

6.0 Conditions Assessment

In order to protect drinking water sources, it is necessary to identify the *threats* that pose a *risk* to drinking water sources. The drinking water threats that may be considered in identified *vulnerable areas* are those due to: *prescribed activities*, *other activities*, *conditions* (past activities) and activities contributing to identified drinking water quality *issues*. A *condition* is the result of a past activity and may pose a *risk* to a drinking water source. This Section of the Assessment Report describes the situations in which a *condition* may exist, and the preliminary investigation made in assessing *conditions* in the Upper Thames River Source Protection Area. Section 5 – Issues Evaluation describes the drinking water quality *issues* identified in this source protection area, while Section 7 – Threats and Risk Assessment describes the assessment of *risks* due to *prescribed activities* and *other activities*.

The Source Protection Committee is required to identify, as a drinking water *threat*, any *Condition* of which it is aware. The *Source Protection Plan* is focused on reducing the level of *risk* associated with *threats*. The identification of *threats* in *vulnerable areas*, including those due to *conditions*, is an important step in the development of the *Source Protection Plan*. The Clean Water Act requires that *significant threats* be managed to the point that they no longer become significant. The Source Protection Committee may also develop policies for *moderate and low drinking water threats*, however it is anticipated that the types of policies which can be applied to *moderate and low threats* will not be as broad as for the *significant threats*. Policies for conditions are however anticipated to be significantly different than those for *prescribed activities* as a result of the fact that the *activity* is no longer being undertaken and that the contaminant has already been released into the environment.

Conditions must be identified in *vulnerable areas*. The vulnerable areas are *Intake Protection Zones (IPZ)*, *Wellhead Protection Areas (WHPA)*, *Highly Vulnerable Aquifers (HVA)* and

Upper Thames River Source Protection Area Assessment Report

Significant Groundwater Recharge Areas (SGRA). The delineation and assessment of **vulnerable areas** is described in Section 4 - Vulnerability Assessment of this Assessment Report. In the Upper Thames River Source Protection Area, there are no **Intake Protection Zones**. The **Wellhead Protection Areas** are delineated around the wellheads of 22 groundwater drinking systems. **Map 4-1** shows the location of the **WHPA** around municipal wellheads. **Map 4-7 and Map 4-8** respectively show the **HVA** and **SGRA** delineations.

Through the technical work on Threats and Risk Assessment, a preliminary review of data made available by the Ministry of Environment (**MOE**) for the assessment of **conditions** was undertaken. The Threats and Risk Assessment studies involved the operating authorities of the drinking water systems and were undertaken through partnerships involving the municipalities and Conservation Authorities in the region. These studies are described in detail in Section 7 - Threats and Risk Assessment. The technical reports for these studies are listed in Table 6-1.

Table 6-1 Technical Studies on Drinking Water Threats and Risk Assessment

Drinking Water Systems	Technical Study on Threats and Risk Assessment
City of London back up wells (Fanshawe and Hyde Park wellfields), Birr, Melrose, Komoka, Dorchester and Thorndale	London, Middlesex Centre and Thames Centre Wellfield Source Protection Study. Water Quality Threats and Risk Assessment Final Report. June 4, 2010. Dillon Consulting Limited.
Embro, Lakeside, Mount Elgin (existing wells) and Tavistock	Upper Thames River Source Protection Area. Embro, Lakeside, Mount Elgin and Tavistock Well Systems Threats Assessment. March 23, 2010. County of Oxford.
Ingersoll	Upper Thames River Source Protection Area. Ingersoll Well Systems Threats Assessment. April 23, 2010. County of Oxford.
Beachville, Hickson, Innerkip, Thamesford	Upper Thames River Source Protection Area. Beachville, Hickson, Innerkip and Thamesford Well Systems Threats Assessment. April 27, 2010. County of Oxford.
Woodstock (urban wellfield)	Upper Thames River Source Protection Area. Woodstock Urban Well Systems Threats Assessment. May 19, 2010. County of Oxford.
Mount Elgin (existing and planned wells)	Upper Thames River Source Protection Area. Mount Elgin Threats Assessment. June 10, 2010. County of Oxford.
Woodstock (rural wellfield including planned wells)	
Mitchell, Sebringville, St. Pauls, Stratford	Draft Threat Assessment – Perth County Municipal Drinking Water Systems. Schlumberger Water Services. May 2010.
Shakespeare	Draft Threat Assessment – Milverton and Shakespeare Municipal Drinking Water Systems. Schlumberger Water Services. May 6, 2010.
St. Marys	

6.1 Conditions Assessment Methodology

6.1.1. Situations where Conditions may Exist

The *Technical Rules: Assessment Report* identifies the types of situations within a *vulnerable area* that may be considered *conditions*. *Conditions* include any one of the following situations that exist in a *vulnerable area* and result from a past *activity*:

- the presence of a non-aqueous phase liquid in groundwater in a *highly vulnerable aquifer, significant groundwater recharge area* or *wellhead protection area*;
- the presence of a single mass of more than 100 litres of one or more dense non-aqueous phase liquids in surface water in a surface water *intake protection zone*;
- the presence of a contaminant in groundwater in a *highly vulnerable aquifer, significant groundwater recharge area* or a *wellhead protection area*, if the contaminant is listed in Table 2 of the Soil, Ground Water and Sediment Standards and is present at a concentration that exceeds the potable groundwater standard set out for the contaminant in that Table;
- the presence of a contaminant in surface soil in a surface water *intake protection zone*, if the contaminant is listed in Table 4 of the Soil, Ground Water and Sediment Standards is present at a concentration that exceeds the surface soil standard for industrial/commercial/community property use set out for the contaminant in that Table; and
- the presence of a contaminant in sediment, if the contaminant is listed in Table 1 of the Soil, Ground Water and Sediment Standards and is present at a concentration that exceeds the sediment standard set out for the contaminant in that Table.

Conditions in a *HVA, SGRA* or *WHPA* may exist as a result of the presence of non-aqueous phase liquids in groundwater. Non-aqueous phase liquids do not mix with water. Light Non-Aqueous Phase Liquids (*LNAPLs*) float on top of water, and examples are oil and gasoline. Dense Non-Aqueous Phase Liquids (*DNAPLs*) are liquids that do not mix with water and are heavier than water. *DNAPLs* are of concern in groundwater since they sink into the ground, settle at the bottom of and contaminate an aquifer. Examples of where *DNAPLs* are used include: dry cleaning, wood preservation, asphalt operations, machining, and in the production

Upper Thames River Source Protection Area Assessment Report

and repair of automobiles, aviation equipment, munitions, and electrical equipment (Source of information: <http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=6A7FB7B2-1#sub3>). The Soil, Ground Water and Sediment Standards refer to an MOE publication, 'Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act' (March 9, 2004). This document, consisting of 6 tables (called Tables 1 to 6), sets out the prescribed contaminants and the applicable site condition standards for those contaminants for the purposes of Part XV.1 ('Records of Site Condition') of the *Environmental Protection Act*. The prescribed standards for contaminants are set out by indicating the maximum concentrations of the contaminants in soil, groundwater and sediment for a type of property use (such as agricultural or commercial). These are expressed in microgram per gram ($\mu\text{g/g}$) dry weight for soil and sediment, and as microgram per litre ($\mu\text{g/L}$) for groundwater, unless otherwise indicated in the table. Contaminants listed in the tables include metals, nutrients, polyaromatic hydrocarbons, pesticides, petroleum constituents and dense non-aqueous phase liquids.

Table 1 ('Full Depth Background Site Condition Standards') is used to determine if conditions exist in sediments of a vulnerable area. The sediment standards in Table 1 are values within the range of measured background sediment where data is available in the 1993 Sediment Guidelines and are considered to provide a level of human health and ecosystem protection consistent with background, and protective of sensitive ecosystems. These sediment standards are for all property uses. Table 2 ('Full Depth Generic Site Condition Standards in a Potable Ground Water Condition') is used to determine if a condition exists in the groundwater of a *WHPA*, *SGRA* or *HVA*, by comparing the contaminant concentration with the standard for potable groundwater, which applies to all property uses. Table 4 ('Stratified Site Condition Standards in a Potable Ground Water Condition') is used to determine if a condition exists in the surface soil of an *IPZ*, in properties used for industrial, commercial or community purposes.

6.1.2. Information Used to Identify Conditions

A preliminary investigation of situations that may be *conditions* has been undertaken based on information available. To date, investigation of *conditions* includes the following measures:

- Those undertaking municipal technical studies were requested to determine if there are *conditions* which the plant operating authorities are aware of. If such a concern was identified, the consultants were to investigate to determine if it was in fact a *condition*.
- *MOE* provided information from their local offices to determine if their files contain any information which might lead to identifying a *condition*. This information was restricted to a fixed radius around intakes and wells. Although it has been provided to the consultants for their consideration, not all of the consultants have been able to review the information. Further, the information does not include the entire *vulnerable areas*.
- It is anticipated that stakeholders, including the public, may identify situations which they believe may be a concern and will require investigation to determine if they are *conditions*. Some of these have been identified, but are yet to be reviewed to determine if they should be considered a *condition*.

