



# AEM Tier 2 Worksheet

## Manure Management: Nutrient Management, Field Application and Storage

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### Glossary

**Animal Unit:** A measure intended to equalize the size of a livestock farm based on the live body weight of all animals on the farm. One animal unit equals 1,000 lbs. of live animal body weight.

**Concentrated Flow:** The collected flow of water through a field that may result in gully or more severe erosion. These flows will carry potential pollutants across a vegetative buffer and can also permanently damage vegetative buffers by eroding a channel through them.

**Field Runoff Potential:** Measurement of risk derived from soil characteristics and topography that estimates the potential for surface loss of nutrients.

**Growing Season:** Time of year in which a field's nutrients have potential of being utilized by growing crops. On cornfields, a fall cover crop tends to extend the growing season well past the time of corn harvest and before corn is planted the next spring.

(Continued on Page 2)

### Background

If used properly, manure is an excellent crop nutrient source and soil conditioner. If not used properly, the pathogens, nutrients, and organic material contained in it can contribute to the pollution of surface and groundwater, possibly including your own farm water supply. Bacterial and protozoan pathogens in manure can pose a human health risk when found in drinking water supplies. Nitrates can leach to groundwater, creating potential human and animal health risks. Nitrates, ammonia and phosphorus can also reach surface waters, stimulating undesirable algae and plant growth, and consequently damaging recreational and drinking water uses. Phosphorus is usually the limiting nutrient for plant growth in fresh water. Too much phosphorus delivered to a waterbody will lead to excessive aquatic weed growth or algae blooms, a process known as eutrophication. As this additional plant organic matter decays, it robs a stream or lake of the oxygen needed to maintain fish life.

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### Agricultural Water Quality Principle

Manure produced by domestic livestock should be applied to land in a manner that maximizes the nutrient value and soil conditioning benefits to the farm while protecting surface and ground water resources.

## Glossary continued ...

**Manure Pile Area:** Pre-determined locations, usually on a farm that practices daily manure spreading, that can be used to temporarily store manure. See NRCS Standard NY 749, October 1, 1999 (Previously Standard NY 193).

**Pre-Sidedress Nitrogen Test (PSNT):** A test done when corn is 6-12 inches tall that measures the concentration of nitrate in the top 12" of soil. Currently only calibrated for corn, the test determines if additional nitrogen is needed (usually applied alongside the growing crop -- sidedressed) to adequately produce this year's crop.

**Prescribed Grazing Management:** The controlled harvest of vegetation by grazing or browsing animals managed with the intent to achieve a specific objective. Often the objective is to maximize livestock production on a per-animal basis or on a per-unit of forage basis.

**Staff Gauge:** Measuring device crafted from various materials, which is used to estimate quantities of manure stored and/or estimate available capacity to store manure.

**Vegetative Buffer:** A permanent strip of dense, vigorous perennial vegetation of at least 20 feet in width established and maintained along a watercourse or stream. See NRCS Standards NY 393s (Filter Strip), NY 390 (Riparian Herbaceous Buffer), and NY 391 (Riparian Forest Buffer).

**Watercourse:** Water flowing over a non-vegetated channel to a waterbody.

## Background continued ...

The risk of pollution to ground and surface water increases when livestock manure or other livestock byproducts are stored in one location. This risk is magnified if the storage is in an improperly-designed, constructed or managed facility. Properly-designed and constructed storage facilities can minimize risks associated with stored manure and manure applications. In addition, properly sized storage allows flexibility in land application to maximize crop utilization of nutrients and minimize applications at times of high surface runoff.

