



1. *What is the Threat to Drinking Water?*

This paper provides background information for prescribed drinking water threat 6 – the application of non-agriculture source material and prescribed drinking water threat 7 – the handling and storage of non-agriculture source material (NASM).

According to Ontario Regulation 267/03 – General under the Nutrient Management Act, non-agricultural source materials include the following materials that are intended to be applied to land as nutrients, but that are not produced on a farm:

- Pulp and paper biosolids
- Sewage biosolids
- Anaerobic digestion output where less than 50% of the total material is on-farm anaerobic digestion materials (anaerobic digestion is a process used to decompose organic matter by bacteria in an oxygen-limited environment)
- Any other material that is not from an agricultural source and that is capable of being applied to land as a nutrient (such as materials from dairy product or animal food manufacturing).

NASM that will be applied to fields on a farm can be stored in a permanent nutrient storage facility (usually a steel or concrete tank), or on a temporary field nutrient storage site (only for solid NASM stored for more than 24 hours). There are restrictions about what types of NASM can be stored on a farm and for how long.

The primary consideration for reducing or eliminating drinking water threats related to the application, handling and storage of non-agricultural source material is to make sure it does not enter surface water and/or groundwater.

NOTE TO THE READER

*This document is one of a series of threat policy discussion papers for the Thames- Sydenham and Region in support of Source Protection Plan development. Each discussion paper looks at the nature of one or more types of drinking water threat, describes the local occurrence 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 revised as the policy development process progresses. This discussion paper represents the best information available to the SPC upon which they will base their policy decisions.*

Contents

- What is the Threat to Drinking Water?
- What causes the activity to be a drinking water threat?
- What is the local scale of the drinking water threat?
- How is the risk currently managed?
- Policy considerations
- Proposed policy ideas
- References
- Tables
- Draft Policies (added to later versions)

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

The Ministry of the Environment (MOE) Tables of Drinking Water Threats (Ontario Ministry of the Environment, 2009) identify nitrogen, total phosphorus and pathogens as contaminants that could make their way into surface and groundwater as a result of the application of NASM to land (circumstances 37 to 54, 1970 and

Non-Agricultural Source Material

1971), and the handling and storage of NASM (circumstances 1409 to 1432, 1965 to 1968). These nutrients and pathogens could threaten the safety of drinking water sources in certain situations due to runoff or spills.

The source of nitrogen and total phosphorus is dependent on the material that is found in the NASM. Examples may include, human waste, household and personal care products (e.g. soap), or animal by-products.

Threat 1970 and 1971 of the MOE Tables of Drinking Water Threats (2008, as amended in 2009) are the pathogen threats associated with the application of NASM. This threat specifically addresses the following sources of NASM:

- seafood processing operations
- dairy producers
- dairy product manufacturing operations
- pulp and paper mills
- animal food manufacturing operations (from animal sources)
- meat plants
- sewage works

While heavy metals and pharmaceuticals in biosolids are of concern, they are outside the scope of the *Clean Water Act* at this time.

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

The classification of these activities as a significant, moderate or low drinking water threat is dependent on the location as well as the combination of the managed land percentage and livestock density for the vulnerable area. In general, the greater the managed land percentage and the livestock density, the greater the risk to drinking water. As a reminder:

- The application of NASM (chemical threats 37 to 54), is designated based on a function of managed land percentage and livestock density.
- Nitrogen for wellhead protection areas (WHPAs) and Intake Protection Zones (IPZs), Phosphorus for IPZs only
- Nitrogen is a concern for both surface and groundwater.
- Total phosphorous is only considered a drinking water threat in IPZs and in WHPAs where the groundwater is under the direct influence of surface water (i.e. WHPA-E). This is because excessive inputs of total phosphorous in surface water results in eutrophication and can cause toxic algae blooms both of which impair water quality.
- Managed lands include cropland, fallow land, improved pasture, golf courses, sports fields and lawns to which ASM, NASM, or commercial fertilizer could be applied. This value was calculated based on MOE Technical Bulletin and is included in the Assessment Report.
- Livestock density is derived from the number of farm animals in a given area. Livestock density is standardized to nutrient units per acre to account for the fact that different types of animals produce different amounts of manure with different nutrient values. A nutrient unit is based on the manure

Non-Agricultural Source Material

equivalent of nutrients contained in 43 kg of nitrogen or 55 kg of phosphate. The livestock density value was calculated based on MOE Technical Rules and is included in the Assessment Report.

