

On site Sewage Storage and Treatment Systems

This document is one of a series of drinking water threat discussion papers developed for the Thames-Sydenham and Region Source protection Region. Each paper looks at the nature of one or more drinking water threats, describes the local occurrence of those threats, assesses existing policies/programs, and introduces policy ideas for consideration in source protection planning.

This version is considered to be a working draft intended to generate discussion. It is not intended to indicate proposed or accepted policies. This paper begins the process of policy development for on-site sewage storage and treatment systems. As the SPC continues through the discussion process, the policies included in this paper will evolve into draft policy.

1. What is the Threat to Drinking Water?

Definition:

This drinking water threat includes systems that store and/or treat human waste on-site, but does not include sewage treatment plants. These systems come in a variety of forms including earth pit privies, privy vaults, greywater systems, cesspools, leaching bed systems and associated treatment units, and holding tanks. Leaching bed systems with septic tanks or holding tanks are the systems most commonly used in the Thames-Sydenham Source Protection Area.

There are two categories of systems: small and large.

Small systems (those with a design flow less than or equal to 10,000 L/day) are subject to approval by the municipality under the *Ontario Building Code Act*. The requirements are described in more detail below. Small systems most frequently service rural residences.

Large systems (those with a design flow greater than 10,000 L/day) are subject to approval by the Ministry of the Environment (MOE) under the *Ontario Water Resources Act*. The requirements are described in more detail below. Schools, campgrounds, and larger businesses are examples of facilities that may require a large system.

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

The MOE Tables of Drinking Water Threats (2008, as amended in 2009) identify a number of chemicals and pathogens that could make their way from on-site sewage storage and treatment systems into the groundwater and/or surface water under certain conditions. (circumstances 831 to 854 and 1955, 1956). The following chemicals and

pathogens could threaten the safety of these sources of drinking water in certain situations.

- Pathogens
- Acetone
- Chloride
- dichlorobenzene-1,4 (para)
- Nitrogen
- Total phosphorus
- Sodium

The chemicals listed above are a concern for both surface and groundwater, with the exception of total phosphorous which is only considered a threat to surface water because excessive inputs of total phosphorous in surface water results in eutrophication and can cause toxic algae blooms.

Acetone - Acetone is the active ingredient in common household products like nail polish remover, paint thinner and household cleaner. It is also used in industrial products and applications such as pesticides, cleaning (e.g. printing), solvents (e.g. rubber manufacturing), and dilution and extraction (e.g. laboratories).

Chloride, Sodium and Total Phosphorus - Water softeners (water used and backwash), laundry detergents, bar soaps, foods and cleaning products may contain chloride, sodium and phosphorus.

Dichlorobenzene □ 1,4 (para) - 1,4 Dichlorobenzene (para) is used as a disinfectant, pesticide (e.g. mothballs, general agricultural insecticide), a deodorant (e.g. urinal cakes), for resin manufacturing and in the pharmaceutical industry.

Nitrogen and Pathogens - The primary source of nitrogen and pathogens in on-site systems and holding tanks is from human waste. Bacteria, viruses and protozoans are the main categories of pathogens.

The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage, for sub-threat *sewage systems or sewage works –septic systems* is considered a significant threat for the above mentioned chemicals for a large system subject to the OWRA in a WHPA with a vulnerability score of 10. The large OWRA systems, holding tanks and small septic system subject to the *Ontario Building Code* are significant for pathogen contamination in areas with a vulnerability score of 10.

3. What is the local scale of the drinking water threat?

On-site sewage systems, particularly leaching bed systems, are prevalent throughout the Thames-Sydenham Source Protection Area in areas that are not serviced by municipal or communal wastewater treatment systems. They can be found now and in the future in all or part of the intake protection zones (IPZ), wellhead protection areas (WHPA), highly vulnerable aquifers (HVA), and significant groundwater recharge areas (SGRA).

Depending on the location and size of the systems, and the type of contaminant, discharge from a septic system or a spill from a holding tank can be classified as a significant, moderate or low drinking water threat.