AEM Tier 2 Worksheet: Manure Management Table 1: Nutrient Management		Potential Concern																																
Factors Needing Assessment	Lower 1	2	3	Higher 4																														
How many animal units* do you have per acre of land to which manure is applied (see footnote below)?	<table border="0"> <tr> <td></td> <td style="text-align: center;"><u>Animal Units</u></td> </tr> <tr> <td><u>Rotation</u></td> <td style="text-align: center;"><u>per Acre</u></td> </tr> <tr> <td>Corn-Legume</td> <td style="text-align: center;">&lt;1</td> </tr> <tr> <td>Corn-Grass</td> <td style="text-align: center;">&lt;1.5</td> </tr> <tr> <td>Grass</td> <td style="text-align: center;">&lt;2.25</td> </tr> </table>		<u>Animal Units</u>	<u>Rotation</u>	<u>per Acre</u>	Corn-Legume	<1	Corn-Grass	<1.5	Grass	<2.25		<table border="0"> <tr> <td></td> <td style="text-align: center;"><u>Animal Units</u></td> </tr> <tr> <td><u>Rotation</u></td> <td style="text-align: center;"><u>per Acre</u></td> </tr> <tr> <td>Corn-Legume</td> <td style="text-align: center;">1 – 1.5</td> </tr> <tr> <td>Corn-Grass</td> <td style="text-align: center;">1.5 – 2.25</td> </tr> <tr> <td>Grass</td> <td style="text-align: center;">2.25 – 2.5</td> </tr> </table>		<u>Animal Units</u>	<u>Rotation</u>	<u>per Acre</u>	Corn-Legume	1 – 1.5	Corn-Grass	1.5 – 2.25	Grass	2.25 – 2.5	<table border="0"> <tr> <td></td> <td style="text-align: center;"><u>Animal Units</u></td> </tr> <tr> <td><u>Rotation</u></td> <td style="text-align: center;"><u>per Acre</u></td> </tr> <tr> <td>Corn-Legume</td> <td style="text-align: center;">&gt;1.5</td> </tr> <tr> <td>Corn-Grass</td> <td style="text-align: center;">&gt;2.25</td> </tr> <tr> <td>Grass</td> <td style="text-align: center;">&gt;2.5</td> </tr> </table>		<u>Animal Units</u>	<u>Rotation</u>	<u>per Acre</u>	Corn-Legume	>1.5	Corn-Grass	>2.25	Grass	>2.5
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Do you know the nutrient needs of your crops?	All fields are soil tested at least every 1 or 2 years.	All fields are soil tested at least every 3 years.	Fields are soil tested regularly, but less often than every 3 years	Soil testing is not done regularly on fields.																														
How is the need for sidedress nitrogen on your corn crop determined?	Pre-sidedress Nitrogen Testing (PSNT) of all corn fields receiving manure.	Pre-sidedress Nitrogen Testing (PSNT) of some corn fields receiving manure <b>OR</b> Other method used to determine available nitrogen (e.g. Cardimeter).		Pre-sidedress Nitrogen Testing (PSNT) is not utilized on fields receiving manure. <b>AND</b> Other method to determine available nitrogen is <u>not</u> used on corn fields receiving manure.																														
Do you keep records of manure applications to fields?	Records are kept indicating the number of loads applied, yields, rotations, and fertilizer applications for each field.	Records are kept indicating the number of loads applied, only.		No records are kept indicating the number of loads applied, yields, rotations, and fertilizer applications for each field.																														
<b>Notes:</b> * <b>Animal Units: The number of 1,000 lb. animals. Divide the total weight of animals by 1,000.</b> <b>Example: 120 animals X 1,400 lbs. per animal</b> <b>168,000 lbs. + 1,000 = 168 animal units</b>																																		

