1.0 Introduction

Following the public inquiry into the Walkerton drinking water crisis in May 2000, Justice Dennis O'Connor released a report in 2002 containing 121 recommendations for the protection of drinking water in Ontario. Since the release of the recommendations, the Government of Ontario has introduced legislation to safeguard drinking water from the source to the tap, including the *Clean Water Act (2006)*. The Act provides a framework for the development and implementation of local, watershed-based source protection plans, and is intended to implement the drinking water source protection recommendations made by Justice O'Connor in Part II of the Walkerton Inquiry Report. The Act came into effect in July 2007, along with the first five associated regulations.

The intent of the *Clean Water Act (2006)* is to ensure that communities are able to protect their municipal drinking water supplies now and in the future from overuse and contamination. It sets out a risk-based process on a watershed basis to identify vulnerable areas and associated drinking water threats and issues. It requires the development of policies and programs to reduce or eliminate the risk posed by significant threats to sources of municipal drinking water through science-based source protection plans.

Source Protection Committees are working in partnership with municipalities, Conservation Authorities, water users, property owners, the Ontario Ministries of the Environment (MOE) and Natural Resources (MNR), and other stakeholders to facilitate the development of local, science-based Source Protection Plans.

The *Clean Water Act (2006)* and the Drinking Water Source Protection Program form one component of a multi-barrier approach to protecting drinking water supplies in Ontario. The five steps in the multi-barrier approach include:

- Source water protection
- Adequate treatment
- Secure distribution system
- Monitoring and warning systems
- Well thought-out responses to adverse conditions

Following the Walkerton Inquiry, the Government of Ontario enacted the *Safe Drinking Water Act* in 2002, which provides new requirements and rules for the treatment, distribution and testing of municipal drinking water supplies. Together, the *Clean Water Act (2006)* and *Safe*

Drinking Water Act, along with their associated regulations, provide the legislative and regulatory framework to implement the multi-barrier approach to municipal drinking water protection in Ontario.

Source Protection Planning Process

The key objectives of the Source Protection Planning Process are to complete science-based Assessment Reports that identify the risks to municipal drinking water sources and to develop local Source Protection Plans that put policies in place to protect current and future sources of drinking water. In doing so, the most up-to-date scientific understanding is used to create water management policies that are most appropriate for the unique characteristics of each Source Water Protection Area.

Since 2005, municipalities and conservation authorities have been undertaking studies to delineate the areas around municipal drinking water sources that are most vulnerable to contamination and/or overuse. Within these vulnerable areas, technical studies have identified historical, existing and possible future land use activities that are or could pose a threat to municipal water sources. This Assessment Report is a compilation of the findings of the technical studies undertaken in the North Bay-Mattawa Source Protection Area (Fig. 2-2).

The Proposed Assessment Report was submitted to the Ministry of the Environment for approval on October 19, 2010. Originally the Proposed Assessment Report was due for submission to the Ministry of the Environment May 11, 2010. With approval from the Director, Source Protection Programs Branch, the submission date was extended to July 28, 2010 and subsequently to October 19, 2010.

Opportunities for public review and input were made available on the Draft Assessment Report in July and August 2010. Review and input was also sought for the Proposed Assessment Report in September 2010 before it was submitted to the Province for review and approval.

Since submission of the Proposed Assessment Report in October 2010, additional information became available which has been incorporated into this Updated Assessment Report. This version is being posted for public comment from May 13 to June 13, 2011 prior to submission to the Province for review and approval.

The Source Protection Plan is a document that will contain policies to protect sources of drinking water against threats identified in the Assessment Report. The Plan will set out:

- how the risks posed by drinking water threats will be reduced or eliminated;
- policy, threat and issues monitoring programs;
- who is responsible for taking action;
- timelines for implementing the policies and programs; and
- how progress will be measured.