It should be noted that in sensitive areas holding tanks are sometimes used to protect the area since a properly functioning holding tank does not leach, thereby eliminating sewage from impacting the area. Depending on the location and size of the systems, and the type of contaminant, discharge from a septic system or a spill from a holding tank can be classified as a significant, moderate or low drinking water threat. Section 8.8.1.2 of the OBC lists acceptable criteria for a class 5 sewage system.

The following table displays where septic threat activities are or would be drinking water threats in the Thames-Sydenham SPR according to the MOE Tables of Drinking Water Threats (2008, as amended in 2009). An “N” indicates the activity cannot be considered a threat within the drinking water system given its vulnerability score. A “Y” indicates that the threat can occur in the system. Only significant threats have been enumerated. Where a zero appears, there is and can be no significant threats associated with septic systems.

Table 1.0 Septic System Drinking Water Threats in the Thames-Sydenham SPR

Vulnerable Area (System)	Zone	Vulnerability Score	Septic System - Chemical			Septic System - Pathogens		
			Significant	Moderate	Low	Significant	Moderate	Low
St. Clair Systems								
LAWSS	IPZ-1	8.0	0	N	Y	0	Y	N
	IPZ-2	6.4	0	N	Y	0	N	Y
Town Of Petrolia								
	IPZ-1	7.0	0	N	Y	0	N	Y
	IPZ-2	6.3	0	N	Y	0	N	Y
Wallaceburg								
	IPZ-1	9.0	0	Y	Y	0	Y	N
	IPZ-2	7.2	0	N	Y	0	N	Y
Lower Thames Systems								
Chatham/South Kent	IPZ-1	5.0	0	N	N	0	N	N
	IPZ-2	4.0	0	N	N	0	N	N
Wheatley Primary	IPZ-1	6.0	0	N	Y	0	N	Y

	IPZ-2	4.8	0	N	N	0	N	N
			Septic System - Chemical			Septic System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability Score	Significant	Moderate	Low	Significant	Moderate	Low
Wheatley Emergency	IPZ-1	7.0	0	N	Y	0	N	Y
	IPZ-2	5.6				0	N	Y
West Elgin Primary	IPZ-1	6.0	0	N	Y	0	N	Y
	IPZ-2	4.2	0	N	N	0	N	N
West Elgin Emergency	IPZ-1	7.0	0	N	Y	0	N	Y
	IPZ-2	TBD	-			-		
Upper Thames Systems								
London Middlesex								
Birr	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Dorchester	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,6	5,0	Y N	N Y	1,0	N N	N Y
	WHPA-C	8,4	0,0	Y N	Y N	0,0	Y N	N N
	WHPA-D	6,2	0,0	N N	Y N	0,0	N N	Y N
Kilworth-Komoka	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	Y Y N	N Y Y	1,0,0	N Y N	N N Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
London - Fanshawe	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	Y Y N	N Y Y	1,0,0	N Y N	N N Y
	WHPA-C	8,6,4	0,0,0	Y N N	Y Y N	0,0,0	Y N N	N Y N
	WHPA-D	-						
London - Hyde Park	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	Y Y N	N Y Y	1,0,0	N Y N	N N Y

	WHPA-C	8,6,4	0,0,0	YNN	YYN	0,0,0	YNN	NYN
	WHPA-D	6,4,2	0,0,0	NNN	YNN	0,0,0	NNN	YNN
			Septic System - Chemical			Septic System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability Score	Significant	Moderate	Low	Significant	Moderate	Low
Melrose	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10	5	Y	N	1	N	N
	WHPA-C	8,6	0,0	YN	YY	0,0	YN	NY
	WHPA-D	6,4,2	0,0,0	NNN	YNN	0,0,0	NNN	YNN
Thorndale	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Oxford								
Beachville	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	8,6	0,0	YN	YY	0,0	YN	NY
	WHPA-C	8,4	0,0	YN	YN	0,0	YN	NN
	WHPA-D	6,4,2	0,0,0	NNN	YNN	0,0,0	NNN	YNN
Embro	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Hickson	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	8	0	Y	Y	0	Y	N
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Ingersoll	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	YYN	NYY	1,0,0	NYN	NNY
	WHPA-C	6,4,2	0,0,0	NNN	YNN	0,0,0	NNN	YNN
	WHPA-D	6,4,2	0,0,0	NNN	YNN	0,0,0	NNN	YNN
Innerkip	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	8	0	Y	Y	0	Y	N
	WHPA-C	8,6	0,0	YN	YY	0,0	YN	NY