- The application of NASM (threats 1970,1971) and the handling and storage of NASM (threats 1965 to 1968) of NASM (Pathogen) is tied to material source not managed land percentage or livestock density. The storage of NASM is tied to mass of nitrogen.

4. *How is the Risk Currently Managed?*

The following section illustrates examples of how these threats are dealt with municipally, provincially, federally or in other jurisdictions.

Federal

Fisheries Act

In general the Fisheries Act is enforced by Fisheries and Oceans Canada; however, the section that applies to contamination is under the authority of Environment Canada. The deposition of any deleterious substance (contaminant) is in contravention of the legislation. Section 36(3) of the Fisheries Act states that "... no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water." For example, the latter case would apply if a licensed applicator spread NASM on land near a river and the NASM subsequently washed into the river (Government of Canada, 1985).

Provincial

Environmental Protection Act

A certificate of approval issued by the Ontario Ministry of the Environment (MOE) under Part V of the Environmental Protection Act is required in order to apply NASM to land, or to store it. A separate certificate of approval is required for each specific site (called an Organic Soil Conditioning Site) and for the hauler/spreader (Organic Waste Management System) (Government of Ontario, 1990). As of January 1, 2011, the land application of NASM will be regulated under the Nutrient Management Act. Existing certificates of approval will remain valid until they are suspended, revoked or expire 5 years from the date of issue.

Section 39 of the Environmental Protection Act, which relates to the approval of certificates of approval, is a prescribed instrument under the Clean Water Act.

The MOE has published a "Guide for Applying for Approval of a Hauled Sewage (Septage) or Processed Organic Waste (Biosolids) Waste Disposal Site" (November 1999) that outlines the extensive documentation required to support an application for a certificate of approval. The supporting information includes, but is not limited to: source and type of material to be applied, waste analysis report, soil analysis report, terrain description, surface physiology and geology, depth to water table, water wells, separation distances, application areas, crops, schedule of use, notification to adjacent landowners, and confirmation from the municipality that NASM can be applied (i.e. no municipal restrictions).

The MOE, in conjunction with the Ontario Ministry of Agriculture, Food and Rural Affairs, also prepared a document called "Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land" (March 1996) that outlines the criteria that must be met before biosolids and other waste materials (e.g. pulp sludge)

Non-Agricultural Source Material

can be considered for use on agricultural land. The minimum requirements in this document have generally been carried over to Ontario Regulation 267/03 – General, under the Nutrient Management Act (see below).

Nutrient Management Act and Ontario Regulation 267/03 – General

Sections 15.2 and 28 of Ontario Regulation 267/03 – General are prescribed instruments under the Clean Water Act. These sections relate to the approval of, and compliance with, NASM plans (Government of Ontario, 2003). Ontario Regulation 267/03 – General will be the principal piece of legislation related to the application and on-farm storage of NASM. As of January 1, 2011, Amendment 267/03 will take effect. The new amendment will establish consistent standards and requirements across the province. These will focus on the quality of the material being applied (Table 4.1), ensuring it meets strict criteria and is beneficial to the soil. They also include greater consideration of the material quality and potential odor generation and will cover any Ontario farm where NASM will be applied. The new regulation now includes references to 11 metals. A local SPA would have to add these metals as an MOE approved local threat in their Assessment Report prior to creating policies relating to these specific metals.

NASM Plans

The “Nutrient Management Protocol” (OMAFRA, 2009) provides technical standards and procedures related to O. Reg. 267/03 – General. A NASM plan is similar to a nutrient management plan, except that it only covers those fields where the NASM will be applied instead of the entire farm unit. Therefore it is possible that a farm could require a NMS, NMS/P and NASM Plan. According to the Protocol, a NASM Plan must contain numerous components including information about the nutrients that will be applied (source, type, content, application rate); the fields where the nutrients will be applied; cropping practices, crop rotation and yields; and on-farm storage (if applicable). The required contingency plan covers topics such as receiving more nutrients than addressed in the nutrient management plan, and unanticipated release of nutrients (e.g. spills).

The purpose of NASM plans are:

- To optimize the relationship between the land-based application of nutrients, farm management techniques and crop requirements; and
- To minimize adverse impacts to the environment by ensuring that fields and storage meet regulatory requirements.

With the recent amendment, NASMs are divided into three categories based on the source of the materials and the level of risk associated with them (Table 4.1).

