Domestic Action Plan (DAP) Initiative: Nutrient Management

Ag Sector Working Group June 16, 2017



- Provide background around two government commitments with implications for nutrient management in Ontario
 - 1. Domestic Action Plan commitment to consider further restrictions on nutrient application in the non-growing season
 - Red Tape Challenge commitment to review of 5-Year cessation/renewal requirement for Nutrient Management Strategies (NMS) and Nutrient Management Plans (NMP)
- Follow-up with more detailed discussion around these items at the next Right Timing working group meeting on June 28.

Lake Erie DAP Commitment



 Includes a proposed provincial action to consider further restrictions on the application of nutrients during the non-growing season.

Application Opportunities – Right Time and Wrong Time

Late Fall / Early Spring: Slim Application is discouraged on frozen or snow-covered ground and between Dec. 1 and Mar. 31 without injection/ incorporation. However in some years, good weather can facilitate favourable conditions within this period.

At Planting: High Small amounts of "starter" (N,P,K) fertilizer can be placed in close proximity to seed. Practice is limited for manure. After Harvest: High 2nd most common application time for manure and less mobile fertilizer nutrients (e.g. P, K). Window size is determined by previous crop, fall weather (e.g. winter wheat harvested in July/August, corn could be harvested as late as Dec.)

Before Planting (Spring): High Most common application time for manure and commercial fertilizer. Window size is determined by spring weather and planting timing for crops.

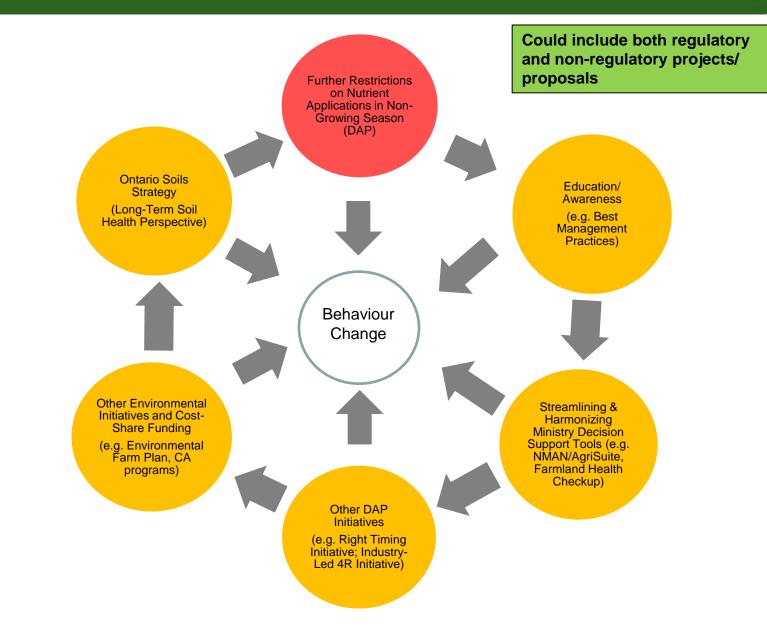
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In Crop: Some, Growing More common with some fertilizer nutrients (e.g. N). More common with manure applied to perennial crops (e.g. hay). Difficult in annual crops without expensive application equipment, but custom applicators are an option. After Harvest: Encouraging more cover crop planting to help "fix" more mobile nutrients (e.g. N).

Evidence of Application at the Wrong Time

- Application of nutrients on snow, when the ground is frozen, or when the ground is extremely wet are not best management practices (BMP's) and are strongly discouraged in OMAFRA education materials and industry 4R materials
- Despite ministry and industry best efforts emphasizing problems with the practice of applying nutrients in the winter – there is evidence that in some cases nutrients are being applied at the wrong time:
 - MOECC compliance officers indicate that roughly 25 formal public complaints are filed in the province annually with respect to winter application;
 - 2011 Canadian Farm Environmental Management Survey (FEMS) estimates that 12% of solid manured acres and 3% of liquid manured acres is applied in the winter months in Ontario (slightly higher percentages in Lake Erie Ecoregion);
 - Field staff efforts to record observations through the "Timing Matters Pre-Pilot" indicated that instances of winter manure application was widespread.

