proposed edits to policy G-1 for the Committee's consideration as follows:

- timeline for risk management plans be 5 years from when the updated Source Protection Plan (pursuant to Section 34, 35 or 36) comes into full force and effect; and
- timeline for prescribed instrument amendments be 3 years from when the updated Source Protection Plan (pursuant to Section 34, 35 or 36) comes into full force and effect.

The above edits remove the need to update the timeline policy G-1 each time there is a Section 34 or 35 or 36 update (amendment) to the SPP. There is general consensus amongst municipalities with this approach. "Section 51" (typographical and other minor edits) is not included in the above proposed edits because timeline amendments for risk management plans and prescribed instruments are not considered to be typographical and other minor edits.

Policy G-2 designates land uses to which the restricted land uses provisions (Section 59) of the Clean Water Act, 2006 apply. An update was made to address a requirement related to policy consistency, per the MECP Minister's Section 36 amended Order for the HHSPR. This policy update would allow risk management officials to provide written direction to municipal staff regarding types of building or planning applications that can be screened out of the Section 59 notice process.

3.1 Waste Disposal Sites

3.1.1 Background

The establishment, operation, or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act is Threat 1 of the 21 prescribed threats.

What are waste disposal sites?

Section 25 of the Environmental Protection Act, 1990, defines waste as ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse, and such other materials as are designated in the regulations.

A waste disposal site is defined in Part V of the Act as:

- Any land upon, into, in or through which, or building or structure in which, waste is deposited, disposed of, handled, stored, transferred, treated or processed, and
- Any operation carried out or machinery or equipment used in connection with the depositing, disposal, handling, storage, transfer, treatment or processing referred to in clause (a).

What activities related to waste disposal sites pose a significant threat?

~~Tables of Drinking Water Threats can be reviewed at https://www.ontario.ca/document/tables-drinking-water-threats~~

According to Ontario Regulation 287/07, section 1.1 (1) paragraph 2, the activities that are deemed to be a threat to drinking water supplies are the establishment, operation, or maintenance of these waste disposal sites. There are ten subcategory activities listed under this threat in the ~~Ministry of the Environment's~~MECP Tables of Drinking Water Threats (2017~~09~~). They are:

- Storage And Discharge of Tailings from Mines
- Storage of PCB Waste at any location (generating or accepting)
- Storage of Small Quantity Exemptions (SQEs) of Hazardous Wastes or Liquid Industrial Wastes at any type of waste disposal site including generators, receivers, and Transfer/Processing Sites
- The Application of Hauled Sewage to Land
- The land disposal at a waste disposal site of hazardous waste, liquid industrial waste, or processed liquid industrial waste
- Waste Disposal Site - Landfarming of Petroleum Refining Waste
- Waste Disposal Site - Liquid Industrial Waste Injection into a well
- Waste Disposal Site - Storage of Hazardous Wastes or Liquid Industrial Wastes subject to registration and manifesting

- ~~Application of untreated septageto land~~
- ~~Storage, treatment, and discharge of tailings from mines~~
- ~~Landfarming of petroleum refining waste~~
- ~~Landfilling of hazardous waste~~

- ~~Landfilling of municipal waste~~
- ~~Landfilling of solid, non-hazardous industrial, or commercial waste~~
- ~~Liquid industrial waste injection into a well~~
- ~~PCB (Polychlorinated biphenyl) waste storage~~
- ~~Storage of hazardous waste or liquid industrial waste at disposal sites~~
- ~~Storage of certain wastes excluded from the hazardous waste definition~~

The MECP Tables of Drinking Water Threats can be reviewed at: https://www.ontario.ca/document/tables-drinking-water-threats

The ~~Ministry of the Environment and Climate Change~~MECP issues environmental compliance approvals for seven of the above activities at waste disposal sites, under the Environmental Protection Act. The activities not requiring an environmental compliance approval are storage of PCB waste, storage of hazardous waste or liquid industrial waste at disposal sites, storage of certain wastes excluded from the hazardous waste definition, i.e. clause (p), (q), (r), (s), (t), or (u), or clause (d) of the definition of liquid industrial waste as defined by Ontario Regulation 347.
The approvals are required prior to the establishment, extension, or ongoing operation of a waste disposal site. Exemptions are given for the storage and disposal of domestic waste and other activities. The regulations for waste disposal sites do not apply to the storage or disposal on a private property, unless the situation becomes a nuisance (Director's decision), or where the activity would fall under the Ontario Water Resources Act. Therefore, activities such as dumpsters on privately owned property and salvage yards would not be considered under this threat category.

~~The release of chemicals is the primary threat associated with waste disposal sites. Pathogens may be a threat if untreated septage is applied to land.~~

The ~~Ministry of the Environment and Climate Change~~MECP identifies many chemicals of concern related to the ten subcategory activities listed above. These chemicals have the potential to be introduced into surface and groundwater as a result of the storage and land disposal of waste and could threaten the safety of drinking water sources in certain situations.

~~The flow charts for this threat (see Appendix C) outline the circumstances identified for this activity and their associated chemicals of concern. These are the circumstances that were considered during the threat assessment and that must be considered during policy development for significant threats~~.
Waste disposal site threats are primarily due to the potential release of chemicals, with only the application of untreated septage to land listed as a pathogen threat. The chemicals of concern include nutrients, petroleum hydrocarbons, metals, and organic compounds. All of these chemicals could impact the quality of source water and require appropriate treatment at the Water Treatment Plant, if treatment is possible.

How does this threat affect the Source Protection Areas?

~~Significant threats are possible in the wellhead protection areas surrounding the Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Greensville and Cedarvale well fields. Based on assessments within the Region, there are no existing threats from waste disposal sites.~~

The vulnerable areas within the Halton Region Source Protection Area (SPA) where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line,

Kelso and Cedarvale well fields (see Figures B-1 through B-7~~6 and B-8~~). In the Hamilton Region Source Protection Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (Figure B-10). All of the municipal wells have delineated WHPAs A through D. In these areas, the vulnerability scoring that results in significant chemical threats is 10 for all subcategories and 8 for a few. One subcategory requires a score of 10 for a pathogen threat. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 9 or greater can result in significant chemical threats, and 8 or greater for significant pathogen threats.

~~The circumstances and areas where a significant risk level would occur for each waste disposal site subcategory are summarized in the flow charts for Threat 1 in Appendix C.~~

When assessing the risk to municipal drinking water sources from existing activities, active and closed landfill sites, sites with environmental compliance approvals related to waste, and known PCB storage sites were considered. Based on the assessment, there are no existing threats to drinking water sources for this category in the Areas.

What legislation, guidelines, or protocols already exist?

Existing legislation associated with waste disposal threats includes the following Acts:

- Environmental Protection
- Ontario Water Resources
- Environmental Assessment
- Environmental Protection Act, 1990

The Environmental Protection Act (EPA), which is enforced by the ~~Ministry of the Environment and Climate Change~~MECP, provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects.

Part V of the Act sets out the definitions, exemptions, and requirements for the management of waste. Under section 27, an environmental compliance approval is required from the ~~Ministry of the Environment and Climate Change~~MECP prior to using, operating, establishing, altering, enlarging, or extending a waste management system or a waste disposal site. The approval for an active site includes detailed operational standards to manage and limit any potential discharge of contaminants into the natural environment.

An approval may contain legally enforceable terms and conditions for:

- the types of waste to be accepted and applicable service area
- maximum volume of waste allowed per day and per year
- control measures/inspections required
- operational requirements
- environmental monitoring conditions for the site, including leachate, surface water, groundwater, bio-monitoring, and weather conditions
- measures to close a site, including ensuring the site is properly maintained and monitored
- Environmental compliance approvals are prescribed instruments under the Clean Water Act, 2006 and may be used through policy to protect drinking water sources.

Until December 31, 2010, the Environmental Protection Act regulated the application of septage (hauled sewage) to land. Legally, land application sites were considered waste disposal sites and required an environmental compliance approval. As of January 1, 2011, the Ministry of the Environment and Climate Change (MOECC) now called the Ministry of Environment, Conservation and Parks (MECP) is not issuing new approvals for land application sites, though existing approvals remain valid until expiry, typically within five years. However, there are no existing approvals within the significant threat areas of the Source Protection Areas.

The ~~Ministry of the Environment and Climate Change~~MECP discourages this activity and is exploring policy options towards banning the application of hauled sewage to land in the future. Instead, the ~~MOECC~~MECP recommends the treatment of this septage in municipal sewage treatment plants or other treatment facilities (e.g., composting, gasification, anaerobic digestion, dewatering, or alkaline stabilization). In Halton Region and the City of Hamilton, septage is accepted at wastewater treatment plants.

Hauled sewage does not include septage after it has been composted, digested, or otherwise treated. Treated septage is discussed at length in Section 3.4 Non-Agricultural Source Material (NASM). Ontario Regulation 347 – General Waste Management exempts NASM Plan areas defined in Ontario Regulation 267/03 made under the Nutrient Management Act, 2002 from the requirements of Part V of the Environmental Protection Act. Areas where NASM is applied that do not meet the definition under the Nutrient Management Act, 2002 are regulated through environmental compliance approvals.

The storage or disposal by any person of their domestic wastes on their own property is exempt from Part V of the Act, unless the waste is deemed to be or likely to create a nuisance.

Ontario Water Resources Act, 1990

~~Provincial legislation, such as Section 53 of the Ontario Water Resources Act, are prescribed instruments to be used in source protection planning. Section 53 requires approvals with regard to sewage works.~~

Leachate collection systems that discharge to surface water require approval under the Ontario Water Resources Act and issuance of an environmental compliance approval. Section 53 of the Act regulates approvals to establish, alter, extend, or replace new or existing sewage works. This section is a prescribed instrument under the Clean Water Act and may be used to protect municipal drinking water sources.

The ~~Ministry of the Environment and Climate Change~~MECP has established provincial water quality objectives, and any surface water discharges from a landfill site must meet these criteria.

Environmental Assessment Act, 1990

Many landfill site proposals, particularly those for larger sites, require approval under the Environmental Assessment Act. An environmental assessment is a study that evaluates the potential negative and positive environmental effects of a proposed site. The assessment requires consultation with agencies and the public, consideration of alternatives, and the mitigation and management of potential negative

environmental effects. By completing the environmental assessment process, decisions about the application are based on good environmental planning.

The Ministry of the Environment and Climate Change developed environmental assessment requirements for waste management projects, which apply to public and private sector proponents (Ministry of the Environment, 2007). The requirements ensure that the environmental effects of new sites, or modifications to sites, are reviewed with the potential significance of the projects in mind.

Other Tools:

- Ontario Regulation 347, which prescribes standards relating to waste management
- Ontario Regulation 232/98, which regulates municipal landfill sites
- Guideline D-4, which addresses land use on or near landfills and dumps
- Municipal land use planning
- Municipal sewer use by-laws.
- Regulation 347-General-Waste Management

Ontario Regulation 347 is the principle regulation under Part V of the Environmental Protection Act. It sets out the designations and exemptions of wastes, the standards for waste disposal sites, the requirements for waste generation facilities, the requirements for disposal and storage of hazardous waste, the requirement for environmental compliance approvals, and the requirements for other waste management systems and waste disposal sites.

Land disposal of waste includes five of the threat subcategories - the landfilling of the waste (hazardous, liquid industrial, processed liquid industrial; municipal; or solid non-hazardous industrial or commercial), the discharge of the waste into a geological formation through a well (liquid industrial), and the landfarming of the petroleum refining wastes. Each of these activities requires the issuance of an environmental compliance approval.

Section 11 of Ontario Regulation 347 prescribes the standards for the location, maintenance, and operation of a landfilling site. Landfilling is defined as the disposal of waste by deposit, under controlled conditions, on land or on land covered by water, and includes compaction of the waste into a cell and covering the waste with cover materials at regular intervals. These activities are standard operating practices at a regulated landfill site operating under the requirements of an environmental compliance approval. The standards in the regulation include the following points that are relevant to drinking water source protection:

- Drainage that may cause pollution shall not, without adequate treatment, be discharged into watercourses.
- Waste shall be placed sufficiently above or isolated from the maximum water table at the site in such manner that impairment of groundwater in aquifers is prevented and sufficiently distant from sources of potable water supplies so as to prevent contamination of the water, unless adequate provision is made for the collection and treatment of leachate.
- Where necessary to isolate a landfilling site and effectively prevent the egress of contaminants, adequate measures to prevent water pollution shall be taken by the construction of berms and dykes of low permeability.

- Where there is a possibility of water pollution resulting from the operation of a landfilling site, samples shall be taken and tests made by the owner of the site to measure the extent of egress of contaminants and, if necessary, measures shall be taken for the collection and treatment of contaminants and for the prevention of water pollution.
- Landfarming of petroleum refining waste involves the breakdown of the wastes by naturally occurring soil bacteria through the application of the waste to land with subsequent periodic tilling of the soil. The application of the material is strictly controlled.
- The storage of hazardous waste or liquid industrial waste must be at a waste disposal site to be considered a drinking water threat under the Clean Water Act. These sites require an environmental compliance approval to operate.

Regulation 347 also controls the activities at waste generating facilities that have temporary chemical storage. Section 17.1 exempts these facilities from the classification as waste disposal sites and the need for environmental compliance approvals to operate. Storage must be for less than 24 months or an environmental compliance approval must be obtained. These facilities are not captured by the Clean Water Act as drinking water threats.

Mill tailings from a mine, one of the subcategories of this threat category, are defined as waste under the regulation but are regulated by other legislation.

Ontario Regulation 232/98-Landfilling Sites

This provincial regulation applies to proposed landfill sites, or those expanded after August 1, 1998, that receive only municipal waste and have a capacity greater than 40,000 cubic metres. It details the requirements for land ownership, study requirements to support the establishment of the site, and required, detailed design criteria. The study requirements include a hydrogeological assessment and a surface water assessment. The regulation also states the monitoring and reporting requirements, which include the monitoring of surface water, groundwater, and leachate. Financial assurance is required as part of the leachate contingency plan, should a collection system or liner fail.

Guideline D-4-Land Use On or Near Landfills and Dumps

This guideline, implemented under the Environmental Protection Act, Regulation 347, the Environmental Assessment Act, the Planning Act, and the Condominium Act, protects the health, safety, convenience, and welfare of residents from the potential adverse effects of landfills and dumps by restricting or controlling land use in their vicinity.

Guideline B-7-Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities

Guideline B-7 lists examples of locations where the ~~Ministry of the Environment and Climate Change~~MECP may not support approval of waste disposal facilities, including:

- where no appreciable attenuation can be provided, for example when the travel time of leachate leaving the site underground is insufficient to allow sufficient degradation of biodegradable organic compounds before the groundwater discharges to a surface waterbody;
- where natural attenuation is weak, for example in fractured rock where interaction between the contaminant and soil is minimal;
- where the subsurface is suited for better use, for example if a sandy area is better suited to a water supply; or
- where the consequences of failure are unacceptable, for example where contaminant discharge may affect the only drinking water source for a community to an unacceptable degree.

Several provincial guidelines outline standards and requirements for managing waste disposal sites. These include restrictions on establishing a site, approvals needed, and measures to protect adjacent properties.

Procedure B-7-1-Determination of Contaminant Limits and Attenuation Zone

Procedure B-7-1 sets out an approach to determine impact limits of contaminants discharged from a waste disposal site on adjacent properties. It provides for the use of a zone down-gradient of the disposal site where attenuation of the contaminants will occur naturally and their concentrations will be acceptable for the land use and groundwater use on the adjacent property. This zone is referred to as a "contaminant attenuation zone."

Guideline for Environmental Protection Measures at Chemical and Waste Storage Facilities

This guideline identifies environmental protection measures for chemical and waste storage areas as well as protection measures for human health. It is identified as a resource during the planning of upgrades to existing storage areas and for the design and operation of new facilities. ~~MOECC~~MECP abatement staff, owners, operators, and designers of chemical and waste storage facilities may utilize this document, which indicates best practices and spill containment provisions.

Ontario Regulation 362-Waste Management PCBs

PCB wastes are stored on PCB waste disposal sites and their management is regulated by Ontario Regulation 362. An environmental compliance approval is not required for these sites, however, record keeping and reporting to the ~~Ministry of the Environment and Climate Change~~MECP is. The regulation requires that the storage of PCB is in a safe and secure location that will prevent PCB waste from coming into contact with any person and to ensure that any liquid containing PCBs that may escape from the storage containers can be readily recovered and will not discharge into a watercourse or groundwater.

Land Use Planning

Under municipal law, Planning Act approvals must be obtained prior to establishing any new waste disposal sites or landfill operations.

Sewer Use By-Laws

If a landfill discharges collected drainage or leachate to a municipal sewer for disposal or treatment, the quality and quantity of the discharge is controlled by local sewer use by-laws and the requirements or limitations of the receiving wastewater treatment plant.

The by-laws set standards for what can and cannot be discharged to sanitary, storm, and combined sewers. This includes physical, chemical, radioactive, and pathological criteria.

What policy approaches were discussed?

The Planners' Working Group and the Source Protection Committee discussed approaches to address the prescribed drinking water threat of the establishment, operation, or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act.

Within the Halton Region and Hamilton Region Source Protection Areas, there are no existing activities associated with this threat; however, policies must be included within the Source Protection Plan to ensure that future activities do not become significant threats.

It is important to note that Part IV tools under the Clean Water Act, including risk management plans, prohibition, and restricted land uses cannot be used to address threats associated with waste disposal sites where prescribed instruments are required.

The policy approaches discussed were:

- Education and Outreach
- Support the education and outreach initiatives of the Region of Halton and the City of Hamilton in providing education materials and information sessions about the proper disposal of various waste materials, and what can be done to reduce the volume of waste.
- Prescribed Instruments
- Request that the ~~Ministry of the Environment and Climate Change~~MECP fully consider the protection of sources of municipal drinking water for any applications for waste disposal sites or land filling sites within the wellhead protection areas, or alternatively, not grant an environmental compliance approval if an application is filed.
- Land Use Planning
- Amend official plans and zoning by-laws to prohibit waste disposal and landfilling sites within wellhead protection areas where they would be a significant threat to the municipal drinking water source.
- Part IV Prohibition
- ~~-~~Rely on the Ministry's prescribed instruments to address the applicable waste disposal site activities and prohibit, through screening of applications and prohibition, the other three activities that are exempt - storage of PCB waste, storage of hazardous waste or liquid industrial waste at disposal sites, storage of wastes in clauses (p), (q), (r), (s), (t), and (u) of the hazardous waste definition, and clause (d) of the definition of liquid industrial waste as defined by Ontario Regulation 347.

There are no activities within the Source Protection Areas associated with the threat of waste disposal sites. However, policy options discussed include education and outreach in addition to amending official plans and zoning by-laws to ensure the future protection of municipal drinking water sources.

3.1.2 Discussion on Policy Options

There are no current waste disposal sites within the vulnerable areas where this activity would be a significant drinking water threat. Any new activity would require an amendment to the municipal official plan or the Niagara Escarpment Plan (for most subcategories) to be established. There are no applications at this time and any new application would need to be considered in the context of the existing planning framework. Based on this context, it is the opinion of the Source Protection Committee that no activity could be established prior to the Source Protection Plan coming into effect. For this reason, only policies relating to future significant threats are contained within the Source Protection Plan.

~~While existing municipal outreach programs were supported, education and outreach was not considered adequate to address this threat.~~

Education and Outreach

There was support for education and outreach approaches to address the threat of activities related to waste disposal sites; however, it was understood that this would not be enough in itself to address the threats associated with waste disposal. Education and outreach can help inform individuals about responsible waste disposal, particularly for hazardous materials, as well as how to reduce the volume of waste. The outreach and education provided through the various municipal programs at present is an appropriate base on which to build an increased awareness about drinking water source protection.

It is important for the education and outreach program to target small industrial and commercial facilities, residential and agricultural properties to address the storage of wastes described in clauses p, q, r, s, t, or u of the definition of hazardous waste in Ontario Regulation 347. Emphasis should be on proper disposal of these wastes.

Prescribed Instruments

The use of prescribed instruments is the preferred option to address the threats of the establishment, operation, or maintenance of waste disposal sites. An environmental compliance approval is required to operate one of these sites, except for PCB waste storage sites and sites where mine tailings are stored, treated or discharged.

The Planners' Working Group and the Source Protection Committee considered the use of prescribed instruments as a policy tool with clear criteria for implementation; however, the position of the Committee was that ~~the preferred approach was to have the application for a prescribed instrument not supported by the Ministry of the Environment and Climate Change. Environmental compliance approvals are the preferred option for dealing with waste disposal site threats. It was felt that~~ policy regarding approvals for waste disposal sites should direct the Ministry of the Environment to deny applications for new sites where significant threats would occur.

The Committee also noted that some of the subcategory activities will require an extensive environmental assessment under the Environmental Assessment Act and recognized the benefits of the

process in which the protection of drinking water sources would be evaluated. This assessment was supported outside of the vulnerable areas where the subcategory activity could be significant.

It was noted that any application of a policy for significant threats due to waste disposal sites would be for future sites only and prohibition was appropriate. Prohibition through the denial of an environmental compliance approval is considered one of the best approaches for this threat. The Committee determined that the areas affected by this new policy direction were fairly limited in size and, therefore, easily identified as lands to be considered off-limits for such activities.

Land Use Planning

The policy direction for threat activities was to eliminate the option of waste disposal sites occurring within vulnerable areas where associated activities would be significant drinking water threats. It was determined that a clear official plan prohibition of this activity would be helpful and compliment prohibition through prescribed instruments. The official plan is a public and accessible document. Any official plan amendment application for establishment of a waste disposal site would be considered in the context of the official plan policies based on the Source Protection Plan. In addition, the prohibition of waste disposal sites through land use planning will address in policy those sites that do not require an environmental compliance approval. Halton Region's Official Plan currently prohibits some of the subcategories in the vulnerable area. The use of prohibition of future activities through land use planning is based on the precautionary concept that the best protection of drinking water sources is achieved when the threat cannot be established within the vulnerable area where it could be a significant drinking water threat. The municipal planners' also indicated that it was unlikely that an application would be submitted for one of the significant threat areas and that because these areas are small, the applicant could find another location, if needed, for the activity. The City of Hamilton preferred this policy tool.

After establishing the policy directions, it was determined that, within the Niagara Escarpment Plan Area, the Environmental Protection Act prohibits the establishment of most waste disposal sites and facilities, so an additional policy requesting an amendment to the Niagara Escarpment Plan to prohibit this activity was not required.

Official plan restrictions were considered a useful supporting policy for addressing this threat.

Part IV Prohibition

Halton Region requested the use of Part IV prohibition to compliment the reliance on prescribed instruments. Prescribed instruments are issued for seven of the ten activities listed for waste disposal sites. Within Halton Region, reliance will be on screening of planning and building permit applications by the risk management official under Section 59(1) of the Clean Water Act, 2006, with subsequent prohibition under Section 57(1) of the Act. Using this tool, no changes to the municipality's Official Plan is required.

Monitoring

Annual monitoring of the implementation of policies was discussed by the Planners' Working Group and the Source Protection Committee. Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed

in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Consultation

The only revisions to the draft policies from consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording, and it was noted that a policy regarding mine tailings was missed and was added. During public consultation the Ministry of the Environment and Climate Change provided additional requests for wording changes to T-1-C to align the policy with an implementable procedural change and provide flexibility in reporting. Changes were made to Part (a) of the policy to accommodate the Ministry's request in 2011 and made again in 2014. The Ministry requested that the policy direct them to prohibit the activity rather than to not issue a prescribed instrument. The Committee is of the opinion that the specific information requested in monitoring policies is required to assure them that the necessary data/information is being documented for future analysis of policy effectiveness. Hence, Part (b), the monitoring policy, was not changed.

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level. Minor wording changes were made based on comments received.

The land use policy T-3-C was expanded during pre-consultation to include a listing of the threat activities associated with waste disposal sites that must be prohibited. Relating the activities to the waste site land use will help capture the threat subcategories not regulated by prescribed instruments. Based on comments received on the draft Plan, the Source Protection Committee added the application of non-agricultural source material to the list of threat activities associated with waste disposal sites. However, the Ministry requested that this be removed because under the Environmental Protection Act the material is considered waste. The municipal planners requested that wording be included in the policy to direct the municipality to use Planning Act tools to prohibit the land use as support for the required official plan amendment. Halton Region requested a change to policy T-3-C to allow them to use Part IV – prohibited activities rather than Planning Act tools to prohibit the three threat activities not captured by Policy T-1-C. The Source Protection Committee approved this change by adding to Policy T-3-C, while keeping the policy as written for implementation by the City of Hamilton.

The reader is directed to the Plan to review the policies.

Policy Directives for Threat 1 – Waste Disposal Sites		
	Policy Directive	Policy
1	Require that the Ministry of the Environment deny applications for environmental compliance approvals for waste disposal sites proposed where waste disposal sites could be significant threats. Modified in 2014 to require that the Ministry of the Environment, Conservation and Parks ~~and Climate Change~~ prohibit this activity.	T-1-C

2	Support municipal education and outreach programs about hazardous waste disposal and reduction of waste.	T-2-C
3	Amend official plans and zoning by-laws to prohibit waste disposal sites within vulnerable areas where there would be a significant threat to municipal drinking water sources.	T-3-C a.
4	Amend the Niagara Escarpment Plan to prohibit waste disposal sites within vulnerable areas where there would be significant threat to municipal drinking water sources.	Policy not required

Policy Directives for Threat 1 – Waste Disposal Sites		
	Policy Directive	Policy
5	Outside of significant threat areas, recognize the current environmental assessment process and provide support to continue to use this process.	Policy not required
6	Use Part IV restricted and prohibited activities to address the waste disposal site activities that do not require prescribed instruments.	T-3-C c.

3.2 Sewage Systems

3.2.1 Background

What are sewage systems?

The Ontario Water Resources Act defines sewage as drainage, stormwater, commercial wastes, and industrial wastes. It refers to the equipment, piping, tanks, etc., that are used for the collection, transmission, treatment, and disposal of sewage as sewage works. The ~~Ministry of the Environment and Climate Change~~MECP has designated certain sewage systems that pose a significant threat to drinking water sources under specific circumstances in the Tables of Drinking Water Threats~~ (2009)~~. Sewage systems that collect, store, transmit, treat, or dispose of sewage and are prescribed threats to drinking water sources include:

- Combined sewer discharge
- Discharge from a stormwater retention pond
- Industrial effluent discharges
- Sanitary sewers and related pipes
- Septic system holding tanks
- Sewage treatment plant bypass discharge
- Sewage treatment plant effluent discharges
- Storage of sewage

~~These systems include~~They are described below.~~:~~

Combined sewers

Some older sewage works combine the collection of sanitary wastes and stormwater together in one pipe.

The combined flow is treated at the wastewater treatment plant.

Stormwater ~~retention ponds~~management facility

Stormwater includes water runoff from roads, parking lots, lawns, and fields. Most comes from rain and snow melt, though lawn watering and car washing also can contribute to the total volume.

Where stormwater is managed, it usually involves a stormwater retention pond designed to hold water to reduce downstream flows and provide primary treatment through the settlement of suspended solids. Some pollutants tend to adsorb to the solid materials, so settlement removes them from the downstream watercourse.

Industrial effluent discharges

Industrial effluent consists of the collection, transmission, treatment, or disposal of wastewater generated from industrial activities.

Under the Ontario Water Resources Act (OWRA), these systems include works to handle storm runoff, process wastewater streams, cooling water streams, domestic sewage from industrial sites, and wastewater from site remediation activities at industrial sites.

An environmental compliance approval issued under section 53 of the OWRA is required in order to discharge industrial sewage to a water body.

Sanitary sewers and related pipes

Sanitary sewers consist of a piping system designed to carry sanitary waste from households and commercial buildings to a treatment facility. Where industry and institutions exist, wastes are also transported in the pipes.

Sewage within the pipes typically flows with gravity but some areas require a pumping station and pressurized pipe to overcome a rise in elevation.

Water may flow into the pipes from downspouts, foundation drains, yard drains, and leaky manhole covers and add to the total volume carried.

Prior to the mid-1970s, Halton Region allowed the connection of foundation and storm drainage pipes to sanitary sewers. This is no longer allowed. Municipalities have typically implemented an inspection and maintenance program to ensure the system continues to perform as designed.

~~Sewage is defined as drainage, stormwater, commercial wastes, and industrial wastes. Sewage systems that collect, store, transmit, treat, or dispose of sewage and are prescribed threats to drinking water sources include:~~
~~Combined sewer discharge~~
~~Discharge from a stormwater retention pond~~
~~Industrial effluent discharges~~
~~Sanitary sewers and related pipes~~
~~Septic system holding tanks~~
~~Sewage treatment plant bypass discharge~~
~~Sewage treatment plant effluent discharges~~
~~Storage of sewage~~

~~**Sanitary sewers and pipes carry waste from residential, commercial and industrial** buildings to a treatment facility.~~

Septic systems

About 25 percent of Canadians use septic systems. The main purpose of this type of system is to separate solids from liquid and provide a breakdown of organic matter.

Defined in the Tables of Drinking Water Threats (201709) as earth pit privy, privy vault, greywater system, cesspool, and leaching bed system and its associated treatment uni

~~**Septic system holding tanks can be above or below ground. They have safeguar**ds to protect against spillage.~~

Septic systems are used by about 25 percent of Canadians to treat and dis from toilets, showers, sinks, washing machines, and dishwashers (CMHC, 2(

A conventional septic system is comprised of a septic tank connected to a l

The septic tank is buried in the ground and made of concrete, plastic, or fibreglass.

The tank may have one or two chambers, but the purpose remains the same – to separate solids from liquid and provide some breakdown of organic matter.

Settled solids are called sludge, and the lighter greases and fats that float on water are called scum. To keep the system working efficiently, the sludge and scum must be removed from the tank every few years, depending on use. Anaerobic bacteria use the organic matter as a food source and digest some of it. The water in the middle of the tank flows by displacement into the second chamber or out through an effluent filter into the leaching bed.

The leaching bed comprises a network of plastic pipes that have holes along the bottom. The pipes are laid into a gravel and soil bed. When the effluent seeps out of the pipes it flows through a bacteria layer that digests more of the organic matter and transforms ammonia to the less toxic nitrate. The surrounding soil filters the effluent, and phosphorus is removed through adsorption onto soil minerals.

Small systems (those with a design flow less than or equal to 10,000 litres per day) are subject to approval by the municipality under the Ontario Building Code Act. Local municipalities within the Region of Halton, the Cities of Hamilton and Mississauga, the Township of Puslinch, and the Town of Grimsby administer these approvals.

Small systems most frequently service individual residences or businesses in rural areas or hamlets, or small villages that do not have municipal or communal sewage services.

Large systems (those with a design flow, or the combined design flow of all septic systems on one property, that is greater than 10,000 litres per day) are subject to approval by the ~~Ministry of the Environment and Climate Change~~MECP under the Ontario Water Resources Act for existing systems and require a certificate of approval to operate, or under the Environmental Protection Act for future systems and will require an environmental compliance approval.

Schools, campgrounds, more than one household sharing a system, and larger businesses are examples of facilities that may require a large system.

Any system, no matter what its size, which cannot be located on a single property, is subject to approval by the ~~Ministry of the Environment and Climate Change~~MECP.

~~About 25 percent of Canadians use septic systems. The main purpose of this type of system is to separate solids from liquid and provide a breakdown of organic matter.~~

Septic system holding tank

Septic system holding tanks can be above or below ground. They have safeguards to protect against spillage but must be pumped out regularly to protect the environment.

A holding tank is a watertight tank made of concrete, fibreglass, or polyethylene used to temporarily hold wastewater from a house or building until its contents are pumped and hauled away for disposal.

Holding tanks can be installed above or below ground.

Holding tanks have safeguards to protect against spillage and are equipped with alarms that signal capacity is limited.

In some municipalities, the proponent is required to establish a contract with a licensed waste hauler to ensure the system is maintained.

The Province of Manitoba recommends the use of holding tanks because they provide the highest level of environmental protection (Manitoba Conservation, 2007). Because holding tanks do not release pollutants to the environment, Manitoba Conservation suggest that these systems are far superior to septic systems with leaching beds, particularly in areas where soils are thin, bedrock or clay is at ground surface, or the land is sloping. To make these systems superior environmentally, they must be pumped out and inspected periodically. Thus, Manitoba restricts their use to sites where a registered hauler services the area and disposal facilities are available.

~~Septic system holding tanks can be above or below ground. They have safeguards to protect against spillage but must be pumped out regularly to protect the environment~~

Sewage treatment plant bypass discharge to surface water

Sewage treatment plants, more commonly called wastewater treatment plants, can be designed to treat large volumes of wastewater each day.

Treatment is classed as either primary, secondary, or tertiary with each level increasing the removal of contaminants.

A bypass occurs when a part of the system breaks down or gets overwhelmed, typically due to excess stormwater.

During a bypass, untreated or partially treated sewage discharges or is released into surface water.

Sometimes bypasses occur to prevent sewage from backing up into homes.

The strength of the bypassed sewage varies depending on its water content.

Sewage treatment plant effluent discharges (including lagoons)

Sewage treatment plants treat the collected effluent from households, commercial establishments, industries, and institutions.

Treatment processes vary depending on the quality of the material and the requirements for effluent quality. They typically include physical, chemical, and biological processes to remove contaminants.

Treatment is classed as primary, secondary, or tertiary with each level improving the quality of the plant effluent.

Storage of sewage (e.g., treatment plant tanks)

Sewage treatment plants generally have underground and/or above ground tanks used in the treatment process or to store sewage prior to or after treatment.

What activities related to sewage systems pose a significant threat?

The ~~Ministry of the Environment and Climate Change~~MECP has prescribed the establishment, operation, or maintenance of a system that collects, stores, transmits, treats or disposes of sewage as a threat to drinking water sources. This threat is further defined, at a significant level, as the nine activities listed

below. ~~The rationale for their inclusion as a drinking water threat is as follows and the circumstances are summarized on flow charts in Appendix C.~~

~~The establishment, operation, or maintenance of a system that collects, stores, transmits, treats, or disposes of sewage is Threat 2 of the 21 prescribed threats.~~

Combined sewer discharge from a stormwater outlet to surface water

Occasionally, during periods of high rainfall and snow melt (wet weather), water flows may rise above the capacity of a combined sewer system. At these times, some of the flow may be released to water bodies.

This activity is a significant threat only in areas of surface water vulnerability, i.e., wellhead protection area-E in the Halton Area. Pathogens and toxic chemicals could be released during these overflows.

Discharge of untreated stormwater from a ~~stormwater retention pond~~stormwater management facility

Included in the Tables of Drinking Water Threats (2017~~09~~) are the releases with stormwater of pathogens, as well as 18 chemicals and their compounds, to either groundwater or surface water.

The chemicals include metals, nutrients, pesticides, ions, and hydrocarbons. ~~The flow chart for Threat 2 in Appendix C tabulates a full list of these chemicals.~~

Industrial effluent discharges

The main consideration for reducing or eliminating drinking water threats related to industrial effluent is to make sure that any discharge from these systems does not contain contaminants in a volume and concentration that would threaten the quality of the receiving surface water body.

The drinking water threat relates to industrial sewage systems that discharge to surface water; however, the discharge can affect the quality of surface water and groundwater.

According to the ~~MOECC~~ MECP Tables of Drinking Water Threats (~~2009~~2017), there are ~~58~~ several chemicals and their compounds, as well as pathogens that could be released to the environment from industrial sewage works that are considered to result in significant threats under certain conditions. ~~The flow chart for Threat 2 in Appendix C tabulates a full list of these chemicals.~~

~~Industrial effluent discharges pose threats to surface water under certain conditions and when it contains contaminants in a harmful volume or concentration.~~

Sanitary sewers and related pipes

Outflow of raw sewage due to the collapse or failure of collection pipes could threaten a drinking water source.

Sanitary sewers cross open waterbodies and, in some locations, have ruptured during extreme storm events and released their contents directly to the water.

Infiltration through degraded pipes or pipe joints can happen when the water table is high or soils are saturated following rain or snow melt.

Inflow of stormwater or infiltration of groundwater into a degrading, collapsed, cracked, or sagging pipe is a concern as it increases the volume carried.

Sanitary sewer systems are designed based on estimates of the amount of sanitary waste to be generated and conveyed in the system. If excess stormwater enters the system, there is the potential for overflows of untreated or partially treated wastewater at pumping stations and/or wastewater treatment plants.

Septic systems

Septic systems release contaminants to the environment. Their treatment process is limited to removal of solids and scum and biological breakdown of organic matter. Dissolved chemicals not affected during the process pass through the septic tank and discharge through the leaching bed to the environment.

For small septic systems, only the discharge of pathogens has been identified as potentially affecting drinking water sources adversely. The threat only exists for groundwater sources.

For large septic systems, pathogens, as well as ~~five~~ chemicals, have been identified as pollutants that could be released and affect drinking water sources ~~(see Appendix C)~~. The chemicals are found in household cleaners and products, in food, and in human waste.

~~The discharge of pathogens from small septic tanks may affect groundwater sources. Pathogens and chemicals could also be released from large systems.~~

Septic system holding tanks

Holding tanks do not release pollutants to the environment if maintained and working as designed.

The effectiveness of some holding tanks has been compromised by holes that allow the release of effluent to the environment.

It is essential to monitor tanks for proper use and potential leaks.

Tanks must be pumped out and inspected regularly, and registered septage haulers should perform both functions.

Sewage treatment plant bypass discharge to surface water

Bypasses from a treatment plant are typically the result of infiltration/inflow which results in high sewage volumes, equipment failure or power failure.

Bypasses can be of untreated or partially treated wastewater with untreated discharges being of greater concern, depending on the volumes released and the flow conditions in the waterbody at the time of release.

~~Bypass discharge from a wastewater treatment plant can be harmful to water sources, depending on the volume released.~~

Sewage treatment plant effluent discharges

Sewage treatment plant effluent contains a range of contaminants, and thus the impact on the environment to which it is discharged also varies. Depending on the treatment level and the source of wastewater collected, the effluent can include human and other organic wastes, nutrients, pathogens, micro-organisms, suspended solids, and household and industrial chemicals not removed by the treatment process (CCME, December 2006).

Effluent is discharged to water bodies that have sufficient assimilative capacity to receive the effluent without adverse impacts on aquatic life or humans.

Although treatment occurs, conventional systems do not remove all contaminants from the effluent. The ~~Ministry of the Environment and Climate Change~~MECP has identified a variety of chemicals and pathogens as chemicals of concern when released in treated effluent ~~(see Appendix C)~~.

The ~~Ministry of the Environment and Climate Change~~MECP sets criteria for the quality of the components of effluent. However, control of the sources of wastewater entering the system alleviates some of the treatment issues. To that regard, municipalities have sewer use by-laws in place that set criteria for contaminants in waste streams discharging to sanitary sewer pipes.

Storage of sewage

Sewage storage tanks may leak or spills may occur, thereby potentially contaminating groundwater or surface water. In this case, the impact on the environment is based on the quality and the volume of the material released.

~~The circumstances defined as significant threats pertaining to sewage systems are outlined on the flow charts for Threat 2 in Appendix C.~~

The ~~MOECC~~ MECP Tables of Drinking Water Threats (~~2009~~2017) identify a number of chemicals and pathogens that could make their way into the groundwater and surface water under certain conditions related to the above sewage systems. ~~A full list of these chemicals is tabulated and included with the Threat 2 flow chart in Appendix C.~~

~~The MOE Tables of Drinking Water Threats can be viewed at https://www.ontario.ca/document/tables-drinking-water-threats~~

For a description of vulnerability scores, see the Assessment Report.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Kelso and Cedarvale well fields (see Figures B-1 through B-6 and Figure B-9). Significant threats from sewage systems are also possible in the Greensville municipal wellhead protection area located within the Hamilton Region Source Protection Area (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant threats is 8 or 10 for chemical threats and 10 for pathogen threats. Only two wells of the Carlisle well field have an associated WHPA-E. For this area, vulnerability scoring of 8 or greater can result in significant threats.

~~Although septic systems release chloride to drinking water sources, the mandatory sewage system inspection program that would be required for these septic systems would not reduce the chloride released and not positively impact the source water quality. Thus, this activity has not been elevated to a significant threat within the issue contributing area of the Cedarvale well field.~~

The wellhead protection areas and associated vulnerability scores where a significant drinking water threat may occur under certain conditions due to these activities are as follows:

WHPA-A or B with a vulnerability score of 10

- Discharge of stormwater from a ~~stormwater retention pond~~stormwater management facility
- Sanitary sewers and related pipes
- Septic System - pit privy, privy vault, greywater system, cesspool, leaching bed system with associated treatment unit
- Septic system holding tank for the retention of hauled sewage at the site where it is produced before its collection by a hauled sewage system
- Sewage treatment plant effluent discharges (includes lagoons)
- Storage of sewage (e.g., treatment plant tanks)

WHPA-B or C with a vulnerability score of 8

- ~~Storage of sewage (e.g., treatment plant tanks)~~
-

WHPA-E with a vulnerability score of 9

- Combined sewer discharge from a stormwater outlet to surface water
- Discharge of stormwater from a ~~stormwater retention pond~~stormwater management facility
- Industrial effluent discharges
- Sewage treatment plant bypass discharge to surface water
- Sewage treatment plant effluent discharges (includes lagoons)
- ~~Storage of sewage (e.g., treatment plant tanks)~~

WHPA-E with a vulnerability score of 8.1

- Combined sewer discharge from a stormwater outlet to surface water
- Discharge of stormwater from a ~~stormwater retention pond~~stormwater management facility
- Industrial effluent discharges
- Sewage treatment plant bypass discharge to surface water
- ~~Sewage treatment plant effluent discharges (includes lagoons).~~
- ~~In the Halton and Hamilton Areas, significant threats from sewage exist in the wellhead protection areas of Freelton, Carlisle, Campbellville, Kelso, Cedarvale and Greensville municipal wells. In the Carlisle area, significant threats may be to groundwater and surface water sources.~~

Issue contributing area – chloride

- Discharge of stormwater from a ~~stormwater retention pond~~stormwater management facility

There are no existing significant threats enumerated within the WHPA-E of the Carlisle wells under this threat category.

Municipal and private sewage systems, including residential septic systems, are the most common threats in the Source Protection Areas. For the purpose of the threat assessment, it was assumed that every residence and business in the vulnerable area without municipal servicing, a lagoon, or regulated private wastewater treatment system had a septic tank with a leaching bed. No municipal wastewater treatment systems, including plants and piping, exist in wellhead protection areas where the risk to drinking water sources is at a significant level.

The ~~following table (Table 1) identifies the~~ significant threat counts in each of the municipal wellhead protection areas and issue contributing areas in the Source Protection Areas are included in the latest approved assessment reports and are subject to changes due to modifications or new drinking water systems, changing landscapes, etc. The existing threats are all related to the existence and use of a septic system on the property.

Significant threats from wastewater treatment facilities that discharge to surface water through a means other than a designed bypass (wastewater treatment facility discharge) were identified through modelling of scenarios along the Lake Ontario shoreline (Figure~~s~~ B-9~~7 and B-11~~). This threat relates to a total plant failure and release of high concentrations of E.coli from the plants to the source water of municipal intakes. The number of significant threats identified for each municipal intake are listed in the latest assessment reports~~is listed on Table 1~~.

Table 1 Significant sewage system threats

Vulnerable Municipal System Source Water	Threat	Number of Occurrences
Kelso WHPA	septic system	4
Walkers Line WHPA	septic system	01
Campbellville WHPA	septic system	33
Carlisle WHPA	septic system	36
Freelton FDF01 WHPA	septic system	1173
Freelton FDF03 WHPA	septic system	1173
Greensville WHPA	septic system	3735
Burlington Intakes	wastewater treatment facility discharge	6
Burloak Intake	wastewater treatment facility discharge	5
Oakville Intake	wastewater treatment facility discharge	6
Oakville Intake	trunk sewer break	1
Woodward Intake	wastewater treatment facility discharge	3

What legislation, guidelines, or protocols already exist?

Fisheries Act, 1985

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

Ontario Water Resources Act, 1990 and Environmental Protection Act, 1990

The Ontario Water Resources Act, 1990 (OWRA) provides for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, in order to promote

Ontario's long-term environmental, social and economic well-being. The Environmental Protection Act, 1990 (EPA) provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects. The ~~Ministry of the Environment and Climate Change~~MECP is responsible for enforcing both Acts, and both Acts administer approvals for sewage works.

~~Due to the modernization of the environmental approval process, future environmental compliance approvals for sewage works will be administered through the Environmental Protection Act whereas existing ones will exist as certificates of approval under the Ontario Water Resources Act.~~

Until October 31, 2011, section 53 of the Ontario Water Resources Act applied to the issuance of approvals to establish, alter, extend or replace new or existing sewage works with a design capacity of greater than 10,000 litres per day. On this date, the Act was amended and the future issuance of approvals will be administered through the Environmental Protection Act. An environmental compliance approval will be issued for new approved systems, while existing certificates of approval issued under the OWRA will continue to apply and will be treated as an environmental compliance approval. This means that certificates of approval may be amended, reviewed, suspended or revoked as if they were environmental compliance approvals.

In addition to the requirement for approvals for larger systems, any system, no matter what its size, which cannot be located within the confines of a single property, is subject to approval by the ~~Ministry of the Environment and Climate Change~~MECP.

The ~~MOECC's~~ MECP's Environmental Compliance Approvals Application outlines the required information, supporting documentation and technical requirements necessary to assess proposed sewage works. The ~~MOECC~~ MECP generally requires at a minimum the following information in support of an application for approval:

- site location information including zoning and classification
- identification of whether the proposed activity is within a vulnerable area and whether it is designated as a significant drinking water threat in the Assessment Report for the local Source Protection Area
- proposed activities for the site
- design capacity
- preliminary engineering report
- environmental impact analysis

The terms and conditions of the environmental compliance approval, generally address:

- criteria for operation and performance of the facility
- requirements for monitoring and recording of specific indicators of the environmental impact of the works (water quality, not quantity)
- reporting on incidents
- provision of contingencies to prevent and deal with accidental spills

The threat subcategories for which an environmental compliance approval is issued or a certificate of approval has been issued in the past include:

- combined sewer discharge from a stormwater outlet to surface water
- sanitary sewers and related pipes (excluding "plumbing")
- septic system with a design capacity over 10,000 litres per day
- sewage treatment plant bypass discharges to surface water
- sewage treatment plant effluent discharges (including lagoons)
- storage of sewage (e.g., sewage treatment plant storage tanks)

~~A sewage system is unsuitable in circumstances where, for example, a system failure would affect the only water supply for a community.~~

Guideline B-7 states that there are four situations where a sewage disposal system would be unsuitable:

- where no appreciable attenuation can be provided (e.g., very short time of travel to surface water)
- natural attenuation capacity is weak (e.g., fractured rocks)
- the subsurface is suited for better use (e.g., an esker that could be used as a water supply)
- the consequences of failure are unacceptable (e.g., affect the only water supply for a community)

Provincial Policy Statement, ~~2005~~2020

The Provincial Policy Statement (PPS) is issued under section 3 of the Planning Act and provides direction on matters of provincial interest related to land use planning and development. Decisions affecting planning matters must be consistent with the PPS.

The PPS indicates that municipal sewage services are the preferred form of servicing for new development in settlement areas. Municipalities may choose to use private communal sewage services and individual on-site sewage services where municipal sewage services are not provided and policies have been established to ensure the systems are designed appropriately. The municipality is to ensure that these systems are financially viable and comply with regulatory requirements, and that they protect human health and the natural environment.

Planning for sewage services must consider lot creation only if there is confirmation of sufficient sewage system capacity within municipal sewage services or private communal sewage services. This includes treatment capacity at wastewater treatment plants for hauled sewage from private communal sewage services.

Individual, on-site sewage services (e.g., septic systems) can be used for new development of five or less lots or private residences when municipal services are not provided, or in rural areas. Sufficient reserve sewage system capacity within municipal sewage services or private communal sewage services must be confirmed for the long-term.

The ~~MOECC~~ MECP considers that reserve capacity for private communal and individual on-site sewage services is sufficient if the hauled sewage from the development can be treated or disposed at sites approved under the Environmental Protection Act or the Ontario Water Resources Act. In the Halton-Hamilton Source Protection Region, both the City of Hamilton and Halton Region accept septage generated in their jurisdiction for treatment at their wastewater treatment plants.

~~When municipal services are not provided, private residences, new developments of five or less lots, or rural properties may use individual, on-site sewage systems, such as septic systems.~~

Pesticides Act, 1990 and Ontario Regulation 63/09, 2009

The ~~MOECC~~MECP identifies Mecoprop as a chemical of concern in stormwater discharge. Mecoprop, or methylchlorophenoxypropionic acid (MCPP), is a common general use herbicide and an ingredient in household weed killers and "weed-and-feed" lawn fertilizers (Wikipedia, July 2010). Ontario's cosmetic pesticides ban controls the use of this pesticide. The ban took effect on April 22, 2009. The Pesticides Act and Ontario Regulation 63/09 detail the requirements of the ban.

The provincial ban prohibits the application of pesticides for cosmetic purposes on lawns, vegetable and ornamental gardens, patios, driveways, cemeteries, and in parks and school yards. More than 250 pesticide products are banned for sale and over 95 pesticide ingredients are banned for cosmetic uses. Exceptions to the ban are made for: public health and safety, natural resources, golf courses, sports fields, specialty turf, agriculture, forestry, and public works. Monitoring of stream water quality by the ~~Ministry of the Environment and Climate Change~~MECP has shown that the ban is effective at reducing the amount of pesticides in stormwater.

~~The cosmetic pesticides ban, as detailed under the Pesticides Act and Ontario Regulation 63/09, prohibits the sale of 250 products and the use of over 95 products for cosmetic purposes. The results of the ban should reduce the amount of pesticides in stormwater.~~

Ontario Building Code Act, ~~2006~~1992

Small septic systems (those with a design flow of 10,000 litres per day or less) are subject to approval by the municipality under the Ontario Building Code Act. Small septic systems most frequently service rural residences and hamlets or small villages that do not have municipal or communal sewage services.

There are five classes of sewage systems designated under the Ontario Building Code (Ontario Regulation 350/06):

- Class 1 - Outhouse, chemical or composting toilet, incinerating toilet or vault privy
- Class 2 - Leaching pit for grey water disposal only
- Class 3 - Cesspool for disposal of outhouse waste
- Class 4 – Septic tank and leaching bed includes a filter bed, conventional leaching bed and chamber systems, tertiary systems (new technologies)
- Class 5 – Holding tanks (minimum 9,000 litres)
- Class 4 systems are the most common and include the following components: a septic tank with effluent filter (required as of January 1, 2007), a leaching bed or filter bed, and a mantle. These systems are generally installed on a property-by-property basis conforming to minimum separation distances in the Ontario Building Code as displayed on Figure 2.

The Ontario Building Code regulates construction, operation and maintenance requirements for servicing by qualified people, wastewater monitoring and sampling, and septic tank pump outs. Small septic systems are designed to minimize pathogens released to the environment. The Code does not currently contain requirements for the abatement of nutrients and/or other chemicals.

~~Under the Ontario Building Code Act, small septic systems must conform to specific construction and maintenance standards.~~

Staff have asked MECP to provide updated information, if any, on this: Consultation is underway to make changes to the Building Code to require testing of systems to a new national standard and the requirement, in some at-risk areas, for the installation of tertiary treatment systems. Tertiary systems include additional treatment of waste through aeration and/or a filter medium. If these changes are passed by Cabinet, their effective date would be December 31, 2016.

Under the existing requirements of the Ontario Building Code, Class 4 systems may include a secondary or tertiary treatment unit to which the septic tank discharges. With this in place, the area of the leaching bed could be reduced.

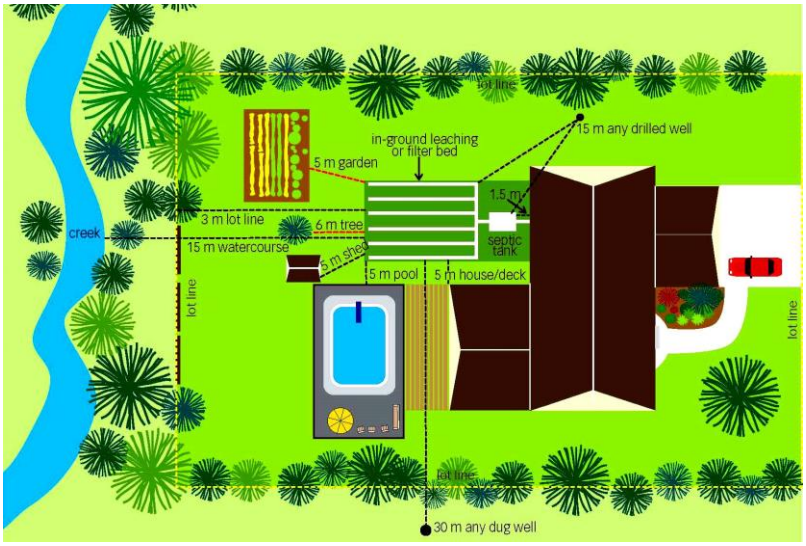

Figure 2 Minimum separation distances for leaching or filter beds (Rideau Valley Conservation Authority, undated).

Note: If a leaching or filter bed is raised, the separation distances are increased by a factor directly related to the difference between the finished and existing grade. For instance, if the finished grade is 1.5 metres higher than the existing grade, then 1.5 metres is multiplied by 2 to equal 3 metres. Three metres is then added to all the distances noted above.

The Code has been amended by Ontario Regulation 315/10 to establish and govern mandatory and discretionary on-site sewage system maintenance inspection programs. The municipalities must administer a mandatory inspection program for systems subject to the Ontario Building Code that have

been identified as a significant drinking water threat in vulnerable areas (as identified in the Assessment Reports for the Source Protection Areas). The wellhead protection areas are the only vulnerable areas delineated where significant small septic system threats are possible in the Halton Region and Hamilton Region Source Protection Areas. Therefore, the City of Hamilton and the Town of Milton ~~will~~ administer this program.

Inspections of sewage systems must be carried out:

- no later than five years after the date on which the notice of approval of the Assessment Report is published on the Environmental Bill of Rights (the notices for both reports were published on January 11, 2012)
- every five years after the most recent inspection of the sewage system

In addition to the above, there is a discretional inspection program whereby additional areas can be included in the inspection program, if the municipality considers this necessary. Under this program, the timelines for inspection are flexible.

The inspection program is an important additional tool for implementing measures to address drinking water threats. According to Ontario Regulation 287/07, Part IV, tools under the Clean Water Act (prohibition, risk management plans, and restricted land use) cannot be applied to threats related to sewage systems. Therefore, other ways to address these threats must be considered.

~~Ontario Regulation 315/10 amends the Building Code to require on-site maintenance inspection programs. Municipalities administer these programs on septic systems that are identified as significant drinking water threats in vulnerable areas. In Halton and Hamilton Areas, the City of Hamilton and the Town of Milton administer these programs.~~

Other Tools

Other tools for addressing threats associated with sewage systems include:

- Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems
- Stormwater Management Planning and Design Manual
- Municipal Requirements
- Conservation Authority Planning Policy

Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessments

Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessments provides technical guidance to locate septic systems in rural subdivisions with five or more units. It includes a groundwater impact assessment to address the ability of the development lands to treat septic effluent to acceptable limits. Such an assessment should be considered in conjunction with the Technical Guideline for Private Wells: Water Supply Assessment.

~~Other tools for addressing threats associated with sewage systems include:~~

~~Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems~~

~~Stormwater Management Planning and Design Manual~~

~~Municipal Requirements~~

~~Conservation Authority Planning Policy~~

Stormwater Management Planning and Design Manual

The Ministry of the Environment's "Stormwater Management Planning and Design Manual" (March 2003) provides practical information on how to design stormwater management facilities in Ontario. It focuses on quantity and quality control and it is the main reference document for urban stormwater management within source protection areas. In some areas, a new emphasis has been placed on low impact development to mitigate urban effects on the natural environment. In addition, new stormwater management facilities require a permit from the conservation authority and approvals from the municipality. Municipalities have extensive engineering manuals setting out requirements for design criteria for stormwater management facilities.

There are three different levels of quality treatment for stormwater management facilities, all related to sediment control. However, the document does mention the need to consider bacteria near recreational/swimming areas and temperature for cold water streams.

Enhanced – removes 80 percent of suspended solids and is used in areas with highly permeable soils, sensitive spawning habitat, high baseflow, clear waters, and low erosion.

Normal – removes 70 percent of suspended solids and is used in areas with some sediment loading and less sensitive spawning habitat.

Basic – removes 60 percent of suspended solids and is used in areas with high sediment loading and a significantly altered stream system with little opportunity to rehabilitate.

~~The MOE's "Stormwater Management Planning and Design Manual," a practical guide to designing facilities, focuses on quantity and quality control. This manual is the primary reference document for urban stormwater management within Source Protection Areas.~~

Municipal Requirements

The Region of Halton updated their guidelines for studies to support approval of private services. The requirement for a hydrogeological study for new development has been incorporated into official plans. For example, Halton Region's official plan states:

145(5) Require that land uses that have the potential to release or discharge contaminants to affect the quality of groundwater proposed on any lands outside the Burlington and Oakville Urban Areas be subject to a review by the Region to assess the risk of such uses to potentially contaminate the groundwater system in Halton. As a result of such an assessment, a landowner may be required to carry out a hydrogeological study to the satisfaction of the Region and implement its recommendations which may result in a prohibition of the use, restriction of the use, or an agreement to adopt best management practices as prescribed by the Region.

~~Halton Region requires that rural development be based on conventional septic tank and tile bed systems. They require a minimum sewage system area of 700 square metres of vacant and available land.~~

~~The City of Hamilton requires a minimum lot size of one acre.~~

Halton Region's guidelines require that development outside the urban area be planned on the basis of conventional septic tank and tile bed systems and that the minimum clearance requirements of the Ontario Building Code are achieved. A minimum sewage system envelope of 700 square metres of vacant and suitable land for the tile bed system is required. The tile field must be adequately distant from all water supplies to meet minimum separation distance requirements. For any development to proceed, the lot must be sized to be self-sustaining for sewage and water supply.

Area-specific hydrogeological studies completed for a number of settlement areas include further detail on minimum lots sizes. Prior to any development proceeding, additional site-specific studies would be required to assess the impact of that development.

The City of Hamilton has guidelines to deal with servicing of lots. A minimum lot size of one acre is used. Minimum lot sizes have been addressed in their new rural official plan (Chapter C, section 5.1.3.c) in order to accommodate the required servicing area for septic tanks. The City has prepared hydrogeology study guidelines to assist proponents with development applications when private servicing is proposed.

Conservation Authority Planning Policy

Ontario Conservation Authorities are commenting agencies under the Planning Act. One of their roles is to review stormwater management plans for new development and to provide comments to their member municipalities. The authority considers the following aspects through this review:

- maintenance of the hydrologic cycle
- recognition of riparian water rights
- retention and improvement of ecosystem health

Flood control, maintaining baseflow in watercourses, water temperature, erosion and sediment control, limiting nutrient and bacteria loading, maintaining fish habitat, and groundwater recharge and contamination may be of interest in a particular watershed or subwatershed.

To ensure consistency in their approach to stormwater management, many conservation authorities have guidelines for this purpose. These guidelines outline a conservation authority's main policies and objectives for stormwater management.

~~One of the conservation authorities' roles is to review stormwater management plans for new developments. Flood control and ecosystem health are two prime factors in their review.~~

What policy approaches were discussed?

The Planners' Working Group and the Source Protection Committee discussed approaches to address the threat to drinking water of the establishment, operation or maintenance of a system that collects, stores, transmits, treats, or disposes of sewage. The group and Committee discussed each of the subcategories described above separately. Policy approaches discussed for the subcategories included:

Education and Outreach

Educate residents and businesses about septic systems where drinking water threats would be significant.

Incentive Programs

Initiate or support incentive programs for septic system upgrades.

Land Use Planning

Impose requirements and/or restrictions on sewage systems.

Prescribed Instruments

Amend and support requirements of certificates of approval / environmental compliance approvals.

Existing Legislation and Programs

Rely on existing programs to address threats.

Under Ontario Regulation 287/07, tools enabled under Part IV of the Clean Water Act, 2006, such as risk management plans and prohibition, cannot be applied to threats related to sewage systems. Therefore, the Source Protection Committee developed policies based on other approaches to address this threat.

~~The Committee discussed policy options for each subcategory associated with sewage.~~ Policy directives for individual subcategories follow the discussion.

3.2.2 Discussion on Policy Options

Monitoring

Annual monitoring of the implementation of policies for all subcategories of sewage threats was discussed by the Planners' Working Group and the Source Protection Committee. Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Combined sewer discharges from stormwater outlets to surface water

Combined sewers are only significant threats to surface water. Therefore, they can only be significant in the Halton-Hamilton Source Protection Region within the WHPA-E of the Carlisle well field. No combined sewers exist in this area. Municipalities no longer construct combined sewers to convey sanitary sewage and stormwater. Thus, prohibition of this activity will rely on existing requirements.

The following summarizes the policy directive and gives the corresponding identifier for the policy included in the Source Protection Plan.

~~**No significant threats exist due to discharges from combined sewers or stormwater retention ponds. Also, it is unlikely that any new facilities will be constructed where they would be significant threats.**~~

Consultation

This policy was added during the pre-consultation process. No combined sewers exist where they would be a significant threat and none are likely to be constructed due to existing municipal and provincial policies. Therefore, in 2014 the City of Hamilton requested that the policy require that they comply with requirements of the province. The Source Protection Committee agreed that provincial requirements will not permit significant threats from this activity to occur. The reader is directed to the Plan to review the policy.

Policy Directives for Threat 2 – Combined Sewer Discharges		
	Policy Directive	Policy
1	Direct the City of Hamilton to prohibit the construction of combined sewers within a wellhead protection area E. Revised in 2014 to require the City of Hamilton to comply with the requirements of the province.	T-51-C

Discharge of Stormwater from ~~Stormwater Retention Pond~~Stormwater management facilit~~y~~~~ies~~

Only one stormwater management facility currently exists within a wellhead protection area or issue contributing area, and although it is located adjacent to a well under the direct influence of surface water, based on the circumstances used for assessment it does not pose a significant threat to the drinking water source. The drainage area of the sewer network and pond is smaller than that required to make it a significant threat. Thus, there are no existing threats.

The wellhead protection areas within the Source Protection Areas where a significant threat could occur are occupied by lands zoned as agricultural and low density residential. Thus, it is unlikely that additional storm ponds will be constructed in these vulnerable areas. The area within the Cedarvale issue contributing area for chloride where significant threats are possible currently crosses agricultural and forested land. The majority of this area is proposed for future urban mixed-residential development. Thus, there is the possibility that a ~~stormwater retention pond~~stormwater management facility could be proposed within the area.

Under the Environmental Protection Act, stormwater management facilities require an environmental compliance approval issued by the ~~Ministry of the Environment and Climate Change~~MECP.

The City of Hamilton has confirmed that there are no stormwater retention ponds currently planned for vulnerable areas that will have a sufficiently large drainage area to be a significant threat. For this reason, only policies relating to future significant threats are contained within the Source Protection Plan.

Education and Outreach

Discussions included the benefits of enhanced education and outreach including the yellow fish program, implemented by the Conservation Authorities, and signage at stormwater management facilities regarding water quality. The Committee supports these programs and their continuation.

Prescribed Instruments

An environmental compliance approval is required under the Environmental Protection Act for future stormwater management facilities. The ~~Ministry of the Environment and Climate Change~~MECP could be requested to deny the approval if the proposed activity is located within a vulnerable area where a significant threat to drinking water sources would occur.

Alternatively, the Committee suggested that the Ministry impose conditions on an environmental compliance approval to manage the risk associated with the discharge of stormwater within a vulnerable area to ensure it is not a significant threat to drinking water sources.

The ~~Ministry of the Environment and Climate Change~~MECP could be requested to assess the need for additional treatment, such as oil/water separators, to improve the quality of discharge water. Particularly in settlement areas, oil may be entering the pond and require removal. The Ministry could also impose requirements for the removal of accumulated sediment from the retention ponds on a regular basis. This would be beneficial to ensure the pond has the capacity to operate effectively for sediment removal and to remove adsorbed contaminants.

Land Use Planning

In addition to relying on the prescribed instrument to address the threat of discharge from stormwater management ponds, the Source Protection Committee determined that it would be appropriate to include a policy to locate the ponds outside of the vulnerable areas where there could be a significant drinking water threat, if possible. The Committee understands that this may not always be possible but the conditions imposed on the environmental compliance approval should manage the threat.

Consultation

The only revisions to the draft policies from consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording to align policy T-4-C with an implementable procedural change and provide flexibility in reporting. Changes were made to Part (a) of the policy to accommodate the Ministry's request. The Committee is of the opinion that the specific information requested in monitoring policies is required to assure them that the necessary data/information is being documented for future analysis of policy effectiveness. Hence, Part (b), the monitoring policy, was only changed slightly. The reader is directed to the Source Protection Plan to review the policies.

Effective policies to address this threat include supporting existing education and outreach programs, such as the yellow fish program. Otherwise, the committee agreed to rely on prescribed instruments, such as certificates of approval, to address the threat from stormwater management ponds.

Policy Directives for Threat 2 – Discharge of Stormwater from ~~Stormwater Retention Pond~~Stormwater management facility~~s~~		
	Policy Directive	Policy
1	Require the ~~Ministry of the Environment and Climate Change~~MECP to include terms and conditions in environmental compliance approvals for the discharge of stormwater from a ~~stormwater retention pond~~stormwater management facility that will ensure this activity never becomes a significant drinking water threat. The Ministry will consider the following conditions to manage the risk – the requirements for regular maintenance of the pond, periodic removal of accumulated sediment, lining of the pond where warranted, the possible need for an oil/water separator, and other conditions to address site conditions.	T-4-C
2	As part of the approval of a Planning Act application, the municipalities must consider whether the stormwater ~~pond~~ management facility can be located outside of the vulnerable area where there could be a significant drinking water threat.	T-9-C

Industrial Effluent Discharges

Education and Outreach

Education and outreach is not considered appropriate to address this threat.

Prescribed Instruments

An environmental compliance approval is required under the Environmental Protection Act for future industrial effluent discharges. The ~~Ministry of the Environment and Climate Change~~MECP could be requested to deny the approval if the proposed activity is located within a vulnerable area where a significant threat to drinking water would occur. Also, the Ministry could be requested to impose conditions to reduce discharge criteria, or to manage the risk associated with the discharge to ensure it is not a significant threat to drinking water sources.

Industries require an environmental compliance approval to discharge effluent to surface water. Therefore, these prescribed instruments are the preferred policy approach to protect drinking water sources.

Land Use Planning

Industrial effluent discharges are only a significant threat in surface water vulnerable areas, such as the WHPA-E of the Carlisle two wells. The land area of the WHPA-E is not currently used, nor planned for, industrial land. Regardless of the current planning context, policies are required to be included within the Source Protection Plan to ensure that this activity does not become a significant threat to the municipal drinking water sources.

Since there are no existing threats, only policies for future threats are required. The challenge with using land use planning tools is that official plans only regulate industrial uses and not the activity of the release of effluent. The land use planning tool will not work unless there are very specific land uses that are to be prohibited.

The Committee noted that the policy should not be so restrictive that it would disallow light industry that has no discharges of concern, such as wind farms or solar farms. The City of Hamilton has expressed concern regarding the use of a land use option to address this activity, because the zoning by-law is not structured to segregate between industrial uses that discharge effluent and those that do not. The zoning by-law can be used for a general prohibition regarding industrial uses within the vulnerable area, but it is not as refined a tool to provide for this additional distinction.

Consultation

The only revisions to the draft policies from consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording to align policy T-5-C with an implementable procedural change and provide flexibility in reporting. Changes were made to Part (a) of the policy to accommodate the Ministry's request. The Committee is of the opinion that the specific information requested in monitoring policies is required to assure them that the necessary data/information is being documented for future analysis of policy effectiveness. Hence, Part (b), the monitoring policy, was only changed slightly. The reader is directed to the Source Protection Plan to review the policy.

Policy Directive for Threat 2 – Industrial Effluent Discharges		
	Policy Directive	Policy
1	Require that the ~~Ministry of the Environment and Climate Change~~MECP include terms and conditions in environmental compliance approvals for industrial effluent discharges in vulnerable areas to ensure that the activity does not become a significant drinking water threat. These terms and conditions could include monitoring or the inclusion of strict criteria for effluent quality.	T-5-C

Sanitary Sewers and Pipes

Although integral to the operation of a sewage treatment plant, the sanitary sewers and pipes are considered a separate drinking water threat. The threat is due to potential leakage and spills. The primary method of addressing this threat is through implementation of a program for condition assessment and a proactive process of repairs and upgrades. At this time there are no existing sanitary sewers and pipes where they would be significant drinking water threats and the areas within the wellhead protection areas are located within the rural portions of the community where services are not planned. There may be a future need for a sanitary sewer within the Kelso wellhead protection area and appropriate policies must be in place if that occurs.

The Committee recommends that, if the installation of sanitary sewers and pipes is proposed in a vulnerable area, the MOE include conditions on an environmental compliance- approval that require an enhanced program of monitoring and a proactive maintenance program.

Education and Outreach

Education and outreach were not considered appropriate to address this threat.

Prescribed Instruments

New sanitary sewers and pipes require an environmental compliance approval as part of the whole sewer works. It was noted that both the Region of Halton and the City of Hamilton have current programs of sewer pipe inspection. If, in the future, sanitary sewers and pipes were proposed for installation within an area where they would be a significant threat, an enhanced program of monitoring and proactive maintenance on a regular schedule would be appropriate as a policy option.

Land Use Planning

Land use planning tools were not considered appropriate to address this threat.

Consultation

The only revisions to the draft policies from consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording to align policy T-6-C

with an implementable procedural change and provide flexibility in reporting. Changes were made to Part (a) of the policy to accommodate the Ministry's request. The Committee is of the opinion that the specific information requested in monitoring policies is required to assure them that the necessary data/information is being documented for future analysis of policy effectiveness. Hence, Part (b), the monitoring policy, was only changed slightly. The reader is directed to the Source Protection Plan to review the policy.

Policy Directive for Threat 2 – Sanitary Sewers and Pipes		
	Policy Directive	Policy
1	Require the ~~Ministry of the Environment and Climate Change~~MECP to include terms and conditions in environmental compliance approvals for sanitary sewers and pipes within vulnerable areas where they would be a significant threat to municipal drinking water sources. The terms and conditions could include the requirement for inspections and maintenance.	T-6-C

Small Sewage Systems

Education and Outreach

The role of education and outreach as a means to reduce the disposal of toxic chemicals down the drain was identified as a useful tool. However, without supporting policies, the Committee did not consider this an adequate policy to address this threat at a significant level.

It was noted that some rural residents are not familiar with septic systems and their operation. It is important that the homeowner be educated about the workings of their septic system and the limited treatment it provides. Conventional and tertiary septic systems require long-term maintenance, and therefore, require a commitment from the homeowner to carry out that maintenance.

Mandatory Sewage System Inspections

~~The Ontario Building Code requires municipalities to inspect sewage systems once every five years in areas where they are significant drinking water threats. In Halton and Hamilton Areas, the Town of Milton and the City of Hamilton undertake these inspections.~~

The province amended the Ontario Building Code to require the development and implementation of an on-site, sewage system maintenance inspection program. This sewage system maintenance inspection program supports the implementation of the Clean Water Act by providing a consistent approach for determining if small septic systems, in vulnerable areas where significant threats exist, are functioning properly. The intent of the mandatory inspection program is to bring all systems up to the standards of the Ontario Building Code to ensure the risk to the environment is reduced. The municipalities are now required to inspect systems in designated areas once every five years on a reoccurring basis. Where a

system is found to not be operating properly, the Ontario Building Code provides the authority to order maintenance, replacement, or upgrading where necessary.