Table 4.1 – Plan requirements based on category of NASM

Category	Examples of material	Plan requirements
1	unprocessed plant material such as leaf and yard waste, and culled vegetables	NASM plan not required
2	processed plant material, bakery waste, organic matter that does not contain fish or meat	NASM plan registration with OMAFRA for NASM with low metal content; approval by OMAFRA for NASM with high metal content
3 ¹	sewage biosolids, pulp and paper biosolids, washwater and waste from a process that	NASM plan approval by OMAFRA

Non-Agricultural Source Material

	involves animal products	
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¹ Category 3 NASM are specified in the MOE Tables of Drinking Water Threats for pathogen threats.

NASM plans will address the land application of NASM and the storage of NASM on farms, and will be required for any farm where these activities would occur, regardless of the number of nutrient units generated. The plans can be prepared for one to five year periods, and are subject to annual review and summary by the operator.

Consultants who prepare NASM plans must be certified through the Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Proponents, who apply nutrients to a field that will require a NASM plan, but who do not own, operate or work as an employee for the farm, must have a Nutrient Application Technician License.

Requirements for the Application of NASM

Before NASM is approved for land application, the operator must demonstrate to Ontario Ministry of Agriculture Food and Rural Affairs (OMAFRA) that the NASM will have a beneficial use for agriculture. For example, it must increase organic matter, increase soil pH, contain plant available nutrients (nitrogen, phosphorus, potassium), or be a source of water between June 15 and September 30. OMAFRA may seek the advice of the Biosolids Utilization Committee (BUC) in determining the suitability of a NASM for land application. BUC is an advisory body, with agricultural and environmental expertise, to MOE and OMAFRA. It was responsible for developing the "Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land" (MOE and OMAFRA, 1996).

There are restrictions on the application of NASM based on time of year, slope and application rate, application method, incorporation, crop residue, and distances from surface water. For example, NASM applied to land when the soil is snow-covered or frozen is subject to a number of restrictions. Sewage biosolids cannot be applied between December 1 and March 31 or when the ground is frozen or snow covered.

The minimum setback requirements for the application of NASM to land are listed in Table 4.2. These setbacks reflect the amendments to O. Reg. 267/03 – General that will come into effect on January 1, 2011, and are similar to those specified in the "Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land" (MOE and OMAFRA, 1996). Under the Nutrient Management Act, the operator will no longer need to provide notification to adjacent landowners or receive confirmation from the municipality. OMAFRA will provide a notice of NASM plan approval to the municipality. For the application of category 3 NASM or category 2 that is CM2, the MOE must be notified at least 24 hours before application begins.

Table 4.2 - Minimum setback requirements for the application of NASM to land

Feature	Value
Minimum soil depth to bedrock	0.3 m ¹
Minimum depth to groundwater table	0.3 m or 0.9 m ²
Minimum distance to municipal wells	100 m
Minimum distance to drilled wells (>15 m deep)	15 m
Minimum distance to all other wells including dug wells	30 m or 90 m ²
Minimum distance to individual residences	25 to 450 m ³
Minimum distance to residential areas, commercial, community or institutional uses	50 m to 900 m ³
Minimum distance to watercourses	20 m ⁴

Non-Agricultural Source Material

¹ NASM cannot be applied if the soil depth to bedrock is less than 0.3 m. There are restrictions to the application of NASM for soil depth between 0.3 m and 1 m.

² This requirement is dependent on the type of NASM and the method of application.

³ This distance depends on the odour classification of the NASM.

⁴ The minimum distance to a watercourse is dependent on slope, presence of vegetative buffer, method of incorporation into soil, a specified amount of crop residue, or if it is applied to a living crop (such as in a pasture).

A vegetated buffer zone is required between land where NASM is applied and surface water. The buffer zone must have a minimum width of 3 m and be maintained under continuous vegetated cover including perennial grasses, other herbaceous plants, or trees and perennial forage crops that can be harvested as hay or silage.

The minimum distances to other land uses such as residential areas relates to the odour associated with the NASM, however, in terms of drinking water source protection, it has the effect of providing separation between the land application of NASM and municipal and private drinking water wells that may exceed the minimum well separation required under O. Reg. 267/03.

O. Reg. 267/03 restricts the use of high trajectory irrigation guns to land apply liquid manure or NASM on all farms regardless of whether or not they have a nutrient management strategy, nutrient management plan or NASM plan. The regulation also contains rules for the land application of anaerobic digestion output on all farms regardless of whether or not they have a nutrient management plan. The minimum setback requirements listed in Table 4.2 generally apply to the application of anaerobic digestion output where it is considered to be a NASM.