Multiple Tools



Current Standards

• Current NMA regulatory restrictions pertaining to the non-growing season vary by soil conditions, nutrient source and farm size

Nutrient Source	Scenario/Application Conditions	Allowed During Conditions?	Restrictions
Sewage biosolids or contains human body waste	Dec. 1 – Mar. 31 OR frozen/snow-covered soil	No	
Other Non-Agricultural Source Materials (NASMs) - Expanded on next slide	Dec. 1 – Mar. 31 OR frozen/snow-covered	Yes	 Rules vary for NASM depending on the category of NASM, whether liquid/solid, whether applied in restricted period and whether the ground is snow covered or frozen Special rules for application to certain types of land
Greenhouse Nutrient Water	frozen/snow-covered soil	No	
Greenhouse Nutrient Water	Dec. 1 – Mar. 31	Yes	 Land cannot be "vulnerable" Must be an "emergency" making land application necessary with no other disposal options Must be injected or incorporated same day OR surface applied to living crop/minimum residue cover Minimum setbacks to surface water based on land slope Application rate cannot exceed 17 kg/ha of PAN
Agricultural Source Material (farm phased-in to NMP requirement) - Expanded on next slide	Dec. 1 – Mar. 31 OR frozen/snow-covered soil	Yes	 Rules vary for ASM depending on type of material, whether liquid/solid, whether applied in restricted period, whether the ground is snow covered or frozen and how ASM is applied Special rules for application to certain types of land
Agricultural Source Material (non-phased-in farm)	Dec. 1 – Mar. 31 OR frozen/snow-covered soil	Yes	No restrictions
Commercial Fertilizer	Dec. 1 – Mar. 31 OR frozen/snow-covered soil	Yes	No restrictions

Current Standards

NMA Regulatory Restrictions for ASM (farm phased-in to NMP requirement) and NASM (not containing sewage biosolids or human body waste)

 No winter (includes both below conditions) applications are allowed on lands defined as vulnerable

Frozen or Snow-Covered Ground:

- Liquid ASM/Liquid Category 2 NASM/all Category 3 NASM applied must be injected or incorporated (within 6 hours) into the soil with minimum 20 m setback from surface waters (100 m if land slope > 3%)
- Solid ASM/Solid Category 2 NASM/all Category 1 NASM applied must be injected or incorporated (within 6 hours) into the soil with minimum 3 m setback from surface waters (100 m if land slope > 6%)
- Solid ASM can be surface applied if land slope is < 3% and snow depth does not exceed 15 cm with minimum 100 m setback from surface waters

Restricted Period (Dec. 1 – Mar. 31) with no frozen/snow-covered ground:

- Liquid ASM/Liquid Category 2 NASM/all Category 3 NASM applied must be injected, incorporated into the soil within same day, or surface applied to a living crop/high crop residue with minimum 20 m setback from surface waters (100 m if land slope > 3%)
- Solid ASM/Solid Category 2 NASM/all Category 1 NASM applied must be injected, incorporated into the soil within same day, or surface applied to a living crop/high crop residue with minimum 3 m setback from surface waters (100 m if land slope > 6%)

Phase-In Process and Relationship to Current Restrictions

Three Broad Categories of Livestock Operations (manure generating):

- Farms not phased-in → winter application is discouraged (through BMP's and education), but not "illegal" unless the application causes or may cause an "adverse effect" under the Environmental Protection Act (EPA)
- 2. Farms phased-in to requirement for NMS only → The regulation stipulates that an operation must have storage capacity capable of containing all nutrients generated over a 240 day period. However, many land application standards, including winter spreading restrictions do not apply because farm is not required to have a NMP. Winter application is discouraged, but not "illegal" unless the application causes or may cause an "adverse effect" under the EPA
- Farms phased-in to requirement for both NMS and NMP (usually large operations) → all land applications standards, including winter application restrictions apply

Note:

• Crop operations (no manure generation) never require an NMS nor an NMP, even if they receive, store and land apply any amount of manure from a livestock operation.