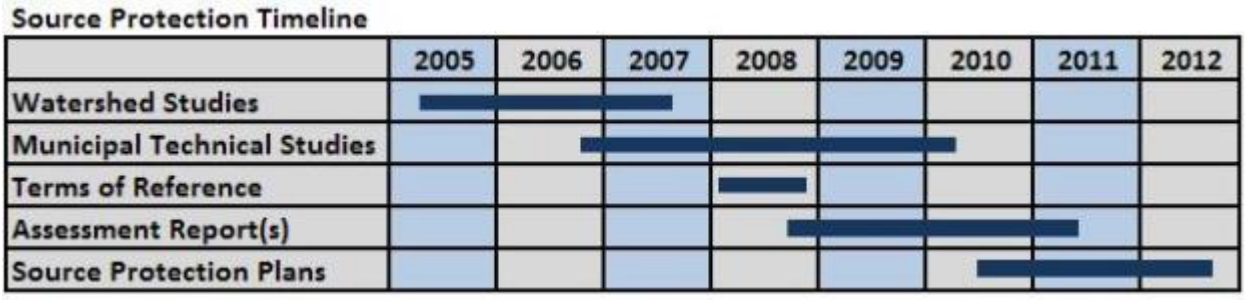
Plan development will involve municipalities, conservation authorities, property and business owners, farmers, industries, health officials, community groups, and others working together to develop a fair, practical, and implementable Source Protection Plan. Public input and consultation is essential to completing this process.

As illustrated in Figure 1-1 the Source Protection Plan must be submitted to the Minister of the Environment by August 2012 for approval. The MOE may appoint a hearing officer to deal with public concerns arising from the proposed Source Protection Plan.

After approval of the Source Protection Plan, annual monitoring reports and progress reports on implementation will be required. Implementation of the Source Protection Plan, once it has been approved by the Minister of the Environment, will be led by municipalities in most cases. In some cases, conservation authorities, public health units, or other organizations may be involved in implementing policies. A range of voluntary and regulatory programs and tools will be available, including:

- outreach and education;
- incentive programs;
- land use planning (zoning by-laws, and Official Plans);
- new or amended provincial instruments;
- risk management plans;
- prohibition; and
- land use restrictions.

Figure 1-1. Source Protection Timeline



Source Protection Areas (SP Area) and Authorities

The province has organized the Source Protection Program using watershed boundaries, rather than municipal or other jurisdictional areas. The watershed boundary is the most appropriate scale for water management, since both groundwater and surface water flow across political boundaries. Each planning area is referred to as a Source Protection Area under the *Clean Water Act (2006)*.

The North Bay-Mattawa Source Protection Area (SP Area) includes the North Bay-Mattawa Conservation Authority (NBMCA) administrative area (2,800 km^2) with its ten member municipalities and an additional 1,200 km^2 comprised primarily of the South River watershed. This latter extension was required to provide source protection planning support to the Municipality of Powassan and the Village of South River. It brings in portions of five additional municipalities, giving each the right to participate in the governance of the project. Local governance and oversight rests with the Source Protection Authority, a board that includes the original conservation authority board as well as representatives of each of the additional participating municipalities.

Source Protection Committee (SPC)

In the SP Area, the source protection planning process is being led by a multi-stakeholder steering committee called the North Bay-Mattawa Source Protection Committee (SPC), which was formed in November 2007. The Committee is currently responsible for directing the development of the Assessment Report and Source Protection Plan for the SP Area. It is evenly comprised of representatives of municipalities, the economic sector, and the public at large. Because this Source Protection Area includes First Nations' territory, the *Clean Water Act (2006)* requires that a seat be held for a representative from the band. As of date of publication of the Proposed Assessment Report, the General Manager of the North Bay-Mattawa Conservation Authority is actively discussing the vacancy with the Nipissing First Nation. The list of members is summarized in Table 1-1.

Table 1-1. Members of the North Bay-Mattawa Source Protection Committee

Name	Seat Held	Appointed by
Barbara Groves	Chair (2007-2013)	Minister of the Environment
Beverley Hillier	Municipal	Source Protection Authority
George Onley	Municipal	
Randy McLaren	Municipal	
George Stivrins	Industrial/Commercial	
Dennis MacDonald	Transportation	
Maurice Schlosser	Agriculture	
John MacLachlan	Public At-Large	
Lucy Emmott	Public At-Large	
Roy Warriner	Public At-Large	
Vacant	First Nations	

In October 2008, the Committee submitted its Terms of Reference for the North Bay-Mattawa Source Protection Area Assessment Report and Source Protection Plan to the Minister of the Environment. The Terms of Reference set out the work plan for completing both the Assessment Report and Source Protection Plan, and received Ministerial approval on May 11, 2009. A copy of the North Bay-Mattawa Protection Area Terms of Reference can be found atwww.actforcleanwater.ca.

