Drinking Water Source Protection Background Document
Wastewater Treatment Plants and Sewer Systems
March 2011

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NOTE TO THE READER

This document is one of **nineteen** background reports now under development by staff at various Conservation Authorities and Conservation Ontario in support of Source Protection Plan development. The final set of reports will cover all nineteen prescribed water quality threat types. Each report looks at the nature of one or more types of drinking water threat, describes the local occurrence ("is" and "would be") of those threats, assesses existing policies/programs, and introduces related 'policy concepts' for source protection planning. ***While every effort has been made to ensure the accuracy of the information in this document, it should not be construed as legal advice or relied on as a substitute for the legislation.***

This version is considered to be a ***working draft*** because it will be going through additional review by MOE and subject experts. SPA/SPRs can use these documents with the understanding that additional refinement will occur. Any questions on these reports can be directed to Nicole Barbato, Source Water Protection Liaison (via nbarbato@conservationontario.ca). Thank you!

Prescribed Drinking Water Threat 2B: Sewage Treatment Plants and Sewer Systems

1. Definition

This paper provides background information for prescribed drinking water threat 2B – the establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage – Sewage treatment plants and sewer networks.

The main consideration for reducing or eliminating drinking water threats related to sewage treatment plants and sewer systems is to make sure that any discharge from the sites does not result in a significant risk to drinking water through appropriate measures to mitigate the threat. Also, future sewage treatment plants and sewer networks must not create a significant drinking water threat.

This report includes the activities that follow as identified in the Ontario Ministry of the Environment (MOE) Tables of Drinking Water Threat (MOE, 2009):

i. Sewage treatment plant effluent discharges (including lagoons): All sewage treatment plants release treated wastewater that is called effluent. The effluent can be directly released to a watercourse or waterbody or its release from a lagoon can be scheduled.

ii. Storage of sewage (treatment plant tanks): Many sewage treatment plants have sewage storage tanks as part of the treatment process.

iii. Sewage treatment plant by-pass discharge to surface water: Sometimes the capacity at a sewage treatment plant is overwhelmed and partially treated or untreated sanitary waste is released into the receiving water body. This is generally as a result of an extreme wet weather event (i.e. significant rainfall or snow melt) where the sanitary sewer network is not completely isolated from stormwater. Combined sewers or sewer networks with inflow/infiltration issues are the root cause of bypasses.

iv. Sanitary sewers and related pipes: these are the pipes that collect sanitary waste from all the serviced buildings in the area.

Combined sewer discharge from a stormwater outlet to surface water: in older parts of urban areas there are sometimes pipes that convey both stormwater and sanitary waste. Under normal conditions these two waste streams remain separate (i.e. the stormwater flows to watercourse or water bodies and the sanitary waste enter sewage treatment plants). However, during an extreme wet weather event the portion of the pipe with stormwater can become full, spill into the sanitary waste stream, mix together and result in untreated sewage entering surface water.

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

There are 318 chemical and pathogen circumstances for sewage systems and sewage works listed in the MOE Tables of Drinking Water Threats (MOE, 2009) that could make their way into surface and groundwater as a result of a discharge. The main groups of contaminants are pesticides, metals, synthetic chemicals and pathogens (circumstances 631-694 and 1958, 719-783 and 1948, 784-903 and 1959 and 904-1097 and 1960-1961, 212-276 and 1947).

The following chemicals and pathogens could threaten the safety of drinking water sources in certain situations.

- Antimony
- Arsenic
- Barium
- BTEX
- Cadmium
- Chlorophenol-2
- Chromium VI
- Copper
- Cyanide (CN-)
- Dibutyl phthalate
- Dichlorobenzene-1,2 (ortho)
- Dichlorobenzene-1,4 (para)
- Dichlorobenzidine-3,3
- Dichlorophenol-2,4
- Ethylene Glycol
- Hexachlorobenzene
- Lead
- MCPA (2-methyl-4-chlorophenoxyacetic acid)
- Mercury
- Nickel
- Nitrogen
- Nitrosodimethylamine-N (NDMA)
- Pentachlorophenol
- phenol
- Phosphorus (total)
- Polychlorinated Biphenyls (PCBs)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Silver
- Trichloroethylene
- Vinyl chloride
- Zinc
- Pathogens

The Summary of Drinking Water Threat Contaminants see (Reference Materials) includes details on relevant drinking water standards, guidelines or objectives, the health or aesthetic concerns and other useful information for these contaminants.