AEM Tier 2 Worksheet: Manure Management Table 1 Continued: Nutrient Management		Potential Concern		
Factors Needing Assessment	Lower 1	2	3	Higher 4
Do you calibrate fertilizer and manure application equipment?	All manure and fertilizer application equipment is calibrated regularly to determine the amount applied per acre.			Manure and fertilizer application equipment is not calibrated regularly to determine the amount applied per acre.
Is the nutrient content of the manure known and monitored?	There is a history of manure testing that characterizes variability throughout the year. <b>AND</b> Manure is tested every year.	Manure samples are tested at least every other year.		Manure samples are not tested for nutrients.
How is the rate of manure application determined? (Phosphorus and nitrogen are typically the primary nutrients of concern in surface and groundwater pollution, respectively.)	Manure is applied based on crop needs, with <u>phosphorus</u> as the priority nutrient. <b>AND</b> Commercial fertilizer applications are reduced or eliminated in order to account for nutrients in manure.	Manure is applied based on crop needs, with <u>nitrogen</u> as the priority nutrient. <b>AND</b> Commercial fertilizer applications are reduced or eliminated in order to account for nutrients in manure.	Manure is occasionally applied in rates that exceed the <u>nitrogen</u> needs of the crop. <b>OR</b> Commercial fertilizer applications only partially take into account nutrients in manure.	Manure is often applied at rates that exceed the <u>nitrogen</u> needs of the crop. <b>OR</b> Commercial fertilizer applications do not take into account nutrients in manure.
<b>Notes:</b> <b>1. Define your rotation by the majority of your farmed acres that receive manure.</b>  <b>2. Farms using Prescribed Intensive Grazing: When considering acreage on which manure is applied, an acre of pasture which is predominantly a high-yielding grass (orchard grass, reed canary grass, tall fescue, bromegrass) equals one crop acre. Where pastures consist of lower-yielding grasses (bluegrass, timothy, native grasses) and clovers, one acre of pasture equals ½ a crop acre.</b>				

AEM Tier 2 Worksheet: Manure Management Table 2: Field Application		Potential Concern		
Factors Needing Assessment	Lower 1	2	3	Higher 4
<p><b>Daily spreading of animal manure is practiced on many livestock farms in New York State. This method of waste management inherently poses a high level of potential risks. Manure nutrients, sediment, and pathogens can move from where they are applied and impact the environment and water quality.</b></p>				
<p><b>Are field runoff potentials considered in scheduling manure applications?</b> (Greatest potential for loss of manure from a field occurs when soils are fully saturated and have areas of concentrated flow.)</p>	<p>Manure is never spread when fields: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high <b>AND</b> Manure is applied during the growing season.</p>	<p>Manure is never spread when fields: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high <b>AND</b> Manure is applied during the growing season to those fields with the highest runoff potential and during the non-growing season to those fields with the lowest runoff potential.</p>	<p>Manure is sometimes spread on fields which: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high <b>AND</b> Manure is applied during the non-growing season to those fields with the lowest runoff potential.</p>	<p>Manure is sometimes spread on fields which: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high <b>AND</b> Fields are not prioritized based on runoff potential.</p>
<p><b>How close is manure spread to well heads or springs?</b></p>	<p>Manure is spread at least 200 feet from nearest well head or spring.</p>	<p>Manure is spread at least 100 feet from nearest well head or spring.</p>	<p>Manure is spread at least 50 feet from nearest well head or spring.</p>	<p>Manure is spread less than 50 feet from nearest well head or spring.</p>
<p><b>Are vegetative buffers maintained along watercourses in fields receiving manure</b></p>	<p>A vegetative buffer that meets NRCS Standards is maintained along water courses in fields receiving manure.</p>			<p>Little or no vegetation exists along watercourses in fields receiving manure.</p>

AEM Tier 2 Worksheet: Manure Management Table 3: Storage – Long-term and Temporary Manure Pile Areas		Potential Concern		
Factors Needing Assessment	Lower 1	2	3	Higher 4
How much manure storage capacity does your farm have (including temporary manure piles)?	Greater than 270 days.	Between 120 and 270 days.	Manure storage is less than 120 days. <b>AND</b> Temporary manure pile areas are designated for use when ground is frozen or saturated.	Manure is not stored. <b>AND</b> Temporary manure pile areas have not been identified.
What are the design and operating conditions of your long-term storage facility?	Designed, installed and operated to current engineering standards. Plans and test pit data are on file. <b>AND</b> No sign of leaks, cracks, or other structural problems. <b>AND</b> Emergency plan available for pit failure or spills.	Designed, installed and operated to current engineering standards in use at the time of construction. <b>AND</b> No sign of leaks, cracks or other structural problems.	Not designed according to any engineering standards. <b>AND</b> No sign of leaks, cracks or other structural problems. <b>AND</b> If earthen, installed on tight soils and with bedrock and normal water table more than 2 feet below bottom of storage unit.	Not designed according to any engineering standards <b>AND</b> Installed on permeable soils. <b>OR</b> If earthen, closer than 2 feet to normal water table or bedrock without an appropriate liner. <b>OR</b> Limited knowledge of soil conditions and depth to bedrock. <b>OR</b> Evidence of leaks, cracks or other structural problems.
Is your long-term storage adequately protected from outside water entry?	Storage has surface water diversions to prevent runoff from entering the storage, <b>AND</b> Perimeter drainage systems to prevent groundwater entry.			Little or no control exists over the amount of roof water, surface runoff water, or groundwater entering storage.