Requirements for the Storage of NASM

The minimum setback requirements for a new permanent nutrient storage facility are listed in Table 4.3. Temporary field nutrient sites must also meet setback requirements if solid NASM is to be stored on the site for more than 24 hours (value in brackets if different). These setbacks reflect the amendments to O. Reg. 267/03 – General that will come into effect on January 1, 2011. Category 3 NASM (see Table 4.1) cannot be stored on-farm.

Table 4.3 – Location Requirement for NASM Storage

Feature	Value
Minimum distance to municipal wells	100 m
Minimum distance to drilled wells (>15 m deep)	15 m (45 m)
Minimum distance to all other wells including dug wells	90 m
Minimum distance to field drainage tiles or piped municipal drains	15 m
Minimum flow path to surface water or tile inlet	50 m
Minimum distance to individual residences	200 m (125 m or 200 m ¹)
Minimum distance to residential areas, commercial, community or institutional uses	450 m (250 m or 450 m ¹)

¹ This distance depends on the odour classification of the NASM.

The minimum distances to other land uses such as residential areas relates to the odour associated with the NASM, however, in terms of drinking water source protection, in some cases, it may have the effect of providing separation between the storage of NASM and municipal and private drinking water wells that may exceed the minimum separation required under O. Reg. 267/03.

Non-Agricultural Source Material

Permanent nutrient storage facilities built after June 30, 2003 can be used to store NASM provided that an engineer confirms that the facility meets the requirements of the Nutrient Management Act and is appropriate for the storage of NASM. NASM can only be stored in a permanent facility built before June 30, 2003 if it is subject to a certificate of approval under the Environmental Protection Act (Government of Ontario, 1990).

Under O. Reg. 267/03, a permanent solid NASM storage facility must have a runoff management system to handle all of the runoff generated by the facility (e.g. solid NASM piled on a concrete base). The system must consist of at least one of the following:

- A roof used to prevent the entry of precipitation, assuming that any water upstream of the facility has been diverted away from the facility
- Vegetated filter strip systems
- Properly sized runoff collection and storage systems
- A permanently vegetated area (PVA), if runoff from the facility is generated from an area less than 300 sq. m. The location requirements for a PVA are similar to those for the nutrient storage facility (see Table 4.2).
- A sewage works approved under the OWRA or a sewage system approved under the Ontario Building Code.

Compliance

Compliance and enforcement of the Nutrient Management Act is the responsibility of the MOE. According to “Complying with Environmental Legislation on Farms” (Ontario Ministry of the Environment, 2009), the MOE’s on-farm compliance program uses a problem-solving approach to help farmers comply with the law and manage environmental issues through education and outreach. Minor violations can be addressed through voluntary abatement plans, authorizing document amendments (to the nutrient management strategy and/or plan), and provincial officer orders. Enforcement, including Provincial Offences Act summons and investigation and prosecution, would be used in situations where serious issues are identified.

Municipal

Municipal Act

Municipalities have the ability to pass by-laws about the economic, social and environmental well-being of the municipality, and about the health, safety and well-being of people, under the Municipal Act (Government of Ontario, 2001).

Municipalities have authorities to enact by-laws for specific matters within their jurisdiction and these authorities are available under the Municipal Act, or, in the case of the City of Toronto, under the City of Toronto Act. Municipalities have broad authorities to pass by-laws about the economic, social, and environmental well-being of the municipality, and about the health, safety, and well-being of people. There are limitations on these authorities which need to be taken into consideration. Very generally, these broad authorities may not conflict with specific authorities found in other legislation. For example, any municipal by-law with respect to construction or demolition of buildings is superseded by the Building Code Act and the Building Code. In addition, in the event of a conflict between a municipal by-law and federal and provincial legislation, the legislation prevails. For example, if a municipality wishes to enact legislation to protect its drinking water sources, the municipality must review the applicable legislation to ensure that the municipal by-

Non-Agricultural Source Material

law does not conflict with it. Municipalities can supplement provincial regulatory schemes, provided that the by-law does not conflict with the provincial legislation.

In a two tier system, each tier may have exclusive jurisdiction over a matter, for example, lower tiers may enact zoning by-laws whereas upper tiers may be responsible for public health. As a result, the upper tier municipality cannot use its broad authorities to pass a by-law which is specifically within the jurisdiction of the lower tier.

