



# AEM Tier 2 Worksheet

## Soil Management

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### Glossary

**Comprehensive Nutrient Management Plan (CNMP):** A grouping of conservation practices and management activities that when implemented as part of a conservation management system, will help to ensure that both production and natural resource protection goals are achieved. It addresses natural resource concerns on livestock farms from farmstead, production areas, and fields; including soil erosion, manure, and organic by-products (and their potential impacts on water quality).

**Cover Crop:** Crops, including grass, legumes and other species, grown for seasonal cover and other conservation purposes.

**Crop Residue:** Plant material left on the soil surface after harvest. High crop residue crops include hay, small grains, soybeans, and grain corn. Low crop residue crops include corn for silage and most vegetable crops.

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### Background

Soil health indicates the capacity of a soil to function, which has a direct impact on crop production and an indirect impact on water quality. Healthy soils are able to infiltrate water, cycle nutrients, suppress pests and weeds, and produce high yields. Unhealthy soils have fewer of these qualities or require costly inputs to achieve crop yield potentials. Unhealthy soils are also less stable, more likely to erode and have a higher potential for runoff during storm events. This means, less available water for plant growth.

Preventing erosion and enhancing soil quality should be a priority on every farm. It makes good economic and environmental sense. A systems approach to soil conservation provides multiple barriers against soil erosion and water quality degradation. Crop rotations, strip cropping, conservation tillage, and cover crops help protect soil from erosion by wind and water and help maintain or increase soil organic matter. Soil organic matter improves soil tilth, reduces susceptibility to compaction, increases nutrient and water holding capacity, slows the movement of pesticides through the soil, and can protect against erosion. Diversions, waterways, water and sediment control basins, and terraces capture and provide stable flow paths and outlets for runoff. Vegetative filter strips and riparian buffers capture sediments and the nutrients and pesticides attached to them, before they reach watercourses.

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### AEM Principle:

Good soil health improves soil functioning leading to improved crop production and reduced off-site impacts from erosion and runoff.

## Glossary Continued...

**Ephemeral Erosion:** Small rills that concentrate into a defined channel, which are often removed by tillage operations, but may reform each year.

**Full-width Tillage:** A tillage system that disturbs 100% of the soil surface.

**Gully Erosion:** Gullies are channels too deep for normal tillage operations to erase. They may grow or enlarge from year to year by head-cutting and lateral widening. Gullies usually occur in depressions and natural drainage ways.

**Highly Erodible Land (HEL):** Fields defined as highly erodible by the Food Security Act of 1985.

**Mulch Tillage:** A non-inversion, full-width tillage system that maximizes soil residue levels.

**No-till/Strip-till:** A one or two pass tillage system that disturbs less than 40% of the soil surface.

**Sheet and Rill Erosion:** Sheet erosion is the process by which transportation of soil particles begins. Rill erosion occurs as runoff begins to form small concentrated channels, generally less than 4 inches deep, that appear at different locations on the landscape from year to year. Deposition of sediment usually occurs at the end of a rill.

**Whole Farm Plan:** A grouping of conservation practices and management activities which, when implemented as part of a conservation management system, will help ensure that both production and natural resource protection goals are achieved. It addresses all natural resource concerns, including soil, water, air, plants, animals, and human considerations.

Effective management of soil resources on a farm is a key component to the profitability of the enterprise and the impact the operation has on the environment. Soil erosion can carry sediments, nutrients and pesticides to surface water bodies, degrading water quality. At the same time, soil erosion removes organic matter, nutrients, and topsoil, decreasing soil fertility, tilth, water holding capacity, and other beneficial soil characteristics. In turn, this causes reduced crop growth and inefficient use of crop inputs. Sediment from erosion fills drainage ditches, road ditches, culverts, stream channels, and shortens the life of lakes, reservoirs, and ponds. Excessive tillage, weight and traffic can increase runoff potentials by compacting soil. Protecting soil from compaction can enhance water availability to crops and root growth, resulting in increased yields and less runoff.