The two sets of data made available by the Ministry of Environment (*MOE*) to check for conditions are data from the 'Brownfields Registry' and '*MOE* Data Scanning'. Brownfields are lands on which industrial or commercial activity took place in the past and that may need to be cleaned up before they can be redeveloped. The Brownfields Registry data from *MOE* contained summarized information from individual Records of Site Condition (*RSC*) available on the Brownfields Site Registry. The Brownfields Environmental Site Registry provides access to the individual *RSCs* where contamination information about each individual *RSC* property is documented. Records of Site Condition are not a listing of all contaminated sites in the province (no such list exists). The information provided is only applicable to properties that have undergone a land use change and for which an *RSC* has been accepted. The Brownfields data from *MOE* contained all records up to December 11, 2008. The *MOE* Data Scanning information included all Ministry of the Environment files pertaining to water, within 500 metres around a groundwater wellhead and 1000 m around a surface water intake.

6.1.3. Risk Assessment Methodology for Conditions

Should the committee become aware of a *condition* as described above, the *condition* is to be considered a *drinking water threat*. As with all *drinking water threats*, the *risk score* of a *condition* is identified in the *Technical Rules: Assessment Report*, as the product of the *vulnerability score* and *hazard score*.

Upper Thames River Source Protection Area Assessment Report

Risk = Vulnerability X Hazard

The assessment of *prescribed activities*, *other activities* and a description of the *MOE Table of Drinking Water Threats* is provided in Section 7 – Threats and Risk Assessment of this

Assessment Report. As per Technical Rule 139 (Nov. 2009), the *hazard score* of a *condition* is:

- (a) **10**, if there is evidence that the situation is causing off-site contamination
- (b) **10**, if the *condition* is on a property where a well, intake or monitoring well (existing and planned drinking water systems that are major residential, included in the Terms of Reference by resolution or upon order of the Director, or serve reserves) is located
- (c) **6**, if (a) and (b) do not apply.

The *risk score* of a *threat* due to a *condition* in *IPZ*, *WHPA*, *HVA* and *SGRA* would depend on the *vulnerability scores*, and whether the *hazard score* of the *condition* is 6, or 10. Table 6-2 shows the general relationship between the *hazard score* and the resulting *threat* level for *conditions*.

Table 6-2 Threat Level Determination for Conditions

Hazard Score	Vulnerability Score	Risk Score	Threat Level
10	8 or greater	80 or greater	Significant*
	6 to less than 8	60 to less than 80	Moderate
	Greater than 4 but less than 6	Greater than 40 but less than 60	Low
	4 or less	40 or less than 40	No threat
6	Not possible	80 or greater	Significant*
	10	60 to less than 80	Moderate
	7 to less than 10	Greater than 40 but less than 60	Low
	Less than 7	40 or less than 40	No threat

Notes:

Upper Thames River Source Protection Area Assessment Report

*There are additional scenarios where, regardless of the risk score, a threat is considered significant

While the *risk score* helps determine *threat* level, other factors that determine *threat* level for *conditions* are described below. According to Rule 140.1, a *condition* is deemed a *significant threat* in an *Intake Protection Zone* if an *IPZ-3* is delineated due to the *condition*. According to Rule 141, a *condition* resulting from a past *activity* would be deemed a *significant threat* if:

- it is associated with an identified drinking water quality *issue*;
- it is identified as a *threat* that contributes (or may contribute) to an *issue*;
- it is located in an identified *issue*-contributing area within a *vulnerable area*; and
- there is evidence that the *condition* is or may be causing off-site contamination, or the *condition* is on a property where a well, intake or monitoring well is located.

6.2 Conditions Assessment Findings

The efforts completed to date serve as a preliminary screening for known situations which the Source Protection Committee should consider in developing a *Source Protection Plan* for the area. A more comprehensive investigation will be conducted when more information is available. Known situations in the Upper Thames River *Source Protection Area* are described below.

At the Komoka municipal well supply system in Middlesex County, a petroleum fuel spill associated with the fuel storage for the backup generator had occurred near the well house approximately five years ago. Clean-up of the impacts is being managed by *MOE*, and will be completed following the decommissioning of the municipal wells.

At the St. Marys municipal well supply system, there is an old fuel storage, which was remediated in 2008, located within the St. Marys WHPA, to the east of Well No. 1. There is also an old fuel storage and fill area along the St. Marys River, within the WHPA-A of Well No. 2. Located in this area are buried petroleum and concrete degreasing tanks. Therefore the *MOE* requested an Environmental Assessment to be conducted prior to the construction of Well No.

2. The findings of the 2005 report indicate that the historical activities do not impact the well water quality.

Further investigation will need to be conducted to assess whether the above situations are *condition* based threats.