	WHPA-D	4,2	0,0	NN	NN	0,0	NN	NN
			Septic System - Chemical			Septic System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability Score	Significant	Moderate	Low	Significant	Moderate	Low
Lakeside	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Mount Elgin	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Tavistock	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Thamesford	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	YYN	NYY	1,0,0	NYN	NNY
	WHPA-C	10,8,4	5,0,0	YYN	NYN	1,0,0	NYN	NNN
	WHPA-D	8,2	0,0	YN	YN			
Woodstock	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	YYN	NYY	1,0,0	NYN	NNY
	WHPA-C	8,6,2	5,0,0	NNN	YYN	0,0,0	YNN	NYN
	WHPA-D	10,8,6,4,2	5,0,0,0,0	YYNNN	NYYYN	1,0,0,0,0	NYNNN	NNYYN
Perth								
Mitchell	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
Sebringville	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10	5	Y	N	1	N	N
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N

Vulnerable Area (System)	Zone	Vulnerability Score	Septic System - Chemical			Septic System - Pathogens		
			Significant	Moderate	Low	Significant	Moderate	Low
Shakespeare	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
St. Pauls	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N
St Marys	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	10,8,6	5,0,0	YYN	NYN	1,0,0	NYN	NNY
	WHPA-C	6,4	0,0	NN	YN	0,0	NN	YN
	WHPA-D	6,4,2	0,0,0	NNN	YNN	0,0,0	NNN	YNN
Stratford	WHPA-A	10	5	Y	N	1	N	N
	WHPA-B	6	0	N	Y	0	N	Y
	WHPA-C	4	0	N	N	0	N	N
	WHPA-D	2	0	N	N	0	N	N

Vulnerable Area (System)	Zone	Vulnerability score	Septic Holding System - Chemical			Septic Holding System - Pathogens		
			Significant	Moderate	Low	Significant	Moderate	Low
St. Clair Systems								
LAWSS	IPZ-1	8.0	N	N	Y	N	Y	N
	IPZ-2	6.4	N	N	Y	N	N	Y
Town Of Petrolia	IPZ-1	7.0	N	N	Y	N	N	Y
	IPZ-2	6.3	N	N	Y			
Wallaceburg	IPZ-1	9.0	N	Y	Y	N	Y	N

	IPZ-2	7.2	N	N	Y	N	N	Y
			Septic Holding System - Chemical			Septic Holding System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability score	Significant	Moderate	Low	Significant	Moderate	Low
Lower Thames Systems								
Chatham/South Kent	IPZ-1	5.0	N	N	N	N	N	N
	IPZ-2	4.0	N	N	N	N	N	N
Wheatley Primary	IPZ-1	6.0	N	N	Y	N	N	Y
	IPZ-2	4.8	N	N	N	N	N	N
Wheatley Emergency	IPZ-1	7.0	N	N	Y	N	N	Y
	IPZ-2	5.6	N	N	N	N	N	Y
West Elgin Primary	IPZ-1	6.0	N	N	Y	N	N	Y
	IPZ-2	4.2	N	N	N			
West Elgin Emergency	IPZ-1	7.0	N	N	Y	N	N	Y
	IPZ-2	TBD	-	-	-	-	-	-
Upper Thames Systems								
London Middlesex								
Birr	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Dorchester	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,6	Y N	N N	N Y	Y N	N N	N Y