3. Understanding the nature of the drinking water threat?

All of the circumstances in the MOE Tables of Drinking Water Threats (MOE, 2009) are tied to the designed average daily effluent rate of the facility. Generally speaking all areas with sewer networks experience some inflow/infiltration problems which like combined sewers; impact sanitary sewage bypasses. Note that new combined sewers are not permitted by the MOE.

Depending on the location, type of facility and designed discharge rate, a sewage treatment facility or sewer network can be classified as a significant, moderate or low drinking water threat.

Significant Drinking Water Threats

Sanitary sewers network– Sewage discharge from sanitary sewers (e.g. leaks) is generally a threat to groundwater quality. Any sanitary sewer or related pipe can be significant for pathogens in wellhead protection areas with a vulnerability score of 10.

Sewage treatment plants with designed bypasses – Wastewater treatment facilities with a designed by-pass and an average daily discharge rate greater than 17,500 cubic metres is or would be a significant drinking water threat in intake protection zones (IPZ) that have vulnerability scores of 9. A significant pathogen drinking water threat is significant for IPZs and WHPAs with vulnerability scores of 8.1 and 10 respectively.

Sewage treatment plants without designed bypasses and sewage storage tanks - sewage treatment plants that do not have designed by-passes could be significant drinking water threats if associated with a very large volume of sewage and specific contaminants in IPZs and WHPAs with vulnerability scores of 8.1 and 10 respectively. Any capacity plant is significant for pathogens.

Combined Sewers – combined sewers can only be significant drinking water threats for surface water where the vulnerability score is at least 8 (for PCBs) or 9 for the balance of contaminants. Generally speaking the average daily rate of the sewage treatment plant must be at least 2,500 m^3 before there are any significant drinking water threats. However, any capacity system can be significant in a vulnerable area of at least 8 for pathogens.

4. Applicable legislation, policies and programs

a) Provincial

Ontario Water Resources Act

Certificates of approval (C of A) are required under the *Ontario Water Resources Act* for sewage systems and other sewage works. The MOE is the regulatory body for these C of As which are prescribed instruments under the *Clean Water Act*. The MOE "Guide for Applying for Approval of Municipal and Private Water and Sewage Works" (August, 2000) is used by applicants to ensure that their proposals meet the legislative requirements for a C of A.

The terms and conditions of the C of A generally address the criteria for operation and performance of the sewage treatment plant, the requirements for monitoring and recording of specific indicators of the environmental impact of the works (e.g. effluent standards), reporting on incidents, and provision of contingencies to prevent and deal with accidental spills. The most important aspect of the environmental impact considered in the assessment of any proposed sewage works is the anticipated impact of the facility's final effluent quality on the

receiver (i.e. surface water body, land area, soil and/or ground water aquifer) and its potential users.

All operators at a sewage treatment plant must be licensed technicians.

Procedure D-5-2: Application of Municipal Responsibility for Communal Water and Sewage Services

This MOE guidance document indicates that the MOE "requires municipal ownership and responsibility for operation and maintenance of proposed new communal water and sewage works, as well as the existing privately owned communal water and sewage works when they are proposed for expansion. As defined in the Procedure, communal water and sewage works are works serving more than five (5) units of full-time or seasonal residential or industrial/commercial occupancy or other occupancy as determined by MOE staff. Where municipal ownership of communal works cannot be achieved, this issue must be addressed in pre-application consultation with the local District Office of the Ministry and resolved prior to submitting an application for approval of the works."

b) Municipal

Land Use Planning

Those municipalities with existing water and sanitary sewage services will not permit development that would require unplanned expansions to these systems. New development within the serviced areas must connect to them (i.e. no private well and septic system).

In general, communal water and sewage systems are not supported because of the financial implications to the municipality. However, most may consider this form of servicing in areas where there is a public health threat, and that cannot be easily serviced by existing municipal systems.

Sewer Use By-laws

Municipalities often have sewer use by-laws that regulate connections to the sanitary sewer systems, as well as the types and concentrations of waste that can enter the systems. Industrial, commercial, institutional or multi-residential building developments may be required to pre-treat, monitor and report on sewage or stormwater discharge. Dilution of waste to meet concentration requirements is prohibited. Special agreements may be required to all special exceptions to these rules.

5. Gaps in existing legislation, policies and programs

- Older sewage treatment plant C of As may not require monitoring or reporting.

- Sewer use by-laws may not address all source water protection concern relating to the contaminants identified in the MOE Tables of Drinking Water Treats (MOE, 2009).

