

# DRINKING WATER SOURCE PROTECTION

ACT FOR CLEAN WATER

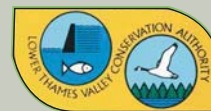
Thames-Sydenham and Region Source Protection Committee  
*Upper Thames River Source Protection Area*

Amended Proposed  
**Assessment Report**

Revised - August 12, 2011

**APPROVED**

*6.0 Conditions Assessment*



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Thames - Sydenham and Region  
Upper Thames River Conservation Authority  
1424 Clarke Road, London, ON, N5V 5B9

July 4, 2011

Dear reader

Re: **Upper Thames River Amended Proposed Assessment Report posted for comments**

The Thames-Sydenham and Region Source Protection Committee has posted the enclosed report for review and comment by stakeholders. This report includes updates and amendments to the Proposed Assessment Report for the Upper Thames River Source Protection Authority. Comments received through the first posting (draft proposed report) were considered by the Source Protection Committee and the report has been revised. Comments received in response to the second posting were submitted with the Proposed Assessment Report to the Ministry of the Environment (MOE).

Based on directions from the Director of Source Protection Programs Branch, MOE, updates and amendments were made to the Proposed Assessment Report to include further technical work conducted. These include the Tier 2 water budget drought scenario analysis, the delineation, vulnerability assessment and threats assessment of WHPA-E, and threats assessment of sewer line threats. The updates and amendments made are summarized in Appendix 4. This version of the Assessment Report once approved will be used by the Source Protection Committee for the development of the Source Protection Plan which is to be submitted to the MOE in August 2012.

The Amended Proposed Assessment Report for the Upper Thames River Source Protection Area represents a significant milestone in the Source Protection Committee's progress in the completion of the first Source Protection Plans for the Thames-Sydenham and Region. The Source Protection Committee realizes that this report is a "living document" which may be updated as more information becomes available in the future.

We hope that you have had an opportunity to attend previous open houses that were held throughout the region, and plan to attend the open houses to be held in July 2011. More information on this assessment report and the past and current consultation is available on the web site given at the bottom of this letter.

Yours truly,  
THAMES-SYDENHAM and REGION

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# Upper Thames River Source Protection Area Assessment Report

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- Appendix 3 – System Summaries (bound separately)
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## 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 are no longer 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* may not be as broad as for the *significant threats*. Policies for conditions are however anticipated to be significantly different than those for *prescribed activities* because 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 *Significant Groundwater Recharge Areas (SGRA)*. The delineation and assessment of

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*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 an overview of the locations of the *WHPA* in the UTRSPA, while Maps 4-1-1 to 4-1-23 show the *WHPA* for each drinking water system's wellheads. Map 4-3-2 and Map 4-2-1 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**

<b>Drinking Water Systems</b>	<b>Technical Study on Threats and Risk Assessment</b>
City of London back up wells (Fanshawe and Hyde Park wellfields), Birr, Melrose, 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 and Tavistock	Upper Thames River Source Protection Area. Embro, Lakeside, Mount Elgin and Tavistock Well Systems Threats Assessment. March 31, 2011. County of Oxford.
Ingersoll	Upper Thames River Source Protection Area. Ingersoll Well Systems Threats Assessment. March 31, 2011. County of Oxford.
Beachville, Hickson, Innerkip, Thamesford	Upper Thames River Source Protection Area. Beachville, Hickson, Innerkip and Thamesford Well Systems Threats Assessment. March 31, 2011. County of Oxford.
Woodstock (urban wellfield)	Upper Thames River Source Protection Area. Woodstock - Urban Well Systems Threats Assessment. March 31, 2011. County of Oxford.
Mount Elgin (existing and planned wells)	Upper Thames River Source Protection Area. Mount Elgin Threats Assessment. March 31, 2011. County of Oxford.
Woodstock - Rural Well Systems (existing and planned wells)	Upper Thames River Source Protection Area. Woodstock - Rural Well Systems Threats Assessment. March 31, 2011. County of Oxford.
Mitchell, Sebringville, St. Pauls, Stratford, St. Marys	Draft Threat Assessment – Perth County Municipal Drinking Water Systems. Schlumberger Water Services. June 2010.
Shakespeare	Draft Threat Assessment – Milverton and Shakespeare Municipal Drinking Water Systems. Schlumberger Water Services. May 6, 2010.

## 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

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 are 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*.

$$\text{Risk} = \text{Vulnerability} \times \text{Hazard}$$

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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

\*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 Mitchell municipal well supply system, a spill containing polychlorinated biphenyls (*PCBs*) occurred in the WHPA-A of well 4, at a former dairy industry site. No further data on this spill are available yet.

At the Stratford municipal well supply system, a former landfill is identified as a potential condition west of the Romeo wells 3, 4 and 6. No data on this former landfill are available yet.

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 Thames River, within the WHPA-A of Well No. 2. In this area, there 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.

A site of historical contamination occurred at Woodstock within the *HVA* and *SGRA*, not in the Woodstock *WHPA*. According to *MOE*, there was a historical underground storage tank leakage site in the late 1990's. Petroleum hydrocarbon related subsurface contamination still exists as of 2010. Impacts include free product light non- aqueous phase liquids, soil contamination, and relatively large groundwater plume.

### **6.3 Data Gaps and Next Steps for Conditions**

Data on past activities that have resulted in potential *conditions* are 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 a subsequent Assessment Report.

Section 9.0 Data Gaps and Next Steps lists the remaining data and information gaps, including the 'conditions assessment'.