	WHPA-C	8,4	NN	YN	NN	NN	YN	NN
	WHPA-D	6,2				NN	NN	YN
			Septic Holding System - Chemical			Septic Holding System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability score	Significant	Moderate	Low	Significant	Moderate	Low
Kilworth-Komoka	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	YNN	NYN	NNY	YNN	NYN	NNY
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
London - Fanshawe	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	YNN	NYN	NNY	YNN	NYN	NNY
	WHPA-C	8,6,4	NNN	YNN	NYN	NNN	YNN	NYN
	WHPA-D	-	-			-	-	-
London - Hyde Park	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	YNN	NYN	NNY	YNN	NYN	NNY
	WHPA-C	8,6,4	NNN	YNN	NYN	NNN	YNN	NYN
	WHPA-D	6,4,2	NNN	NNN	YNN	NNN	NNN	YNN
Melrose	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10	Y	N	N	Y	N	N
	WHPA-C	8,6	NN	YN	NY	NN	YN	NY
	WHPA-D	6,4,2	NNN	NNN	YNN	NNN	NNN	YNN
Thorndale	WHPA-A	10	Y	N	N	Y	N	N

	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
			Septic Holding System - Chemical			Septic Holding System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability score	Significant	Moderate	Low	Significant	Moderate	Low
Oxford								
Beachville	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	8,6	NN	YN	NY	NN	YN	NY
	WHPA-C	8,4	NN	YN	NN	NN	YN	NN
	WHPA-D	6,4,2	NNN	NNN	YNN	NNN	NNN	YNN
Embro	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Hickson	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	8	N	Y	N	N	Y	N
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Ingersoll	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	YNN	NYN	NNY	YNN	NYN	NNY
	WHPA-C	6,4,2	NNN	NNN	YNN	NNN	NNN	YNN
	WHPA-D	6,4,2	NNN	NNN	YNN	NNN	NNN	YNN

Vulnerable Area (System)	Zone	Vulnerability score	Septic Holding System - Chemical			Septic Holding System - Pathogens		
			Significant	Moderate	Low	Significant	Moderate	Low
Innerkip	WHPA-A	10	Y	N		Y	N	N
	WHPA-B	8	N	Y	N	N	Y	N
	WHPA-C	8,6	N N	Y N	N Y	N N	Y N	N Y
	WHPA-D	4,2	N N	N N	N N	N N	N N	N N
Lakeside	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Mount Elgin	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Tavistock	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Thamesford	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	Y N N	N Y N	N N Y	Y N N	N Y N	N N Y
	WHPA-C	10,8,	Y N N	N Y N	N N N	Y	N	N

	C	4						
	WHPA-D	8,2	NN	YN	NN	NN	YN	NN
			Septic Holding System - Chemical			Septic Holding System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability score	Significant	Moderate	Low	Significant	Moderate	Low
Woodstock	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	YNN	NYN	NNY	YNN	NYN	NNY
	WHPA-C	8,6,2	NNN	YNN	NYN	NN	YN	NY
	WHPA-D	10,8,6,4,2	YNNNN	NYNN N	NNYN N	YNNN N	NYNN N	NNYN N
Perth								
Mitchell	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Sebringville	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10	Y	N	N	Y	N	N
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
Shakespeare	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
St. Pauls	WHPA-A	10	Y	N	N	Y	N	N

	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N
			Septic Holding System - Chemical			Septic Holding System - Pathogens		
Vulnerable Area (System)	Zone	Vulnerability score	Significant	Moderate	Low	Significant	Moderate	Low
St Marys	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	10,8,6	Y N N	N Y N	N N Y	Y N N	N Y N	N N Y
	WHPA-C	6,4	N N	N N	Y N	N N	N N	Y N
	WHPA-D	6,4,2	N N N	N N N	Y N N	N N N	N N N	Y N N
Stratford	WHPA-A	10	Y	N	N	Y	N	N
	WHPA-B	6	N	N	Y	N	N	Y
	WHPA-C	4	N	N	N	N	N	N
	WHPA-D	2	N	N	N	N	N	N

4. How the Risk is Currently Managed?

a) Provincial

Ontario Building Code

Small systems (those with a design flow less than or equal to 10,000 L/day) are subject to approval by the municipality under the *Ontario Building Code Act*. Small systems most frequently service rural residences.