6.3 Data Gaps and Next Steps for Conditions

Data on past activities that have resulted in potential *conditions* is sparse, thus a comprehensive investigation is yet to be conducted. If information such as:

- o data from the Spills Action Centre of the *MOE*;
- o additional data from *MOE* regional files (*MOE* Data Scanning) for *WHPA* , *IPZ* , *HVA* and *SGRA* where the vulnerability is greater than 4

were made available to the Source Protection Committee, this information would be reviewed to determine if the situation might meet the criteria of a *condition*. Findings would be included in an amended Assessment Report. The Source Protection Committee will continue to investigate any situations or concerns that are brought to their attention. Should any *conditions* be identified, it will be necessary to amend the Assessment Report to include those *conditions*.

Upper Thames River Source Protection Area Assessment Report

8.0 Great Lakes

The Clean Water Act (2006) requires that the Great Lakes Agreements be considered in an Assessment Report and *Source Protection Plans*, if a Source Protection Area (*SPA*) contains water that flows into a Great Lake (Section 14). The *Technical Rules: Assessment Report* also requires that a description be provided on how the Great Lakes Agreements were considered in work undertaken (Rule 9) towards the Assessment Report.

The Upper Thames River Source Protection Area (*UTRSPA*) is one of the three *SPAs* that the Thames-Sydenham and Region Source Protection Region (*SPR*) is comprised of, the other two being the Lower Thames Valley Source Protection Area (*LTVSPA*), and the St. Clair Region Source Protection Area (*SCRSPA*).

The *UTRSPA* is based on the Upper Thames River Conservation Authority (CA) jurisdiction. Conservation Authorities are established on a watershed basis. The *UTRSPA* is landlocked and has no Great Lakes shoreline. It is surrounded by the Ausable Bayfield Maitland Valley *SPR* and Lake Erie *SPR*, as well as the *LTVSPA*. The Thames River originates in the *UTRSPA* and continues to flow through the *LTVSPA* where it outlets into Lake St. Clair, which in turn outlets into Lake Erie through the Detroit River.

Lake St. Clair is not a Great Lake but it is included while considering Great Lakes in the source protection planning process. For source water protection purposes, the Lake Erie basin is considered to be comprised of Lake St. Clair, the Detroit River and Lake Erie.

In the *UTRSPA*, most communities receive their drinking water from groundwater sources. However the City of London and a few neighbouring communities receive water from Lake Huron and Lake Erie, through municipal water treatment plants located outside of this *SPA*. Map

1-3 shows the watershed boundary of the *UTRSPA*, and the location of the groundwater systems and surface water intakes that serve communities in the watershed.

8.1 Impact of Considering Great Lakes

The Clean Water Act requires *Source Protection Plans* to consider policies that relate to the Great Lakes. The Ministry of Environment (*MOE*) document 'A Discussion Paper on Requirements for the Content and Preparation of Source Protection Plans' (June 2009) provides some details on how Great Lakes policies may be included in the Source Protection Plan. Those details are reproduced below.

The Clean Water Act gives the Minister of the Environment the authority to set targets for the Great Lakes or any part thereof, to address any water quality or quantity issue related to the use of the Great Lakes as a source of drinking water (Section 85). Targets are anticipated to direct and coordinate action on a drinking water source protection issue or an emerging Great Lakes problem. The Minister also has the option of establishing a Great Lakes target for a group of source protection areas. If a target applies to multiple source protection areas, the Minister may direct the source protection authorities to decide jointly on what the relative target should be for each individual source protection area, to contribute to the overall target.

The Clean Water Act also provides that the source protection plan may identify one or more Great Lakes target policies as a "designated Great Lakes policy" (Section 22). Where a *source protection plan* does not designate any of the Great Lakes policies, the Minister may direct a source protection authority to do so during the process of reviewing and approving the *source protection plan*.

Also, policies that govern monitoring to assist in implementing and in determining the effectiveness of a Great Lakes target policy may be established. It may be possible that Great Lakes targets are set up through other *SPR source protection plans* but include the *UTRSPA*, in which case the *SPA* will be involved in discussions with other *SPAs* on achieving those targets.

8.2 Great Lakes Agreements

Under the Clean Water Act, the Great Lakes Agreements to be considered (Section 14) are listed below:

1. The Great Lakes Water Quality Agreement of 1978 between Canada and the United States of America, signed at Ottawa on November 22, 1978, including any amendments made before or after this section comes into force.
2. The Great Lakes Charter signed by the premiers of Ontario and Quebec and the governors of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin on February 11, 1985, including any amendments made before or after this section comes into force.
3. The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem 2002 entered into between Her Majesty the Queen in Right of Canada and Her Majesty the Queen in Right of Ontario, effective March 22, 2002, including any amendments made before or after this section comes into force.
4. The Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement.
5. Any other agreement to which the Government of Ontario or the Government of Canada is a party that relates to the Great Lakes Basin and that is prescribed by the regulations.