Framework of the Assessment Report

The North Bay-Mattawa Source Protection Assessment Report was completed in compliance with Ontario Regulation 287/07 (General) under the *Clean Water Act (2006)*, which sets out the minimum requirements for Assessment Reports. In addition, the technical work summarized in this Assessment Report was completed in conformance with the Technical Rules, Assessment Report under O.Reg. 287/07. All technical studies were managed by the North Bay-Mattawa Conservation Authority on behalf of each the municipalities involved: Callander, Mattawa, North Bay, Powassan and the Village of South River. Funding to complete the technical studies was provided by the Province of Ontario.

Within the SP Area there are five municipal drinking water systems. The City of North Bay draws drinking water from Trout Lake, which is a part of the Mattawa River watershed. The Municipality of Callander takes water from Callander Bay, which is the outlet of the Wasi River and a part of Lake Nipissing. The Village of South River obtains drinking water from the South River. Both the Town of Mattawa and the Municipality of Powassan utilize groundwater.

The *Clean Water Act (2006)* focuses on the protection of municipal drinking water supplies; however, the Act allows for other water systems to be considered, including clusters of private wells, communal systems, and other non-municipal supplies (referred to as Type II systems). Only municipalities with water distribution systems and the Minister of the Environment have the power to add additional non-municipal systems to the scope of the Drinking Water Source Protection studies.
The technical studies summarized in this Proposed Assessment Report start with information at the watershed scale, and then move to the scale of the municipal drinking water system. The descriptions of the technical work provided in the Proposed Assessment Report are summaries of more detailed technical reports. Readers are encouraged to view the technical studies and background reports for each municipality available online at www.actforcleanwater.ca.

Continuous Improvement

The findings of this Assessment Report are based on the best available information. It is recognized that new information relevant to the objectives of this process will continuously become available in the future. Beyond the completion of this Assessment Report, municipalities and conservation authorities will continue to refine and improve these findings based on this new information, and will address the data gaps documented in the Assessment Report to the extent possible. Opportunities for input and review of amended Assessment Reports will be made available to those affected by the proposed changes.

Public Consultation

Public input on the Draft & Proposed Assessment Report was sought during two comment periods between July and October 2010. Further details regarding Public Consultations is included in Appendix D.

Draft Assessment Report Consultations

The first comment period for the Draft Assessment Report was held July 26 to August 31. Comments received during this period were considered by the North Bay-Mattawa Source Protection Committee (SPC) as it prepared the subsequent Proposed Assessment Report

The public were invited to review the Draft Assessment Report on the web at www.actforcleanwater.ca. Hard copies were also available for viewing at the North Bay-Mattawa Conservation Authority Office, Municipal Offices of the five municipal water systems and well cluster, and at public libraries of the municipalities.

As well, two public open houses and presentations were held to provide the public with an opportunity to learn about the results of the technical work summarized in the Assessment Report, ask questions, and provide comments.

The public meetings on the Draft Assessment Report were held on:

- August 19, 2010 in Callander; and
- August 24, 2010 in South River.

For the Draft Assessment Report consultation period, members of the public were also invited to contact dwsp.comments@nbmca.on.ca for specific meeting details.

Proposed Assessment Report Consultations

The Proposed Assessment Report was posted and available for public review and comment for 30 days. No further changes to the Proposed Assessment Report were permitted to be made by the SPA; and comments received during this second consultation period were forwarded with the Proposed Assessment Report to the Ministry of Environment (MOE) for review and approval. The MOE may direct the local SPC to make changes.