There are five classes of sewage systems under the *Ontario Building Code*:

- 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

Review of Advanced Treatment Units or New Technologies

Advanced treatment units (ATU) (also referred to as tertiary treatment systems) are generally implemented in situations where the size of the lot or site conditions do not permit the installation of a conventional septic tank and associated leaching bed or when enhanced effluent quality is sought. The main difference between these systems and conventional ones are that more treatment occurs in the tank as a result of introduction of aeration and/or filter media. Common brands include EcoFlow and Waterloo Biofilter. ATUs must be approved through the Building Materials Evaluation Committee which is under the Ministry of Municipal Affairs and Housing before they can be permitted under the Ontario Building Code. Effluent targets for these systems to be classed are tertiary units BOD5 15 mg/L, CBOD5 are 10 mg/L, and the target for suspended solids is 10 mg/L. (Code and Guide for Sewage Systems – 1997 Ontario Building Code). BOD5 is Biochemical Oxygen Demand (5-day), and CBOD is carbonaceous BOD (5 day). BOD is a measure of the organic material in water or wastewater.

From Oxford County's experience, there are concerns associated with tertiary systems as they tend to fail more frequently. The advantage of the tertiary system is that they require less space, however, where possible, traditional systems are the preferred option, as tertiary systems are high maintenance. They require a service agreement which means there is an annual cost associated with the system. Also the peat in these systems must be changed regularly which is an additional cost. Some people are inclined to avoid proper maintenance because of the cost.

Ontario Water Resources Act

The review and approval of applications for **large systems** (those with a design flow greater than 10,000 L/day) rests with the MOE under the *Ontario Water Resources Act* (OWRA). Also, small systems that cross property boundaries are required to get an approval under the OWRA.

The MOE "Guide for Applying for Approval of Municipal and Private Water and Sewage Works" (August 2000) is used for a number of sewage-related facilities including large on-site sewage systems that require approval under the OWRA. The most important environmental aspect to consider as part of the approval process is the impact of the sewage works on the receiving waterbody or aquifer (groundwater). The following information is generally needed in support of an application for a large on-site sewage system:

- Expected rate of contaminants discharge to the groundwater.
- Background levels of contaminants in the groundwater.
- Estimated allowable amount of degradation based on the current and potential future uses of the groundwater in accordance with "Guideline B-7:

Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities”.

- Proposed measures to be taken to reduce or prevent groundwater contamination.
- Proposed monitoring program to assess the effectiveness of the proposed groundwater aquifer contamination control measures.

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), and
- The consequences of failure are unacceptable (e.g. affect the only water supply for a community).

b) Regional

Education and Incentive Programs

Canada-Ontario Environmental Farm Plan

The Environmental Farm Plan (EFP) is a program that is delivered locally through the Ontario Soil and Crop Improvement Association with expertise provided by the Ontario Ministry of Agriculture and Food. It is a voluntary educational program for farmers delivered through local workshops. Participants are provided instruction on how to progress through the risk assessment and action plan development contained in the EFP workbook. Limited funds (either a 50/50 or 30/70 cost share depending on project) are available to help address areas identified in the plan as needing improvement.

The risk assessment gives the farmer the opportunity to rate the current level of environmental concern in up to 23 different worksheets/ topic areas on the farm. The worksheet relevant to this drinking water source protection initiative is the *treatment of household waste*.

Ontario Drinking Water Stewardship Program

Landowners with property near municipal wells and surface water intakes can help protect those sources of drinking water supplies. In order to help landowners take action, the provincial government has created the Ontario Drinking Water Stewardship Program. It provides grants to help pay for a variety of projects that protect municipal water supplies from contamination. Grants have been available to help maintain or upgrade septic systems in the Thames-Sydenham Region through the Early Actions Program. This program was focused on eligible activities (including septic system upgrades) in eligible areas (WHPA-A, IPZ-1 and 2 year time of travel areas or preliminary WHPA-B as endorsed by councils). Although this program is nearing its

completion the CAs in the region have applied for funding through the Early Response Program. This program, if applications are successful, would target significant threats as identified in the Assessment Reports.