Other Jurisdiction Approaches

Restrictions Based on "Who"; "What":

- Increased diligence based on size of farm (e.g. many U.S. states)
- Increased diligence for manure versus other nutrients (varies)

Restrictions Based on "When" – Often Linked with Requirements for "How":

- Prohibition on application based on conditions and/or calendar dates (e.g. QC,MB,VT)
- Allowances for application with restrictions on method to frozen or snow-covered ground (e.g. OH, MI, IN)
- Allowances for application with restrictions on method during calendar dates (e.g. WI)
- Allowance for application with restrictions on method to saturated soils (e.g. OH)
- Allowance for application with restrictions on method in proximity to forecasted precipitation events (e.g. OH)

Restrictions Based on "Where":

- Increased diligence based on field "risk" rating slope, P-test, etc. (e.g. MI)
- Increased diligence based on geography (e.g. OH Western Lake Erie Basin)

Few Restrictions – Guidance Only:

• E.g. Smaller farms in MI, IL, NY

What We Have Previously Heard

- Ag Stakeholders Working Group:
 - Have indicated preference to extend current winter restrictions applicable to phased-in farms to all farms
 - Utilizes existing restriction precedents in Ontario which have some similarities to restrictions in other jurisdictions
- ENGO's:
 - Have indicated preferences for some stricter application restrictions in nongrowing season – potentially something similar to Ohio's rules
 - Potential areas of interest include restrictions for commercial fertilizer, application prohibitions on frozen/snow-covered/saturated ground, application rate restrictions, application setbacks from other sensitive features and paperwork requirements
- Auditor General/Environmental Commissioner:
 - Has called for phasing-in of all farms under the Nutrient Management regulations, which would include nutrient application restrictions in both nongrowing and growing seasons, and requirements to complete nutrient management strategies and plans

Draft DAP Comments

- "Should be given the opportunity to implement other measures including a peer-to-peer advisory committee approach before expanded regulation is considered."
- "Concept of non-growing season should be limited to when ground is frozen and/or snow-covered."
- "Where possible, site-specific risk characteristics of the soil should be taken into account."
- "Time-based nutrient application restrictions would not be suitable for most farmers. Any restrictions should be conditions-based (e.g. soil). Any regulatory approach should allow for winter application when soil and weather conditions are appropriate; while deterring application when conditions are not suitable."
- "Any expanded or broadened regulatory restrictions must be accompanied by significant cost-share funding to ease transition. Geographic targeting of regulatory requirements may need to be considered to better prioritize financial assistance."
- "Existing regulatory standards for nutrient application on frozen/snow-covered ground should be applied consistently across all farms."
- "Added flexibility may need to be considered to address unintended consequences."
- "More stringent regulations than "further restrictions on the application of nutrients during the non-growing season" is necessary."
- "Regulating a ban on winter spreading would possibly be the single most important action that could be taken to move towards achieving the 40% Lake Erie reduction target and should address the highest risk P sources (e.g. manure)."

Potential Impacts

Benefits:

- Estimates based on best available research as well as current estimates of baselines and potential level of adoption suggest that increased winter restrictions could result in reduced phosphorus loadings to Lake Erie of between 2 to 21 MT (30 Year Modelled Estimate for manure).
- Actual realized phosphorus loading reductions will depend on many factors including the current baseline, the level of adoption and various site-specific agronomic, climatic and land use variables.

Costs:

- Some producers, primarily operations utilizing manure, may need to incur costs in order to comply with any additional proposed regulatory restrictions.
- Potential costs will **vary** depending on the **action** taken. Types of actions may include:
 - Construction/Rental of additional storage capacity
 - Purchase/Rental of additional application equipment or services
 - Changes in crop rotation
 - Additional handling of materials
 - Additional time (operator or contracted)
- Estimating total costs will require numerous assumptions pertaining to "who" will be affected and "how" they will respond (actions)

Questions for Consideration

- Who/ What farms/nutrients should be subject to potential further restrictions?
- What / How should any new restrictions be phased-in (e.g. by date, by farm size,
- Where? by geographic area)?
- How? What potential further restrictions could provide the right level of environmental protection and disincentive for applying at the wrong time without creating undue burden?
 - What does the non-growing season mean?
 - What are the best approaches to restrictions?
 - Application restrictions based on "when" (e.g. certain times of year; when soil is frozen or snow-covered; when soil is saturated; when soil is already high in P test)
 - Application restrictions based on "where" (e.g. on high slopes; on bare soils (no living crop or low crop residue); in proximity to sensitive environmental features (wells, surface waters, other?)
 - Application restrictions based on "how" (e.g. method of application; maximum application rates)

- Other
- Should any exemptions be granted for any potential further restrictions?
- What level of monitoring/reporting could be appropriate to demonstrate due diligence and compliance?
- What types of actions and associated costs could be incurred by producers in response to any potential further restrictions?