The first four Agreements are discussed below. At the time of drafting of this report, the Source Protection Committee is not aware of any other Agreement, signed by the Government of Ontario or the Government of Canada, related to the Great Lakes and prescribed by the regulations.

8.2.1. Great Lakes Water Quality Agreement

The Great Lakes Water Quality Agreement (*GLWQA*), first signed in 1972 and renewed in 1978, expresses the commitment of Canada and the United States to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem and includes a number of objectives and guidelines to achieve these goals. In 1987, a Protocol was signed to help develop and implement Remedial Action Plans (*RAPs*) and Lakewide Management Plans (*LaMPs*). *RAPs* focus on the geographic Areas of Concern (*AOCs*), which are identified under

Upper Thames River Source Protection Area Assessment Report

the Canada-Ontario Agreement Respecting Great Lakes Water Quality described in Section 8.2.2.

LaMPs are designed to improve the environmental quality of the open waters of each of the Great Lakes. In accordance with the GLWQA, the goal of the Lake Erie LaMP is to restore and protect the beneficial uses of Lake Erie, with a focus on the beneficial-use impairments listed in the Agreement. Ecosystem objectives specific to Lake Erie are established to guide LaMP efforts toward defined endpoints. In 1994, nine conservation authorities created a co-operative agreement to combine the strengths of their individual, long-term community partnerships across the Lake Erie Basin, and improve the ability to work with provincial and federal governments. The group established is called the Federation of Conservation Authorities of Lake Erie, or *FOCALErie*, and is comprised of the Essex Region, Lower Thames Valley, Upper Thames River, St. Clair Region, Catfish Creek, Kettle Creek, Long Point Region, Grand River and Niagara Peninsula Conservation Authorities. *FOCALErie* supports the Lake Erie *LaMP* through projects such as public involvement and Lake Erie basin geographic information system compilation and updates. The City of London and neighbouring communities in the *UTRSPA* receive water from Lake Huron and Lake Erie intakes located outside the SPA. It is important to note that *FOCALErie* provides a mechanism for Conservation Authorities including the Upper Thames River CA to deal with other, broader Great Lakes concerns and to coordinate watershed planning and implementation activities at a scale beyond their individual watershed boundaries.

As mentioned before, the Thames River originates in the *UTRSPA* and continues to flow through the *LTVSPA* where it outlets into Lake St. Clair, which in turn outlets into Lake Erie. The Great Lakes Water Quality Agreement (*GLWQA*) has been considered in the Lower Thames Valley Source Protection Area Assessment Report. Under the Great Lakes Water Quality Agreement, the Four Agency Management Committee established a framework for binational coordination of environmental issues on Lake St. Clair (U.S. Environmental Protection Agency, Environment Canada, Ontario Ministry of Environment, Michigan Department of Environmental Quality. 2004). It is called the Lake St. Clair Management Plan. Lake St. Clair intakes in the Essex Region SPA supply some communities in the Lower Thames Valley Source Protection Area.

Upper Thames River Source Protection Area Assessment Report

A Lakewide Management Plan is yet to be established for Lake Huron. In 2004, a report was prepared entitled Lake Huron Bi-national Partnership Action Plan and is described based on information from <http://www.epa.gov/glnpo/lakehuron/LH%202004.pdf>. This plan does provide an overview of issues and recommends actions to address these issues. The approach to Lake Huron differs from the Lake-wide Management Plans (*LaMPs*) of Lakes Superior, Michigan, Erie and Ontario in that there has been no systematic assessment of beneficial use impairments, identification of causes, definition of critical pollutants, determination of chemical sources and loadings, and release of a report for comment. The alternative approach focuses on areas of obvious importance, such as identified Areas of Concern, tackles these as priorities in the first action plans, and will expand over time to include other activities that investigate the less severe or obvious issues in the lake. Through the *GLWQA*, three Areas of Concern in the Lake Huron basin are identified none of which are in the *UTRSPA*. Under the Action Plan, three priority issues - contaminants in fish and wildlife; biodiversity and ecosystem change; fish and wildlife habitat - were given priority for immediate action while other issues will be tracked and added as the Partnership pursues this process of updating and expanding activities over time. Other Lake Huron concerns include: low water levels, botulism, cormorant populations, blue-green algae blooms, aquaculture, the spread of exotic non-native species such as the Common Reed Grass (*Australius phragmities*), emerging contaminants and global climate change. The 2008-2010 Action Plan tracks progress on issues identified in the previous cycle, including contaminants in fish, changes in food web structure and protection of critical habitat, and has been expanded to address emerging issues, such as observed increases in nearshore algae and diseases such as botulism (<http://www.epa.gov/glnpo/huron.html>). At the time of writing of this report, it is understood that the Lake Huron Bi-national Partnership Action Plan is not prescribed by the Regulations.