<b>AEM Tier 2 Worksheet: Manure Management Table 3 Continued: Storage – Long-term and Temporary Manure Pile Areas</b>		<b>Potential Concern</b>			
<b>Factors Needing Assessment</b>	<b>Lower 1</b>	<b>2</b>	<b>3</b>	<b>Higher 4</b>	
<b>If you utilize temporary manure pile areas, how are they designated and managed?</b>	<p>Earthen areas with medium or fine-textured soils are identified for manure pile areas.</p> <p style="text-align: center;"><b>AND</b></p> <p>Clean water is excluded from the manure pile area.</p> <p style="text-align: center;"><b>AND</b></p> <p>The manure pile area has at least a 300 foot flow path to a watercourse.</p> <p style="text-align: center;"><b>AND</b></p> <p>Manure pile areas are not located in a flood plain.</p> <p style="text-align: center;"><b>AND</b></p> <p>Manure pile is spread as soon as conditions are appropriate.</p>			<p>Earthen area with coarse-textured soils (sand, sandy loams) are identified for manure pile areas.</p> <p style="text-align: center;"><b>Or</b></p> <p>Clean water is not excluded from the manure pile area.</p> <p style="text-align: center;"><b>OR</b></p> <p>No runoff control grass filter area has been designed.</p> <p style="text-align: center;"><b>OR</b></p> <p>The manure pile areas are located less than a 300 foot flow path to a watercourse, where it frequently floods; or within a spring recharge area.</p> <p style="text-align: center;"><b>OR</b></p> <p>Manure pile is left unspread.</p>	
<b>How do you handle odor and its potential to generate complaints about your farm?</b>	<p>Neighbors recognize that your farming operation may emit odors at times.</p> <p style="text-align: center;"><b>AND</b></p> <p>Neighbors are informed and understand environmental reasons you store and spread manure.</p> <p style="text-align: center;"><b>AND</b></p> <p>Manure spreading is managed with odors as a consideration.</p>	<p>Neighbors have complained about your farm odors.</p> <p style="text-align: center;"><b>AND</b></p> <p>You have addressed their concerns.</p> <p style="text-align: center;"><b>AND</b></p> <p>Manure spreading is managed with odors as a consideration.</p>	<p>Neighbors have not complained about your farm odors.</p> <p style="text-align: center;"><b>AND</b></p> <p>You feel your neighbors will come to you if they have concern of complaint.</p> <p style="text-align: center;"><b>AND</b></p> <p>Manure spreading is managed with odors as a consideration.</p>	<p>Neighbors have complained about your farm odors,</p> <p style="text-align: center;"><b>AND</b></p> <p>You have not addressed their concerns.</p> <p style="text-align: center;"><b>OR</b></p> <p>Odors are not a consideration when spreading manure.</p>	

## **Other**

1. What is the approximate distance from the storage unloading facility to the nearest surface waterbody?
2. What is the approximate distance from and relative location of the storage facility to water wells or springs?
3. Is the manure storage located in a floodplain?
4. Are your wells or springs high in nitrates?
5. Does your manure storage unit accommodate silage juice and milking center waste?
6. Does human waste enter the manure storage unit?
7. Does the storage unit have a staff gauge?
8. How much freeboard remains right before storage is emptied?
9. Do you have access problems to your manure storage facility?
10. Do you have two valves for gravity outlet system and for pumped inlet system?
11. Do valves leak?
12. Is manure incorporated into the soil during or shortly after application?
13. Do vegetative buffers along streams and watercourses receive concentrated flows?
14. Is manure applied to legume crops? If so, how is the rate determined?

## **Additional Comments:**