The Ontario Building Code also allows for discretionary maintenance inspection programs that can be established in non-designated areas. It is up to the municipality if they wish to use their discretionary authority to apply the same requirements to other areas. The Committee did not support the extension of the inspection program beyond the mandatory inspections already required.

The City of Hamilton advised that, in the past, visual inspections were completed based on received complaints, and when problems were found, orders were issued. The tank itself only tells half the story, since it is very difficult to see what's happening underground. If a breakout occurs at ground surface, the sewage could be a public health issue, and the health department requires the area to be fenced off to keep children and pets away while repairs are completed. Initially, a complaint usually goes to the building department. To identify the problem, the tank is typically pumped and inspected. If repairs to the tile bed will take an extended time to repair, the septic tank is turned into a holding tank, and it is pumped out periodically. The Health Department is rarely involved.

The ~~Ministry of the Environment and Climate Change~~MECP also responds to complaints from the public and conducts inspections and tests in such situations. They suggest that the closest source is usually the most likely source of the problem. A properly operating septic system is designed to discharge effluent into the ground and it should never be seen.

The Ministry of Municipal Affairs and Housing has developed the requirements of the mandatory inspection program based on a phased approach. The first phase is non-intrusive, only requiring a desktop review of the details of the system, such as location, construction, and maintenance schedule, and a visual inspection of lands around the system. If a problem is identified, a phase two intrusive study is completed.

The Ministry of Municipal Affairs and Housing has developed a phased approach to mandatory inspections:

- Phase 1 requires information such as the location and maintenance schedule.
- Phase 2 requires a more complete study, if a problem is identified

A training program for building officials and inspectors regarding the Ontario Building Code amendment will be implemented. The Committee suggested that those undertaking the inspections should be trained, technical municipal staff or septic system contractors and not summer students. Many factors must be considered when assessing the effectiveness of a septic system, for example soil conditions. A single approach may not always work and the inspector has to be knowledgeable enough to assess each site.

Landowners within an urban area are encouraged to connect to municipal sewer systems when available and connection feasible.

The municipality can recoup the costs of the inspection program, and it is up to the municipality as to how to administer charges. For many homeowners, the status of their system is unknown, and the fear is that, upon inspection, long-time residents may be confronted with expensive repairs or replacement costs. The Committee raised the issue about whether the homeowners who use the septic system should

pay for the inspection, as they are the users and beneficiaries. It was put forth that there be some sort of fund to assist homeowners to ensure upgrades are completed when needed without financial limitations.

The new mandatory inspections will be required only in the vulnerable areas where a significant threat exists, and therefore, the program will be implemented by the Town of Milton and the City of Hamilton. The Ontario Building Code regulates sewage systems that are not designated as drinking water threats by the province under the Clean Water Act, 2006. Thus, the systems included in the mandatory program will include earth pit privies, privy vaults, greywater systems, cesspools, leaching bed systems and their associated treatment units, and holding tanks.

Land Use Planning

One suggested policy approach to address septic system threats was to direct a municipality to establish a by-law requiring existing developments to hook up to municipal services when it is feasible to do so. When urban areas change, some homes that were rural become urban, and when municipal sewers are established in the area, homeowners should be encouraged to hook up to those services and to decommission their septic systems. It is an extremely expensive option to hook up a household to a municipal sanitary sewer line. The financial side of such matters must be considered. It is also important to remember that official plans do not permit the extension of municipal sewage systems beyond the urban area. The pipes that exist in front of homes outside the urban area are usually trunk lines and connection to them by individual residences is not permitted.

The option to connect to municipal services by homeowners having existing septic systems was discussed. Halton Region allows connection to municipal service facilities outside the urban area only for public uses. The only wellhead with a planned sanitary sewer line in the vicinity is Kelso. Connection of homes in the rural area was not considered part of the extension of services within the adjacent urban area of Milton. The Niagara Escarpment Plan does not permit urban service expansion until the Niagara Escarpment Plan review. The Committee noted that the Niagara Escarpment Commission will be reviewing the Niagara Escarpment Plan in 2015 and could address source protection planning at that time. The Clean Water Act, 2006 states that those policies that provide the highest level of protection to drinking water sources will take precedence.

A municipal funding assistance program is required to ensure landowners can proceed with connection to municipal sewers within the urban boundary and with upgrades to septic systems in the rural area. The program could consist of recoverable loans through taxes.

Overall, it was agreed by the Committee that sewage connections outside the urban area are rare and unlikely to be feasible. Therefore, it was felt that full support should be given to the inspection program, coupled with a funding initiative that would ensure that individuals forced to upgrade could afford to do so in a timely manner.

The principle of a self-sustaining lot, or a minimum lot size that would accommodate all of the components required to service a lot, should be included as a tool. The Region of Halton is bringing forward the definition of a self-sustaining lot in their new Hydrogeologic Guidelines for Private Services, and Hamilton has incorporated this policy direction into the City's new rural official plan. The Source Protection Plan should support the use of definitions and regulations and ensure they are incorporated

into all official plans. Lot sizes should be sufficient to meet long term servicing needs. The Ontario Building Code does not allow existing lots of record that are substandard in size to develop unless they can meet all requirements of a Class 4 system. Holding tanks are only permitted in specific circumstances as noted above. Holding tanks and tertiary systems are not considered a sustainable treatment system by the municipalities due to long term operational and maintenance concerns. On a substandard lot, if a tertiary system fails, the lot may not have the required attenuative capacity to accommodate a traditional Class 4 system. Similar policies should be contained within the Niagara Escarpment Plan to ensure a consistent policy direction on this matter.

Consultation

Concerns were raised by some municipalities regarding the funding source for any municipal education, outreach and incentive programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level. The Ministry of Municipal Affairs and Housing commented that the education and outreach and incentive policies could enhance the Plan. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years. The monitoring policy was changed slightly to remove two specific reporting requirements on the recommendation of the Ministry of the Environment and Climate Change.

The Niagara Escarpment Commission indicated that the lot creation and land use policies of the Niagara Escarpment Plan would already likely prevent the Niagara Escarpment Commission from issuing permits for activities which pose significant threats on new lots or uses that pose threats on existing lots.

The municipal planners requested that wording be included in Policy T-11-C to direct the municipality to use Planning Act tools to prohibit the land use as support for the required official plan amendment.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threat 2 – Sewage Systems regulated by the Ontario Building Code		
	Policy Directive	Policy
1	Support education and outreach programs for landowners about the proper disposal of toxic chemicals, the operation and maintenance of septic systems, and the benefits of installing effluent filters, performing tank inspections, and having tanks regularly pumped out.	T-13-C
2	Support the mandatory inspection program as required under the Ontario Building Code.	T-14-C
3	Support the inspection program only for mandatory inspections and leave it up to the municipality regarding their discretionary authority.	No policy required

Policy Directives for Threat 2 – Sewage Systems regulated by the Ontario Building Code		
	Policy Directive	Policy
4	Request landowners to connect to municipal sewage systems when a septic system is used within a vulnerable area where municipal services are provided, permitted, and capacity is available.	T-15-S
5	Support and encourage ongoing funding of the Ontario Drinking Water Stewardship Program or a similar program by the ~~Ministry of the Environment and Climate Change~~MECP for septic system upgrades, replacements, decommissioning, and connection to municipal sewage works where they are a significant threat.	T-16-S
6	Consider the creation of municipal financing programs to assist landowners who are required to complete septic system improvements under the mandatory inspection program. The program should allow the work to be completed without undue delay and the landowner to repay the municipality over time.	T-17-C
7	Within official plans and zoning by-laws, ensure future lot sizes are of sufficient size to accommodate the required on-site servicing.	T-11-C
8	Request the Niagara Escarpment Commission amend the Niagara Escarpment Plan to ensure future lot sizes are of sufficient size to accommodate the required on-site private servicing.	T-12-S

Large Septic Systems

Education and Outreach

Education and outreach was not considered sufficient to address the threat posed by large septic systems. It was, however, deemed to be beneficial to remind users of the limited treatment offered by the system to reduce the amount of toxic chemicals released to the environment.

Land Use Planning

The Committee discussed the option of using land use planning to prohibit large septic systems in vulnerable areas where they would be a significant threat. One large septic system may be maintained at a better standard than several smaller systems, and therefore, offer better protection of drinking water sources. The Committee did not support proceeding with this option.

~~If a significant threat to municipal drinking water occurs due to a large septic system, the Committee recommended that, if feasible, municipalities consider connecting that property to municipal wastewater services.~~

A Source Protection Plan policy could utilize site plan control under the Planning Act by directing the municipality to identify specific areas for the location of any future large septic systems. This approach could be used to locate large septic systems outside areas where this threat is significant. The municipalities may need to amend their official plan and their site plan control by-law to implement the policy. A site plan would delineate areas where future septic systems would be permitted. The site plan agreement would be registered on title to the land.

One option considered by the Committee was the potential for large-scale septic systems to be connected to municipal sewage works. It was noted that the current policy framework within Halton Region would not permit that connection to occur unless the system was for a municipal service facility. Based on discussions, the Committee concluded that, where possible, and where there is or would be a significant threat to municipal drinking water sources due to a large-scale septic system, the municipality should consider a connection of that property to municipal wastewater services within the current policy context and where servicing capacity is available.

Prescribed Instruments

The first choice of the Committee to address the threat of the establishment, operation, or maintenance of a system that collects, stores, transmits, treats, or disposes of sewage was the use of prescribed instruments, when they exist. For large septic systems, the instrument is the environmental compliance approval issued by the ~~Ministry of the Environment and Climate Change~~MECP.

In considering the use of a prescribed instrument to manage a significant drinking water threat, it is important to note that capacity to do so will depend on the legislative authority that governs the issuing of the prescribed instrument. The instrument can only control activities that it can legally regulate. The advantages of the use of support for or amendments to prescribed instruments are the familiarity with the instrument by the property owner and the avoidance of regulatory duplication.

This approach can be used for both existing and future large septic systems. When developing policies to amend prescribed instruments, the Source Protection Plan can include some policy details about how the activity should be managed or detail the outcomes that should be achieved. Conversely, the Plan may leave those details to the public body responsible for implementing the policy. For example, for significant drinking water threats, the policy could require a specific standard to be applied, or simply

state that measures must be taken to ensure that the activity ceases to be a significant drinking water threat.

~~Environmental compliance approvals issued by the Ministry of the Environment are the preferred tool to address the threats associated with large septic systems.~~

~~The approval could include conditions that require regular inspections.~~

The choice of approach will depend on the level of detail in the information available regarding the threat. In the absence of such information, it may be useful to leave the specific details of how to manage the threat to the public body responsible for administering the prescribed instrument, rather than requiring the prescribed instrument to adopt a prescriptive set of actions to manage the activity.

The ~~Ministry of the Environment and Climate Change~~MECP has jurisdiction to inspect large septic systems, and District offices set targets for inspection. Following the Walkerton water contamination tragedy, inspections have increased. Policies could be included to make regular inspection of the large septic systems located where they are significant threats a priority in the District Office's work plan. These should have the same inspection schedule as small systems. This could be included in the prescribed instrument.

The Committee concluded that the ~~Ministry of the Environment and Climate Change~~MECP, when issuing new environmental compliance approvals or in the review of existing certificates of approval should include measures that ensure the activity ceases to be a significant drinking water threat, such as mandatory inspections, monitoring of impacts to groundwater, or system upgrades to current standards, if necessary.

Consultation

Revisions to the draft policies from consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording to align the prescribed instrument and incentive policies with implementable procedural changes and provide flexibility in reporting. Changes were made to Part (a) of the prescribed instrument policy T-7-C to accommodate the Ministry's request. The Committee is of the opinion that the specific information requested in monitoring policies is required to assure them that the necessary data/ information is being documented for future analysis of policy effectiveness. Hence, Part (b), the monitoring policy, was only changed slightly.

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level.

Another revision was to Policy T-18-C to clarify that it would apply to existing and future significant threats. The Ministry questioned the appropriateness of having the landowner as the implementing body in Policy T-15-S and thus have no legal effect. This policy will address future conditions and since the cost to connect will be the responsibility of the homeowners and businesses, it was the opinion of the Planners' Working Group and the Committee that it would not be appropriate for the municipality to implement the policy.

The Ministry of Municipal Affairs and Housing pointed out that if the proposed municipal incentive were provided to a commercial, manufacturing or industrial operation, the municipality would require a community improvement plan under the Planning Act. Section 28 of the Planning Act should be consulted for eligible costs.

Water softener discharges were added to the suggested education program due to their potential release of chloride to drinking water sources.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threat 2 – Septic Systems regulated by Ontario Water Resources Act or Environmental Protection Act		
	Policy Directive	Policy
1	Require the ~~Ministry of the Environment and Climate Change~~MECP to include terms and conditions in environmental compliance approvals for large septic systems in vulnerable areas to ensure that they cease to be or do not become significant drinking water threats. The terms and conditions could include mandatory monitoring of groundwater impacts, contingencies in the event that the source water quality is affected, compliance monitoring, mandatory system inspections at least every five years, upgrades to current standards, if necessary, and annual reporting to the Source Protection Authority.	T-7-C
2	Require the municipality, in consideration of site plan approval for a property with a new large septic system, to locate the septic system on the site in a manner that eliminates its location within a vulnerable area where there would be a significant drinking water threat.	T-10-C
3	Request the municipality responsible for wastewater services to consider a connection to municipal wastewater services for rural properties where the septic system has failed and where all other mitigation measures have been explored (including the replacement of the system and/or installation of an advanced private treatment facility) to the satisfaction of the municipality and found unsuitable, or where the municipality considers connection for future development to be most appropriate, and where the connection is permitted by provincial and municipal planning policy.	T-18-C
4	Request landowners to connect to municipal sewage systems when a septic system is used within a vulnerable area where municipal services are provided, permitted and capacity is available.	T-15-S
5	Support education and outreach programs for landowners about the proper disposal of toxic chemicals, the operation and maintenance of septic systems, and the benefits of installing effluent filters, performing tank inspections, and	T-13-C

	having tanks regularly pumped out.	
6	Support and encourage ongoing funding of the Ontario Drinking Water Stewardship Program or a similar program by the ~~Ministry of the Environment and Climate Change~~MECP for septic system upgrades, replacements, decommissioning, and connection to municipal sewage works where they are a significant threat.	T-16-S

Holding Tanks

An assumption was made during the threats assessment that each rural home and business in the vulnerable areas used a septic tank and tile bed for sewage disposal, unless explicitly known otherwise. Therefore, no existing threats to drinking water sources were identified for holding tanks.

The municipalities have indicated that a property owner is only allowed to use a holding tank in the case of septic tank failure, if the site is not large enough to accommodate a replacement Class 4 system, or if it is to be used for an interim use (municipal servicing is imminent). In Halton Region, interim use is two years or less.

Under the Ontario Building Code, a signed contract with a provincially certified sewage pumping/disposal company is required to be presented prior to final approval of a holding tank system by a municipality.

Education and Outreach

Educating users about maintenance, tank inspections, and the treatment of hauled sewage are key elements to a successful education and outreach program for holding tank threats.

Maintenance of the holding tank is the key point for an education and outreach program. Holding tanks need to be inspected periodically to ensure the tank and connecting piping are not leaking, and they need to be on a regular pump-out schedule to ensure they don't overflow. It would also be appropriate to educate users of holding tanks about the complexity of treatment of hauled sewage and the inability of conventional treatment to remove all chemicals from the effluent. This may assist in improving the quality of the sewage entering the treatment plant.

Land Use Planning

For existing lots of record with substandard lot area, holding tanks are considered. There is concern regarding the implementation of a proper, long-term maintenance program. The municipalities noted that, within areas that will not have municipal sewage services in the future, holding tanks are not permitted for new development as a general rule. However, a holding tank may be installed to address an existing human health risk. The Committee was satisfied that the current official plan policies and practices regarding holding tanks were appropriate and no additional land use policies were required.

Inspection Program

The inspection of holding tanks is required under the Ontario Building Code once every five years as part of the required municipal on-site, sewage system maintenance inspection program. This inspection program provides a consistent approach for determining if sewage systems, in vulnerable areas where significant threats exist, are functioning properly. The intent of the mandatory inspection program is to

bring all systems up to the standards of the Ontario Building Code to ensure the risks to the environment are reduced. As with small septic systems, the Committee determined that a municipal financial assistance program is necessary to ensure that repairs and upgrades can be made in a timely manner without financial hardship.

The Committee will rely on the municipal sewage system maintenance inspection program to address the risk from holding tank use.

Consultation

Comments were received on a number of policies in the draft Plan that set out support for the province taking the lead role in education and outreach to ensure a consistent position and messaging for the program. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and the messaging should be local. Water softener discharges were added to the suggested education program due to their release of chloride to water sources.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threat 2 – Holding Tanks		
	Policy Directive	Policy
1	Require the ~~Ministry of the Environment and Climate Change~~MECP to include terms and conditions in environmental compliance approvals for holding tanks in vulnerable areas to ensure that they cease to be or do not become significant drinking water threats. The terms and conditions could include mandatory monitoring of groundwater impacts, contingencies in the event that the source water quality is affected, compliance monitoring, mandatory inspections at least every five years, upgrades to current standards, if necessary, and annual reporting to the Source Protection Authority.	T-7-C
2	Implement an education and outreach program to inform users of holding tanks about the requirements for an appropriate long-term maintenance program, including inspections and scheduled pump-outs, and about the proper disposal of toxic chemicals. This could improve the quality of the effluent that leaves the sewage treatment plant.	T-13-C
3	Support the mandatory inspection program under the Ontario Building Code for holding tanks.	T-14-C
4	Request landowners to connect to municipal sewage systems when a holding tank is used within a vulnerable area where municipal services are provided, permitted and capacity is available.	T-15-S

5	Support and encourage ongoing funding of the Ontario Drinking Water Stewardship Program or a similar program by the ~~Ministry of the Environment and Climate Change~~MECP for holding tank upgrades, replacements, decommissioning, and connection to municipal sewage works where they are a significant threat.	T-16-S
6	Request the municipality responsible for wastewater services to consider a connection to municipal wastewater services for rural properties where the holding tank has failed and where all other mitigation measures have been explored (including the replacement of the system and/or installation of an advanced private treatment facility) to the satisfaction of the municipality and found unsuitable, or where the municipality considers connection for future development to be most appropriate, and where the connection is permitted by provincial and municipal planning policy.	T-18-C

Sewage Treatment Plants

Sewage treatment plants are located in urban areas, away from municipal wells, and therefore, there are no existing drinking water threats associated with the subcategories of sewage treatment plants, including bypasses effluent discharges, and storage of sewage in wellhead protection areas.

Modelling was completed for various scenarios resulting in spills to Lake Ontario waters to identify significant threats to surface drinking water sources. One scenario modelled was for the prescribed threat of wastewater treatment plants that discharge to surface water through a means other than a designed bypass. The scenario included a power outage that resulted in a total plant failure and release of E. coli to Lake Ontario. ~~.~~This modelling identified significant risk to the municipal drinking water sources and policies have been written that address this existing threat.

Existing plants are regulated by certificates of approval granted under the Ontario Water Resources Act. Any new facility would be required to go through the environmental assessment approval process and would require an environmental compliance approval under the Environmental Protection Act.

~~There are no existing significant drinking water threats associated with sewage treatment plants within the wellhead protection areas. However, significant threats have been identified through modelling for the Lake Ontario-based municipal water intakes.~~

~~The use of existing legislation, such as the environmental assessment process and prescribed instruments, are the preferred policy directives for this threat.~~

Education and Outreach

Education and outreach were not considered appropriate to address these threats.

Prescribed Instruments

The Committee noted that an extensive process is already in place for environmental assessment, as well as a requirement that sewage treatment plants obtain environmental compliance approvals. The Committee preferred to rely on these two existing tools as they are firmly established in legislation and

practice and have the authority to address the concerns regarding protection of municipal drinking water sources. Providing support for the continued use of these processes to address the threat will avoid duplication of rules and regulation.

Land Use Planning

Land use planning tools were not considered appropriate to address these threats.

Consultation

Revisions to the draft policies based on comments received during consultation included response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording to align the prescribed instrument policies, T-8-C and T-52-C, with an implementable procedural change and provide flexibility in reporting. Changes were made to the significant threat policies to accommodate the Ministry's request. The Committee is of the opinion that the specific information requested in monitoring policies is required to assure them that the necessary data/information is being documented for future analysis of policy effectiveness. Hence, the monitoring policy was only changed slightly.

Policy T-52-C/S was written during pre-consultation following the advice of the Ministry of the Environment and Climate Change to combine, reword and bring the policies inline with the permitted content of the Plan. These policies were further refined to provide clarity about the implementing bodies and where the policies apply. The Ministry of the Environment and Climate Change determined that asking the Ministry to test Lake Ontario drinking water sources annually was out of scope for the Plan and the policy was removed. The Ministry suggested this request could be discussed using other means.

In 2021, Policy T-52-C/S was further revised to split out the legally binding and non-binding parts for clarity and to assist with efficient annual progress reporting.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threat 2 – Sewage Treatment Plants		
	Policy Directive	Policy
1	Support the environmental assessment process as an important tool in addressing significant drinking water threats.	No policy required
2	Require the ~~Ministry of the Environment and Climate Change~~MECP to include terms and conditions in certificates of approval and environmental compliance approvals for sewage treatment plants in vulnerable areas to ensure that they cease to be or do not become significant drinking water threats. The terms and conditions could include strict effluent quality criteria, appropriate sizing to reduce bypasses, and inspections and proactive maintenance of the works to prevent leaks.	T-8-C

3	Request the City of Hamilton and local municipalities to implement programs to address connections of stormwater sources to sanitary sewers to reduce surges in volumes during wet weather.	T-19-C
4	For significant threats to Lake Ontario, request that the ~~Ministry of the Environment and Climate Change~~MECP protect drinking water sources through provision of threat mapping to the Spills Action Centre, and if necessary, modify notification procedures.	~~T-52-S~~T-67-S
5	Require the ~~Ministry of the Environment and Climate Change~~MECP to include terms and conditions in certificates of approval for sewage treatment plants that are significant drinking water threats to Lake Ontario municipal intakes to ensure that they cease to be significant drinking water threats. The terms and conditions could include the adjustment of the reporting thresholds for pathogens and chemicals of concern in effluent.	T-52-C
6	Request that the owners of facilities engaged in significant threat activities to the municipal Lake Ontario intakes update their emergency preparedness/ contingency plans to include the location of municipal intakes, actions to be taken, and inclusion of protection of drinking water sources in preparedness exercises.	~~T-52-S~~ T-66-C
7	Request that the ~~Ministry of the Environment and Climate Change~~MECP test Lake Ontario nearshore water quality annually to monitor potential impacts due to the identified significant threats. Also request that the data be released annually.	T-52-S removed

3.3 Agricultural Source Material (ASM)

3.3.1 Background

What is agricultural source material?

Agricultural source material is waste from farms that can be applied to land as a source of nutrients. Regulated compost and manure are two examples.

According to Ontario Regulation 267/03—General under the Nutrient Management Act, agricultural source materials include the following treated or untreated materials if they are capable of being applied to land as nutrients:

- Manure produced by farm animals, including bedding materials.
- Runoff from farm-animal yards and manure storages.
- Washwaters from agricultural operations that have not been mixed with human body waste (e.g., from the milking centre).
- Organic materials produced by intermediate operations that process the above materials (e.g., mushroom compost).
- Anaerobic digestion output, if,
- the anaerobic digestion materials were treated in a mixed anaerobic digestion facility;
- at least 50 percent, by volume, of the total amount of anaerobic digestion materials were on-farm anaerobic digestion materials; and
- the anaerobic digestion materials did not contain sewage biosolids or human body waste.
- Regulated compost, which is a mixture of dead animals and substrate.

What activities related to ASM pose a significant threat?

The activities prescribed in regulation under the Clean Water Act, 2006 as threats to drinking water sources are the storage or the application to land of any of the materials listed above. These materials typically contain chemicals and pathogens that could alter the quality of source water.

The management of agricultural source material relates only to aquaculture operations and the release of pathogens to surface water. This threat is never significant in the Halton-Hamilton Source Protection Region.

Nitrogen, total phosphorus, and pathogens are contaminants that could make their way into groundwater as a result of the application of agricultural source material to land and the storage of agricultural source material. These nutrients and pathogens could threaten the safety of drinking water sources in certain situations due to infiltration, runoff, or spills.

~~ASMs can threaten drinking water through infiltration, runoff, or spills resulting from their improper storage, or application to land. Contaminants that could be released in these situations are nitrogen, total phosphorus, and pathogens.~~

The primary source of nitrogen, total phosphorus, and pathogens in agricultural source materials is from animal waste and by-products. Agricultural source material is generated on livestock farms but can be

used to enhance soil quality wherever needed. Permanent nutrient storage facilities are generally, but not always, located near barns and outdoor confinement areas. Temporary nutrient storage facilities may be located on fields where the agricultural source material will be applied.

Nitrogen is a concern for both surface and ground drinking water sources. When water with high nitrate concentrations is consumed by babies less than six months of age, their digestive systems aren't able to cope and high levels of methemoglobin are formed in the blood. Oxygen is not distributed to the body's cells and Methemoglobinemia, or Blue Baby Syndrome, results.

Total phosphorus associated with agricultural source material can only be a drinking water threat in intake protection zones (IPZs) and in wellhead protection areas (WHPAs) where the groundwater is under the direct influence of surface water (areas designated WHPA-E). The addition of excess nutrients, such as phosphorus, to surface water can cause increased plant growth and the depletion of oxygen. These changes alter the water quality and the aquatic ecosystem.

Pathogens are microscopic organisms capable of producing infections or infectious disease in humans. The bacterium, Escherichia coli (E. coli), is an example of a pathogen typically monitored in water.

~~The activities related to ASM that are considered significant threats (and therefore part of the policy development process) are outlined in the flow charts for Threats 3 and 4 (see Appendix C). Note that the management of agricultural source material (Threat 5) is classified as a moderate or low threat and therefore was not considered in the policy development process for significant threats.~~

How do these threats affect the Halton Region and Hamilton Region Source Protection Areas?

The vulnerable areas mapped in the Halton Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, and Kelso municipal well fields (see Figures B-1 through B-7~~6~~). In the Hamilton Source Protection Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant threats is 10 for chemical and pathogen threats. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 9 or greater can result in significant chemical threats and 8 or greater for significant pathogen threats.

~~Significant threats from ASMs are possible in the wellhead protection areas surrounding the Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal well fields.~~

~~Within the Halton Area, there are three pathogen threat related to application of agricultural source material to land, and one chemical and two pathogen threats related to storage of agricultural source material (see Table 2). There are no existing significant threats in the Hamilton Area.~~

~~Table 2 Existing significant drinking water threats from ASM~~

~~Activity~~	~~Freelton Well~~	~~Freelton Well~~	~~Carlisle~~	~~Kelso~~

	~~FDF01~~	~~FDF03~~		
~~Storage of ASM~~	~~1C, 1P~~	~~4C, 4P~~	~~4C, 4P~~	~~1C2C, 2P~~
~~Application of ASM~~	~~2C, 4P~~	~~4P~~	~~4C, 4P 2P~~	~~1P 2C, 2P~~

~~Note: C=chemical threat, P=pathogen threat~~

The number of pathogen or chemical threat occurrences related to either application of agricultural source material to land or storage of source material is reported in the latest assessment reports for Halton Region and Hamilton Region source Protection Areas.

As noted in the Assessment Report, data was assessed from a variety of sources to determine where agricultural activities were occurring. The level of risk to drinking water supplies from chemicals associated with the storage or application of ASMs was based on the intensity of managed land and the quantity of nutrient units generated within the vulnerable areas.

A conservative assumption was made for this assessment that a higher nutrient unit density results in a greater concentration of nutrients and an increased potential for nutrient contamination of source waters. The combination of managed lands and livestock density was used as a surrogate of nutrients present as a result of generation, storage, and land application within the area. This surrogate was used to determine the potential impact of a single property on water quality through the release of nutrients.

Pathogen threats associated with these activities are not determined based on the quantity of agricultural source material. Application threats are based on proximity to the municipal well, and storage threats are based on whether storage facilities are temporary or permanent, and above or below grade.

~~The potential threat from pathogens posed by the storage or application of ASM was assigned based on location, and on the type of storage facility being used.~~

The wellhead protection areas and associated vulnerability score where a significant threat may occur and the associated threat subcategories are as follows ~~(see also threat flow charts in Appendix C)~~:

WHPA-A or B with a vulnerability score of 10

Application: a significant chemical threat exists due to the combination of managed land percentage and livestock density that produces ASM in sufficient quantity annually to apply to land above the threshold in the ~~Ministry of the Environment and Climate Change (MOECC)~~MECP Tables of Drinking Water Threats (2017)~~(2009)~~. The chemical of concern is nitrogen. A significant pathogen threat exists when ASM is applied to land in any quantity.

Storage: a significant chemical threat exists based on the storage below grade in or on a permanent facility, storage above grade in or on a permanent storage facility, or storage at or above grade in either a permanent or temporary field storage site, and is dependent on the associated volume or weight of the ASM. The chemical of concern is nitrogen. A significant pathogen threat is associated with a spill or runoff from the ASM storage area.

~~The MOE Tables of Drinking Water Threats can be viewed at https://www.ontario.ca/document/tables-drinking-water-threats~~

For a description of vulnerability scores, see the Assessment Reports.

-WHPA-E with a vulnerability score of 9

Application: a significant chemical threat exists due to the combination of managed land percentage and livestock density that produces ASM at sufficient quantity annually to apply to land above the threshold in the ~~MOECC~~ MECP Tables of Drinking Water Threats ~~(2009)~~. The chemicals of concern are nitrogen and total phosphorus. A significant pathogen threat exists when ASM is applied to land in any quantity.

Storage: a significant chemical threat exists, based on the storage at or above grade in or on a temporary field storage site or a permanent storage facility, dependent on associated volume or weight of the ASM. The chemicals of concern are nitrogen and total phosphorus. A significant pathogen threat is associated with a spill or runoff from the permanent or temporary storage area.

-WHPA-E with a vulnerability score of 8.1

For all applications of agricultural source material to land where it is stored at or above grade in either a temporary or permanent facility, with the concern being the spill or runoff from the area and the potential release of pathogens.

What legislation, guidelines, or protocols already exist?

Fisheries Act, 1985

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

For example, the latter case would apply if a farmer spread manure on land near a river with fish habitat and the manure subsequently washed into the river.

Existing legislation associated with ASM threats includes the following Acts:

- Fisheries
- Environmental Protection
- Nutrient Management

Environmental Protection Act, 1990

The Environmental Protection Act (EPA), which is enforced by the ~~Ministry of the Environment and Climate Change~~MECP, provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects. Although the application of animal wastes to land (in accordance with normal farming practices and the regulations made under the Nutrient Management Act) does not require approval under the EPA, farmers must ensure that agricultural source material spills do not occur.

~~The Environmental Protection Act prohibits the discharge of contaminants into the natural environment, including accidental spillage of ASM during its application to land, or while it is being stored.~~

Nutrient Management Act, 2002

Responsibility for oversight of, and policy development related to, the Nutrient Management Act is shared by the Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) and the ~~Ministry of the Environment and Climate Change~~MECP. The ~~MOECC~~MECP is also responsible for inspections, investigations, and enforcement of regulatory requirements, while OMAFRA is responsible for the necessary approvals, training, and certification requirements.

~~The Nutrient Management Act sets out province-wide standards for the safe application and storage of ASM.~~

The Act sets out a comprehensive and integrated approach to the storage and land-application of materials containing nutrients. It ensures that all land-applied materials will be managed in a sustainable, beneficial manner that provides environmental and water-quality protection. The Act provides clear, province-wide standards that apply to the land application of materials generated by agricultural and non-agricultural operations.

Enforcement of the Nutrient Management Act is the responsibility of the ~~Ministry of the Environment and Climate Change~~MECP. According to "Complying with Environmental Legislation on Farms" (MOE, September 2009), the ~~MOECC~~MECP's on-farm compliance program uses a problem-solving approach to help farmers comply with the law and manage environmental issues through education and outreach. Minor violations can be addressed through voluntary abatement plans, authorizing document amendments (to the nutrient management strategy and/or plan), and provincial officer orders. Enforcement, including Provincial Offences Act summons, investigation, and prosecution, are used in situations where serious issues are identified.

Inspections are carried out in response to spills, complaints, and reports of potential non-compliance, in addition to the ~~Ministry of the Environment and Climate Change~~MECP's proactive inspection program.

Ontario Regulation 267/03—General

~~Ontario Regulation 267/03 is the main regulatory tool dealing with the application and storage of ASM. It sets out detailed criteria for activities related to these materials.~~

The Nutrient Management Act is supported by Ontario Regulation 267/03—General, which sets out detailed criteria for the storage of nutrients and their application to agricultural cropland. The "Nutrient Management Protocol" (MAFRA, September 2009 and updated 2012) outlines technical standards and procedures related to this regulation. Ontario Regulation 267/03 is the principal regulation related to the application of ASM to land and to the storage of ASM for phased-in operations. The regulation sets out what operations must comply with its requirements and what triggers the capture of an existing operation.

Under Ontario Regulation 267/03, certain farmers must submit a nutrient management strategy, which describes how ASMs will be managed on the farm and/or a nutrient management plan, which outlines how they will be safely applied to cropland.

Sections 10, 14, and 28 of Ontario Regulation 267/03 are prescribed instruments under the Clean Water Act. These sections relate to the approval of and compliance with nutrient management strategies and nutrient management plans.

A nutrient management strategy sets out an environmentally acceptable method for managing all prescribed materials generated and received at an agricultural operation. Nutrient management strategies are required:

- at farms that generate more than 300 nutrient units annually;
- when applying for a building permit to construct or expand barns or manure storage facilities, if the livestock operation generates more than 5 nutrient units;
- when construction of a permanent storage facility made of earth is proposed;
- when construction of a regulated mixed-anaerobic digester is proposed; or
- when a farm having an existing anaerobic digester receives off-farm materials for treatment.

A strategy is also required if any portion of the farm unit used for the operation lies within 100 metres of a municipal well. The strategy must be approved by a director at the Ministry of Agriculture, Food, and Rural Affairs (OMAFRA).

A nutrient management plan details how nutrients are to be applied to a given land base. A plan is based on both the components of the nutrients used and the characteristics of the field and aims to optimize the utilization of the nutrients by crops and to minimize environmental impacts. A person who owns or controls an agricultural operation, and generates 300 or more nutrient units, or generates more than 5 nutrient units and is located within 100 metres of a municipal well, must ensure that nutrients are managed in accordance with a nutrient management plan if they apply nutrients to land on their farm unit.

~~Nutrient management strategies and plans must be updated annually and renewed every five years.~~

It is possible that a person who owns or controls an agricultural operation may be required to have a nutrient management plan as well as a non-agricultural source-material plan (see Threats 5 and 6) for

part or the entire farm unit. These plans are kept on the farm, available for review by the ~~MOECC~~MECP Agricultural Environmental Officer during compliance inspections.

The regulation requires that by February 15 each year, the person who owns or controls an agricultural operation must prepare a summary of activities carried out the previous year and update the nutrient management strategy and plan to reflect the anticipated operation during the coming year. The regulation also requires renewal of the nutrient management strategy and plan every five years.

Figures 3 and 4 illustrate the main differences between a nutrient management plan and strategy. A complete list of components required for both strategies and plans are set out in Table 3.

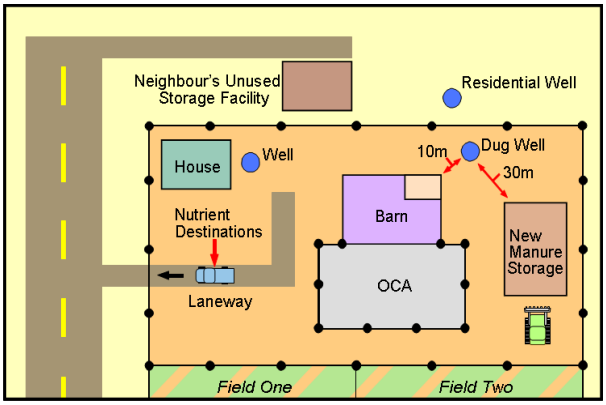

Figure 3 Pictorial of nutrient management strategy matters. A nutrient management strategy sets out the method for managing prescribed materials generated or received at an operation. (Ministry of Agriculture, Food and Rural Affairs, 2011)

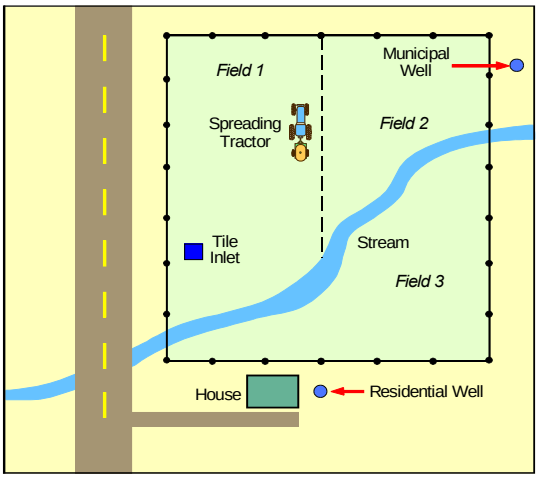

Figure 4 Pictorial of nutrient management plan matters. A nutrient management plan details how nutrients are applied to the farm unit. (Ministry of Agriculture, Food and Rural Affairs, 2011)

Table 3 Requirements of nutrient management strategies and plans

Topic	Component	Included in a Nutrient Management Strategy	Included in a Nutrient Management Plan
Operation Information	Description of the Operation	Y	Y
	Agreements	Y	Y
For Farm Units	Farm Unit Declaration Form	Y	Y
	Farm Unit Sketch	Y	Y
Inventory and Description of Prescribed Materials	List of Prescribed Materials (generated	Y	Y
	Analysis of Nutrient Content or use of Table 2 information (see source below)	N	Y
Destination and Storage	Destinations	Y	N
	Agricultural Source Material Storage	Y	Y
NASM Plan	NASM storage Facilities	Y	Y
Contingency Plan	Contingency Plan	Y	Y
Sign-off form	Sign-off form	Y	Y
Field Information	Field Properties	N	Y
	Field Sketches	N	Y
	Soil Samples and Analysis	N	Y
Crop Information	Crop Rotation and Yields	N	Y
	Tillage Practices	N	Y
Nutrient Application Information	Commercial Fertilizer Application	N	Y
	Application of Prescribed Materials	N	Y
	Agronomic and Crop Removal Balance for Nitrogen	N	Y
	Agronomic and Crop Removal Balance for Phosphorous	N	Y
	Common Land Application	N	Y

	Demonstration of Adequate Land Base	N	Y
	Information on a regulated mixed anaerobic digestion ("AD") facility	Y	N

Source: Nutrient Management Protocol prepared by the Ministry of Agriculture, Food, and Rural Affairs and the Ministry of the Environment, September 14, 2009 and updated 2012. Y=Yes, N=No

Consultants who prepare nutrient management strategies and plans for agricultural source materials must be certified through OMAFRA. Furthermore, custom manure application businesses must have a Prescribed Materials Business Owners License. Employees who apply nutrients to land on an agricultural operation that requires a nutrient management plan must have a Nutrient Application Technician License.

Standards for Storage of ASM

~~Farms that require a nutrient management strategy or plan must follow standards set out in Ontario Regulation 267/03.~~

Regulation 267/03 contains ASM land application and storage standards that are applicable to all farms that require a nutrient management plan or strategy. These standards include timing restrictions for application, requirements for vegetated buffer zones adjacent to surface water, and setbacks from surface water and wells. The standards are considered to be best management practices for non-regulated farms.

Farms with more than five nutrient units need a building permit for livestock housing or manure storage. These operations must, with some exceptions, be able to store their manure for 240 days using all of the available storage on the farm.

The threat to drinking water sources from storage of agricultural source material stems from leaching, runoff, and spills. Each of these possibilities is addressed in the Regulation and standards are set to manage their occurrences. Runoff from ASM storage areas is of prime concern.

Runoff

Farmers who are subject to the Nutrient Management Act are required to manage their runoff so it does not affect surface water and groundwater quality.

Runoff is generally defined as liquid that is generated from precipitation falling on the site and that:

- has come into contact with manure in a permanent nutrient storage facility, temporary field nutrient storage site, outdoor confinement area, or livestock yard lined with concrete or other paving material of equal or lesser permeability
- may contain components of manure in solution or suspension
- is no longer contained in the permanent nutrient storage facility, temporary field nutrient storage site, and outdoor confinement area or livestock yard

Runoff may be collected and stored in a permanent liquid nutrient facility, to be spread over cropland as a nutrient source. The location requirements for such a facility are as follows:

- Facility must be at least 100 metres from a municipal well.
- Facility must be at least 15 metres from a well drilled 15 metres or deeper with a 6-metre casing, and at least 30 metres from any other well.
- Facility must be at least 15 metres from field drainage tiles.
- Flow from field drainage tiles and piped municipal drains must be away from the facility.

There must be a flow path of at least 50 metres from the storage to the top of the bank of the nearest surface water or tile inlet.

No construction is allowed within 1-in-100-year flood lines unless a permit is issued by the Conservation Authority.

Permanent Storage Facilities

~~New or expanded storage facilities must be a safe distance from wells, surface water and tile inlets, and not in an area that has flooded in the past 100 years.~~

Minimum site requirements for new or expanded permanent storage facilities include:

- Must be at least 15 metres from a drilled well that has a depth of at least 15 metres and a watertight casing to a depth of at least 6 metres below ground level.
- Must be at least 100 metres from a municipal well and at least 30 metres from any other well.
- Must allow a 50-metre flow path to the top of the bank of the nearest surface water or tile inlet and not be constructed within the 1-in-100 year flood lines unless a permit is issued by the conservation authority.

Temporary Storage Facilities

~~Temporary storage facilities must be located over the appropriate soil of sufficient depth, away from steep slopes, or areas prone to flooding, and must have a flow path of at least 50 metres to surface water or a tile inlet.~~

There are also minimum site requirements for temporary field storage lasting longer than 24 hours. These include:

- Liquid nutrients cannot be stored at a temporary facility.
- The site must have a minimum depth of 0.3 metres of unconsolidated soil to bedrock, under the site and within 3 metres of the side of the site.
- It must have a minimum depth of 0.9 metres of soil above the water table, under the site, and within 3 metres of the side of the site.
- No storage of nutrients on soils of hydrologic soil group A is allowed, unless the depth of the soil to bedrock is greater than 0.9 metres.
- The storage site must not be located in an area that is subject to flooding more than once every 100 years, according to flood plain mapping.
- The site must not have a slope greater than 3 percent.
- There must be a flow path that is at least 50 metres to the nearest surface water or tile inlet and located at least 0.3 metres above bedrock.

A site may not be located within:

- 45 metres of a drilled well that has a depth of at least 15 metres and a watertight casing to a depth of at least 6 metres below ground level
- 90 metres of any other well, other than a municipal well
- 100 metres of a municipal well
- 125 metres of a single residence
- 250 metres of a residential, commercial, community, or institutional use area

Standards for Land Application of ASMs

~~Liquid ASM can only be applied a safe distance from wells, on land that is relatively flat, and it must be injected or spread into the soil the same day. Solid ASM must be applied to cropland, a safe distance from wells.~~

Ontario Regulation 267/03 also contains requirements for the application of both liquid and solid agricultural source material to land. The requirements define where, when, and how the material may be applied, and include the following:

- Liquid manure shall not be applied to land where the sustained slope is 25 percent or greater.
- Application must be at least 100 metres from a municipal well.
- Application must be at least 15 metres to a drilled well at least 15 metres deep with a 6 metre casing.
- Application must be at least 30 metres from all other wells.
- Liquid manure must be injected or spread and incorporated into the soil within the same day of application.
- The only requirement for incorporation of ASM outside of the winter restrictions is within the area 13 metres from surface water.
- Application of ASM during the restricted period (December 1 through March 31 of the next year) and when soil is frozen or covered in snow must follow specified standards.

Winter Application

~~During frozen conditions, ASM must be applied a safe distance from surface water; the distance required depends on the slope of the land and whether the ASM is in liquid or solid form.~~

Agricultural source material rich in nitrogen and phosphorus can contaminate water sources if improperly applied. This threat of contamination is particularly acute when the soil is frozen or snow-covered, since these conditions increase the likelihood of runoff. As such, a restricted period has been designated when nutrient application must comply with more rigorous requirements. The application of these standards has been expanded to include any period when soil is frozen or snow-covered.

If snow melts quickly, rapid surface-water runoff will flush nutrients to adjacent surface-water sources. Frozen soils may also be unable to absorb water at the same rate under normal conditions. The greatest risk of runoff and nutrient loss is when application occurs within 72 hours of a rainfall or snowmelt. Manure applied in early winter during dry conditions may have a lower risk of nutrient loss than manure applied to wetter or snow-covered surfaces.

Certain vulnerable areas are protected in the regulation from ASM application during the restricted period and when soil is frozen or snow-covered. These areas include land that floods once or more every

five years and land where water collects during a rainstorm or thaw and flows directly into surface water.

Different standards exist for the application of liquid and solid ASM under frozen conditions.

Liquid ASM application standards include:

- injection or spreading and incorporation into soil within 6 hours
- a setback from the top of bank of surface water of at least 20 metres
- a setback of 100 metres from the top bank of the surface water, if the maximum sustained slope
- of the land is more than 3 percent

Solid ASM application standards include:

- a setback from the top bank of the surface water of at least 100 metres
- a maximum depth of snow in the application area of 15 centimetres or less
- a maximum sustained slope of the application area of less than 3 percent

Different standards apply to the restricted period when soil is not frozen or snow-covered.

Other Tools

Other tools related to ASM threats include:

- Canada-Ontario Environmental Farm Plan
- Spills Action Centre
- Minimum distance separation formulae
- Hamilton-Halton Watershed Stewardship Program
- Canada-Ontario Environmental Farm Plan

~~Under Part X of the Environmental Protection Act, spills must be reported immediately. The owner of the spilled material and the person in control of it when the spill occurred are responsible for the cleanup~~

The Environmental Farm Plan (EFP) is a risk assessment and management process for environmental protection, sustainable production, and health and safety. Farmers voluntarily prepare the plans to increase their environmental awareness in up to 23 different areas. Eight of those areas are linked to drinking water threats under the Clean Water Act, 2006. Through the EFP local workshop process, farmers highlight their farm's environmental strengths, identify areas of environmental concern, and set realistic action plans with timetables to improve environmental conditions (Ontario Soil and Crop Association, 2005). The plans are peer reviewed and are confidential. Environmental cost-share programs are available to assist in implementing projects. ~~As of 2009, 34,000 out of 57,000 farm families in Ontario have participated (presentation made by Chris Attema to the Planners' Working Group, January 4, 2011).~~ Over 35,000 participants have participated in the program since it began in 1993. This internationally recognized program has been very successful in helping Ontario farmers adopt more environmentally sustainable practices. Nutrient management plans are addressed as part of Worksheet 17 – Manure Use and Management.

Spills Action Centre

~~The Environmental Farm Plan is a confidential, voluntary risk assessment and management program for Ontario farmers.~~

The ~~Ontario Ministry of the Environment and Climate Change (MOECC)~~MECP is the lead provincial agency for environmental emergencies. The ~~MOECC~~ MECP regulatory mandate for spills is based on Part X of the Environmental Protection Act, which requires spills to be reported immediately. Part X also requires the owner of the spilled material and the person who had control of the material when it was spilled to promptly clean up and restore the environment.

The Ministry also enforces the cleanup and disposal of the spilled materials in an appropriate manner. If there is an inadequate response, the Minister can order a cleanup. If the owner fails to comply, the ~~MOECC~~MECP can undertake the cleanup and recover costs.

The Ministry is responsible for spills and drinking water emergencies by Order in Council under the Emergencies Management and Civil Protections Act. The Ministry has developed an Emergency Management Program to implement this requirement.

Agricultural operations with either a nutrient management strategy and plan or an environmental farm plan will have a contingency plan that provides details on how to respond to a spill.

Minimum Distance Separation Formulae

Agricultural land uses include livestock facilities (e.g., barns and manure storage) and are restricted by municipalities to lands that are designated and zoned for agricultural and rural use. To reduce complaints regarding odour related to livestock facilities, municipalities use provincial minimum distance separation (MDS) formulae to separate land uses.

In terms of drinking water source protection, the minimum distance separation has the effect of providing distance between new livestock facilities (and permanent nutrient storage facilities) and municipal wells when the wells are located within settlement areas.

The Hamilton-Halton Watershed Stewardship Program

Hamilton Harbour is one of 43 Areas of Concern in the Great Lakes. The Bay Area Restoration Council, a community group, is working with government, industry, and other stakeholders to restore and protect the harbour and its watershed.

The Hamilton Conservation Authority, Conservation Halton, and the Bay Area Restoration Council initiated the Hamilton-Halton Watershed Stewardship Program. The program grew from a recommendation of the Hamilton Harbour Remedial Action Plan “that citizens in urban and rural areas take responsibility for restoring and maintaining the quality of the environment in which they live.”

The program’s purpose is to protect, enhance, and restore environmentally significant natural areas and watercourses in the Conservation Authorities’ watersheds through developing an educated, empowered group of landowners. The program has been proactively contacting landowners of natural areas and

watercourses, encouraging them to be good stewards of their land and assisting these landowners with designing work plans and obtaining funding.

What policy approaches were discussed?

The Planners' Working Group and Source Protection Committee discussed approaches to address the threats associated with agricultural source material. This section summarizes those discussions and the policy approaches that were considered.

Policy approaches discussed were:

- Education and Outreach
- Conduct outreach on the importance of respecting separation requirements and of monitoring the impact of agricultural source materials on water quality.
- Promote voluntary nutrient management strategies and plans to farms that are exempt from Ontario Regulation 267/03 and are within the areas where these activities are or would be significant threats to drinking water supplies.

Incentive Programs

Establish incentive programs for agricultural/rural landowners to establish buffers on lands adjacent to surface water within WHPA-E areas.

Encourage development of better management practices through an incentive program.

Continue existing stewardship programs.

Prescribed Instruments (Existing and Future Threats)

Require OMAFRA to consider protection of municipal drinking water sources in their review and approval of proposed nutrient management strategies for farms within wellhead protection areas and in their review of nutrient management plans during inspections, and to require monitoring by the farmer and reporting back to OMAFRA.

Require OMAFRA to work with farmers where significant threats exist to ensure compliance with nutrient management strategies and plans.

Require ~~MOECC~~MECP to prioritize inspections for areas where significant threats would occur, and to conduct regular inspections.

Require all contingency plans included in strategies or plans for farms where significant threats exist now and could exist in the future to include immediate notification of the appropriate municipal official of discovered leaks or spills of agricultural source material.

Land Use Planning (Future Threats)

Apply minimum distance separation formula to assist in protecting municipal water supplies located within settlement areas.

Develop policies and zoning regulations to prohibit new agricultural storage facilities within 100 metres of a municipal well.

Risk Management Plans (Existing and Future Threats)

Require risk management plans for the storage and application of ASMs in vulnerable areas where these activities are or would be a significant drinking water threat.

Restricted Land Uses (Future Threats)

Require pre-screening by a risk-management official of planning applications for activities related to the application and storage of ASMs where the activity would be a significant drinking water threat.

Prohibition (Future Threats)

Prohibit the application and storage of ASMs in vulnerable areas where they could be a significant drinking water threat.

3.3.2 Discussion on Policy Options

Education and Outreach

~~While existing programs such as the Environmental Farm Plan program were seen as worthwhile, outreach to farmers and voluntary nutrient management strategies were not considered adequate to address the threats.~~

Education and outreach are not considered sufficient to address the threats caused by the application or storage of agricultural source materials. Overall, the Source Protection Committee is of the opinion that significant information is already available to farmers on this issue, especially through the Environmental Farm Plan program and other educational programs operated by OMAFRA. There is support for encouraging ongoing participation by farmers in the Environmental Farm Plan and in existing stewardship programs. However, voluntary nutrient management programs are not considered adequate or enforceable and therefore not sufficient to address the threat.

Incentive Programs

The Committee considered a funding program to encourage farmers to create buffers along stream corridors within the WHPA-E, but rejected its use as a sufficient response to the threat. The Hamilton-Halton Watershed Stewardship program currently provides advice and funds to construct vegetated buffers along stream corridors. This program should be encouraged.

Options for funding new design standards for manure storage were also discussed as a soft approach to changing a farmer's methods and helping to promote best management practices. However, incentive programs alone are not deemed sufficient to address ASM threats.

Prescribed Instruments (Existing and Future Threats)

~~Nutrient management plans and strategies are the preferred approach for managing ASM-related threats.~~

The use of prescribed instruments, specifically nutrient management plans and strategies, is the preferred primary option to address the threats caused by the application and storage of agricultural source materials.

The consensus of the Planners' Working Group and the Source Protection Committee was that these instruments are effective tools with clear criteria for implementation, they are familiar to the farming community, and they can be implemented at limited additional cost to the farmer. This approach does not duplicate existing requirements, but builds upon the current practices and knowledge base of the farm community. It was also noted that these plans and strategies are updated periodically and as new best management practices are developed.

Based on these considerations, the direction of the Committee is to require OMAFRA to consider protection of municipal drinking water sources in their review and approval of proposed nutrient management strategies for farms within wellhead protection areas, and require ~~MOECC~~MECP to protect source water during inspections.

It was noted that OMAFRA and ~~MOECC~~MECP have a good working relationship with the farm community and protocols for addressing any issues found on a farm. For this reason, the Committee determined that an appropriate approach to the issue would be to require OMAFRA to work with farmers where significant threats exist to ensure compliance with nutrient management strategies and plans.

One of the concerns identified by the Working Group and Committee was the need to make current inspections within vulnerable areas a priority; therefore, the Committee recommends that ~~MOECC~~MECP prioritize inspections for areas where significant threats would occur and that the Ministry conduct regular inspections in these areas.

Lastly, it was noted that one of the important requirements in these strategies and plans is for a contingency plan based on best practices. The Source Protection Committee was of the opinion that reliance on current practices would be appropriate to address any risk related to spills or leaks. Therefore, the Committee recommends the policy should specify that all contingency plans included in strategies or plans for farms where significant threats exist now or could exist in the future must include the immediate notification of the appropriate municipal official of leaks or spills of agricultural source material.

Land Use Planning (Future)

The Planners' Working Group chose not to pursue land use planning options, as they were of the opinion that these tools would not be an effective means of managing the threats in question. Land use planning is effective when restrictions are required for the use of land, but not when the threat involves activities that are occurring as part of that land use.

Risk Management Plans (Existing and Future Threats)

~~Risk management plans were considered the most effective approach to ASM threat management in vulnerable areas when the Nutrient Management Act does not apply.~~

It was agreed that the best means of addressing the threats associated with ASM for any farm is a nutrient management strategy or plan. For farms that are not required to have a nutrient management strategy or plan, the policy approach proposed by the Planners' Working Group and the Source Protection Committee is to require a risk management plan for the application and storage of

agricultural source materials in vulnerable areas where these activities are or would be a significant drinking water threat. This risk management plan would be based on the same principles as the nutrient management plan and be scoped to address these specific threats. The Source Protection Committee is of the opinion that it is important that the scope and requirements of a risk management plan be disclosed in the policy included in the Source Protection Plan to be used by a risk management official. This way, the farmer and the official are both aware of the requirements of the Source Protection Plan.

Restricted Land Uses (Future)

When risk management plans are required by policy in the Source Protection Plan (as proposed by the Source Protection Committee), pre-screening of planning applications related to agricultural land uses and of building permit applications for the proposed construction of ASM storage facilities must also be required to ensure compliance. Pre-screening of agricultural applications would be necessary in areas where these activities would pose a significant drinking water threat.

Prohibition (Future)

No consideration was given to implementation of this option as these threats will be effectively addressed through the use of other tools.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

Overall support for the policy direction was received through pre-consultation from OMAFRA and the municipalities. The wording was clarified to ensure that the policy directions match the existing terminology and legislation.

The Ministry of the Environment and Climate Change requested that policies provide flexibility for implementation when they affect operational procedures. However, it is the opinion of the Source Protection Committee that every farm where activities are occurring that could be significant drinking water threats should be visited and that a funding program be in place to assist farmers with protecting drinking water sources. Flexibility has been given to the ~~MOECC~~MECP to define the frequency of regular inspections.

The compliance requirements stated in policy T-22-S were modified to specifically mention Ontario Regulation 267/03 - General under the Nutrient Management Act, 2002.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 3 and 4 – Agricultural

Source Material		
	Policy Directive	Policy
1	Support the use of nutrient management plans and strategies as the primary tools to address drinking water Threats 3 and 4, i.e., the application of agricultural source material to land and storage of agricultural source material.	T-21-C
2	Require OMAFRA to ensure nutrient management plans and strategies for farms within vulnerable areas where there are or would be significant threats are inclusive of measures to protect drinking water including the requirement for contingency plans to contain the requirement for notification of the Spills Action Centre if a leak or spill occurs.	T-21-C
3	Require ~~MOECC~~MECP to work with farmers where significant threats exist to ensure compliance with nutrient management plans and strategies, where needed, and the ultimate protection of source water.	T-22-S

Policy Directives for Threats 3 and 4 – Agricultural Source Material		
	Policy Directive	Policy
4	Require ~~MOECC~~MECP to prioritize inspections of farms in areas where significant threats would occur and to conduct regular inspections.	T-22-S
5	For those farms that are not phased-in under the Nutrient Management Act, require a risk management plan for the storage and application of agricultural source material in vulnerable areas where these activities are or would be a significant drinking water threat. These risk management plans would be based on the regulatory requirements of a nutrient management	T-20-C

	plan or strategy and scoped to address these specific threats.	
6	Request ongoing funding of the Ontario Drinking Water Stewardship Program or a similar program by the ~~Ministry of the Environment and Climate Change~~MECP for projects that reduce the threat from the application and storage of agricultural source material where these activities are a significant risk to municipal drinking water sources.	T-23-S
7	Require pre-screening by a risk management official of agricultural building permits and planning applications for activities related to the application and storage of agricultural source materials in a vulnerable area where the activity would be a significant drinking water threat.	T-20-C

3.4 Non-Agricultural Source Material (NASM)

3.4.1 Background

What are non-agricultural source materials?

~~Non-agricultural source materials fall into one of three categories:~~

~~unprocessed plant material, such as yard waste~~

~~processed plant material~~

~~animal original material, pulp and paper mill biosolids, sewage biosolids, or other unlisted material~~

According to Ontario Regulation 267/03 – General under the Nutrient Management Act, non-agricultural source materials (NASMs) include the following materials. These are intended to be applied to land as nutrients:

- Pulp and paper biosolids
- Sewage biosolids
- Anaerobic digestion output, where less than 50 percent of the total material is on-farm anaerobic digestion materials
- Any other material that is not from an agricultural source and that is capable of being applied to land as a nutrient

For more than 30 years, NASM has been applied to Ontario farmland to add valuable nutrients to soil and crops. A beneficial value of the NASM to the growing of crops must be demonstrated. NASM provides organic matter that can help maintain soil productivity and reduce soil erosion. It also could have value as a fertilizer or soil pH adjuster. The application of NASM to farmland is a cost-effective option for improving soil quality and fertilizing crops. NASM is also applied to non-agricultural properties.

NASM comes in two states—solid and liquid, and is placed in one of three categories:

- unprocessed plant material, such as unprocessed leaf and yard waste, or unprocessed fruits and vegetables
- processed plant material, such as organic food processing waste that contains no meat or fish, or bakery washwater
- animal originated material, pulp and paper mill biosolids, sewage biosolids, or unlisted material

What activities related to NASM pose a significant threat?

The application of NASM to land, and the handling and storage of NASM, are ~~Threats 6 and 7, respectively,~~ two of the ~~21~~22 prescribed threats.

The ~~Ministry of the Environment and Climate Change~~MECP has prescribed in Ontario Regulation 287/07 the application of NASM to land and the handling and storage of NASM as threats to drinking water sources. ~~The circumstances that are to be considered as part of the policy development process for significant threats for these activities are outlined in the flow charts for Threats 6 and 7 (see Appendix C).~~

The level of risk to a drinking water source from NASM-related threats depends on the cumulative impact from nutrient and pathogen sources. This impact is determined through the relationship between the percentage of managed land in an area and the livestock density in that same area. The greater the percentage of managed land in a vulnerable area, the higher the cumulate amount of nutrients that may be over applied to that area.

NASM that will be applied to fields on a farm can be stored in a permanent nutrient storage facility (usually a steel or concrete tank) or on a temporary field nutrient storage site. There are restrictions made under the Nutrient Management Act about what types of NASM can be stored on a farm, for how long, and how it can be applied. For example, liquid NASM must be applied to the land by midnight on the day it is received. The restrictions based on legislation are discussed below.

~~When applying, handling, or storing NASMs, a significant threat to drinking water exists in certain situations if nitrogen, total phosphorus, or pathogens make their way into surface or ground water through runoff or spills.~~

The ~~Ministry of the Environment and Climate Change~~MECP identifies nitrogen, total phosphorus, and pathogens as contaminants that could make their way into surface or groundwater as a result of the application of NASM to land, and the handling and storage of NASM. These nutrients and pathogens could threaten the safety of drinking water sources in certain situations due to runoff or spills.

The sources of nitrogen and total phosphorus in the NASM are dependent on the material. Sewage biosolids could have nutrients from human waste and household products, such as soap.

Nitrogen is a concern for both surface and ground drinking water sources. When water with high nitrate concentrations is consumed by babies less than six months of age, their digestive systems aren't able to cope with high levels of methemoglobin that are formed in the blood. As a result, oxygen is not distributed to the body's cells, and Methemoglobinemia, or Blue Baby Syndrome, results.

Excessive phosphorus in surface water results in eutrophication. Eutrophication involves abundant plant growth and decay and causes reductions in water quality.

Pathogen sources where significant threats are possible are meat plants or sewage works. Additional sources of NASM where threats could be low are:

- seafood processing operations;

~~dairy producers;~~

- dairy product manufacturing operations;
- animal food manufacturing operations (from animal sources); and
- pulp and paper mills.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

Significant threats from NASMs are possible in the municipal wellhead protection areas of the Halton and Hamilton Areas.

~~However, there are no existing significant threats.~~

The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line,

Cedarvale and Kelso municipal well fields (see Figures B-1 through B-7). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant threats is 10. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 8 or greater can result in significant threats for pathogens. A vulnerability of 9 or greater is required for a chemical threat to be significant.

For a description of vulnerability scores, see the Assessment Reports.

For the number of pathogen or chemical threat occurrences related to activities involving NASM within Halton-Hamilton Source Protection Region please visit the latest assessment reports.~~There are no existing significant threats due to activities involving NASM within the Halton-Hamilton Source Protection Region.~~

The circumstances for significant threats are:

WHPA–A or B with a vulnerability score of 10

Application: a significant chemical threat exists when the combination of managed land percentage and livestock density is above the threshold in the ~~MOECC~~ MECP Tables of Drinking Water Threats (2017) ~~(2009)~~. The chemical of concern is nitrogen. A significant pathogen threat only exists when meat plant products and sewage works products are applied to land in any quantity.

Handling and Storage: a significant chemical threat exists, depending on the mass of nitrogen within the NASM, when storage is below grade in or on a permanent facility; above grade in or on a permanent storage facility; or at or above grade in either a permanent or temporary field storage site. A significant pathogen threat is only associated with the potential spill or runoff from the storage of material from a meat plant.

WHPA–E with a vulnerability score of 9

Application: a significant chemical threat exists when the combination of managed land percentage and livestock density is above the threshold in the ~~MOECC~~MECP Tables of Drinking Water Threats. The chemicals of concern are nitrogen and total phosphorus. A significant pathogen threat exists only when meat plant products and sewage works products are applied to land in any quantity.

Storage: a significant chemical threat exists, dependent on the weight of the nitrogen within the NASM, and is based on storage below grade in or on a permanent facility, storage above grade in or on a permanent storage facility, or storage at or above grade in either a permanent or temporary field storage site. The chemicals of concern are nitrogen and total phosphorus. A significant pathogen threat is only associated with the potential spill or runoff from the storage of material from a meat plant with a portion stored above grade in or on a permanent nutrient storage facility.

WHPA–E with a vulnerability score of 8.1

Application: a significant pathogen threat exists when materials from meat plants or sewage works are applied to land in any quantity.

Storage: a significant pathogen threat exists when material from a meat plant is stored at or above grade and there could be spills or runoff from the area.

What legislation, guidelines or protocols already exist?

Existing legislation associated with NASM threats include the following Acts:

- Fisheries
- Environmental Protection
- Nutrient Management

Fisheries Act, 1985

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

For example, the latter case would apply if a farmer had sewage biosolids spread on land near a river with fish habitat, and the biosolids subsequently washed into the river.

Environmental Protection Act, 1990

The Environmental Protection Act (EPA), which is enforced by the ~~Ministry of the Environment and Climate Change~~MECP, provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects.

Prior to January 1, 2011, an environmental compliance approval, issued by the Ontario Ministry of the Environment and Climate Change under Part V of the Environmental Protection Act, was required to apply NASM to land. However, since that date, the land application of NASM has been regulated under the Nutrient Management Act for agricultural properties. Those haulers that have a Waste Management System environmental compliance approval will need to apply to ~~MOECC~~MECP to amend their approvals in order to allow the transport of NASM to sites operating under a NASM Plan. If the application of NASM is not to agricultural lands, then approvals will continue to be issued under the previous process and non-agricultural sites to which NASM is applied are designated waste disposal sites. Existing farm approvals will remain valid until they are suspended, revoked, or expire five years from the date of issue.

Nutrient Management Act, 2002

~~The Nutrient Management Act sets out province-wide standards for regulating the safe application and storage of NASM.~~

Ontario passed the Nutrient Management Act in June 2002. The intent of the Act is to provide comprehensive, enforceable, province-wide standards to regulate biosolids and other materials that are applied to land by the agricultural industry, municipalities, food processors, wineries, and paper mills. This includes agricultural source materials, such as manure, and non-agricultural source materials (NASM).

Enforcement of the Nutrient Management Act is the responsibility of the ~~Ministry of the Environment and Climate Change~~MECP.

Ontario Regulation 267/03

~~Ontario Regulation 267/03, administered by OMAFRA, ensures that strict criteria are met when applying NASMs to farmland.~~

The principle piece of legislation related to the application and on-farm storage of NASM is Ontario Regulation 267/03. This regulation, as amended, stipulates detailed requirements for the storage, handling, and application of nutrients to agricultural cropland. Sections 15.2 and 28 of Ontario Regulation 267/03 are prescribed instruments under the Clean Water Act, 2006. These sections relate to the approval of and compliance with NASM plans.

Recent amendments to Ontario Regulation 267/03 focused on the quality of the material being applied to land, ensuring strict criteria are met and that the material is beneficial to the soil. The regulations also include greater consideration of the potential odour generation. The regulations apply to any Ontario farm where NASM will be applied, not just livestock farms.

The regulations set out standards for application of NASM, including set back distances (e.g., from surface water, groundwater, and residences), odour requirements, and land application requirements based on material and soil quality.

Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) is responsible for the administration of the regulation, which includes approvals of NASM plans as well as training requirements. The OMAFRA Director will consult with the ~~Ministry of the Environment and Climate Change~~MECP and other agencies where required when approving NASM plans. Proactive inspections will be conducted by the Ministry to ensure NASM is managed in accordance with requirements under the Nutrient Management Act.

Other Tools

- Non-Agricultural Source Material Plans
- NASMs are divided into three categories based on the source of the materials and the level of risk to human health and the environment (see Table 4).

Table 4 NASM Plan requirements based on category of NASM

Category	Examples of material	Plan requirements
1	unprocessed plant material such as leaf and yard waste, and culled fruit and vegetables	NASM plan is not required. Land application rates are limited to 20 tonnes/hectare

2	processed plant material, bakery waste, organic matter that does not contain fish or meat	Registration of agricultural operation; NASM plan required but no approval if low metal content; Approval by OMAFRA for NASM with high metal content; Approved NASM Plan if stored on a farm.
3	sewage biosolids, pulp and paper biosolids, all other NASM not specifically mentioned above	NASM plan approval by OMAFRA

A NASM Plan is required by any farm on which NASMs are applied, stored, or handled.

A NASM plan developer, trained and certified by OMAFRA, must prepare NASM plans. To be eligible, individuals must demonstrate their knowledge and skills by taking the appropriate courses and passing the certification tests. There are three required courses for the NASM plan development certificate, followed by a required practicum and a written exam receiving a grade of 75 percent or better.

People who apply nutrients to a field that will require a NASM plan, but who do not own, operate, or work as an employee for the farm, must have a nutrient application technician license.

NASM plans will address the land application of NASM and the storage of NASM on farms, and will be required for any farm where these activities would occur, regardless of the number of nutrient units generated. The plans can be prepared for one- to five-year periods, and are subject to annual review and summary by the operator.

The preparation of the NASM plan takes into account maximum application rates and sampling and analysis results, to determine an application rate that is both agronomically sound and protective of the environment and human health. In addition, the OMAFRA Director has the power to require an individual to submit a NASM plan for approval, even if the material does not normally need an approval, if there are grounds to believe that the management of the material may cause an adverse effect.

As noted above, NASM plans are required in order to apply or store Category 2 and 3 materials. A plan is not needed to apply Category 1 materials to land. Instead, the applicator must follow the maximum application rate set out in Ontario Regulation 267/03.

A NASM plan is similar to a nutrient management plan (see Section 3.3, Agricultural Source Materials) because both documents deal with the land application of nutrients and address sensitive features, such as watercourses and wells.

The NASM plan, however, includes testing of the materials and the soils for 11 metals and can include other requirements, such as limits on fats, oil and grease, or sodium. In addition, whereas a nutrient management plan would include all the agricultural fields in a farm unit, a NASM plan can be limited to one or more fields where the NASM is going to be applied and the NASM storage area.

~~NASM plans include components such as an analysis of nutrient values, metal tests, maximum application rates, and storage descriptions.~~

The following components must be included in the NASM plan:

- A list of the sources of NASM.
- Analysis of applicable parameters such as nutrient content or nutrient values, tests for metals, pathogens and other parameters.
- Establishment of beneficial use of the NASM.
- Determination of maximum application rate as determined by the limits set in section 8.2.5 of the Nutrient Management Act (NMA).
- NASM application area information including sufficient information to locate the property (i.e., lot and concession, 911 address, tax roll assessment number, property identification number).
- Cropping practices.
- Nutrient application.
- Land base information.
- List of storages if used for NASM, including locations, type of storage (temporary/permanent), description of permanent storage facilities (storage tanks, lagoons) and storage capacity.

NASM Application

Restrictions on the application of NASM are based on time of year, slope and application rate, application method, incorporation, crop residue, and distances from surface water. For example, NASM cannot be applied to land when the soil is snow-covered or frozen. Sewage biosolids cannot be applied between December 1 and March 31.

The minimum setback requirements for the application of NASM to land are listed in Table 5. These setbacks are similar to those specified in the "Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land" (MOE and OMAFRA, 1996). OMAFRA will provide a notice of NASM plan approval to the municipality. For the application of Category 3 NASM or Category 2 that has high metal concentrations, the ~~MOECC~~MECP must be notified at least 24 hours before application begins.

A vegetated buffer zone is required between land where NASM is applied and surface water. The buffer zone must have a minimum width of 3 metres and be maintained under continuous vegetated cover including perennial grasses, other herbaceous plants, or trees and perennial forage crops that can be harvested as hay or silage.