Comments on the Proposed Assessment Report were to be submitted to the North Bay-Mattawa Source Protection Authority by email to dwsp.comments@nbmca.on.ca, or by regular mail by October 18, 2010 to:

David Mendicino, Chair,
North Bay-Mattawa Source Protection Authority
c/o North Bay-Mattawa Conservation Authority
15 Janey Avenue,
North Bay, ON P1C 1N1

2011 Updated Assessment Report Consultations

The Updated Assessment Report was posted and available for public review and comment for 30 days. No comments were received during this consultation period, so no comments were forwarded to the Ministry of Environment for review with the Updated Assessment Report.

Comments on the Updated Assessment Report were to be submitted to the North Bay-Mattawa Source Protection Committee by email to dwsp.comments@nbmca.on.ca, or by regular mail by June 13, 2011 – 4:30 PM to:

Barbara Groves, Chair, North Bay-Mattawa Source Protection Committee
c/o North Bay-Mattawa Conservation Authority
15 Janey Avenue,
North Bay, ON P1C 1N1

2014 Updated Assessment Report Consultations

Similar to the consultation on the 2011 update, the 2014 Updated Assessment Report was posted and available for public review and comment for 30 days, ending February 18, 201 at 4:30 pm. Comments were to have been submitted by email to dwsp.comments@nbmca.on.ca, or by regular mail to:

John MacLachlan, Acting Chair, North Bay-Mattawa Source Protection Committee

c/o North Bay-Mattawa Conservation Authority
15 Janey Avenue,
North Bay, ON P1C 1N1

No comments were received and this current version was subsequently approved by the Ministry of Environment and Climate Change on February 10, 2015.

Overview of Source Protection Risk Assessment Process

The Assessment Report attempts to summarize all of the pre-existing background knowledge and findings of current technical studies to:

- identify the vulnerable areas around municipal-residential drinking water sources;
- determine the vulnerability within various zones in those areas;
- identify existing and potential threats to water quality and quantity within each area; and
- assess the risk level for threats that may contaminate or deplete the water supply.

Vulnerable Areas

What are vulnerable areas?

The *Clean Water Act (2006)* identifies four types of vulnerable areas related to drinking water sources:

- Highly Vulnerable Aquifer (HVA) areas;
- Significant Groundwater Recharge Areas (SGRA);
- Wellhead Protection Areas (WHPA); and
- Intake Protection Zones (IPZ).

The first three vulnerable areas are associated with groundwater; intake protection zones are associated with surface waters (rivers and lakes). The Highly Vulnerable Aquifer (HVA) areas, Significant Groundwater Recharge Areas (SGRA), and Wellhead Protection Areas (WHPA) are identified through consideration of geology, groundwater flow, and the permeability of surface material above the groundwater (aquifers). In some cases, complex modelling may be undertaken. Intake Protection Zones (IPZ) are identified by considering the flow of surface water in a river or lake. In all cases, legislated Technical Rules direct methodology to provide consistency in both approach and interpretation of results.

Vulnerable areas surrounding wells are called Wellhead Protection Areas (WHPA), whereas the vulnerable areas associated with surface water intakes are referred to as Intake Protection Zones (IPZ) (See details in Section 3.2.). Highly Vulnerable Aquifers (HVA) and Significant Groundwater Recharge Areas (SGRA) are assessed at the watershed scale and are not necessarily associated with any particular municipal drinking water system.

What is vulnerability?

The term “vulnerability” describes how easily a source of water, such as an aquifer, a river or a lake, could become polluted with a dangerous substance. The vulnerability of an area can range from 1 to 10, with 10 being the most vulnerable. The process for assessing vulnerability is different for groundwater and surface water systems, and also varies depending on whether the surface water source is a lake or river.

Drinking Water Threats

What are threats to drinking water?

Researchers have studied the areas around municipal wells and intakes to identify the human activities that could threaten those water supplies. There are three categories of threats: chemical, pathogen, and water quantity.

- **Chemical** threats include things like solvents, fuels, fertilizers, pesticides, and similar products. They can be found in many different places such as factories, storage depots, gasoline stations, and farms.

- A **pathogen** is a micro-organism (e.g., bacteria or virus) that can cause sickness in humans. Pathogens are often associated with human or animal waste.