8.2.2. The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem

Information on this Agreement is reproduced from the Ministry of Environment website (<http://www.ene.gov.on.ca/en/news/2007/081602mb.php>). The governments of Canada and Ontario have signed an agreement to protect the Great Lakes that includes cleaning up 15 Areas of Concern on the Great Lakes or its connecting channels where the natural environment

has been severely degraded, reducing harmful pollutants, and improving water quality. The Agreement also aims to conserve fish and wildlife species and habitats, lessen the threat of aquatic invasive species and improve land management practices within the Great Lakes Basin. The Agreement, which is valid until 2011, contains new areas of cooperation such as protecting sources of drinking water, understanding the impacts of climate change and encouraging sustainable use of land, water and other natural resources. The implementation of this Agreement helps fulfill the obligations of the Great Lakes Water Quality Agreement.

This Agreement is not considered to be relevant to the current Assessment Report, as there are no Areas of Concern in the *UTRSPA*. However as mentioned earlier, the Assessment Report notes the participation of the Upper Thames River CA in organizations that promote watershed based programs that aim at improving Great Lakes water quality.

8.2.3. The Great Lakes Charter and the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement

The Great Lakes Charter contains agreements between the eight Great Lakes states in the United States and the Province of Ontario and the Government of Quebec. The purposes of the Charter are “to conserve the levels and flows of the Great Lakes and their tributary and connecting waters; to protect and conserve the environmental balance of the Great Lakes Basin ecosystem; to provide for cooperative programs and management of the water resources of the Great Lakes Basin by the signatory States and Provinces; to make secure and protect present developments within the region; and to provide a secure foundation for future investment and development within the region” (<http://www.cglg.org/pub/charter/index.html>).

The Great Lakes Charter was supplemented in 2001 by the Great Lakes Charter Annex, and its implementing agreements, including the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement, pertaining to the watershed of the Great Lakes and the St. Lawrence River upstream from Trois-Rivières, Québec within the jurisdiction of eight states in the United States and the Province of Ontario and the Government of Quebec (http://www.mnr.gov.on.ca/en/Business/Water/2ColumnSubPage/STEL02_164560.html).

Upper Thames River Source Protection Area Assessment Report

These Agreements are not considered relevant to the work conducted for the Upper Thames River Source Protection Area Assessment Report. The Water Budget and Water Quantity Stress Assessment included in this Assessment Report consider supply and *demand* within the watersheds of the Thames-Sydenham and Region. Great Lakes water budgeting must be undertaken on a much larger scale. The information developed through the Water Budget work in the Thames-Sydenham and Region, along with those developed in the other Source Protection Regions, can be used by others when considering the larger scale Great Lake basin water budgets. This work is beyond the scope of the Assessment Report and *Source Protection Plan* in the Thames-Sydenham and Region.

8.3 Lake Erie Basin Working Group

The formation of a Lake Erie Basin working group was discussed in October 2009. This group could bring together interested parties within the Source Protection Regions (*SPRs*) that have intakes which rely on water from the Lake Erie basin as their source of drinking water. This working group would provide a forum to discuss drinking water specific matters relevant to the Clean Water Act. The Lake Erie Basin is comprised of Lake Erie, Lake St. Clair and the Detroit River. The proposed working group members would include system operator, Conservation Authority and Source Protection Committee representation from the Niagara Peninsula *SPR*, Lake Erie *SPR*, Thames-Sydenham and Region *SPR* and the Essex Region Source Protection Area. In the *UTRSPA*, the City of London and a few other communities receive water from municipal intakes located outside the source protection region, on Lake Erie and Lake Huron.

At the preliminary meeting held in October 2009 at Woodstock, discussions took place on lake-wide and local water quality issues identified through draft Assessment Report work. The group also discussed general source water quality concerns. From preliminary information being compiled through the Assessment Reports, turbidity, aluminium, algal growth and nutrients appear to be common to many of the intakes in the southwestern part of Lake Erie. At the time the meeting was held, the drinking water quality issue identification (as per the Clean Water Act and *technical rules*) was not complete. Once the *issues* identification process has been completed and *issues* contributing areas and activities have been identified it will be possible to consider whether issues are lake-wide or due to local activities at a subwatershed scale. In the

Upper Thames River Source Protection Area Assessment Report

Thames-Sydenham and Region the *issues* contributing areas and activities would be determined as part of an amended Assessment Report.

The group also discussed how existing Great Lakes groups and agreements are relevant to the requirements of the Clean Water Act. This will require further consideration in future meetings of the group.

A more formal working group was considered. At this time, however, the group decided to correspond with neighbouring Source Protection Regions as needed and to hold another meeting in 2010, after the submission of Assessment Reports. This would help bring forward for discussion the findings of each Source Protection Authority's Assessment Report, especially as they pertain to *issues*.