The minimum distances to other land uses, such as residential areas, relates to the odour associated with the NASM. However, in terms of drinking water source protection, this minimum distance has the effect of providing separation that may exceed the minimum well separation required under Ontario Regulation 267/03 between the land application or storage of NASM and municipal and private drinking water wells.

Table 5 Minimum setback requirements for the application of NASM to land

Feature	Value	Note
Minimum soil depth to bedrock	0.3 m	1
Minimum depth to groundwater table	0.3 m or 0.9 m	2

Minimum distance to municipal wells	100 m	
Minimum distance to drilled wells (>15 m deep)	15 m	
Minimum distance to all other wells including dug wells	30 m or 90 m	2
Minimum distance to individual residences	25 to 450 m	3
Minimum distance to residential areas, commercial, community, or institutional uses	50 m to 900 m	3
Minimum distance to watercourses	20 m	4

1. ~~1~~ NASM cannot be applied if the soil depth to bedrock is less than 0.3 m. There are restrictions to the application of NASM for soil depth between 0.3 m and 1 m.
2. ~~2~~ This requirement is dependent on the type of NASM and the method of application.
3. ~~3~~ This distance depends on the odour classification of the NASM.
4. ~~4~~ The minimum distance to a watercourse is dependent on slope, presence of vegetative buffer, method of incorporation into soil, a specified amount of crop residue, or if it is applied to a living crop (such as in a pasture).

Ontario Regulation 267/03 restricts the use of high trajectory irrigation guns to apply liquid manure or NASM on all farms regardless of whether or not they have a nutrient management strategy, nutrient management plan, or a NASM plan. The regulation also contains rules for the land application of anaerobic digestion output on all farms regardless of whether or not they have a nutrient management plan. The minimum setback requirements listed in Table 5 generally apply to the application of anaerobic digestion output where it is considered to be a NASM.

Permanent Storage Facilities

~~Permanent, solid NASM storage facilities must be certified to meet the requirements of the Nutrient Management Act and have a runoff management system to limit its effects on water sources.~~

Permanent nutrient storage facilities built after June 30, 2003 can be used to store NASM provided that an engineer confirms that the facility meets the requirements of the Nutrient Management Act and that it is appropriate for the storage of NASM. NASM can only be stored in a permanent facility built before June 30, 2003 if it is subject to a certificate of approval under the Environmental Protection Act.

Under Ontario Regulation 267/03, a permanent, solid NASM storage facility must have a runoff management system to handle all of the runoff generated by the facility (e.g., solid NASM piled on a concrete base). The system must consist of at least one of the following:

A roof used to prevent the entry of precipitation, assuming that any water upstream of the facility has been diverted away from the facility.

Vegetated filter strip systems.

Properly-sized runoff collection and storage systems.

A permanently vegetated area (PVA), if runoff from the facility is generated from an area less than 300 square metres. The location requirements for a PVA are similar to those for the nutrient storage facility (see Table 6).

A sewage works approved under the Ontario Water Resources Act or a sewage system approved under the Ontario Building Code.

Table 6 Location requirements for NASM storage facilities

Feature	Value
Minimum distance to municipal wells	100 m
Minimum distance to drilled wells (>15 m deep)	15 m (45 m)
Minimum distance to all other wells including dug wells	90 m
Minimum distance to field drainage tiles or piped municipal drains	15 m
Minimum flow path to surface water or tile inlet	50 m
Minimum distance to individual residences	200 m (125 m or 200 m)1
Minimum distance to residential areas, commercial, community or institutional uses	450 m (250 m or 450 m)1

1 This distance depends on the odour classification of the NASM.

Halton Region Biosolids Recycling

~~Biosolids are an organic by-product of the wastewater treatment process. Halton Region owns and operates seven wastewater treatment plants within its four local municipalities. Halton biosolids are recycled as an agricultural fertilizer to improve and maintain soil productivity and stimulate plant growth. They are applied to agricultural land only after the material is fully treated and meets strict quality standards set by the Ministry of the Environment and Climate Change..Halton Region currently generates approximately 11,000 dry tonnes of biosolids per year. Historically, biosolids were handled in liquid form (approximately 3 percent solids), but more recently, dewatering equipment has been added at some facilities to produce a more semi-solid "cake" material (greater than 20 percent solids). Halton Region currently dewaters approximately 60 percent of its annual biosolids production.Dewatering takes place as a standard operation at the Skyway and Mid-Halton Wastewater Treatment Plants. In addition,~~

~~the Region also operates a mobile dewatering unit to address specific program requirements. The dewatering process has the benefit of reducing the overall volume of biosolids that muWhen conditions permit, biosolids are directly applied to agricultural land. The program is closely monitored by the municipality and when the biosolids cannot be applied, such as during periods of wet weather or the winter months, temporary storage is provided.~~

~~Liquid biosolids are stored in holding tanks at Halton's Biosolids Management Centre, located on Regional Road 25 in Oakville, and dewatered biosolids are similarly stored at a special facility in Niagara Region, operated by Halton's contractor, Terratec EnvironIn May 2009, Halton Region initiated a comprehensive master plan study for the management of biosolids generated by the Region's wastewater treatment plants.~~

Halton Region owns and operates six wastewater treatment facilities, producing over 35,000 tonnes of biosolids per year. Halton Region manages its Biosolids Land Application Program by applying liquid municipal biosolids from the wastewater treatment plants to agricultural lands within Halton and in other municipalities. In addition, the Region manages a permanent biosolids storage facility in Oakville that is used to store liquid municipal biosolids prior to land application. The Region's biosolids storage facility is an approved facility under the Environmental Protection Act. Temporary field nutrient storage site for liquid prescribed materials (Biosolids) are not employed in the Region's program. Liquid municipal biosolids are the only type of NASM that the Region produces and manages within its boundaries.

Hamilton Biosolids Recycling

~~The City of Hamilton is shifting to thermal reduction as the preferred management option for biosolids generated at their two wastewater treatment plants.~~

~~The City of Hamilton has two wastewater treatment plants (WWTPs) dedicated to protecting the health of the environment and its residents. The largest of these is the Woodward Avenue WWTP. A much smaller plant is located in Dundas. The sludge is treated at both facilities through anaerobic digestion and dewatering to become biosolids. Currently, all biosolids are used as a soil amendment.~~

~~In 2007, the City of Hamilton completed the second phase of the Class Environmental Assessment (EA) process to develop a biosolids master plan. The Biosolids Master Plan will provide direction for the management of biosolids that are generated from the city's wastewater treatment plants for the next 20 years and beyond. The Biosolids Master Plan identified a preferred management alternative of thermal reduction (with digestion for energy recovery). The Master Plan Class EA recommended the establishment of a new technology for the thermal reduction process at the existing site while continuing the use of digestion for energy production through co-generation.~~

In 2005, the City of Hamilton undertook a Biosolids Master Plan to address the challenges associated with the existing practice of biosolid management at the Woodward Wastewater Treatment Plant. Work began on a new Biosolids Management Process in June 2017 and began operations in May 2020. The new management process takes up to 60,000 wet tonnes of wastewater biosolids and dries it into a food grade pellet or Product regulated under the Canadian Food Inspection Agency. The Biosolids Management Project was created to develop a long-term sustainable solution for the City's biosolids, moving away from a wet sludge Class B material to a Class A product through a pelletization process. The

end product can now be sold and used as fertilizer or used as fuel replacement. This project is only treating material from the City of Hamilton, receiving dewatered biosolids from both the Woodward and Dundas wastewater treatment plants.

What policy approaches were discussed?

The Planners' Working Group and Source Protection Committee discussed approaches to address the threats of the application to land, and the handling and storage of non-agricultural source material. The Source Protection Committee relied on the municipalities to report the locations of properties where NASM is spread. No existing threats exist and therefore only policies for future scenarios are required.

Incentive programs

Introduce incentive programs for agricultural/rural landowners to establish additional buffers beyond the minimum required on lands adjacent to surface water within WHPA-E areas.

Prescribed Instruments

Require OMAFRA to consider protection of municipal drinking water sources in their approval of proposed NASM plans within wellhead protection areas where there would be significant threats.

Require ~~MOECC~~MECP to prioritize inspections for these vulnerable areas and to conduct regular inspections with a target of 100 percent compliance.

Require monitoring as a condition of approval for the application or storage of NASM for all properties within WHPAs where significant threats would occur.

Require OMAFRA or ~~MOECC~~MECP to report back on an annual basis on the application of the plan policies within these areas.

Prohibition (Future)

Prohibit the application, handling, and storage of NASM in wellhead protection areas where these activities would be significant drinking water threats.

3.4.2 Discussion on Policy Options

Policies need to be included within the Source Protection Plan to ensure that future activities do not become a threat to municipal drinking water sources. It is important to note in the consideration of policy options, that the recent amendments to Ontario Regulation 267/03 have significantly improved the regulatory context for the application, handling, and storage of NASM. As a NASM plan is required for all agricultural properties, the use of a prescribed instrument is the preferred approach.

Education and Incentive Programs

Category 1 NASM is unprocessed plant material that farmers apply to their fields up to a regulated maximum application rate. As such, the Source Protection Committee endorsed an education and outreach program for farmers undertaking the application, or handling and storage of this material in vulnerable areas where these activities would be significant drinking water threats. The Committee is of the opinion that the implementation of an education and outreach policy will promote the achievement

of the objectives of the Plan that the threat ceases to be or never becomes significant, and that a policy to regulate or prohibit the activity is not necessary to achieve the objectives.

The Committee did not indicate support for additional incentive programs beyond the current stewardship program.

Prescribed Instruments

~~The use of NASM plan approvals is the preferred option to address the threats associated with NASMs in the Halton and Hamilton Areas.~~

The use of prescribed instruments, NASM plans, was the preferred primary option to address the threats due to the application to land, and the handling and storage of category 2 and 3 NASM. The regulations regarding NASM for agricultural lands have been greatly strengthened recently, and the Source Protection Committee is of the opinion that these revisions address the risks to drinking water sources. Category 1 does not require a NASM plan.

The Committee supports the monitoring requirement for the Source Protection Authority to be advised of the number and location of NASM plans approved within their jurisdiction on a yearly basis.

The Committee noted the distinction between whether the application of non-agricultural source material to land is subject to the Environmental Protection Act or the Nutrient Management Act. The Environmental Protection Act approvals that were phased out with the recent amendments to the Regulation were for application and storage on agricultural properties. There is no legislated definition of agricultural land, but the definition of nutrient in the legislation does reference the application to land for the purpose of improving the growing of agricultural crops. If there are no crops, the material is not a nutrient and would be considered a waste.

A different policy approach must be used for the application, handling and storage of non-agricultural source material on non-agricultural properties and when it is considered a waste. The policy directives set out under waste disposal sites earlier in this document and the related policies would apply.

It was noted that, as part of the NASM plan process, ~~MOECC~~MECP does conduct occasional inspections. However, there are many farms to inspect and only a few inspectors. The Committee supported prioritization of the inspections and annual reporting of the results of these inspections when the farm is located where significant drinking water threats would occur. The Committee discussed that these inspections could support the education and outreach program for category 1 NASM.

Land Use Planning

The Ministry of the Environment and Climate Change suggested that when prohibition through prescribed instruments is used in policy a complimentary land use policy would help inform proponents at the beginning of the development process about any restrictions that exist. Although planning tools would not be an effective means of managing specific activities, for this threat the land use could be prohibited.

Risk Management Plans

As all NASM plans are subject to approval as a prescribed instrument, there is no need for the use of the additional tool of risk management plans.

Prohibition (Future)

No consideration was given to implementation of this option, as these threats will be addressed effectively through the use of other tools.

Monitoring

Annual monitoring of the implementation of policies was discussed by the Planners' Working Group and the Source Protection Committee. Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Consultation

Overall support for the policy direction was received through pre-consultation from OMAFRA and the municipalities. Revisions to the draft policies from pre-consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording.

Non-agricultural source material referenced policies T-1-C and T-3-C to show what policies were used to address its application outside of agricultural land. However, because outside of agricultural land it is called waste, these references were removed. The municipal planners requested that wording be included in the policy to direct the municipality to use Planning Act tools to prohibit the land use as support for the required official plan amendment.

The Ministry of the Environment and Climate Change requested that policies provide flexibility for implementation when they affect operational procedures. However, it is the opinion of the Source Protection Committee that every farm where activities are occurring that could be significant drinking water threats should be visited. Flexibility has been given to the ~~MOECC~~MECP to define the frequency of regular inspections.

The reader is directed to the Plan to review the policies.

Policy Directives for Threats 6 and 7 – Non-agricultural Source Material		
	Policy Directive	Policy
1	Support the current regulatory framework and use measures in NASM Plans to manage the threats associated with the application, handling, and storage of category 2 and 3 NASMs on agricultural lands.	T-24-C
2	Require ~~MOECC~~MECP to prioritize and conduct regular inspections of farms located where threats associated with NASMs would be significant risks to drinking water sources.	T-22-S

3	Require that the Source Protection Authority be advised on a yearly basis of the number and location of NASM plans approved within their jurisdiction by OMAFRA, and the number and location of inspections conducted by ~~MOECC~~MECP.	T-21-C and T-22-S
4	Require that the municipalities develop and implement an education and outreach program to promote best management practices regarding the application, or handling and storage of category 1 NASM.	T-54-C

3.5 Commercial Fertilizer

3.5.1 Background

What is commercial fertilizer?

~~Commercial fertilizers are synthetic materials designed to promote plant growth. They typically contain nitrogen, phosphorus, and potassium, as well as supplements such as lime and gypsum.~~

Commercial fertilizer is a synthetic material containing one or more plant nutrients. It is either designated for such use or claims to have value in promoting plant growth.

Plants need sufficient nutrients for proper growth. They retrieve these nutrients from soil organic matter, soil minerals, organic fertilizers such as manure, and nitrogen from the air. If the soil still does not contain adequate nutrient levels, commercial fertilizers may be added.

The majority of commercial fertilizers contain nitrogen, phosphorus, and potassium. Nitrogen is important for leaf development; phosphorus promotes good root development and plant growth, especially during plant establishment; and potassium contributes to the general vigour of a plant, including drought tolerance and winter hardiness. Commercial fertilizers also include supplements such as lime and gypsum.

What activities related to commercial fertilizers pose a significant threat?

~~The application of commercial fertilizer to land, and the handling and storage of commercial fertilizer are Threats 8 and 9, respectively, of the 21 prescribed threats~~

The ~~Ministry of the Environment and Climate Change~~MECP has identified nitrogen and total phosphorus as chemicals that could affect drinking water sources under certain circumstances related to commercial fertilizers. These nutrients could threaten the safety of drinking water in certain situations due to runoff, leaching, or spills. The application of commercial fertilizer to land is associated with a range of land uses including agricultural, active recreational, institutional, industrial, commercial, and residential.

The Ministry has prescribed both the application of commercial fertilizer to land, and the handling and storage of commercial fertilizer as threats to drinking water. ~~The circumstances related to these activities in areas where they pose a significant risk are summarized on flow charts for Threats 8 and 9 (see Appendix C).~~

When assigning risk to drinking water sources from associated land application activities, the ~~Ministry of the Environment and Climate Change~~MECP considered the cumulative impacts from all sources of nutrients. The combination of percent managed lands and livestock density was used as a surrogate of nutrients present as a result of generation, storage, and land application within the area. This surrogate was used to determine the potential impact of a single property on water quality through the release of nutrients. The level of risk to drinking water sources from the land application of commercial fertilizers depends on the intensity of managed lands and quantity of nutrient units along with the proximity of the activity to a municipal well. A conservative assumption was made for this assessment that a higher nutrient unit density and a larger area of managed lands results in a greater concentration of nutrients and an increased potential for nutrient contamination of source waters.

The primary advantage of using packaged commercial fertilizer over manure is that nutrients are immediately available to the plants and the exact amounts of a given element can be applied. With manure, estimates are made of the quantity of nitrogen and phosphorus it contains. For environmental and economic reasons, it is important to optimize the amount of fertilizer applied.

When more nutrients are applied to land than the crops or vegetation require, the nutrients run off into surface waterbodies or infiltrate into the soil and affect the groundwater. Excessive amounts of nitrogen and phosphorus may cause algae blooms in surface waters. Algae can produce toxins that are harmful to humans, and they can decrease the quality of the water, imparting a foul taste and odour to drinking water. Phosphorus typically binds to soil as it infiltrates through, or precipitates out of infiltrating water and does not impact groundwater quality significantly.

Nitrogen is the nutrient taken up in the largest amount by crops. Increased nitrate concentrations in groundwater results from excess infiltration of nitrogen. Elevated concentrations of nitrate in drinking water may lead to methemoglobinemia (Blue Baby Syndrome) in infants, the formation of carcinogenic nitrosamines in the human stomach, and hypertension (U.S. Department of Agriculture, 2006).

Commercial fertilizer can be stored in a variety of locations, inside or outside, for retail sale or in relation to its application to land. Although storage for these purposes can occur year-round, the greatest volume of fertilizer is stored in the spring before the growing season begins and application occurs.

How do these threats affect the Halton Region and Hamilton Region Source Protection Areas?

~~Applying commercial fertilizer and handling and storing commercial fertilizers pose a significant threat on one property in the Source Protection Areas.~~

The vulnerable areas mapped in the Halton Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Cedarvale and Kelso well fields (see Figures B-1 through B-7~~6 and B-8~~). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (Figure B-10). All wells have WHPAs A through D. In these areas, a vulnerability score of 10 results in significant threats. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 9 or greater can result in significant threats.

The significant threat counts related to this activity in the Source Protection Areas are included in the latest approved assessment reports and are subject to changes due to modifications or new drinking water systems, changing landscapes, etc.

~~There is one unverified existing threat associated with the storage of commercial fertilizer within the Halton Region Source Protection Area. Therefore, policies are required to ensure these threats cease to be and never become significant risks to municipal drinking water sources now and in the future.~~

The MOE Tables of Drinking Water Threats can be viewed at https://www.ontario.ca/

document/tables-drinking-water-threats

For a description of vulnerability scores, see the Assessment Report.

The wellhead protection areas and associated vulnerability score where a significant threat may occur are as follows ~~(see also threat flow charts in Appendix C)~~:

WHPA-A or B with a vulnerability score of 10

Application: a significant chemical threat exists due to the combination of managed land percentage and livestock density as compared to criteria listed in the Tables of Drinking Water Threats (2017~~09~~). The chemical of concern is nitrogen.

Handling and storage: the storage for retail sale or for application is a significant threat when the mass of fertilizer in any form is greater than 2,500 kilograms. The chemical of concern is nitrogen.

WHPA-E with a vulnerability score of 9

Application: a significant chemical threat exists due to the combination of managed land percentage and livestock density as compared to criteria listed in the Tables of Drinking Water Threats (2017~~09~~). The chemicals of concern are nitrogen and total phosphorus.

What legislation, guidelines, or protocols already exist?

Existing legislation associated with commercial fertilizer threats includes the following Acts:

- Fertilizers
- Fisheries
- Nutrient Management
- Fertilizers Act, 1985

~~The federal Fertilizers Act regulates the registration, safety, effectiveness, and proper labelling of commercial fertilizers. Provinces are responsible for regulating their manufacture, proper use, and safe disposal.~~

All fertilizers or supplements sold in or imported into Canada, are regulated under the Federal Fertilizers Act administered by the Canadian Food Inspection Agency (CFIA).

The Fertilizers Act sets out the requirements for the legal registration of fertilizers and stipulates that all regulated products must be: safe with respect to human, plant, and animal health and to the environment; effective for the intended purpose; and properly labelled to avoid fraud or misrepresentation in the marketplace.

The manufacture, proper use, and safe disposal of these products are controlled by provincial rules and regulations. The Canadian Food Inspection Agency works together with provinces and municipalities to ensure that all fertilizers and supplements meet the highest standards for safety and efficacy.

Officers from the Canadian Food Inspection Agency and the Canadian Border Services Agency carry out compliance and enforcement under the Fertilizers Act. Compliance efforts are focused on verifying that products meet label guarantees and satisfy the safety standards for biological and chemical contaminants. Producers found to be non-compliant are subject to regulatory action, which may include product detention and, in severe cases, prosecution.

Fisheries Act, 1985

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

This rule would apply, for example, if a farmer or homeowner applied fertilizer near surface water and the runoff affected the quality of water in fish habitat.

Nutrient Management Act, 2002

Ontario's Nutrient Management Act sets out a comprehensive and integrated approach to the storage and land-application of materials containing nutrients, however, does not regulate the storage of commercial fertilizer. It ensures that all materials applied to land will be managed in a sustainable, beneficial manner that provides environmental and water quality protection. The Act provides clear, province-wide standards that apply to the land application of materials generated by agricultural and non-agricultural operations.

Responsibility for oversight and policy development related to the Nutrient Management Act is shared by the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) and the Ministry of the Environment, Conservation and Parks (MECP) ~~and Climate Change (MOECC)~~. The ~~MOECC~~MECP is also responsible for inspections, investigations, and enforcement of regulatory requirements, while OMAFRA is responsible for the necessary approvals, training, and certification requirements.

Ontario Regulation 267/03—General

~~Ontario Regulation 267/03 is the main regulatory tool dealing with the application of commercial fertilizer on farms. It sets out detailed criteria for activities related to these materials.~~

The Nutrient Management Act is supported by Ontario Regulation 267/03— General, that sets out detailed criteria for the storage and application of nutrients (not including the storage of commercial fertilizer) to agricultural cropland for phased-in operations. The regulation sets out what operations must comply with its requirements and what triggers the inclusion of an existing operation. The "Nutrient Management Protocol" (MAFRA, September 2009 and updated 2012) provides technical standards and procedures related to this regulation.

The Nutrient Management Act sets out province-wide standards for the safe application of commercial fertilizers on farms.

Sections 10, 14, and 28 of Ontario Regulation 267/03 are prescribed instruments under the Clean Water Act. These sections relate to the approval of and compliance with nutrient management strategies and nutrient management plans.

A nutrient management strategy sets out an environmentally acceptable method for managing all prescribed materials generated and received at an agricultural operation. Nutrient management strategies are required:

- at farms that generate more than 300 nutrient units annually
- when applying for a building permit to construct or expand barns or manure storage facilities, if the livestock operation generates more than 5 nutrient units
- when construction of a permanent storage facility made of earth is proposed
- when construction of a regulated mixed-anaerobic digester is proposed
- when a farm having an existing anaerobic digester receives off-farm materials for treatment

A strategy is also required if any portion of the farm unit used for the operation lies within 100 metres of a municipal well. The strategy must be approved by a director at the Ministry of Agriculture, Food, and Rural Affairs.

Under Ontario Regulation 267/03, certain farmers must submit a nutrient management plan, which outlines how commercial fertilizers will be safely applied to cropland.

A nutrient management plan details how nutrients are to be applied to a given land base. A plan is based on both the components of the nutrients used and the characteristics of the field and aims to optimize the utilization of the nutrients by crops and to minimize environmental impacts. A person who owns or controls an agricultural operation, and generates 300 or more nutrient units, or generates more than 5 nutrient units and is located within 100 metres of a municipal well, must ensure that nutrients are managed in accordance with a nutrient management plan if they apply nutrients to land on their farm unit.

It is possible that a person who owns or controls an agricultural operation may be required to have a nutrient management plan as well as a non-agricultural source material plan (see Threats 5 and 6) for part or all of the farm unit. These plans are kept on the farm, available for review by the ~~MOECC~~MECP Agricultural Environmental Officer during compliance inspections.

The land application standards set out in Regulation 267/03 and discussed in Section 3.3 (Agricultural Source Material) also apply to commercial fertilizers. In addition, the regulation prohibits the application of commercial fertilizer close to water wells and provides strict guidelines for its application within vegetated buffer zones.

The regulation requires that by February 15 each year, the person who owns or controls an agricultural operation must prepare a summary of activities carried out the previous year and update the nutrient management strategy and plan to reflect the anticipated operation during the coming year. The regulation also requires renewal of the strategy and plan every five years.

Figures 3 and 4, included in Section 3.3 Agricultural Source Material illustrate the main differences between a nutrient management plan and strategy. A complete list of components required for both strategies and plans are set out in Table 3, also in that section.

Consultants who prepare nutrient management strategies and plans must be certified through OMAFRA. Employees who apply nutrients to land on an agricultural operation that requires a nutrient management plan must have a Nutrient Application Technician License.

Regulation 267/03 contains land application standards that are applicable to all farms that require a nutrient management plan. These standards include timing restrictions for application, requirements for vegetated buffer zones adjacent to surface water, and setbacks from surface water and wells. The standards are considered to be best management practices for non-regulated farms. The following summarizes the standards that address commercial fertilizer specifically:

- No person shall apply commercial fertilizer to land closer than 3 metres to a water well that is not a municipal well.
- No person shall apply nutrients within the vegetated buffer zone except for an amount of commercial fertilizer that is reasonable to establish or maintain the vegetation of the vegetated buffer zone. If a person does apply an amount of commercial fertilizer that is reasonable to establish or maintain the vegetation of a vegetated buffer zone, the fertilizer must be applied,
- in accordance with a determination of the concentration of plant available phosphorus and plant available potassium in the soil of the vegetated buffer zone,
- in accordance with the Agronomy Guide for Field Crops, and
- in such a manner that the agronomic balance does not exceed zero.

Other Tools

Other tools related to commercial fertilizer threats include:

- Canadian Fertilizer Quality Assurance Program
- Spills Action Centre
- Canada-Ontario Management Practices
- Canadian Fertilizer Industry Storage and Handling Guidelines
- Hamilton-Halton Watershed Stewardship Program
- Canadian Fertilizer Quality Assurance Program (CFQAP)

~~The CFQAP monitors quality assurance of commercial fertilizers. Participants in the program submit samples to an accredited laboratory, which sends the results directly to the CFIA. Results are verified, and plant ratings based on the previous year's samples are published each March.~~

The Canadian Food Inspection Agency (CFIA) is responsible for the monitoring of fertilizer products as well as the administration of the Canadian Fertilizer Quality Assurance Program (CFQAP). The objective of the program is to implement an effective monitoring program while ensuring citizens' health and safety.

Many companies today participate in sophisticated quality assurance programs to monitor their production. This government program recognizes industry's own quality assurance efforts and provides for audits of quality control, health and safety issues, and complaint investigation.

Quality assurance is monitored through the following steps:

- Each participant submits at least the minimum number of samples required, based on a statistically valid sampling plan.
- Samples are analyzed by a laboratory that is accredited and monitored by the Agency.

- The Agency receives a copy of all results from official program samples directly from the accredited laboratory. The laboratory simultaneously sends a copy of the results to the company concerned.
- The Agency verifies the accuracy of all results with the company submitting the samples.
- In March of each year all plant ratings are published and made available. These ratings are based on samples taken in the previous year.

Spills Action Centre

Under Part X of the Environmental Protection Act, spills must be reported immediately. The owner of the spilled material and the person in control of it when the spill occurred are responsible for the cleanup.

The Ontario ~~Ministry of the Environment and Climate Change~~MECP is the lead provincial agency for environmental emergencies. The Ministry operates the Spills Action Centre, a 24-hour service for emergency action and response.

The ~~MOECC~~MECP regulatory mandate for spills is based on Part X of the Environmental Protection Act that requires spills to be reported immediately. Part X also requires the owner of the spilled material and the person who had control of the material when it was spilled to promptly clean up and restore the environment.

The Ministry also enforces the cleanup and disposal of the spilled materials in an appropriate manner. If there is an inadequate response, the Minister can order a cleanup. If the owner fails to comply, the ~~MOECC~~MECP can undertake the cleanup and recover costs.

The Ministry is responsible for spills and drinking water emergencies by Order in Council under the Emergencies Management and Civil Protections Act. The Ministry has developed an Emergency Management Program to implement this requirement.

Agricultural operations with either a nutrient management strategy and plan or an environmental farm plan will have a contingency plan that provides details on how to respond to a spill.

Canada-Ontario Environmental Farm Plan

~~Best practices for fertilizer storage listed in the EFP Workbook include storing fertilizer a safe distance away from surface water and wells, testing well water regularly, and regular monitoring of storage units for spills, leaks, cracks, or seepage.~~

The Environmental Farm Plan (EFP) is a risk assessment and management process for environmental protection, sustainable production, and health and safety. Farmers voluntarily prepare the plans to increase their environmental awareness in up to 23 different areas. Eight of those areas are linked to drinking water threats under the Clean Water Act, 2006. Through the EFP local workshop process, farmers highlight their farm's environmental strengths, identify areas of environmental concern, and set realistic action plans with timetables to improve environmental conditions (Ontario Soil and Crop Association, 2005). The plans are peer reviewed and are confidential. Environmental cost-share programs are available to assist in implementing projects. Over 35,000 participants have participated in the program since it began in 1993. This internationally recognized program has been very successful in helping Ontario farmers adopt more environmentally sustainable practices.~~As of 2009, 34,000 out of~~

~~57,000 farm families in Ontario have participated (presentation made by Chris Attema to the Planners' Working Group, January 4, 2011)~~.

The Environmental Farm Plan Workbook includes a work sheet on fertilizer handling and storage. It outlines a number of best practices regarding fertilizer storage, including the following:

- Fertilizer should be stored in a location where it will not contaminate water and not create a health hazard for humans and animals. In the event of a fire, fertilizer should be stored in a separate facility where fumes, explosions, water, etc., will not affect the health and safety of humans and livestock.
- The shorter the separation distance between the fertilizer storage site and surface water, the greater the risk of contaminating surface water supplies. Steeply sloping topography and heavy soils will further increase the chance that contaminated runoff will reach surface water if a fertilizer spill occurs.
- Move the fertilizer storage an adequate distance away from surface water.
- Move surface water away from fertilizer storage.
- Increase the flow path distance between surface water and fertilizer storage.
- Locate storage an adequate distance away from a water well.
- Relocate water wells away from fertilizer storage.
- Test well water for indicator bacteria at least three times a year, and once a year for other parameters (such as nitrate).
- For existing liquid storages that have secondary containment comprised of an impermeable floor that is not cracked or leaking and a curb/berm installed to collect spills, and for dry fertilizer storages that have an impermeable floor, the farmer should monitor storage regularly, visually checking for spills, leaks, cracks, or seepage from storage.

Golf Course Best Management Practices

~~Voluntary best practices for fertilizer use on golf courses include using appropriate application rates, naturalizing areas not in use, increasing buffer zones around surface water, keeping records of fertilizer use, and proper storage.~~

Voluntary best management practices identified by the Ontario Allied Golf Associations for the use and storage of fertilizer at golf courses include:

- using slow-release fertilizers in environmentally sensitive areas
- basing fertilizer application rates on soil tests
- naturalizing out-of-play areas
- increasing buffer areas along watercourses and ponds
- keeping records of all fertilizer applications
- storing fertilizers in enclosed structures to keep the product dry, away from the elements, and manageable in the event of a spill

Audubon Cooperative Sanctuary Program for Golf Courses

Audubon International has developed an award winning education and certification program to assist golf courses with their environmental protection practices. The program provides guidance on how to enhance natural areas and wildlife habitats, and minimize harmful impacts of the golf course operations.

In completing the program, operators will assess the environmental resources on and adjacent to the course, and develop an environmental plan appropriate for their specific site. Guidance is provided on environmental planning, wildlife and habitat management, chemical use reduction and safety, water conservation, water quality management, and outreach and education.

When the environmental plan is implemented and practices are documented, the golf course may be designated as a Certified Audubon Cooperative Sanctuary.

Canadian Fertilizer Industry Storage and Handling Guidelines

~~CFI guidelines recommend: storing fertilizers away from surface water, sensitive areas, and private and municipal wells; creating and practicing emergency plans; training employees; and designing containment and runoff collection areas with care.~~

The Canadian Fertilizer Institute (CFI) has published "Canadian Fertilizer Industry Storage and Handling Guidelines" (2001). The aim of these guidelines is to help those in the industry determine what changes they can make to their existing or planned facilities to maintain or improve the level of safety associated

with the handling and storage of fertilizers. The guidelines are based on regulatory requirements and industry best practices, and include aspects such as:

Locating all new fertilizer storage facilities a minimum of 50 metres from surface water and environmentally sensitive areas.

Locating liquid fertilizer facilities a minimum of 50 metres from private wells and 300 metres from sources of public water supply (e.g., municipal wells) unless a hydro-geological assessment is prepared that permits a closer setback.

Requiring an emergency response plan that addresses how to contain emergency response water (e.g., from a fire).

Designing specifications for fertilizer containment areas and the collection of runoff water.

Training employees.

Planning and practicing emergency responses in conjunction with the local emergency response officials.

The Hamilton-Halton Watershed Stewardship Program

~~The Hamilton-Halton Watershed Stewardship Program encourages landowners to be good stewards of the land and helps them to design work plans and get funding to protect significant natural areas and watercourses.~~

Hamilton Harbour is one of 43 Areas of Concern in the Great Lakes. The Bay Area Restoration Council, a community group, is working with government, industry, and other stakeholders to restore and protect the harbour and its watershed.

The Hamilton Conservation Authority, Conservation Halton, and the Bay Area Restoration Council initiated the Hamilton-Halton Watershed Stewardship Program. The program grew from a recommendation of the Hamilton Harbour Remedial Action Plan "that citizens in urban and rural areas take responsibility for restoring and maintaining the quality of the environment in which they live." The Hamilton-Halton Watershed Stewardship Program encourages landowners to be good stewards of the land and helps them to design work plans and get funding to protect significant natural areas and watercourses.

The program's purpose is to protect, enhance, and restore environmentally significant natural areas and watercourses in the Conservation Authorities' watersheds through developing an educated, empowered group of landowners. The program has been proactively contacting landowners of natural areas and watercourses, encouraging them to be good stewards of their land and assisting these landowners with designing work plans and obtaining funding.

~~Hamilton Harbour is one of 43 Areas of Concern in the Great Lakes. The Bay Area Restoration Council, a community group, is working with government, industry, and other stakeholders to restore and protect the harbour and its watershed.~~

What policy approaches were discussed?

The Planners' Working Group and Source Protection Committee discussed approaches to address the threats associated with the application, handling, and storage of commercial fertilizer. The following summarizes the policy approaches that were considered:

Education and Outreach

Establish programs targeted at fertilizer application technicians and homeowners to emphasize the importance of fertilizer-free buffers around wells and surface water.

Encourage education programs about grass and crop nutrient requirements, to reduce the excess use of fertilizers.

Promote voluntary nutrient management strategies and plans for all farms.

Incentive Programs

Establish incentive programs for agricultural/rural landowners to establish buffers on lands adjacent to surface water within WHPA-E areas.

Prescribed Instruments

Require OMAFRA to consider protection of municipal drinking-water sources in their review of proposed nutrient management plans for farms within wellhead protection areas.

Require OMAFRA to work with farmers where significant threats exist to ensure compliance with nutrient management plans.

Require ~~MOECC~~MECP to prioritize inspections for areas where significant threats would occur, and to conduct regular inspections.

Land Use Planning

Prohibit the application and storage of commercial fertilizers where the activity would be a significant drinking water threat.

Establish a buffer zone to ensure location of storage facilities are a minimum distance away from WHPA-A and B areas with a vulnerability score of 10, and WHPA-E areas with a vulnerability score of 9.

Risk Management Plans

Require risk management plans for the storage of commercial fertilizer in wellhead protection areas where this activity is or would be a significant drinking water threat

Restricted Land Uses

Require pre-screening by a risk management official of planning applications for activities related to the storage and retail sale of commercial fertilizers where these activities would be a significant drinking water threat.

Prohibition

Prohibit the application and storage of commercial fertilizer in wellhead protection areas where these activities would be a significant drinking water threat.

3.5.2 Discussion on Policy Options

It was discussed that storage of commercial fertilizer on farms is usually minimal, as it is often delivered at the time of need. Even if it is stored, the farmer must keep it dry for application and economic reasons. Commercial fertilizers may be sold at discounted prices in the autumn and if purchased, would be stored until spring/summer the following year. Golf courses and farmers may hire a third party to spread commercial fertilizer and accordingly no storage on the property would occur.

Policies have been prepared to address existing and future threats as one significant drinking water threat was identified in the preparation of the assessment report.

Education and Outreach

~~Education, especially of homeowners, golf course administrators, retailers, and application technicians, was considered an important tool to address threats associated with the storage and handling of commercial fertilizers.~~

Education and the promotion of best management practices were considered important tools to address threats related to commercial fertilizer. It was pointed out that many golf courses already use best management practices, and that they should be encouraged and supported. Education programs could be targeted at fertilizer application technicians and homeowners on the importance of fertilizer-free buffers around wells and surface water, and the proper rate and timing of the application.

It is noted that Halton Region has issued best management practices for golf courses. Inclusion of the requirement for an Audubon Cooperative Sanctuary Certification was proposed but not specifically mentioned. Applications for new golf courses should be reviewed with these standards in mind.

The working group and Committee also noted that the Audubon Society Certification for golf courses should be supported within significant threat areas. This tool would assist with addressing Threat 8, the application of commercial fertilizer to land.

In the case of retail establishments that may potentially have enough stored fertilizer on hand to pose a significant threat, consideration should be paid to the scope of the threat and perhaps an outreach program to educate retail establishments about the importance of storing fertilizer in safe, covered areas, protected from the elements. This tool would assist with addressing Threat 9, the storage and handling of commercial fertilizer.

Incentive Programs

The working group and Committee did not indicate any support for new incentive programs. The source of any funding to establish an incentive program was uncertain. The existing Hamilton-Halton Watershed Stewardship Program should be supported.

Land Use Planning

In the review of tools to address the threats of the application, handling, and storage of commercial fertilizer, it was determined that land use planning was not the preferred option.

Prescribed Instruments

~~Where applicable, the use of nutrient management plans was the preferred option for dealing with the threat associated with fertilizer application.~~

For those farms required to have nutrient management plans, use of that tool is the preferred choice to address the threat posed by the application of commercial fertilizer to land (Threat 8).

The consensus of the Planners' Working Group and the Source Protection Committee was that this instrument is an effective tool with clear criteria for implementation; it is familiar to the farming community; and it can be readily implemented at limited additional cost to the farmer. This approach does not duplicate existing requirements but builds upon the current practices and knowledge of the farmers and regulators. It was also noted that this instrument is updated as new best management practices are developed.

Based on this consideration, the direction of the Committee is to rely on the existing program and require ~~MOECC~~MECP to consider protection of municipal drinking water sources in their review of nutrient management plans during inspections.

The Fire Code regulates storage of fertilizer at golf courses and retail locations. The working group and Committee were of the opinion that this code was an effective starting point for policy; however, the use of a risk management plan would be a stronger approach.

~~For farms that are not required to have a nutrient management strategy or plan, the preferred option is to require a risk management plan for the application, and the handling and storage of fertilizers. Other landowners with large volumes stored could also be required to create such a plan.~~

Risk Management Plans

For farms that are not required to have a nutrient management strategy and plan for the application of commercial fertilizer, and for all farms that handle and store commercial fertilizer, the policy approach proposed by the Planners' Working Group and the Source Protection Committee is to require a risk management plan in vulnerable areas where these activities are or would be a significant drinking water threat. This risk management plan would be based on the same principles as the nutrient management plan and best management practices and scoped to address these specific threats. The Source Protection Committee is of the opinion that it is important to disclose the requirements of a risk management plan in the policy included in the Source Protection Plan to be used by a risk management official. This way, the farmer and the official are aware of the requirements of the Plan.

In the case of retail establishments, golf courses and other properties that may potentially have enough stored fertilizer on hand to pose a significant threat, it was felt that the most appropriate tool to address the threats of handling and storage of fertilizer within a retail environment would be a risk management plan.

Restricted Land Uses

Use of the restricted land use tool is necessary to ensure compliance with the Source Protection Plan.

Since risk management plans are proposed as a policy approach to address the threats posed by the application to land and handling and storage of commercial fertilizers, the restricted land use tool will have to be implemented for the screening and review of applications for building permits and planning applications for specified land uses, to ensure compliance with the Source Protection Plan.

Prohibition

No consideration was given to implementation of this option as these threats will be addressed effectively through the use of other tools.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

Overall support for the policy direction was received through pre-consultation from OMAFRA and the municipalities. A number of wording revisions were received during pre-consultation regarding the appropriate implementing bodies for policies and the wording of policies to ensure that their intent aligns with the regulatory authority of those implementing bodies. Policies were revised and updated in accordance with the suggested revisions. The wording was clarified to ensure that the policy directions match the existing terminology and legislation.

The ~~Ministry of the Environment and Climate Change~~MECP requested that policies provide flexibility for implementation when they affect operational procedures. However, it is the opinion of the Source Protection Committee that every farm where activities are occurring that could be significant drinking water threats should be visited. Flexibility has been given to the ~~MOECC~~MECP to define the frequency of regular inspections.

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level. Minor wording changes were made based on comments received to extend the time period for implementation to two years and specify collaborators.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 8 and 9 – Commercial Fertilizer		
	Policy Directive	Policy
1	Support education and the promotion of best management practices for golf courses, fertilizer application technicians, homeowners, and retail establishments that apply, handle or store fertilizer on site.	T-27-C
2	Encourage Audubon Cooperative Sanctuary Certification for golf courses within significant threat areas.	T-28-C
3	Support the use of nutrient management plans as the primary tools to address drinking water Threat 8, for farms included under the Nutrient Management Act.	T-26-C
4	Require the ~~Ministry of the Environment and Climate Change~~MECP to prioritize inspections of farms in areas where significant threats would occur and to conduct regular inspections to address Threats 8 and 9.	T-22-S
5	Require a risk management plan for the application of commercial fertilizer on farms not phased-in by the Nutrient Management Act, and for the handling and storage of commercial fertilizers on all properties where these activities are or would be significant drinking water threats. These risk management plans would be based on the regulatory requirements of nutrient management plans and best management practices and scoped to	T-25-C

	address these specific threats. This policy approach would aim to address Threats 8 and 9.	
6	Require pre-screening by a risk management official of building permits and planning applications for activities related to the application, handling and storage of commercial fertilizer in a vulnerable area where the activity would be a significant drinking water threat.	T-25-C

3.6 Pesticide

3.6.1 Background

What are pesticides?

Pesticides are used to treat, repel, or control insects, weeds, and other hindrances to healthy plant growth. Pesticides of concern to drinking water source protection are those used to control weeds, fungi, or nematodes.

The Pesticides Act, 1990, defines pesticide as:

Any organism, substance or thing that is manufactured, represented, sold or used as a means of directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest or altering the growth, development or characteristics of any plant life that is not a pest and includes any organism, substance or thing registered under the Pest Control Products Act (Canada).

Generally, pesticides are classed as:

- herbicides (weeds)
- insecticides (insects)
- fungicides (fungi)
- rodenticides (rodents)
- pediculicides (head lice)
- algaecides (algae)
- avicides (birds)
- bactericides (bacteria)
- miticides (mites)

molluscicides (slugs and snails)

- nematicides (nematodes)
- virucides (viruses)
- biocides (living organisms)

Each of the above is formulated to control its targeted organism.

All of the pesticides considered through the drinking water source protection initiative are chemicals used to control weeds (herbicides) or fungi (fungicides), or used as a soil fumigant to control fungi, nematodes, and weeds.

Pesticides have benefits and drawbacks. The target organisms can destroy property, spread or carry disease, or cause a nuisance. This leads to public health or environmental concerns and possible impacts on the economy.

The Stockholm Convention on Persistent Organic Pollutants, an international environmental treaty first signed in 2001 and effective from May 2004, identified nine pesticides as the most dangerous persistent organic pollutants out of the 12 chemicals listed (Stockholm Convention, 2011). Eight of these pesticides were identified for elimination, and one was identified for restriction of its production and use. In May 2009, the Convention added five additional pesticides to the list for elimination. In April 2011, another

pesticide was added to the list of persistent organic pollutants, bringing the total number of pesticides now listed for elimination or restricted production and use to 15.

Some pesticides are available for domestic use, while a much larger number are available for agricultural, commercial, or industrial uses. Each of these available pesticides is regulated and approved for use in Canada.

Eleven chemicals that are ingredients in pesticides are listed in the Ontario ~~Ministry of the Environment and Climate Change~~MECP ~~(MOECC)~~ Tables of Drinking Water Threats (201709). These chemicals could make their way into groundwater as a result of the application of pesticides to land, or through spills or leaks resulting from the improper handling and storage of pesticides. The chemicals are:

- Atrazine
- Dicamba
- 2,4-Dichlorophenoxy Acetic Acid (2,4-D)
- 1,3-Dichloropropene
- Glyphosate
- Mecoprop
- Metalaxyl
- Metolachlor or s-Metolachlor
- MCPA (2-methyl-4-chlorophenoxyacetic acid)
- MCPB (4-(4-chloro-2-methylphenoxy) butanoic acid)
- Pendimethalin

Glyphosate and pendimethalin are chemicals of concern only at a moderate or low threat level and are not considered chemicals of concern for this assessment. All of these substances are active ingredients in herbicides, with the exception of 1,3-dichloropropene, which is used as a soil fumigant or nematicide, and metalaxyl, which is a fungicide.

The Persistent Organic Pollutants list, prepared under an international environmental treaty, includes the following pesticides for elimination worldwide:

- Aldrin
- Alpha hexachlorocyclohexane
- Beta hexachlorocyclohexane
- Chlordane
- Chlordecone
- Dieldrin
- Endosulfan
- Endrin
- Heptachlor
- Hexachlorobenzene
- Lindane
- Mirex
- Pentachlorobenzene
- Toxaphene

-

DDT is listed under restricted production and use.

What activities related to pesticides pose a significant threat?

~~The application and the handling and storage of pesticide are Threats 10 and 11, respectively, of the 21 prescribed threats.~~

The ~~Ministry of the Environment and Climate Change~~MECP has prescribed the application of pesticide to land, and the handling and storage of pesticide, as threats to drinking water sources. ~~The circumstances related to these activities when drinking water threats are a significant risk are summarized on flow charts for Threats 10 and 11 (see Appendix C).~~

Manufacturing, processing, and wholesale activities are generally permitted on lands that are zoned for industrial uses in order to provide separation between industrial establishments and incompatible land uses. Storage of pesticides for retail sale or for use in extermination could exist on many properties since this activity is generally associated with agricultural, recreational, institutional, commercial, industrial, and public works (for use along roads and utility corridors) land uses.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

~~In the Halton Area and the Hamilton Area, significant threats from the storage and handling of pesticides are possible in the wellhead protection areas of the Freelton, Carlisle, Campbellville, Walkers Line, Kelso, and Greensville municipal well fields.~~

The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Cedarvale and Kelso well fields (see Figures B-1 through B-~~7~~6 ~~and B-8~~). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring must be 10 for the threat to be significant. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For the WHPA-E area, vulnerability scoring of 8.1 or greater can result in significant threats for the application of pesticide to land, and 9 or greater for the handling and storage of pesticide.

~~There are four existing significant threats in the Carlisle wellhead protection area and one within the Kelso wellhead protection area. The threats are all from the application of pesticide to land in the WHPA-B areas and need to be verified.~~

The significant threat counts related to this activity in the Source Protection Areas are included in the latest approved assessment reports and are subject to changes due to modifications or new drinking water systems, changing landscapes, etc.

No properties within the Halton Region and Hamilton Region Source Protection Areas where existing or future threats could be significant are currently zoned for industrial uses. Accordingly, it is unlikely that manufacturing, processing, or wholesaling of pesticides will occur in the areas where the handling and storage of pesticide would be a significant threat to drinking water sources.

In general, the greater the pesticide application area the greater the risk will be to drinking water sources. Furthermore, a greater risk due to the handling and storage of pesticides comes from a greater

mass of materials stored that contain the pesticide. The wellhead protection areas and associated vulnerability score where a significant threat may occur are as follows:

WHPA-A or B with a vulnerability score of 10

Application: If the application area is 1 to 10 hectares based on the application of MCPA or mecoprop, or greater than 10 hectares for the remaining chemicals of concern.

Handling and storage: If the material is stored for retail sale or for extermination, and the mass of materials that contain the pesticide is either between 250 and 2,500 kilograms or greater than 2,500 kilograms, depending on the chemicals of concern. If the material is stored where manufactured or processed or where wholesaled, and the mass of the materials that contain the pesticides is greater than 2,500 kilograms for MCPA or mecoprop.

WHPA-E with a vulnerability score of 9

Application: If the application area is 1 to 10 hectares based on the application of MCPA and mecoprop, or greater than 10 hectares for the remaining chemicals of concern.

Handling and storage: If the material is stored for retail sale or for extermination, and the mass of materials that contain the pesticide is greater than 2,500 kilograms based on MCPA or mecoprop.

WHPA-E with a vulnerability score of 8.1

Application: if the application area is greater than 10 hectares based on the application of MCPA.

~~MOE Tables of Drinking Water Threats can be reviewed at https://www.ontario.ca/~~

~~document/tables-drinking-water-threats~~

For a description of vulnerability scores, see the Assessment Reports.

What legislation, guidelines, or protocols already exist?

Existing legislation regarding the threats associated with pesticides include these Acts:

- Pest Control Products
- Fisheries
- Pesticides
- Pest Control Products Act, 2002

Health Canada, through the Pest Management Regulatory Agency, is responsible for pesticide regulation in Canada. Under the Pest Control Products Act, 2002, the Agency ensures that pesticides pose minimal risk to human health and the environment. They undertake science-based evaluations of risk, and ensure that the pesticides can be used safely (when the directions for use recorded on the label are followed) and are effective at what they claim to do. If the results of the scientific evaluation conclude, with reasonable certainty, that no harm to human health, future generations, or the environment will result from exposure to or use of a pesticide, it will be registered for use in Canada. Following registration, pesticides are re-evaluated every 15 years and as new science evolves. The Agency also encourages development and implementation of sustainable pest management strategies by facilitating access to pest control products that pose lower risks.

The pesticide label is also approved during the registration process. It is a legal document which must be followed. It is against the law to use the product in any other way. The label displays important information such as:

- The active ingredient.
- What the hazards are when you use the product.
- How dangerous the pesticide is.
- How to use it safely.
- The rates at which the product should be used.
- What to do in case of an accident.

~~Pesticide labels are legal documents that must contain such information as active ingredients, how to use it safely, and what to do in case of an accident.~~

Fisheries Act, 1985

~~The federal Fisheries Act prohibits the deposition of any harmful substance in water that is frequented by fish.~~

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. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

Accidental release of pesticides that could affect fish habitat could result from the improper application of pesticides to land, and from spills or leaks from the handling and storage of pesticides.

Pesticides Act, 1990

~~The MOE regulates the sale, use, transportation, storage, and disposal of pesticides in Ontario. Extermination permits issued by the Ministry are valid for one year.~~

The Pesticides Act, 1990, is enforced by the ~~Ministry of the Environment and Climate Change~~MECP. Under the Act, the ~~MOECC~~MECP is responsible for regulating the sale, use, transportation, storage, and disposal of pesticides in Ontario. Pesticides are regulated by placing appropriate education, licensing and/or permit requirements on their use. All pesticides must be used in accordance with requirements under the Pesticides Act and Ontario Regulation 63/09.

Sections 7 and 11 of the Pesticides Act are prescribed instruments under the Clean Water Act. These sections relate to issuance, renewal, and revocation of permits for land extermination, structural exterminations, and water exterminations. In processing permit applications, the ~~MOECC~~MECP considers a number of factors to ensure protection of human health and the environment, including the protection of drinking water sources. Pesticide permits are only valid for one year. It is noted that most agricultural use of pesticides is not covered by sections 7 and 11, and provincial instruments are not applicable to

regulate these activities on farms. The agricultural use of pesticides is highly regulated through other mechanisms, including those listed below.

Other Tools

Other tools associated with pesticide threats include:

- Ontario Regulation 347, 1990
- Ontario Regulation 63/09
- Agrichemical Warehousing Standards Association
- Cosmetic Pesticide Ban
- Integrated Pest Management Accreditation/Certification
- Ontario Pesticide Education Program.
- Canada-Ontario Environmental Farm Plan

Ontario Regulation 347, 1990

Ontario Regulation 347, made under the Environmental Protection Act, regulates the requirements for "pesticide container depots." Depots are retail locations holding vendor licences under the Pesticides Act that receive containers originally used to hold commercial pesticides.

Procedures and requirements are described for owning or operating a depot, including restricting access to the depot and ensuring that workers are familiar with safe handling and storage practices, such as labelling, security, inspection, ventilation, and record keeping.

A depot owner must have an agreement with a holder of an environmental compliance approval issued under Part V of the Act authorizing the individual/company to transport the empty containers.

Ontario Regulation 63/09

Under Ontario Regulation 63/09, made under the Pesticides Act, all pesticide manufacturers, operators, and vendors must be certified, and are required to follow specified storage and disposal procedures. It is illegal to store pesticides under unsafe conditions. Storage requirements under the regulation include ensuring that:

- The pesticides are not likely to impair the health or safety of any person.
- The pesticides will not come into contact with food or drink intended for human or animal consumption.
- The storage area is maintained in good repair, with precautions to prevent pesticides from contaminating the environment or other pesticides.
- The storage area is properly secured, posted with warning signs, and has emergency telephone numbers prominently displayed nearby.
- Pesticides stored in an unsupervised vehicle are in a place inaccessible to the public or in a locked compartment, and the vehicle displays the required warning sign.
- Class 1, 2, and 3 pesticides are stored in areas that are inaccessible to the public, ventilated to the outdoor atmosphere, do not have floor drains leading to a watercourse, and have emergency response equipment readily available.

- Licensed vendors, licensed operators, manufacturers, and persons storing Class 1 pesticides provide written notice annually to the fire department responsible for the area in which the pesticide is stored.
- The pesticide storage area is dry. Moisture may cause labels and some types of packaging to break down. Therefore, sites where there is any chance that runoff or drainage water from the pesticide storage may enter surface or ground water are avoided, as are flood areas.

Unsold pesticides or unused surplus pesticide concentrate must be disposed of in accordance with Ontario Regulation 63/09 and Regulation 347 (General Waste Management) under the Environmental Protection Act. Generally, all pesticide wastes must be disposed of at a waste disposal facility that has been approved by the ~~Ministry of the Environment and Climate Change~~MECP, and can only be transported by a waste management company that has obtained the appropriate approvals.

The Ontario Pesticides Advisory Committee is responsible for reviewing and recommending to the ~~Ministry of the Environment and Climate Change~~MECP the classification of pesticide products before they can be sold or used in Ontario. Under Ontario Regulation 63/09, p~~P~~esticide products are classified on the basis of their toxicity, environmental or health hazard, persistence of the active ingredient, concentration, usage, federal class, and registration status. This classification system provides the basis for regulating the distribution, availability, and use of pesticide products in Ontario.

Ontario Regulation 63/09 establishes a classification system for pesticides which allows the province to apply specific rules on the sale, use, storage, transportation, and disposal of pesticides to protect human health and the environment.

~~Under Ontario Regulation 63/09, pesticides are classified according to toxicity, concentration, usage, and other factors.~~

Pesticides are classed into 11 categories and must be used accordingly. These restrictions supersede any local by-laws. This Pesticide Classification Guideline for Ontario is intended to provide details on the classification system set out in sections 3 to 8 of the Regulation. These sections outline the decision-making framework for classifying pesticides and describe the 11 classes of pesticides. The classifications are as follows:

Class 1

Designated pesticide of the manufacturing class.

Class 1 pesticides are manufacturing concentrates used to formulate pesticide products or to be incorporated into other manufactured products.

Class 2

Designated pesticide of the commercial or restricted class.

The pesticide meets the description of Very Hazardous in the Guideline.

The pesticide does not meet the description of a Controlled Sales pesticide in the Guideline.

Class 3

Designated pesticide of the commercial or restricted class.

The pesticide meets the description of Moderately Hazardous in the Guideline. The pesticide does not meet the description of a Controlled Sales pesticide in the Guideline.

Class 4

Designated pesticide of the commercial or restricted class.

The pesticide meets the description of Less or Least Hazardous in the Guideline.

The pesticide does not meet the description of a Controlled Sales pesticide set out in the Guideline.

Class 5

Designated pesticide of the domestic class.

The pesticide meets the description of Less Hazardous in the Guideline, or is registered under the Fertilizers Act, and the size of its container is greater than 1 kilogram or 1 litre.

If the pesticide may be used in, on, or over land, the only pesticide ingredient it contains is a Class 11 pesticide, or every use set out on the pesticide's label is a use mentioned in subsection 7.1(2) of the Pesticides Act.

Class 6

Designated pesticide of the domestic class.

The pesticide meets the description of Least Hazardous in the Guideline, or is registered under the Fertilizers Act, and the size of its container is less than or equal to 1 kilogram or 1 litre.

If the pesticide may be used in, on, or over land, the only pesticide ingredient it contains is a Class 11 pesticide, or every use set out on the pesticide's label is a use mentioned in subsection 7.1 (2) of the Pesticides Act.

Class 7

Designated pesticide of the domestic or restricted class.

The pesticide may be used in, on, or over land. The pesticide meets the description of a Controlled Sales pesticide set out in the Guideline.

Class 8

Designated pesticide of the domestic class or is registered under the Fertilizers Act.

The pesticide may be used in, on, or over land.

The pesticide contains a Class 9 pesticide.

The pesticide meets one of the following descriptions:

Its label does not set out any of the uses mentioned in subsection 7.1 (2) of the Pesticides Act.

If its label sets out a use mentioned in paragraph 4 of subsection 7.1 (2) of the Pesticides Act, the label does not meet the description of a Controlled Sales pesticide set out in the Guideline.

Class 9

The pesticide is an ingredient in a Class 2, 3, 4, 5, 6, 7, or 8 pesticide and the label sets out at least one use that is not a use mentioned in subsection 7.1 (2) of the Act.

The pesticide does not meet the description of a Category I pesticide in the Guideline.

Class 10

The pesticide is a Class 9 pesticide.

The pesticide meets the description of a Category II pesticide in the Guideline.

Class 11

The pesticide is an ingredient in a Class 2, 3, 4, 5, 6, or 7 pesticide and meets the description of a Category I pesticide in the Guideline.

The pesticides listed as chemicals of concern in the Tables of Drinking Water Threats (2017~~09~~) are included in the classes as set out in Table 7. Some chemicals are listed in multiple classes, depending on the products to which they contribute. Others are banned, but could still be used under certain exceptions. For instance, Glyphosate is banned from sale (Class 8), but could still be used for health and safety purposes under exemptions in the Pesticides Act.

Table 7 ——Class Lists dated May 27, 2013 for pesticides listed in Tables of Drinking Water Threats (2009) (for current lists see https://www.ontario.ca/environment-and-energy/classification-pesticides)

Class	Pesticide
Class 1	Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), Glyphosate, MCPA, Mecoprop
Class 2	Metalaxyl, Pendimethalin
Class 3	Atrazine, Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), MCPA, Metalaxyl, Metolachlor, Pendimethalin
Class 4	Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), Glyphosate, MCPA, Metolachlor
Class 5, 6	No prescribed pesticides for this assessment
Class 7	Glyphosate
Class 8	Dicamba, Dichlorophenoxy Acetic Acid (2,4-D), Glyphosate, MCPA, Mecoprop
Class 9	Atrazine, Dichlorophenoxy Acetic Acid (2,4-D), Dicamba, Glyphosate, MCPA, Mecoprop, Metalaxyl, Metolachlor
Class 10	Glyphosate
Class 11	No prescribed pesticides for this assessment

Agrichemical Warehousing Standards Association

~~The Agrichemical Warehousing Standards Association (AWSA) ensures that industrial and agricultural pesticides are stored in certified warehouses.~~

The Agrichemical Warehousing Standards Association (AWSA) consists of Canadian warehouse operators, manufacturers, distributors, and governments that cooperatively establish standards to ensure that crop protection products, such as pesticides, are stored in certified warehouses. They also inform, educate and communicate with stakeholders and provide other services as required.

The AWSA Certified Warehousing Standards apply to products based on their federal registration classification and their user. Currently, the standards apply to the storage facilities of vendors of all pesticides classified as agricultural or industrial, and to the storage facilities of custom applicators (e.g.,

ground or aerial crop sprayers). This would include Ontario's class 1, 2, 3, 4, 5, 8, 9, and 10 pesticides. There is no distinction based on the volume or weight of pesticides in storage or on the length of time that they are stored.

These standards do not apply to the storage facilities of someone who is only an end user (such as a farmer or golf course operator). A farmer who is also a pesticides dealer must follow the standards.

~~In addition to clear warning signage, storage facilities must have an emergency response plan and employees trained in safe handling and first aid.~~

In general, the AWSA standards address and manage 11 areas of potential storage-related risk such as spills, floods, and shipping and receiving design safety. To address these potential risk areas, the standards have three primary components:

- Construction and structural requirements
- Employee training
- Documentation

Structural requirements incorporate the National Fire Code, National Building Code and Canadian Electrical Code. New pesticide storage facilities can only be built in certain areas, and precautions such as dyking and containment must be taken to prevent potential contamination of environmentally sensitive areas. If provincial or municipal governments have more rigorous legislation, regulations, by-laws or codes, then these standards supersede the AWSA's Warehousing Standards.

Approximately 300 AWSA-certified warehouses exist in Ontario.

Warning and emergency signs must be clearly posted at all storage facilities. For flammable and combustible products, special storage precautions must be provided. Every warehouse employee must be trained in the safe handling of pesticide products, first aid, and emergency procedures. Emergency response planning for each storage facility is mandatory.

Independent auditors, who are specially trained and certified, audit warehouses every two years. The standards are enforced through the issuing and withdrawing of certificates by AWSA. Agrichemical manufacturers will not ship product to uncertified warehouses, and the AWSA maintains a database for certification and compliance tracking.

The provincial government is responsible for regulating the sale, use, transportation, storage, and disposal of pesticides in Ontario. This is done through a classification system, based on reviews and recommendations from the Ontario Pesticides Advisory Committee (OPAC), and administered through the ~~Ministry of the Environment and Climate Change~~MECP. Products must be classified before they can be sold or used in Ontario.

Through correspondence with HHSPR in 2019, AWSA indicated that based on their review of the AWSA standards there are adequate policies and procedures established to comply with municipal, provincial and federal regulatory requirements to protect municipal drinking water. There is a 50m buffer from zoned residential lot lines, hospitals, schools, shopping centres, restaurants, processing facilities for feed or food and other buildings of high occupancy. Pre-approval with AWSA is required if there is potential for infringement into the 50 m buffer. Other measures include spills prevention and response.

In 2021, staff proposed edits to policy T-29-S that request AWSA to review their standards to ensure they include appropriate buffer areas and emergency planning and response measures to protect municipal drinking water sources. Further discussions are ongoing to encourage AWSA to incorporate information into their auditor notes who in turn could potentially advise operators of individual sites; and to send out industry bulletins to the operators.

Cosmetic Pesticide Ban

~~Since April 2009, the Cosmetic Pesticide Ban prohibits the application, for cosmetic purposes, of pesticides on lawns, driveways, parks, and other spaces. The ban applies to more than 250 pesticides and over 80 pesticide ingredients.~~

Ontario's cosmetic pesticides ban took effect April 22, 2009. The requirements of the ban are detailed in Ontario Regulation 63/09 under the Pesticides Act, which was amended by the Cosmetic Pesticides Ban Act, 2008.

The provincial ban supersedes local municipal pesticides bylaws to create one clear, transparent, and understandable set of rules across the province. The ban prohibits the application of pesticides for cosmetic purposes on lawns, vegetable and ornamental gardens, patios, driveways, cemeteries, and in parks and schoolyards. There are no exceptions for pest infestations (insects, fungi, or weeds) in these areas. Banned pesticides cannot be sold, and only licensed vendors can sell controlled pesticides. Vendors must inform pesticide purchasers of the circumstances in which the pesticide can and cannot be used. More than 250 pesticide products are banned for sale and over 80 pesticide ingredients are banned for cosmetic uses.

Included in the ban, under Ontario Regulation 63/09 are exceptions for:

- Public health and safety - plants and animals that may be poisonous or cause structural damage to buildings.
- Natural resources – control invasive species, protect a native plant, animal or rare ecosystem.
- Golf courses - accredited for Integrated Pest Management, requirement for ~~publically~~publicly accessible annual report.
- Sports fields - hosting national or international sports competitions.
- Specialty turf - accredited for Integrated Pest Management, requirement for ~~publically~~publicly accessible annual report.
- Agriculture - business related use.
- Forestry - control competing vegetation.
- Public works - maintain safe conditions along transportation and utility corridors.

The ~~Ministry of the Environment and Climate Change~~MECP manages its approach to compliance and enforcement through education and outreach, inspections, response to incidents, voluntary abatement, orders, tickets, and prosecutions. In the case of the pesticides ban, the focus of initial efforts will be on education when responding to reports of suspected non-compliance.

Integrated Pest Management Accreditation/Certification

~~Golf course operators are exempt from the ban on using Class 9 pesticides if accredited by the Integrated Pest Management Council of Canada.~~

In order to be exempt from the cosmetic pesticides ban and continue using Class 9 pesticides in their maintenance operations, golf courses must meet certain conditions. These conditions include becoming fully accredited by the Integrated Pest Management Council of Canada (IPMCC), the integrated pest management (IPM) body approved for the purpose of section 18 of Ontario Regulation 63/09. Accredited golf courses are able to apply Class 9 pesticides only on the actual playing surfaces and not on lawns, gardens, patios, and other outdoor areas associated with the facility. Other conditions that must be met for exemption include preparing annual reports on pesticide use and holding public meetings to present the annual reports.

Integrated pest management aims to manage pests with effective, economical, and environmentally-sound techniques.

The IPM accreditation program involves:

- employing an IPM certified agent who is responsible for IPM at the golf course
- completing annual desk audits that assess conformance with pest monitoring, sprayer calibration, pesticide usage, alternative treatments, pesticide use reduction where appropriate, and employee training on the principles of IPM
- completing an on-site audit once every three years, further assessing golf course management activities as they relate to the principles of IPM

~~Integrated pest management aims to manage pests with effective, economical, and environmentally-sound techniques.~~

In addition to the above, pesticide use on specialty turf (such as lawn bowling, cricket, lawn tennis, or croquet), and certain public works (related to health or safety) is exempt from the cosmetic pesticide ban, provided the treatment is done by a licensed exterminator certified by the IPMCC. Owners or operators of specialty turf or public works also must prepare annual reports on pesticide use, detailing their use of pesticides, why they were used, and how future uses could be reduced.

The IPM Council of Canada consists of industry associations, advisors, and other interested parties. According to the IPM Council of Canada, integrated pest management is a process that uses all necessary techniques to suppress pests effectively, economically, and in an environmentally sound manner. IPM employs a two-pronged approach: managing the plant environment to prevent problems and using thresholds to decide how and when to treat pests.

Ontario Pesticide Education Program

Under Ontario Regulation 63/09, all pesticide operators and vendors must be certified. Certification programs are conducted through the Ontario Pesticide Education Program. Three major categories exist: certified farmers and trained assistants, certified vendors, and licensed exterminators and technicians.

Certified Farmers and Trained Assistants

~~Farmers and their trained assistants, vendors, licensed exterminators, and technicians can be certified to use or sell pesticides. Each operator or vendor must pass exams and safety courses.~~

Farmers require certification to buy or use Class 2 or 3 pesticides on the land they farm. To become certified, they must attend the Grower Pesticide Safety Course (GPSC) and pass the GPSC exam. Certificates are valid for five years. Certified farmers cannot spray as a business or sell pesticides.

Pesticide safety training is also mandatory for any assistant, such as a farm employee, farm family member, or seasonal foreign worker, who handles Class 2 or 3 pesticides. Trained assistants cannot buy Class 2 or 3 products and may only handle these products under the supervision of a Certified Farmer. To become trained, a farm assistant can either attend a GPSC and not write the exam, or attend an on-farm training session presented by a qualified Assistant Instructor. Training is valid for five years.

Certified Vendors

Vendors become certified by taking a two-day Pesticide Vendor Course that provides information on how to sell, store, and handle pesticides properly. They also must pass an exam. Once certified, vendors can apply for a "General Vendor License" from the ~~Ministry of the Environment and Climate Change~~MECP that allows them to sell Class 2 and 3 products.

Licensed Exterminators and Technicians

Anyone who applies pesticides commercially is considered an "exterminator." Exterminators include farmers who custom-apply pesticides for other farmers and charge a fee for the service. Exterminators become certified by taking a course and passing an exam. They must hold an Operator's License from the ~~Ministry of the Environment and Climate Change~~MECP. These licenses are valid for five years.

Technicians can mix, load, or apply Class 3 to 7 pesticides, and most Class 2 pesticides, under the indirect supervision of a Licensed Exterminator. Technicians become certified by taking a course and passing an exam, and by completing practical training with a licensed exterminator. Technician cards are valid for two years. Unlicensed assistants who do not train to become technicians must be directly supervised by licensed exterminators at all times.

Canada-Ontario Environmental Farm Plan

Farmers voluntarily prepare environmental plans that identify any areas of environmental concern as well as plans to address these concerns. At the latest assessment, almost two thirds of Ontario farmers had participated in this process.

The Environmental Farm Plan (EFP) is a risk assessment and management process for environmental protection, sustainable production, and health and safety. Farmers voluntarily prepare plans to increase their environmental awareness in up to 23 different areas. Eight of those areas are linked to drinking water threats under the Clean Water Act, 2006. Through the EFP local workshop process, farmers highlight their farm's environmental strengths, identify areas of environmental concern, and set realistic action plans with timetables to improve environmental conditions. The plans are peer reviewed and are confidential. Environmental cost-share programs are available to assist in implementing projects. Over 35,000 participants have participated in the program since it began in 1993. This internationally recognized program has been very successful in helping Ontario farmers adopt more environmentally

sustainable practices. ~~As of 2009, 34,000 out of 57,000 farm families in Ontario have participated (presentation made by Chris Attema to the Planners' Working Group, January 4, 2011).~~

One of the 23 areas assessed through the EFP is the handling and storage of pesticides. The information sheet on this activity suggests the following actions to address existing issues:

- Relocate permanent mixing/loading and storage areas away from surface water and wells.
- Increase the flow path distance between surface water and mixing/loading and storage areas.
- Relocate wells away from mixing/loading and storage areas.
- For existing mixing/loading and storage areas that have an impermeable floor, install a curb to collect spills. Also, install floors that are not cracked or leaking and test the well water at least once a year.
- Construct a mixing/loading and storage areas with impermeable floor, curb, and permanent roof to exclude rainfall, and a collection sump.
- Mix and load pesticide products at site of spray application away from surface water and wells. No regular mixing/loading area at one location.
- Store pesticides in one designated area.
- Use temporary, plastic-lined berms to hold pesticides when mixing/loading is done at field site.
- Use a separate tank to supply water to the pesticide tank to prevent the potential for backflow into a well or surface water source.
- Apply rinsate to crops listed on label at adequate separation distances from surface water and wells.
- Have pesticides custom applied.
- Prepare a written emergency plan and have spill clean-up equipment available.
- Regulation of Pesticide on Crown Lands

Pesticide bans and other restrictions at the provincial or municipal level do not apply to federally owned and operated lands. As such, the pesticide practices of the owners/occupiers must be examined in order to appropriately address and manage the threat and ensure compliance. Also, municipal bans do not apply to provincial agencies, such as Hydro One.

These utility and rail agencies use herbicides as a means of vegetation management to control tree and brush growth.

According to the Canadian National Railway and Hydro One, it is stated that the application of pesticides is federally regulated for the products and provincially regulated, through the ~~Ministry of the Environment and Climate Change~~MECP, for the licensing and application. All herbicides are applied by authorized and licensed applicators in accordance with federal and provincial regulations as well as the manufacture's recommendations to ensure the least amount of chemical use. In addition to compliance with application regulations, agencies must adhere to a mandatory, annual reporting process to the ~~Ministry of the Environment and Climate Change~~MECP, detailing the amount used and location of the pesticide application.

All federal and provincial agencies that apply pesticides are highly regulated and follow strict guidelines and best practices.