Clean Water Program

The Clean Water Program (CWP) is a rural water quality initiative that provides technical assistance and financial incentives to improve and protect water quality on private property. Currently the following municipalities participate in this program: Oxford County, Middlesex County and Perth County. Septics are eligible in Oxford, Middlesex, City of London, and upstream of Stratford (Upper Avon watershed) but not in St. Marys or Perth County with the exception of the Upper Avon watershed. Though Perth County contributes to Erosion Control, Well Upgrades and Well Decommissioning, septic related upgrades are not eligible within the County. St. Mary's has participated in this program in the past, however, in 2010 did not contribute.

Local municipalities are offering cost-sharing grants to qualified landowners for best management practices that improve ground and surface water quality. The grant rate for all projects is 50% and range from a maximum of \$500 - \$5,000, depending on the project type. Septic systems are covered at a cost-share rate of 50% to a maximum of \$4,000.

c) Municipal

Land Use Planning

Municipalities can impose greater setbacks from water bodies through their official plans and zoning by-laws than what is required in the Ontario Building Code and have the ability to develop Official Plan policies related to certain aspects of septic systems and implementation of policies through provisions of the Zoning By-Law.

Oxford County has existing Official Plan policies relating to the protection of groundwater and specifically, policies pertaining to septic systems. The policies of the Oxford County Official Plan state that policies related to source protection will remain in place until such time as the Plan is amended to incorporate approved Source Protection Plans. These policies include the prohibition of certain activities within certain vulnerable areas identified in the OP. Listed within the prohibited uses and activities is "New development utilizing a private septic system and, or private well within the 100-metre (328 feet) radius or the 0 – 2 year time-of-travel zone, excluding farm severances in accordance with Section 3.1.4.4 provided that the zoning by-law or other development controls prohibit the establishment of buildings or structures within this area".

Septic System Re-inspection Programs

Septic system re-inspection programs can be used to locate faulty and failed septic systems, and to require their repair or replacement in order to improve effluent quality.

The *Ontario Building Code Act* will be amended in January 2011 to require municipalities to implement mandatory septic system re-inspection programs in vulnerable areas (e.g. WHPAs and IPZs) and voluntary programs elsewhere.

Mandatory onsite sewage maintenance inspections

- Mandatory maintenance inspection program will be required where on-site sewage systems subject to the Building Code Act have been identified as a significant drinking water threat in vulnerable areas identified in the most recent Assessment Report under the Clean Water Act.
- Inspections of on-site sewage systems are to be conducted no later than:
 - 5 years after the date on which the notice of approval of the assessment report is published on the Environmental Bill of Rights Registry
 - Every 5 years after the most recent inspection of the sewage system.
- The regulation also authorizes principal authorities (municipalities, health units, or conservation authorities) to accept certificates from property owners as an alternative to conducting inspections under mandatory or discretionary on-site sewage system maintenance inspection programs. These certificates must be in a form approved by the Minister of Municipal Affairs and Housing and be signed by a qualified person as set out in the regulation.

Discretionary inspection program

- “Discretionary” – pertains to the discretion of the principal authority to include additional areas under their maintenance inspection program. It does not mean that the landowner can choose whether to complete the re-inspection.
- MMAH has made the “discretionary” program flexible – it is up to the principal authority to decide where it applies and to establish timeframes for re-inspection.
 - Principal authorities have the discretion to include additional areas (beyond what is included in the mandatory requirements) within an inspection program.
 - Timeframes for re-inspection of on-site sewage system that fall under the discretionary program are flexible and do not have to follow the same timelines as the mandatory program. It is at the discretion of the principal authority to set these timeframes.

d) Other Regional Examples (United States)

Wellhead Protection Ordinance- Pinellas County

<http://www.pinellascounty.org/wpo/>

1. All new non-residential discharges, new non-residential activities, and installations shall be prohibited subject to conditions including but not limited to the following:

- (1) Commercial or industrial septic tank disposal systems are prohibited in the zone of protection.
- (10) New single-family residential septic tanks will be exempt from this article, provided they meet the minimum criteria of one unit per two acres.