Municipalities may also use authorities under the Municipal Act to set up a licensing regime for businesses. The licensing system generally applies to how operators conduct the business, rather than how a product is applied. However, the municipality may determine that there are certain conditions to holding a license, such as certification or operators.

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 (Ontario Soil and Crop Association, 2005). Participants progress through a risk assessment and action plan development for their farm. The risk assessment gives the farmer the opportunity to assess the current level of environmental concern in up to 23 different areas on the farm and access funding to make improvements for areas of identified risk. The information sheets on nutrient management for the EFP program are consistent with the requirements of O. Reg. 267/03.

5. *Policy Considerations*

- Each section of the source protection plan will need to include a high-level policy approach (“a catch-all policy”) to address those “would be” drinking water threats that are unlikely to occur in a given vulnerable area. For example, a general policy may be appropriate in an urban setting even if it is unlikely that NASM would be applied or stored there. The occurrence of the number of potential significant threats related to NASMs is related to the location of farm fields.
- NASM storage can be either governed by the Ontario Water Resources Act, the Environmental Protection Act, the Nutrient Management Act or not at all.
- Some municipalities don’t have 240 storage for NASMs and in the past have used random agricultural storages.
- Application of NASMs cannot be prohibited under land use planning because it is an activity. Only land uses can be prohibited, such as agricultural land use. New NASM storage can be prohibited through the land use planning tool.
- An applicant is required to keep records of how the conditions of a certificate of approval are met, but they are not submitted to MOE unless requested.
- No NASM storages have been identified as a significant risk in the Thames-Sydenham region. The number of significant threat locations identified for NASM application is based on farm field locations within the WHPA-A and B with a vulnerability score of 10, and the possibility of spreading NASMs on those lands.

6. *Proposed policy ideas*

For discussion purposes, this section of the report provides examples of policy ideas that could be applicable to the subject threat in the Thames-Sydenham and Region. It is not an exhaustive list. Each policy tool is discussed separately in the table below.

Threat: The application and storage of Non-agricultural source materials

Policy Tool	Policy ideas
Education and Outreach	<ul style="list-style-type: none"> Encourage property owners of storage to adopt risk management measures Encourage property owners to consider alternatives to NASM applications in vulnerable areas Encourage the use of the most current best management practices for application
Incentive Programs	<ul style="list-style-type: none"> Incentive programs to establish buffers on lands adjacent to surface water within WHPA-E or IPZ (with vulnerability score of 9)
Land Use Planning	<ul style="list-style-type: none"> Land Use Planning is not an appropriate tool to manage the application of NASMs. Prohibit new NASM storages within areas where they would be a significant threat.
Prescribed Instruments	<ul style="list-style-type: none"> Require MOE and OMAFRA to consider protection of municipal wellheads in review of NASM Plans under NMA for farms in WHPA-A Recommend MOE to prioritize inspections of NASM Plans in vulnerable areas and conduct regular inspections
Municipal Operations/ Infrastructure	<ul style="list-style-type: none"> Encourage municipalities to relocate NASM storage outside vulnerable areas in which they would be significant
Risk Management Plans	<ul style="list-style-type: none"> Require risk management plans to address site specific restrictions of NASM application in areas where threat to drinking water could be significant.
Prohibition	<ul style="list-style-type: none"> Prohibit application of NASMs where this activity is considered a significant threat (only tool which can prohibit an activity)
	<ul style="list-style-type: none"> Prohibit storage of NASMs where this activity is considered a significant threat
Restricted Land Use	Require prescreening of planning applications for activities related to storage of ASMs where the activity is considered a significant threat

7. *Reference List*

Government of Canada. 1985. Fisheries Act. <http://laws.justice.gc.ca/en/F-14/index.html>

Government of Ontario. 1990. Conservation Authorities Act. www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90c27_e.htm

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Non-Agricultural Source Material

Appendix A – Significant Threat Locations in the Thames-Sydenham Source Protection Region

System	Threat	Type	# Locations*	WHPA	Vulnerability Score
UTR	Birr	Application of NASM to land	1	A	10
UTR	Dorchester	Application of NASM to land	5	A	10
UTR	Dorchester	Application of NASM to land	16	B	10
UTR	Melrose	Application of NASM to land	2	B	10
UTR	Thorndale	Application of NASM to land	2	A	10
LTV	Ridgetown	Application of NASM to land	5		
		Totals	31		

* identified as farm fields