What policy approaches were discussed?

~~The Committee noted that strict provincial regulations on pesticide application fully regulate this activity and any additional policies associated with this threat are unnecessary.~~

The Planners' Working Group and the Source Protection Committee discussed approaches to address the threats of pesticide application to land and the storage and handling of pesticide. Policy options discussed include the following:

Education and Outreach

Educate users as to the proper handling procedures for pesticide application and storage.

Risk Management Plans (Existing and Future)

Require plans for activities involving manufacturing, processing or wholesaling of pesticides, retail of pesticides, and storage for extermination use, where the activity would be a significant drinking water threat. The plan could address items of operating practices including containment and the management of pesticides, as well as a spill contingency plan.

Require plans to manage the application of pesticides and to undertake site improvements to manage the risk of pesticide application.

Land Use Planning (Future)

Prohibit the types and scale of land uses that would manufacture, process or wholesale pesticides, retail pesticides, or store pesticides for extermination use where the activities would be significant drinking water threats.

Establish a buffer zone to ensure the location of storage facilities are a minimum distance away from the WHPA-A and B, with a vulnerability score of 10, and WHPA-E with a vulnerability score of 9.

Restricted Land Uses (Future)

Require pre-screening of planning applications by a risk management official for activities related to the application, manufacture, processing, or wholesaling of pesticides, or to the retailing or storage of pesticides for extermination where the activity would be a significant drinking water threat.

Prohibition (Future)

Prohibit the manufacturing, processing, or wholesaling of pesticides, or the retailing or storage of pesticides for extermination where the activity would be a significant drinking water threat.

3.6.2 Discussion on Policy Options

The application to land, and the handling and storage of pesticides are heavily regulated in Ontario. Therefore, the Committee noted that there was no need for additional policies regarding ~~Threat 10,~~ the application of pesticide to land, since this threat is fully regulated by existing tools, and any additional policies would be duplicative and unnecessary.

To understand better where pesticides are applied and stored, the Committee requests that those that prepare annual reports on pesticide use include mapping that show these areas.

Education and Outreach

Extensive education programs and regulations are in place to manage threats from pesticide storage and application to land.

Due to the extensive regulatory requirements and education programs already in place, the Committee considered that a supplemental education program should focus on proper pesticide use and disposal methods and potential impacts on drinking water sources. Additional education and outreach to farmers and pest control operators would assist in informing them of the locations of municipal wells. An additional education opportunity is to educate homeowners about the risks relating to illegal use of pesticides. These untrained and uncertified users may purchase the product out of jurisdiction, use it within a vulnerable area, or dispose of the pesticide improperly.

The Source Protection Committee is of the opinion that the implementation of an education and outreach policy will promote the achievement of the objectives of the Plan that the threat ceases to be or never becomes significant, and that a policy to regulate or prohibit the activity is not necessary to achieve the objectives.

Land Use Planning (Future)

Land use planning, and specifically zoning by-laws, is the most effective management tool to deal with threats associated with the storage and handling of pesticides.

The only land uses identified that could represent a threat for drinking water sources are a retail store, manufacturer, processor, or wholesaler of pesticides, if they were to establish within a vulnerable area where the storage and handling of pesticides would be a significant drinking water threat (addressing Threat 11).

Initially the Committee chose to prohibit these specific activities where they would be significant threats using the precautionary principle. After some consideration, this policy approach was considered too broad. Land use restrictions could not differentiate between the facilities that store or manufacture the pesticides of concern for significant threats under the Clean Water Act and those pesticides that are designated concerns for moderate and low threats, or not at all. In essence, the policy was prohibiting moderate and low threats as well as the significant ones. For this reason, the Committee changed the policy to a management approach.

Risk Management Plans (Future)

For storage and handling operations that land use planning does not prohibit, a risk management plan could be effective.

For retail stores, manufacturers, processors, and wholesalers of pesticides, a risk management plan could be used. A plan would be negotiated with the landowner to reduce the risk to the drinking water source. Risk management plans are needed only for future threats since none of these facilities currently exist where they would be significant threats.

Restricted Land Uses

As risk management plans are proposed as the policy approach to address the significant threats of retail stores, manufactures, processors, and wholesalers of pesticides, the restricted land use tool is required. Identification of significant threats would be relatively easy for a risk management official.

Prohibition

The Committee did not deem prohibition an appropriate tool for managing the threats associated with pesticides because they are addressed appropriately through land use planning.

The Committee emphasized that pesticides are significantly regulated at present and that an effective system is in place. Therefore, it is suitable to rely on the existing regulatory framework.

Other Tools

The Committee felt that standards developed by the Agrichemical Warehousing Standards Association could be used to ensure that sufficient buffers exist between warehousing facilities and municipal wells to protect drinking water sources. The Association could be requested to review and amend their standards, as necessary.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

During the public consultation process, the policy approach regarding retail stores, manufacturers, processors, and wholesalers of pesticides was reconsidered by the Source Protection Committee and a management approach based on risk management plans is now proposed. Due to the change from land use prohibition, Policy T-30-S directed at the Niagara Escarpment Plan area is no longer necessary. The policy was extended during final consultation to include existing and future threat activities.

Concerns were raised by some municipalities regarding the funding source for any municipal education, outreach and incentive programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 10 and 11 – Pesticide		
	Policy Directive	Policy
1	Require municipalities to implement an education and outreach program on proper pesticide use and storage methods and potential impacts on drinking water. Policy should target golf course operators, farmers, pesticide applicators and exterminators.	T-31-C
2	Provide wellhead protection area mapping to pesticide applicators, including farmers and exterminators.	T-31-C
3	Rely on the existing regulatory framework, since it is effective and appropriate both to address Threat 10, the application of pesticide to land, and to deal with the majority of concerns associated with Threat 11, the handling and storage of pesticide.	No policy required
4	Require pre-screening by a risk management official of building permits and planning applications and negotiation of risk management plans for retail establishments that sell pesticides and pesticide manufacturing, processing, or warehousing operations within the vulnerable areas where these activities could be significant drinking water threats.	T-29-C
5	Request the Niagara Escarpment Commission to consider an amendment to the Niagara Escarpment Plan with regard to issuing development permits: do not permit the development of a retail establishment that sells pesticides or a pesticide manufacturing, processing, or warehousing operation within the vulnerable areas where the handling and storage of pesticides could be a significant drinking water threat.	T-30-S ~~Repealed~~ Replaced (see below)
6	Request that the Agrichemical Warehousing Standards Association review their standards to ensure that sufficient buffers exist between warehousing facilities and municipal wells~~,~~ and review their emergency planning and response measures to protect municipal drinking water sources.	T-~~29~~30-S

3.7 Road Salt

3.7.1 Background

What is road salt?

Road salt is used to maintain human safety on roads and pedestrian areas. The most commonly used road salt products are sodium chloride and calcium chloride.

Road salt is defined as any inorganic, chloride salt product used to maintain human safety on roads and pedestrian areas. The majority of road salt is used as a de-icer or an ice prevention agent, although there is some limited use of salt for dust suppression. The most commonly used products are sodium chloride and calcium chloride because they are effective, inexpensive, readily available, and easy to use.

The ~~Ministry of the Environment and Climate Change~~MECP identifies chloride and sodium as chemicals of concern. These chemicals could threaten the sustainability of drinking water sources in certain situations. When large amounts of road salts are released to the environment, they can have an adverse effect on freshwater ecosystems, soil, vegetation, and wildlife.

At typical concentrations in drinking water sources, sodium and chloride are not risks to human health, except for people on sodium restricted diets.

Chloride ions move with water through the environment without undergoing chemical reactions or being lost in other ways. Therefore, all of what is added to the environment will reach surface waterbodies eventually.

At typical concentrations in drinking water sources, sodium and chloride are not risks to human health. If concentrations of sodium exceed 20 milligrams per litre in a water supply, the Medical Officer of Health is notified so doctors can advise patients on sodium restricted diets. Both chemicals can render a water source unusable at high concentrations because the water has an unpleasant salty taste, and because sodium and chloride are difficult to remove from water, treatment can become quite expensive.

What activities related to road salt pose a threat?

~~The application and the handling and storage of road salt are Threats 12 and 13, respectively, of the 21 prescribed threats.~~

The ~~Ministry of the Environment and Climate Change~~MECP has prescribed the application of road salt, and the handling and storage of road salt as activities that are threats to drinking water sources. The provincial and municipal road authorities are the greatest users of road salt.

Winter road salt application works by breaking the bond formed between the pavement and the ice/compacted snow. As snow accumulates on the road and compacts due to traffic, it forms a bond with the pavement, making it difficult to remove with snowplows. The salt reacts with moisture to create a layer of salty water, called brine, between the snow or ice layer and the road. This brine layer has a freezing point below zero degrees Celsius, and breaks the bond, thereby permitting the snow and ice to be plowed from the road.

A widely used technique for keeping the salt on the road and increasing the speed of the melt action is “pre-wetting.” Pre-wetting involves spraying liquid salt brine onto the solid salt as it is spread. This has

two benefits. The first is that it makes the salt sticky, increasing its adhesion to the road. The second benefit is that the salt is already wet, and therefore, it starts to form the brine that is needed to break the ice-road bond more quickly.

~~Pre-wetting is a method by which liquid salt brine is sprayed on to solid salt as it is applied to road surfaces.~~

Liquid salts are applied either as an additive to conventional rock salt (pre-wetting as discussed above) or applied on their own in advance of snow accumulation (direct liquid application). The pre-wetting chemicals include near-saturation solutions of calcium chloride brine or magnesium chloride brine, both with corrosion inhibiting additives. The direct liquid application is used extensively on all provincial highways.

A study by Environment Canada and Health Canada (2001) showed that regional-scale, groundwater chloride concentrations—greater than the aesthetic objective of 250 milligrams per litre—will likely result where the road network is dense and where road salt is applied at annual loadings above 20 tonnes sodium chloride per two-lane-kilometres.

Local impacts from road salt are typically caused by inappropriate handling and storage facilities and practices. Impacts to the environment are possible due to the loading and unloading of trucks, stormwater runoff from the site, and the release of water used to wash equipment (see Figure 5). Salt storage should be out of direct contact with precipitation and runoff to reduce dissolution. Salt storage domes dot the landscape, but the loading of trucks typically occurs outside of these domes. In these situations, the area around the salt dome should be paved with asphalt. Good housekeeping practices (sweeping up spilled salt) are needed to prevent local contamination of soil and water resources.

The best practice for storage and handling of road salt is to store and handle it under cover. A permanent, roofed facility keeps the salt dry, easy to work with, prevents loss through dissolution and runoff, and eliminates the possibility of contaminating watercourses and water supplies. Even if salt is stored indoors, it will absorb moisture when humidity reaches 75 percent. That moisture will evaporate when the humidity falls, and this does not affect the salt's effectiveness as a de-icer. The Ministry of Transport is in the process of changing their facilities to indoor storage sites.

~~The best practice to reduce threats from road salt is to store and handle it in permanent, roofed facilities. These facilities~~ ~~lution and runoff.~~

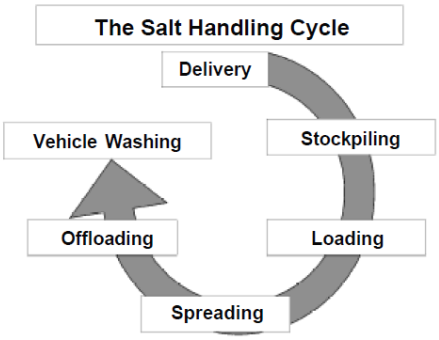

Figure 5 The salt handling cycle.
(Transport Association of Canada, 2003)

The risk level for handling and storage of road salt depends on the coverage of the salt pile, the quantity of salt stored, and the potential release of sodium and chloride into the environment.

Table 8 identifies where significant, moderate and low threats for the application of road salt would occur if this activity was engaged in now or in the future in the Halton Region Source Protection Area. The chemicals of concern are chloride and sodium for wellhead protection areas (WHPA) and intake protection zones (IPZ) and chloride for the issue contributing area.

~~Tables of Drinking Water Threats can be reviewed at https://www.ontario.ca/document/tables-drinking-water-threats~~

For a description of vulnerability scores, see the Assessment Report.

Table 8 Application of road salt risk levels for various conditions

The Application of Road Salt			
Vulnerable Area	Vulnerability Score	Percent Imperviousness	Risk Level
WHPA A, B	10	≥ 80	Significant
WHPA A, B, C	8 to 10	> 8 and <80	Moderate
WHPA A, B	10	> 1 and < 8	Moderate
WHPA A, B, C	8 to 10	< 1	Low
WHPA B, C	8	≥ 80	Moderate
WHPA E	9 ~~to 10~~	≥ 80	Significant

WHPA E	7 to 8.1	≥ 80	Moderate
WHPA E	8 to 9	> 8 and < 80	Moderate
WHPA E	8 to 10	> 1 and < 8	Moderate
WHPA E	9 to 10	< 1	Low
WHPA E	6 to 8.1	< 1	Low
IPZ 1 or 2	4.5 to 6.4	≥ 80	Low
IPZ 1 or 2	4.9 to 7.2	> 8 and < 80	Low
IPZ 1 or 2	5.4 to 7.2	> 1 and < 8	Low
IPZ 1 or 2	6 to 8.1	< 1	Low
Issue Contributing Area	All	All	Significant

Table 9 identifies where significant, moderate and low threats for the handling and storage of road salt would occur if this activity was engaged in now or in the future. The chemicals of concern are chloride and sodium for wellhead protection areas (WHPA) and intake protection zones (IPZ), and chloride for the issue contributing area.

Table 9 Handling and storage of road salt risk levels for various conditions

The Handling and Storage of Road Salt				
Vulnerable Area	Vulnerability Score	Storage Condition	Quantity Stored [tonnes]	Risk Level
WHPA A, B	10	Exposed	> 5,000	Significant
WHPA B, C	8	Exposed	> 5,000	Moderate
WHPA A, B	8 to 10	Exposed	500 to < 5,000	Moderate
WHPA A, B	10	Exposed	< 500	Moderate
WHPA B, C, D	6	Exposed	> 5,000	Low
WHPA A, B, C	8 to 10	Not Exposed	> 5,000	Moderate
WHPA A, B	10	Not Exposed	500 to < 5,000	Moderate
WHPA B, C, D	6	Not Exposed	> 5,000	Low
WHPA B, C, D	6 to 8	Not Exposed	500 to < 5,000	Low
WHPA A, B, C	8 to 10	Not Exposed	< 500	Low
WHPA E	9 to 10	Exposed	> 5,000	Significant
WHPA E	8 to 9	Exposed	500 to < 5,000	Moderate
WHPA E	8 to ~~10~~9	Exposed	< 500	Moderate
WHPA E	7 to 8.1	Exposed	> 5,000	Moderate
WHPA E	8 to 10	Not Exposed	> 5,000	Moderate

WHPA E	9 to 10	Not Exposed	500 to < 5,000	Moderate
WHPA E	6 to 8.1	Not Exposed	500 to < 5,000	Low
WHPA E	7 to 10	Not Exposed	< 500	Low
IPZ 1	10	Exposed	500 to < 5,000	Significant
IPZ 1 or 2	4.5 to 6.4	Exposed	> 5,000	Low
IPZ 1 or 2	4.9 to 7.2	Exposed	500 to < 5,000	Low
IPZ 1 or 2	5.4 to 7.2	Exposed	< 500	Low
IPZ 1 or 2	5.4 to 7.2	Not Exposed	> 5,000	Low
IPZ 1 or 2	6 to 8.1	Not Exposed	500 to < 5,000	Low
IPZ 1 or 2	~~7~~ 8 to ~~10~~9	Not Exposed	< 500	~~Low~~Moderate
IPZ1	10	Exposed	<500	Moderate
Issue Contributing Area	All	All	All	Significant

Commented [JS1]: Full set of circumstances for IPZs is very very long. I just added a few. I would just direct the reader to the Tables of threats for details

How do these threats affect the Halton Region and Hamilton Region Source Protection Areas?

~~In Halton Area and Hamilton Area, significant threats from the storage and handling of road salt are possible in the wellhead protection areas of Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal wells, and in the Cedarvale issue contributing area for chloride.~~

The circumstances that are to be considered as part of the policy development process for threats for the storage of, and handling and storage of road salt are outlined in Tables 8 and ~~9.~~9. The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Cedarvale and Kelso municipal well fields (see Figures B-1 through B-6). Significant threats are also possible within the wellhead protection area and issue contributing area for chloride of the Cedarvale wells #1A, 4 and 4A (Figures B-~~7~~8 and B-~~8~~9). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability score of 10 results in significant chemical threats for both application and

handling and storage activities under certain circumstances. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 9 or greater can result in significant threats under the same circumstances.

~~Assessments made in the Halton Hamilton Source Protection Region concluded that the only existing significant threats due to road salt application, or handling and storage are located within the issue contributing area of the Cedarvale well field. In addition, caution is necessary, due to the proximity of major roadways to municipal wells.~~

The assumption used for the risk analysis for the application of road salt is that road salt is applied only during the winter months to impervious surfaces. Roads and parking lots were considered impervious. A one square kilometre grid, centred on the midpoint of the Source Protection Area, was used to assess the percentage of impervious surfaces within each grid cell of each vulnerable area (see maps included in the Assessment Reports). Then, risk levels were assigned, based on the calculated percentage. The assessment did not find any one kilometre grid cell to have greater than or equal to 80 percent impervious surfaces, which is required for a level of significant risk. Therefore, there are no existing significant threats due to road salt application in wellhead protection areas of the Halton Region and Hamilton Region Source Protection Areas. A portion of Trafalgar Road and four residential driveways lie within the Cedarvale issue contributing area for chloride and are deemed significant threats.

No road salt storage facilities of greater than 5,000 tonnes exist within the wellhead protection areas, and no salt storage facilities exist within the issue contributing area for Cedarvale, and therefore, no significant threats exist due to the storage and handling of road salt. Handling and storage is a significant threat activity in wellhead protection areas when the quantity of salt stored is more than 5,000 tonnes and it is stored in a way that it is exposed to precipitation, runoff and snowmelt. When the salt storage is protected from the elements the risk to drinking water sources from chloride and sodium is reduced.

Areas were identified where the application, or handling and storage of road salt were moderate or low risk activities. To enforce certain policies, the Source Protection Committee has extended the applicability of these policies to include the extended area of less risk within the wellhead protection areas and intake protection zones. Figures B-11~~2~~ to B-14~~5~~ map the full extent of the low, moderate and significant road salt threat areas.

Commented [JS2]: @Chitra Gowda and @Brad Rennick Figures B-11 through B14 need to be updated

Even though the application of road salt is not at a significant threat level in the wellhead protection areas, impacts are evident in groundwater and surface water quality. Halton Region's well fields are in close proximity to the point at which Highway 401 rises over the Niagara Escarpment. The large volume of traffic using the highway requires optimal safety precautions, and therefore, a considerable amount of road salt use. Halton Region is in contact with the Ministry of Transportation and studying measures that can be taken to reduce the amount of sodium and chloride that are released to the environment.

What legislation, guidelines, or protocols already exist?

Existing legislation regarding the threats associated with road salt include:

- Canadian Environmental Protection Act
- Fisheries Act
- Ontario Environmental Protection Act
- Ontario Water Resources Act

- Canadian Environmental Protection Act, 1999

Due to concerns about the large quantities of chlorides being released to the environment, Environment Canada and Health Canada (2001) completed a comprehensive scientific assessment of road salt as a priority substance under the Canadian Environmental Protection Act, 1999. The road salts assessment included the inorganic chloride salts — sodium chloride (NaCl), calcium chloride (CaCl2), magnesium chloride (MgCl2), and potassium chloride (KCl). Brines used in road de-icing/anti-icing and dust suppression, the salt portion of abrasive mixtures, and ferrocyanide salt additives for anti-caking were also studied.

Based on the evidence reviewed and the risk assessment completed, road salts were determined to be toxic. This rating is based on the quantity or concentration of road salts entering the environment, the possibility for long-term, harmful effects on the environment or its biological diversity, or the danger they may pose to the environment on which life depends.

The report recognizes the benefits of road salt use to keep roadways safe and minimize traffic crashes, injuries, and mortality under icy and snowy conditions. It recommends that any measures developed as a result of the assessment must not jeopardize road safety while minimizing the potential to harm the environment, and as a result, drinking water supplies.

Fisheries Act, 1985

~~Scientific assessments carried out by Environment Canada and Health Canada concluded that road salts are toxic. However, since road salts are necessary for traffic safety, any measures taken to reduce harmful environmental affects should not compromise road safety.~~

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

Road salts can be considered deleterious substances that readily enter watercourses and waterbodies. Chloride is especially a concern since it is very stable, and therefore, almost all chloride that enters the environment reaches surface water and stays in solution.

Environmental Protection Act, 1990

The Environmental Protection Act (EPA), which is enforced by the ~~Ministry of the Environment and Climate Change~~MECP, provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects.

Ontario Regulation 339—Classes of Contaminant does not allow the application of the Environmental Protection Act to any road authority where a contaminant is applied to create safe driving conditions. It states:

Where any substance used on a highway by the Crown as represented by the Minister of Transportation or any road authority or any agent or employee of any of them for the purpose of keeping the highway safe for traffic under conditions of snow or ice or both is a contaminant, it is classified and is exempt from the Act and the regulations.

Ontario Water Resources Act, 1990

Section 30 of the Ontario Water Resources Act prohibits the discharge of any material into the water that may impair the quality of the water.

30. (1) Every person that discharges or causes or permits the discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters is guilty of an offence.

Other Tools

Other tools related to road salt threats include:

- Code of Practice for the Environmental Management of Road Salts Syntheses of Best Practices: Road Salt Management
- Best Practices for Road Salt Use on Private Roads, Parking Lots, and Sidewalks
- Ontario Ministry of Transportation—Salt Management
- Halton Region Salt Management Plan
- City of Hamilton Salt Management Plan
- 407 ETR Salt Management

Code of Practice for the Environmental Management of Road Salts

The publishing of the priority substances report on road salts initiated a risk management process. The Code of Practice for the Environmental Management of Road Salts (Environment Canada, 2004) was released as the result of this process to address the risk. The code applies to:

- organizations that use more than 500 tonnes of road salts per year (five year rolling average)
- organizations that have vulnerable areas in their territory that could be potentially impacted by road salts

The main objective of the Code of Practice is to ensure environmental protection while maintaining roadway safety. The two main recommendations are the development of salt management plans to reduce negative impacts of salt releases, and the development and implementation of best management practices for salt application, salt storage, and snow disposal (see also discussion in Section 3.8, Snow Storage).

The Code of Practice does not address the use of road salts on parking lots and private properties, use as dust suppressants, or the use of ferrocyanide additives. Environment Canada is addressing these applications separately.

~~The Code of Practice imposes standards for road salt application, handling, and storage on organizations that use more than 500 tonnes of road salt yearly and/or organizations that use salt in or near vulnerable areas.~~

Best management practices are recommended for storage and application of road salts as follows:

Salt Storage: The objective is the prevention or control of releases from existing and new sites. Best practices are the coverage of salt piles and blended salt-sand piles, handling practices that avoid uncontrolled releases, drainage management, wash water collection and treatment, training of personnel, and monitoring of the effectiveness of the facility.

Salt Application: The objective is the reduction of the negative impacts of road salts by delivering the right amount of road salts in the right place at the right time. In pursuing this objective, consideration should be given to using the most recent advancements in the application of winter maintenance anti-icing and de-icing materials, winter maintenance equipment, road weather information, and other decision support systems. As well, the training of personnel and the monitoring of the effectiveness of road salt application techniques should be considered.

Salt management plans identify activities through which road salts could be released to the environment, contain training programs for all personnel, ensure monitoring and record keeping, and provide numerous other elements to achieve improved environmental protection and continuing road safety.

The salt management plan should establish the following:

- Provide a statement recognizing the role of a salt management plan in achieving improved environmental protection without compromising road safety.
- Provide a commitment or endorsement of the plan at the highest level in the organization.
- Identify activities or operations through which road salts may be released to the environment, and goals to achieve reduction of the negative environmental impacts from these releases.
- Assess current practices against recommended best management practices, including those contained in the Transportation Association of Canada's Syntheses of Best Practices.
- Contain documentation of all policies and procedures applicable to the salt management plan.
- Include communication activities necessary to inform the organization and the public of the salt management plan and related policies and procedures.
- Contain a training program for all personnel when managing or performing winter maintenance activities involving the use of road salts.
- Provide response procedures to react to uncontrolled releases of road salts that could result in environmental impacts.
- Ensure monitoring of actions to measure the plan's effectiveness.
- Include record keeping as described in the code.
- Include a procedure for yearly review of the plan by the organization with continual improvement of salt management practices and salt management plan as better management practices become known and progress is achieved.
- Establish and implement corrective actions to address deficiencies identified in the operations of the organization to which the plan applies.

Syntheses of Best Practices: Road Salt Management

~~The Transportation Association of Canada's Syntheses of Best Practices establishes guiding principles and provides a framework for minimizing the potential impacts of road salt on the environment.~~

The Transportation Association of Canada's Syntheses of Best Practices (2003) establishes guiding principles to aid in the management of road salt and provides a framework to identify the specific practices that can be implemented to minimize potential impacts of road salt on the surrounding environment. The syntheses supplement the recommendations made within the Environment Canada Code of Practice. Best practices exist for:

- salt management plans
- training
- road and bridge design
- drainage and stormwater management
- pavements and salt management
- vegetation management
- design and operation of road maintenance yards
- snow storage and disposal
- winter maintenance equipment and technologies

Best Practices for Salt Use on Private Roads, Parking Lots, and Sidewalks

~~The use of road salts on parking lots, private roads, and sidewalks is addressed in a best management practices guidance document produced by Environment Canada. Guidelines include correct standards for storage, information about timing and application, and training.~~

As a follow up to the Code of Practice, Environment Canada released Best Practices for Salt Use on Private Roads, Parking Lots and Sidewalks (2004). This guidance document provides advice to property owners and contractors for consideration when they develop road salt management practices. Although the major user of road salt is government, private companies also use significant quantities.

The objective of Environment Canada is to reduce the amount of salt used through adoption of best management practices. Again, it is stressed that safety is priority. It is pointed out that better salt management practices benefit the environment and also result in cost savings to the organization.

Best practices to ensure road salt is used effectively and efficiently are provided with emphasis on:

- materials storage and handling – use covered storage areas underlain by impermeable asphalt or concrete, and manage site drainage
- salt application – right material, right amount, right place, and right time
- materials – salt or salt/sand mixtures, brines, other products
- equipment – right equipment for optimum application
- decision-making tools – local weather forecasts and radar

- operational consideration – sequence of techniques used
- training – changes in behaviour result in changes in approach
- Ontario Ministry of Transportation – Salt Management

~~Within the Halton-Hamilton Source Protection Region, Highways 5, 6, 8, 401, 403 and QEW are managed by the Ministry of Transportation and its comprehensive salt management plan.~~

The Ministry of Transportation is responsible for the provincial highways (Highways 5, 6, 8, 401, 403 and QEW) within the Halton-Hamilton Source Protection Region. The Ministry has a salt management plan, developed in 2005, that applies to all roads under their authority. All salt is stored indoors, and yards must be cleaned up after a salt delivery. New structures have loading/offloading of trucks that takes place inside the structure, and the Ministry is changing all its existing structures to have the same design.

The Ministry uses the latest winter maintenance technologies (Ministry of Transportation, 2010) including:

- electronic spreader controls on spreading trucks, allowing the operator to control the amount and location of salt placed
- pre-wetted salt to keep the salt on the road
- infrared thermometers to assess road and air temperatures for effective use of salt
- advanced Road Weather Information Systems (ARWIS) to monitor and forecast road and weather conditions
- automatic bridge de-icing systems
- trials of rubber blades and high-speed spreaders

The Ministry also supports research and studies in road salt management to develop new initiatives that are more effective and/or more efficient.

Halton Region Salt Management Plan

~~Halton Region's salt management plan applies to the Regional Municipality of Halton, the City of Burlington, Town of Halton Hills, Town of Milton, and Town of Oakville.~~

The salt management plan is intended to set out a policy and procedural framework for ensuring that the Regional Municipality of Halton, City of Burlington, Town of Halton Hills, Town of Milton, and Town of Oakville continuously improve the management of road salt used in their winter maintenance operations. The Plan demonstrates the five Road Authorities' commitment to reducing the environmental effects of excessive salt use, consistent with Environment Canada's stated objections.

Within the context of the overall Regional and Municipal policies, the following are the five Road Authorities' policies on the use and management of road salt:

- To comply with all applicable federal and provincial legislation regarding the storage and use of snow and ice control products.
- To use road salt in an environmentally responsible manner, and minimize the negative environmental effects of handling, storage, and application of salt on the environment.
- In providing the stated Level of Service, the five Road Authorities will conserve the use of salt by utilizing the most cost-effective technologies and practices.

City of Hamilton Salt Management Plan

~~The City of Hamilton's salt management plan comprises strategies such as modifying storage facilities, purchasing more efficient vehicles for road de-icing, and applying new information systems.~~

The City of Hamilton has a winter control plan in effect, and included within that plan is a salt management plan. The objective of the winter control plan is to define standards to be maintained and procedures to be followed in order to keep the municipality's roads and sidewalks in a safe condition from snow and ice. The road salt management plan is an environmental initiative to reduce the overall use of road salt for snow control, while maintaining the same level of service. The main aspects of the program are as follows:

Storage and Loading: Work yards will be modified to minimize the loss of material to the environment by containing run-off and by providing additional structures for the warehousing of materials.

New Vehicles: New vehicles are being purchased and existing vehicles modified to wet the salt before application so it starts working faster and stays on the traveled portion of the road, rather than migrating to the curb or ditch. Anti-icing units are being acquired and built for applying an anti-icing liquid. The latter is a proactive approach to winter maintenance.

Information Systems: Quality weather information is required to ensure anti-ice liquid and salt is applied in a timely manner and in appropriate quantities. A study by the City of Hamilton is underway to determine sites for stand-alone road and air weather information stations. Vehicle tracking systems are being reviewed in an effort to reduce the city's exposure to liability and to confirm appropriate route assignments.

407 ETR Salt Management Plan

~~As part of its salt management plan, the 407 ETR operates four road weather information sites and is investing in new equipment for more efficient road de-icing.~~

A salt management plan has been adopted for the 407 ETR to reduce the volume of salt used. The 407 ETR is investing in new, hi-tech spreader equipment that will increase the performance and effectiveness of salt using anti-icing and pre-wetting processes. Detailed weather forecasting data is monitored using information from Environment Canada and the Weather Network to anticipate road conditions. In addition, 407 ETR operates four road weather information sites (Dundas St., Derry Road, Yonge Street, and York/Durham Line) with online access. Their Highway Operations Control Centre is continuously monitoring weather data, including radar images, road and surface temperatures, and moisture and chemical (salt) conditions. With this information, road salt is applied where and when it will be most effective using the least amount.

What policy approaches were discussed?

On January 27 and February 22, 2011, the Planners' Working Group and Source Protection Committee, began discussing policy approaches to address the application, and the handling and storage of road salt. Once the Cedarvale issue contributing area was identified within the Halton Region Source Protection Area the policy approaches used were discussed for the applicability within this area. As there are a few existing significant threats and some low and moderate threats within the wellhead protection areas and

intake protection zones, policies discussed will apply to existing and potential future threats. The policies discussed were:

Education and Outreach

Request that the Region of Halton, City of Hamilton, Ministry of Transportation, and private companies amend their salt management plans to identify the location of wellhead protection areas where the application or storage or road salt could be a significant drinking water threat and include policies to protect these areas from these threats.

Land Use Planning

Amend official plans and zoning by-laws to prohibit salt storage and handling facilities within wellhead protection areas where these activities would be a significant drinking water threat.

Risk Management Plans

Require risk management plans for the application of road salt or for any new salt handling or storage facility where this activity would be a significant drinking water threat.

Restricted Land Uses

Require pre-screening of planning applications by a risk management Official for activities related to the application, or handling and storage of road salt where the activity would be a significant drinking water threat.

Prohibition

Prohibit the use of land as facilities for the handling and storage of road salt in wellhead protection areas where this activity would be a significant drinking water threat.

3.7.2 Discussion on Policy Options

~~The committee supported the use of salt management plans. In addition, it was considered important to educate the private sector and the general public about the impacts of road salt on drinking water sources, with an emphasis on efficient and appropriate use of salts or their alternatives.~~

No threats at a significant level were identified in the Halton-Hamilton Source Protection Region wellhead protection areas for the activities of road salt application, or handling and storage. Significant threats were identified for road salt application within the issue contributing area for Cedarvale wells. Policies addressing road salt application apply to existing and future scenarios due to the inclusion of low and moderate threat activities. For a threat due to the application of road salt to become significant in a wellhead protection area, the density of the road network or the number and size of paved parking lots would have to increase substantially. This is not likely to occur. In the issue contributing area, the application of any amount of road salt is elevated to a significant risk.

For a threat due to the handling and storage of road salt to become significant, a storage facility would have to be constructed within the wellhead protection area that exposes salt to precipitation, runoff or snow melt. Within the issue contributing area, the handling and storage of salt at a salt storage facility may be a significant threat activity if any amount of salt is either exposed or protected from the elements.

The storage threshold for significant threats from road salts in wellhead protection areas is 5,000 tonnes and is not likely to occur. Therefore, the Committee recommended that official plans prohibit storage facilities of this capacity where significant threats would occur.

The Source Protection Committee discussed the elevated concentrations of sodium and chloride in the Campbellville, Kelso, and Greensville municipal well groundwater sources. The concentrations are generally below the aesthetic standard for drinking water but could rise above this and cause the water to taste salty. Halton Region was put in contact with the appropriate personnel from the Ministry of Transportation to discuss ways to protect the drinking water sources for their municipal wells.

Education and Outreach

The municipalities within the Source Protection Region are or have completed updating their salt management plans to incorporate recent best management practices. The use of these plans is supported by the Committee. These plans are already in place and address the issues related to Threat 12, the application of road salt. It was noted that these documents should be updated further to incorporate the latest mapping of wellhead protection areas, intake protection zones, and issue contributing areas where the application and the handling and storage of road salt would be low, moderate or significant threats to drinking water sources.

An education and outreach program should be implemented by the municipalities to inform the private sector and the general public about source protection planning and the impacts of road salt on drinking water sources. As the only way to appropriately address this threat is to use less inorganic chloride salts or to capture road and parking lot runoff, efficient use of the salts or the use of alternatives should be the key message. To broaden the delivery of the message, the Committee changed the policy to apply where low, moderate or significant threats could exist, i.e. in wellhead protection areas, intake protection zones and issue contributing areas.

Land Use Planning

The Committee explored the question of whether a retail operation could store enough salt in one location to become a significant threat. As the storage threshold is 5,000 tonnes, it is not a possibility. The threat primarily relates to large municipal and provincial salt storage facilities where salt is delivered in bulk, and the Committee was of the opinion that the most effective method of addressing this storage threat was land use planning tools, as it was reasonable to expect that the municipality and provincial agencies would follow this policy framework.

It was recommended that the official plans and zoning by-laws be amended to prohibit salt storage facilities within wellhead protection areas and issue contributing areas where the handling or storage of greater than 5,000 tonnes of road salt could be a significant threat to drinking water supplies. There are currently no public work yards or any plans for public works yards within these vulnerable areas and options are available to locate these facilities outside of locations where a significant threat would occur. This policy approach will be used to address Threat 13, the handling and storage of road salt.

The use of prohibition through land use planning is based on the precautionary concept that the best protection of drinking water supplies is achieved when the threat cannot be established within the

vulnerable area where it could be a significant drinking water threat. Because there is already a concern about the existing degraded water quality due to road salt, the Committee is of the opinion that to decrease any further salt loading, the storage of road salt should be located away from the municipal wells.

However, when the capacity of the salt storage facility is 5,000 tonnes or less in an issue contributing area, it was the opinion of the Source Protection Committee that the risk could be managed through the use of risk management plans.

The Committee recommended that the Niagara Escarpment Plan be amended as well to ensure consistency of the policy documents within the municipal jurisdictions.

Risk Management Plans

To address the threat posed by the handling and storage of road salt at facilities of 5,000 tonnes or less, the Source Protection Committee require risk management plans to be established. Since the definition of a salt storage facility requires that salt be brought to the property in bulk, this requirement would not apply to typical residential properties.

Restricted Land Uses

The bringing of road salt to a property does not require a building permit or planning application and so the use of restricted land use screening would not help with the identification of road salt threat activities. Therefore, this tool is not used.

Prohibition

As road salt threats have been addressed through the tools of education and outreach, land use planning, and risk management plans, the use of prohibition was not pursued as an option.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Consultation

As part of the pre-consultation process, discussions where held with the Ministry of Transportation and de-icing contractors regarding the draft policies. The Ministry did not support the request to amend its Salt Management Plan to incorporate vulnerable areas because it uses best practices throughout the province. The policy framework was revised as it relates to the Ministry of Transportation with a focus on the Halton-Hamilton Source Protection Area. At the suggestion of de-icing contractors, an additional policy was included in the Plan requesting that the province develop a mandatory accreditation program. After much discussion, the Source Protection Committee repealed the policy citing its lack of provincial support and the effectiveness of the required education and outreach program to raise the awareness of de-icing contractors.

Concerns were raised by some municipalities regarding the funding source for any municipal education, outreach and incentive programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years.

The Niagara Escarpment Commission indicated that the limited range of uses permitted within the Niagara Escarpment Plan suggest it is unlikely that the activities that pose significant threats could be established.

The municipal planners requested that wording be included in the policy to direct the municipality to use Planning Act tools to prohibit the land use as support for the required official plan amendment.

The identification of an issue contributing area for chloride for the Cedarvale wells #1A, 4, and 4A required revision of some policies to address significant threats in that area. Policies T-32-C, T-34-C, and T-35-C have been modified.

Policy Directives for Threats 12 and 13 – Road Salt		
	Policy Directive	Policy
1	Request that Halton Region, in cooperation with the local municipalities, the City of Hamilton amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the significant threats due to the application, handling, and storage of road salt.	T-35-C
2	Request that the Ministry of Transportation update their salt management plan to stay current with Environment Canada's Code of Practice for the Environmental Management of Road Salts and the Transportation Association of Canada's Syntheses of Best Practices.	T-36-S b
3	Encourage an education and outreach program for the private and public sectors and general public about source protection planning and the impacts of significant threat road salt on drinking water sources, with the key message being the efficient use of road salts or the use of alternatives.	T-34-C
4	Request that municipalities amend official plans and zoning by-laws to prohibit salt storage and handling facilities greater than 5,000 tonnes within vulnerable wellhead areas and issue contributing areas for chloride where they would be significant threats.	T-32-C

5	Encourage an education and outreach program for the private and public sectors and general public about source protection planning and the impacts of low or moderate threat road salt on drinking water sources, with the key message being the efficient use of road salts or the use of alternatives.	T-60-S
6	Request that Halton Region, in cooperation with the local municipalities, the City of Hamilton amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low and moderate threats due to the application, handling, and storage of road salt.	T-61-S
7	Request that private de-icing companies amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low, moderate and significant threats due to the application, handling, and storage of road salt.	T-49-S

Also, policies T-34-C, T-35-C and T-49-S were revised to extend their application to areas where low and moderate road salt application threat activities are possible in wellhead protection areas and intake protection zones since it is unlikely that the density of imperviousness within the watershed will attain the threshold for significance. The policies will be strategic within the low and moderate areas. Halton Region requested that the policy state that they will work collaboratively with the local municipalities to develop the education and outreach program required by T-34-C/S.

The reader is directed to the Source Protection Plan to review the policies.

~~Policy Directives for Threats 12 and 13 – Road Salt~~		
	~~Policy Directive~~	~~Policy~~
~~1~~	~~Request that Halton Region, in cooperation with the local municipalities, the City of Hamilton, and private de-icing companies amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low, moderate and significant threats due to the application, handling, and storage of road~~	~~T-35-C/S T-49-S~~

	~~salt.~~	
~~2~~	~~Request that the Ministry of Transportation update their salt management plan to stay current with Environment Canada's Code of Practice for the Environmental Management of Road Salts and the Transportation Association of Canada's Syntheses of Best Practices.~~	~~T-36-S b~~
~~3~~	~~Encourage an education and outreach program for the private and public sectors and general public about source protection planning and the impacts of significant threat road salt on drinking water sources, with the key message being the efficient use of road salts or the use of alternatives.~~	~~T-34-C/S~~
~~4~~	~~Request that municipalities amend official plans and zoning by-laws to prohibit salt storage and handling facilities greater than 5,000 tonnes within vulnerable wellhead areas and issue contributing areas for chloride where they would be significant threats.~~	~~T-32-C~~
~~5~~	~~Encourage an education and outreach program for the private and public sectors and general public about source protection planning and the impacts of low or moderate threat road salt on drinking water sources, with the key message being the efficient use of road salts or the use of alternatives.~~	~~T-60-S~~
~~6~~	~~Request that Halton Region, in cooperation with the local municipalities, the City of Hamilton amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low and moderate threats due to the application, handling, and storage of road salt.~~	~~T-61-S~~
~~7~~	~~Request that private de-icing companies amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low, moderate and significant threats due to the application, handling, and storage of road salt.~~	~~T-49-S~~

Policy Directives for Threats 12 and 13 – Road Salt		
	Policy Directive	Policy
5	Request that the Niagara Escarpment Commission amend the Niagara Escarpment Plan to prohibit salt storage and handling facilities with capacity greater than 5,000 tonnes within wellhead protection areas and issue contributing areas for chloride where the handling and storage of salt would	T-33-S

	be a significant drinking water threat.	
6	Request that the Ministry of Transportation and their supporting de-icing contractors continue the proactive implementation of their salt management plans and to continue the use of best management practices within wellhead protection areas and intake protection zones.	T-36-S
7	Request that the Ministry of Transportation complete research on innovative practices and mitigative technologies to improve road salt application and the management of runoff.	T-36-S
8	Request that the Ministry of Transportation investigate innovative practices and new mitigative technologies to manage road salt runoff and consider a pilot study within the Halton-Hamilton Source Protection Region.	T-36-S
9	Request that the Ministry of Transportation develop a mandatory accreditation program for de-icing contractors.	T-50-S repealed
10	Require the establishment of risk management plans for salt storage facilities of 5,000 tonnes or less within issue contributing areas.	T-32-C

3.8 Snow Storage

3.8.1 Background

What is snow storage?

Snow storage involves the collection of snow from roadways and parking lots to be stockpiled and/or melted at another designated location.

During the winter season, snow often accumulates along the sides of roads and in parking lots. Large snow banks can affect driver and pedestrian safety and reduce available parking. In these cases, it is necessary to remove the snow by melting it in place or by transporting it to designated disposal sites. Municipal and commercial snow-removal operators use snow storage facilities to store snow removed from roads and parking lots during the winter months. The snow in these facilities is either melted or stockpiled and then allowed to melt.

What activities related to snow storage pose a significant threat?

~~The storage of snow is Threat 14 of the 21 prescribed threats.~~

Snow plowed from roads and parking lots can be contaminated with road salt, oil, grease and heavy metals from vehicles, litter, and airborne pollutants. It must therefore be stored and disposed of in an appropriate manner. Storing large quantities of snow in one location concentrates the contaminants in melt water, which results in a greater impact on the surrounding environment.

Storing snow can pose a significant drinking water threat, depending on the geographic location of the storage area and whether the snow is stored above or below grade. (Snow storage below grade would occur in a pit or quarry.) In general, the greater the snow storage area, and therefore the possible volume of snow stored, the greater the risk to drinking water sources. ~~The circumstances that cause a significant threat are outlined in the flow chart for Threat 14 in Appendix C.~~

If the storage area is large, a significant release of chemicals to groundwater or surface water can occur.

~~Among the chemicals that could be released into the environment from a snow storage site are chloride, sodium, nitrogen, petroleum hydrocarbons, cyanide, copper, lead, and zinc.~~

The four storage area sizes considered in the threat assessment were as follows:

- ~~0.01~~ hectares (ha) to 0.5 ha
- 0.5 ha to 1 ha
- ~~1~~ ha to 5 ha
- greater than 5 ha

The ~~MOECC~~MECP Tables of Drinking Water Threats (2009) list chemicals that could be released from snow storage areas and affect surface and groundwater. The eight listed below are associated with conditions that present a significant drinking water threat:

- Chloride
- Sodium
- Nitrogen
- Petroleum hydrocarbon fractions F1 to F4

- Cyanide (CN^-)
- Copper and copper compounds
- Lead and lead compounds
- Zinc and zinc compounds

The main source of sodium, chloride, and cyanide in snow is road salt. The other contaminants are generally from vehicle fluids, exhaust, brake linings, and tire and engine wear.

~~The MOE Tables of Drinking Water Threats can be viewed at https://www.ontario.ca/document/tables-drinking-water-threats~~

For a description of vulnerability scores, see the Assessment Report.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

~~In Halton and Hamilton Areas, significant threats from snow storage are possible in the wellhead protection areas surrounding the Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal wells and in the Cedarvale issue contributing area-chloride.~~

The vulnerable areas mapped in the Halton Region and Hamilton Region Source Protection Areas where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Cedarvale and Kelso well fields (see Figures B-1 through B-~~6~~ 7~~and B-8~~). In the Hamilton Area, significant threats are possible in the Greensville municipal wellhead protection area (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant chemical threats from the storage of snow is 10. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 9 or greater can result in significant threats. Significant threats are also possible within the issue contributing area for chloride of the Cedarvale wells #1A, 4 and 4A when the snow storage facility is at least 0.01 hectares in size (Figure B-~~8~~9).

Based on current information, the Halton and Hamilton areas have no significant threats to drinking water supplies due to the storage of snow.

For the threat assessment, the municipalities provided the locations of their snow dumps. The locations of other snow storage facilities are unknown at this time. These areas will be assessed later and relevant results added to amended Assessment Reports. Based on current information, no significant threats to drinking water supplies from the storage of snow exist in Halton and Hamilton Areas.

The following list identifies where significant threats would occur if snow were stored there at any time in the future:

WHPA–A or B with a vulnerability score of 10

For the storage of snow below grade, a significant chemical threat exists when the storage area is larger than 0.01 hectare. Depending on the size of the storage area, the chemicals of concern are a subset of: lead and lead compounds; nitrogen; petroleum hydrocarbons F1, F2, F3, or F4; sodium; chloride; cyanide; copper and copper compounds; and zinc and zinc compounds.

For storage of snow at or above grade, a significant chemical threat exists when the storage area is larger than 1 hectare. The chemicals of concern are a subset of: lead and lead compounds; nitrogen; petroleum hydrocarbons F1; sodium; chloride and cyanide.

WHPA–E with a vulnerability score of 9

A significant chemical threat exists only when snow is stored at or above grade in a storage area that is larger than 1 hectare. Depending on the size of the storage area, the chemicals of concern are a subset of: chloride; copper and copper compounds; cyanide; lead and lead compounds; nitrogen; sodium; and zinc and zinc compounds.

Issue contributing area for chloride

A significant threat exists when snow is stored at a snow storage facility at or greater than 0.01 hectare in size.

What legislation, guidelines, or protocols already exist?

Among the guidelines currently available for dealing with snow storage are the following:

- Code of Practice for the Environmental Management of Road Salts
- Syntheses of Best Practices: Road Salt Management
- Best Management Practices for Salt Use on Private Roads, Parking Lots, and Sidewalks
- Guideline B4: Snow Disposal and De-icing Operations in Ontario
- Code of Practice for the Environmental Management of Road Salts

Environment Canada developed a code of practice for road salts to be used in conjunction with the best practices compiled by the Transportation Association of Canada (see below). The code applies to organizations that:

- use more than 500 tonnes of road salts per year (five-year rolling average); and
- have vulnerable areas in their territory that potentially could be affected by road salts.

The code does not apply to road salts used for domestic purposes, or for private or institutional uses.

The code recommends that best management practices be used with the objective being the control of releases from existing and new snow disposal sites. The code suggests that in pursuing this objective, the following elements should be considered:

- location and construction of the sites, to take into account operational and environmental factors
- drainage management
- training of personnel
- monitoring of the effectiveness of the facility

Environment Canada recommends the preparation of salt management plans to cover all activities that may result in the release of road salts to the environment, of which snow storage is just one. It also suggests collaboration between stakeholders to monitor and report on the effectiveness of the plans to assess the need for additional mitigation.

Environment Canada's Code of Practice for organizations that use more than 500 tonnes of road salts per year in vulnerable areas focuses on controlling the location and construction of storage sites, drainage management, personnel training, and effective monitoring.

Syntheses of Best Practices: Road Salt Management

~~The Transportation Association of Canada's Syntheses of Best Practices establishes guiding principles and provides a framework for minimizing the potential impacts of contaminated snow on the environment. It advocates the use of collection ponds for melt water.~~

The Transportation Association of Canada's Syntheses of Best Practices: Road Salt Management (2003) establishes guiding principles to aid in developing appropriate removal, storage, and disposal procedures for snow. It also provides a framework to identify the specific practices that can be implemented to minimize potential impacts of contaminated snow and salt-laden melt water on the surrounding environment. The best practices supplement the recommendations made within the Environment Canada Code of Practice (see above).

For melt water management, the Transportation Association of Canada (TAC) recommends directing site drainage and melt water to a collection pond that is designed with an impermeable base, a fore bay to collect litter and settle coarse sediments, and a larger secondary area to settle finer particles. An absorbent boom can be placed in the fore bay to capture any oil and grease from the site drainage. The outlet from the pond should be controlled to regulate the release of runoff to the receiving waterbody or off the property.

Best Management Practices for Salt Use on Private Roads, Parking Lots, and Sidewalks

Environment Canada (2004) prepared this guidance document for use by property owners and contractors when they are developing their own policies, practices, and procedures for road salt management. Best management practices relating to snow storage and disposal on private property are as follows:

- Owners should ensure that site plans provide for sufficient snow storage to eliminate the need to transport snow off-site.
- Snow storage sites should be located such that melt water that may contain salt is not directed towards vulnerable areas.
- Melt water should be directed to sediment ponds or sanitary sewers where permitted by the local municipal sewer-use by-law.
- Snow should be stored on-site in paved areas where the melt water will not drain into the parking area or form puddles, which cause slippery conditions that may require extra salting operations.
- Snow should be stored in areas of the parking lot where puddles frequently form, to deter vehicles and pedestrians from using these areas.
- Snow should not block drains.
- Salt should never be used to promote rapid melting of stockpiled snow.
- Snow should be stored in areas where the sun will promote rapid melting.

- Snow that is removed from a facility and transported for disposal should be taken to a properly designed snow disposal site. Property owners and contractors should determine the disposal locations prior to the winter.
- Snow disposal sites should be designed in accordance with TAC's Syntheses of Best Practices: Road Salt Management (see above).

~~Environment Canada recommends that property owners and contractors allow room for on-site snow storage and ensure that the melt water is directed away from the parking area, drains, or vulnerable areas to sediment ponds or sanitary sewers. Snow that must be removed should be taken to a properly designed disposal site.~~

Snow Disposal and De-icing Operations in Ontario

A guideline for snow disposal and de-icing operations was developed for the Ministry of the Environment and Climate Change by the Task Force on Snow Disposal, which was established in 1975. It was amended in February 2011. The purpose of the guideline is to minimize the environmental impact of snow collection, disposal practices, and de-icing operations.

The details outlined in the guideline are very general and advocate for the conservative use of de-icing compounds, especially in sensitive areas, and the protection of stockpiles from precipitation and runoff.

The ~~MOE~~ MECP guidelines on snow disposal and de-icing operations recommend that snow disposal sites should be evaluated on the basis of their accessibility, surface and sub-surface drainage, and their impact on neighbouring wells.

The ~~Ministry of the Environment and Climate Change~~MECP identifies a number of criteria that should be used to evaluate the suitability of snow disposal sites. The following criteria relate to potential impacts on water:

Accessibility: the roads to the site and the site itself must be able to bear heavy truck traffic when the ground is not frozen, since inadequate road and site surfacing could lead to soil compaction, erosion, and runoff.

Surface drainage: The site should be remote from watercourses; berms and dykes may be required to prevent direct drainage to watercourses. The quantity of snow that can be stockpiled should be assessed in relation to estimated runoff rates and quality, the dilution capacity of the receiving watercourse, and downstream water users.

Sub-surface drainage: A hydrogeological study is required to determine the impact of contaminants on the aquifer. If possible, sites should be located in areas where an impervious layer of strata (soil and/or rock) will prevent the migration of soluble contaminants to the aquifer.

Ontario Water Resources Act, 1990 and Environmental Protection Act, 1990

Due to the modernization of the environmental approval process a decade ago, ~~future~~ environmental compliance approvals for sewage works ~~will be~~are administered through the Environmental Protection Act whereas existing ones will exist as certificates of approval under the Ontario Water Resources Act.

The Ontario Water Resources Act, 1990 (OWRA) provides for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social and economic well-being. The Environmental Protection Act, 1990 (EPA) provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects. The ~~Ministry of the Environment and Climate Change~~MECP is responsible for enforcing both Acts, and both Acts administer approvals for sewage works.

A snowmelt water management facility, like a stormwater management facility, requires an approval. An environmental compliance approval will be issued for new approved systems, while existing certificates of approval issued under the OWRA will continue to apply and will be treated as an environmental compliance approval. This means that certificates of approval may be amended, reviewed, suspended or revoked as if they were environmental compliance approvals.

The Stormwater Management Planning and Design Manual (March 2003) provides practical information on how to design stormwater management facilities in Ontario that meet the requirements for approval.

Monitoring of the engineered melt water management facilities in the City of Ottawa demonstrated that these facilities have been successful at reducing total suspended solids entering receiving water bodies by 90 to 99 percent, and at reducing chloride levels in discharge water through dilution (Environment Canada, 2011).

Municipal Winter Control and Salt Management Plans

~~Both Halton Region and Hamilton have salt management plans that aim to mitigate the effects of road salt on the environment while ensuring public safety.~~

In response to Environment Canada's Code of Practice for the Environmental Management of Road Salt (discussed above), municipalities within the Halton Region and Hamilton Region Source Protection Areas have prepared salt management plans.

Halton Region

Halton Region's plan was a collaborative effort by the Region and the four local municipalities, the City of Burlington, and Towns of Milton, Oakville, and Halton Hills. It specifically addresses road-salt management in sensitive areas. Halton Region has identified impacts on source water for drinking water supplies due to road salt and is currently studying ways to mitigate them.

Section 3.7 of Halton Region's salt management plan indicates that the four local municipalities currently remove snow from specific areas within their jurisdictions and dispose of it at five existing snow disposal sites. The Town of Halton Hills recently constructed an engineered snow disposal site beside their maintenance yard.

Hamilton Snow Disposal

The City of Hamilton has a winter control plan in effect, which includes a salt management plan. The objective of the winter control plan is to define standards to be maintained and procedures to be followed to keep the municipality's roads and sidewalks in a safe condition, free from snow and ice. As part of four components of the salt management plan, staff are reviewing locations where snow is stored to ensure that they are environmentally appropriate.

What policy approaches were discussed?

On January 27 and February 22, 2011, the Planners' Working Group and Source Protection Committee began discussing approaches to address the threats associated with snow storage. When the Cedarvale issue contributing area for chloride was delineated in the Halton Region Source Protection Area the Committee discussed the applicability of the policies in this area. There are no existing threats from snow storage in Halton-Hamilton Source Protection Region, therefore policy discussions are for potential future threats only.

Land Use Planning

Amend official plans and zoning by-laws to prohibit snow storage and melting facilities that are at or above grade at greater than one hectare in size or below grade at or greater than 0.01 hectare in size within vulnerable areas where they would be a significant threat to drinking water supplies.

In issue contributing areas for chloride where a significant drinking water threat could exist when the snow storage facility is one hectare or less in size, require best practices for the management of snow storage and the associated melt water as part of the approval process for site-plan applications for developments with parking lots (such as multiple residential or commercial developments).

3.8.2 Discussion on Policy Options

Prohibiting the operation of snow storage facilities in vulnerable areas was considered the most effective means of addressing the threats posed by this activity.

Land Use Planning

The first choice for addressing the threat of snow storage was the use of land-use planning tools.

The use of prohibition through land use planning is based on the precautionary concept that the best protection of drinking water supplies is achieved when the threat cannot be established within the vulnerable area where it could be a significant drinking water threat. Land use planning prohibitions can only be applied to future threats and are achieved through incorporation of appropriate land use plan policies within the Official Plan.

To be a significant drinking water threat, any application for a new snow storage facility within a wellhead protection area would have to be purpose-designed, and at least one hectare in size when above grade and at least 0.01 hectare in size below grade. In the issue contributing area for chloride, activities included in the Tables of Circumstances for the groundwater source are elevated to significant. Thus, facilities at or above grade or below grade must be at least 0.01 hectare in size to be a significant threat.

Any official plan amendment application to establish a snow storage facility would be considered in the context of the official plan policies regarding the protection of drinking water and wellhead protection areas, as well as in the context of the Source Protection Plan.

While best practice guidelines for the design and operation of snow storage facilities do exist, the preferred option was to prohibit the activity within the official plan and zoning by-law. Preventing the establishment of any new facility was considered the most effective tool in addressing this threat. It was also recommended that similar provisions should be included within the Niagara Escarpment Plan.

It was also noted that a certificate of approval/environmental compliance approval is required for engineered facilities and this requirement could be used to manage the threat. However, from a policy perspective, it was considered more prudent to eliminate the possibility of these sites being built in vulnerable areas where a significant drinking water threat could occur in the future.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Consultation

Few policy revisions were identified through pre-consultation. The municipal planners requested that wording be included in the policy to direct the municipality to use Planning Act tools to prohibit snow storage facilities as support for the required official plan amendment.

The Niagara Escarpment Commission indicated that the limited range of uses permitted within the Niagara Escarpment Plan suggest it is unlikely that the activities that pose significant threats could be established. The Ministry of Municipal Affairs and Housing indicated that a municipality may require official plan and site plan control by-law amendments to establish use of the site plan control within vulnerable areas.

Policies T-37-C and T-39-C were amended to include provision for the issue contributing area and to amend the facility area to which policy T-39-C will apply.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 14 – Snow Storage		
	Policy Directive	Policy
1	Require the municipalities to amend official plans and zoning by-laws to prohibit purpose designed snow storage facilities, at or above grade greater than one hectare or below grade 0.01 hectare in size or greater within wellhead protection areas and issue contributing areas where they would be significant threats to drinking water sources.	T-37-C
2	Request that the Niagara Escarpment Commission amend the Niagara Escarpment Plan to prohibit snow storage facilities within vulnerable areas where they would be a significant threat to drinking water sources.	T-38-S
3	In the municipal review of site plan applications for new developments located within issue contributing areas where a significant threat to drinking water supplies would exist, require best practices for site design to manage snow storage and the associated melt water be included within the consideration and approval of those applications. Facilities smaller than those requiring prohibition but at least of threat size should be included in the policy.	T-39-C

3.9 Fuel

3.9.1 Background

What is fuel?

~~Fuel is matter that is burned or oxidized to generate energy. Examples include gasoline and home heating oil.~~

The Canadian Environmental Protection Act, 1999, defines fuel as any form of matter that is combusted or oxidized for the generation of energy.

The fuels considered in the threats assessment are used in appliances and equipment, such as furnaces and generators, and to power motor vehicles. They include, for example, gasoline, diesel fuel/home heating oil and kerosene.

~~The handling and storage of fuel is Threat 15 of the 21 prescribed threats.~~

It is expected that fuel is always stored in a tank. The handling of fuel is in relation to its storage through piping and dispensing equipment.

What activities related to fuel pose a significant threat?

The Clean Water Act, 2006, specifies the handling and storage of liquid fuels (at facilities regulated under Ontario Regulations 213/01 – Fuel Oil, and 217/01 – Liquid Fuels, made under the Technical Standards and Safety Act), and the storage of fuel at manufacturing or refining facilities as drinking water threats (see Tables of Drinking Water Threats, 2009).

Fuels are used extensively to provide energy to heat our homes and work places, fuel our vehicles, and power machinery. However, due to their wide-spread use, there is also widespread release of fuels to the environment. Therefore, the handling and storage of fuel can be a significant threat to drinking water sources. About 60 percent of Canada's contaminated sites involve petroleum hydrocarbon contamination (CCME, 2001). Without adequate cleanup or management, these contaminants can impair water sources.

Petroleum hydrocarbons are mixtures of organic compounds that occur in geological substances such as oil, bitumen, and coal. The compounds are composed of carbon and hydrogen, with minor amounts of nitrogen, sulphur, and oxygen. The Canadian Council of Ministers of the Environment grouped the compounds into four fractions — F1, F2, F3 and F4 — to standardize monitoring and reporting. The compounds in each fraction act alike in soil and water.

~~The "Tables of Drinking Water Threats" and the "Provincial Tables of Circumstances" can be reviewed at https://www.ontario.ca/ document/tables-drinking-water-threats~~

~~and~~

~~https://www.ontario.ca/environment-and-energy/provincial-tables-circumstances~~

For a description of vulnerability scores, see the Assessment Reports.

Petroleum hydrocarbon fractions are grouped by the equivalent number of carbon atoms in the straight-chain molecules of the compounds:

- F1: 6 to 10 Carbon atoms
- F2: more than 10 to 16 Carbon atoms
- F3: more than 16 to 34 Carbon atoms
- F4: 35 and more Carbon atoms

Most petroleum hydrocarbon constituents are toxic to some degree (CCME, 2001). Those that have lighter molecular weights dissolve more readily, are mobile, and can flow with groundwater or surface water for great distances. Those with heavier molecular weights are persistent in the environment, dissolving and degrading very slowly.

Approximately 60 percent of contaminated sites in Canada involve petroleum hydrocarbon compounds, which are found in substances such as oil, bitumen, and coal. These compounds pose a significant threat to drinking water sources.

The Provincial Tables of Circumstances (2009) identify chemicals that could make their way into groundwater as a result of a leak or spill from the handling and/or storage of fuel. These chemicals include:

- BTEX
- Petroleum hydrocarbon fractions F1, F2, F3, and F4

BTEX is an acronym that stands for benzene, toluene, ethylbenzene, and xylenes. These are volatile compounds with ringed structures that are found in gasoline and other petroleum hydrocarbon mixtures. These compounds are the most soluble compounds released from petroleum hydrocarbons, and therefore, spread more quickly with groundwater and surface water flows. Benzene is a known carcinogen, while toluene, ethylbenzene, and xylenes are less toxic.

~~BTEX (an acronym of benzene, toluene, ethylbenzene, and xylene) is found in gasoline and other petroleum hydrocarbon mixtures. If fuel is spilled or leaked, BTEX and petroleum hydrocarbons can make their way into groundwater and surface water.~~

The classification of the handling and storage of fuel as a significant drinking water threat is dependent on:

- the location of the activity
- the quantity of fuel stored or handled
- whether the activity occurs above grade, partially below grade, or fully below grade

~~The circumstances for this threat are set out in detail on the flow chart for Threat 15 (see Appendix C).~~

The threat subcategories considered in the threat assessment are as follows:

- Handling of Fuel
- Handling at a below-grade facility as defined in section 1 of Ontario Regulation 213/01 or 217/01 under the Technical Standards and Safety Act.
- Storage of Fuel
- Facility defined in section 1 of Ontario Regulation 213/01 or 217/01 under the Technical Standards and Safety Act.
- Bulk plant as defined in Ontario Regulation 217/01 or a facility that manufactures or refines fuel.

- The location and quantity of fuel being stored or handled determines the significance of the threat. The volume of fuel considered in the significant threat assessment for handling of fuel is greater than 2,500 litres. The volume of fuel for storage is either greater than 250 to 2,500 litres, or grea

~~Within the Source Protection Areas, there are ten existing situations where the handling or storage of fuel presents a significant threat. The wellhead protection areas where this threat occurs are primarily residential and mostly serviced by natural gas for heating.~~

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

The vulnerable areas mapped in the Halton Region and Hamilton Region Source Protection Areas where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Cedarvale and Kelso well fields (see Figures B-1 through B-~~6-7and B-8~~). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant threats is 10. Only two wells of the Carlisle well field have an associated WHPA-E. Significant threats are possible in WHPA-E in areas where vulnerability score is 9 (see Figure B-6). ~~There cannot be a significant drinking water threat due to this activity in a WHPA-E.~~

The land use within the wellhead protection areas where a significant threat could occur is primarily residential. According to a survey of local natural gas companies, these areas are mostly serviced with natural gas for heating. However, there are several properties within the Halton Region and Hamilton Region Source Protection Areas ~~are ten existing locations~~ where this activity is a significant threat to groundwater. The exact count can be found in the latest approved assessment reports, and can change periodically due to changing drinking water systems, changing landscapes, etc. ~~Kelso-3, Campbellville-1, and Freelton FDF03-6.~~

Significant threats to source water for the Lake Ontario municipal intakes have also been identified. Locations modelled for fuel release resulted in the identification of eight significant threats to surface water sources at Burlington, Burloak, Oakville and Woodward intakes.

Commented [JS3]: Leave it?

What legislation, guidelines, or protocols already exist?

Existing legislation concerning the storage and handling of fuel includes the following:

- Canadian Environmental Protection Act, 1999
- Technical Standards Safety Act, 2000
- Canadian Environmental Protection Act, 1999 (CEPA)

The Canadian Environmental Protection Act, 1999 (CEPA) gives the federal government the authority to protect the environment and public health from risks associated with pollution and dangerous substances. Environment Canada and Health Canada are responsible for assessing threats posed by these substances and for undertaking risk reduction measures.

A substance, as defined under CEPA, includes any distinguishable kind of organic or inorganic matter, whether animate or inanimate, that is capable of being released as a single substance, an effluent, emission, waste, or a mixture into the Canadian environment.

CEPA regulates the quality of fuels as well as concentrations of lead, phosphorus, and sulphur in gasoline and of sulphur in diesel. It also sets reporting requirements for sulphur and additives in fuel.

CEPA does not designate fuels as toxic substances unless the fuel contains substances that are dangerous goods within the meaning of section 2 of the Transportation of Dangerous Goods Act, 1992 and that:

- are neither normal components of the fuel nor additives designed to improve the characteristics or the performance of the fuel; or
- are normal components of the fuel or additives designed to improve the characteristics or performance of the fuels, but are present in quantities or concentrations greater than those generally accepted by industry standards.

There are currently four regulations made under section 140 of CEPA. These are the Gasoline Regulations (SOR/90-247), Sulphur in Gasoline Regulations (SOR/99-236), Sulphur in Diesel Fuel Regulations (SOR/2002-254) and Fuels Information Regulations No. 1 (SOR/C.R.C., c. 407). These regulations address:

- quality for fuels produced and consumed in Canada and for fuels that are imported for consumption in Canada
- concentration limits for lead, phosphorous, and sulphur in gasoline
- concentration limits for sulphur in diesel fuel
- prescribed reporting requirements for sulphur levels and density in fuels and additives

These fuel regulations were passed in order to complement vehicle and engine emission regulations made under CEPA, which in tandem reduce emissions of harmful substances.

~~Provincial regulations under the Technical Standards and Safety Act, 2000 cover the safe handling of petroleum based motor or appliance fuels, including installation, inspection, and repair, as well as the licensing and certification of people and companies involved in the handling or use of fuel oil.~~

Technical Standards and Safety Act, 2000

The Technical Standards and Safety Authority (TSSA) has provincial jurisdiction over the safe and responsible handling of petroleum products used as motor or appliance fuels. This includes gasoline, diesel/fuel oil, natural gas, and propane handled at retail outlets, private outlets, bulk plants, and in tank vehicles. The TSSA does not have authority at refineries. The TSSA is responsible for enforcement of the Technical Standards and Safety Act, 2000, and its regulations. TSSA is a delegated administrative authority and is accountable to the Province.

Other Tools

Other tools related to fuel threats include:

- Ontario Regulation 213/01—Fuel Oil
- Ontario Regulation 217/01—Liquid Fuels
- Environmental Management Protocol for Fuel Handling Sites
- Spills Action Centre
- Municipal Emergency Response Plans
- Ontario Regulation 213/07: Fire Code

- ~~Ontario Regulation 213/01 - Fuel Oil~~

The Fuel Oil Regulation and associated Fuel Oil Code (Ontario Installation Code for Oil Burning Equipment) regulate the installation, testing, maintenance, repair, removal, replacement, inspection, and use of:

- appliances, equipment, components, and accessories where oil is used for fuel purposes, such as:
- forced air furnaces
- boilers
- process furnaces
- water heaters
- vehicle heaters, and
- power supplies for buildings;
- all stationary and portable oil-burning equipment including fuel supply equipment and piping; and
- above-ground and underground tanks.

The Regulation requires that all persons employed in the handling or use of fuel oil be trained and certified and that all fuel oil distribution facilities be licensed.

~~Ontario Regulation 213/01 sets out requirements for the use and handling of fuel oil, including certifications, inspection timelines, and hazard procedures.~~

Furthermore, the Regulation states that a distributor cannot supply fuel oil unless the facility complies with the Regulation, the appliance or work has been inspected by the distributor at least once in the last ten years, or the distributor has inspected the appliance or work as part of a quality assurance inspection program. Fuel cannot be supplied to an underground tank unless the tank is registered with TSSA. All contractors who install or modify these systems must be registered, as well.

For industrial, institutional, or assembly buildings, the owner of the building must ensure that the appliance and fuel features are maintained. At least once every ten years, an evaluation of the maintenance procedure must be completed, and where required, updated. In addition, an inspection is required at least once every 10 years.

If, during an inspection, an immediate hazard is noted, a number of steps are required in order to reduce or eliminate the hazard. If there is an unacceptable condition that is not an immediate hazard, the owner is given notice of the need to remediate as well as a time period for this remediation to occur. No delivery of fuel can occur until the remediation is complete.

If there is a leak, poisoning, explosion, or fire, an inspector must be notified, and procedures must be documented for such notifications.

Ontario Regulation 217/01 - Liquid Fuels

~~Ontario Regulation 217/01 applies to liquid fuels. It covers gasoline or associated products when handled, stored, or used in motor vehicles or as a fuel oil.~~

The Liquid Fuels Regulation and its associated Liquid Fuels Handling Code apply to facilities where gasoline or an associated product is handled, loaded, or dispensed to be used as a fuel in motor vehicles or as a fuel oil. The facilities where fuel is handled or stored include:

- bulk plants or facilities where fuel is manufactured or refined
- permanent or mobile retail outlets
- marinas
- cardlocks/keylocks
- private outlets (for example public works yard, contractor yard)
- farms
- homes and businesses where fuel oil is used for heating purposes

The licence holder of the facility or tank vehicle is responsible for ensuring compliance with all requirements of this Regulation and Code. Contractors who install or modify these systems must be registered with the TSSA.

As above, if there is a leak, poisoning, explosion, or fire, an inspector must be notified, and there must be procedures documented for such notifications.

If, during an inspection, an immediate hazard is noted, a number of steps are required to reduce or eliminate the hazard. If there is an unacceptable condition that is not an immediate hazard, the owner is given notice to remediate as well as a time period for this remediation to occur. No delivery of fuel can occur until the remediation is complete.

In addition to the typical site plan information required on an application for a new facility licence, locations of property lines and any wells located within 30 metres of the storage tanks and pump must be provided.

Environmental Management Protocol for Fuel Handling Sites

~~The Environmental Management Protocol for Fuel Handling Sites applies to operations governed by the TSSA and sets out requirements for addressing leaks of petroleum products.~~

The Environmental Management Protocol for Fuel Handling Sites in Ontario provides direction for the assessment, management, and reporting of petroleum products that have escaped into the environment or inside a building. This protocol only applies to operations governed by the TSSA. The Liquid Fuel Handling Code and the Fuel Code require compliance with this protocol.