Red Tape Challenge Commitment





 In response to concerns raised pertaining to the costs associated with mandatory 5-year cessation and renewals of NMSs and NMPs by phased-in farms, the province has made a commitment to review the frequency requirements associated with these documents.

See Appendix for background on current process and cessation triggers for NMS and NMP

Questions for Consideration

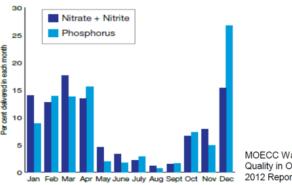
- What is the main role and content included in each nutrient management planning document (NMS/NMP)? How prone is information contained within each document to change? What additional benefits/environmental safeguards accrue from having certified persons review documentation regularly?
- What are the potential impacts for producers, certified strategy/plan developers, OMAFRA administration, MOECC compliance?
- What are the potential impacts/risks to the environment and potential for adverse effects? How can we improve producer engagement to mitigate these risks?
- What are the potential impacts/linkages with other non-regulatory initiatives (e.g. ministry education & outreach, industry 4R initiative, cost-share program funding)?



Nutrients & P Loss Evidence

- Crop production removes nutrients from soil throughout the growing season; thus replenishing them is essential to the sustainability of agriculture
 - P is 1 of 6 key nutrients required in large amounts for plant growth
 - P binds with soil particles over time, progressively becoming more stable but can become mobile under the right conditions (dissolved form or particulate form)
- Some nutrient-containing materials (e.g. manure) are by-products of livestock production
 - Costly for producers to store, transfer/transport and land apply
 - Can lead to application at undesired times or under sub-optimal conditions
 - Highest risk application period for P loss from ag land is in the non-growing season
 - Little or no crop growth to utilize phosphorus
 - More difficult to incorporate into soil
 - Intense rainfall events and snowmelt can increase erosion and surface runoff

Majority of nutrient export in non-growing season:

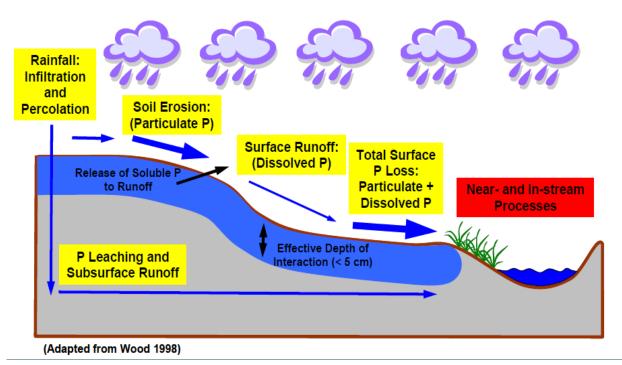






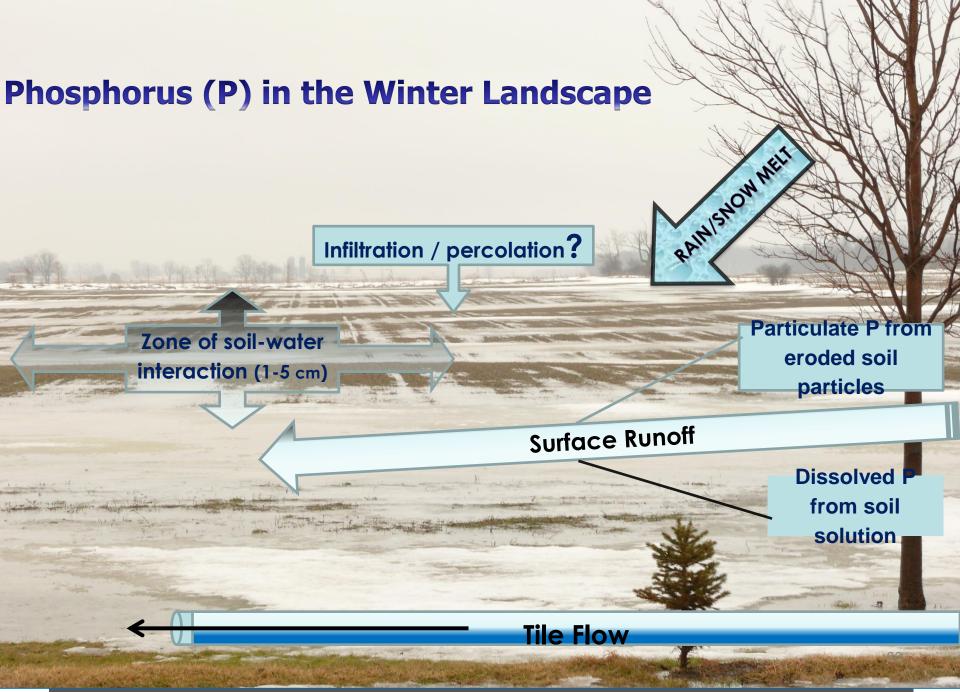
Understanding P in Agricultural Runoff

- Soil P is highest at surface due to its soil "binding" properties
- P loss varies with soil type, erosion and nutrient management
- Water, specifically in large amounts, causes surface erosion
- Both forms of P can be lost at surface and sub-surface. Subsurface loss is mainly from preferential flow (e.g. soil macropores)
- Research shows that P concentrations in sub-surface runoff are generally much less than surface runoff

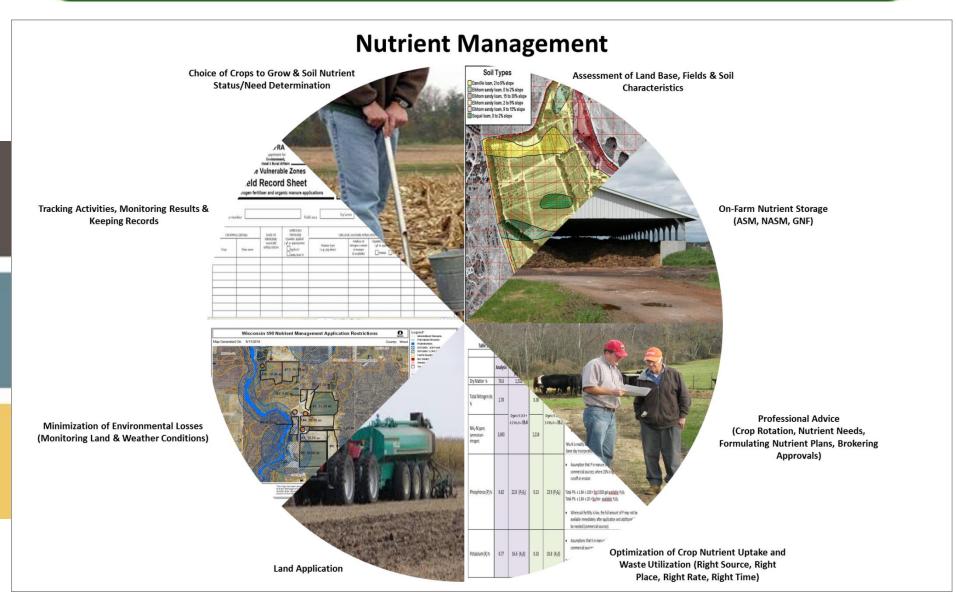


Risk of erosion and runoff tends to increase with:

- slope
- low infiltration rates
- compacted soils
- frozen soils
- low crop/residue cover
- intense rainfall / snowmelt



Nutrient management – the concept



Nutrient Management – the Legislation

- The Nutrient Management Act (NMA) has been in effect in Ontario since 2002, and the General Regulation (O. Reg. 267/03) since 2003.
- The legislation was developed to provide a consistent framework across the province and address key issues and risks related to improper storage, handling and land application of nutrients to protect the environment and provide a sustainable future for agricultural operations and rural development
- 2 key documents prescribed under the regulation each addressing different risks, each required by different producers in different circumstances (phase-in process), each requiring a certified person to prepare, and each applicable for a 5-year period after which they must be renewed
 - <u>Nutrient Management Strategy (NMS)</u> deals with generation and storage of certain nutrients
 - Nutrient Management Plan (NMP) deals with the land application of nutrients
- There are numerous standards/requirements in the regulation (e.g. nutrient storage capacity, land application standards, record keeping)
 - However, majority of these requirements apply <u>only</u> to agricultural operations that are required to have a NMS or NMP (linkage to the phase-in process)
- Legislation is a shared responsibility:
 - Administration, approvals and training/certification is led by OMAFRA
 - Inspection and enforcement is led by MOECC

See Appendix for more background on NMA regulation including Phase-in triggers.