AEM Tier 2 Worksheet: Soil Management		Potential Concern		
Factors Needing Assessment:	Lower 1	2	3	Higher 4
Is there a current conservation plan in place that addresses soil management?	There is a Whole Farm Plan or Comprehensive Nutrient Management Plan in place <b>AND</b> The plan is up to date and being followed.		Highly Erodible Land (HEL) fields have a plan <b>AND</b> The plan is being followed <b>AND</b> Non-HEL fields have not been assessed.	There is no plan in place to address erosion <b>OR</b> Plan is not being followed <b>OR</b> Plan is out of date.
If there is a plan, when was it last updated?				
Is there visible erosion occurring in any fields?	Sheet and rill erosion appear to be under control. <b>AND</b> There is no evidence of ephemeral or gully erosion occurring on the farm and/or evidence of soil deposition.		Minor amounts of sheet and rill erosion are visible.	There is evidence of both ephemeral and gully erosion.
Does sediment from crop fields reach a water course?	Fields have at least a 35 ft. buffer, <b>AND</b> Upland erosion is controlled.		Fields have less than a 35 ft. buffer, <b>AND</b> Fields slope towards the water course.	Sediment is entering the watercourse.
List fields with erosion concerns:				

AEM Tier 2 Worksheet: Soil Management		Potential Concern			
Factors Needing Assessment:	<b>Lower</b> <b>1</b>	<b>2</b>	<b>3</b>	<b>Higher</b> <b>4</b>	
<b>What type of tillage practice(s) is used on the farm?</b>	Only continuous no-till or strip till is used, with the exception of periodic incorporation of soil amendments.	A mulch tillage system is used, <b>OR</b> Mulch tillage in combination with no-till.		Full width tillage with little to no crop residue at planting.	
<b>How is crop rotation used on your farm?</b>	Crop rotation is used and includes rotations of at least 3 years of hay crops, small grains and/or legumes.	Crop rotation is used and includes rotations of at least 1 or 2 years of hay crops, small grains and/or legumes.	Crop rotations are used but do not always include hay, small grains, or legumes.	Crops are not rotated.	
<b>What is the minimum level of crop residue cover during the rotation?</b>	A crop residue of 50% or greater is left after planting.	A crop residue of 30% to 50% is left after planting.	A crop residue of 10% to 30% or greater is left after planting.	A crop residue of less than 10% is left after harvest.	
<b>How are cover crops managed on an average year?</b>	Proper cover crop rates and timing are used, <b>AND</b> Seeding includes a diverse mix, including legumes.	Proper cover crop rates and timing are used, <b>AND</b> A single species seeding is used.	Cover crops are used when time and weather permits.	Cover crops are not used.	

<b>AEM Tier 2 Worksheet: Soil Management</b>		Potential Concern		
<b>Factors Needing Assessment:</b>	<b>Lower 1</b>	<b>2</b>	<b>3</b>	<b>Higher 4</b>
<b>How does your farm manage soil organic matter?</b>	Manure and/or compost are added regularly, <p style="text-align: center;"><b>AND</b></p> Crop rotations include high residue and/or perennial crops <p style="text-align: center;"><b>AND</b></p> Cover crops are used regularly, <p style="text-align: center;"><b>AND</b></p> Reduced tillage practices are used to increase soil organic matter.	Two (2) or three (3) of the practices listed under #1 are part of the farms' management practices.	Only one (1) of the practices listed under #1 are part of the farms' management practices.	Soil organic matter is not a consideration in the farms management.
<b>Are there existing soil and/or water control practices in place in the farm fields (e.g. diversions, WASCOB, waterways, terraces, strip cropping, and buffers)? If yes, complete table on page 7.</b>				
<b>Are there subsurface drainage concerns on the farm?</b>				
<b>Are the location and/or stability of any water control outlet, surface or subsurface, a concern?</b>				
<b>Are you satisfied with crop yields on an average year?</b>				

<b>AEM Tier 2 Worksheet: Soil Management</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>How is soil compaction managed on the farm?</b>	Traffic on wet soil is avoided, <b>AND</b> Traffic on fields is controlled, <b>AND</b> Equipment loads are reduced to minimize weight, <b>AND</b> Tillage and crops are selected to manage compaction.	Two (2) or three (3) of the practices listed under #1 are part of the farms' management practices.	Only one (1) of the practices listed under #1 are part of the farms' management practices.	Soil compaction is not actively managed.	
<b>Do you know the level of soil organic matter content in farm fields?</b>					
<b>Has the Cornell Soil Health Test been used to manage soils?</b> <b>If no, would the farm be interested in more information?</b>					
<b>Is wind erosion a concern on the farm?</b>					
<b>Does erosion occur from irrigation runoff?</b> <b>(Farms that answer yes should complete the irrigation water management worksheet)</b>					

**Existing Soil and/or Water Control Practices in Place in Farm Fields**

Practice	Location (field # or name)	When was it installed?	Is it still functioning?

Benefits to other resources can also be possible while working toward improved water quality. Taking stock of how existing and future management affect **soil, water, air, plants, animals, energy, greenhouse gases, people, and economics** can result in more effective plans and additional benefits to farms and communities both now and into the future.

**Additional Comments:**