The protocol sets out detailed requirements for addressing the discovery of a petroleum product that has escaped into the environment or inside a building. The protocol sets out the actions required to address the conditions of the site, at the property boundary, and off-site. These requirements are consistent with Ontario Regulation 153/04 made under the Environmental Protection Act.

If a leak is detected, historical contaminants are discovered, or a spill of fuel occurs on a property, the owner/operator must contact the ~~MOECC~~MECP Spills Action Centre, and the Fuels Safety Program of TSSA is informed. Spills must be reported if they are greater than 100 litres at sites restricted from public access, or greater than 25 litres at sites with public access. A spill of lesser quantity must be reported if it could:

- create a hazard to public health or safety
- contaminate any fresh water source or waterway
- interfere with the rights of any person
- allow entry of the product into a sewer system or underground stream or drainage system

All confirmed leaks, regardless of quantity, must be reported. TSSA is the regulatory lead:

- when remediation or management is required at an operating fuel site; or
- if a facility is closed and the equipment is still on-site.

The ~~Ministry of the Environment and Climate Change~~MECP is the regulatory lead:

- when there is a likelihood of off-site adverse effect or an adverse effect to any drinking water supply
- ~~-~~upon the permanent closure of a fuel handling site

Spills Action Centre

~~If a fuel leak or spill occurs, owners and operators must contact the Spills Action Centre. This provincial body, governed by the Ministry of the Environment, is a 24-hour service that ensures appropriate action and response.~~

The ~~Ministry of the Environment and Climate Change~~MECP is the lead provincial agency for environmental emergencies. As explained above, the Ministry operates the Spills Action Centre for emergency action and response in the event of potentially harmful spills.

The ~~MOECC~~MECP regulatory mandate for spills is based on Part X of the Environmental Protection Act that requires spills to be reported immediately. Part X also requires the owner of the spilled material and the person who had control of the material when it was spilled to promptly clean up and restore the environment. The Ministry also enforces the clean up and disposal of the spilled materials in an appropriate manner. If there is an inadequate response, the Minister can order a cleanup. If the owner fails to comply, the ~~MOECC~~MECP can undertake the clean up and recover costs.

The Ministry is responsible for spill and drinking water emergencies by Order in Council under the Emergencies Management and Civil Protections Act. In order to implement this requirement, the Ministry has developed an Emergency Management Program.

Municipal Emergency Response Plans

~~The Ministry of the Environment regulates emergency protocols with regard to fuel spillage and drinking water emergencies. However, every municipality is responsible for preparing and managing a municipal emergency response plan for its area.~~

In addition to the provincial emergency response process, every municipality must have an emergency management program co-ordinator, an emergency management program committee, and a municipal emergency control group. It is their collective responsibility to prepare a municipal emergency response plan (Ontario Regulation 380/04). The municipality has primary responsibility for public health and safety in an emergency due to a spill or a fire.

Ontario Regulation 213/07- Fire Code

Part 4 of the Fire Code made under the Fire Protection and Prevention Act, 1997, regulates flammable and combustible liquids; however, it is superseded by the Technical Standards and Safety Act regulations, except where fire prevention, fire protection, and spill containment are concerned.

What policy approaches were discussed?

The Planners' Working Group and Source Protection Committee discussed approaches to address the threat of fuel handling and storage.

The policy approaches discussed were:

Education and Outreach

Educate homeowners about the importance of inspection and maintenance of their fuel tank and the negative impact of fuels on the septic system and groundwater if poured down the drain or released to the ground.

Put stickers on home heating oil tanks with a spill response number and an indication that the tank is located within a specific vulnerable area.

Inform fuel distributors about vulnerable areas, and encourage annual inspections where companies are not already doing so.

Provide letters to fuel oil companies and franchise owners, informing them about the vulnerable areas as well as promoting best management practices and training of staff.

Land Use Planning (Future)

Prohibit the types and scale of land uses that would handle and store fuels in volumes that would make the activity a significant drinking water threat, specifically in locations within vulnerable areas.

Establish a buffer zone to ensure storage facilities are a minimum distance away from the WHPA-A and B with a vulnerability score of 10.

Risk Management Plans (Existing and Future)

Require risk management plans for activities involving the handling and storage of fuels in WHPA-A and B where the vulnerability score is 10 for the circumstances where the activity would be a significant threat.

The plan could address items of operating practices, including the containment and management of fuel and employee training, as well as a spill contingency plan. Other areas to be covered could include: monitoring of groundwater quality; an appropriate alarm system; automatic valves to prevent storage containers from being overfilled and to contain leaks and spills; periodic leak testing of storage systems; secondary containment systems; and other items.

Require annual inspection as part of the plan.

Restricted Land Uses (Existing and Future)

Identify land uses that are associated with the handling and storage of fuel as restricted land uses (in WHPA-A and B with a vulnerability score of 10) and in circumstances where these activities would be a significant drinking water threat.

Prohibition (Future)

Prohibit the handling and storage of fuels in WHPA-A and B with a vulnerability score of 10 in such circumstances where these activities would be significant drinking water threats.

3.9.2 Discussion on Policy Options

The Source Protection Committee discussed the future threats to groundwater first, and once the significant threats were demonstrated for the lake-based intakes, the Committee revised the policies to include existing threats for fuel. The Committee toured the Suncor Distribution Terminal to learn more about its operations and the existing regulatory requirements.

Initially, the policy directive was to prohibit bulk fuel storage facilities where the handling and storage of fuel would be a significant drinking water threat because it was unlikely that any of these facilities would be proposed within wellhead protection areas where a significant threat from this activity was possible. With the identification of existing threats to the Lake Ontario intakes, the policy approach for bulk fuel storage was changed from prohibition to management with risk management plans.

~~It was agreed that educating both homeowners and commercial users of fuel oil is essential, particularly about the hazards associated with leaks and spills and how to prevent them.~~

Education and Outreach

The Planners' Working Group and Source Protection Committee discussed the issue of home heating oil tanks within wellhead protection areas. It was noted that TSSA does not regulate whether the tank is within a vulnerable area and also that there is nothing in legislation that restricts the installation of a new underground tank or requires the removal of existing ones that are in use.

It was noted that all underground tanks must be removed within two years of disuse. A common indication that an underground tank is leaking is typically a decrease in the level of oil shortly after the tank is filled. In this situation, it is critical that the homeowners know that they are required to report a spill to the Spills Action Centre. The immediacy of response is most important if there is a leak or spill. Quick and proper containment of a spill is the key to limiting the impacts to land and water. Therefore, stickers with emergency phone numbers on or near tanks are essential to ensure the homeowner has the information he or she needs.

The education program could be broadened to include information for homeowners on other fuel spills, the importance of preventing and cleaning up spills to ground immediately, and the proper disposal of fuels.

Fuel oil companies and fuel distributors should be advised of the vulnerable areas where significant threats to drinking water supplies would occur and be reminded of best practices within these areas, including staff training. The Committee is of the opinion that the education and outreach policy

approach will achieve the objectives of the plan and that a policy regarding the regulation or prohibition of home fuel tanks is not necessary to achieve the Plan objectives.

The Source Protection Committee is of the opinion that the implementation of an education and outreach policy for homeowners will promote the achievement of the objectives of the Plan that the threat ceases to be or never becomes significant, and that a policy to regulate or prohibit the activity is not necessary to achieve the objectives.

Land Use Planning (Future)

Debate occurred at the Working Group and Committee as to whether the preferred approach to address the handling and storage of fuel significant threats was to prohibit land uses through the official plan or through Part IV of the Clean Water Act. Also discussed was the necessity to prohibit the activity versus managing the activity. It was not considered appropriate to manage the risk for all scenarios. The Committee also discussed if a prohibition of bulk fuel tanks would apply to fuel tanks on farms, and it was determined that it would not be applicable to restrict the storage on agricultural properties.

Overall, it was determined that the preferred option for addressing the land use issues was to prohibit within the official plans and zoning by-laws the use of lands for gas stations within the vulnerable areas where there would be significant drinking water threats. The use of prohibition through land use planning is based on the precautionary concept that the best protection of drinking water supplies is achieved when the threat cannot be established within the vulnerable area where it could be a significant drinking water threat.

In addition, it was recommended that the Niagara Escarpment Commission include similar language within the Niagara Escarpment Plan.

For bulk fuel handling and storage facilities, the original policy direction when addressing future threats was to prohibit these uses through land use planning. However, an existing threat was identified through modelling of potential threats to the Lake Ontario-based municipal intakes. The existing activity would not be adequately addressed through a prohibition approach as planning tools only apply to future uses. The Committee determined that for the existing and future threat of fuel handling and storage and any expansions of the facilities, the preferred approach was to manage the threat through risk management plans.

It was also noted that site plan control is not a good planning tool to use unless dealing with a very specific activity, such as a fuel tank at a gas station. Zoning by-laws could be used to limit the locations of gas stations, but any property could be subject to an amendment to the zoning by-law. There was a concern that, for areas such as within the Niagara Escarpment Plan area where no zoning by-law exists, there is no tool to deal with the threat. If land use planning tools were used outside this area, an inconsistent approach throughout the Source Protection Area would result.

Risk Management Plans (Existing and Future)

~~Risk management plans are recommended for certain activities, such as farm operations, where fuel tanks might be necessary.~~

Both the Working Group and Source Protection Committee considered the option of managing this threat for the future through risk management plans versus prohibiting the establishment of a new fuel

storage or handling facility. One option discussed was that a gas station could meet certain criteria, and therefore, lessen the risk within a particular area; however, it was decided that it was best not to establish the activity within the vulnerable areas in the first place.

A concern regarding prohibiting farm fuel tanks was raised, and it was the opinion of the Committee that this activity could be necessary for a farm operation, and therefore, a management approach would be best.

The Committee recommended a policy be written that would require risk management plans for all circumstances related to this activity under Ontario Regulation 213/01, and facilities under Ontario Regulation 217/01, except home heating fuel tanks, with the requirement that all storage tanks are to meet TSSA requirements and the property owner have an emergency response plan.

Restricted Land Uses (Future)

A restricted land use designation policy is to ensure that the risk management official reviews applications prior to a proponent obtaining a building permit or planning approval in relation to land uses connected with a significant threat activity. This would ensure that the permits are compatible with the Source Protection Plan policies. However, restricted land use is not a stand-alone tool and is always used with prohibition or risk management plans.

Prohibition (Future)

The Source Protection Committee preferred the use of land use planning tools and risk management plans to address the threats relating to handling and storage of fuel.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

Concerns were raised by some municipalities regarding the funding source for any municipal education, outreach and incentive programs. The Source Protection Committee was of the opinion that these programs were important supporting elements to the policies and should be maintained at the local level. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years.

Policy T-52-C/S was written during pre-consultation following the advice of the Ministry of the Environment and Climate Change to combine, reword and bring the policies inline with the permitted content of the Plan. These policies were further refined to provide clarity about the implementing bodies and where the policies apply.

The Niagara Escarpment Commission indicated that the limited range of uses permitted within the Niagara Escarpment Plan suggest it is unlikely that the activities that pose significant threats could be established.

Changes to the requirements of a risk management plan were made after comments were received from stakeholders recommending that the current procedures of the Spills Action Centre are appropriate and stakeholders should not be made to contact each municipality to report a spill. Stakeholders also suggested the inclusion of source protection staff in emergency preparedness exercises, as observers, to support information exchange. The policies were changed.

The municipal planners requested that wording be included in the land use planning policies to direct the municipality to use Planning Act tools to prohibit the land use as support for the required official plan amendment.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 15 – Fuel		
	Policy Directive	Policy
1	Require education and outreach for homeowners regarding spill response and when and how to contact the Spills Action Centre. The program will include distribution of stickers with emergency phone numbers to be placed on or near fuel tanks to ensure immediacy of response in case of a spill.	T-43-C
2	Require the municipalities to amend official plans and zoning by-laws to prohibit new gas stations where the handling and storage of fuel would be a significant drinking water threat.	T-41-C
3	Require risk management plans for all circumstances, except home fuel oil tanks, related to this activity under Ontario Regulation 213/01 and facilities under Ontario Regulation 217/01. All storage tanks are to meet the Technical Standards and Safety Act (TSSA) requirements and the property owner must have an emergency response plan.	T-40-C
4	Require pre-screening of applications for building permits and planning applications by a risk management official for any land uses that could involve activities related to the handling or storage of fuel where the activity would be a significant drinking water threat.	T-40-C
5	Request the Niagara Escarpment Commission to amend the Niagara Escarpment Plan to prohibit new gas stations where the handling and storage of fuel would be a significant threat to municipal drinking water sources.	T-42-S
6	For significant threats to Lake Ontario request that the ~~Ministry of the Environment and Climate Change~~MECP protect drinking water sources through provision of threat mapping to the Spills Action Centre and modify procedures for notification, as required.	~~T-52-S~~ T-67-S
~~7~~	~~Require the Ministry of the Environment and Climate Change to include terms and conditions in certificates of approval associated with bulk fuel storage facilities that are significant drinking water threats to Lake Ontario municipal intakes to ensure that they cease to be significant drinking water threats. The terms and conditions could include the adjustment of the reporting thresholds for chemicals of concern in effluent.~~	~~T-52-C~~
7~~8~~	Request that the owners of facilities engaged in significant threat activities to the municipal Lake Ontario intakes update their emergency	~~T-52-S~~

	preparedness/contingency plans to include the location of municipal intakes, actions to be taken, and inclusion of protection of drinking water sources in preparedness exercises.	T-65-S

3.10 Dense Non-aqueous Phase Liquid (DNAPL)

3.10.1 Background

What are dense non-aqueous phase liquids?

~~Dense non-aqueous phase liquids (DNAPLs) are a group of organic substances that are denser than water and do not dissolve easily in water.~~

Chemicals that do not dissolve easily in water are called non-aqueous phase liquids (NAPLs). Some of these chemicals are lighter than water (i.e., they have a lower density), and some are heavier than water. The lighter chemicals, such as gasoline, are called light non-aqueous phase liquids (LNAPLs). These float on the surface of water. Liquids that are denser than water are called dense non-aqueous phase liquids (DNAPLs) and they do not dissolve easily in water.

DNAPLs are a group of organic substances that, because of their density, sink vertically below the water table flowing by gravity. The extent to which the liquid will sink depends on the geologic conditions. Once in bedrock, the fracture network and bedding planes will control the liquid's distribution. The liquids will dissolve sparingly into the passing groundwater, creating a contaminant plume. The slow dissolution of the substance suggests that the pure chemical can be present below ground for decades or centuries before being depleted. It is because of these characteristics that DNAPLs have been considered independently under the Clean Water Act.

~~Chlorinated solvents are the most common DNAPLs, which are used in industrial and commercial applications. These solvents are also found in small quantities in domestic products.~~

The most common DNAPLs are chlorinated solvents. DNAPLs have been used in vast quantities for decades in industrial and commercial applications such as dry cleaning, cleaning/degreasing solvents, electronics, aerosols, plastics, pesticides, pharmaceuticals, wood preservation, asphalt operations, varnishes and the repair of motor vehicles and equipment. These chemicals can also be found in small quantities in common household products (for example, adhesives and cleaners).

DNAPLs can also be discharged as spent solvents or wastes that contain noticeable fractions of other organic chemicals. Co-contaminants may represent a wide range of organic and inorganic chemicals that are miscible with the DNAPL and therefore migrate through the subsurface with them.

The Ministry of the Environment Tables of Drinking Water Threats (2009) identify five DNAPLs that could make their way into groundwater as a result of the handling and storage of these chemicals and pose a significant threat to a drinking water source in certain situations. These substances are:

- 1,4-Dioxane
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Tetrachloroethylene (also known as perchloroethylene, PCE)
- Trichloroethylene (TCE) or a DNAPL that degrades to TCE
- Vinyl chloride (VC) or a DNAPL that degrades to vinyl chloride

~~The MOE's Tables of Drinking Water Threats identify five DNAPLs that could pose a significant threat. These are:~~
~~1,4-Dioxane~~

~~Polycyclic Aromatic Hydrocarbons~~
~~Tetrachloroethylene~~
~~Trichloroethylene~~

- 1,4-Dioxane

1,4-dioxane is manufactured in and imported into Canada. It is an industrial chemical and a residual left over from the manufacturing process of some consumer products. It is used primarily as a solvent in the manufacture of pharmaceuticals, veterinary drugs, natural health products, for research and development, and as a laboratory reagent. 1,4-dioxane is also an impurity in substances used in the manufacturing of items such as personal care products, detergents, pesticides, and food packaging.

Environment Canada and Health Canada recently completed a screening assessment of 1,4-dioxane under section 74 of the Canadian Environmental Protection Act, 1999, to assess potential harm to the general population, not including workplace exposure (Environment Canada and Health Canada, March 2010). Canadians are expected to be exposed to this chemical through air, drinking water, food, and use of consumer products containing the substance.

1,4-dioxane is not expected to bioaccumulate, and not degrade in water, soil, or sediment. It was concluded, based on the evidence reviewed, that 1,4-dioxane is not entering the environment in a quantity or concentration or under conditions that may pose a danger to human life or health. It also is not expected to have an immediate or long-term harmful effect on the environment on which life depends or its biological diversity.

Polycyclic Aromatic Hydrocarbons

~~Polycyclic aromatic hydrocarbons comprise over 100 chemicals. Asphalt, creosote, and coal tar shampoos contain them. Forest fires also produce these widespread organic pollutants.~~

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 persistent chemicals that are released into the environment from natural and man-made sources. They are one of the most widespread organic pollutants. Forest fires are the primary natural source. They are formed during the incomplete burning of carbon containing materials like coal, wood, oil and gas, or other organic substances like tobacco or charbroiled meat. Asphalt, creosote, mothballs and coal tar shampoos also contain PAHs. They also accumulate in soils adjacent to railways. The major sources of PAHs in the aquatic and soil environments include creosote-treated products, spills of petroleum products, metallurgical and coking plants, and atmospheric deposition. Industrial and wastewater treatment plant effluents discharged to water may also contain PAHs. In the environment, PAHs adsorb onto particulate matter and are transported with flowing water or air.

In 1994, Environment Canada and Health Canada published the Priority Substances List Assessment Report for polycyclic aromatic hydrocarbons. Due to limited data, they focused their assessment of the effects on human health to five PAHs with exposure to humans only from air. They concluded that, based on the data reviewed, the five PAHs may constitute a danger in Canada to human life or health.

PAHs at high concentrations in coal tar are what contaminate Randle Reef in Hamilton Harbour. Remediation of the site involves encasement of the sediments to reduce exposure to the aquatic environment.

Tetrachloroethylene

~~Tetrachloroethylene's uses include dry cleaning, as a solvent for metal cleaning, and as an ingredient in household and other products. Water contamination from tetrachloroethylene in Canada could be significant.~~

Tetrachloroethylene is a manufactured chemical also known as perchloroethylene, PCE, and tetrachloroethene. The manufacture of tetrachloroethylene in Canada stopped in 1992, and since that time, it has been imported for use (Environment Canada and Health Canada, 1993). Tetrachloroethylene has been the principal solvent used in the dry cleaning industry since the 1940s. With the current focus on protecting the environment, products that are less toxic are being introduced to replace tetrachloroethylene. These products include glycol ethers, hydrocarbon solvents, liquid silicone, liquid CO2, and biodegradable soaps used for wet cleaning (Wikipedia, 2011).

Tetrachloroethylene is also used for the cleaning and degreasing of metals. It is used in smaller quantities in the manufacture of textiles, paint removers, printing inks, adhesives, specialized cleaning fluids, and is used as an aerosol and dye carrier (Environment Canada and Health Canada, 1993). Tetrachloroethylene is present in small quantities in household products such as automobile cleaners, suede protectors, paint removers and strippers, water repellents, silicone lubricants, and adhesives.

Tetrachloroethylene enters the environment through air emissions, discharges from wastewater systems, leachate from landfills, and spills to land and water. It has been found in both surface waters and groundwaters, and based on an assessment of existing data, Environment Canada and Health Canada concluded that tetrachloroethylene contamination of groundwater in Canada could be significant.

Trichloroethylene

~~Trichloroethylene is primarily used as a solvent to clean metal products. It is released to water from dry cleaning facilities, wastewater treatment plants, septic tanks, storage tanks, industries, and landfills.~~

Trichloroethylene (TCE) is also a manufactured chemical, and since 1985, it has been imported into Canada for use. Its primary use is as a solvent to remove grease from fabricated metal parts in the automotive and metal industries (Environment Canada and Health Canada, 1993). It is also used in the production of additives and copolymers, in dry cleaning, the manufacture of textiles, the cleaning of electronic components, and in laboratory reagent/solvent applications. Household products that may contain trichloroethylene are paint removers/strippers, adhesives, spot removers, and rug-cleaning fluids.

Sources of trichloroethylene released to the environment include discharges from dry cleaning facilities, wastewater treatment plants, septic tanks, storage tanks, industries, leachate from landfills, and incinerators. Trichloroethylene is also a degradation product of tetrachloroethylene and can be formed where the latter has been released. Trichloroethylene has been found in groundwater and many surface waters as a result of the inappropriate disposal of the chemical and spills.

Trichloroethylene is classified as probably carcinogenic to humans.

Vinyl Chloride

Commented [JS4]: VC is not a DNAPL (although DNAPL degrade into VC)

Vinyl chloride is a synthetic chemical with no known natural sources. It is also a degradation product of trichloroethylene. At room temperature, vinyl chloride is a gas; therefore, if it is released to surface water, it will disperse in air. Vinyl chloride is primarily used in Canada to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, latex, and packaging materials. Vinyl chloride is also used as a raw material in the glass, rubber, paper, and automotive industries.

Health Canada (1992) indicates that sufficient evidence exists to classify vinyl chloride as a human and animal carcinogen.

What activities related to DNAPLs pose a significant threat?

~~The handling and storage of a dense non-aqueous phase liquid (DNAPL) is Threat 16 of the 21 prescribed threats.~~

The activities associated with DNAPLs, prescribed by the ~~Ministry of the Environment and Climate Change~~MECP to be threats to drinking water sources, are the handling and storage of the five DNAPLs discussed above. ~~The circumstances related to these activities are outlined in the flow charts for Threat 16 see Appendix C.~~

As noted above, DNAPLs are chemical compounds that are denser than water and do not dissolve readily in water. These chemicals will sink downward through the water column and the soil or rock until their flow is impeded. These liquids flow with gravity and are difficult to track underground. Since it is so difficult to clean up water sources affected by DNAPLs, and due to their persistence in the environment, their storage and handling pose a threat to the drinking water sources at greater distances from the well than other chemical threats.

~~DNAPLs are persistent in the environment and pose a threat at greater distances from wells than other chemical threats. DNAPLs are difficult to locate and remove from below ground and complete cleanup is considered unattainable.~~

Not only are DNAPLs extremely difficult to locate in the subsurface, but also small amounts of DNAPLs can contaminate large volumes of water. It is widely considered that restoration of DNAPL sites to drinking water standards or maximum contaminant levels is unattainable. A key challenge is the difficulty in adequately characterizing the volume and extent of DNAPL releases to the environment, in particular finding and delineating DNAPL source zones. Remediation can take place via extraction or in situ processes. The prospect of an incomplete removal of the source and leaving residual DNAPL behind is a real possibility.

Chlorinated solvents such as trichloroethylene are among the most prevalent contaminants identified in groundwater supplies and at contaminated sites (Ministry of the Environment, 2011). DNAPLs are used widely in many industrial sectors and some are manufactured in Canada in large quantities. Because of this continued use, the potential exists for future contamination through spills and leaks from bulk storage.

Among the most prevalent contaminants in groundwater supplies are chlorinated solvents such as trichloroethylene.

The Technical Experts Committee (2004) identified DNAPLs as posing greater risk to source water than other chemicals and recommended that the storage of commercial quantities of DNAPLs be considered a very high risk within the five-year time of travel to a well. This assessment was based on the likely inability to remediate the aquifer and the time needed to replace the well.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

~~In Halton Area and Hamilton Area, significant threats from the handling and storage of DNAPLs are possible in the wellhead protection areas surrounding the Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal wells.~~

The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Kelso and Cedarvale well fields (see Figures B-1 through B-5~~6~~ and B-7~~8~~). In the Hamilton Area, significant threats are possible within the wellhead protection area of the Greensville municipal well (see Figure B-10). For DNAPL threats, significant risk exists for all associated handling and storage activities within the WHPAs A through C with any vulnerability score.

The associated threat circumstances where a significant threat is possible are as follows:

- Handling below grade
- Handling above grade
- Storage at or above grade
- Storage below grade
- Storage with a portion below grade

The significant threat counts related to this activity in the Source Protection Areas are included in the latest approved assessment reports and are subject to changes due to modifications or new drinking water systems, changing landscapes, etc.

~~There are no existing threats within the Halton Region and Hamilton Region Source Protection Areas.~~

What legislation, guidelines, or protocols already exist?

Existing legislation associated with DNAPL threats include:

- Canadian Environmental Protection Act
- Toxics Reduction Act

Canadian Environmental Protection Act, 1999

The Canadian Environmental Protection Act, 1999 (CEPA) gives the federal government the authority to protect the environment and public health from risks associated with pollution and dangerous substances. Environment Canada and Health Canada are responsible for assessing threats posed by these substances and for undertaking risk reduction measures.

A substance, as defined under CEPA, includes any distinguishable kind of organic or inorganic matter, whether animate or inanimate, that is capable of being released as a single substance, an effluent, emission, waste, or a mixture into the Canadian environment.

CEPA introduced processes for assessing these substances to determine if they are toxic. The three key assessment processes are:

- categorization and screening assessment of the Domestic Substances List
- assessment of the Priority Substances List
- review of other jurisdictions' decisions

The CEPA Priority Substances List continues to be the method used to focus on substances that require investigation on a priority and in-depth basis and to determine if they are toxic under the Act.

All of the DNAPLs included as chemicals of concern in the drinking water source protection program, except 1,4-dioxane, are listed on the Priority Substances List and on the Toxic Substances List.

Under CEPA, Environment Canada and Health Canada assess substances that could be released into the environment. They then screen and categorize the substances and maintain the CEPA Priority Substance List. This list is the method used to focus on those substances that might pose a threat to human health and the environment.

Toxics Reduction Act, 2009

The Ontario government enacted the Toxics Reduction Act, 2009 to protect public and environmental health by reducing the amount of toxic substances used and restricting their release to the environment. Regulated facilities track the toxic substances that are used and created and aid the development of plans to reduce both activities.

Other Tools

Other tools that address threats associated with DNAPLs include:

- Federal Toxics Management Policy
- Ontario Regulation 455/09 – General, Toxics Reduction Strategy
- National Pollutant Release Inventory
- Spills Action Centre
- Ontario Regulation 213/07 – Fire Code
- Municipal by-laws and management plans

Federal Toxic Substances Management Policy

This national policy puts forward a preventive and precautionary approach to deal with substances, categorized as Track 1 and Track 2, that could harm the environment or human health. The key management objectives for the two categories are:

- Track 1 substances: virtual elimination from the environment of toxic substances that result predominantly from human activity, that are persistent, and that bioaccumulate
- Track 2 substances: management of other toxic substances and substances of concern throughout their entire life cycles, to prevent or minimize their release into the environment

The DNAPLs listed above are Track 2 substances.

The federal government is identifying toxic substances and other substances of concern that are subject to management under Track 2 through a variety of existing programs. Substances that do not satisfy all four criteria for Track 1 are candidates for full, life-cycle management to prevent or minimize their release into the environment.

Management strategies, including pollution prevention, pollution control, remediation, and in the case of sources outside Canada, international action, will be based on a life cycle approach. Risk assessment and risk management approaches will be used to identify Track 2 substances and management options. Pollution control and remediation strategies may be used to achieve the objective set for Track 2 substances. However, pollution prevention is often the most cost effective management strategy, and in such cases, this method will be promoted by the federal government as the preferred approach for Track 2 substances.

~~The DNAPLs considered for source protection are Track 2 substances, which must be managed throughout their life cycle. Prevention is the preferred method of dealing with Track 2 substances.~~

Ontario Regulation 455/09—General

As regulated by Ontario Regulation 455/09—General, Ontario's Toxics Reduction Strategy focuses on managing and reducing the use and creation of toxic substances. The strategy also aims to inform Ontarians about toxic substances in their communities. The owner and operator of the manufacturing facility must produce a toxic substance reduction plan which will optimize potential reductions in the use or creation of toxic substances.

National Pollutant Release Inventory

~~THE NPRI tracks the release, disposal, and recycling transfer of specified toxic substances at facilities that use toxic substances, such as refineries, steel mills, and car manufacturers.~~

The National Pollutant Release Inventory (NPRI) is legislated under the Canadian Environmental Protection Act, 1999 as a way to track releases, disposals, and transfers for recycling of specified substances.

The information is used to:

- identify pollution prevention priorities
- support the assessment and risk management of chemicals
- assist with the development of targeted regulations for the reduction of the release of toxic substances
- encourage actions to reduce the release of pollutants

- improve public understanding

The NPRI requires reports on more than 300 substances including the DNAPLs considered in source protection planning. Reporting is required for facilities that have a specified number of employees or those that are engaged in specified activities, and if the facility manufactures, processes, or otherwise uses one or more of the listed substances. The owner or operator of the facility must calculate the quantities of the specified substances and report these quantities on an annual basis. The data reported are available for public review in annual summary reports and datasets released by Environment Canada.

Examples of facilities that report to NPRI for land and water discharges include petroleum refineries, mines, pulp and paper operations, steel mills, and automobile manufacturers.

No facilities within the WHPA-A or B within the Halton Region and Hamilton Region Source Protection Areas are required to report to the NPRI regarding DNAPLs.

Spills Action Centre

If a chemical leak or spill occurs, owners and operators must contact the Spills Action Centre. This provincial body, governed by the ~~Ministry of the Environment~~MECP, is a 24-hour service that ensures appropriate action and response.

The ~~Ministry of the Environment and Climate Change~~MECP is the lead provincial agency for environmental emergencies. The Ministry operates the Spills Action Centre for emergency action and response in the event of a potentially harmful spill.

The ~~MOECC~~MECP regulatory mandate for spills is based on Part X of the Environmental Protection Act that requires spills to be reported immediately. Part X also requires the owner of the spilled material and the person who had control of the material when it was spilled to promptly clean up and restore the environment. The Ministry also enforces the clean up and disposal of the spilled materials in an appropriate manner. If there is an inadequate response, the Minister can order a cleanup. If the owner fails to comply, the ~~MOECC~~MECP can undertake the cleanup and recover costs.

The Ministry is responsible for spill and drinking water emergencies by Order in Council under the Emergencies Management and Civil Protections Act. In order to implement this requirement, the Ministry has developed an Emergency Management Program.

Ontario Regulation 213/07- Fire Code

~~The Ontario Fire Code contains rules governing fixed storage tanks that contain flammable or combustible liquids. Municipal sewer use by-laws may cover the discharge of DNAPLs to the sanitary sewer system.~~

The Ontario Fire Code contains specifications for fixed storage tanks (capacity greater than 230 litres) containing flammable or combustible liquids. The specifications include setbacks from buildings and property lines, clearance, protection from damage, and fire department access. Some of the DNAPLs listed above are flammable and their storage is regulated under the Fire Code.

Municipal Legislation and Emergency Response Plans

In addition to the provincial emergency response process, every municipality must have an emergency management program coordinator, an emergency management program committee, and a municipal

emergency control group. It is their collective responsibility to prepare a municipal emergency response plan (Ontario Regulation 380/04). The municipality has primary responsibility for public health and safety in an emergency due to a spill or a fire.

The discharge of DNAPLs to the sanitary sewer system may be subject to sewer use by-laws.

What policy approaches were discussed?

On December 9, 2010 and February 22, 2011, the Planners' Working Group and Source Protection Committee began discussing approaches to address the threat of handling and storing DNAPLs. Existing significant threats were not verified and the focus of much of the discussion was on potential future threats. The following approaches were discussed:

Education and Outreach

Educate business and residents about the importance of proper handling and disposal of these chemicals.

Land Use Planning

Prohibit the types of land uses that would handle and store DNAPLs.

Risk Management Plans

Require Risk Management Plans for activities involving the handling and storage of DNAPLs in WHPA-A, B, and C. The plan could address items of operating practices, including containment and management, employee training, as well as a spill contingency plan. Other areas to be covered could include proper waste disposal, monitoring of groundwater, appropriate alarm systems and automatic valves to ensure containment of leaks and spills, periodic testing of storage systems, secondary containment systems, and other items.

Require annual inspection as part of the plan.

Restricted Land Uses

Identify land uses that are associated with the handling and storage of DNAPLs as restricted land uses in WHPA-A, B, and C where these activities are or would be a significant drinking water threat. Applications for these land uses would require pre-screening.

Prohibition

Prohibit the handling and storage of DNAPLs in WHPA-A, B, and C where these activities are or would be significant drinking water threats.

3.10.2 Discussion on Policy Options

The Committee supports existing education and outreach programs related to waste disposal, but recommends that information specific to the handling, storage, and disposal of DNAPLs be included as part of these programs.

Education and Outreach

As part of the specific education and outreach for threats relating to waste disposal sites (see Section 3.1), it was noted that the municipalities have an extensive education program regarding proper waste disposal and waste reduction. As part of that program, specific information should be included on the handling and storage of DNAPLs and the proper disposal techniques for these products by homeowners and businesses. The ongoing education and outreach programs of the municipalities should be supported.

Land Use Planning

The Committee determined that land use planning tools would not be effective for this activity as there is uncertainty of how the specific DNAPLs of concern relate to specific landuses; therefore, it would be difficult to determine an exhaustive list of land uses which could potentially handle or store DNAPLs.

Risk Management Plans

~~The Committee's opinion is that risk management planning is the best tool for addressing threats associated with DNAPLs. Building permit and planning applications for areas where these activities would be significant drinking water threats would be screened.~~

The Committee decided that the best method for addressing this threat is through the implementation of risk management plans. With this tool, a risk management official will determine a set of applicable criteria within vulnerable areas where the handling and storage of DNAPLs could be a significant drinking water threat.

Restricted Land Uses

Since risk management plans are proposed as a policy approach to address the threats of the handling and storage of DNAPLs, the restricted land use tool is required for the screening and review of building permit and planning applications to ensure compliance with the Source Protection Plan.

Prohibition

The Committee was concerned that there were various issues relating to the use of DNAPLs by industry and in commercial operations. The chemicals are readily available and are found within commonly used products. Therefore, the Committee was of the opinion that other tools, such as risk management plans supported by education, would be more effective.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs will be important supporting elements to the policies and should be maintained at the local level. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 16 – Dense Non-Aqueous Phase Liquid (DNAPL)		
	Policy Directive	Policy
1	Support municipal education and outreach programs about hazardous waste disposal and reduction of waste.	T-2-C
2	Require risk management plans for the handling and storage of DNAPL where these activities would be significant drinking water threats.	T-44-C
3	Require pre-screening of building permit and planning applications by a risk management official for any land use that could involve activities related to the handling and storage of DNAPLS where the activity would be a significant drinking water threat.	T-44-C

3.11 Organic Solvents

3.11.1 Background

What are organic solvents?

~~Solvents are substances that can dissolve another substance. To be organic solvents they must contain carbon as their base. Through improper handling and storage, organic solvents could be harmful to drinking water.~~

A solvent is a substance capable of dissolving another substance to form a solution. Solvents are typically liquid but can be gases or solids. Organic solvents are those solvents that contain carbon as their base. The Clean Water Act, 2006 identifies four organic solvents as having the potential to be released to the environment through improper handling and storage. Under certain circumstances, these activities would pose a threat to a municipal drinking water source. These organic solvents are:

- Carbon tetrachloride
- Chloroform
- Dichloromethane
- Pentachlorophenol
- Carbon tetrachloride

~~In Canada, the production of carbon tetrachloride was phased out in 1996. In 1998, the government banned the storage of this substance.~~

The Montreal Protocol on Substances That Deplete the Ozone Layer, an international treaty, came into force in 1989 in order to phase out the production of ozone depleting substances. Carbon tetrachloride was identified as a class 1 ozone depleting substance and prohibited (with exceptions) from being made, used, sold, or discharged to the environment in Ontario (see Ontario Regulation 463/10). Carbon tetrachloride production and use was phased out in Canada in 1996. Between 1996 and 1998, all incidences of storage of this substance had to be reported to the province, and as of July 1, 1998, the storage of carbon tetrachloride was banned. This man-made product is considered a hazardous waste and is classified as a possible human carcinogen. However, it may be imported to Canada for limited use in chemical production and is primarily found in air because of direct releases (Health Canada, 2009).

In 2009, Health Canada completed a review of the health risks associated with carbon tetrachloride in drinking water in order to revise the current drinking water guideline set in 1986. Their report indicates that, because of the high volatility of carbon tetrachloride, it is unlikely to pose a concern from surface water sources. Inhalation and dermal absorption during bathing and showering may be important exposure routes; however, spills or leaks to ground will volatilize quickly and likely won't bind to soil.

Chloroform

~~Most chloroform found in the environment is synthetic and released from manufacturing plants, pulp and paper mills, and other industries.~~

In 2001, chloroform was assessed under the Canadian Environmental Protection Act, Priority Substances List. Chloroform is a suspected carcinogen to humans based on studies on animals. However, chloroform

is not considered to be toxic as defined in section 64 of the Act. Showering was determined to be the greatest contributor to the total daily intake of chloroform from drinking water.

Chloroform is a naturally occurring chemical, but most of what is found in the environment is manufactured. Historically, chloroform was used as an anaesthetic and, more recently, as a solvent and to make coolants. The primary sources of chloroform releases are pulp and paper mills, pharmaceutical manufacturing plants, and chemical manufacturing plants. Chloroform also forms during the water chlorination process when organic matter is present. Thus, concentrations are higher in treated surface water than in treated groundwater due to the presence of more organic matter in the former. In addition, concentrations are higher in chlorinated effluent discharged to waterbodies from wastewater treatment plants. Chloroform evaporates quickly from lakes, streams, and soil, but can leach into groundwater and remain for years.

Dichloromethane (also known as Methylene Chloride)

~~Dichloromethane is an imported man-made chemical that is probably carcinogenic to humans. It is usually found in the air, but is also released into groundwater from waste disposal sites and landfills.~~

The Priority Substances List Assessment Report, prepared for dichloromethane in 1993, approximates that 13.2 kilotonnes of dichloromethane are used each year for paint removal and foam production, and in aerosols. The substance is also used in film processing, as a solvent for degreasing, and as an extraction solvent for spices, hops, and coffee. It is not manufactured in Canada, but it is imported.

Most releases of this man-made chemical are into the air; however, it has been found in surface waters and groundwater. The Priority Substances List Assessment Report links the detection of dichloromethane in groundwater to landfills or waste-disposal sites. The primary source of human exposure to dichloromethane is through indoor air. It is classed as probably carcinogenic to humans, which means there could be some adverse health effect at any level of exposure.

Pentachlorophenol

~~Pentachlorophenol, an imported chemical, protects wood from insects and fungi and is used on industrial wood such as utility poles. The chemical is toxic to humans, and Health Canada is reassessing its use in the wood preservation industry.~~

Pentachlorophenol (PCP or Penta) is a manufactured chemical that is persistent in the environment. It is inherently toxic to humans and other species, and a probable human carcinogen (Environment Canada, 2011). It has not been manufactured in Canada since the early 1980s but has been used widely for almost 50 years, primarily as a fungicide and insecticide for long-term industrial wood protection (Environment Canada, December 2013). It is used to preserve utility poles, railroad ties, foundation pilings, timbers in highway construction, construction timbers and poles, bridge timbers and ties, and fence posts. An assessment by Environment Canada and Health Canada found no additional uses or releases of pentachlorophenol than those listed above.

Health Canada's Pest Management Regulatory Agency, under the Pest Control Products Act, and the United States Environmental Protection Agency are re-evaluating the registration for use of pentachlorophenol and other wood preservatives (Health Canada, August 2010). These agencies assess the risks to the public and to those workers who use the chemical and any end products containing the

chemical. They have suggested that, under the proposed conditions of use, pentachlorophenol is acceptable for continued registration. The report notes that pentachlorophenol and the other wood preservatives are critical to the wood preservation industry. However, a final decision on their re-evaluation has yet to be made and could include new registration requirements.

As expected, the primary source of pentachlorophenol release to the environment is from wood preservation facilities. Leaching of the chemical from treated wood used in the environment also occurs, although minimally. It is unlikely that the use of treated wood in aquatic environments will have a significant effect on aquatic life (Sinnott, 2000). However, it is recommended that treated wood not be used in direct contact with drinking water systems, but is acceptable for incidental contact, such as docks and bridges.

Pentachlorophenol is also the most significant source for dioxin release to the environment and contains furans (Health Canada, 2007). Dioxins and furans are toxic impurities formed during the manufacturing process.

What activities related to organic solvents pose a significant threat?

~~The handling and storage of an organic solvent is Threat 17 of the 21 prescribed threats.~~

As mentioned above, the handling and storage of an organic solvent has been prescribed as a threat to drinking water sources. ~~The flow chart for Threat 17 (see Appendix C) summarizes the circumstances listed in the Ministry of the Environment Tables of Drinking Water Threats (2009) under which these activities are a significant risk.~~

The circumstances under which these activities are a significant risk focus on where the organic solvent is stored, the volume stored, and the chemical released. Handling circumstances are not specified. Storage can be:

- below grade
- a portion below grade
- at or above grade

For the risk of storage to be significant, the volume stored at a site must be greater than 25 litres. Storage volumes are classed as:

> 25 to 250 litres
> 250 litres to 2,500 litres
> 2,500 litres

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

~~In the Halton Area and Hamilton Area, significant threats from the storage and handling of organic solvents are possible in the wellhead protection areas of Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal wells. There are no existing significant threats.~~

The vulnerable areas mapped in the Halton Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Kelso and Cedarvale well fields (see Figures B-1 through B-56 ~~6~~ and B-87 ~~8~~). In the Hamilton Area, significant

threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant threats is 10. Significant threats are not possible in the WHPA-E associated with the two wells of the Carlisle well field.

The significant threat counts related to this activity in the Source Protection Areas are included in the latest approved assessment reports and are subject to changes due to modifications or new drinking water systems, changing landscapes, etc.

~~There are no existing significant threats posed by the handling and storage of organic solvents in any of the wellhead protection areas of the Halton Region and Hamilton Region Source Protection Areas.~~

What legislation, guidelines, or protocols already exist?

Legislation and guidelines regulating the handling and storage of organic solvents include:

- Canadian Environmental Protection Act
- National Pollutant Release Inventory
- Toxics Reduction Act

Canadian Environmental Protection Act, 1999 (CEPA)

The Canadian Environmental Protection Act, 1999 (CEPA) gives the federal government the authority to protect the environment and public health from risks associated with pollution and dangerous substances. Environment Canada and Health Canada are responsible for assessing threats posed by these substances and for undertaking risk reduction measures.

A substance, as defined under CEPA, includes any distinguishable kind of organic or inorganic matter, whether animate or inanimate, that is capable of being released as a single substance, an effluent, emission, waste, or a mixture into the Canadian environment.

CEPA introduced processes for assessing these substances to determine if they are toxic. The three key assessment processes are:

- categorization and screening assessment of the Domestic Substances List;
- assessment of the Priority Substances List; and
- review of other jurisdictions' decisions.

The CEPA Priority Substances List continues to be the method used to focus on substances that require investigation on a priority and in-depth basis and to determine if they are toxic under the Act.

Chloroform, for example, has been identified under the List, but it is not identified as toxic at this time.

Risk management measures for toxic substances are developed through the Toxics Management Process. For regulations, pollution prevention plans, or environmental emergency plans, the substance must be on the List of Toxic Substances or, in the case of environmental emergency plans, at least be recommended for addition to the List.

~~Under CEPA, Environment Canada and Health Canada assess substances that could be released into the environment. They then screen and categorize the substances and maintain the CEPA Priority Substance~~

~~List. This list is the method used to focus on toxic substances that might pose a threat to human health and the environment.~~

National Pollutant Release Inventory (NPRI)

The National Pollutant Release Inventory (NPRI) is legislated under the Canadian Environmental Protection Act, 1999 as a way to track releases, disposals, and transfers for recycling of specified substances.

The information is used to:

- identify pollution prevention priorities
- support the assessment and risk management of chemicals
- assist with the development of targeted regulations for the reduction of the release of toxic substances
- encourage actions to reduce the release of pollutants
- improve public understanding

The NPRI requires reports on more than 300 substances, including carbon tetrachloride, dichloromethane, and chloroform. Reporting is required for facilities that have a specified number of employees or those that are engaged in specified activities, and if the facility manufactures, processes or otherwise uses one or more of the listed substances. The owner or operator of the facility must calculate the quantities of the specified substances and report these quantities on an annual basis. The data reported are available for public review in annual summary reports and datasets released by Environment Canada.

~~The NPRI tracks releases, disposals, and recycling transfers of over 300 specified substances (including carbon tetrachloride, dichloromethane, and chloroform) at facilities such as oil refineries and car manufacturers.~~

Examples of facilities that report to NPRI for land and water discharges include petroleum refineries, mines, pulp and paper operations, steel mills, and automobile manufacturers.

No facilities within the WHPA-A or B within the Halton Region and Hamilton Region Source Protection Areas are required to report to the NPRI regarding organic solvents.

Toxics Reduction Act, 2009

The Toxics Reduction Act, 2009, was enacted to protect the health of Ontarians and the environment by reducing the amount of toxic substances used and their emission to the environment. The Act requires regulated facilities to track the toxic substances used, and it creates and develops plans to reduce this use and the subsequent emissions.

Ontario's Toxics Reduction Strategy focuses on managing and reducing the use and creation of toxic substances as regulated by Ontario Regulation 455/09— General, and on informing Ontarians about toxic substances in their communities. Owners and operators of facilities must produce a toxic substance reduction plan to optimize potential reductions in the use or creation of toxic substances.

~~The Toxics Reduction Act requires certain facilities to identify toxic substances they use, and then create and implement a toxic reduction plan.~~

Other Tools

Other tools that address threats associated with organic solvents include:

- Codes of Practice
- Spills Action Centre
- Municipal Policies
- Codes of Practice

In addition to the legislative tools outlined above, the Federal Government also develops codes of practice that identify and describe best management practices that can be used by specific industries to conserve the use of a particular chemical and minimize environmental releases. The implementation of codes of practice is voluntary.

For example, there is a code of practice for commercial furniture refinishing and other stripping applications that use paint strippers containing dichloromethane (Environment Canada, 2003). This code identifies measures such as manual stripping, the use of low dichloromethane containing strippers, as well as the capture and reuse of strippers.

The wood preservation industry worked with Environment Canada to develop and implement best management practices for wood treatment facilities where pentachlorophenol is used (Environment Canada, 2004). The industry follows these standards to ensure minimal environmental and human health effects at almost all of the wood treatment facilities in Canada (Health Canada, 2010). The recommendations focus on site selection, human health and environmental concerns, facility design, operational practices, emissions, and spill and fire contingency planning.

~~Certain industries, such as wood preservation companies, work voluntarily under government codes of practice that provide guidelines and standards to ensure environmental and human safety.~~

Spills Action Centre

~~If organic solvents are spilled, the Ministry of the Environment and Climate Change requires owners to contact the Spills Action Centre. However, the owner is responsible for the prompt cleanup and safe disposal of any spilled material.~~

The ~~Ministry of the Environment and Climate Change~~MECP is the lead provincial agency for environmental emergencies. The Ministry operates the Spills Action Centre, a 24-hour service for emergency action and response.

The ~~MOECC~~MECP regulatory mandate for spills is based on Part X of the Environmental Protection Act that requires spills to be reported immediately. Part X also requires the owner of the spilled material and the person who had control of the material when it was spilled to promptly clean up and restore the environment. The Ministry also enforces the clean up and disposal of the spilled materials in an appropriate manner. If there is an inadequate response, the Minister can order a cleanup. If the owner fails to comply, the ~~MOECC~~MECP can undertake the cleanup and recover costs.

The Ministry is responsible for spill and drinking water emergencies by Order in Council under the Emergencies Management and Civil Protections Act. The Ministry has developed an Emergency Management Program to implement this requirement.

Municipal Legislation

~~Municipalities are required to have a municipal emergency response plan that includes provisions for spills. They also regulate land use for manufacturing plants that may store large amounts of organic solvents.~~

In addition to the provincial emergency response process, it is a requirement that every municipality have an emergency management program coordinator, an emergency management program committee, and a municipal emergency control group. It is their collective responsibility to prepare a municipal emergency response plan (Ontario Regulation 380/04). The municipality has primary responsibility for public health and safety in an emergency due to a spill or a fire.

Large volumes of organic solvents (i.e., greater than 2,500 litres) would generally be located at a manufacturing industry site. Land use is regulated through municipal zoning.

What policy approaches were discussed?

The Planners' Working Group and Source Protection Committee discussed approaches to address the drinking water threat of handling and storage of organic solvent. As there are no existing significant threats posed by this activity, the discussion focused on policies for potential future threats. However, during consultation on the policies, the policy requiring risk management plans was changed to include existing threats. The policy approaches discussed were:

Education and Outreach

Educate business about the importance of proper handling and disposal of these chemicals.

Educate homeowners about the importance of proper handling and disposal of household products containing these chemicals.

Increase opportunity and advertising of local hazardous waste collection for household products.

Land Use Planning

Prohibit the types and scale of land uses that would handle and store organic solvents in volumes that make the activity a significant drinking water threat.

Risk Management Plans

Require risk management plans for activities involving the handling and storage of organic solvents. The plan could address items of operating practices, including containment and management, employee training, as well as a spill contingency plan. Other areas to be covered could include proper waste disposal, monitoring of groundwater, appropriate alarm systems, and automatic valves to ensure containment of leaks and spills, periodic testing of storage systems, secondary containment systems, and other items.

Require annual inspection as part of the plan.

Restricted Land Uses

Identify land uses that are associated with the handling and storage of organic solvents as restricted land uses where this activity would be a significant drinking water threat.

Prohibition

Prohibit the handling and storage of organic solvents in WHPA-A and B where this activity would be significant drinking water threats.

~~Effective policies included education and outreach to support the municipal programs already in place related to proper chemical disposal. However, the method considered most effective in addressing this activity was risk management plans~~

3.11.2 Discussion on Policy Options

The policy directives were presented on June 10 and June 14, 2011 to the Planners' Working Group and the Source Protection Committee for final review and confirmation. The policy directives set out below are the final directives recommended by the Source Protection Committee.

Education and Outreach

As part of the specified education and outreach approach to address the threats relating to waste disposal sites (see Section 3.1), it was noted that the municipalities have an extensive education program regarding proper waste disposal. As part of that program, specific information should be included on the handling and storage of organic solvents and the proper disposal techniques for these products by homeowners and businesses. The ongoing education and outreach programs by the municipalities should be supported.

Land Use Planning

It was determined that land use planning tools would not be an effective tool as it would be difficult to determine an exhaustive list of land uses which could potentially handle or store organic solvents.

Risk Management Plans

~~Risk management plans were considered the best approach to reduce the risk posed by handling and storage of organic solvents.~~

The Committee determined that the best method for addressing this threat is through the implementation of risk management plans. If this measure were in place, a risk management official would screen any new applications for industrial or commercial land uses where the handling and storage of organic solvents may be an activity. The use would be required to meet a set of criteria within vulnerable areas where the handling and storage of organic solvents would be a significant drinking water threat.

Restricted Land Uses

Since risk management plans are proposed as a policy approach to address the threats of the handling and storage of organic solvents, the restricted land use tool is required to be implemented for the screening and review of building permits and planning applications to ensure compliance with the Source Protection Plan. A list of land uses to which pre-screening will apply will be required, and training of the Building Officials to identify applications that require screening will be necessary.

Prohibition

No consideration was given to implementation of this option since this threat will be effectively addressed through the use of other tools.

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs will be important supporting elements to the policies and should be maintained at the local level. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years.

The Ministry of the Environment and Climate Change suggested that the policy requiring a risk management plan be changed to align with the complimentary G-3 policy that suggests it applies to both existing and future occurrences of the threat. The significant threat policy was modified.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 17 – Organic Solvent		
	Policy Directive	Policy
1	Support municipal education and outreach programs about hazardous waste disposal and reduction of waste.	T-2-C
2	Require risk management plans for the handling and storage of organic solvents in vulnerable areas where these activities would be significant drinking water threats.	T-45-C
3	Require pre-screening of building permit and planning applications, for commercial and industrial uses by a risk management official where the handling and storage of organic solvents would be significant drinking water threats.	T-45-C

3.12 De-icing of Aircraft

3.12.1 Background

What are de-icing chemicals?

~~De-icing is the process of spraying aircraft with chemicals prior to takeoff in order to remove frost, ice, or snow. Chemicals may also be used to prevent the formation of frost, ice, or snow on the plane during flight.~~

Canadian Aviation Regulations forbid aircraft that have frost, ice, or snow on any of their critical structures to attempt take-off. The frost, ice, or snow increases the roughness and movement of the lift, controls surfaces of an aircraft, and disrupts air flow over them. Ice also can add significant weight to the aircraft. The interference in air flow results in severe lift loss, increased drag, and impaired manoeuvrability of the aircraft. If ice forms on the wing or fuselage during takeoff, or when the aircraft is climbing to higher altitudes, it can dislodge and damage engines and other aircraft components. Accordingly, in appropriate conditions, aircraft may be sprayed with de-icing and/or anti-icing fluids prior to take-off.

De-icing and anti-icing fluids are primarily ethylene glycol, diethylene glycol, or propylene glycol. These fluids contain additives in varying quantities, including corrosion inhibitors, flame retardants, wetting agents, and thickeners. The additives protect the aircraft surfaces and allow the fluid to cling to the aircraft to prolong the time during which ice or snow is prevented from adhering to the aircraft surfaces. The chemical formulations of de-icing fluids are considered trade secrets, and therefore, exact compositions are not known (United States Environmental Protection Agency, 2002).

The Ministry of the Environment and Climate Change identifies 1,4-dioxane and ethylene glycol as chemicals that could make their way into surface and groundwater without proper management of the runoff from aircraft de-icing areas. These chemicals could threaten the safety of drinking water sources in certain situations.

The fluids used to de-ice aircraft are ethylene glycol, diethylene glycol, or propylene glycol. Additives may also be present.

Ethylene glycol is a colourless, odourless liquid that completely mixes with water, biodegrades, and therefore, does not persist in the environment. Propylene glycol is less toxic than ethylene glycol and has not been listed as a chemical of concern under the Clean Water Act, 2006. However, ethylene glycol 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 (March 2010) 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.

~~The management of runoff that contains chemicals used in the de-icing of aircraft is Threat 18 of the 21 prescribed threats.~~

What activities related to de-icing chemicals pose a significant threat?

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. This, in turn, would suffocate fish and plant life. The additives in the fluids also increase the toxicity to the aquatic environment.

~~The level of threat posed by the de-icing of aircraft depends on the location and size of the airport.~~

The activity prescribed as a threat to drinking water sources is the management of the runoff that contains the de-icing fluid chemicals. No or ineffective management could result in an impact to drinking water sources. 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
- the collection and disposal or reuse of fluids

The classification of this activity as a significant, moderate, or low drinking water threat is dependent on the geographic location of the airport, as well as the classification of the airport as remote, small, regional, or national. The assumption made is that the number of flights and the size of the planes being de-iced increase with the size of the airport, and so does the amount of runoff that could be released to the environment.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

~~In the Halton Area and Hamilton Area, significant threats from the de-icing of aircraft are possible in the wellhead protection areas of Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal wells.~~

~~The circumstances identified for this activity that are to be considered as part of the policy development process for significant threats are outlined in the flow chart for Threat 18 (see Appendix C).~~ The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Kelso and Cedarvale well fields (see Figures B-1 through B-7~~6 and B-8~~). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, the vulnerability scoring that results in significant chemical threats is 10. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 9 or greater can result in threats at a significant level.

The Burlington Executive Airport is the only airport within the Source Protection Area. It is not located within a vulnerable area, and therefore, runoff management activities do not pose a threat to municipal drinking water supplies. Accordingly, there are no existing threats within this Area for this activity.

~~One airport, Burlington Executive Airport, exists within the Halton Area. This airport is not located within a vulnerable area, and therefore, de-icing activities do not presently pose a significant threat.~~

Within the Halton Region and Hamilton Region Source Protection Areas, a significant threat would only exist for runoff management at a national airport. Thus, policies are to be developed to ensure that the management of runoff never becomes a significant threat in the future.

What legislation, guidelines, or protocols already exist?

Airports and related activities are regulated by the Federal Government. However, discharges from airports may also require compliance with municipal sewer use by-laws.

Canadian Environmental Protection Act, 1999 (CEPA)

Glycol Guidelines

~~Glycol guidelines, set out under CEPA, require that the discharge of glycol into surface water does not exceed a concentration of 100 mg/L. Glycol management plans and improved application and control methods reduce the quantity of ethylene glycol released to the environment.~~

The Department of the Environment established Glycol Guidelines in 1994 under the Canadian Environmental Protection Act (CEPA). These guidelines apply to the monitoring of the release of ethylene glycol, diethylene glycol, and propylene glycol at federal airports. The guidelines establish a discharge limit for total glycols as follows:

The responsible federal department should ensure that the discharge of glycols into surface water resulting from aircraft de-icing and anti-icing activities at a federal airport does not exceed a concentration of 100 mg/L.

This concentration is expected to protect the direct toxicity to aquatic organisms and indirect toxicity due to oxygen depletion. The guidelines outline appropriate sampling and analysis methods as well as monitoring and reporting requirements.

Priority Substance List

In 1995, ethylene glycol was added to the Priority Substances List under the Canadian Environmental Protection Act to assess the potential environmental and human health risks posed by exposure to ethylene glycol in the environment and in consumer products.

A state of the science report on ethylene glycol was released in 2000 (Environment Canada and Health Canada). The report concluded that harmful environmental effects (related to the depletion of dissolved oxygen and resulting from the biodegradation of ethylene glycol in receiving waters) were possible near some Canadian airports, but only a very small percentage of the time and under conditions of maximum loading. It was recommended that efforts to reduce releases of ethylene glycol during aircraft de-icing/anti-icing operations continue to be strengthened with the aim of reducing further the instances when ethylene glycol concentrations in stormwaters exceed the CEPA Part IV guideline of 100 mg total glycol/litre.

The Priority Substances List assessment was suspended in December 2000 due to uncertainty about the effects of ethylene glycol on humans and the available exposure data. The data required to complete the health assessment was collected over the following years and a follow-up report was released in April 2010 (Environment Canada and Health Canada).

The follow-up report reviews the additional data collected and the interpretations made regarding the effects of the release of ethylene glycol to the environment. Based on the updated information available, it was concluded that ethylene glycol does not: have an immediate or long-term harmful effect on the environment or its biological diversity; constitute a danger to the environment on which life depends; or constitute a danger in Canada to human life or health.

The risk assessment indicated that National Pollutant Release Inventory data show that releases of ethylene glycol from air transportation facilities is primarily to land, with subsequent movement to receiving waters. Due to the seasonality of the requirement to de-ice planes, the releases occur only in the winter months. Glycol mitigation plans, glycol operational management plans, and improved glycol application and control methods have reduced the quantity of ethylene glycol released to the environment.

It is important to note that the release of ethylene glycol from airports was the basis for the ecological risk assessment carried out as part of the follow-up report. For the human health risk assessment, no monitoring data were available for drinking water and soils, and therefore, daily intake values of ethylene glycol for the general population could change.

Canadian Environmental Assessment Act, 1992

The Canadian Environmental Assessment Act, 1992, established the Canadian Environmental Assessment Agency (CEAA). The agency reports to the Minister of the Environment, but operates independently of any federal department, including Environment Canada, or any other agency.

The mission of the CEAA is "to provide effective means of integrating environmental factors into federal planning and decision-making in a manner that takes into account public values and the goal of sustainable development."

Under the Act, the agency's objectives are to:

- administer the environmental assessment process
- promote uniformity and harmonization in the assessment of environmental effects across Canada at all levels of government
- promote environmental assessment research, including the development of environmental assessment techniques and practices

Environmental assessments provide a systematic approach for identifying the effects of a proposed project, and identifying adverse environmental effects before they occur. Environmental assessments also allow decision-makers to modify plans so that the effects can be minimized or eliminated.

Under section 5 of the Canadian Environmental Assessment Act, an environmental assessment is required when a federal authority exercises certain powers, duties, or functions in relation to a proposed project. The "triggers" that would require an environmental assessment are if 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
- ensures opportunities are provided for public participation in the environmental assessment process

The Environmental Assessment Act sets out the responsibilities and procedures for carrying out the environmental assessments of projects that involve federal government decision making, such as those involving Transport Canada.

The Comprehensive Study List Regulations were enabled under the Canadian Environmental Assessment Act in 1994. 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 on this list. Any new airport facility within the Source Protection Areas would be required to follow the environmental assessment process. Any concerns regarding the activity of the management of the runoff of de-icing chemicals and its potential impact on drinking water supplies in vulnerable areas, as well as the appropriate management of that threat, would be addressed through this process.

~~The Comprehensive Study List Regulations enabled under the Environmental Assessment Act, regulates the approval of large projects, such as airports, which have the potential for significant adverse environmental effects. Also, these projects may generate public concerns.~~

Other Tools

Other tools associated with de-icing chemical threats include:

- Guidelines for Aircraft Ground Icing Operations
- Municipal sewer use by-laws

Guidelines for Aircraft Ground Icing Operations

Transport Canada prepared guidelines for specialists in ground icing operations to provide advice on the Canadian Aviation Regulations' requirements for establishment of an Approved Ground Icing Program (AGIP) and a management plan to ensure it is properly executed. The overall objective of the AGIP is to ensure that no pilot attempts to take off in an aircraft that has frost, ice, or snow adhering to any of its critical surfaces. The AGIP outlines the respective responsibilities of everyone involved and includes necessary training and knowledge in their respective areas.

Chapter 13 of the guidelines outlines considerations for the environment. It specifies that, to ensure responsible management of glycol based chemicals, detailed glycol management plans and procedures must be prepared by the airport operator, de-icing service provider, local airport authority, air carriers using the airport, and the companies responsible for disposal of the used de-icing fluids.

~~Transport Canada's guidelines for aircraft de-icing includes an Approved Ground Icing Program, which sets out guidelines for the management of de-icing, training and an emergency response plan.~~

A typical plan, as a minimum, will address the following issues:

- General information on the companies that will be operating and using the de-icing facility
- Details of the area where the de-icing operation will take place
- Details on the storage and handling of de-icing 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
- De-icing fluid inventory control
- Reporting plan – for reporting glycol use

In addition, the guidelines require the development of an emergency response plan. It can be a stand-alone plan or included as part of the glycol management plan. The emergency response plan details procedures and plans that utilize all available resources to protect the environment in the event of an emergency, including spills, vehicle accidents involving de-icing trucks, and a complete discharge of the largest holding tank at the facility.

The requirements of the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems containing Petroleum and Allied Petroleum Products (2003) are implemented for the storage, handling, and management of de-icing and anti-icing fluids.

Municipal Sewer Use By-law

~~Municipal sewer use by-laws do not currently apply, since no municipal sewer systems are located in vulnerable areas where this threat is significant.~~

Currently, Halton Region does not have municipal sewer systems located within the vulnerable areas where this drinking water threat is significant. Therefore, the requirement to comply with the municipal sewer use by-law for the discharge of collected used de-icing and anti-icing fluids would only occur if the sewer system was expanded at the time of future airport development.

What policy approaches were discussed?

The Planners' Working Group and Source Protection Committee discussed approaches to address the drinking water threat of the management of runoff that contains chemicals used in the de-icing of aircraft.

A significant drinking water threat from the management of runoff of de-icing chemicals only exists at national airports, none of which is located within the Halton-Hamilton Source Protection Region. The wellhead protection areas, where this threat could be a significant threat to drinking water sources, are not suitable for these land intensive facilities and so the threat is not likely to occur. Accordingly, policies are required only for the future possibility of this activity occurring. The policy approaches discussed were:

Land Use Planning

Amend official plans and zoning by-law to prohibit airports within wellhead protection areas where runoff management would be a significant drinking water threat.

Existing legislation, regulations and guidelines

As this activity is only a significant threat for a national airport, it should be noted that municipal land use planning tools do not apply to federal facilities. A land use planning policy can recommend to the Federal Government that it should consider drinking water source protection in its decision-making process when designing and locating a national airport.

3.12.2 Discussion on Policy Options

Land Use Planning

~~It was recommended that future threats associated with the management of runoff at airports could be adequately handled using existing regulations and guidelines.~~

The Planners' Working Group did not consider it appropriate to prohibit airports when it is the management of runoff that contains de-icing chemicals that poses the threat to drinking water sources and since land use planning cannot be used to control federal facilities. Therefore, the policy should focus on the activity rather than the land use. As a result, prohibition through land use planning is not the policy approach of choice.

Existing Legislation, Regulations, and Guidelines

Much of the discussion focused on the assessment processes already in place, through which consideration is given to possible restraints when choosing appropriate locations for airports. The existing regulations and guidelines are quite extensive and require appropriate training of personnel, correct storage and handling of de-icing and anti-icing fluids, and the effective management of runoff from de-icing and anti-icing areas. At present, these measures are working to reduce the quantity of de-icing and anti-icing fluids into the environment.

The Committee is satisfied that the existing regulatory regime is appropriate for managing this threat and for ensuring that this activity never becomes a significant threat to the municipal drinking water sources.

Monitoring

Reporting back to the Source Protection Committee on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources.

Consultation

Minor wording revisions were proposed through the pre-consultation process and these have been completed to be consistent with a neighbouring Source Protection Authority. Late in the review process Transport Canada clarified that they do not have a role in the approval or construction of new airport facilities. Accordingly the implementing body has changed. The Ministry of the Environment and Climate Change also requested that the monitoring policy directly monitor the implementation of the policy. Changes were made to the policy wording.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threat 18 – De-icing of Aircraft		
	Policy Directive	Policy
1	Support existing regulations for proper management of runoff that contains chemicals used in the de-icing of aircraft.	T-46-S

3.13 Water Availability

3.13.1 Background

What does water availability mean?

Water availability refers to whether drinking water sources are capable of sustaining existing and future populations relying on the groundwater and surface water resources within the Source Protection Area. These resources face growing pressure from increasing populations, changes in land uses, and climate change and must be studied and protected.

In 2009 in the Halton-Hamilton Source Protection Region, Environment Canada determined that the threat to water availability is high (see Figure 6). They established the reasons for the high threat as large industrial and municipal water use and a low inland surface water supply. This assessment does not include water taken from groundwater or from lakes, which are the main sources of water in this Region. The Water Availability indicator compares the amount of fresh water withdrawn from rivers for human use to the volume of water in Canadian rivers. The water available in rivers is measured at the Water Survey Canada's HYDAT stations (see Section 4 in the Assessment Reports). The water demand is the sum of municipal, industrial and agricultural water withdrawals from all flowing water. Environment Canada uses the indicators as estimates of how water demand by humans is impacting the water supply in rivers to identify where water demand may be putting too much pressure on these supplies.

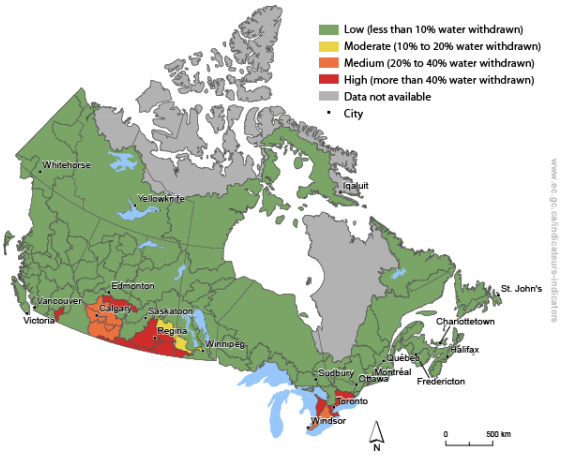

Figure 6 Water Demand and Availability Indicator for 2007 (Environment Canada, https://www.ec.gc.ca/indicateurs-indicators/default.asp?lang =en&n=1B1433B4-1)

What activities related to water availability pose a significant threat?

Threats 19 and 20 are the two activities that could impact the availability of source water. Threat 19 occurs when water is taken and not returned and is no longer available for other users of the same source water. This is called consumptive use. In the Halton-Hamilton Source Protection Region only groundwater takings were considered for impacts on other water users. The Lake Ontario water takings are considered, for this study, to have lesser impacts on others.

Threat 20 occurs when the activity reduces recharge of the water table. Examples of activities that could restrict the infiltration of water into the ground are paving of parking lots, construction of buildings, and the pumping of water out rather than allowing water in – such as at a pit or quarry.

Significant threats to the availability of municipal well source water are determined following a Tier 3 water budget and water quantity risk assessment.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

Under the Technical Rules: Assessment Report (2017~~09~~), water quantity threats can only occur where it has been determined that a local area around a municipal well is stressed. The identification of threats occurs following the completion of a Tier 3 water budget and a local area risk assessment. Risk assessments were completed for the Kelso, Campbellville, ~~and~~ Greensville and Cedarvale well fields.

Threat 19 – consumptive use, applies within a wellhead protection area Q1, and Threat 20 – reduction of recharge, applies within a wellhead protection area Q2. The fully integrated GSFLOW models used to complete the Tier 3 water budgets and water quantity risk assessments were used to delineate these two vulnerable areas for each well field. The reader is referred to Section 5 of the Assessment Reports for an overview of the Tier 3 process and the models used. Maps of the vulnerable areas for Kelso, ~~and~~ Campbellville and Cedarvale are included in Appendix B (see Figures B-15 through B-17), as policies apply within these areas.

The threats assessment did not identify any existing significant threats to the Kelso, Campbellville or Greensville well fields. Policies need to be developed for potential future threats in the Kelso and Campbellville protection areas due to their assessment as having a moderate risk level. No policies are required for the Greensville well field based on its low risk level.

What legislation, guidelines, or protocols already exist?

Water Opportunities Act, 2010

Existing legislation associated with water availability includes:

- Water Opportunities Act

The Water Opportunities Act, 2010 is provincial legislation intended to assist municipalities with the development of innovative, cost-effective solutions to water challenges, to optimize existing systems, and improve water conservation. The province will set water efficiency standards for consumer products, set goals for water use, and raise awareness of water use through information on water bills.

Along with the Act, the province will pilot new technologies and practices, and educate the public on wise water use.

Once the appropriate regulations are in effect, municipalities that provide water services will be required to prepare and submit a Municipal Water Sustainability Plan. Under the requirements of the regulations, the plan may be required to contain:

- an assessment management plan for the physical infrastructure of the municipal system
- a financial plan
- a water conservation plan
- an assessment of risks that may interfere with the future delivery of the municipal service, including the risks posed by climate change and a plan to deal with those risks
- strategies for maintaining and improving the municipal service in order to satisfy future demand, consider efficient use of water, reduce negative impacts on Ontario's water resources, and increase cooperation with other municipal service providers

The regulations may also require public agencies to prepare water conservation plans that summarize annual water use for prescribed operations. Additional requirements may include a description and forecast of the expected results from proposed conservation measures, a summary of progress made, and achievements relating to set targets.

Ontario Water Resources Act, 1990

The Ontario Water Resources Act, 1990 (OWRA) provides for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social and economic well-being. Section 34 outlines the requirements for water taking. Section 34 (3) states:

"…a person shall not take more than 50,000 litres of water on any day by any means except in accordance with a permit issued by the Director."

The purpose of the Permit To Take Water program is to manage the taking of water to ensure fair sharing of water, promote stewardship and prevent unacceptable interference with other uses of water. The ministry uses a risk-based approach for processing and evaluating applications for permits. Permits are not required for ordinary household purposes, for the watering of livestock, poultry, home gardens or lawns, or for firefighting. They are required for the watering or irrigation of crops grown for sale.