Current NMA Regulatory Approach

Nutrient Generation and Storage:

- Regulates certain farm operations based on defined risks:
 - Farms generating ≥ 300 NU manure
 - New constructions (building permit) for barns and nutrient storages (≥ 5 NU)
 - Nutrient Management Strategy (NMS) (5-Year)

• Predicts nutrie required storage usage (land ar

- Predicts nutrient generation, calculation of required storage and accounts for sufficient usage (land application, transfers off farm, etc.)
- Must include a contingency plan
- Can be prone to less changes from year to year

Due Diligence

- Engineers for Building/Storage Constructions
- Municipal Building Officials
- Certified NMS Preparer
- OMAFRA NMS Approval

Regulatory Standards

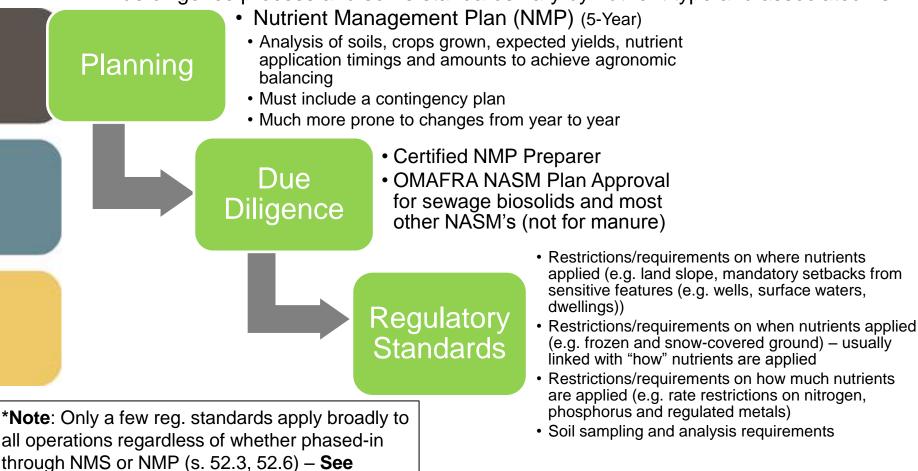
- Barn/Storage siting requirements
- Storage construction requirements and runoff control
- Storage capacity requirements
- Possible sampling and analysis requirements

Current NMA Regulatory Approach (cont'd)

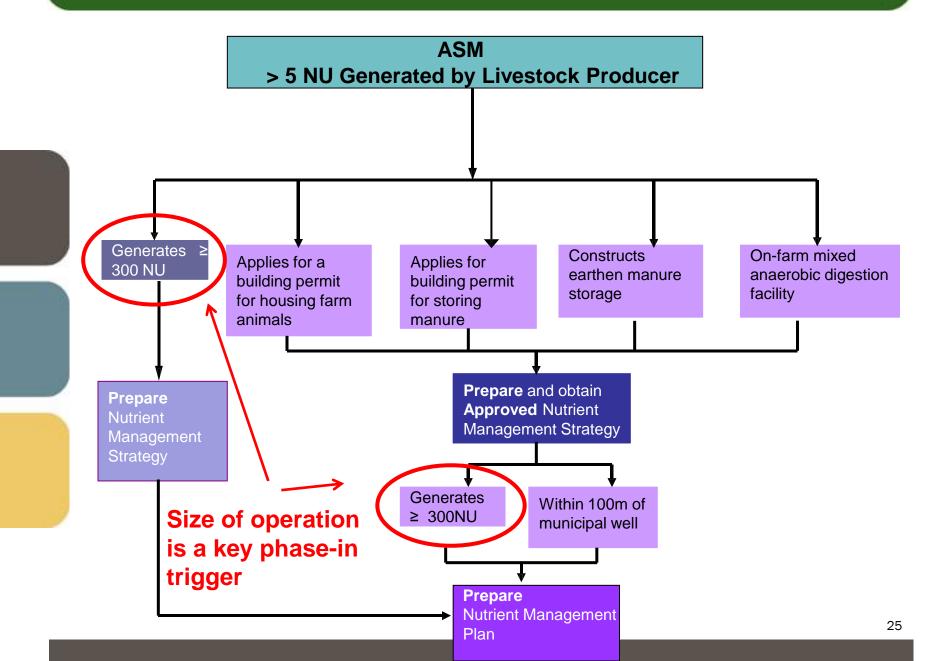
Nutrient Application to Land:

Appendix for more regulatory background

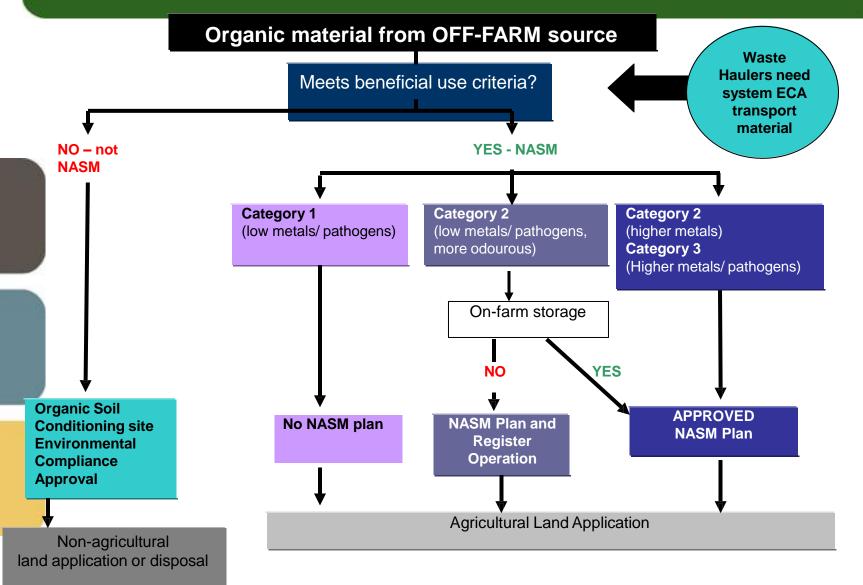
- Regulates certain farm operations based on defined risks
 - Farms generating ≥ 300 NU manure
 - Farms applying most Non-Ag Source Materials (NASM's) including municipal biosolids
 - Due diligence process and some standards vary by nutrient type and associated risk*



NMA Phase-In Process for ASM (manure)



NMA Phase-In Process - NASM



Current Ontario Process (NMS)

Year 0 (Phase –in)	Years 1-5	5 year anniversary
Livestock producer initiates a project* that requires a NMS	Producer follows NMS	NMS Ceases
NMS is prepared/submitted by a certified person	Complete an Annual Review/Update/ Summary	A new NMS is required to be prepared by a certified person
OMAFRA Approves the NMS	If the producer initiates one of the cessation	NMS is registered with OMAFRA and kept on site
Producer builds according to the approval	triggers, process starts over	Process starts over Years 1-5

* See previous slides for phase-in thresholds for NMS ** See subsequent slides for cessation triggers for NMS

Current Ontario Process (NMP)

Year 0 (Phase –in)	Years 1-5	5 year anniversary
Livestock producer triggers a threshold* that requires a NMP	Producer follows NMP	NMP Ceases**
NMP is prepared by a certified person and kept on site	Complete an Annual Review/Update/ Summary	A new NMP is required to be prepared by a certified person and kept on site
	If the producer initiates one of the cessation triggers**, process starts over	Process starts over Years 1-5

* See previous slides for phase-in thresholds for NMP
** See subsequent slides for cessation triggers for NMP

NMS Cessation Triggers

A NMS for an agricultural operation ceases for any of the following reasons:

- The owner/controller of the agricultural operation submits an application for a building permit for a building to house livestock or store manure (or constructs a manure storage made of earth) on land included in the farm unit (former NMS ceases on the day the application is submitted – new NMS must be approved by OMAFRA);
- The owner/controller of the agricultural operation begins treating materials through mixed anaerobic digestion (digestion of both on-farm anaerobic digestion materials and off-farm anaerobic digestion materials) on the farm unit (former NMS ceases on the day off-farm anaerobic digestion materials are first received on the farm unit – new NMS must be approved by OMAFRA);
- There is a change of ownership or control of the agricultural operation (NMS either ceases on the day on which the change occurs or can potentially continue depending on the capacity of the person who owns/controls the operation to implement the NMS – either new NMS or notification of continuation of former NMS must be approved by OMAFRA); or
- The fifth anniversary of the NMS (NMS ceases either on the 5th anniversary of the day on which it was approved (if applicable) or on the 5th anniversary of the day on which it was prepared (new NMS does not require OMAFRA approval).

