



# AEM Tier II Worksheets

## Irrigation Water Management

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### Glossary

**Backflow:** the ability of water to gravity flow or siphon back into a well or other source.

**Down Slope:** at a lower topographic elevation than the source.

**Legal Requirements (for backflow prevention):** for irrigation systems using a municipal water supply, installation of backflow prevention devices must meet the standards set by local law.

**Source Water:** a reservoir of water such as an aquifer, surface water body or municipal water.

**Tailwater:** water applied at a rate that exceeds the soil's infiltration rate and begins to run off.

**Up Slope:** at a higher elevation than the source.

**Water Holding Capacity:** the maximum amount of water the soil can hold that is available for plant uptake.

### *Background*

Irrigation Water Management is a planned system that determines and controls the rate, amount, placement and timing of water application. Irrigation can be an important management tool, particularly in areas with sandy or gravelly soils, and soils with limited water-holding capacity. The availability of water plays a crucial role in crop quality and quantity.

The development of an "Irrigation Water Management Plan" that addresses the irrigation scheduling, in both timing and amount, control of runoff, minimizing deep percolation and the uniform application of water is an essential component of this practice. The use of flood irrigation is not a valid practice in an Irrigation Water Management Plan.

Irrigation water management is utilized on cropland to supplement rainfall, and to apply fertilizer and pesticides to target crops. Several irrigation methods exist. Selection of the irrigation system to be used is based on the needs of the crop to be grown, soil type, topography, climate, distance to streams or other water bodies, and the source of water to be used for irrigation. To decrease non-point source pollution of surface and groundwater resources, water application must be at rates that minimize the transport of sediments, nutrients and chemicals to surface waters and that minimize the transport of nutrients and chemicals to groundwater.

Effective use of irrigation water can promote a desired crop response, minimize soil erosion, reduce the leaching of plant nutrients and pesticides and protect surface and groundwater quality. Irrigation water should be applied efficiently, at the proper time and application rate, and the amount of water applied should be based upon crop needs and the soil's moisture holding capacity.

**Agricultural Water Quality Principle:** Reduce surface water runoff and/or leaching of nutrients and pesticides by applying irrigation water based upon the capacity of the soil to hold water and the needs of the crop. Irrigation water should be applied so that the amount, rate, timing and method of application promote the desired crop response while conserving water and protecting water quality.

## AEM for Irrigation Water Management

Factors Needing Assessment	Lower Risk.....1	2	3	Higher Risk.....4
<b>What is the present level of source water protection?</b>	Source water is at least 100 ft. up gradient from farm activities OR a municipal water supply is used	Source water is at least 100ft from farm activities <b>OR</b> Agricultural chemicals or petroleum products adjacent to water source are protected for spill containment.	Source water is down slope of farming activities <b>AND</b> Agricultural chemicals or petroleum products adjacent to water source are protected for spill containment.	Source water is down slope of farming activities <b>AND</b> Agricultural chemicals or petroleum products are used/stored adjacent to well or surface water.
<b>What is the present level of backflow prevention?</b>	Backflow installation meets legal requirements and protects municipal water supply, well-water, and non-crop water supplies OR irrigation water is not mixed with fertilizers or chemicals.	Backflow installation meets legal requirements	A Check Valve is used	No backflow protection equipment installed
<b>Does irrigation result in excess off-site water movement and runoff?</b>	Irrigation practices result in no runoff (i.e. drip irrigation, if applicable). Application rate of irrigation device is lower than soil infiltration rate.	Conservation practices are in place to minimize runoff (e.g. perennial cover crops, subsoiling, buffer/filter strips, diversions, and grass waterways)..	Irrigation practices result in no runoff BUT runoff and erosion occurs during high rainfall events. <b>AND/OR</b> Conservation practices need improvement.	Runoff occurs when irrigating and/or during rainfall events. Application rate of irrigation device exceeds soil infiltration rate.

<b>What type of distribution system do you use?</b>	Micro or low volume emitters are used and operated at the correct pressure.	Rotary impact heads with new or matching nozzles <b>OR</b> Center pivot or boom with low flow sprinklers	Rotary impact heads with worn or different nozzles <b>OR</b> big gun; and not operated at the specified pressure	Rotary impact heads with worn or different nozzles <b>OR</b> big gun; and not operated at the specified pressure  <b>AND</b> Portable pipe joint seals are leaking
<b>Are monitoring devices used to determine the need to irrigate?</b>	Soil moisture monitoring devices (e.g. neutron gauge, tensiometer or gypsum blocks) are installed and used to track soil moisture depletion.	Soil moisture monitoring is done by bucket auger (judging by feel). <b>AND</b> Weather data is recorded and seasonal rainfall amounts are considered when deciding when to irrigate and how much water to apply.	Weather data is recorded and daily rainfall amounts are considered when deciding when to irrigate and how much water to apply.	An irrigation schedule is maintained regardless of soil moisture or weather conditions; and no rain sensor override on automated timers.
<b>Do you check for distribution uniformity?</b>	System is checked throughout the growing season by measuring emitter outflows and/ or pressure differential in each zone.	System is checked at the beginning of each growing season by measuring emitter outflows and/or pressure differential in each zone.	Distribution uniformity is tested irregularly by measuring emitter outflows and/or pressure differential in each zone.	Distribution uniformity is never checked.

<b>Is a flow meter installed?</b>	Flow meter is installed and used to monitor application rates throughout the season.		Flow meter is installed but not regularly used to monitor the system OR flow meter is installed but not working correctly OR proper application rate reference amount for system is not known.	Flow meter is not installed.
<b>How is the amount of water applied determined for each irrigation?</b>	Water is applied according to the water holding capacity of the soil, soil moisture measurement, crop demand and weather conditions at that time. <i>AND</i> Application time is calculated according to the application rate of the system and the measured depletion in the root zone.	Water is applied according to the water holding capacity of the soil, crop demand and weather conditions at that time. Soil moisture is not measured. <i>AND</i> Application time is calculated according to the application rate of the system.	Irrigation water is applied for a pre-determined time period when conditions are dry.	Irrigation water is applied without regard to weather conditions, or water holding capacity of the soil <i>AND</i> Tailwater (runoff) flows from the field.
<b>What level of system maintenance is applied?</b>	System is routinely inspected for operating pressure AND leaks are repaired as soon as noticed.	System is routinely inspected for operating pressure AND leaks are repaired within the season.	Operating pressure is occasionally checked AND leaks are repaired at the beginning of the season.	System is not inspected and only major repairs are performed.

<p><b>Is routine maintenance performed on the drip irrigation system?</b></p>	<p>Water filters are inspected and cleaned whenever pressure differences indicate and irrigation lines are flushed at the beginning and end of each season. Flush water is contained and treated.</p> <p style="text-align: center;"><i>AND</i></p> <p>Chemical treatment of the water is completed if tests show a problem (e.g. to prevent precipitate buildup and kill algae or bacteria present in the system).</p>	<p>Water filters are inspected and cleaned whenever pressure differences indicate and irrigation lines are flushed at the beginning of the irrigation season each year.</p>		<p>Water filters and irrigation lines cleaned only when clogged and rinsate is discharged to water source or downstream.</p>
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**Comments:**

1. Is your pump engine and fuel storage in a sensitive area?
2. Are irrigation ponds treated for algae and/or weed control?
3. What is the source of your irrigation water? Is it tested?

**NOTE: You must also complete Farmstead Water Supply Worksheet.**