Ontario Regulation 387/04 – Water Taking

The Water Taking Regulation (Ontario Regulation 387/04), under the Ontario Water Resources Act, establishes that every permit holder must report annually to the ~~Ministry of the Environment and Climate Change~~MECP on their daily water taking. This obligation is in addition to any monitoring requirements specified in the terms and conditions of the water taker's permit.

A Director of the ~~Ministry of the Environment and Climate Change~~MECP must consider available information and relevance of the following on the proposed application:

- Natural functions of the ecosystem including potential impact on the natural water flow or level and the habitat that depends on that water flow/level;

- The interrelationship between ground and surface water that may be affected by the proposed taking;
- Water availability including water balance and existing uses from various sources including municipal residential drinking water systems, sewage disposal, livestock, agricultural and other uses;
- Low water conditions, and if the watershed is high or medium use;
- Planned municipal use of the water;
- Water conservation;
- The purpose for the water taking and current uses of that same source;
- If there is an intended use of the proposed water – the assessment of this prospect may be subject to other approvals being granted by other agencies; and
- Other issues including interests of other persons and other matters the Director considers relevant.

Permits have expiry dates, typically in less than 10 years, and can be cancelled or altered before then. Permits contain general and specific terms and conditions that must be complied with. These terms and conditions safeguard other interests in the watershed and require that water takings do not cause unacceptable interference with other uses of the water or natural functions of the ecosystem. Of prime importance is that a permitted water taking may not cause unacceptable interference with other private or public use of the water.

Every permit states that it does not allocate a right to the water – permits do not allocate water or guarantee a supply of water for any taking event.

Schedule E of the application for a permit requires applicants to document what water conservation measures will be implemented. Applicants are encouraged to take all reasonable and practical measures to conserve water and to be up to date with sector-specific best management practices and standards for water conservation.

Other Tools

Other tools used to address water availability include:

- Low Water Response Program
- Municipal Water Use Programs
- Ontario Low Water Response Program

The Ministry of Natural Resources has implemented the Low Water Response program in cooperation with Conservation Authorities. This program uses precipitation and stream flows as triggers to suggest that water use should be reduced. The program aims to ensure that provincial and local authorities are prepared in the event of a drought. There are three levels of low water conditions that require action. The first level recommends a voluntary ten percent reduction in water consumption. The second level recommends water conservation and restrictions on non-essential use. The third level results in socio-economic impacts and water conservation, restriction, and regulation of permitted water users is suggested.

Municipal water bans are implemented at the Level II stage and are very effective to reduce water usage. The data gap in this program is that only the municipal and permitted water takings are monitored, and therefore, measures to reduce use taken by domestic or agricultural users are unknown.

Municipal Outdoor Water Use Programs

Halton-Hamilton Source Protection Region relies on groundwater and surface water for its water supplies. The availability of these water resources is influenced by climate and water use. During the spring and summer months water use increases as more time is spent watering lawns and gardens, filling swimming pools, washing cars, and using water for other recreational activities. The use peaks during hot periods with little rainfall. Under severe conditions this can cause water shortages. To ensure the sustainability of the water supplies for all residents, water must be conserved and use decreased. The City of Hamilton and Halton Region have water use programs to engage residents and business owners, promote conservation, and require reductions in water use.

Halton Region and the City of Hamilton have implemented extensive programs to engage residents and businesses in water conservation.

In Hamilton, the Wise Water Program has provided residents with information and incentives for water efficiency. The goal of the program is to reduce individual daily water consumption by 10 percent by 2015. The program targets the use of water outdoors, indoors, and by businesses. Outdoor water use focuses on reducing lawn and garden watering, and offers an incentive program selling rain barrels. Indoor, the focus is on the areas of the home where most water is used, i.e., bathrooms, which use 65 percent and kitchens, which use 15 percent. Again, Hamilton uses an incentive program to replace inefficient toilets and reduce water use. Businesses are encouraged to look for water savings both inside and outside.

In addition to the above, the city encourages the detection and repair of leaks in toilets and pipes to reduce the amount of water used. Since leaks are costing homeowners directly, it is economical for them to repair leaks quickly.

Halton Region also has a water conservation program in place. It includes education and outreach as well as incentives. As in Hamilton, incentives include rain barrel sales and toilet replacement rebates.

~~Both Halton Region and the City of Hamilton have water conservation programs in place. These programs should be supported and extended where possible.~~

What policy approaches were discussed?

Significant drinking water threats from consumptive water demand and a reduction in recharge are determined through interpretation of flow modelling results. These results indicated that the risk to the municipal wells studied was moderate and so policies for future threats and not existing are required. The policy approaches discussed were:

Education and Outreach

-Reach out to youth through school curriculum

-Expanded municipal water conservation message

-Educate municipal planners and engineers, and developers and consultants on the importance of maintaining recharge

Prescribed Instruments

Control the issuance of Permits to Take Water to ensure increased and new water takings do not become significant threats

Land Use Planning

-Require consideration of decreased recharge and the sustainability of drinking water sources when decisions on expansions to urban and settlement boundaries are made

-Require best management practices and low impact development measures for planning applications

-Require that municipalities wait for a decision by the ~~Ministry of the Environment and Climate Change~~MECP on whether a Permit to Take Water can be issued without causing a significant threat before issuing final approval of development applications

Operational Measures

-Enhance existing municipal programs such as outdoor water use, and leak detection to decrease demand on water resources

Other Tools

Require municipalities to develop or enhance water conservation plans to engage residents and decrease demand on water resources

3.13.2 Discussion on Policy Options

In 2011, the Planners' Working Group and the Source Protection Committee discussed policy approaches to capture water conservation. More recently, the Source Protection Committee discussed policy approaches to address future significant threats caused by the consumptive demand of water and the reduction in recharge of the water table.

Both the City of Hamilton and Halton Region encourage homeowners and businesses to detect and repair facilities that are leaking water. This is an important step. By doing so, they can reduce the loss of water from faulty infrastructure. Brampton recently underwent a large replacement initiative, changing pipes to plastic (which is the new industry standard).

~~Current water rates do not reflect actual costs, especially with regard to lake-based versus well-based water use. Municipalities could consider full-cost pricing in order to encourage water conservation and to raise finances for more efficient water systems.~~

Residents and businesses on municipal water pay for water; however, these costs are not reflective of the actual cost of treatment and delivery of that water. Full-cost pricing for water and wastewater has been discussed at the provincial and municipal levels for some time. If put in place, water rates would rise substantially and monies charged would fund the maintenance or replacement of aging, deteriorating infrastructure. Since Canadians are one of the higher users of water per capita, it is generally thought that an increase in water rates would encourage residents and businesses to change behavioural practices, to look for efficiencies, and ultimately, reduce their water use. Overall, a reduction in water use reduces the pressure on existing infrastructure to meet increasing demand, and also reduces the demand on source water.

Currently, the water rate structure is the same throughout the municipality, whether the consumer uses lake-based or well-based water. The true cost of supplying potable water from the smaller well-based systems is much higher. Potentially, separate rate structures could be instituted for lake-based and well-based systems to assist with operation and maintenance costs.

Substantial benefits from reduced water demand are also realized when less water is treated and fewer chemicals are used to treat the water. The life of the infrastructure is extended without the need for upgrades, repairs, or replacement, and there is no need to find additional water supplies to satisfy increased demand. Leaking municipal water pipes adds to the demand on source waters and the Committee discussed using the municipal leak detection programs as a way to reduce some of the demand in vulnerable areas.

~~Water conservation is a benefit to everyone. It protects water resources for future generations and conserves aquatic habitats.~~

Due to weather conditions and extra water use in the summer the demand on municipal water services can increase by 50 percent at that time of year. Water restrictions or outright bans on water use are used when source water levels decline and the treatment plants are under stress.

Education and Outreach

The Source Protection Committee discussed education and outreach options and determined that educating youth may provide the best opportunity to advance. However, it was learned that the school curriculum includes sessions on water conservation and water sustainability already, and there are other opportunities for children to learn, such as children's water festivals. Accordingly, the Committee did not pursue policy development.

Prescribed Instruments

Relying on the ~~Ministry of the Environment and Climate Change~~MECP to undertake a thorough review of all applications within a wellhead protection area Q1 and to ensure that by issuing a Permit to Take Water the increased or new water taking would not become a significant threat is the best option to ensure water taking threats do not become significant. The Source Protection Committee suggested that Ministry staff should consider phasing in water takings to be able to control adverse effects and that appropriate monitoring should be a requirement of the permits.

Land Use Planning

Municipalities can use the planning application process to stop significant threat activities from occurring. The Source Protection Committee will rely on municipalities to amend their processes, if needed, to not approve planning applications until it is known that the ~~Ministry of the Environment and Climate Change~~MECP has completed their review and they are willing to issue a Permit to Take Water. The municipalities are also relied on to require from applicants that best management practices and low impact development measures be used with an aim to maintain pre-development recharge conditions. The Committee discussed that the boundaries of urban areas and settlement areas should not expand unless the municipality has thoroughly considered the implications of the development on maintenance of recharge and the sustainability of the drinking water source.

Operational Measures

The Source Protection Committee discussed the existing municipal programs that could be enhanced or utilized to decrease the demand on the municipal water sources and thereby reduce risk. These programs include leak detection and repair, and outdoor water use. Municipal water pipes leak. This leakage typically wastes treated water and increases the demand on the water source to provide water to the intended recipients. The Committee is requesting that the municipalities review and strengthen their existing programs in areas serviced by wells within the WHPA-Q1 and where they identify deficiencies, to initiate a strategy to reduce the leakage as soon as possible. The outdoor water use program varies with municipality but could be enhanced and should be enforced. Enhanced outreach could help to engage the water users and increased enforcement of the program could help to curb wasteful practices.

Other Tools

The Source Protection Committee also discussed the use of water conservation plans. The City of Hamilton is developing/enhancing a plan for the Carlisle area and a similar plan could be developed where a wellhead protection area Q1 has been delineated. Reducing the demand on the water source could sustain its current use into the future instead of requiring additional resources.

Monitoring

Reporting back to the Source Protection Committee on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources.

Consultation

Consultation on policies to address threats to water quantity began with a 60-day public consultation held in December 2014 and January 2015. Comments were received from the Ministries of the Environment and Climate Change and Natural Resources and Forestry on ways to improve the text of the Assessment Reports, however, no comments were received on the policy wording or intent.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threat 19 – Taking Water Without Returning it to the Same Water Source, and Threat 20 – Reduction in Recharge

	Policy Directive	Policy
1	Require the ~~Ministry of the Environment and Climate Change~~MECP to ensure permitting water takings in a WHPA-Q1 does not form significant drinking water threats and suggest a phased approach to approval and the requirement for appropriate monitoring.	T-55-C a.
2	Require municipalities to wait for determination of the ~~Ministry of the Environment and Climate Change~~MECP on the issuance of Permits to Take Water prior to granting final approval for development applications in a WHPA-Q1.	T-55-C b.
3	Require municipalities to review and strengthen their leak detection programs in areas serviced by wells in a WHPA-Q1 and initiate a reduction strategy in a timely manner.	T-56-C a.
4	Require municipalities to develop or enhance water conservation plans in a WHPA-Q1.	T-57-C a.
5	Require municipalities to enhance and enforce their outdoor water use programs in a WHPA-Q1.	T-57-C b.
6	Require the municipalities to only approve settlement area and urban area expansions in a WHPA-Q2 as part of a municipal comprehensive review where it has been demonstrated that recharge functions will not be adversely affected.	T-58-C a.
7.	Municipalities shall require planning applicants to demonstrate that they have tried to maintain a pre-development recharge in WHPA-Q2 using best management practices and low impact development measures.	T-59-C a.

3.14 Land Used For Livestock

3.14.1 Background

What are lands used for livestock?

Lands used for livestock include:

- Grazing or pasturing land, which are fenced spaces covered with plants or grass for feeding
- Outdoor confinement areas, which are fenced enclosures
- Farm-animal yards, which are associated with an outbuilding such as a barn

Some farm animals, such as cows, horses, and sheep, are allowed to roam on open spaces that have been fenced to restrict their movements. These open spaces are typically covered in grass or herbaceous plants, which are eaten as food by the animals. These spaces are called grazing and pasturing land. During the grazing season, there is typically a concentration of up to two or three animals per acre on these lands.

Outdoor confinement areas are enclosures for livestock, deer, elk, and game animals, with a very high animal concentration. These areas typically contain more than 15 animals per acre, and often they are used for extended periods of time. Ontario Regulation 267/03, made pursuant to the Nutrient Management Act, 2002, defines an outdoor confinement area as an enclosure with the following characteristics:

- It has no roof, except as described in characteristic #3.
- It is composed of fence, pens, corrals, or similar structures.
- It may contain a shelter to protect the animals from the wind or another shelter with a roof of an area of less than 20 square metres.
- It has permanent or portable feeding or watering equipment.
- The animals are fed or watered at the enclosure.
- The animals may or may not have access to other buildings or structures for shelter, feeding, or watering.
- Grazing and foraging provide less than 50 percent of dry matter intake.

Farm-animal yards are fenced, outdoor livestock areas associated with a barn or other outbuilding that is lined with concrete or paved with impervious material, other than land meeting the definition of an outdoor confinement area. Food and water are not provided in farm-animal yards. They are generally used as outdoor exercise areas or holding areas when barns are being cleaned.

~~The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard is Threat 21 of the 21 prescribed threats.~~

Farm animal is defined in the Nutrient Management Act, 2002, as:

- livestock, including poultry and ratites
- fur-bearing animals
- bees
- cultured fish
- deer and elk

- game animals and birds
- any additional animals, birds, or fish prescribed by the regulations

What activities related to livestock lands pose a significant drinking water threat?

Threat 21 is divided into two subcategories for classification as chemical threats, and grouped together for pathogen threats. The chemical threats are determined using different methods. The chemical threats are:

- the use of land as livestock grazing or pasturing land, and
- the use of land as an outdoor confinement area or a farm-animal yard.

~~The circumstances that result in a significant level of risk for this threat are outlined in a flow chart included in Appendix C.~~

~~The threats associated with land used for livestock are due to the generation of agricultural source material. Runoff or leachate from these lands may contain nitrogen, total phosphorus, or pathogens.~~

In general, the threat related to land used for livestock relates to the generation of agricultural source material (ASM) and the possible improper management or handling of runoff from these areas. This runoff can have elevated concentrations of nutrients and pathogens and could affect both groundwater and surface water sources. Only the nutrient units generated by farm animals that can be pastured, or that occupy confined areas or yards, were considered in this threat assessment. In general, pasturing or confining farm animals creates a significant chemical drinking water threat only when the generation of nutrient units is over the threshold listed in the reference tables. Significant pathogen threats exist when these activities occur in a vulnerable area where significant threats are possible.

Nitrogen, total phosphorus, and pathogens are identified as contaminants of concern in runoff from lands used by livestock. If the runoff is not managed appropriately, it could enter watercourses or infiltrate into the ground and affect water resources. Nitrogen is a concern for both surface and ground drinking water sources. When water with high nitrate concentrations is given to babies less than six months of age, their digestive systems aren't able to cope, and high levels of methemoglobin are formed in the blood. Oxygen is not distributed to the body's cells and Methemoglobinemia, or Blue Baby Syndrome, results. Total phosphorous is only considered for surface water impacts. Excessive inputs may result in eutrophication of the water and can cause toxic algae blooms that could affect human health and alter the taste and odour of drinking water.

A nutrient unit is the amount of nutrients that give the fertilizer replacement value of the lower of 43 kilograms of nitrogen or 55 kilograms of phosphate as nutrient. This is a standard to compare the generation of nutrients by all farm animals.

The nutrients and pathogens that are found in animal manure could threaten the safety of drinking water sources in certain situations. Generally speaking, keeping greater numbers of livestock in a space increases the risk of contamination and the requirements for more active management. As such, the ranking of this drinking water threat in the Tables of Drinking Water Threats (2009) increases proportional to the number of nutrient units generated in a given area.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

~~In the Halton Area and Hamilton Area, significant threats associated with the use of land for livestock are possible in the wellhead protection areas of Freelton, Carlisle, Campbellville, Walkers Line, Kelso, Cedarvale and Greensville municipal wells.~~

The vulnerable areas mapped in the Halton Region Source Protection Area where significant threats are possible are the wellhead protection areas (WHPAs) of the Freelton, Carlisle, Campbellville, Walkers Line, Kelso and Cedarvale municipal well fields (see Figures B-1 through B-~~6~~ 7~~and B-8~~). In the Hamilton Area, significant threats are possible in the wellhead protection area of the Greensville municipal well (see Figure B-10). All wells have WHPAs A through D. In these areas, a vulnerability score of 10 results in significant drinking water threats for chemical threats, and a score of 10 results in significant pathogen threats. Only two wells of the Carlisle well field have an associated WHPA-E (Figure B-6). For this area, vulnerability scoring of 8 or greater can result in significant threats.

The wellhead protection areas and associated vulnerability score where a significant threat may occur and the associated subcategories are as follows:

WHPA-A or B with a vulnerability score of 10

Management or handling of agricultural source material generated from grazing and pasturing: a significant chemical threat exists if the number of nutrient units generated in the farm unit, divided by the number of acres of land that is used for livestock grazing or pasturing land, is sufficient to generate nutrients at an annual rate that is more than one nutrient unit per acre. The chemical of concern is nitrogen. There is a significant pathogen threat if there is one or more animals using the land.

Management or handling of agricultural source material generated from yards or confinement: a significant threat exists when the number of animals confined in the area at any time is sufficient to generate agricultural source material at an annual rate of greater than 300 nutrient units per hectare. The chemical of concern is nitrogen. There is a significant pathogen threat if there is one or more animals using the land.

-WHPA-E with a vulnerability score of 9

Management or handling of agricultural source material generated from grazing and pasturing: a significant chemical threat exists if the number of nutrient units generated in the farm unit, divided by the number of acres of land that is used for livestock grazing or pasturing land, is sufficient to generate nutrients at an annual rate that is more than one nutrient unit per acre. The chemicals of concern are nitrogen and total phosphorus. There is a significant pathogen threat if there is one or more animals using the land.

Management or handling of agricultural source material generated from yards or confinement: a significant threat exists when the number of animals confined in the area at any time is sufficient to generate agricultural source material at an annual rate of greater than 300 nutrient units per hectare. The chemicals of concern are nitrogen and total phosphorus. There is a significant pathogen threat if there is one or more animals using the land.

WHPA-E with a vulnerability score of 8.1

Management or handling of agricultural source material generated from grazing and pasturing: a significant pathogen threat exists if there is one or more animals using the land.

Management or handling of agricultural source material generated from yards or confinement: a significant pathogen threat exists if there is one or more animals using the land.

~~The "Tables of Drinking Water Threats" and the "Provincial Tables of Circumstances" can be reviewed at https://www.ontario.ca/ document/tables-drinking-water-threats and~~

~~https://www.ontario.ca/environment-and-energy/provincial-tables-circumstances~~

For a description of vulnerability scores, see the Assessment Reports.

The threat assessment considered that, if the infrastructure is in place to house animals and fencing is in place that could be used to keep livestock outdoors, this drinking water threat must be assessed. The assumption made was that, if the infrastructure is in place, and even if the land is not being used for livestock today, it could be used for this purpose tomorrow. Using this method captures the worst case scenario and is the most precautionary approach to protect drinking water sources.

In the Halton Region Source Protection Area and the Hamilton Region Source Protection Area, there are both chemical and pathogen threats associated with land used for livestock. The significant threat counts related to agricultural source material generation in the Source Protection Areas are included in the latest approved assessment reports and are subject to changes due to modifications or new drinking water systems, changing landscapes, etc. ~~Agricultural source material generation is a significant drinking water threat for chemicals and/or pathogens on one property near Freelton FDF03, one property near Carlisle, and two properties near Kelso.~~

What legislation, guidelines, or protocols already exist?

Existing legislation associated with this threat include:

- Fisheries Act
- Environmental Protection Act
- Ontario Water Resources Act
- Nutrient Management Act
- Fisheries Act, 1985

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

Runoff from agricultural source materials on lands used by livestock is considered a deleterious substance. In addition to runoff entering surface water from livestock lands, agricultural source material could also enter surface water as a result of unrestricted livestock access to watercourses.

Environmental Protection Act, 1990

~~The provincial Environmental Protection Act prohibits the discharge of contaminants to the natural environment, except as a result of normal farming practices.~~

The Environmental Protection Act (EPA), which is enforced by the ~~Ministry of the Environment and Climate Change~~MECP, provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects. Sections 6 and 14 of the Act prohibit pollutant releases except where the discharge of a contaminant is a result of normal farming practices. Where there is overlap between the authority of the Nutrient Management Act and the Environmental Protection Act, the former applies.

Until October 31, 2011, section 53 of the Ontario Water Resources Act (OWRA) administered certificates of approval for sewage works. On this date, the Act was amended and the future issuance of approvals will be administered through the Environmental Protection Act. An environmental compliance approval will be issued for new approved systems, while existing certificates of approval issued under the OWRA will continue to apply and will be treated as an environmental compliance approval. This means that certificates of approval may be amended, reviewed, suspended or revoked as if they were environmental compliance approvals.

Ontario Water Resources Act, 1990

The Ontario Water Resources Act, 1990 (OWRA) provides for the conservation, protection, and management of Ontario's waters and for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social, and economic well-being. The ~~Ministry of the Environment and Climate Change~~MECP is responsible for the enforcement of this Act. The Act states:

30. (1) Every person that discharges or causes or permits the discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters is guilty of an offence.

As mentioned above, certificates of approval may exist for operating farms and environmental compliance approvals may be granted for future sewage works. Farm operators may have a certificate of approval for the operation of a runoff management system as required under the Nutrient Management Act, 2002 (discussed below). This is one tool that farmers have used to comply with the requirements of the OWRA.

Nutrient Management Act, 2002

~~The Nutrient Management Act regulates standards for the storage and land-application of materials containing nutrients, such as materials generated by agricultural and non-agricultural processes.~~

Responsibility for oversight and policy development related to the Nutrient Management Act is shared by the Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) and the ~~Ministry of the Environment and Climate Change (MOECC~~MECP~~)~~. The ~~MOECC~~MECP is also responsible for inspections, investigations, and enforcement of regulatory requirements, while OMAFRA is responsible for the necessary approvals, training, and certification requirements.

The Act sets out a comprehensive and integrated approach to the storage and land-application of materials containing nutrients. It ensures that all land-applied materials will be managed in a sustainable, beneficial manner that provides environmental and water quality protection. The Act provides clear, province-wide standards that apply to the land application of materials generated by agricultural and non-agricultural operations.

Ontario Regulation 267/03

~~Under the Nutrient Management Act, Ontario Regulation 267/03 is the principal regulation for the management and runoff from lands used as farm animal pastures, confinement areas, or yards.~~

The Nutrient Management Act is supported by Ontario Regulation 267/03 —General, which sets out detailed criteria for the storage and application of nutrients to agricultural cropland. The "Nutrient Management Protocol" (MAFRA, September 2009 and updated 2012) provides technical standards and procedures related to this regulation. Ontario Regulation 267/03 is the principal regulation related to the management of runoff from lands used as farm-animal pastures, confinement areas, and yards.

Sections 10, 14, and 28 of Ontario Regulation 267/03 are prescribed instruments under the Clean Water Act. These sections relate to the approval of and compliance with nutrient management strategies and nutrient management plans.

A nutrient management strategy sets out an environmentally acceptable method for managing all prescribed materials generated and received at an agricultural operation. Nutrient management strategies are required at farms:

- that generate more than 300 nutrient units annually
- when a building permit is applied for to construct or expand barns or manure storage facilities if the livestock operation generates more than 5 nutrient units
- when construction of a permanent storage facility made of earth is proposed
- when construction of regulated mixed anaerobic digester is proposed
- when a farm having an existing anaerobic digester receives off-farm materials for treatment

~~Some farms require a nutrient management strategy that sets out standards for managing the prescribed materials generated and received.~~

A strategy is also required if any portion of the farm unit used for the operation lies within 100 metres of a municipal well. The strategy must be approved by a Director at the Ministry of Agriculture, Food, and Rural Affairs. A strategy does include requirements relating to outdoor confinement areas and farm-animal yards.

A nutrient management plan details how nutrients are to be applied to a given land base and is not relevant for this specific threat.

The following sections under Ontario Regulation 267/03 relate to outdoor confinement areas, farm-animal yards, and the proximity of both areas to wells. There are no similar requirements regarding pasturing and grazing areas.

Section 55, Increase in Capacity: establishes the setbacks to wells and drainage tile that must be applied if a farmer wishes to modify an existing outdoor confinement area, or construct a new one. The setbacks are:

- 15 metres from a drilled well that has a depth of at least 15 metres and a watertight casing to a depth of at least six metres below ground level
- 100 metres from a municipal well
- 30 metres from any other well
- 15 metres from a field drainage tile

Section 57, Access of Livestock to Surface Water: restricts the access of animals to surface water within high density, permanent, outdoor confinement areas.

Section 58, Nutrient Management Strategy Required: requires the following:

- a nutrient management strategy must apply to the confinement area
- the manure produced by the animals that are kept in the confinement area is managed in accordance with the strategy
- the runoff generated by the confinement area is managed in accordance with section 81

Section 60, Management of Manure: manure may be piled within an outdoor confinement area but must be removed at least once a year or more if it could result in an adverse effect.

Section 61, Management of Snow that Contains Manure: there are restrictions on where snow removed from an outdoor confinement area and containing manure may be placed and the rate at which it may be applied.

Section 81, Runoff Management System: this is the most critical of the requirements under Ontario Regulation 267/03 to address the significance of a drinking water threat. It requires that, unless a runoff management system is in place, farm animals cannot be kept in a farm-animal yard or a permanent outdoor confinement area. This system must be capable of preventing, collecting, treating, or containing runoff, and it must consist of at least one of the following:

- a roof to prevent entry of precipitation, in the case of a yard where up-slope water has been diverted away from the yard
- a vegetated filter strip system meeting specified criteria, including distances to wells, tile drains, and surface water, and requirements for pre-treatment of runoff to remove solids and for the discharge of runoff to the filter strip
- a runoff collection and storage system that has the capacity to contain runoff generated by the yard or area for specified storage periods
- a permanently vegetated area, if up-slope water is diverted away from the yard or area
- a sewage works, approved under section 53 of the Ontario Water Resources Act
- a sewage system, regulated under Part 8 of the Building Code

~~A runoff management system must be in place to keep farm animals in a yard or permanent outdoor confinement area. The system must prevent, collect, treat, or contain runoff.~~

Other Tools

Other tools related to the threats associated with land used for livestock include:

- Canada-Ontario Environmental Farm Plan
- Ontario Building Code
- Canada-Ontario Environmental Farm Plan

The Environmental Farm Plan (EFP) is a risk assessment and management process for environmental protection, sustainable production, and health and safety. Farmers voluntarily prepare individual plans to increase their environmental awareness in up to 23 different areas. Eight of those areas are linked to drinking water threats under the Clean Water Act, 2006. Through the EFP local workshop process administered by the Ontario Soil and Crop Association, farmers highlight their farm's environmental strengths, identify areas of environmental concern, and set realistic action plans with timetables to improve environmental conditions. The plans are peer reviewed and are confidential. Environmental cost-share programs are available to assist in implementing projects. Over 35,000 participants have participated in the program since it began in 1993. This internationally recognized program has been very successful in helping Ontario farmers adopt more environmentally sustainable practices. ~~As of 2009, 34,000 out of 57,000 farm families in Ontario have participated (presentation made by Chris Attema to the Planners' Working Group, January 4, 2011)~~

Runoff from grazing and pasture lands, outdoor confinement areas and farm-animal yards is partially addressed in Worksheet 17 – Manure Use and Management.

~~Farmers voluntarily prepare environmental farm plans that identify any areas of environmental concern as well as action plans to address these concerns. At the latest assessment, almost two thirds of Ontario farmers had participated in this process.~~

Ontario Building Code

The Ontario Building Code regulates construction, operation and maintenance requirements for servicing by qualified people, wastewater monitoring and sampling, and septic tank pump outs. The Code does not currently contain requirements for the abatement of nutrients and/or other chemicals.

~~A runoff management system for farm animal yards and confinement areas could be regulated under the Ontario Building Code.~~

There are five classes of sewage systems designated under Part 8 of the Ontario Building Code (Ontario Regulation 350/06):

- Class 1: Outhouse, chemical or composting toilet, incinerating toilet or vault privy
- Class 2: Leaching pit for greywater disposal only
- Class 3: Cesspool
- Class 4:Leaching bed system
- Class 5: Holding tanks

A regulated sewage system under the Ontario Building Code is one method to address the requirement for a runoff management system under the Nutrient Management Act. An agricultural operation could

utilize the design of some of the system classes listed above to construct a runoff management system that will contain and treat runoff carrying agricultural source material.

What policy approaches were discussed?

The Planners' Working Group and the Source Protection Committee discussed approaches to address the threat of the use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard. The policy approaches discussed include:

Education and Outreach

Promote voluntary nutrient management strategies and plans for all farms.

Incentive programs

Incentive programs for agricultural/rural landowners to establish buffers on lands adjacent to surface water within WHPA-E areas.

Prescribed Instruments (Existing and Future Threats)

Require the Ministries of Agriculture, Food and Rural Affairs and the Environment to protect municipal drinking water supplies in their review and approval of proposed nutrient management strategies for farms within wellhead protection areas.

Require OMAFRA to work with farmers where significant threats exist to ensure compliance with nutrient management strategies.

Require the ~~Ministry of the Environment and Climate Change~~MECP to prioritize inspections for areas where significant threats would occur and to conduct regular inspections.

Require the landowner to apply for and obtain an environmental compliance approval under the Ontario Water Resources Act for sewage systems where runoff management systems are required under the Nutrient Management Act.

Risk Management Plans (Existing and Future Threat)

Require risk management plans for the use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard in wellhead protection areas where this activity is or would be a significant drinking water threat.

Restricted Land Uses (Future Threat)

Require pre-screening by a risk management official of planning applications for activities related to the use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard where the activity would be a significant drinking water threat. This would trigger the need for a risk management plan or prohibition of the associated land use.

Prohibition (Future Threat)

Prohibit the use of land as livestock grazing or pasturing land an outdoor confinement area or a farm-animal yard (agricultural land use) in WHPAs where this activity is or would be a significant drinking water threat.

3.14.2 Discussion on Policy Options

There was much discussion at the Planners' Working Group and the Source Protection Committee meetings on the assignment of a significant risk level to a farm when only a few animals trigger a significant pathogen threat and wild animals are not considered. The ~~MOECC~~MECP has clearly defined threats to drinking water sources as human activities. Farm animals are controlled by humans in a defined area. Wild animals are not. Addressing these threats would therefore focus on managing the impact of human activities on the environment. The precautionary principle is used to protect drinking water sources. Thus, policies to address this threat should be inclusive of any number of farm animals.

Education and Outreach

Educating farmers about ways to protect vulnerable features on their property is usually a matter of best practices. Farmers should be reminded of the potential threat that animals grazing near water features may have on the quality of the water and the potential threat that emerges when runoff from confinement areas enters surface water or groundwater. Farmers should be encouraged to participate in stewardship programs to establish and maintain buffers along watercourses. The more proactive farmers become, through knowledge of best practices, the less of a threat to source water there will be.

Although a valuable tool, the use of education and outreach was not considered sufficient to address this threat.

~~The Source Protection Committee supports the efforts of the Hamilton-Halton Watershed Stewardship program to engage farmers to establish buffers along stream corridors and construct fencing to keep farm animals out of the watercourse.~~

Incentive Programs

~~The Source Protection Committee also supports the Environmental Farm Plan program to raise awareness about the runoff of nutrients from agricultural operations.~~

The Committee supports the efforts of the Hamilton-Halton Watershed Stewardship program to engage farmers along stream corridors to establish appropriate buffers to improve surface water quality. The ~~Ministry of the Environment and Climate Change~~MECP has not committed to funding the Ontario Drinking Water Stewardship program past 2012. The Committee recommends that the funding be continued and the program broadened to include the implementation of stewardship policies to address significant threats.

The Committee also recognizes and supports the Environmental Farm Plan program administered by Ontario Soil and Crop Association. Farmers on vulnerable lands should be encouraged to complete the program, taking into account the municipal drinking water sources, and to implement the resultant action plans.

Prescribed Instruments

The consensus of the Planners' Working Group and Source Protection Committee was that the use of existing prescribed instruments—nutrient management strategies—was the preferred policy approach. These instruments have clear criteria for implementation and are familiar to the farming community. The use of these tools does not duplicate existing requirements and builds upon existing best management practices and knowledge of the farmer.

Inspections by the ~~Ministry of the Environment and Climate Change~~MECP of farms that are or would be significant drinking water threats should be prioritized and carried out regularly. Both OMAFRA and ~~MOECC~~MECP should work with the farmers where significant threats exist to ensure they comply with the requirements of their strategies.

Risk Management Plans (Existing and Future)

The first choice to address this threat for any farm is the development and implementation of a nutrient management strategy. However, not all farms are included under the Nutrient Management Act (and therefore are not required to have strategies) and the Act does not regulate all activities that could be significant drinking water threats. For these farms and activities, a risk management plan that addresses specific requirements of Ontario Regulation 267/03 appropriate to this particular threat and generally accepted best management practices is the preferred option. This risk management plan, therefore, would build on existing legislation and knowledge familiar to the farm community. Since grazing and pasturing of farm-animals are not regulated by the Nutrient Management Act, the best management practices as set out within Streamside Grazing, 2007 are proposed for use. The accepted use of the land was further limited as that meeting the definition of extensive grazing. The policy should be specific about the composition of a risk management plan to avoid misunderstandings during negotiations between the risk management official and the farmer.

In early 2021, implementation challenges and potential solutions with respect to the above policy approach were discussed with municipal staff implementing the policy T-47-C part b, which requires a hard regulatory tool of risk management plans to manage livestock grazing, regardless of the number of animals. Accordingly, a proposal to modify the policy was brought by CA staff to the Committee in March 2021. The Committee reached consensus on using a 5 NU (per farm property) criteria outside of WHPA-A, to determine whether the policy tool would be education and outreach (for less than 5 NU per farm) or RMP (for 5 or greater than 5 NU per farm).

Further discussions on factoring in the vulnerability scores were undertaken in late March 2021, when CA staff hosted a municipal working group meeting to discuss contiguous vulnerability scores (particularly, a score of 10 through a WHPA-B). Generally, it was agreed that WHPA-A should continue to be subject to risk management plans. It was agreed that the proposal (hinging on a 5 NU threshold) would be suitable outside WHPA-A (for significant threat activities). A follow up discussion on real life examples and a review of the policy wording allowed for municipal staff to reach the same consensus as the Committee. Staff updated the policy accordingly. The Committee is of the opinion that the policy will promote the achievement of the objectives of the plan in accordance with the Clean Water Act, and where there is less than 5 nutrient units on the farm property located outside a WHPA-A, a policy to regulate or prohibit the activity is not necessary to achieve those objectives. Risk management plans will apply within a WHPA-A, and also outside the WHPA-A where the nutrient units are 5 or more per farm property and other significant threat criteria are met.

Restricted Land Uses (Future)

Since risk management plans are proposed as a policy approach to address this threat, the restricted land use tool is required to be implemented to facilitate the screening of building permit and planning applications for lands within the vulnerable areas where significant threats are possible to ensure compliance with the Source Protection Plan. The land use requiring restriction is agricultural.

Prohibition (Future)

No consideration was given to implementation of this option as these threats will be effectively addressed through the use of other tools.

Other Tools

In addition to the tools set out above, the policy directives included the use of the provisions of the Municipal Act to require the municipalities to pass a by-law that would prohibit livestock grazing and pasturing within a WHPA-A. The Source Protection Committee discussed this directive at length. The Ministry of the Environment and Climate Change advised that the occurrence and concentrations of pathogens in the manure of domestic farm animals can vary greatly. Many farm animals can be infected with more than one pathogen that could affect human health but not exhibit any symptoms. An infected animal excretes the pathogens in its fecal matter and only one pathogen is required to affect the source water. Ontario Ministry of Agriculture, Food and Rural Affairs has indicated that if the soil is greater than 0.3 metres thick and the livestock density is less than one nutrient unit per acre, it is their general opinion that livestock grazing and pasturing would not be a significant risk to drinking water sources.

It was agreed that a prohibition is the best alternative for protecting the drinking water sources. However, the Nutrient Management Act already limits what activities can occur on these lands close to a well, and this policy would add more restrictions to the point that the land could be used for very little. Without compensation to the farmer for the lack of use of their land, the Committee decided to manage rather than prohibit the activity in order to decrease the threat.

~~**The use of risk management plans was selected as the preferred policy approach to address the significant threats posed by the use of land for livestock.**~~

Monitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Ontario Regulation 287/07 provides the annual reporting obligations of the risk management official. Monitoring policies in the Plan mirror those requirements.

Consultation

The proposed restrictions on grazing of livestock raised numerous concerns by commenting agencies and members of the Source Protection Committee. The options for policy development were debated at a number of meetings with the various points of view raised through pre-consultation under consideration. The final policies proposed were considered to be a balance of all of the various interests and positions regarding the management of this threat.

The Ministry of the Environment and Climate Change requested that policies provide flexibility for implementation when they affect operational procedures. However, it is the opinion of the Source Protection Committee that every farm where activities are occurring that could be significant drinking water threats should be visited and an incentive program established/continued to assist farmers. Flexibility has been given to the ~~MOECC~~MECP to define the frequency of regular inspections.

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs will be important supporting elements to the policies and should be maintained at the local level. The wording of the education and outreach policy was clarified regarding collaborators for implementation and the time period for the implementation of the program was extended to two years.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Threats 21 – Land Used for Livestock		
	Policy Directive	Policy
1	Request ongoing funding of the Ontario Drinking Water Stewardship Program or similar program by the Ministry of the Environment and Climate Change for projects that reduce the threat from the use of land for livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard.	T-23-S
2	Support the continuation of stewardship programs that help farmers protect drinking water sources and encourage farmer participation in these programs.	T-23-S
3	Require OMAFRA to protect municipal drinking water sources through incorporation of conditions in nutrient management strategies for farms within vulnerable areas to ensure outdoor confinement areas and farm-	T-48-C

	animal yards cease to be or do not become significant drinking water threats.	
4	Require the ~~Ministry of the Environment and Climate Change~~MECP to prioritize inspections of farms located where significant threats are possible and to conduct regular inspections.	T-22-S
5	Require the ~~Ministry of the Environment and Climate Change~~MECP to work with the farmers where significant threats exist to ensure compliance with the requirements of their nutrient management strategies, where needed.	T-22-S
6	For those farms not phased-in under the Nutrient Management Act in vulnerable areas where outdoor confinement areas or farm-animal yards and for all farms where livestock grazing or pasturing are or would be significant drinking water threats, a 5 NU (per farm property) criteria is applied outside of WHPA-A, to determine whether the policy tool would be education and outreach (for less than 5 NU per farm) or risk management plan (for 5 or greater than 5 NU per farm).~~require a risk management plan~~. ~~This~~ A risk management plan would be based on the regulatory requirements of nutrient management strategies and incorporate the best management practices for livestock grazing and pasturing as set out in Streamside Grazing, 2007, and extensive grazing within wellhead protection area A, and scoped to these threats.	T-47-C

Policy Directives for Threats 21 – Land Used for Livestock		
	Policy Directive	Policy
7	Use restricted land uses to require pre-screening by a risk management official of agricultural building permits and planning applications where the land is used as livestock grazing or pasturing land in a vulnerable area where these activities are or would be significant drinking water threats.	T-47-C
8	Require Municipalities to issue a by-law prohibiting farm-animal grazing and pasturing within a wellhead protection area A.	Policy deleted

3.15 ~~Conveyance of Oil in~~Establishment and Operation of a Liquid Hydrocarbon Pipeline~~s~~

3.15.1 Background

~~What is the conveyance of oil?~~

During the first round of source protection planning, liquid hydrocarbon pipelines were not included as a prescribed drinking water threat under the Clean Water Act, 2006. The Halton-Hamilton source protection committee (HHSPC) was one of six committees that included the conveyance of oil by way of a pipeline (designated as transmitting or distributing "liquid hydrocarbons") that crosses a body of open water. The Ministry of the Environment and Climate Change ~~has~~ defined oil, in their approval of this local threat activity, as liquid hydrocarbons. Hydrocarbons come from petroleum sources and are mixtures of organic compounds that occur in geological substances such as oil, bitumen, and coal. The compounds are composed of carbon and hydrogen, with minor amounts of nitrogen, sulphur, and oxygen. Liquid hydrocarbons are further defined as including crude oil, condensate, and liquid petroleum products and do not include natural gas liquids and liquefied petroleum gas.

During the second round of source protection planning, the Ontario Regulation 287/07 was amended in 2018 to add the "establishment and operation of a liquid hydrocarbon pipeline" to the list of prescribed drinking water threat activities. The definition of liquid hydrocarbons remain the same as above, with further clarification from MECP on the threat activity as follows. The prescribed threat captures pipelines designated for transmitting or distributing liquid hydrocarbons to terminals and distribution centers. It does not capture pipelines that move liquefied natural gas or liquid petroleum gas. It also does not capture pipelines operated by the Ministry of Natural Resources and Forestry (MNRF) as defined in the Oil, Gas and Salt Resources Act, or those that operate within a property such as a refinery. Pipelines that convey liquid fuel within a single property would fall under the prescribed threat 'handling and storage of fuel.'

~~Oil~~ The transportation of liquid hydrocarbons in pipelines is considered to be the safest mode of transport for this substance. Canadian Energy Pipeline Association member companies transport 3 million barrels per day, which would require 5,000 rail cars or 15,000 tanker trucks. Pipeline transportation uses less energy, as well. Pipelines that cross the Halton-Hamilton Source Protection Region transport finished hydrocarbon products such as gasoline and jet fuel.

Why does the establishment and operation of a liquid hydrocarbon pipeline ~~conveyance of oil in pipelines~~ pose a significant threat?

~~This threat activity is the transmission or distribution of liquid hydrocarbons in a pipeline that crosses an open body of water and, if a rupture of the pipeline occurs, could release benzene, toluene, ethylbenzene, and xylene (collectively known as BTEX) to the water.~~

The specified chemicals of concern that could be released to water due to a rupture of a liquid hydrocarbon pipeline are any quantity of: benzene, toluene, ethylbenzene, and xylene (collectively known as BTEX), and petroleum hydrocarbons F1 (nC6-nC10), F2 (>nC10-nC16), F3 (>nC16-nC34), F4 (>nC34).

Most petroleum hydrocarbon constituents are toxic to some degree (CCME, 2001). Those that have lighter molecular weights, such as BTEX compounds, dissolve more readily, are mobile, and can flow with groundwater or surface water for great distances. Those with heavier molecular weights are persistent in the environment, dissolving and degrading very slowly. Benzene is a known carcinogen, while toluene, ethylbenzene, and xylenes are less toxic.

~~Four oil companies transport liquid hydrocarbon products in pipelines across the Halton-Hamilton Source Protection Region. All of the pipelines cross open bodies of water including creeks, Hamilton Harbour, and Lake Ontario.~~ The pipelines used typically range in size between 150 and 760 millimetres and carry hydrocarbon products such as gasoline and jet fuel or crude oil.

A rupture of a pipeline may occur due to corrosion of the pipes, stresses due to ground movements such as stream bed washout under the pipe, and third party damage, such as contact during excavation.

The Lake Ontario Collaborative used event-based modelling to assess the risk to lake-based drinking water sources from this local threat. Two locations were simulated in the Halton Area where the spills occur in Sixteen Mile Creek and Joshua's Creek (see Assessment Report). The chemical released during the modelled spill events was benzene. The Collaborative chose the Ontario Drinking Water Quality Standard for benzene of 0.005 milligrams per litre (this was a standard at the time of study completion) as the threshold for a significant threat. It should be noted the present Ontario Drinking Water Quality Standard for benzene is 0.001 milligrams per litre.

Based on the Clean Water Act regulatory changes made in 2018, the pipelines can pose significant, moderate or low risks to drinking water in certain vulnerable areas. The Clean Water Act technical framework sets out the circumstances of occurrence include the following, for specified chemicals in any quantity:

- pipelines above ground or above a water
- pipelines below ground and not crossing underneath a water body
- pipelines within or under a water body.

How does this threat affect the Halton Region and Hamilton Region Source Protection Areas?

In the first round of source protection planning, e~~E~~vent-based modelling was used to identify significant drinking water threats to Lake Ontario source water. Only two scenarios have been modelled to date within the Halton-Hamilton Source Protection Region, but similar scenarios have been modelled in neighbouring Regions.

The modelled scenarios suggested that a release into the Sixteen Mile Creek of benzene could reach the municipal water intakes stretching from Toronto to Hamilton at significant threat levels. The release of benzene into Joshua's Creek also could reach the municipal intakes from Mississauga to Burlington. This activity was determined to be a significant threat during the delineation of the intake protection zone three modelling and is only a significant threat for those areas that have been modelled.

The Ministry of the Environment and Climate Change indicated that it is reasonable to extrapolate the results to spills of other hydrocarbons from pipelines that cross the same creeks farther upstream and have directed the Halton-Hamilton Source Protection Committee to include additional significant

threats. The locations where a pipeline crosses the two local watercourses modelled increases substantially to 197 - 86 in Joshua's Creek and 111 in Sixteen Mile Creek.

The existing modelled threat activity is a federally regulated facility.

There are currently no liquid hydrocarbon pipelines that cross wellhead protection areas (WHPAs) where they could pose significant risks. The pipelines cross highly vulnerable aquifers (HVAs) and intake protection zones (IPZs). With the exception of the modelled threats shown to pose significant risks to Lake Ontario sources of municipal drinking water in IPZ-3s, the existing pipelines do not pose a significant risk in HVAs, IPZ-1s and IPZ-2s that do not overlap the IPZ-3s.

What legislation, guidelines, or protocols already exist?

Pipelines that cross a provincial or international border fall under the Canada Energy Regulator. Pipeline systems located entirely within the province are regulated by the Ontario Energy Board. Pipeline companies deal with various laws, agencies, and codes such as (but not limited to):

- Federal: Canadian Energy Regulator Act, 2019; Impact Assessment Agency of Canada; CSA - Oil & gas pipeline systems code.
- Provincial: Technical Standards and Safety Act, Ontario Water Resources Act
- Regional/municipal: Municipalities, Conservation Authorities

~~**National Energy Board Act**~~**Canadian Energy Regulator Act**

The National Energy Board Act was repealed in 2019, and the Canadian Energy Regulator Act was passed. The Canada Energy Regulator (CER) is enabled by the federal legislation to oversee how energy moves in Canada. CER regulates companies operating oil and gas pipelines and electrical powerlines that cross a national, provincial or territorial border. While making a decision or recommendation, they factor in economic, environmental, and social considerations. They regulate for the complete life cycle of a pipeline or power line project. ~~and~~ The Canadian Energy Regulator Act includes the Onshore Pipeline Regulations~~ regulate the construction and operation of oil pipelines that cross provincial or international boundaries.~~ Pipelines may not be operated unless a Certificate of Public Convenience and Necessity has been issued. For existing facilities, regulated companies must comply with the ~~National Energy Board's~~ CER regulations and requirements. The ~~National Energy Board~~CER does undertake inspections and audits of all regulated companies' operation and maintenance activities, as appropriate. ~~National Energy Board~~CER staff inspects the entirety of the operation including pipelines, compressor stations, pumps, processing plants, and other facilities operating under their regulations. Staff investigates leaks and spills or other environmental incidents to determine whether corrective actions are needed. Each company must have a management system to ensure that the environmental protection plans are applied effectively in the field. These systems are also subject to audit.

If there is a spill, for federally regulated companies, the ~~National Energy Board~~CER requires that they establish procedures for prompt, effective response as well as clean up. An emergency response plan is required and tested through simulated emergencies or spill exercises. When an incident occurs, the company must report it to the ~~National Energy Board~~CER immediately, and the ~~National Energy Board~~CER staff monitors the company's response, clean up, and site restoration for more serious spills. After the site is restored, the company must file a report with the ~~National Energy Board~~CER outlining the extent and location of damage, volume of product lost, containment measures and the clean up and restoration procedures. A public inquiry may be called if required.

Conservation Authority staff contacted CER in 2020 for more information specific to drinking water source protection. Resulting correspondence from CER indicates that they require any potential threats to drinking water sources to be considered by regulated companies, beginning at the applications phase of pipeline construction/planning, through the full lifecycle of the pipeline in the operational and abandonment phase. When a company applies for approval to construct a pipeline, the company is required to provide the CER with any potential drinking water interactions that may occur during both the construction phase and during the operation phase in the event that a spill could occur. The company's proposed mitigation is assessed and should the Commission of the CER deem it to be required, additional conditions may be included as part of the approval itself to provide additional protection measures.

Companies are also required to comply with the CER's Onshore Pipeline Regulations (OPR), which outlines requirements for their Emergency Response Program, Integrity Management Program, and Environmental Protection Programs. Within the OPR, more prescriptive regulations and guidance are referenced, such as the Canadian Standards Association Z662-19 (CSA Z662-19), the Remediation Process Guide and Incident Reporting Procedure.

For pipeline's integrity programs, the frequency of inspections depends on factors such as the technology used, the history of releases, the age of the pipeline. Where inline testing is not possible, other tests are done. Integrity digs are required to confirm the corrosion impacts. Incidents are reported on the CER website and include those that harm people or the environment.

During the operational phase of pipelines, the CER provides specific oversight to potential threats to drinking water sources, such as conducting compliance verification meetings, field inspections and incident reviews. For example, if a reportable spill occurs, an incident report is required to be submitted to the CER by the company immediately or within 24 hours if the spill volume is below the threshold for immediate reporting. The report is reviewed and if needed follow up actions are taken, such as deploying inspection officers to the field and temporarily suspending pipeline operations until the CER is satisfied the pipeline can be operated safely. Any longer term remediation of the impacts of a spill are reported and reviewed by the Remediation Process, which specifically ensures that drinking water is considered, and protected.

Canadian Standards Association Z662-19 (CSA Z662-19)

A new edition of the CSA Z662:19 – Oil and Gas Pipeline Systems standard - came into effect in June 2019. The goal of the change to CSA Z662:19 is to achieve safety and integrity of a pipeline throughout its lifecycle. The CSA Z662:19 is adopted into legislation upon its publication, pursuant to provisions of Section 1 of the Canada Energy Regulator Onshore Pipeline Regulations. Information from: https://bit.ly/3nYyiTz

According to CER, CSA Z662-19 requires (Clauses 4.3.7.2 to 4.3.7.4) that for liquid pipelines, companies identify and document designated geographical areas (DGA) in the vicinity of the pipeline. This applies to new pipelines (it is not required to be retroactive). A DGA is a surface water body such as a major drinking water source that could be impacted by a pipeline uncontrolled release incident and as such heightened protection measures may be required. Regulated companies are required to identify pipeline segments where a release could adversely affect a DGA and give consideration to a number of factors including:

- topography,
- potential pathways,
- flow characteristics,
- potential release volume,
- and their emergency response plan including capability and time to respond.

Additionally a more conservative safety factor (known as location factor) must be used when designing liquid pipeline segments that can affect a DGA.

DGAs have similarities to high consequence areas (HCAs). Amongst source water protection experts, there is a familiarity with the concept of HCAs, which are heavily populated, environmentally sensitive areas that could be affected by an unintended release of liquid hydrocarbon from the pipeline; read more at: https://bit.ly/3kO3piF.

Ontario Energy Board Act

The Ontario Energy Board (OEB) regulates Ontario's energy sector as required under provincial legislation including the Ontario Energy Board Act. OEB reviews applications for new pipelines and ensures that all design standards, monitoring and maintenance practices are compliant with the Technical Standards and Safety Association (TSSA) requirements and the relevant CSA Pipeline System Code. All applicants for new pipeline construction must file evidence with respect to design specification and their compliance with TSSA's requirements. The OEB's Environmental Guidelines contain the detailed filing requirements for all new pipelines subject to the Board's jurisdiction. Compliance and enforcement actions are described in detail at: https://www.oeb.ca/industry/rules-codes-and-requirements/compliance-and-enforcement-processes

Technical Standards and Safety Act

The Technical Standards and Safety Authority's (TSSA's) mandate is to help protect the public, environment and property from fuel-related hazards such as spills, fires, and explosions. They oversee the ongoing operation and maintenance of existing hydrocarbon pipelines. They also ensure that the pipeline integrity programs are carried out by pipeline operators to ensure their safe operation. They have provincial jurisdiction over the safe and responsible handling of petroleum products used as motor or appliance fuels. This includes gasoline, diesel/fuel oil, natural gas, and propane handled at retail outlets, private outlets, bulk plants, and in tank vehicles. The TSSA does not have authority at refineries. The TSSA is responsible for enforcement of the Technical Standards and Safety Act, 2000, and its regulations. The Act governs the construction and operation of oil and gas pipelines located entirely within Ontario. Under Ontario Regulation 210/01 – Oil and Gas Pipeline Systems, a licence is required from the Fuels Safety Division. The Oil and Gas Pipeline Systems Code supplement this regulation. The TSSA and the Ministry of the Environment, Conservation and Parks ~~ and Climate Change~~ share the regulation and enforcement for reporting and clean up of spills. TSSA is a delegated administrative authority and is accountable to the Province.

Fisheries Act, 1985

In general, Fisheries and Oceans Canada enforces the Fisheries Act; however, the section that applies to contamination is under the authority of Environment Canada. Section 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 under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.

What policy approaches were discussed?

The Source Protection Committee discussed policies to address the significant threats to drinking water sources due to the ~~conveyance of oil~~ in establishment and operation of liquid hydrocarbon pipelines ~~that cross open waterbodies~~. The Committee supported the principle of relying upon the extensive existing regulations to address this threat. The pipeline that was modelled to assess significance of the threat is a federally regulated. There are very limited tools available for policies regarding federally regulated facilities.

3.15.2 Discussion on Policy Options

During the first round of source protection planning, t~~T~~o assist the Committee with understanding the existing regulatory framework, representatives of the oil and gas pipeline industry were invited to present an overview of their current operations and regulatory requirements. The spill scenario modelling and the design elements of the pipeline network were also reviewed. It was noted that the pipeline companies are required to inspect pipelines and regulatory agencies conduct audits.

The Committee identified the need for the Spills Action Centre to be notified immediately if there is a spill and that municipalities should be advised immediately so appropriate responses can be

implemented to protect drinking water sources. The Committee noted that this industry is highly regulated. The Committee recommended that the emergency response plans of the oil companies should be updated to include the findings of source protection planning.

The primary consideration in the protection of drinking water sources is to reduce or manage the threat of spills or ruptures and to have an appropriate spill response in place.

In the second round of source protection planning, the "establishment and operation of a liquid hydrocarbon pipeline" was added to the Clean Water Act list of prescribed drinking water threat activities in 2018. Conservation Authority staff conducted a threats risk assessment accordingly, to determine where pipelines could be significant, moderate or low threats to drinking water in vulnerable areas of the Halton-Hamilton Source Protection Region. Then, staff reviewed draft policy approaches by other source protection regions/areas and committees across the province. Staff also contacted federal and provincial regulatory bodies and researched their websites to determine updated requirements for pipeline companies, since the first round of source protection planning. The Committee continued to support the principle of relying upon the extensive existing regulations to address this threat, and staff recommended that certain policies be directed to the regulatory bodies rather than to the pipeline companies.

M

~~M~~onitoring

Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. ~~The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.~~ It is a requirement of the Clean Water Act, that a public body implement the monitoring policy so the facility operators will be contacted.

Consultation

Through the pre-consultation process conducted in the first round of source protection planning, ~~oil~~ pipeline companies provided comments regarding improvements to wording to better reflect actual practices and better achieve the objectives of the policies. This wording has been incorporated within the final policies. The implementing bodies identified in policies were also reviewed and changed where appropriate.

Policy T-52-C/S was written during that pre-consultation process following the advice of the Ministry of the Environment and Climate Change to combine, reword and bring the policies inline with the permitted content of the Plan. These policies were refined further to provide clarity about the implementing bodies and where the policies apply.

The then Ministry of the Environment and Climate Change directed the Halton-Hamilton Source Protection Committee to include significant threats for pipelines that cross the two creeks upstream of where the Lake Ontario Collaborative modelled the impacts from oil spills near their mouth. The Ministry of the Environment and Climate Change undertook an assessment of dilution factors and deemed it

would be reasonable to include these significant threats. Pipe size, flow rate, and material flowing in the pipeline were not considered.

In the second round of source protection planning, revised policies and draft new policies based on a review of other approaches across the province were brought to the Committee for their review in fall 2020. Staff then engaged pipeline companies with these policies at meetings in January and February 2021. The valuable feedback from the companies resulted in further revisions that the Committee subsequently reviewed.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Local Threat – Conveyance of Oil in Pipelines		
	Policy Directive	Policy
1	~~Request Energy Boards in their consideration of any new or expanded pipelines to ensure that proponents abide by current and applicable regulatory and standardized design requirements, as well as monitoring and maintenance practices, in order to adequately manage the risk to source water.~~ Requests the Canada Energy Regulator and TSSA to ensure that their regulatory requirements manage liquid hydrocarbon pipelines that are existing significant threats.	~~L-2-S~~ T-62-S
2	~~Recommend that fuel pipeline owners conduct inline pipeline integrity testing and visual inspections where pipelines cross open water bodies at a frequent timing of every three years.~~ Recommends that Canada Energy Regulator and Ontario Energy Board use a preventative approach with pipeline applicants for future significant threats.	~~L-1-S~~ T-63-S
3	~~For significant threats to Lake Ontario request that the Ministry of the Environment and Climate Change protect drinking water sources through provision of threat mapping to the Spills Action Centre for notification.~~ Requests pipeline companies to use watershed and source water protection science in their emergency planning.	~~T-52-S~~ T-64-S
4	~~Request that the owners of facilities engaged in significant threat activities to the municipal Lake Ontario intakes update their emergency preparedness/contingency plans to include the location of municipal intakes, actions to be taken, and inclusion of protection of drinking water sources in preparedness exercises.~~ Requests liquid hydrocarbon pipeline companies and owners of bulk fuel storage facilities to update their emergency plans.	~~T-52-S~~ T-65-S
5	Recommends MECP Spills Action Centre to incorporate drinking water protection zone maps and modify their procedures.	T-67-S
6	Directs CAs to collaboratively liaise with pipeline companies, fuel storage companies, sewage treatment plant owners on several matters.	T-68-C

3.16 Land Use Policy

~~The Committee supports a policy that requests the Ministry of Municipal Affairs and Housing to finalize regulations regarding conditional zoning.~~

What additional policies are necessary to help municipalities implement the Plan's significant threat policies?

Conditional zoning was included under section 34 of the Planning Act in 2007. The legislative change permitted municipalities to impose conditions upon a specific owner of land when passing a zoning by-law. These conditions are imposed on an owner through an agreement that is registered against title of the lands, which is enforceable against both current and future owners of the lands. The authority to use conditional zoning is contingent upon a regulation being made that sets out the prescribed conditions that can be imposed. Although a draft regulation has been prepared, no action has been taken by the Ministry of Municipal Affairs and Housing to finalize it.

During the first round of planning, t~~T~~he Planners' Working Group indicated that the ability to use conditional zoning would be an important and effective additional tool to implement source protection plan policies, if it was available. For this reason, a policy ~~has~~ was been supported by the Source Protection Committee that the province be requested to finalize this regulation.

Based on public consultation feedback in 2007, the government is not proposing to proceed with a regulation to enable conditional zoning. In 2019 and in 2021, HHSPR contacted MMAH about this policy. Per the 2020 annual progress reporting, MMAH considers source water protection in its review of new land use planning documents (official plans, comprehensive zoning bylaws) and development applications. There appears to be no pressing need by municipalities and not anticipated in the future. For these reasons, staff recommended the removal of policy T-53-S part c (a non-binding part) for conditional zoning. With its removal, the policy becomes legally binding.

A discussion at the Planners' Working Group meeting revolved around how the planners, in the review of development applications, obtain the required information to understand the activities and the impact of those activities on a property.

~~A disclosure report should be required as part of a complete application for new property developments. This would ensure that information concerning proposed uses and activities on site would be obtained at the beginning of the process.~~

One policy option discussed, based on the approach used within the County of Simcoe, was to include the requirement for a disclosure report as one of the required submission parts of a complete application for development of a property. This report is part of a series of reports including a hydrogeology report, prevention and contingency plan, as well as a risk evaluation.

A disclosure report specifies the nature of the land use proposed, its associated required services and facilities, the activities and operations to be conducted on-site and the substances to be stored or used. This document would provide the information at the beginning of the development application process and could be reviewed by the risk management official if screening of the application was called for. For this reason the Planners' Working Group and the Committee added a policy to include the requirement for a disclosure report as part of a complete application.

Monitoring

Annual monitoring of the implementation of policies was discussed by the Planners' Working Group and the Source Protection Committee. Documentation and reporting back by the implementing body on actions taken are necessary to provide assurance to the Committee that the policy has been implemented and is effective at reducing risk to drinking water sources. The required information listed in the policies will inform the next update to the Source Protection Plan and whether the policies are addressing the risk. Based on this information, the Committee will decide whether amendments to the policies are required.

Consultation

Policy T-53-S was written during pre-consultation following the advice of the Ministry of the Environment and Climate Change to reword and bring the policy inline with the permitted content of the Plan. The policy was further refined to provide clarity about the implementing bodies and where the policy applies.

The reader is directed to the Source Protection Plan to review the policy.

Policy Directives for Land Use		
	Policy Directive	Policy
~~1~~	~~Request the Ministry of Municipal Affairs and Housing to enact the regulations under the Planning Act to enable the use of conditional zoning.~~	T-53-S part c - Repealed
2	To facilitate implementation of source protection policies, the City of Hamilton, Halton Region and the County of Wellington are requested to require a disclosure report as part of a complete application.	T-53-S

4. Optional Policies

~~Optional policies focus on important matters outside of the 18 prescribed threats and 1 local threat already addressed. They are strategic policies that, in the opinion of the Source Protection Committee, will enhance protection of drinking water sources.~~

The Clean Water Act and General Regulation provide provisions for inclusion of policies that address concerns other than significant threats to drinking water sources. Policies that specify actions on specific topics set out in the Regulation or that promote education and outreach or incentive programs are permissible.

There is no requirement to include strategic policies, and based on the direction from the Source Protection Committee set out above, any strategic policy must be focused and of high importance.

Optional policies focus on important matters outside of the prescribed threats already addressed. They are strategic policies that, in the opinion of the Source Protection Committee, will enhance protection of drinking water sources.

4.1 Transport Pathways

4.1.1 Background

What are transport pathways?

~~A transport pathway is a land condition resulting from human activity that increases the vulnerability of a drinking water source, such as a deteriorating well.~~

As set out in Ontario Regulation 287/07 under the Clean Water Act, 2006, a transport pathway means a land condition, resulting from natural or human activity that increases the vulnerability of a drinking water system's raw water source. Constructed pathways include subsurface utility corridors, abandoned boreholes, deteriorating water wells, inappropriately constructed earth energy systems, and excavations.

Earth Energy Systems

Earth energy systems, also called geothermal systems, are an area of potential concern related to transport pathways. The installation of earth energy systems requires drilling holes or constructing trenches, which may intersect with the aquifers that supply municipal and private drinking water wells. A geothermal well may be classified as a transport pathway, depending on the method of construction and whether appropriate casings and/or seals have been placed in the borehole.

Not all boreholes drilled for earth energy systems are classed as wells and regulated as such. However, all systems require a building permit.

Abandoned Wells

~~Municipalities contribute up to 50 percent to the cost of decommissioning a well on eligible properties. The Ontario Drinking Water Stewardship Program also assists with funding.~~

The abandonment of wells is addressed in Ontario Regulation 903. Wells must be decommissioned if they have not been used for more than two years. Wells deteriorate over time and must be inspected and maintained periodically. Older wells may not meet today's construction standards, which ensure that the aquifer is sealed from surface contamination. If there is a connection with the surface, a pathway exists, and this could affect the aquifer's water quality. Therefore, all unused wells should be decommissioned and sealed appropriately. However, this does not always happen and enforcement is limited.

Existing programs educate people about the importance of maintaining their well and decommissioning it, if necessary. For any subdivision or condominium plan, where there are wells on the lands subject to the development application, municipalities require the decommissioning of these wells prior to development.

Funding is available to assist with the cost of decommissioning wells. Municipalities contribute up to 50 percent, or up to $1,000, towards the cost of abandoning a well in compliance with Ontario Regulation 903. All landowners within the municipality's jurisdiction are eligible. The Ontario Drinking Water Stewardship Program will also assist with up to 80 percent of the cost of an eligible project, up to a maximum of $4,000. Eligible properties at this time are within 100 metres of a municipal wellhead or the two-year time-of-travel of a wellhead protection area (WHPA-B).

Wells in Urban Areas

~~No policies exist to prevent the construction of urban wells in municipal water service areas, or to require that existing well users in serviced areas connect to municipal servicing.~~

At present, there are no policies in place that would restrict the construction of a well within the urban area where municipal water services are available. Also, it is not a requirement to connect to municipal servicing, if available. Within the urban areas, there is more risk to a water supply due to the mix of commercial and industrial uses and the greater potential for spills and leaks of chemicals of concern.

Linear infrastructure and excavations

A subsurface linear infrastructure and excavations can bypass the natural protection provided by soil layer overlying aquifers and can become transport pathways. Most of these type of projects would have to go through a planning process and be assessed for a potential to become transport pathways.

Why are transport pathways related to drinking water threats?

Constructed pathways may facilitate the movement of contaminants vertically or laterally below the ground, and result in faster or more widespread distribution. Accordingly, transport pathways may be considered when interpreting the vulnerability scoring within the wellhead protection areas and intake protection zones. A change in vulnerability scoring to a higher number could raise the risk level of a prescribed threat, and could change some moderate threats to significant. A desktop assessment of potential transport pathways within wellhead protection areas was completed within the Halton Region and Hamilton Region Source Protection Areas. The details of the assessment and the results are included in the assessment reports.

What legislation, guidelines, or protocols already exist?

~~Ontario Regulation 287/07 addresses transport pathways. The regulation requires municipalities to notify the Source Protection Authority and Source Protection Committee if they receive applications to build a new transport pathway or modify an existing one.~~

Section 27 of Ontario Regulation 287/07 states that a Source Protection Plan may contain policies to ensure that drinking water threats identified in the vicinity of a transport pathway cease to be or will not become a significant threat, or that the pathway ceases to endanger the raw water supply of a municipal water system.

The Regulation requires municipalities to notify the Source Protection Authority and the Source Protection Committee of any application they receive to undertake an activity within a wellhead protection area or a surface water intake protection zone that may result in the creation of a new transport pathway or the modification of an existing transport pathway. The applicant also receives a copy of the notice, which must include a description of the proposal, the identity of the person responsible for the proposal, and a description of the approvals required before engaging in the proposed activity.

How do transport pathways affect the Halton Region and Hamilton Region Source Protection Areas?

The ~~Source Protection Department of the Conservation Authorities~~ Halton-Hamilton Source Protection Region staff carried out a comprehensive analysis of transport pathways in WHPAs. ~~does not know precisely how many transport pathways exist within the two Source Protection Areas, nor the construction methods or locations of each pathway. Due to this lack of knowledge, transport pathways could not be used to~~ In some WHPA zones, ~~adjust~~ the vulnerability scores were adjusted accordingly. ~~within the wellhead protection areas during the watershed assessment, except where they were known to alter the elevation of the land surface.~~

4.1.2 Discussion on Policy Options

The Planners' Working Group and the Source Protection Committee discussed transport pathways and the need for policies to address their impact on drinking water sources. The preferred method of protecting drinking water sources is to prevent the creation of new transport pathways where possible.

As stated above, under Ontario Regulation 287/07, municipalities must notify the Source Protection Authority and the Source Protection Committee of an application for an activity that includes a transport pathway. Accordingly, it would be appropriate for the Source Protection Plan to contain policies specifying the actions that each body should take when an application is submitted.

~~The Source Protection Committee and the municipalities will discuss which activities create a transport pathway that requires prior notification.~~

The Committee considered that Source Protection Plan policies addressing proposed transport pathways within the wellhead protection areas should include best practices that would include a supporting hydrogeological study. This study should document the potential impact of the proposed transport pathway on the municipal drinking water source and the supply. The study results would provide the information required to assess the proposal's impact on drinking water treatment and distribution. Official plan policy could implement this process.

Source protection staff will hold discussions with the municipalities to identify which activities will create a transport pathway and require notification to the Source Protection Committee and Source Protection Authority from the municipality in accordance with the Clean Water Act, 2006. Furthermore, the Committee and Authority should discuss the appropriate action to be taken if and when notification is received.

The Committee suggested that professional engineers should be consulted about which activities create a transport pathway. Sewage and water piping installation typically do not require a hydrogeological study because they are quite shallow works, but these activities often require geotechnical studies to determine information about the water table and geologic conditions. Some construction protocols do exist, such as clay plugs in utility trenches to limit lateral flow of groundwater. It would be preferable to use these construction techniques and other best management practices where there are or could be significant threats due to transport pathways.

With regard to earth energy systems, the Committee discussed closed loop versus open loop geothermal systems. Open loop systems are considered wells and are regulated under Ontario Regulation 903 – Wells. Closed loop systems are only considered wells if testing of the aquifer properties is completed. A permit under the Ontario Building Code is required for the establishment of a closed loop system. These systems are regulated through the Ontario Building Code under a Canadian Standard CAN/CSA-C448. The potential exists for an aquifer to be contaminated or depressurized.

~~Regarding the abandonment of wells, the Committee voiced concern that these wells are not routinely sealed and that there is no existing enforcement to require landowners to deal with this is issue.~~

Ontario Regulation 98/12 - Ground Source Heat Pumps was released in 2012 to partially fill the void in regulation for closed loop systems. This regulation applies to systems that use methanol as the heat-transfer fluid, applies to the construction, alteration, extension and replacement of the portion of a vertical closed loop system that extends more than 5.0 metres below ground, and requires those seeking to install one of these systems to apply for and obtain an environmental compliance approval.

Municipal building officials are of the opinion that the Ontario Building Code and Canadian Standard are sufficient to protect drinking water sources. A majority of the applications to date have been for shallow, horizontally installed systems.

The Committee noted that abandonment of wells is covered under Ontario Regulation 903, which requires that wells be appropriately decommissioned when not used for longer than two years. The wells are to be sealed in order to remove the pathway to the aquifer. This does not always happen, and consequently, the aquifer could be exposed to contamination. Also, there should be some component of enforcement. At present, if someone abandons a home and does not decommission the well, there do not appear to be repercussions for this inaction.

The Committee identified their concern that the policy not be too aggressive. Sometimes, property owners do not know about the existence of old wells, particularly if there is no ~~Ministry of the Environment and Climate Change~~ MECP well record. Therefore, the focus of the policies should be to help individuals understand the potential danger of old wells and offer support through education and

funding. Policies developed need to encourage and be supportive, and therefore the continuation of funding is necessary to ensure that these wells are decommissioned.

~~The Committee recommends that municipal by-laws prohibit the building of urban wells where municipal water service is available. Owners of existing wells should be encouraged to decommission these wells and connect to municipal services.~~

Improperly constructed or maintained water wells can be transport pathways, as well. The risk to drinking water sources from these wells would be lower if fewer of them existed. Therefore, to protect the health of the residents of urban and settlement areas, it is recommended that:

- urban residents with existing well supplies be encouraged to connect to the municipal water system, when available, and decommission their wells in accordance with Ontario Regulation 903
- local municipalities of Halton Region and the City of Hamilton be encouraged to enact by-laws to prohibit the construction of new water wells in the urban area and settlement area where municipal water service is available

Consultation

Overall support for the policy direction was received. During consultation, the Ministry of the Environment and Climate Change requested that policy wording provide flexibility for implementation when they affect operational procedures. However, it is the opinion of the Source Protection Committee that a funding program is important to ensure all landowners are able to address significant drinking water threats.