NMP Cessation Triggers

A NMP for an agricultural operation ceases for any of the following reasons:

- The fifth anniversary of the day on which the NMP was prepared (new NMP does not require OMAFRA approval); or
- The agricultural operation begins receiving non-agricultural source materials (NASM) on the farm unit (former NMP ceases on the day NASM is received in the course of carrying out the operation – new NASM Plan must be approved by OMAFRA).

Winter Nutrient Application Restrictions in Other Jurisdictions

	JURISDICTION	STATUS		
	Quebec	No application of fertilizer on frozen or snow covered ground. No application between October 1 and April 1, unless the ground is not frozen or snow-covered and an agrologist who prepared the nutrient management plan specifies a new prohibition period.		
	Manitoba	No application of nitrogen or phosphorus between November 10 th and April 10. Director has discretion to vary dates if soil remains thawed and/or not snow covered.		
	Ohio	No person in the western basin (less than 20% of State) shall surface apply manure on frozen or snow-covered ground, when top two inches of soil are saturated or when weather forecast is greater than 50% chance of precipitation exceeding one inch in a 12 hour period, unless manure is injected; incorporated within 24 hours; applied to a living crop; or, if, in an emergency, director provides written consent and application is in accordance with technical standard.		
	Wisconsin	 No application of manure or process wastewater on fields when snow is actively melting in a manner that water is flowing off the field. On a field with soils that are 60 inches thick or less over fractured bedrock, manure or process wastewater may not be applied on frozen or snow covered ground. No solid manure surface application between Feb. 1 and March 31 if ≥ 1 inch of snow or frozen ground. No liquid manure surface application between Feb. 1 and March 31. Additional restrictions for the surface application for solid and liquid manure on frozen or snow-covered ground based on the slope of the field. 		
	Vermont	All farm operators are prohibited from spreading manure between December 15 and April 1. There is discretion to alter dates to accommodate unusual circumstances. Exemptions may be granted by the Secretary for emergency situations. Farm must have sufficient storage capacity for manure generated throughout the prohibition period.		
CAFOs is prohibited, unless allowed under a NPDES permit. Injection or incorpo		Surface application of manure, litter and process wastewater to frozen or snow covered ground by permitted CAFOs is prohibited, unless allowed under a NPDES permit. Injection or incorporation on the same day is permitted. CFOs that are not large CAFOs or CAFOs with a NPDES permit may surface apply manure on frozen or snow covered ground, with some restrictions.		
	New York, Illinois and Michigan	Winter spreading is discouraged but permitted. There are application suggestions if winter spreading takes place.		

Ohio Comparison Non-Growing Season

		Ohio Revised Code 939:08	Ontario Currently for manure (O.Reg. 267/03)
	What it applies to	Fertilizer and manure	Manure, other ASM, NASM
	Who it applies to	Farms in the Western Lake Erie Basin	Farms phased-in to NMP requirements (large farms)
	Application to frozen or snow- covered ground	Allowed with restrictions (see below)	Allowed with restrictions (see below)
	Application during restricted period (Dec 1- Mar 31)	No restrictions* (no defined restricted period based on dates)	Allowed with restrictions (see below)
	Application to saturated soils (top 2") or before significant rainfall	Allowed with restrictions (see below)	No additional restrictions beyond restricted period restrictions
	Restrictions	 Materials must: Be injected/ incorporated into the soil or applied to a living crop 	 Materials must: Be Injected/incorporated into the soil or applied to a living crop or > 30% crop residue Not be applied to vulnerable lands Not be applied within defined setback distances to surface waters

Note: There are other restrictions that apply in both jurisdictions (not specific to non-growing season)