8.4 Next Steps for Great Lakes

The Thames-Sydenham and Region will continue to be involved in the Lake Erie Basin working group if formed. Dealing with lake-wide issues, investigating local activities, and formation of Great Lakes related policies will be discussed with other members of the working group. If the *MOE* identifies Great Lakes targets, policies specific to those targets will need to be developed under the Source Protection Plan. Further, if the *MOE* identifies targets that apply across several Source Protection Regions and Source Protection Areas, working groups such as the Lake Erie working group may provide an opportunity to work together to satisfy shared regulatory requirements.

9.0 Data Gaps and Next Steps

The development of Assessment Reports is required by the Clean Water Act, the related regulations and the *Technical Rules: Assessment Report*. Together these documents outline the materials which are required in the Assessment Reports. The Clean Water Act and the regulations also outline the process for developing, consulting on, submitting, and revising the Assessment Reports.

Through information from various technical studies, the Assessment Report must identify and assess *vulnerable areas*, evaluate drinking water quality *issues*, and identify and assess *threats* to the sources of drinking water. This section of the Assessment Report describes the known data gaps in the technical studies conducted, the plans to fill the gaps and the next steps in the *Source Protection Planning* process.

9.1 Data Gaps

The different types of data gaps summarized in this section relate to the availability of information and the timing of Provincial guidance updates, such as the *Technical Rules*.

The *Technical Rules: Assessment Report* identifies many of the requirements of the Assessment Report. For some of these requirements, the *technical rules* allow for the submission of a work plan if the information necessary to complete the item is not available. These items include work related to threats contributing to *issues*, Tier 3 Water Budget, *Wellhead Protection Area-E (WHPA-E)* and *WHPA-F* associated with *Groundwater Under Direct Influence (GUDI)* of surface water systems and *Intake Protection Zone-3 (IPZ-3)*.

Other gaps identified throughout the Assessment Report are a result of information not being available, or not available in time, to be included in the Assessment Report. In other cases, the

Upper Thames River Source Protection Area Assessment Report

analysis required to include the item in the Assessment Report could not be completed in time to be included. While gaps are identified in most sections of the Assessment Report, this section provides a list of the priority gaps to be filled.

Table 9-1 provides the work plan to fill the identified gaps in the Upper Thames River Source Protection Area Assessment Report. This Table identifies the gap, provides a description of the gap and its current status, lists the steps to be undertaken in the work plan to fill the gap, and provides the anticipated work plan completion date. It is important that this information be completed in a timely fashion so that it is available to the Source Protection Committee for use in developing the *Source Protection Plan*. The *Source Protection Plan* is required to be submitted in August 2012. Filling of the data gaps in early 2011 to be included in an Assessment Report submitted in mid 2011 will allow for the materials to be available to the Source Protection Committee for the development of the *Source Protection Plan*.

Table 9-1 Work Plan to fill Data and Analysis Gaps

Gap	Description	Work Plan	Planned Completion Schedule
Edge matching of HVA and SGRA with neighboring regions	<ul style="list-style-type: none"> ▪ Edge matching of HVA and SGRA with neighboring regions is to be completed in order to form seamless mapping between source protection regions 	<ul style="list-style-type: none"> ▪ This work will be considered when neighboring regions' HVA and SGRA maps are complete ▪ Methodologies will be determined in consultation with the neighbouring regions once the extent of the challenges are known. 	Dependent on when neighboring regions complete HVA and SGRA maps
Conditions Assessment	<ul style="list-style-type: none"> ▪ MOE data delivered to consultants, but not all consultants have reviewed or considered it ▪ A few potential conditions have been identified which require further investigation 	<ul style="list-style-type: none"> ▪ Have consultants review and report on data distributed by MOE ▪ Request same data for the rest of the vulnerable areas ▪ Investigate potential conditions ▪ Submit report to Source Protection Committee for consideration ▪ Include in amended Assessment Report if appropriate 	2011*