2. **Prohibited Uses.** The following uses, unless granted a special exception, are prohibited within Zone 1, the 6- month time-of-travel zone. (NOTE: this is typically within about 1000 feet of the public water supply well.)
Land divisions resulting in high density (>1 unit/acre) septic systems;

Oregon DEQ Surface Water Drinking Water Protection Overlay Zone2

http://www.lanecounty.org/Departments/PW/LMD/LandUse/Documents/Flood_DWP/CPW%20BMP%20Report_Final.pdf

- In addition, owners of septic systems within the DWP are required to have their septic system inspected within one year of the ordinances effective date and every five years thereafter.
- Septic tanks are prohibited within the buffer or setback.
- Site plans are required before permits are issued for any development within the buffer or setback.
- Prohibited land uses include: septic tanks and drain fields;
- Locate land uses that pose a particular threat to water quality 150 to 300 feet away from stream corridors. Land uses regulated include septic drain fields
- Prohibit construction of new septic systems in the regulatory
- Prohibit construction of new conventional septic systems in the regulatory floodplain.
- Require aerobic septic systems, which pose a lesser threat to water quality, for new developments in the floodplain as part of public health protection standards

e) Gaps in existing legislation, policies and programs

- Few areas in Ontario have programs in place to ensure on-going maintenance and proper function of septic systems.
- The *Ontario Building Code* does not have requirements for bacteria, nitrate and phosphorus control. It is focused on oxygen demand and suspended solids.
- Procedure D-5-4 does not account for pathogens. Situations that are good for the dilution of nitrogen in groundwater (which is accounted for) are problematic for the transportation of bacteriological contaminants.

6. Policy Considerations

- *Clean Water Act* Part IV tools which include interim risk management plans, risk management plans, prohibition, and restricted land uses cannot be used for sewage systems, which include onsite sewage treatment and storage systems. The *Ontario Water Resources Act* or the *Building Code Act* provides the authority for source protection plan policies to address both existing and future threats. In addition, a policy could rely on land use planning for future occurrences.

- The main consideration for reducing or eliminating drinking water threats related to on-site sewage systems is to produce cleaner effluent.
- The Oxford Public Health Department feels that generally ‘new’ properly functioning systems are not of concern; it is the old septic systems that are of concern. It sees the septic system maintenance program as being instrumental in implementation of the SPPs and wishes to see emphasis placed on this.

7. Proposed policy ideas

For discussion purposes, this section of the report provides examples of policy ideas that could be applicable to on-site sewage treatment and storage systems. It is not an exhaustive list. The examples are categorized by the types of policy tools that can be used to meet the source protection plan objectives.

Table 7.1 – Examples of risk management measures and policy ideas for on-site sewage systems

Policy Tool	Example
Education and Outreach	Area-wide education programs for landowners on BMPs for on-site sewage maintenance, and impacts of systems on drinking water.
Incentive Programs	Cost-share program for landowners to upgrade or replace failing septic systems
	Cost-share program to connect in existing sewer infrastructure and decommission septic systems
Land Use Planning	Land use restrictions for future occurrences
	By-laws requiring mandatory hook-up where sewer lines are available for connection in vulnerable areas. This could likely be achieved via the Municipal Act rather than land use planning.
	Review minimum lot size requirements in vulnerable areas through zoning.
	OP policies addressing new severances in vulnerable areas.
Prescribed Instruments	Support re-inspection program through Ontario Building Code.
	OWRA for larger systems.
Municipal Operations/ Infrastructure	Encourage re-inspection programs in moderate and low threat areas.

Considerations for monitoring considerations and possible policy implementers will be added to this section as the discussion paper is moved through the policy development process.

8. Further Research

Additional research is required for the following matters:

- Review certificates of approval for large systems for information about monitoring and maintenance requirements.
- Gather existing policy information from municipal regions throughout SPR to determine extent of septic land use planning, education and other policies in application.
- Determine to what extent the Health Units across the Thames-Sydenham are engaged in septic system re-inspection and education and outreach.
- Determine if a new properly functioning system is believed to adequately manage the threat.