Concerns were raised by some municipalities regarding the funding source for any municipal incentive programs. The Source Protection Committee was of the opinion that these programs will be important supporting elements to the policies and should be maintained at the local level. The Ministry of Municipal Affairs and Housing pointed out that if the proposed municipal incentive were provided to a commercial, manufacturing or industrial operation, the municipality would require a community improvement plan under the Planning Act. Section 28 of the Planning Act should be consulted for eligible costs.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Transport Pathways		
	Policy Directive	Policy
1	Recommend a list of activities that could create transport pathways that require the municipalities to notify the Source Protection Authority and the Source Protection Committee upon receipt of applications for development.	Policy not required

2	Recommend actions to be taken by the Source Protection Authority and the Source Protection Committee upon receipt of notification about a proposed transport pathway.	O-1-S h
3	Request that best management practices be used for the installation of new municipal infrastructure in proximity of municipal wells to protect groundwater sources.	O-1-S a
4	Support the inclusion of conditions of approval for development applications, to ensure the decommissioning of wells in accordance with Ontario Regulation 903 occurs.	O-1-S b
5	Support ongoing funding for the Ontario Drinking Water Stewardship program and other similar municipal programs for the decommissioning of wells.	O-1-S c
6	Support ongoing education programs regarding the decommissioning of wells.	O-1-S c,d
7	Support a program to encourage landowners within the urban boundary that currently use wells as their water supply to connect to the municipal supply and decommission those wells, where possible and appropriate.	O-1-S e
8	Request the municipalities prepare by-laws that prohibit the construction of new wells and septic systems within the urban areas where municipal water and wastewater services are available.	O-1-S f
9	Request the municipalities to prepare by-laws/procedures/ processes that prohibit the construction of closed loop earth energy systems within the wellhead protection areas A and B. Removed in 2014 following release of Ontario Regulation 98/12 – Ground Source Heat Pumps and updates to the Canadian Standards Association requirements in CSA C448 Series, July 13, 13.	repealed

4.2 Climate Data

4.2.1 Background

What are climate data?

~~The Meteorological Service of Canada and the Water Survey of Canada collect the data related to climate. In addition, Halton Region, the City of Hamilton, and the Conservation Authority operate rain gauges or weather stations in their Area.~~

The Ministry of the Environment and Climate Change has listed in section 26 of Ontario Regulation 287/07 that the parameters used to monitor the climatic conditions of the Source Protection Area are precipitation, stream flow, temperature, evapotranspiration, and solar radiation.

Two departments of Environment Canada collect data related to climate. They are:

The Meteorological Service of Canada

- Collects and archives data to interpret past, current, and future weather conditions across Canada.
- Disseminates the data collected in real time, as well as operating the National Climate Data and Information Archive.
- Sets climate normals, the average values for a given period of time, which are used for comparison with existing conditions and for predictions. The data collected vary between climate stations and may include temperature, precipitation (rain and snow), wind speed and direction, pan evaporation, and solar radiation.

The Water Survey of Canada

- The national authority responsible for the collection, interpretation, and dissemination of standardized water resource data and information in Canada.
- Works with local agencies to operate hydrometric gauges in waterbodies.
- Collects data on water levels and stream flows.

Information on climate is essential to an improved understanding of long-term climatic effects on water resources.

Halton Region, the City of Hamilton, and the Conservation Authority supplement the data collected by Environment Canada by operating their own weather stations, typically rain gauges. Private industry and academic research projects also collect climate data within the Area.

What policies related to climate data will assist with managing drinking water threats?

The collection of data that can be used to evaluate long-term trends in weather conditions and changes in local climate is crucial to an improved understanding of impacts on water resources under varying conditions. Also, the monitoring of surface water levels and flows and groundwater levels is required to support predictions on impacts to drinking water sources.

~~It would be useful to include solar radiation data collection at a local station below the Niagara Escarpment. This could help with interpreting water balances within the Region's watersheds.~~

Data on temperatures and precipitation received should be collected, at a minimum, on an hourly basis to facilitate the development of surface water numerical modelling.

Solar radiation data are collected at very few stations and none within the Halton Region Source Protection Area. The inclusion of solar radiation data collection at a local station below the Niagara Escarpment would provide more accurate information that could be used to interpret water balances within the watersheds.

How does collection of climate data affect the Halton Region and Hamilton Region Source Protection Areas?

Environment Canada has reduced the number of climate stations in operation in the Halton Area and Hamilton Area, and currently, few are located above the Niagara Escarpment. In order to assess long-term trends in surface and groundwater data, it is essential that the Source Protection Authority have reliable, long-term weather data.

The groundwater and surface water monitoring networks of the Province may not reflect the findings of the watershed assessments completed as part of the source protection planning process. The data collected from these networks are used for various studies and are typically the only long-term records available. Due to our changing climate there is a greater need to understand our water resources now.

What legislation, guidelines, or protocols already exist?

Section 26 of Ontario Regulation 287/07 under the Clean Water Act, 2006 states that Source Protection Plans may set out policies specifying the actions to be taken by persons or bodies in the Source Protection Area to ensure that data on the climate conditions in the area are gathered on an ongoing basis, including data related to precipitation, streamflow, temperature, evapotranspiration, and solar radiation.

~~Under Ontario Regulation 287/07, Source Protection Plans may include policies to address the collection of climate data.~~

4.2.2 Discussion on Policy Options

~~The Committee supports the on-going data collection carried out by municipalities in addition to an expansion and diversification of data collection across the Source Protection Areas by Environment Canada.~~

The Planners' Working Group and Source Protection Committee discussed policy approaches regarding the continued collection of climate data.

The municipalities indicated that they would continue to collect data for their own records, because it is information deemed important to municipal studies and archives. However, since municipalities generally collect only rainfall and temperature data, it was suggested that the data collection efforts of Environment Canada be expanded further throughout the Areas in order to gather more localized and accurate data on more parameters. Environment Canada should be encouraged to review their current network of stations in the Halton Area and vicinity and to assess the need for additional stations or for stations that monitor more parameters, such as solar radiation.

The Committee agreed that policy should encourage ongoing data collection by the municipalities, as well as Environment Canada and other authorities, and advocate for the expansion and diversification of data collection across the Areas.

Consultation

The Ministry of the Environment and Climate Change and Environment Canada identified the limitations of their programs to implement the policy as written. The policy is strategic and highlights what the Source Protection Committee believes would benefit the protection of the drinking water sources. Environment Canada has suggested the use of other products to assist source protection planning and has indicated that they are developing new programs that may be of use.

The Ministry of the Environment and Climate Change has requested that policy wording provide flexibility for implementation when they affect operational procedures. However, it is the opinion of the Source Protection Committee that the data requested in the policies is important for long-term assessment of climate impacts on drinking water sources. The Source Protection Committee discussed the Lake Ontario monitoring requirements and decided to trust the Ministry of the Environment and Climate Change to implement the policy for monitoring in the best practical way. Thus, O-2-S b was modified.

The County of Wellington requested a wording change for O-2-S a. to reflect the variability in the municipalities' capacity to collect, interpret and share data.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Climate Data		
	Policy Directive	Policy
1	Support and encourage continued collection, sharing and interpretation of hydrological, hydrogeological and climate data by municipalities, the conservation authority, the Ministries of the Environment and Natural Resources, and Environment Canada.	O-2-S a
2	Encourage Environment Canada to review its monitoring network to ensure appropriate locations of climate stations exist and that data for all necessary parameters, such as solar radiation, are collected, where needed.	O-2-S c

3	Request the Ministry of the Environment and Climate Change to install instrumentation to provide monitoring of current speed and direction and water chemistry of Lake Ontario source water.	O-2-S b
4	Request the Ministry of the Environment and Climate Change to review groundwater and surface water monitoring networks and to ensure appropriate locations and adequate construction and that appropriate data are being collected.	O-2-S d

4.3 Disposal or Use of ~~Imported Fill~~excess fill/excess soil including but not limited to contaminated soil

4.3.1 Background

~~What is imported fill?~~

~~Fill is material (usually earth and rock) that is not native to a property but is used to alter ground elevation.~~

In the first round of planning, the source protection committee used the term "imported fill" with the intent to include contaminated soil. Fill refers to a variety of materials that are not native to a property and are typically used to alter the elevation of the ground surface. Fill normally comprises earth and rock, but broken asphalt, concrete and boulders may be used. Depending on the purpose of fill placement, the properties of the fill may be strictly controlled. Imported fill is materials brought from another property. It can be excess soil or demolition debris from development sites or construction projects.

On January 1, 2021, phase one of Ontario's On-Site and Excess Soil Regulation O. Reg. 406/19, came into force. Through it, the province regulates soil reuse to responsibly dispose of contaminated soil and also decrease the amount of clean excess soil entering landfills as waste. "Excess soil" means soil, or soil mixed with rock, that has been excavated as part of a project and removed from the project area for the project.

In October 2021, the Source Protection Committee reviewed the definitions of contaminated fill and excess soil. They discussed the original intent of the policy O-4-5, use of the phrase "important of fill", and considered the O. Reg. 406/19. It was decided to use the wording: "excess fill/excess soil including but not limited to contaminated soil" in the Source Protection Plan. This helps capture the consideration of contaminated soil being used or disposed of within the watershed.

What policies regarding excess fill/soil will assist with managing drinking water threats?

~~All imported fill should be tested for contamination prior to transportation from one property to another. Contaminated fill can affect water sources.~~

Depending on the land use of the property from which the fill is removed, the quality of that fill may not be suitable for disposal on another property. Accordingly, all excess fill/excess soil including contaminated soil should be tested to demonstrate that it is free of contamination prior to transportation from one property to another.

If contaminated ~~fill~~ soil is used or disposed of on a property, rain and surface runoff percolating through the material could dissolve the contaminants and carry them to watercourses or down to groundwater. Furthermore, if sediment with adsorbed contaminants enters a watercourse, the water quality could be impaired. Whether the excess fill/excess soil is contaminated or not, it should not be placed in locations where it could enter a watercourse.

How does imported ~~excess~~ fill~~/excess soil including contaminated soil~~ affect Halton Region and Hamilton Region Source Protection Areas?

Conservation Halton is concerned about ~~excess~~ fill~~/excess soil including contaminated soil~~ imported from the Greater Toronto Area into Halton's rural land. Some imported material has been contaminated, and truck drivers cannot always confirm that the ~~fill~~ material was clean or identify its origin.

Halton Region Source Protection Area is partially within the Greater Toronto Area, where cleanup and development of brownfields is occurring. The proximity of rural lands in both Halton Area and Hamilton Area provides an opportunity for the disposal of imported ~~excess fill/excess soil including but not limited to contaminated soil fill~~.

The City of Hamilton has a municipal by-law regulating the import of fill (Site Alteration By-law No. 19-286), available here: https://www.hamilton.ca/sites/default/files/media/browser/2019-11-29/19-286.pdf

In July 2008, Conservation Halton initiated an inter-agency program to screen dump trucks that carry excavation waste into the watershed, and their drivers. The Ministry of the Environment and Climate Change sampled the materials carried by the trucks, and testing showed that some material was contaminated at a hazardous level. Not all drivers carried the proper paper work or could verify that the material was clean. Some would not comment on where the material came from or where it was going.

For these reasons, Conservation Halton is concerned about the amount of ~~excess~~ fill~~/excess soil including contaminated soil~~, and its quality, being disposed of in the Area.

The Source Protection Committee, Niagara Escarpment Commission, municipalities, and the conservation authorities are concerned about the quality of fill materials being placed in the Halton-Hamilton Source Protection Region and its potential effect on the quality of water sources.

What legislation, guidelines, or protocols already exist?

Legislation related to imported fill includes:

- Environmental Protection Act (1990)
- Conservation Authorities Act (1990), and
- Municipal Act (2001).
- ~~Municipal Act (2001).~~

~~Environmental Protection Act, 1990~~

~~The Environmental Protection Act (EPA), which is enforced by the Ministry of the Environment and Climate Change, provides for the protection and conservation of the natural environment partially through the prohibition of discharges of any contaminants into the environment that cause or are likely to cause adverse effects. Construction materials, demolition materials and inert fill are classed as wastes under the Act.~~

Environmental Protection Act (1990)

The Environmental Protection Act (EPA) is a comprehensive provincial legislation for the protection and conservation of the natural environment. This is achieved through tools including prohibitions, licensing,

codes and standards, enforcement orders and prosecutions, inspections, and special provisions to deal with waste, brownfield sites and spills. It is enforced by the MECP. The main prohibition in the EPA is the discharge of a contaminant into the natural environment when it exceeds a standard established in the regulations. The EPA has several regulations, of which those relevant to fill are described below.

O. Reg. 406/19 On-Site and Excess Soil Regulation (under the Environmental Protection Act)

On January 1, 2021, phase one of Ontario's On-Site and Excess Soil Regulation O. Reg. 406/19, came into force. Through it, the province regulates soil reuse to responsibly dispose of contaminated soil and also decrease the amount of clean excess soil entering landfills as waste. "Excess soil" means soil, or soil mixed with rock, that has been excavated as part of a project and removed from the project area for the project.

Part XV.1 and O. Reg. 153/04 'Record of Site Condition' (under the Environmental Protection Act)

Properties that are vacant or underutilized and have contamination due to past industrial or commercial activities, are commonly called 'Brownfields'. If such a property is to be re-developed for a different land use (i. e. from less to more sensitive use e.g.: industrial or commercial use, to residential or public park use), a Record of Site Assessment (RSC) is required per Part XV.1 and O. Reg. 153/04 of the EPA. The O. Reg 153/04 sets out the standards for the allowable concentrations of certain constituents in soil, which will vary depending on the soil conditions and the use to which the property will be put.

O. Reg. 347 'General Waste Management' (under the Environmental Protection Act)

The O. Reg. 347 sets out the definition, categorization, management and disposal of waste. The S. 82 of O. Reg. 347 sets out the allowable concentrations of certain constituents in "soil" or "soil mixture", in order to be disposed of on land.

Fill Quality Guide and Good Management Practices for Shore Infilling in Ontario, March 2011

The Ministry of the Environment and Climate Change provides guidance and good management practices for fill use in shore infilling projects. This guidance document is focused on the creation of new land in shallow areas of lakes and rivers. However, the good management practices provided can be used wherever imported fill could affect water sources. The goal of the guidance document and practices is to protect aquatic ecosystems by protecting the quality of the sediment and water. The document discusses the evaluation of the suitability of fill material, including its quality and states that contaminated fill should not be placed in water or adjacent to water along a shore or bank.

Management of Excess Soil – A Guide for Best Management Practices

The Ministry of Environment released this guidance document in January 2014 to provide general concepts on how to handle excess soil from its excavation, through transportation and reuse. They encourage municipalities and conservation authorities to consider the best management practices when issuing permits or approvals, and establishing policy and by-laws.

4.3.2 Discussion on Policy Options

~~Conservation Authorities regulate a 120-metre distance from all watercourses in their jurisdiction. This regulation overrides municipal by-laws, so policy should encourage both municipalities and conservation authorities to require fill testing and documentation.~~

First round of Source Protection Planning (using the term importation of fill)

The municipalities, conservation authorities, and the Niagara Escarpment Commission have indicated that their ability to control fill importation may not be sufficient to prevent non-inert material from being used where only inert material was permitted.

The Committee noted that a clause usually exists in municipal policy about site alteration or fill disposal. Site alteration by-laws may be too limited to provide protection to drinking water sources. This is an issue due to the overlapping jurisdiction between the conservation authorities and the local municipalities, and varying rules in municipal by-laws.

The Committee reviewed the various site alteration by-laws in order to ascertain a common objective among them. Generally, the by-laws attempt to control the movement or placement of soil that may result in the degradation of watercourses.

Ontario Regulations 161/06 and 162/06, Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses for the Hamilton and Halton Region Conservation Authorities, override the municipal site alteration by-laws within the conservation authority's jurisdiction. The conservation authorities regulate a 120-metre distance from all water bodies and wetlands in their jurisdiction. They expressed concern that the more restrictive municipal by-laws could not be enforced in this area. The regulation allows for scrutiny of applications to asses potential effects to the function of the water body or wetland including effects due to pollution.

Close monitoring of fill quality and placement is necessary to protect the water sources within the Source Protection Areas. The municipalities and conservation authorities should require appropriate testing of fill and submission of the laboratory analysis reports with development applications. It was discussed that a condition should be added in policy to give the authority to the municipality to request verification samples of fill quality at the expense of the applicant, if there remains doubt as to the origin or quality of the material being imported. The conservation authorities should ensure fill is tested and documented appropriately and verification of fill quality is made. Typically, it is the lack of appropriately skilled man-power and a proper procedure to follow that limits the agencies from carrying out verification studies.

The Clean Water Act, 2006 specifies what policies are acceptable for inclusion in a Source Protection Plan. Policies that address non-significant threat topics must use either education and outreach, or incentive programs as the tool. Hence, an education and outreach policy was developed to inform landowners, developers, and contractors about the potential risks associated with fill importation. The basis for the information to be shared is the best management practices included in the Ministry of the Environment and Climate Change's document - Management of Excess Soil – A Guide for Best Management Practices (2014). It is suggested that the municipalities, conservation authorities and Niagara Escarpment Commission collaborate on an awareness program to educate landowners and developers about these practices and the potential adverse effects from improper fill placement.

The policy directive was presented ~~on June 10 and June 14~~ to the Planners' Working Group and the Source Protection Committee for final review and confirmation. The policy directive set out below is the final directive recommended by the Source Protection Committee during the first round of source protection planning.

Consultation

The Ministry of the Environment and Climate Change indicated that the only acceptable tools to be used for this topic were education and outreach or incentive programs. The policy approach was supported through the comments received in the pre-consultation process. Minor wording revisions were requested and have been accommodated. The target audience of the outreach program was broadened to include contractors and developers.

In the second round of source protection planning, the Source Protection Committee reviewed the definitions of contaminated fill and excess soil. In October 2021, they discussed the original intent of the policy O-4-S, use of the phrase "important of fill", and considered the O. Reg. 406/19. It was decided to use the wording: "excess fill/excess soil including but not limited to contaminated soil" in the Source Protection Plan. This helps capture the consideration of contaminated soil being used or disposed of within the watershed.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives For Disposal or Use of ~~Imported Fill~~Excess Fill/Excess Soil including but not limited to Contaminated Soil		
	Policy Directive	Policy
1	Request that municipalities and the conservation authorities develop and implement an education and outreach program based on Ministry of the Environment and Climate Change guidance that will best protect municipal drinking water sources when the importation of excess fill/excess soil including but not limited to contaminated soil ~~fill~~ is proposed.	O-4-S

4.4 Spill Prevention, Contingency, and Emergency Response Plans for Transportation Corridors

4.4.1 Background

What are Spill Prevention, Spill Contingency, and Emergency Response Plans, and what are transportation corridors?

~~Spill prevention plans outline appropriate handling and storage of potentially harmful substances. Also, they can set out procedures and preventative maintenance standards.~~

Ontario Regulation 287/07 provides for inclusion of policies specifying actions to be taken by persons or bodies to update spill prevention and spill contingency plans or emergency response plans for the purpose of protecting existing drinking water sources with respect to spills that occur within a wellhead protection area or surface water intake protection zone along highways, railway lines, or shipping lanes.

Prevention of spills is the goal for any business for environmental and economic reasons. A spill prevention plan can assist by outlining, at a minimum:

- materials handling procedures
- materials storage requirements
- process operating procedures
- preventative maintenance requirements
- employee training
- record keeping

A spill contingency plan is in place in case a spill does occur. This plan:

- identifies lines of authority and responsibility
- establishes proper reporting
- establishes communication procedures
- describes an action plan
- includes a resource inventory
- describes employee training programs

All the necessary information to effectively control and clean up a spill should be included in the spill contingency plan.

~~A spill contingency plan sets out an action plan should a spill occur, in addition to proper reporting requirements.~~

An emergency response plan is required under legislation to be developed by every municipality. This plan deals with incidents that have caused or could cause damage of major proportions to life or property. To respond to an emergency typically requires a coordinated effort of more than one government level, the public, and private sectors. The plan:

- authorizes employees of the municipality or public servants to take action prior to the declaration of the emergency
- specifies procedures to be taken for the safety or evacuation of persons

- designates one or more members of council who may perform the duties of the head of council, if the head of council is unable to act
- establishes committees
- designates those responsible for review of the plan, training requirements, and the implementation of the plan
- provides for obtaining and distributing materials, equipment, and supplies
- provides for implementation of the plan

~~Every municipality is responsible for preparing and managing a municipal emergency response plan that addresses incidents that have or could cause damage to life or property.~~

The Regulation focuses policy for the updating of these contingency or emergency response plans for protection of drinking water sources to within transportation corridors. Transportation corridors are geographic areas between two points that link multiple centers and move people and freight (Frank Douma and Kenneth Kriz, 2003). The corridor may contain roads for transport by car or truck, rail tracks for transport in rail cars of various design and purpose, or designated shipping lanes for transportation of goods in vessels on water.

The Highway Traffic Act defines a highway as a highway, street, avenue, parkway, driveway, square, place, bridge, viaduct or trestle intended for or used by the general public for the passage of vehicles. Many companies use roads to transport goods, and many of these goods, if spilled in vulnerable areas, could negatively affect drinking water sources.

Rail lines are used to transport people and a variety of goods along stationary tracks. Shipping lanes define safe passageways between ports for lake or ocean going vessels. Freight trains and ships are efficient means to transport large quantities of goods long distances.

What activities regarding these plans will assist with the management of drinking water threats?

Spills prevention, contingency, and emergency response plans become outdated as processes, chemicals, and technologies change. They should be reviewed on an annual basis to ensure they contain the appropriate personnel and best clean up procedures and methods. Information that should be reviewed includes, at a minimum:

- chemical inventories
- chemical storage locations
- fuel tank storage locations
- new building construction
- new personnel
- contact information
- new processes
- employee training records
- spill prevention measures
- spill response and clean up technologies

The plans should also be updated to include reference to municipal drinking water infrastructure and protection areas. The findings of the source protection planning process provide recent delineations of these vulnerable areas that require consideration.

How do these plans affect Halton Region and Hamilton Region Source Protection Areas?

~~Plans should include up-to-date mapping of vulnerable areas within the Halton-Hamilton Source Protection Region.~~

Major road, rail, and shipping corridors criss-cross the Halton Region and Hamilton Region Source Protection Areas. Highway 401 and the Queen Elizabeth Way (QEW) link major cities and industries to the provincial and international borders. A network of other provincial, regional, and local roads, add to the complexity and coverage of road transportation routes. Canadian National and Canadian Pacific rail lines are two major companies transporting freight across the Areas on a multitude of rail tracks. Hamilton Harbour is an international shipping port located about 500 metres from the Burlington and Woodward municipal Lake Ontario intakes, and the shipping lanes parallel the Halton Region and City of Hamilton shorelines. In addition, a shipping lane to the Suncor Distribution Terminal pier in Oakville crosses the intake protection zones one and two of the Burloak municipal intake.

The municipalities, agencies, industries, transportation companies, rail companies, and shipping companies that work with or transport hazardous materials have spill prevention and/or contingency plans to address accidental spills. These plans should be updated to reflect the mapping of vulnerable areas within the Halton-Hamilton Source Protection Region to ensure they also aim to protect drinking water sources.

What legislation, guidelines, or protocols already exist?

Existing legislation related to spills and emergency plans include:

- Emergency Management and Civil Protection Act
- Emergency Management and Civil Protection Act, 1990

The Emergency Management and Civil Protection Act requires municipalities to develop their own emergency management programs to protect the property, health and safety, and welfare of the inhabitants of the emergency area. Under the Act, the head of council may declare an emergency.

An emergency is defined as a situation or impending situation caused by the forces of nature, an accident, an intentional act, or otherwise that constitutes a danger of major proportions to life or property.

~~An emergency refers to a situation that constitutes a danger of major proportions to life or property. All municipalities within Halton SPA have emergency response plans in effect. The Region of Halton and the City of Hamilton also have emergency spill response teams.~~

Ontario Regulation 380/04 – Standards, sets out the requirements for ministries and municipalities for the designation of a program co-ordinator, committee, and control group. It also specifies that an emergency operations centre must be established and an information officer designated to be the contact for the media and the public.

The Region of Halton, the Towns of Halton Hills and Milton, the Cities of Burlington and Hamilton, the Township of Puslinch, and the County of Wellington all have emergency response plans adopted and in effect.

In addition to the above, the Region of Halton has an emergency spill response team that works with the local municipalities and Ministry of the Environment and Climate Change in the case of a spill. The City of Hamilton also has a similar process.

Other Tools

Spills Action Centre

The Spills Action Centre is a 24-hour service that sets out appropriate response and action in the case of a spill.

The Ministry of the Environment and Climate Change is the lead provincial agency for environmental emergencies.

The ~~MOECC~~MECP regulatory mandate for spills is based on Part X of the Environmental Protection Act that requires spills to be reported immediately. Part X also requires the owner of the spilled material and the person who had control of the material when it was spilled to promptly clean up and restore the environment. The Ministry also enforces the clean up and disposal of the spilled materials in an appropriate manner. If there is an inadequate response, the Minister can order a cleanup. If the owner fails to comply, the ~~MOECC~~MECP can undertake the cleanup and recover costs.

The Ministry is responsible for spill and drinking water emergencies by Order in Council under the Emergencies Management and Civil Protections Act. The Ministry has developed an Emergency Management Program to implement this requirement.

4.4.2 Discussion on Policy Options

~~Companies using the Port of Hamilton could be educated as to the location of municipal drinking water intakes. Companies should be directed to notify the municipality of any spill.~~

The Planners' Working Group and the Source Protection Committee discussed policy approaches for protecting drinking water sources through the update of contingency and emergency response plans.

The Hamilton Port Authority does not have a spill contingency plan for the whole port, but rather each company using the port has a plan. An educational policy could be put in place to inform each company of the location of municipal drinking water intakes near the Burlington Canal and to request that details be added to company plans to notify the municipality directly should a spill occur. The Hamilton Port Authority suggested that vessel operators that use the Port of Hamilton also be requested to update their spill control plans. Direct notification of the municipality that a spill has occurred is imperative to provide extra time for the water treatment plant operators to predict and prepare for impacts on their system.

As a best practice, the Committee discussed inclusion of policies to ensure that the location of wellhead protection areas and intake protection zones are included within municipal emergency response plans and provided to the Spills Action Centre so the most current information is available in the case of a spill within a transportation corridor.

Companies that transport goods that could potentially affect the quality of the source water for municipal drinking water supplies should also be notified of the locations of wellhead protection areas and intake protection zones for municipal wells and intakes. Trucking companies, the chemical industry, and rail companies should all be informed.

The Lake Ontario Collaborative has been working on modelling various spill scenarios, including a spill from a ship within Lake Ontario and its potential impacts on municipal source water. The spill scenario modelling may find that threats to the intakes exist during extreme events and policies will be put in place to manage the risk at that time. However, this work will not be completed in time to be included in the Source Protection Plan. If required, an amendment will be submitted to the Ministry of the Environment and Climate Change to include the new information.

Consultation

Concerns were raised by some municipalities regarding the funding source for any municipal education and outreach programs. The Source Protection Committee was of the opinion that these programs will be important supporting elements to the policies and should be maintained at the local level. ~~The reader is directed to the Source Protection Plan to review the policies.~~

In 2020, CA staff discussed implantation challenges with municipalities. It was noted that the educational message and materials may not be reaching the intended audience, and outcomes are unknown. Staff recommended that the implementer be changed from municipalities to the Ministry of Transportation Ontario and Transport Canada.

The Hamilton Port Authority suggested changes to the draft policy that were incorporated. They suggested that contact be made with vessel operators rather than companies that lease space on port lands; however, the Committee believes it is important to contact both groups to raise awareness about the location of municipal drinking water intakes in Lake Ontario. The Committee removed the requirement to contact the municipality directly should a spill occur, instead relying on the existing Spills Action Centre procedures.

The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Spill Prevention, Contingency and Emergency Response Plans		
	Policy Directive	Policy
1	To assist in the response to spills in transportation corridors, request all municipalities within the Source Protection Areas to incorporate the information regarding the location of vulnerable areas into their emergency response plans.	O-5-S a
2	Request that the Hamilton Port Authority advise each company that leases space on port lands of the location of municipal drinking water intakes and request that details be added to company spill contingency plans to notify the	O-6-S

	municipality directly should a spill occur.	
3	To assist the Spills Action Centre in their response to spills in transportation corridors, include a policy that the Spills Action Centre must be provided with mapping of vulnerable areas within Halton-Hamilton Source Protection Region.	O-5-S b
4	Request that the Ministry of Transportation Ontario and Transport Canada ~~municipalities~~ implement an education and outreach program to encourage all transportation businesses to prepare or update spill prevention plans, to review them annually, and to update them when required.	0-5-S c

4.5 Lake Ontario Outreach

What additional policies are necessary to protect Lake Ontario drinking water sources?

An additional policy was discussed by the Source Protection Committee regarding an update to the Environmental Sensitivity Atlas for Lake Ontario's Canadian Shoreline, a product of Environment Canada, Ontario Region. The document highlights, with mapping, the infrastructure and water use along the shore of Lake Ontario and is a good reference for shipping companies transporting goods on the lake. The document was published in 1992 and requires updating to reflect the current infrastructure and current knowledge of potential risks.

An outreach initiative proposed by the Lake Ontario Collaborative is to share the findings of source protection planning with others that use the water of Lake Ontario. The Committee adopted this policy for inclusion in the Plans for the Halton Region and Hamilton Region Source Protection Areas. The agencies to be included in the outreach initiative are Environment Canada, New York State, and United States government agencies. By sharing and discussing the program, the findings and the resultant source protection policies, the agencies and the residents of the other communities may benefit from our work and their actions could also protect our drinking water sources.

Consultation

The only revisions to the draft policies from pre-consultation were in response to additional directives from the Ministry of the Environment and Climate Change regarding suggested wording to keep the policies in scope. The reader is directed to the Source Protection Plan to review the policies.

Policy Directives for Lake Ontario Outreach		
	Policy Directive	Policy
1	Request the Ministry of the Environment and Climate Change share information about water resources obtained through the source protection planning process with Environment Canada, Ontario Region, with an emphasis on updating the Environmental Sensitivity Atlas for Lake Ontario's Shoreline to include current knowledge and understanding of the lake and current infrastructure.	O-7-S
2	Request the Ministry of the Environment and Climate Change to discuss the findings and policies arising from source protection planning with Environment Canada, New York State, and United States government agencies.	O-8-S

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~~Appendix A~~

Appendix A: Evaluation Matrix

~~APPENDIX A~~

~~Evaluation Matrix~~

~~Evaluation Matrix~~

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Threat 1- Waste Disposal Sites The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act	Require that the Ministry of the Environment deny applications for environmental compliance approvals for waste disposal sites proposed where waste disposal sites could be significant threats. Updated in 2014 to prohibit this activity.	T-1-C	X		X	X		X	X	X
	Support municipal education and outreach programs about hazardous waste disposal and reduction of waste.	T-2-C					X		X	X
	Amend official plans and zoning by-laws to prohibit waste disposal within vulnerable areas where there would be a significant threat to municipal drinking water sources.	T-3-C a.	X		X	X		X	X	X
	Amend the Niagara Escarpment Plan to prohibit waste disposal within vulnerable areas where there would be significant threat to municipal drinking water sources.	Policy not required	X		X	X		X	X	X
	Outside of significant threat areas, recognize the current environmental assessment process and provide support to continue to use this process.	Policy not required	X		X	X			X	X
	Use Part IV restricted and prohibited activities to address the waste disposal site activities that do not require prescribed	T-3-C c.			X	X		X		X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	instruments.									
Threat 2 – Sewage Systems Combined Sewer Discharges	Direct the City of Hamilton to prohibit the construction of combined sewers within a wellhead protection area E.	T-51-C	X		X			X	X	X
Threat 2 – Sewage Systems Discharge of Stormwater from a ~~Stormwater Retention Pond~~Stormwater management facility	Require the Ministry of the Environment to include terms and conditions in environmental compliance approvals for the discharge of stormwater from a ~~stormwater retention pond~~stormwater management facility that will ensure this activity never becomes a significant drinking water threat. The Ministry will consider the following conditions to manage the risk – the requirements for regular maintenance of the pond, periodic removal of accumulated sediment, lining of the pond where warranted, the possible need for an oil/water separator, and other conditions to address site conditions.	T-4-C	X		X	X		X	X	
	As part of the approval of a Planning Act application, the municipalities must consider whether the stormwater pond can be located outside of the vulnerable area where there could be a significant drinking water threat.	T-9-C	X	X	X					X
Threat 2 – Sewage Systems	Require the Ministry of the Environment to include terms and conditions in environmental compliance approvals for	T-5-C	X		X	X		X	X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Industrial Effluent Discharges	industrial effluent discharges in vulnerable areas to ensure that the activity does not become a significant drinking water threat. The terms and conditions could include monitoring, or the inclusion of strict criteria for effluent quality.									
Threat 2 – Sewage Systems Sanitary Sewers and Pipes (not a tank or by-pass)	Require the Ministry of the Environment to include terms and conditions in environmental compliance approvals for sanitary sewers and pipes within vulnerable areas where they would be a significant threat to municipal drinking water sources. The terms and conditions could include the requirement for inspections and maintenance.	T-6-C	X		X	X		X	X	X
Threat 2 – Sewage Systems Small systems - Septic Systems under Ontario Building Code	Support education and outreach programs for landowners about the proper disposal of toxic chemicals, the operation and maintenance of septic systems, and the benefits of installing effluent filters, performing tank inspections, and having tanks regularly pumped out.	T-13-C		X	X		X		X	
Pit privy, privy vault,	Support the mandatory inspection program as required under	T-14-C			X	X	X	X	X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
greywater system, cesspool, leaching bed system	the Ontario Building Code.									
	Support the inspection program only for mandatory inspections and leave it up to the municipality regarding their discretionary authority.	No policy required		X	X	X				X
	Request landowners to connect to municipal sewage systems when a septic system is used within a vulnerable area where municipal services are provided, permitted, and capacity is available.	T-15-S			X	X			X	X
	Support and encourage ongoing funding of the Ontario Drinking Water Stewardship Program or a similar program by the Ministry of the Environment for septic system upgrades, replacements, decommissioning, and connection to municipal sewage works where they are a significant threat.	T-16-S	X	X		X	X			X
	Consider the creation of municipal financing programs to assist landowners who are required to complete septic system improvements under the mandatory inspection program. The program should allow the work to be completed and the landowner to repay the municipality over time.	T-17-C	X	X	X					X
	Within official plans and zoning by-laws, ensure future lot sizes are of sufficient size to accommodate the required on-site	T-11-C	X		X	X		X	X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	servicing.									
Threat 2 – Sewage Systems Small systems	Request the Niagara Escarpment Commission amend the Niagara Escarpment Plan to ensure future lot sizes are of sufficient size to accommodate the required on-site private servicing.	T-12-S	X		X	X		X	X	X
Threat 2 – Sewage Systems Large Systems -Septic Systems under Ontario Water Resources Act and	Require the Ministry of the Environment to include terms and conditions in environmental compliance approvals for large septic systems in vulnerable areas to ensure that they cease to be or do not become significant drinking water threats. The terms and conditions could include mandatory monitoring of groundwater impacts, contingencies in the event that the	T-7-C	X		X	X		X	X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Environmental Protection Act	source water quality is affected, compliance monitoring, mandatory system inspections at least every five years, upgrades to current standards, if necessary, and annual reporting to the Source Protection Authority.									
	Require the municipality, in consideration of site plan approval for a property with a new large septic system, to locate the septic system on the site in a manner that eliminates its location within a vulnerable area where there would be a significant drinking water threat.	T-10-C	X	X	X	X			X	X
	Request the municipality responsible for wastewater services to consider a connection to municipal wastewater services for rural properties where the septic system has failed and where all other mitigation measures have been explored (including the replacement of the system and/or installation of an advanced private treatment facility) to the satisfaction of the municipality and found unsuitable, or where the municipality considers connection for future development to be most appropriate, and where the connection is permitted by provincial and municipal planning policy.	T-18-S	X	X	X	X			X	
	Request landowners to connect to municipal sewage systems	T-15-S		X	X			X	X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	when a septic system is used within a vulnerable area where municipal services are provided, permitted, and capacity is available.									
Threat 2 – Sewage Systems Large Systems	Support education and outreach programs for landowners about the proper disposal of toxic chemicals, the operation and maintenance of septic systems, and the benefits of installing effluent filters, performing tank inspections, and having tanks regularly pumped out.	T-13-C		X	X		X		X	
	Support and encourage ongoing funding of the Ontario Drinking Water Stewardship Program or a similar program by the Ministry of the Environment for septic system upgrades, replacements, decommissioning, and connection to municipal sewage works where they are a significant threat.	T-16-S	X	X	X	X	X			X
Threat 2 – Holding Tanks Holding tank stores sewage until hauled	Implement an education and outreach program to inform users of holding tanks about the requirements for an appropriate long-term maintenance program, including inspections and scheduled pump-outs, and about the proper disposal of toxic chemicals. This could improve the quality of the effluent that leaves the sewage treatment plant.	T-13-C		X	X		X		X	
	Support the mandatory inspection program under the Ontario	T-14-C			X	X	X	X		

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	Building Code.									
Threat 2 – Sewage Systems Sewage Treatment Plants	Support the environmental assessment process as an important tool in addressing significant drinking water threats.	No policy required	X		X	X		X	X	X
	Require the Ministry of the Environment to include terms and conditions in certificates of approval and environmental compliance approvals for sewage treatment plants in vulnerable areas to ensure that they cease to be or do not become significant drinking water threats. The terms and conditions could include strict effluent quality criteria, appropriate sizing to reduce bypasses, and inspections and proactive maintenance of the works to prevent leaks.	T-8-C	X		X	X		X	X	X
	Request the City of Hamilton and local municipalities to implement programs to address connections of stormwater sources to sanitary sewers to reduce surges in volumes during wet weather.	T-19-C			X	X				
Threat 2 – Sewage Systems Sewage Treatment	For significant threats to Lake Ontario, request that the Ministry of the Environment protect drinking water sources through provision of threat mapping to the Spills Action Centre, and if necessary, modify notification procedures.	~~T-52-S~~ T-67-S			X	X		X	X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Plants treated effluent discharges (includes lagoons but not bypasses); (e.g., treatment plant tanks or storage tanks) - storage (e.g., treatment plant tanks or storage)	Require the Ministry of the Environment to include terms and conditions in certificates of approval for sewage treatment plants that are significant drinking water threats to Lake Ontario municipal intakes to ensure that they cease to be significant drinking water threats. The terms and conditions could include the adjustment of the reporting thresholds for pathogens and chemicals of concern in effluent.	T-52-C	X	X	X			X	X	X
	Request that the owners of facilities engaged in significant threat activities to the municipal Lake Ontario intakes update their emergency preparedness/contingency plans to include the location of municipal intakes, actions to be taken, and inclusion of protection of drinking water sources in preparedness exercises.	~~T-52-S~~ T-66-S			X	X	X	X		
Threats 3 and 4 – Agricultural Source Material Application of agricultural source material to land and storage of	Support the use of nutrient management plans and strategies as the primary tools to address drinking water Threats 3 and 4, i.e., the application of agricultural source material to land and storage of agricultural source material.	T-21-C	X	X	X	X	X	X	X	X
	Require OMAFRA to ensure nutrient management plans and strategies for farms within vulnerable areas where there are or would be significant threats are inclusive of measures to	T-21-C	X		X	X		X	X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
agricultural source material	protect drinking water including the requirement for contingency plans to contain the requirement for notification of the Spills Action Centre if a leak or spill occurs.									
	Require Ministry of the Environment to work with farmers where significant threats exist to improve compliance with nutrient management plans and strategies, where needed, and the ultimate protection of source water.	T-22-S	X	X	X		X		X	X
	Require Ministry of the Environment to prioritize inspections of farms in areas where significant threats would occur and to conduct regular inspections.	T-22-S	X		X	X	X		X	X
	For those farms that are not phased-in under the Nutrient Management Act, require a risk management plan for the storage and application of agricultural source material in vulnerable areas where these activities are or would be a significant drinking water threat. These risk management plans would be based on the regulatory requirements of a nutrient management plan or strategy and scoped to address these specific threats.	T-20-C	X		X	X	X	X	X	
Threats 3 and 4 – Agricultural Source	Request ongoing funding of the Ontario Drinking Water Stewardship Program or similar program by the Ministry of the	T-23-S	X				X			X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Material	Environment for projects that reduce the threat from the application and storage of agricultural source material where these activities are a significant risk to municipal drinking water sources.									
	Require pre-screening by a risk management official of agricultural building permits and planning applications for activities related to the application and storage of agricultural source materials in a vulnerable area where the activity would be a significant drinking water threat.	T-20-C	X		X	X		X		
Threats 6 and 7 – Non- Agricultural Source Material Application of non-agricultural source material to land in a vulnerable area and the handling and storage of non-agricultural source material	Support the current regulatory framework and use measures in NASM Plans to manage the threats associated with the application, handling, and storage of category 2 and 3 NASM on agricultural lands.	T-24-C	X		X	X		X	X	X
	Require ~~MOECC~~MECP to prioritize and conduct regular inspections of farms located where threats associated with NASM would be significant risks to drinking water sources.	T-22-S	X		X	X			X	X
	Require that the Source Protection Authority be advised on a yearly basis of the number and location of NASM plans approved within their jurisdiction by OMAFRA, and the number and location of inspections conducted by the Ministry	T-21-C and T-22-S	X		X	X			X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	of the Environment.									
	Require the municipalities to develop an education and outreach program to promote best management practices regarding the application or handling and storage of category 1 NASM.	T-54-C	X		X		X	X		X
Threats 8 and 9 – Commercial Fertilizer Application of commercial fertilizer to land in a vulnerable area and handling and storage of commercial fertilizer	Support education and the promotion of best management practices for golf courses, fertilizer application technicians, homeowners, and retail establishments that apply, handle or store fertilizer on site.	T-27-C	X	X			X			
	Encourage Audubon Cooperative Sanctuary Certification for golf courses within significant threat areas.	T-28-C	X	X			X	X	X	
	Require OMAFRA to ensure nutrient management plans include measures to ensure drinking water Threat 8 never becomes a significant threat.	T-26-C	X		X	X	X	X	X	X
	Require the Ministry of the Environment to prioritize inspections of farms in areas where significant threats would occur and to conduct regular inspections to address Threats 8 and 9.	T-22-S	X		X	X			X	X
	Require a risk management plan for the application of	T-25-C	X		X	X	X		X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	commercial fertilizer on farms not phased-in by the Nutrient Management Act and for the handling and storage of commercial fertilizer on properties would be a significant threat These risk management plans would be based on the regulatory requirements of nutrient management plans and best management practices and scoped to address these specific threats.									
	Require pre-screening by a risk management official of building permits and planning applications for activities related to the application, handling and storage of commercial fertilizer in a vulnerable area where this activity would be a significant drinking water threat.	T-25-C	X		X	X				
Threats 10 and 11 - Pesticides Application of pesticide to land and the handling and storage of pesticide	Require municipalities to implement an education and outreach program on proper pesticide use and storage methods and potential impacts on drinking water. Policy should target golf course operators, farmers, pesticide applicators and exterminators.	T-31-C		X			X			
	Provide wellhead protection area mapping to pesticide applicators, including farmers and exterminators.	T-31-C					X			
	Rely on the existing regulatory framework, since it is effective	No policy	X		X	X	X	X		X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	and appropriate both to address Threat 10, the application of pesticide to land, and to deal with the majority of concerns associated with Threat 11, the handling and storage of pesticide.	required								
	Require pre-screening by a risk management official of building permits and planning applications and negotiation of risk management plans for retail establishments that sell pesticides and pesticide manufacturing, processing, or warehousing operations within the vulnerable areas where these activities could be significant drinking water threats.	T-29-C	X		X	X	X	X	X	
	Request the Niagara Escarpment Commission to consider an amendment to the Niagara Escarpment Plan with regard to issuing development permits: do not permit the development of a retail establishment that sells pesticides or a pesticide manufacturing, processing, or warehousing operation within the vulnerable areas where the handling and storage of pesticides could be a significant drinking water threat.	T-30-S ~~repealed~~replaced								
	Request the Agrichemical Warehousing Standards Association review their standards to ensure buffers exist between warehousing facilities and municipal wells, and review their	~~T-29-S~~ T-30-S			X		X	X		X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Threats 10 and 11 - Pesticides	emergency planning and response measures to protect municipal drinking water sources.~~.~~									
Threats 12 and 13- Road Salt Application. handling and storage of road salt	Request that Halton Region, in cooperation with the local municipalities, the City of Hamilton~~, and private de-icing companies~~ amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the ~~low, moderate and~~ significant threats due to the application, handling, and storage of road salt.	T-35-C~~/S~~ ~~T-49-S~~			X		X		X	X
	Request that the Ministry of Transportation update their salt management plan to stay current with Environment Canada's Code of Practice for the Environmental Management of Road Salts and the Transportation Association of Canada's Syntheses of Best Practices.	T-36-S			X	X	X	X	X	X
	Encourage an education and outreach program for the private and public sectors and general public about source protection planning and the impacts of road salt on drinking water sources, with the key message being the efficient use of road salts or the use of alternatives. ~~Extend the policy to low,~~	T-34-C~~/S~~			X		X		X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Threats 12 and 13- Road Salt	~~moderate and S~~significant threat areas.									
	Request that municipalities amend official plans and zoning by-laws to prohibit salt storage and handling facilities greater than 5,000 tonnes within vulnerable wellhead areas where they would be a significant threat and establish risk management plans with persons proposing to construct salt storage facilities of 5,000 tonnes or less in issue contributing areas. The implementation of these risk management plans shall be overseen by a risk management inspector.	T-32-C	X		X	X		X	X	X
	Request that the Niagara Escarpment Commission amend the Niagara Escarpment Plan to prohibit salt storage and handling facilities with capacity greater than 5,000 tonnes within vulnerable areas where the handling and storage of salt would be a significant drinking water threat.	T-33-S	X		X	X		X	X	X
	Request that the Ministry of Transportation and their supporting de-icing contractors continue the proactive implementation of their salt management plans and to continue the use of best management practices within wellhead protection areas and intake protection zones.	T-36-S			X			X		X
	Request that the Ministry of Transportation complete research	T-36-S		X	X		X		X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	on innovative practices and mitigative technologies to improve road salt application and the management of runoff.									
	Request that the Ministry of Transportation investigate innovative practices and new mitigative technologies to manage road salt runoff and consider a pilot study within the Halton-Hamilton Source Protection Region.	T-36-S		X	X					
	Request that the Ministry of Transportation develop a mandatory accreditation program for de-icing contractors.	repealed	X				X	X		
	Require the establishment of risk management plans for salt storage facilities of 5,000 tonnes or less within issue contributing areas.	T-32-C							X-32-C285285285285285285285285	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
									286	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
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EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
									288	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
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EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
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EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
									291 291 291 291	
	Encourage an education and outreach program for the private and public sectors and general public about source protection planning and the impacts of low or moderate threat road salt on drinking water sources, with the key message being the efficient use of road salts or the use of alternatives.	T-60-S								
	Request that Halton Region, in cooperation with the local municipalities, the City of Hamilton amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low and moderate threats due to the application, handling, and storage of road salt.	T-61-S								
	Request that private de-icing companies amend their salt management plans to identify the location of wellhead protection areas, intake protection zones and issue contributing areas for chloride to address the low, moderate	T-49-S								

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	and significant threats due to the application, handling, and storage of road salt.									
Threat 14 – Snow Storage	Require the municipalities to amend official plans and zoning by-laws to prohibit purpose designed snow storage facilities, at or above grade greater than one hectare or below grade at or greater than 0.01 hectare in size	T-37-C	X		X	X		X	X	X
	Request that the Niagara Escarpment Commission amend the Niagara Escarpment Plan to prohibit snow storage facilities within vulnerable areas where they would be a significant threat to drinking water sources.	T-38-S	X		X	X		X		X
	In the municipal review of site plan applications for new developments located within vulnerable areas where a significant threat to drinking water supplies would exist, require best practices for site design to manage snow storage and the associated melt water be included within the consideration and approval of those applications.	T-39-C			X	X			X	
Threat 15 –Fuel Handling and storage	Require education and outreach for homeowners regarding spill response and when and how to contact the Spills Action Centre. The program will include distribution of stickers with emergency phone numbers to be placed on or near fuel tanks	T-43-C		X	X		X			

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
of fuel	to ensure immediacy of response in case of a spill.									
	Require the municipalities to amend official plans and zoning by-laws to prohibit new gas stations where the handling and storage of fuel would be a significant drinking water threat.	T-41-C	X		X	X		X		X
Threat 15 –Fuel	Require risk management plans for all circumstances, except home fuel oil tanks, related to this activity under Ontario Regulation 213/01 and facilities under Ontario Regulation 217/01. All storage tanks are to meet the Technical Standards and Safety Act (TSSA) requirements and the property owner must have an emergency response plan.	T-40-C			X	X	X		X	
	Require pre-screening of applications for building permits and planning applications by a risk management official for any land uses that could involve activities related to the handling or storage of fuel where the activity would be a significant drinking water threat.	T-40-C			X	X				
	Request the Niagara Escarpment Commission to amend the Niagara Escarpment Plan to prohibit new gas stations where the handling and storage of fuel would be a significant threat to municipal drinking water sources.	T-42-S	X		X	X		X		X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	For significant threats to Lake Ontario request that the Ministry of the Environment protect drinking water sources through provision of threat mapping to the Spills Action Centre and modify procedures for notification, as required.	T-52-S			X	X	X		X	X
	Require the Ministry of the Environment to include terms and conditions in certificates of approval associated with bulk fuel storage facilities that are significant drinking water threats to Lake Ontario municipal intakes to ensure that they cease to be significant drinking water threats. The terms and conditions could include the adjustment of the reporting thresholds for chemicals of concern in effluent.	T-52-S	X	X	X			X	X	X
Threat 15 –Fuel	Request that the owners of facilities engaged in significant threat activities to the municipal Lake Ontario intakes update their emergency preparedness/contingency plans to include the location of municipal intakes, actions to be taken, and inclusion of protection of drinking water sources in preparedness exercises.	T-52-S			X	X	X	X		
Threat 16 – Dense Non-Aqueous Phase	Support municipal education and outreach programs about hazardous waste disposal and reduction of waste.	T-2-C		X			X			X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Liquid (DNAPL) Handling and storage of a dense non-aqueous phase liquid (DNAPL)	Require risk management plans for the handling and storage of DNAPL where these activities would be significant drinking water threats.	T-44-C		X	X	X	X			
	Require pre-screening of building permit and planning applications by a risk management official for any land use that could involve activities related to the handling and storage of DNAPLS where these activities would be significant drinking water threats.	T-44-C	X		X	X	X			
Threat 17 – Organic Solvent Handling and storage of an organic solvent	Support municipal education and outreach programs about hazardous waste disposal and reduction of waste.	T-2-C	X	X			X			X
	Require risk management plans for the handling and storage of organic solvents in vulnerable areas where these activities would be significant drinking water threats.	T-45-C			X	X	X		X	
	Require pre-screening of building permit and planning applications for commercial and industrial uses by a risk management official where the handling and storage of organic solvents would be significant drinking water threats.	T-45-C			X	X				
Threat 18 – De-Icing Chemicals	Support existing regulations for proper management of runoff that contains chemicals used in the de-icing of aircraft.	T-46-S	X		X	X		X	X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Threat 19 – Taking Water Without Returning It	Require the Ministry of the Environment and Climate Change to ensure permitting water takings in a WHPA Q1 does not form significant drinking water threats and suggest a phased approach to approval and the requirement for appropriate monitoring.	T-55-C a.	X		X			X	X	X
	Require municipalities to wait for determination of the Ministry of the Environment and Climate Change on the issuance of Permits to Take Water prior to granting final approval for development applications in a WHPA Q1.	T-55-C b.			X			X		X
	Require municipalities to strengthen their leak detection programs for wells in WHPA Q1 and to initiate a strategy for reduction in a timely manner.	T-56-C a.			X	X				X
	Require municipalities to develop or enhance water conservation plans in WHPA Q1.	T-57-C a.	X				X		X	
	Require municipalities to enhance and enforce their outdoor water use programs in WHPA Q1.	T-57-C b.	X		X			X	X	X
Threat 20 –	Require municipalities to only approve settlement area and urban area expansions in a WHPA Q2 as part of a municipal comprehensive review where it has been demonstrated that	T-58-C a.			X				X	

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
Reduction in Recharge	recharge functions will not be adversely affected.									
Threat 20 – Reduction in Recharge	Municipalities shall require planning applicants to demonstrate that they have tried to maintain a pre-development recharge in WHPA Q2 using best management practices and low impact development measures.	T-59-C a.	X					X	X	X
Threat 21 – Land Used for Livestock Use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard	Request ongoing funding of the Ontario Drinking Water Stewardship Program or similar program by the Ministry of the Environment for projects that reduce the threat from the use of land for livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard.	T-23-S	X	X			X			
	Support the continuation of stewardship programs that help farmers protect drinking water sources and encourage farmer participation in these programs.	T-23-S	X	X	X		X			X
	Require OMAFRA to protect municipal drinking water sources through incorporation of conditions in nutrient management	T-48-C	X		X	X	X	X	X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	strategies for farms within vulnerable areas to ensure outdoor confinement areas and farm-animal yards cease to be or do not become significant drinking water threats.									
	Require the Ministry of the Environment to prioritize inspections of farms located where significant threats are possible and to conduct regular inspections.	T-22-S	X		X	X	X		X	
	Require ~~MOECC~~MECP to work with the farmers where significant threats exist to ensure compliance with the requirements of their nutrient management strategies, where needed.	T-22-S	X	X	X	X	X		X	
Threat 21 – Land Used for Livestock	For those farms not phased-in under the Nutrient Management Act in vulnerable areas where outdoor confinement areas or farm-animal yards and for all farms where livestock grazing or pasturing are or would be significant drinking water threats, a 5 NU (per farm property) criteria is applied outside of WHPA-A, to determine whether the policy tool would be education and outreach (for less than 5 NU per farm) or risk management plan (for 5 or greater than 5 NU per farm). ~~require a risk management plan. This~~ A risk management plan would be based on the regulatory	T-47-C	X	X	X	X	X		X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	requirements of nutrient management strategies and incorporate the best management practices for livestock grazing and pasturing as set out in Streamside Grazing, 2007, and extensive grazing within wellhead protection area A, and scoped to these threats.									
	Use restricted land uses to require pre-screening by a risk management official of agricultural building permits and planning applications where the land is used as livestock grazing or pasturing land in a vulnerable area where these activities are or would be significant drinking water threats.	T-47-C			X	X				
	Require Municipalities to issue a by-law prohibiting farm-animal grazing and pasturing within a wellhead protection area A.	Policy deleted			X			X	X	
~~Local Threat – Conveyance of Oil in~~ Pipelines	~~Request Energy Boards, in their consideration of any new or expanded pipelines, to ensure that proponents abide by current and applicable regulatory and standardized design, as well as monitoring and maintenance practices, in order to Adequately manage the risk to source water.~~ Requests the Canada Energy Regulator and TSSA to ensure that their regulatory requirements manage liquid hydrocarbon pipelines	~~L-2-S~~ T-62-S	X		X			X		X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	that are existing significant threats									
	~~Request fuel pipeline owners to conduct inline pipeline integrity testing and visual inspections where pipelines cross open water bodies every three years.~~ Recommends that Canada Energy Regulator and Ontario Energy Board use a preventative approach with pipeline applicants for future significant threats	~~L-1-S~~ T-63-S			X	X		X	X	
~~Local Threat – Conveyance of Oil in~~ Pipelines	~~For significant threats to Lake Ontario, request that the Ministry of the Environment protect drinking water sources through provision of threat mapping to the Spills Action Centre and modify procedures for notification, as required.~~ Requests pipeline companies to use watershed and source water protection science in their emergency planning.	~~T-52-S~~ T-64-S			X	X	X			X
	~~Request that the owners of facilities engaged in significant threat activities to the municipal Lake Ontario intakes update their emergency preparedness/contingency plans to include the location of municipal intakes, actions to be taken, and inclusion of protection of drinking water sources in preparedness exercises.~~ Requests liquid hydrocarbon pipeline companies and owners of bulk fuel storage facilities to update	~~T-52-S~~ T-65-S			X	X		X		

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Prescribed Threat	Initial Policy Directives	Policy								
	their emergency plans.									
	Recommends MECP Spills Action Centre to incorporate drinking water protection zone maps and modify their procedures.	T-67-S			X	X		X		
	Directs CAs to collaboratively liaise with pipeline companies, fuel storage companies, sewage treatment plant owners on several matters.	T-68-S	X	X			X			
Land Use Policy	~~Request the Ministry of Municipal Affairs and Housing to enact the regulations under the Planning Act to enable the use of conditional zoning.~~	T-53-C part c - Repealed		~~X~~	~~X~~	~~X~~				
	To facilitate implementation of source protection policies, the City of Hamilton, Halton Region, and the County of Wellington are requested to require a disclosure report as part of a complete application.	T-53-C	X		X	X		X		X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Other Policies	Policy Directives	Policy								
Transport Pathways	Recommend a list of activities that could create transport pathways that require the municipalities to notify the Source Protection Authority and the Source Protection Committee upon receipt of applications for development.	Policy not required								
	Recommend actions to be taken by the Source Protection Authority and the Source Protection Committee upon receipt of notification about a proposed transport pathway.	O-1-S h			X	X		X		
	Request that best management practices be used for the installation of new municipal infrastructure in proximity of municipal wells to protect groundwater sources.	O-1-S a			X	X	X		X	
	Support the inclusion of conditions of approval for development applications, to ensure the decommissioning of wells in accordance with Ontario Regulation 903 occurs.	O-1-S b			X	X		X	X	
	Support ongoing funding for the Ontario Drinking Water Stewardship program and other similar municipal programs for the decommissioning of wells.	O-1-S c	X	X			X			X
	Support ongoing education programs regarding the decommissioning of wells.	O-1-S c, d	X	X			X			X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Other Policies	Policy Directives	Policy								
	Support a program to encourage landowners within the urban boundary that currently use wells as their water supply to connect to the municipal supply and decommission those wells, where possible and appropriate.	O-1-S e	X	X	X		X			
Transport Pathways	Request the municipalities prepare by-laws that prohibit the construction of new wells and septic systems within the urban areas where municipal water and wastewater services are available.	O-1-S f	X		X	X		X	X	
	Request the municipalities to prepare by-laws/procedures/ processes that prohibit the construction of closed loop earth energy systems within the wellhead protection areas A and B.	repealed			X	X		X		
Climate Data	Support and encourage continued collection, sharing and interpretation of hydrological, hydrogeological and climate data by municipalities, the conservation authority, the Ministries of Environment and Natural Resources, and Environment Canada.	O-2-S a			X		X		X	X
	Encourage Environment Canada to review its monitoring network to ensure appropriate locations of climate stations exist and that data for all necessary parameters, such as solar radiation, are collected, where needed.	O-2-S c			X		X		X	X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Other Policies	Policy Directives	Policy								
	Request the Ministry of the Environment to install instrumentation to provide monitoring of current speed and direction and water chemistry of Lake Ontario source water.	O-2-S b		X			X		X	X
	Request the Ministry of the Environment to review groundwater and surface water monitoring networks and to ensure appropriate locations and adequate construction and that appropriate data are being collected.	O-2-S d			X		X		X	X
Water Conservation Incorporated into water availability policies.	Support the effective education and outreach and incentive programs currently implemented by the municipalities.	repealed	X	X	X		X		X	X
	Request that the Ministries of the Environment and Natural Resources promote ongoing education and outreach opportunities.	repealed		X			X		X	X
Disposal of Imported Fill	Request that municipalities and the conservation authorities develop and implement an education and outreach program based on Ministry of the Environment guidance that will best protect municipal drinking water sources when the importation of fill is proposed.	O-4-S			X		X		X	X
Spill Prevention, Contingency, and Emergency Response	To assist in the response to spills in transportation corridors, request all municipalities within the Source Protection Areas to incorporate the information regarding the location of	O-5-S a	X		X		X			X

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Other Policies	Policy Directives	Policy								
Plans	vulnerable areas into their emergency response plans.									
	Request that the Hamilton Port Authority advise vessel operators and each company that leases space on port lands of the location of municipal drinking water intakes and request that spill contingency plans be updated to include intake locations, enhanced best practices for spill containment and cleanup, and municipal contact information.	O-6-S	X		X		X	X		X
	To assist the Spills Action Centre in their response to spills in transportation corridors, include a policy that the Spills Action Centre must be provided with mapping of vulnerable areas within Halton-Hamilton Source Protection Region.	O-5-S b					X			X
	Request that the Ministry of Transportation Ontario and Transport Canada ~~municipalities~~ implement an education and outreach program to encourage all transportation businesses that ship goods through wellhead protection areas and intake protection zones to prepare or update spill prevention plans, to review them annually, and to update them when required.	0-5-S c	X	X			X			
Lake Ontario Outreach	Request the Ministry of the Environment share information about water resources obtained through the source protection planning process with Environment Canada, Ontario Region,	O-7-S			X		X	X		

EVALUATION MATRIX Halton Region And Hamilton Region Source Protection Areas			Fairness	Flexibility	Effectiveness	Timeliness	Education & Stewardship	Consistency	Cumulative Impacts	Cost
Other Policies	Policy Directives	Policy								
	with an emphasis on updating the Environmental Sensitivity Atlas for Lake Ontario's Shoreline to include current knowledge and understanding of the lake and current infrastructure.									
	Request the Ministry of the Environment to discuss the findings and policies arising from source protection planning with Environment Canada, New York State and United States government agencies.	O-8-S					X		X	

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APPENDIX B

Where Significant Threat Policies Apply

Figure B-1 Kelso

Figure B-2 Walkers Line

Figure B-3Campbellville

Figure B-4 Freelton

Figure B-5 Carlisle GW

Figure B-6 Carlisle SW

Figure B-7 Cedarvale WHPA

Figure B-8 – Cedarvale ICA

Figure B-9 – Lake Ontario

Figure B-10 Greensville

Figure B-11 Road Salt WHPA Halton

Figure B-12 – Road Salt IPZ Halton

Figure B-13 Road Salt WHPA Hamilton

Figure B-14 – Road Salt Hamilton IPZ

Figure B-15 Kelso WHPA Q

Figure 16 Campbellville WHPA Q

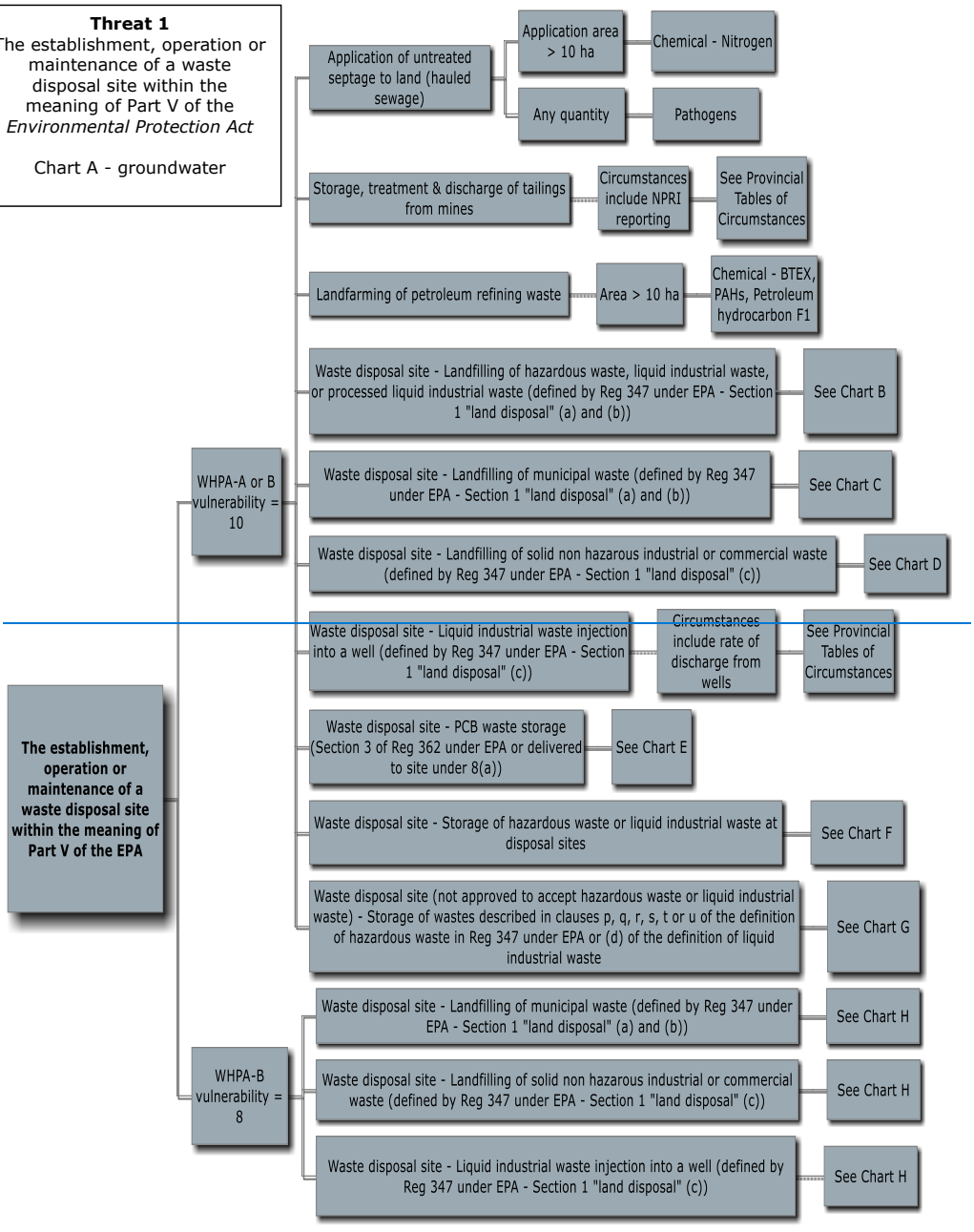
Figure 17 – Cedarvale WHPA Q

APPENDIX C

Significant Threat Flow Charts

Threat 1
The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*

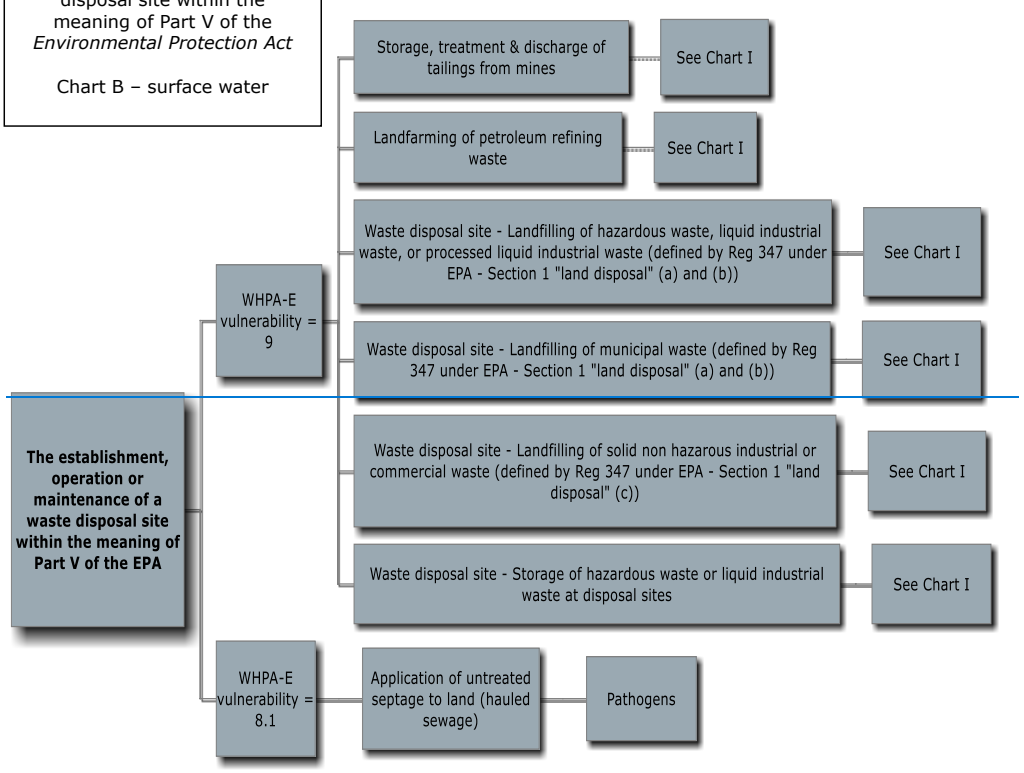
Chart A - groundwater

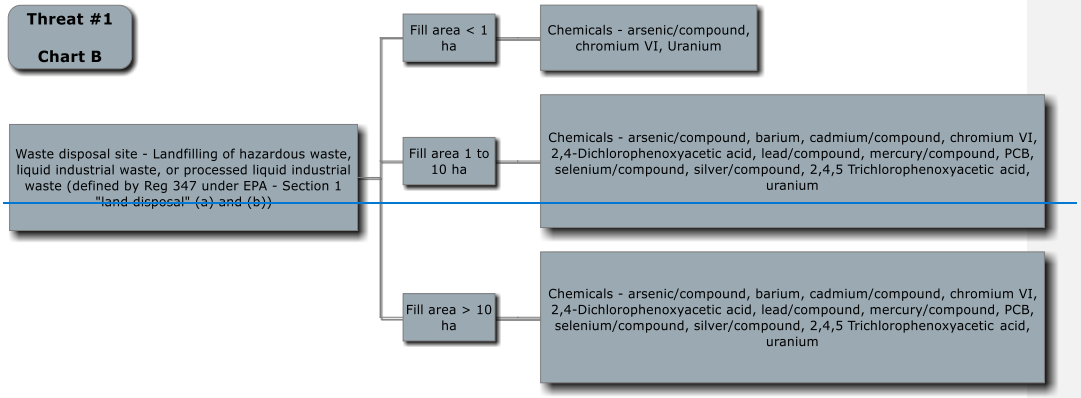


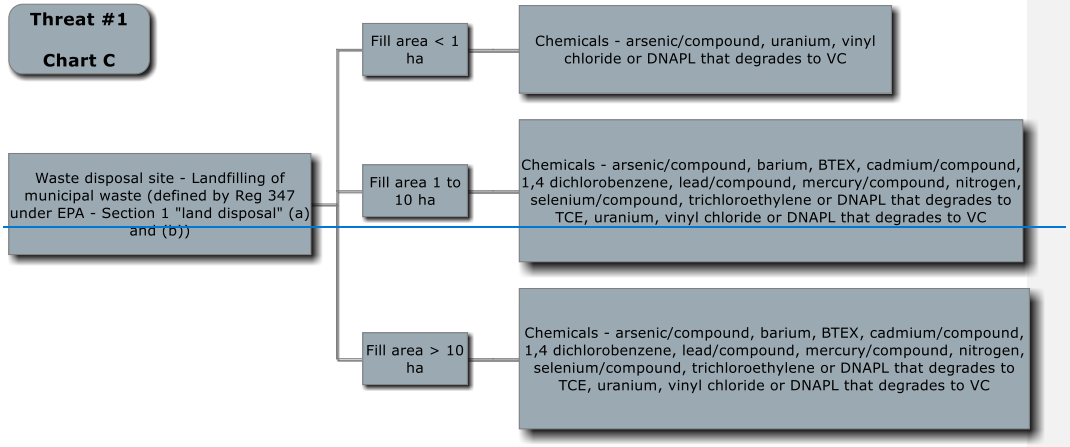
Threat 1

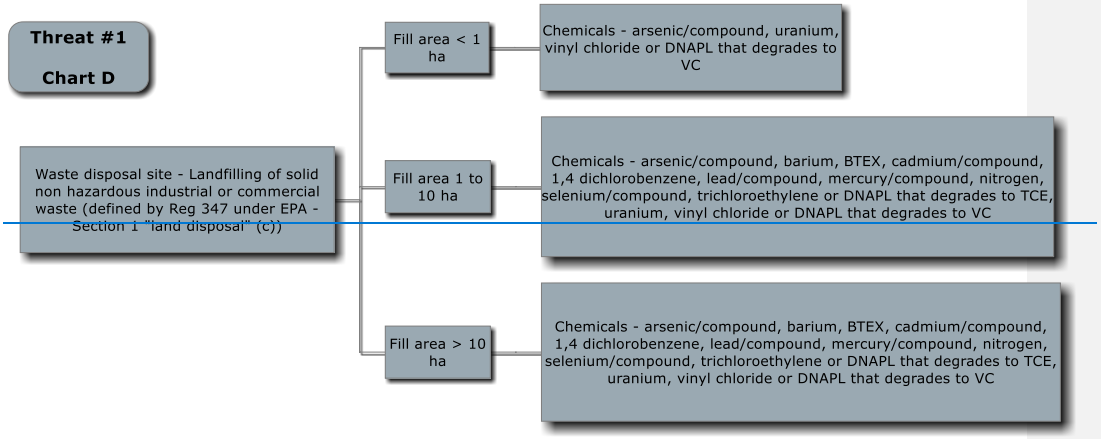
The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*