- Water **quantity** threats are activities that either reduce the ability of water to "recharge" (move from the surface to) an aquifer, or that contribute to the overuse of water.

How are the locations of potential threats identified?

Researchers working for municipalities or conservation authorities have used a variety of means to identify the locations of potential threats including provincial pesticide registries, industrial databases, interviews with property owners, questionnaires, and other means. Details on individual threats, including their location and information are not identified in the Assessment Report. Property owners will be notified directly if it is believed that an activity on their land is a potential threat in order to confirm the information.

Assigning 'Hazard Ratings' to Activities

Not all threats are equal. The level of risk to human health posed by particular chemicals and pathogens depends on several factors including:

- the quantity;
- the toxicity; and
- how it behaves in the environment (e.g., Does the chemical move rapidly or slowly through the ground? How long do bacteria live in groundwater? What is the method of release into the environment.)

The Ontario Ministry of the Environment has produced Provincial Tables of Drinking Water Threats, identifying nearly 2000 potential chemical and pathogen threats. The threats have been given a score on a scale from 1 – 10, with 10 being the most dangerous. This is known as the "hazard rating." The table indicates the threat level of each activity, based on the surface water or groundwater vulnerability score.

Calculating Threat Level: Low, Moderate or Significant

Risk Score	Hazard Rating
80 - 100	Significant
60 ≤ and < 80	Moderate

40< and < 60	Low
Risks with scores lower than 40 are below the threshold of concern.	

The goal of the *Clean Water Act (2006)* is to reduce the risk posed by significant threats to water supplies and to prevent new significant threats from developing. So, it is necessary to sort out which potential threats are significant and which pose low or moderate risks. This is done by calculating the "risk score."

The risk score is a combination of two factors:

1. the vulnerability of the water source (on a scale of 1 to 10) and
2. the hazard rating of the threat (also on a scale of 1 to 10).

The risk score is calculated by multiplying the two factors together to provide a score out of 100. The score is then put into one of three categories: significant, moderate, or low.

Threats from Conditions or Issues

Threats to drinking water stemming from past or present land use activities that have impacted the land or water are referred to as conditions. A condition could be an area of known contamination in the soil or a contaminant in groundwater that is impacting or has the potential to impact a drinking water source.

Issues are identified generally by water quality analysis that reveals parameters that exceed acceptable standards. When an issue is identified that is at least partially the result of human activity, the area of concern must be delineated (Issue Contributing Area) and then any activity therein that contributes to the issue is classified as a significant threat to drinking water.

What does this mean for your property?

A property owner or business can use the Assessment Report to determine whether an activity on their property might be classified as a significant threat. If your property is close to a municipal drinking water system, you can use the vulnerability maps associated with your local system to determine whether your property is in a vulnerable area with a score of 8 to 10. Larger scale maps are available for viewing at the North Bay-Mattawa Conservation Authority.

If your property is located in a Wellhead Protection Area or Intake Protection Zone with a score of 8 to 10, use the Tables of Drinking Water Threats compiled by the Ministry of the Environment to determine whether any activities on your property might be considered a significant threat. The Tables of Drinking Water Threats can be accessed using the following link:

http://www.ene.gov.on.ca/environment/en/subject/protection/STDPROD_080600.html

Uncertainty/Limitations

All calculations contain inherent uncertainty due to incomplete data, data inaccuracies, and imperfect estimation and simulation tools. Most of the sources of uncertainty are documented in the original technical studies that are available from the North Bay-Mattawa Drinking Water Source Protection website: www.actforcleanwater.ca. It is important to consider the regional-scale nature of the analyses and interpretations presented. Any model developed to represent a natural system is inherently a simplification of that natural system. Part of the reason for this is that the complexities of the physical system can never be known well enough to incorporate all details into a numerical context. This does not negate the value of listing numerical models as

tools to help understand and manage natural systems; however, there is a need to recognize the limitations of such tools when interpreting results.

Attempts to apply these findings to a different scale (such as individual parcels of land) may produce invalid results. Every effort was made to minimize uncertainty in all studies: data was cross checked with additional sources and external peer reviewers were consulted where either required or deemed advisable. Methodology was appropriate for current purposes.