6. Policy Considerations

- REMINDER: The main consideration for reducing or eliminating drinking water threats related to sewage systems and sewage works is to produce cleaner effluent. It appears that the legislative framework makes great strides toward this objective and that education and enforcement of the rules and regulations could also be effective.

- *Clean Water Act* Part IV tools interim risk management plans, risk management plans, prohibition, and restricted land uses cannot be used for sewage systems or sewage works.

- Policies related to the preferential location of new facilities with separation between drinking water intakes, and with consideration of flows during extreme events should be considered during discussion related to specific vulnerable areas.

- In certain instances the "would be" drinking water threats are disregarded since they are unlikely to occur. However, the source protection plan will still need to address those situations through a high-level policy approach ("a catch-all policy").

Examples of risk management measures and policy ideas

For discussion purposes, this section of the report provides examples of risk management measures and policy ideas that could be applicable to sewage treatment plants and combined sewers. 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. The MOE Risk Management Measures Catalogue (Version 2, 10/03/2010) was reviewed as part of this exercise and measures were incorporated where appropriate; many of the measures in the catalogue are already required by applicable provincial instruments.

Table 6.1 Risk Management Measures for Sewage Systems and Sewage Works

Policy Tool	Example
Education and Outreach	• Area-wide education and outreach programs targeted at sanitary sewer users about what can and cannot be poured down the drain, what other disposal options are available, how incorrectly disposed of substances/materials negatively affect the treatment system and the quality of the effluent leaving the treatment facility.
Incentive Programs	• Assist with disconnecting illegal connections to the sewer network (eavestroughs, sump pumps).
Land Use Planning	• Prohibit new sewage treatment plants in areas where they would be a significant drinking water threat.
Prescribed Provincial Instruments	• Require/encourage (depending on level of threat) the MOE to take extra care in its review of applications for sites within and adjacent to intake protection zones and wellhead protection areas, to prioritize inspections for these areas and revisit effluent targets to address drinking water threats (e.g. require any contaminant listed in the MOE Tables of Drinking Water Threats to be below the minimum detection limit).
Municipal Operations / Infrastructure	• Inflow/infiltration reduction programs. • Upgrade sewage treatment plants • Continue to separate combined sewer. • Enact and enforce sewer use by-laws.

Appendix A – Local Information on Drinking Water Threat

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

- [Insert description and/or map of local threat context]
- There are (x) existing municipal sewage treatment plants and sewer networks …

Table 3.1 Municipal Sewage Treatment Plants in the _____ Source Protection Area

Municipality	Plant	Designed average daily rate of effluent (m^3/day)	Other information

2. Local approaches to managing these drinking water threats.

a. Land Use Planning

- [Insert description of local land use approaches that are being used]

b. Other Local Programs

- [Insert discussion on local programs including Stewardship, Education/Outreach, Incentive, etc. implemented by Conservation Authority, Municipality, or other watershed/community groups.]

c. Cross Jurisdiction Considerations

- [Insert discussion on policy approaches being considered by neighboring Source Protection Areas/Regions.]

3. Further Research for Specific Vulnerable Areas

- Additional research by staff may occur for the following matters:
  - Obtain and review certificates of approval for specific sewage treatment plants for information about operation and monitoring requirements
  - Consider, in consultation with treatment plant operators, if there is sufficient monitoring of the contaminants of concern
  - Locate and rank any communal systems that exist in the area
  - Review sewer use by-law content in detail to identify areas that could better address drinking water threats
  - Interview by-law officers to better understand sewer use-by implementation and identify any areas where drinking water threats could be addressed

Appendix B – Reference List

Government of Ontario. 1990. Ontario Water Resources Act http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o40_e.htm

Ontario Ministry of the Environment. August, 2000. Guide for Applying for Approval of Municipal and Private Water and Sewage Works. http://www.ene.gov.on.ca/environment/en/resources/STD01_076038.html

Ontario Ministry of the Environment. March 1995. Procedure D-5-2: Application of Municipal Responsibility for Communal Water and Sewage Services. http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_079311.pdf

CH2M Hill and XCG Consultants. July 2010. Pollution Control Plan Update for the City of Kingston.

Corporation of the City of Brockville. September 27, 1994. By-law No. 12-91.

Corporation of the City of Kingston. November 4, 2008. By-law No. 2008-192.

Corporation of Loyalist Township. May 8, 2006. By-law No. 2006-044

Town of Gananoque. 1988. By-law No. 88-09

Appendix C – Additional Resources

The MOE Water Quality Risk Management Measures Catalogue (Version 2, 09/07/2010)
http://maps.thamesriver.on.ca/swpCAMaps/rmc/disclaimer.aspx