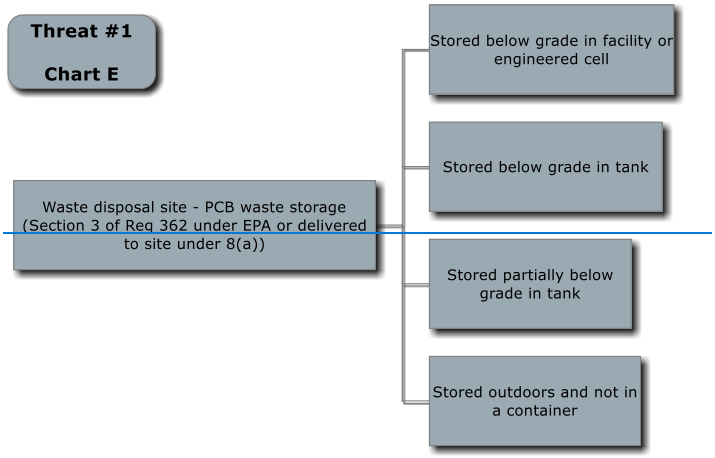
Chart B – surface water

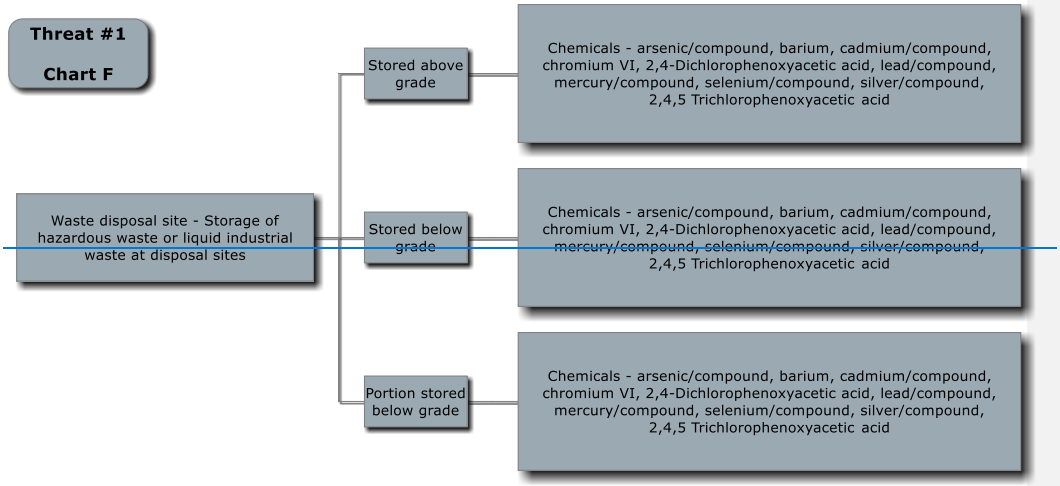


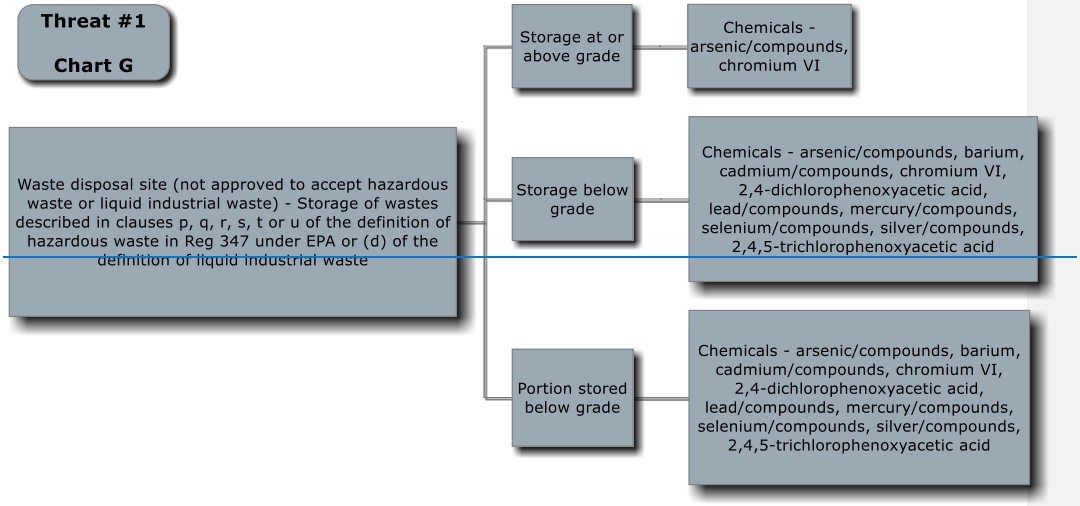

Threat #1
Chart B
Waste disposal site - Landfilling of hazardous waste, liquid industrial waste, or processed liquid industrial waste (defined by Reg 347 under EPA - Section 1 "land disposal" (a) and (b))
Fill area < 1 ha
Chemicals - arsenic/compound, chromium VI, Uranium
Fill area 1 to 10 ha
Chemicals - arsenic/compound, barium, cadmium/compound, chromium VI, 2,4-Dichlorophenoxyacetic acid, lead/compound, mercury/compound, PCB, selenium/compound, silver/compound, 2,4,5 Trichlorophenoxyacetic acid, uranium
Fill area > 10 ha
Chemicals - arsenic/compound, barium, cadmium/compound, chromium VI, 2,4-Dichlorophenoxyacetic acid, lead/compound, mercury/compound, PCB, selenium/compound, silver/compound, 2,4,5 Trichlorophenoxyacetic acid, uranium

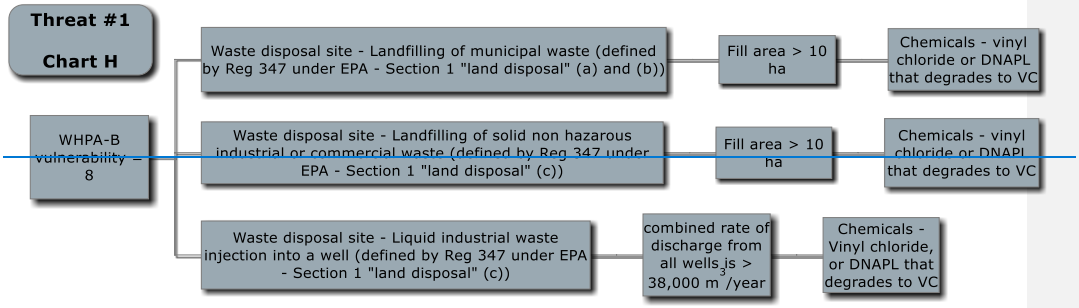

Threat #1
Chart C
Waste disposal site - Landfilling of municipal waste (defined by Reg 347 under EPA - Section 1 "land disposal" (a) and (b))
Fill area < 1 ha
Chemicals - arsenic/compound, uranium, vinyl chloride or DNAPL that degrades to VC
Fill area 1 to 10 ha
Chemicals - arsenic/compound, barium, BTEX, cadmium/compound, 1,4 dichlorobenzene, lead/compound, mercury/compound, nitrogen, selenium/compound, trichloroethylene or DNAPL that degrades to TCE, uranium, vinyl chloride or DNAPL that degrades to VC
Fill area > 10 ha
Chemicals - arsenic/compound, barium, BTEX, cadmium/compound, 1,4 dichlorobenzene, lead/compound, mercury/compound, nitrogen, selenium/compound, trichloroethylene or DNAPL that degrades to TCE, uranium, vinyl chloride or DNAPL that degrades to VC

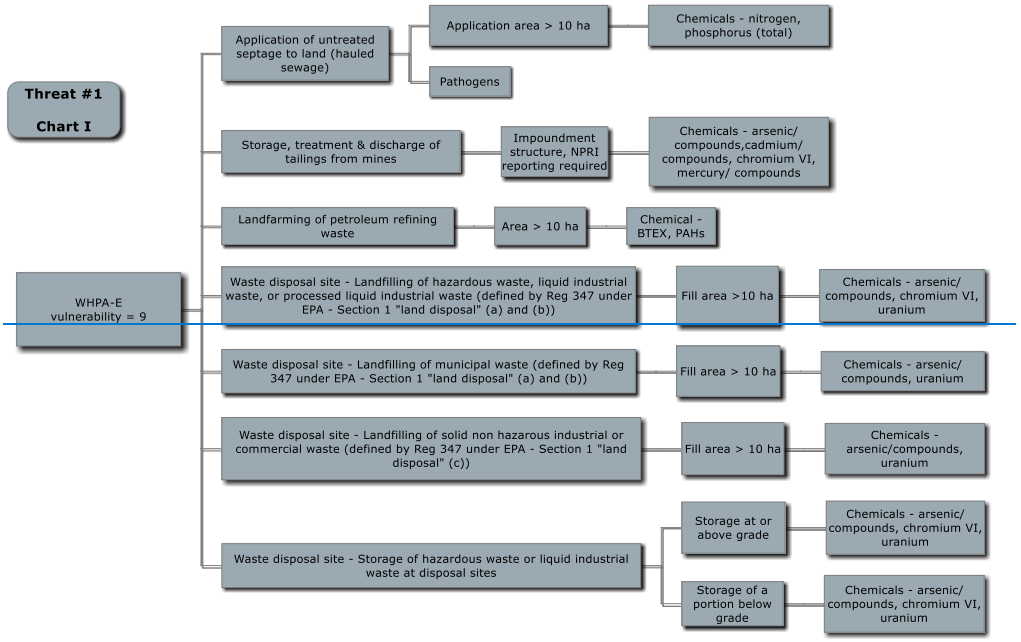

Threat #1
Chart D
Waste disposal site - Landfilling of solid non hazardous industrial or commercial waste (defined by Reg 347 under EPA - Section 1 "land disposal" (c))
Fill area < 1 ha
Fill area 1 to 10 ha
Fill area > 10 ha
Chemicals - arsenic/compound, uranium, vinyl chloride or DNAPL that degrades to VC
Chemicals - arsenic/compound, barium, BTEX, cadmium/compound, 1,4 dichlorobenzene, lead/compound, mercury/compound, nitrogen, selenium/compound, trichloroethylene or DNAPL that degrades to TCE, uranium, vinyl chloride or DNAPL that degrades to VC
Chemicals - arsenic/compound, barium, BTEX, cadmium/compound, 1,4 dichlorobenzene, lead/compound, mercury/compound, nitrogen, selenium/compound, trichloroethylene or DNAPL that degrades to TCE, uranium, vinyl chloride or DNAPL that degrades to VC


Threat #1
Chart E
Waste disposal site - PCB waste storage (Section 3 of Reg 362 under EPA or delivered to site under 8(a))
Stored below grade in facility or engineered cell
Stored below grade in tank
Stored partially below grade in tank
Stored outdoors and not in a container


Threat #1
Chart F
Waste disposal site - Storage of hazardous waste or liquid industrial waste at disposal sites
Stored above grade
Stored below grade
Portion stored below grade
Chemicals - arsenic/compound, barium, cadmium/compound, chromium VI, 2,4-Dichlorophenoxyacetic acid, lead/compound, mercury/compound, selenium/compound, silver/compound, 2,4,5 Trichlorophenoxyacetic acid
Chemicals - arsenic/compound, barium, cadmium/compound, chromium VI, 2,4-Dichlorophenoxyacetic acid, lead/compound, mercury/compound, selenium/compound, silver/compound, 2,4,5 Trichlorophenoxyacetic acid
Chemicals - arsenic/compound, barium, cadmium/compound, chromium VI, 2,4-Dichlorophenoxyacetic acid, lead/compound, mercury/compound, selenium/compound, silver/compound, 2,4,5 Trichlorophenoxyacetic acid


Threat #1
Chart G
Waste disposal site (not approved to accept hazardous waste or liquid industrial waste) - Storage of wastes described in clauses p, q, r, s, t or u of the definition of hazardous waste in Reg 347 under EPA or (d) of the definition of liquid industrial waste
Storage at or above grade
Storage below grade
Portion stored below grade
Chemicals - arsenic/compounds, chromium VI
Chemicals - arsenic/compounds, barium, cadmium/compounds, chromium VI, 2,4-dichlorophenoxyacetic acid, lead/compounds, mercury/compounds, selenium/compounds, silver/compounds, 2,4,5-trichlorophenoxyacetic acid
Chemicals - arsenic/compounds, barium, cadmium/compounds, chromium VI, 2,4-dichlorophenoxyacetic acid, lead/compounds, mercury/compounds, selenium/compounds, silver/compounds, 2,4,5-trichlorophenoxyacetic acid

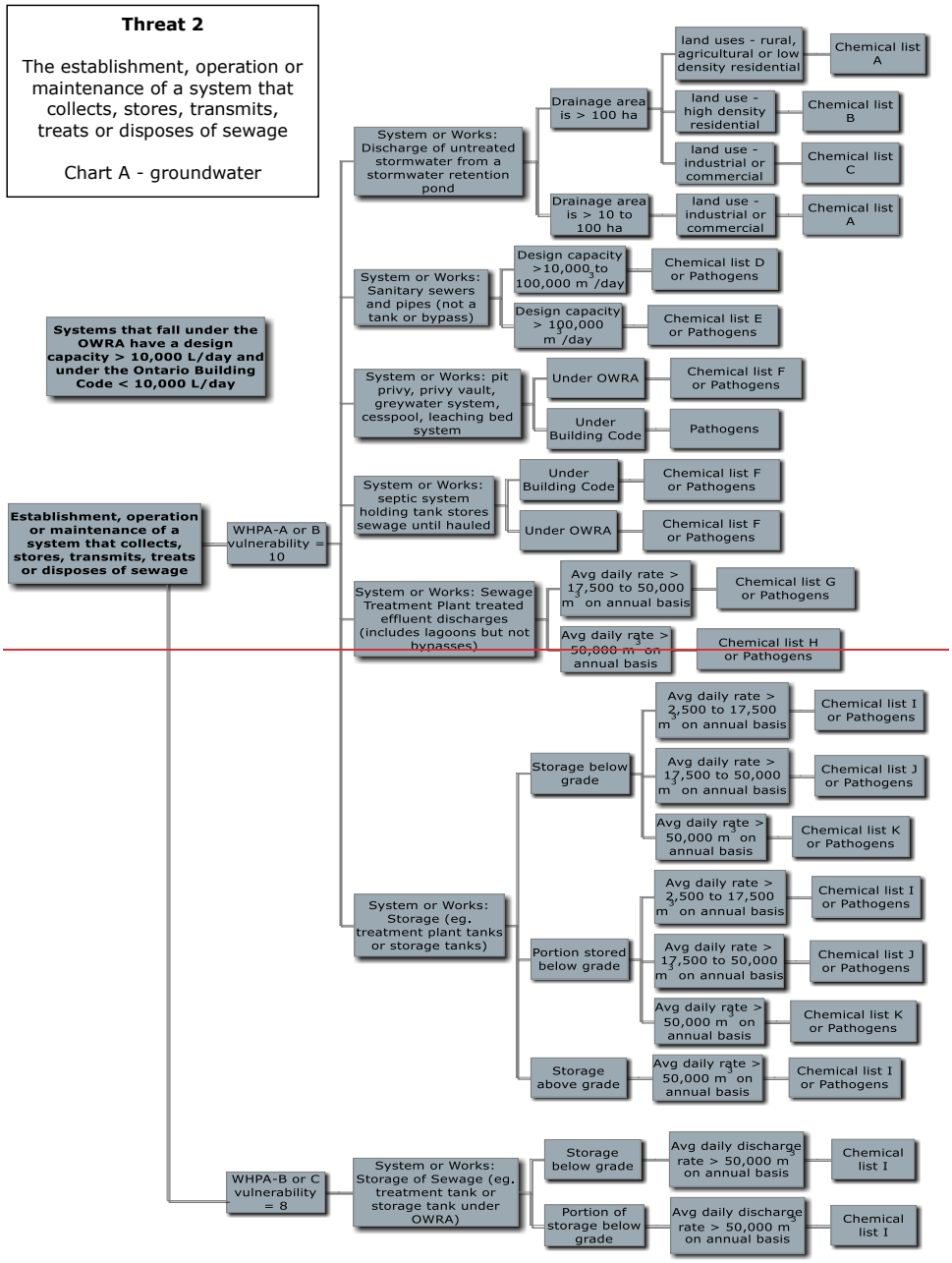

Threat #1
Chart H
WHPA-B vulnerability = 8
Waste disposal site - Landfilling of municipal waste (defined by Reg 347 under EPA - Section 1 "land disposal" (a) and (b))
Fill area > 10 ha
Chemicals - vinyl chloride or DNAPL that degrades to VC
Waste disposal site - Landfilling of solid non hazarous industrial or commercial waste (defined by Reg 347 under EPA - Section 1 "land disposal" (c))
Fill area > 10 ha
Chemicals - vinyl chloride or DNAPL that degrades to VC
Waste disposal site - Liquid industrial waste injection into a well (defined by Reg 347 under EPA - Section 1 "land disposal" (c))
combined rate of discharge from all wells is > 38,000 m3/year
Chemicals - Vinyl chloride, or DNAPL that degrades to VC


Threat #1
Chart I
WHPA-E vulnerability = 9
Application of untreated septage to land (hauled sewage)
Application area > 10 ha
Chemicals - nitrogen, phosphorus (total)
Pathogens
Storage, treatment & discharge of tailings from mines
Impoundment structure, NPRI reporting required
Chemicals - arsenic/ compounds,cadmium/ compounds, chromium VI, mercury/ compounds
Landfarming of petroleum refining waste
Area > 10 ha
Chemical - BTEX, PAHs
Waste disposal site - Landfilling of hazardous waste, liquid industrial waste, or processed liquid industrial waste (defined by Reg 347 under EPA - Section 1 "land disposal" (a) and (b))
Fill area >10 ha
Chemicals - arsenic/ compounds, chromium VI, uranium
Waste disposal site - Landfilling of municipal waste (defined by Reg 347 under EPA - Section 1 "land disposal" (a) and (b))
Fill area > 10 ha
Chemicals - arsenic/ compounds, uranium
Waste disposal site - Landfilling of solid non hazarous industrial or commercial waste (defined by Reg 347 under EPA - Section 1 "land disposal" (c))
Fill area > 10 ha
Chemicals - arsenic/compounds, uranium
Waste disposal site - Storage of hazardous waste or liquid industrial waste at disposal sites
Storage at or above grade
Chemicals - arsenic/ compounds, chromium VI, uranium
Storage of a portion below grade
Chemicals - arsenic/ compounds, chromium VI, uranium

Threat 2

The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage

Chart A - groundwater



Threat 2
The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage

Chart B – surface water

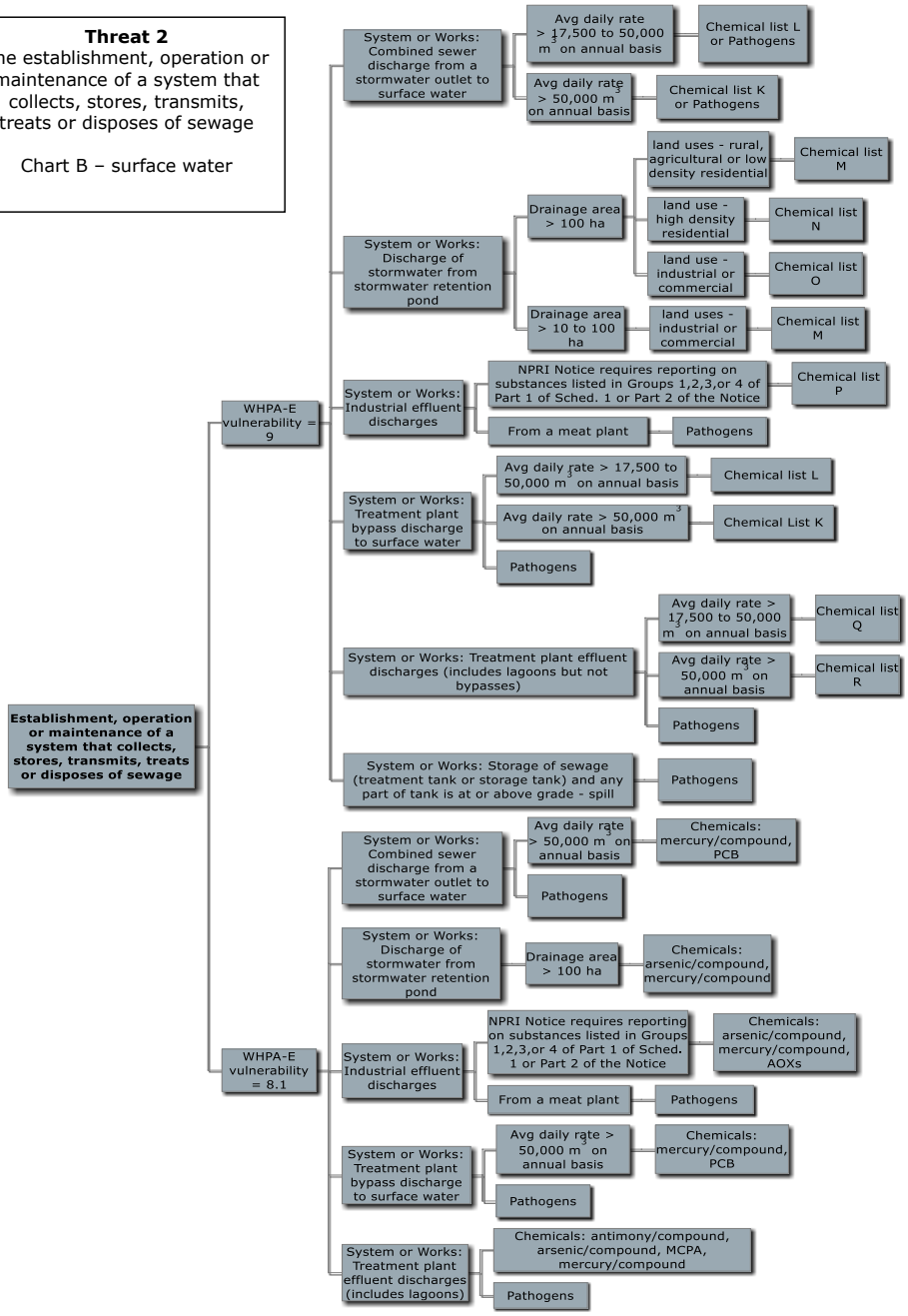
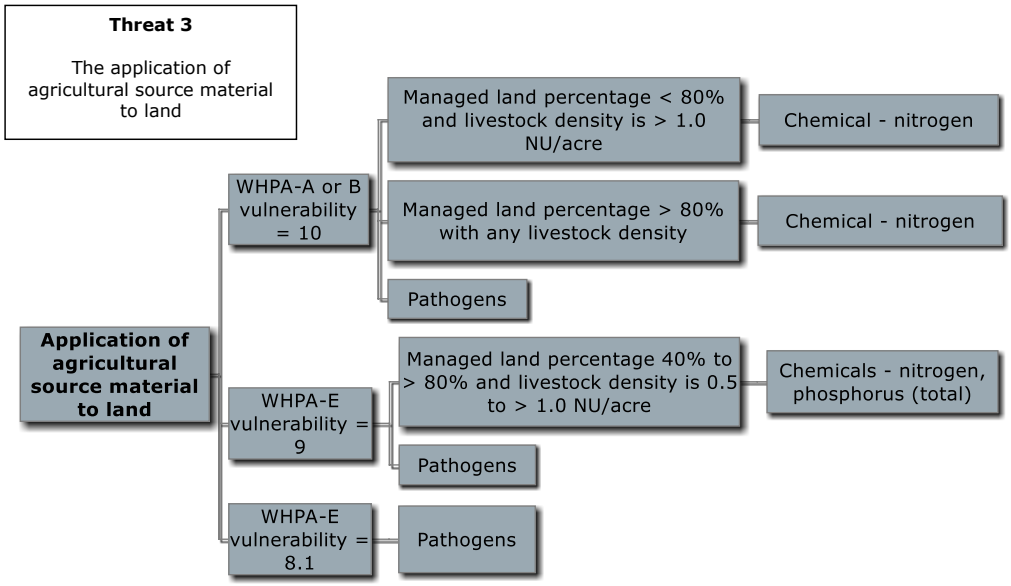
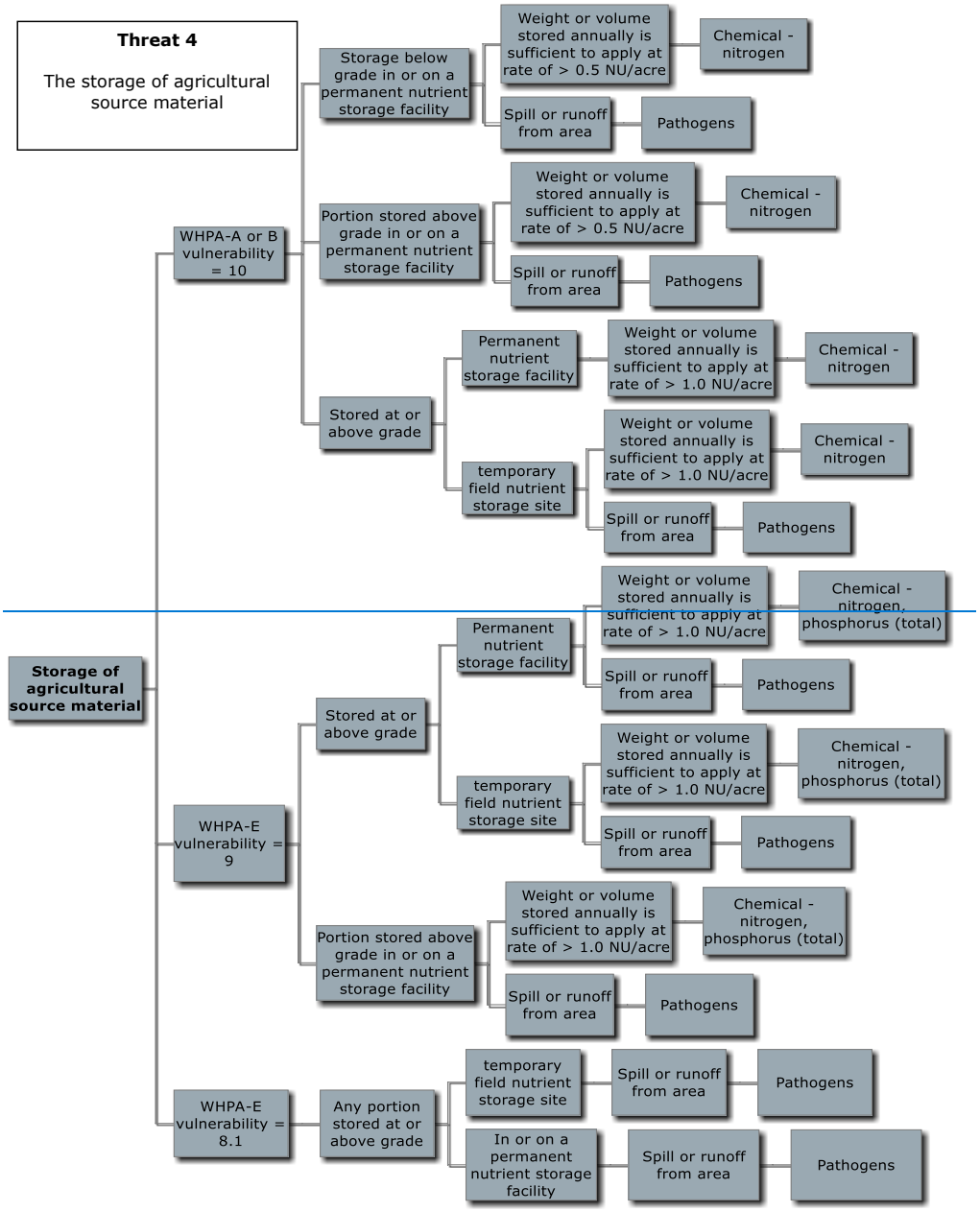


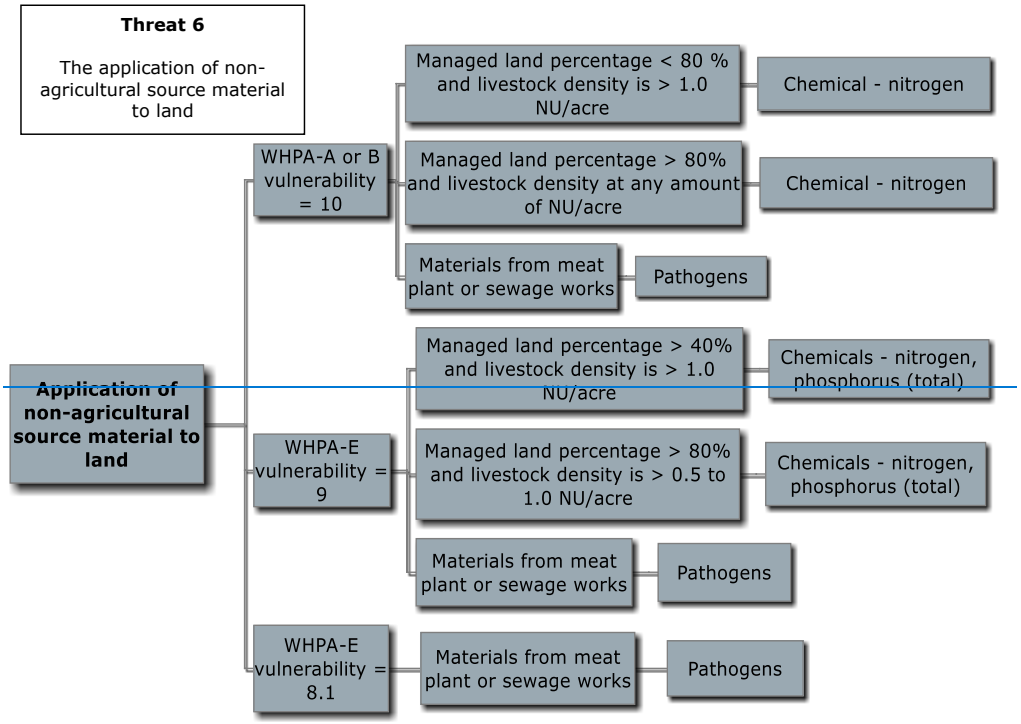
Table B-1. Chemical lists for Threat 2 – Sewage Systems

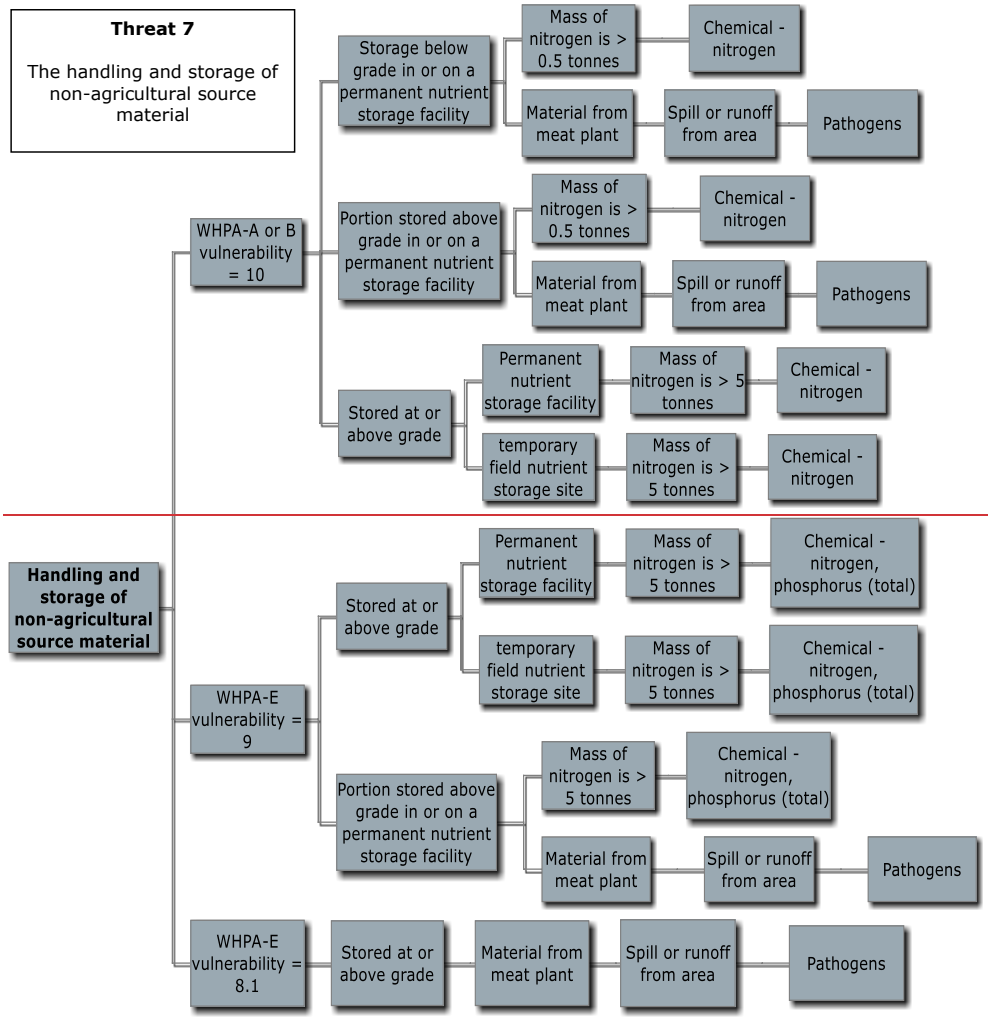
Chemical list	Chemicals
A	Arsenic/compounds, chromium VI, mecoprop
B	Arsenic/compounds, cadmium/compounds, chromium VI, lead/compounds, mecoprop, mercury/compounds, nitrogen
C	Aluminum, arsenic/compounds, cadmium/compounds, chloride, chromium VI, lead/compounds, mecoprop, mercury/compounds, nickel/compounds, nitrogen, PAHs, petroleum hydrocarbons F1
D	BTEX, cadmium/compounds, hexachlorobenzene, lead/compounds, mercury/compounds, nitrogen, PCBs, PAHs
E	BTEX, cadmium/compounds, copper, 3,3-dichlorobenzidine, hexachlorobenzene, lead/compounds, mercury/compounds, nitrogen, PCBs, PAHs, pentachlorophenol, zinc/compounds
F	Acetone, chloride, 1,4-dichlorobenzene, nitrogen, sodium
G	Antimony/compounds, arsenic/compounds, chromium VI, MCPA
H	Antimony/compounds, arsenic/compounds, barium, BTEX, cadmium/compounds, 2-chlorophenol, chromium VI, cyanide, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2,4-dichlorobenzene, ethylene glycol, lead/compounds, MCPA, mercury/compounds, nickel/compounds, nitrogen, NDMA, phenol/salts, silver/compounds
I	Vinyl chloride or DNAPL that degrades to VC
J	BTEX, cadmium/compounds, hexachlorobenzene, lead/compounds, mercury/compounds, nitrogen, NDMA, PCBs, trichloroethylene or DNAPL that degrades to TCE, vinyl chloride or DNAPL that degrades to VC
K	BTEX, cadmium/compounds, copper/compounds, hexachlorobenzene, lead/compounds, mercury/compounds, nitrogen, NDMA, PCBs, pentachlorophenol, trichloroethylene or DNAPL that degrades to TCE, vinyl chloride or DNAPL that degrades to VC, zinc/compounds
L	Cadminum/compounds, lead/compounds, mercury/compounds, PCBs
M	Arsenic/compounds, cadmium/compounds, chromium VI, lead/compounds, mecoprop, mercury/compounds, PAHs
N	Arsenic/compounds, cadmium/compounds, chromium VI, lead/compounds, mecoprop, mercury/compounds, nickel/compounds, PAHs, petroleum hydrocarbons F3
O	Aluminum, arsenic/compounds, cadmium/compounds, chloride, chromium VI, copper/compounds, lead/compounds, mecoprop, mercury/compounds, nickel/compounds, nitrogen, PAHs, petroleum hydrocarbons F2, petroleum hydrocarbons F3, petroleum hydrocarbons F4, phosphorus (total), zinc

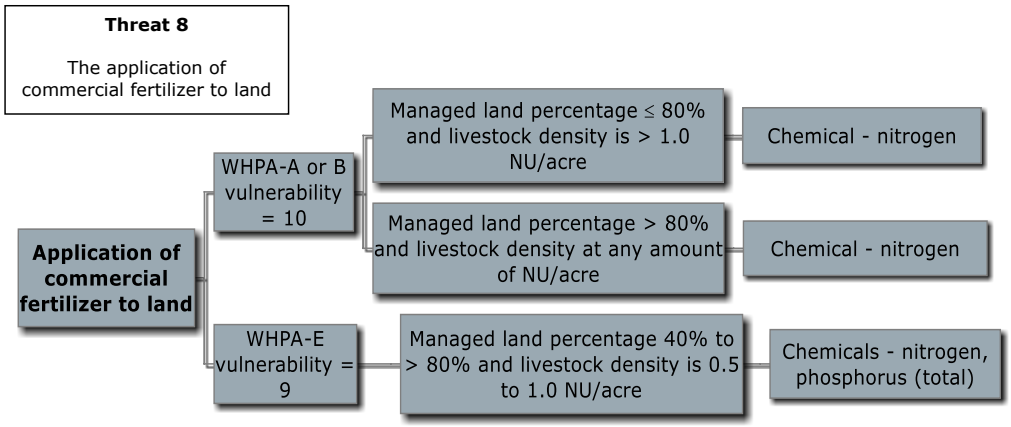
P	Aluminum, arsenic/compounds, bis(2-ethylhexyl) phthalate, boron, bromomethane, BTEX, 2-butoxyethanol, butyl-tert alcohol, cadmium/compounds, carbon tetrachloride, chloride, chloroform, chromium VI, cobalt/compounds, copper/compounds, cyanide, 1,4-dichlorobenzene, 1,2-dichloroethane, ethylene glycol, formaldehyde, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, hydrazine/salts, hydroquinone, iron, lead/compounds, manganese/compounds, mercury/compounds, methanol, dichloromethane, molybdenum, naphthalene, nickel/compounds, nitrogen, NDMA, adsorbable organic halides, PAHs, pentachlorobenzene, petroleum hydrocarbons F2, petroleum hydrocarbons F3, petroleum hydrocarbons F4, phosphorus (total), selenium/compounds, silver/compounds, sodium fluoride, styrene, hydrogen sulphide, 1,2,4,5-tetrachlorobenzene, tetrachloroethylene, 1,2,3-trichlorobenzene, trichloroethylene or DNAPL that degrades to TCE, tritium, vanadium, vinyl chloride or DNAPL that degrades to VC, zinc
Q	Antimony/compounds, arsenic/compounds, cadmium/compounds, chromium VI, lead/compounds, MCPA, mercury/compounds
R	Antimony/compounds, arsenic/compounds, barium, BTEX, cadmium/compounds, 2-chlorophenol, chromium VI, copper/compounds, cyanide, 2,4-dichlorophenol, ethylene glycol, lead/compounds, MCPA, mercury/compounds, nickel/compounds, nitrogen, NDMA, total phosphorus, silver/compounds, zinc/compounds

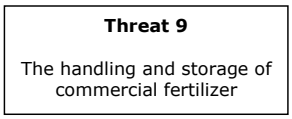

Threat 3
The application of agricultural source material to land
Application of agricultural source material to land
WHPA-A or B vulnerability = 10
WHPA-E vulnerability = 9
WHPA-E vulnerability = 8.1
Managed land percentage < 80% and livestock density is > 1.0 NU/acre
Chemical - nitrogen
Managed land percentage > 80% with any livestock density
Chemical - nitrogen
Pathogens
Managed land percentage 40% to > 80% and livestock density is 0.5 to > 1.0 NU/acre
Chemicals - nitrogen, phosphorus (total)
Pathogens
Pathogens


Threat 4
The storage of agricultural source material
Storage of agricultural source material
WHPA-A or B vulnerability = 10
WHPA-E vulnerability = 9
WHPA-E vulnerability = 8.1
Storage below grade in or on a permanent nutrient storage facility
Portion stored above grade in or on a permanent nutrient storage facility
Stored at or above grade
Any portion stored at or above grade
Permanent nutrient storage facility
temporary field nutrient storage site
In or on a permanent nutrient storage facility
Weight or volume stored annually is sufficient to apply at rate of > 0.5 NU/acre
Weight or volume stored annually is sufficient to apply at rate of > 1.0 NU/acre
Spill or runoff from area
Chemical - nitrogen
Chemical - nitrogen, phosphorus (total)
Pathogens


Threat 6
The application of non-agricultural source material to land
Application of non-agricultural source material to land
WHPA-A or B vulnerability = 10
Managed land percentage < 80 % and livestock density is > 1.0 NU/acre
Chemical - nitrogen
Managed land percentage > 80% and livestock density at any amount of NU/acre
Chemical - nitrogen
Materials from meat plant or sewage works
Pathogens
WHPA-E vulnerability = 9
Managed land percentage > 40% and livestock density is > 1.0 NU/acre
Chemicals - nitrogen, phosphorus (total)
Managed land percentage > 80% and livestock density is > 0.5 to 1.0 NU/acre
Chemicals - nitrogen, phosphorus (total)
Materials from meat plant or sewage works
Pathogens
WHPA-E vulnerability = 8.1
Materials from meat plant or sewage works
Pathogens


Threat 7
The handling and storage of non-agricultural source material
Handling and storage of non-agricultural source material
WHPA-A or B vulnerability = 10
Storage below grade in or on a permanent nutrient storage facility
Mass of nitrogen is > 0.5 tonnes
Chemical - nitrogen
Material from meat plant
Spill or runoff from area
Pathogens
Portion stored above grade in or on a permanent nutrient storage facility
Mass of nitrogen is > 0.5 tonnes
Chemical - nitrogen
Material from meat plant
Spill or runoff from area
Pathogens
Stored at or above grade
Permanent nutrient storage facility
Mass of nitrogen is > 5 tonnes
Chemical - nitrogen
temporary field nutrient storage site
Mass of nitrogen is > 5 tonnes
Chemical - nitrogen
WHPA-E vulnerability = 9
Stored at or above grade
Permanent nutrient storage facility
Mass of nitrogen is > 5 tonnes
Chemical - nitrogen, phosphorus (total)
temporary field nutrient storage site
Mass of nitrogen is > 5 tonnes
Chemical - nitrogen, phosphorus (total)
Portion stored above grade in or on a permanent nutrient storage facility
Mass of nitrogen is > 5 tonnes
Chemical - nitrogen, phosphorus (total)
Material from meat plant
Spill or runoff from area
Pathogens
WHPA-E vulnerability = 8.1
Stored at or above grade
Material from meat plant
Spill or runoff from area
Pathogens

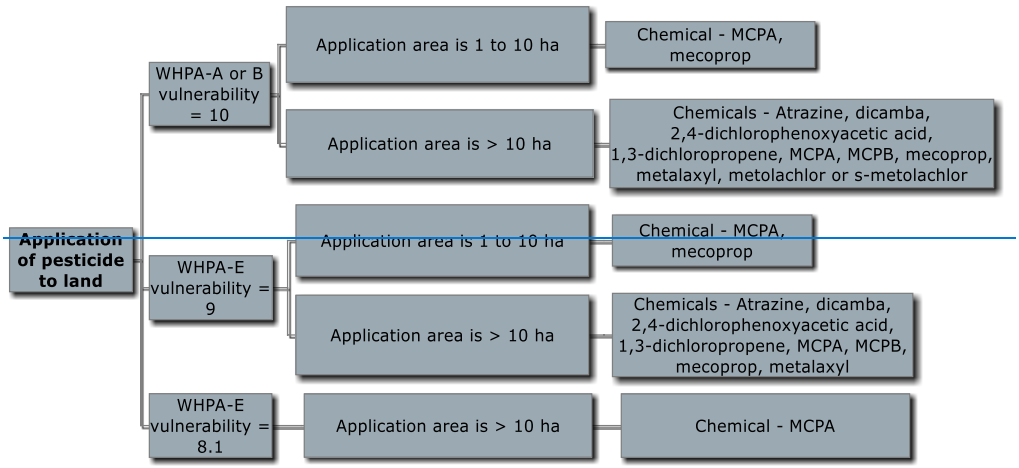

Threat 8
The application of commercial fertilizer to land
Application of commercial fertilizer to land
WHPA-A or B vulnerability = 10
Managed land percentage ≤ 80% and livestock density is > 1.0 NU/acre
Chemical - nitrogen
Managed land percentage > 80% and livestock density at any amount of NU/acre
Chemical - nitrogen
WHPA-E vulnerability = 9
Managed land percentage 40% to > 80% and livestock density is 0.5 to 1.0 NU/acre
Chemicals - nitrogen, phosphorus (total)


Threat 9
The handling and storage of commercial fertilizer

Handling and storage of commercial fertilizer
WHPA-A or B vulnerability = 10
Storage for retail sale or for application
Mass of fertilizer in any form is > 2,500 kilograms
Chemical - nitrogen

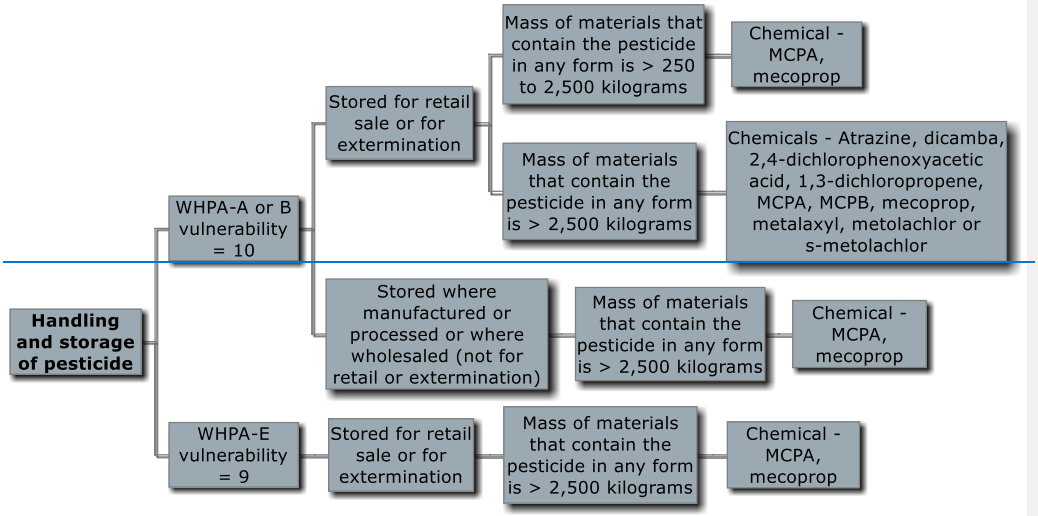
Threat 10

The application of pesticide to land



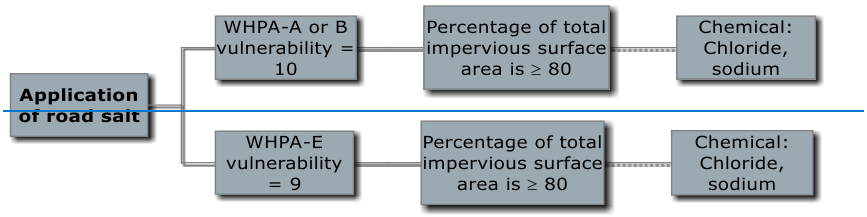
Threat 11

The handling and storage of pesticide



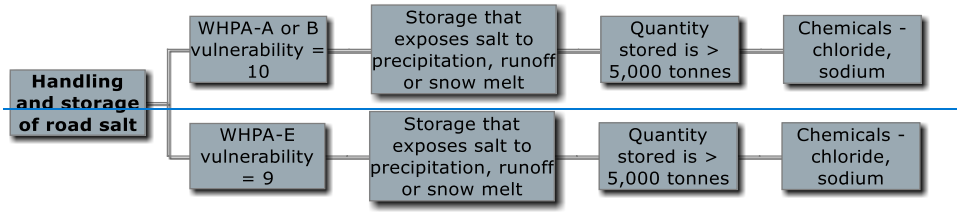
Threat 12

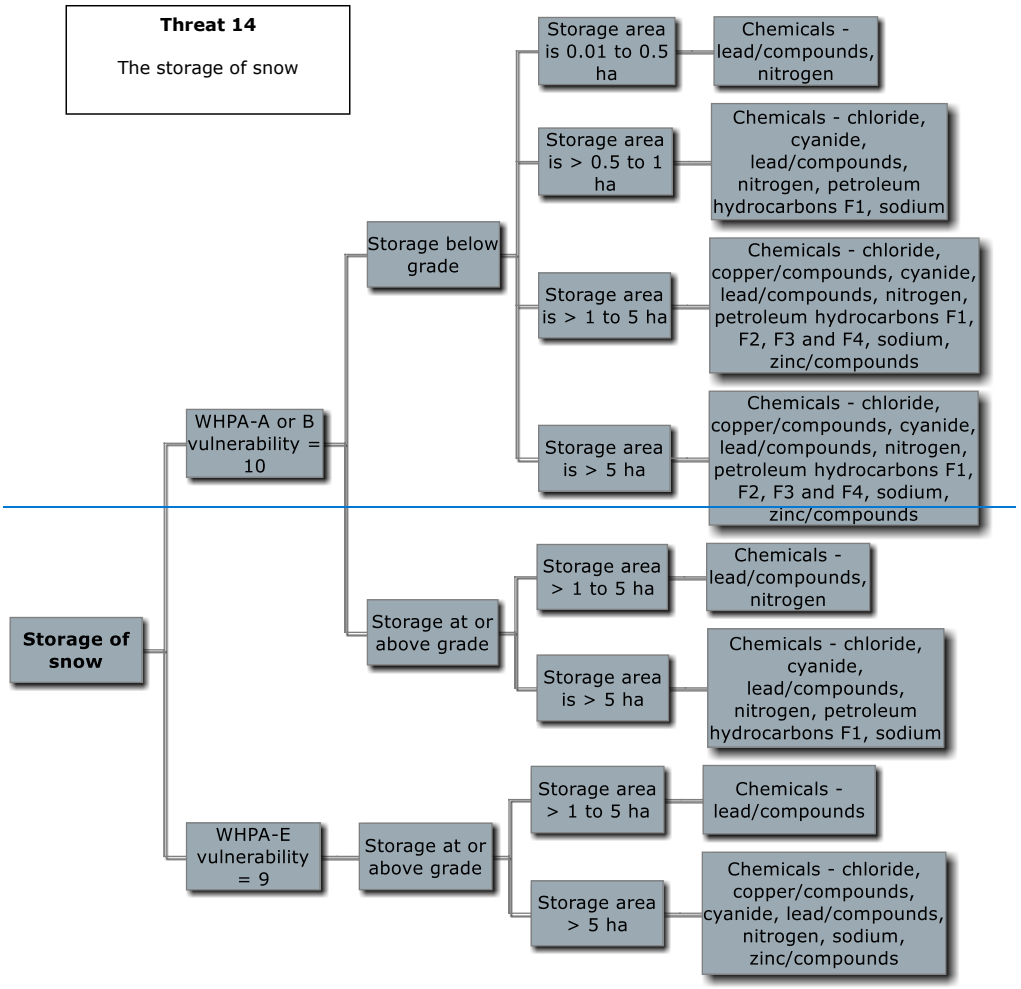
The application of road salt



Threat 13

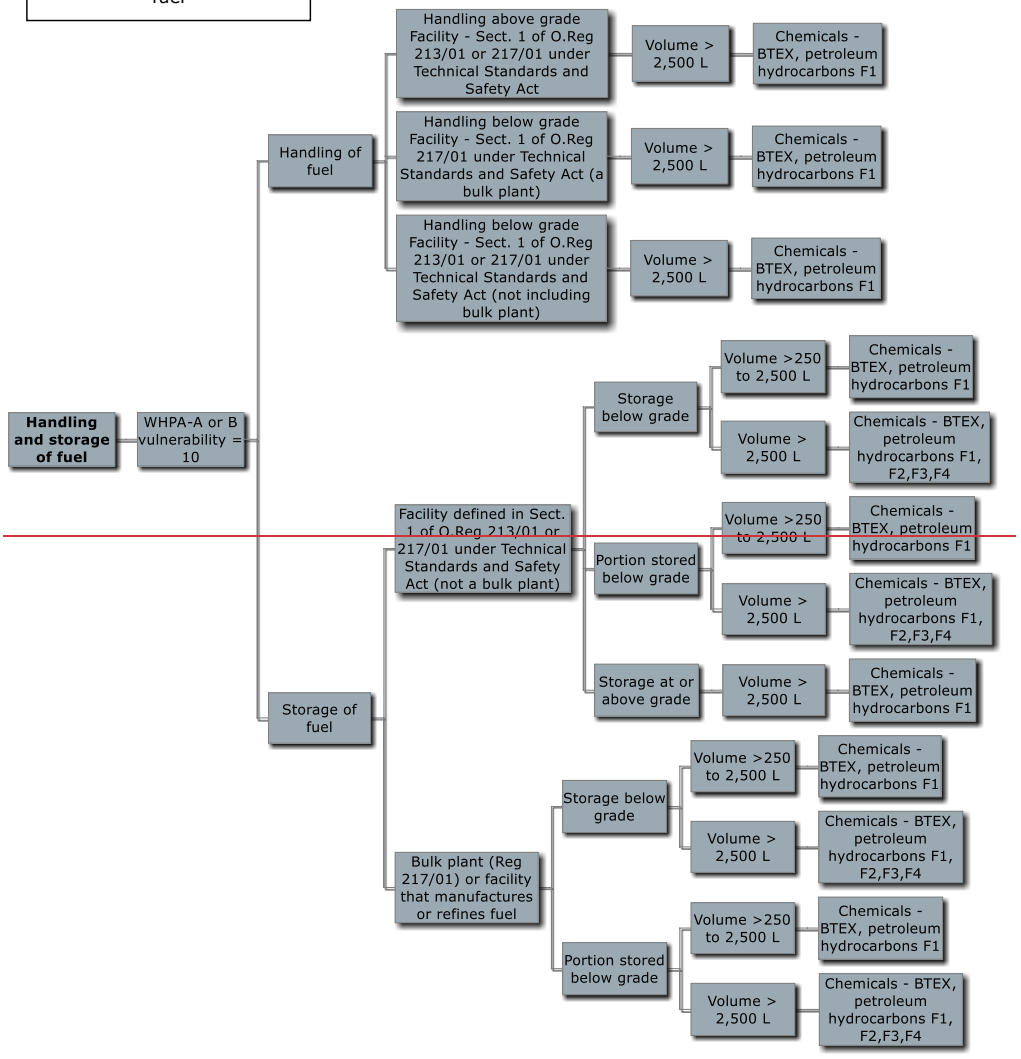
The handling and storage of road salt




Threat 14
The storage of snow
Storage of snow
WHPA-A or B vulnerability = 10
WHPA-E vulnerability = 9
Storage below grade
Storage at or above grade
Storage at or above grade
Storage area is 0.01 to 0.5 ha
Storage area is > 0.5 to 1 ha
Storage area is > 1 to 5 ha
Storage area is > 5 ha
Storage area > 1 to 5 ha
Storage area is > 5 ha
Storage area > 1 to 5 ha
Storage area > 5 ha
Chemicals - lead/compounds, nitrogen
Chemicals - chloride, cyanide, lead/compounds, nitrogen, petroleum hydrocarbons F1, sodium
Chemicals - chloride, copper/compounds, cyanide, lead/compounds, nitrogen, petroleum hydrocarbons F1, F2, F3 and F4, sodium, zinc/compounds
Chemicals - chloride, copper/compounds, cyanide, lead/compounds, nitrogen, petroleum hydrocarbons F1, F2, F3 and F4, sodium, zinc/compounds
Chemicals - lead/compounds, nitrogen
Chemicals - chloride, cyanide, lead/compounds, nitrogen, petroleum hydrocarbons F1, sodium
Chemicals - lead/compounds
Chemicals - chloride, copper/compounds, cyanide, lead/compounds, nitrogen, sodium, zinc/compounds

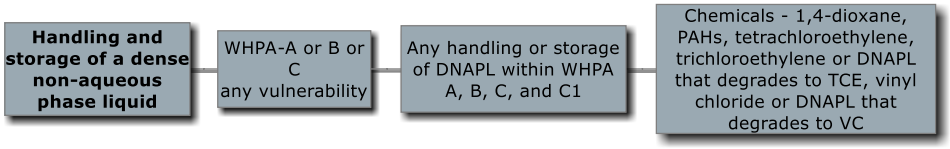
Threat 15

The handling and storage of fuel



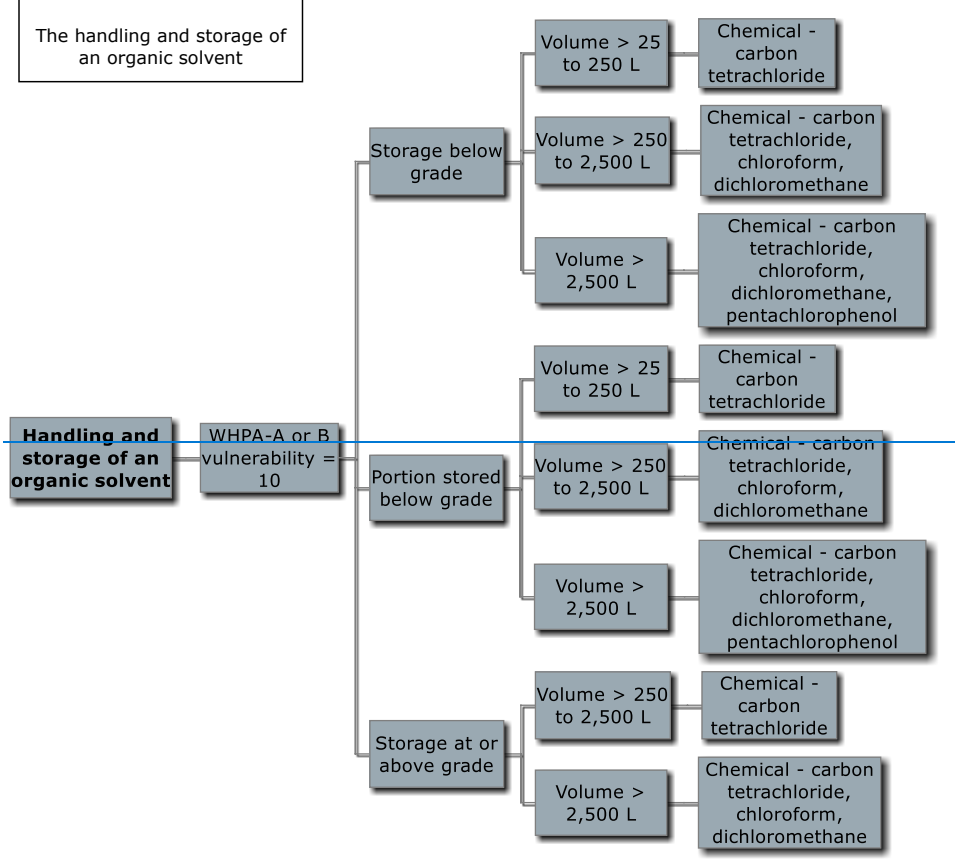
Threat 16

The handling and storage of a dense non-aqueous phase liquid



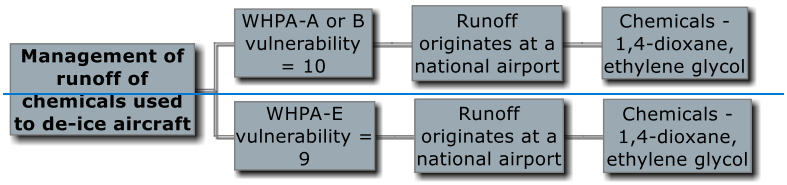
Threat 17

The handling and storage of an organic solvent



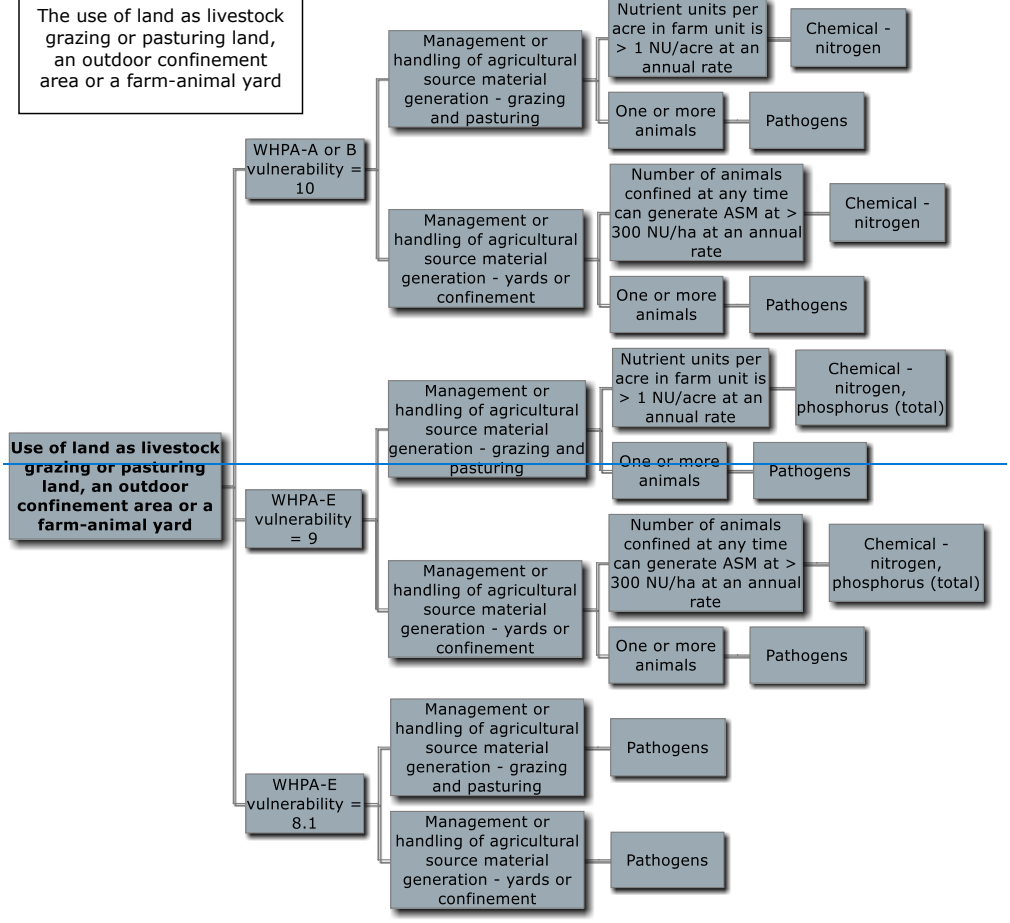
Threat 18

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



Threat 21

The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard



APPENDIX CD

Glossary of Terms

Glossary of Terms

Adsorb/Adsorption: the adhesion of a chemical onto the surface of a particle

Anaerobic bacteria: any bacteria that does not need oxygen for growth

Anaerobic digestion: the breakdown of organic matter by bacteria, without oxygen

Berm: a level space, shelf, or raised barrier separating two areas

Bioaccumulation: the accumulation of substances in an organism

Brownfield: typically, former industrial lands that are no longer used. Examples are factories, gas stations, and former port lands

Coal tar: a by-product of the burning of coal without oxygen

Combined sewer: sewers that carry both stormwater and sanitary wastes in one pipe

Condensate: gas oil, naphtha and other relatively light hydrocarbons which remain liquid at normal temperature and pressure

Copolymers: a large chemical compound made from repeating units of two chemical molecules

Crude oil: a naturally occurring, unrefined petroleum product composed of hydrocarbon deposits. Crude oil can be refined to produce usable products such as gasoline, diesel, and various forms of petrochemicals.

Deleterious: having a harmful effect

Dyke: a natural or artificial slope or wall to regulate water levels

Effluent: a liquid, solid or gas flowing out or discharging from a sewage system, factory, etc.

Extensive grazing: grazing of farm animals in pastures that typically provide all the nutritional needs of the animals with stocking densities of less than one nutrient unit per acre (Streamside Grazing, 2007). The majority of Ontario's unimproved pastures are managed as extensive grazing areas.

Eutrophication: the accumulation of excessive nutrients in a water body, causing a dense growth of plant life

Evapotranspiration: the term used to define water losses due to evaporation and transpiration. Evaporation is the change of water from a liquid to a vapour and requires the addition of heat energy. Transpiration is the process whereby plants take up water through their roots and release it to the atmosphere through their leaves.

Farm unit: under Regulation 267/03 of the Nutrient Management Act, an area of land used for an agricultural operation, part of an agricultural operation, or more than one agricultural operation

Greywater: wastewater generated from domestic activities such as laundry, dishwashing, and bathing, and containing no human waste

Hydrologic soil group A: soils having high infiltration rates, consisting mainly of deep, well-drained sand or gravel

Inert fill: earth, rock, or waste of a similar nature that contains no decomposable materials or soluble chemical substances

Issue: a chemical or pathogen that exits in source water at a concentration, or has an increasing concentration that, if it continues, may deteriorate the quality of the water for use as drinking water.

Issue Contributing Area: an area of water flowing toward an intake or well within a vulnerable area where threats related to an identified issue must be addressed to have the water source remain viable for drinking water.

Leachate: a solution formed when water passes through a material, such as waste, and dissolves soluble constituents

Light industry: a section of an economy's secondary industry characterized by less capital-intensive and more labour-intensive operations. Products made by an economy's light industry tend to be targeted toward end consumers rather than other businesses.

Managed lands: includes all land that is augmented with commercial fertilizers, manure, and/or other source materials

Municipal service facilities: a municipally owned works yard, operations centre, police station or facility, fire station or facility, emergency medical services facility, solid waste management facility or biosolids management facility

Nematodes: microscopic worms that stimulate injured plant tissue to form galls, which block the flow of water and nutrients to the plant

Normals: the averages of the data measured over a specific period. These data are typically used to predict future conditions

Nutrient: a source of nourishment for plants or animals that provides energy for survival and growth

Nutrient unit: the amount of nutrients generated by farm animals that is equivalent to fertilizer with the lower of 43 kilograms of nitrogen or 55 kilograms of phosphate

Pathogen: bacteria, virus, fungus, or other microorganism that causes disease

Plume: a zone of contaminants in water that is moving away from the source of the contaminants

Planners' Working Group: comprising planners from municipalities and conservation authorities within the Halton-Hamilton Source Protection Region and advisors from the Source Protection Committee and chaired by a planning consultant to assist Source Protection staff and the Committee with policy development. Knowledgeable persons from agencies, groups and municipalities attended meetings to speak on and discuss threat topics.

PCB (Polychlorinated biphenyl): a class of organic compounds that have 1 to 10 chlorine molecules attached to two benzene rings

Pulp and paper biosolids: solid or liquid material that results from the treatment of wastewater generated by a manufacturer of pulp, paper, recycled paper, or paper products, including corrugated cardboard

Ratite: a flightless bird such as an ostrich or emu

Rinsate: water used to rinse pesticide containers and equipment, and that contains pesticide residue

Salt Storage Facility: a designated area for the storage of road salt or salt/sand mixtures transported to the site in bulk

Septage: waste or sewage in a septic tank

Septic System: small septic systems are regulated under the Ontario Building Code where the system or all systems on one parcel of land have a design capacity of 10,000 litres per day or less, and where they are located on the same parcel of land as the building they serve. Large septic systems include all others. Both large and small systems are listed in the Ministry of the Environment's Tables of Drinking Water **Threats as including:**

- an earth pit privy
- a privy vault
- a greywater system
- a cesspool
- a leaching bed system and its associated treatment unit

Septic Tank: a watertight vault in which sanitary sewage is collected for the purpose of removing scum, grease and solids from the liquid without the addition of air and in which solids settling and anaerobic digestion of the sanitary sewage takes place

Sewage biosolids: solid or semi-solid residue from the treatment of sewage and removal of effluent

Sewage System: defined in the Ontario Building Code where the system or all systems on one parcel of land have a design capacity of 10,000 litres per day or less, and where they are located on the same parcel of land as the building they serve, as:

- a chemical toilet, an incinerating toilet, a recirculating toilet, a self-contained portable toilet and all forms of privy including a portable privy, an earth pit privy, a pail privy, a privy vault and a composting toilet system
- a greywater system
- a cesspool
- a leaching bed system
- a system that requires or uses a holding tank for the retention of hauled sewage at the site where it is produced before its collection by a hauled sewage system

Sewage Works: the equipment, piping, tanks, etc. used for the collection, transmission, treatment, and disposal of sewage and described in the existing certificate of approval issued under the Ontario Water Resources Act or the environmental compliance approval issued under the Environmental Protection Act for the facility

Snow Storage Facility: a designated purposely designed storage area used for the stockpiling of snow transported to the site for storage and melting

Stormwater: includes water runoff from roads, parking lots, lawns, and fields. Most stormwater comes from rain and snow melt, though lawn watering and car washing also can contribute to the total volume. Stormwater management ponds are typically designed to remove suspended sediment from runoff in urban areas. However, urban stormwater runoff may also contain nutrients, bacteria, heavy metals, oil and grease, pesticides, sodium, and chloride. Some of these contaminants may also be removed through treatment methods, but many are not. Thus, all stormwater discharging from a retention pond is considered untreated.

Substrate: clean sawdust, woodchips, straw, hay, livestock manure mixtures, or poultry litter, as defined in Ontario Regulation 106/09—Disposal of Dead Farm Animals

Watershed: an area of land that drains water into a water body such as a lake or river. Watershed may refer to the drainage of surface water or groundwater and the two drainage areas may not be coincident in a given area.

Water table: the water surface where the water pressure is equal to the air pressure. Underground it is the upper surface of the saturated zone where all pores in the rock or soil are filled with water.