Upper Thames River Source Protection Area Assessment Report

Table 9-1 Work Plan to fill Data and Analysis Gaps

Gap	Description	Work Plan	Planned Completion Schedule
Threats Contributing to Issues	<ul style="list-style-type: none"> ▪ Issues have been identified ▪ In many cases further investigation needs to be undertaken to determine if activities may be contributing to these issues or if they are entirely naturally occurring ▪ Identify issues contributing activities and areas where activities are impacting the issues 	<ul style="list-style-type: none"> ▪ Investigate issues to determine if affected by activities undertaken in vulnerable areas ▪ Assess and delineate issues contributing area ▪ Determine prescribed drinking water threats contributing to the issue ▪ Consider if other activities are contributing to the issue ▪ Amend Assessment Report to include results of this work if appropriate 	2011*
Impact of Climate Change	<ul style="list-style-type: none"> ▪ Work undertaken in Upper Thames River Source Protection Area although focused more on flooding and infrastructure than on water supply ▪ Requires an understanding of the local climactic conditions resulting from global climate change which is not yet available ▪ Impact on source water protection is unknown 	<ul style="list-style-type: none"> ▪ Examine data available for the Upper Thames River Source Protection Area and assess relevancy to source protection ▪ Consider local climactic conditions when information becomes available ▪ Prepare draft section on climate change if data allows ▪ Amend Assessment Report if warranted 	To be determined
Site-specific (Tier 2) Risk Assessment	<ul style="list-style-type: none"> ▪ Risk assessment has been undertaken through desktop with windshield surveys only ▪ Significant threats need to be reassessed with more detailed local knowledge 	<ul style="list-style-type: none"> ▪ Undertake survey of possible significant threats using survey developed in Lake Erie Source Protection Region ▪ Update significant threat counts and threats inventories based on information collected ▪ Assess requirement for site visits and undertake where necessary ▪ Amend Assessment Report as necessary 	2011*
Improved understanding of water use	<ul style="list-style-type: none"> ▪ Use actual water use data in water budget work 	<ul style="list-style-type: none"> ▪ Obtain actual water use data from all significant water users through the PTTW reporting system ▪ Requires reassessment after sufficient data has been reported, perhaps when Assessment Report requires future update ▪ Where Tier 3 assessment will be undertaken, updated PTTW will be considered to the extent that the data is available 	Subsequent Assessment Report, dependant on other programs

Upper Thames River Source Protection Area Assessment Report

Table 9-1 Work Plan to fill Data and Analysis Gaps

Gap	Description	Work Plan	Planned Completion Schedule
WHPA-E and WHPA-F	<ul style="list-style-type: none"> ▪ Delineation and vulnerability assessment of WHPA-E and WHPA-F (if required) for City of London-Fanshawe wellfield, Dorchester, Komoka, St. Marys, Thamesford and Woodstock wells ▪ If WHPA-E and WHPA-F are delineated, Threats and Risk Assessment is to be carried out 	<ul style="list-style-type: none"> ▪ Determine which systems require WHPA-E (as per Rule 49 - systems that are GUDI, or where the interaction of surface and groundwater result in a shorter time of travel to the well than would normally occur) ▪ Delineate and assess vulnerabilities of WHPA-E ▪ Determine which systems require WHPA-F (as per Rule 50 - systems which have a WHPA-E, and for which issues are identified, and the activity causing the issue occurs outside of WHPA-A to E) ▪ Delineate and assess vulnerabilities of WHPA-F ▪ Conduct threats and risk assessment for the delineated WHPA-E and WHPA-F ▪ Work to be undertaken with other GUDI systems in the Thames-Sydenham and Region. 	Late 2010 – early 2011
Tier 3 Water Budget	<ul style="list-style-type: none"> ▪ Tier 3 water budget (local area assessment) is a local water balance undertaken on the scale of a single water supply system ▪ It is intended to examine the reliability of that supply, including testing of drought and future demand scenarios 	<ul style="list-style-type: none"> ▪ Tier 2 analysis suggests that 9 municipal drinking water systems are to be assessed at the Tier 3 water budget level 	2011-2012*

*Dependent upon submission of the amended Assessment Report and/or approved funding

9.2 Next Steps

Prior to the submission of the Assessment Report to the Director, the Clean Water Act identifies consultation requirements. The required consultation is part of a more comprehensive consultation plan being conducted in the Thames-Sydenham and Region involving local and regional consultation on the draft proposed and the proposed Assessment Report, and the technical work that has informed it. See Section 1 - Introduction and Background for more information on the Assessment Report consultation process. Once consultation is complete and the Source Protection Committee has considered input received through the consultation, the Assessment Report is submitted to the Director (Ministry of Environment) for approval. The

Upper Thames River Source Protection Area Assessment Report

Director can approve the Assessment Report or request amendments to it. Amendments which the Director requests will not require consultation.

Following submission of the Assessment Report, work will continue on filling the data and analysis gaps discussed above. That work will require amendments to the Assessment Report which will also be consulted on. The amended Assessment Report will then be submitted to the Director for approval.

The Source Protection Committee has identified that the Assessment Report is, in fact, a living document which will require periodic amendments and updates. Review and update of the Assessment Report will be required as identified in the Clean Water Act. The period of the review will be determined by the Director in its approval of the Assessment Report. Aside from the required review of the Assessment Report, the Source Protection Committee has the ability to amend the Assessment Report at such time when it becomes aware that the material in the Assessment Report has an effect on the *Source Protection Plan* developed. Any amendments to the Assessment Report will require consultation of those affected by the amendments.