

## *Stream & Drainageway Management*

### WHY BE CONCERNED?

Water is one of our most important resources. In the past, it was advantageous to have a water source close to the farmstead. Today, numerous farms have a stream or drainageway cutting through heavily used pastures, exercise lots, or barnyards. As more livestock are concentrated on an area, the potential increases for sediment, bacteria, nitrogen, and phosphorus to run off into these streams. However, if managed properly, on-farm streams can be useful for livestock watering and valuable for fish and wildlife habitat.

Good management methods protect streams from soil erosion and water contamination. Stable, well-vegetated streambanks and buffer strips reduce the amount of sediment and nutrients leaving the farm and entering the water. Forested stream buffer strips stabilize banks, lower stream temperatures, and provide insects and litter for aquatic life.

Good management also discourages livestock from spending time in the water. Herd health may be improved if livestock wastes do not enter streams. Fortunately, good stream management often involves inexpensive actions.

**The goal of Pennsylvania Farm•A•Syst is to help you protect groundwater and surface water, shared resources that are important to everyone.**

### HOW TO RANK GROUNDWATER AND SURFACE WATER PROTECTION USING THIS WORKSHEET

- You can select from a wide range of conditions and management practices that are related to potential surface water and groundwater contamination.
- You can rank the conditions and management practices on your operation according to how they might affect surface water or groundwater.
- Based on your overall ratings, you can determine which of your conditions or practices are reasonably safe and effective, and which might require modification to better protect surface water and groundwater.

### HOW TO COMPLETE THE WORKSHEET

Follow the directions as listed on the next page. The evaluation should take 15 to 30 minutes for each evaluation site to complete and determine your ranking. Evaluate each stream or drainageway on your farm. There are spaces provided to rank up to three sites. If you are unfamiliar with any of the terms used, refer to the glossary provided with this worksheet.

Information derived from Farm•A•Syst worksheet is intended only to provide general information and recommendations to farmers regarding their own farmstead practices. It is not the intent of this educational program to keep records of individual results. However, they may be shared with others who will help you develop a resource management plan.

## WORKSHEET #6: STREAM AND DRAINAGEWAY MANAGEMENT

Use a pencil, in case you want to change an answer later. For each feature listed on the left that applies to your farm, read across to the right and circle the statement that most closely describes conditions on your farm. Skip and leave blank any features that don't apply to your farm. Then look at the descrip-

tion you circled to find your "rank number" (4, 3, 2, 1) and enter that number in the blank under "rank." Allow 15 to 30 minutes to complete the worksheet for each evaluation site and to determine the level of surface and groundwater protection you are providing.

### STREAMS AND DRAINAGEWAY MANAGEMENT

	4 Best	3 Good	2 Fair	1 Poor	RANK (up to 3 sites)
<b>STREAMS AND DRAINAGEWAYS</b>					<b>Site Identification</b>
					<b>#1 #2 #3</b>
<b>1. Surface water entry</b>	No bank damage from water entry. Berms direct water to erosion protection structures.	Washouts protected by drop structures. No berms to direct water.	Bank damage caused by entry of surface water. Protection at entry points not adequate to prevent damage.	Severe bank damage due to entry of surface water.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>2. Buffer strips</b>	More than 50 feet of any type of permanent vegetative buffer strip in place.	10 to 50 feet of any type of permanent vegetative buffer strip.	Less than 10 feet of any type of permanent vegetative buffer strip in place.	No permanent vegetative buffer strip in place.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>3. Drainpipe outlets*</b>	No erosion around tile outlets. Pipes do not outlet directly into streams, but into vegetated swale or grassy area.	Some erosion of tile outlets. Minimum number of outlets (e.g., main pipe collects water from several lateral lines).	Soil is eroding around outlets. Minimum number of outlets, but aren't protected.	Soil is eroding around the outlets and/or in the stream bed. Numerous outlets are not protected.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>4. Inspection and maintenance</b>	Inspected after major storm events for signs of damage: — condition of banks — drainpipe outlets — quality of water discharged to stream — stability of surface water discharge points	Streams or drainageways are inspected in the spring and fall each year for signs of erosion.	Streams or drainageways inspected once per year.	Never inspected.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>5. Stream bank conditions</b>	No evidence of erosion. Bank is covered with grass or woody vegetation.	Most of bank is covered with vegetation.	Banks are slumping at a few spots. Some vertical banks, some erosion occurring.	Mostly vertical banks, no vegetation, and severe erosion.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>6. Livestock access*</b>	Livestock do not have access to the stream or drainageway.	Livestock have access to the stream or drainageway only at properly designed stream crossing sites.	Livestock have access to a portion of the stream or drainageway.	Livestock have access to entire stream or drainageway throughout the grazing season.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

	4 Best	3 Good	2 Fair	1 Poor	RANK (up to 3 sites)
<b>AQUATIC AND WILDLIFE HABITAT</b>					<b>Site Identification</b>
					<b>#1 #2 #3</b>
<b>7. Stream bottom</b>	Clean bottom; less than 25% of stream bottom covered by silt; with exposed gravel, stones, or rocks.	25 to 50% of bottom covered by silt.	50 to 75% of bottom covered by silt.	Over 75% of stream bottom covered by silt, little or no exposed gravel, stones, or rocks.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>8. In-stream fish cover</b>	Abundant cover and variety, including: woody debris, boulders, overhanging vegetation, or undercut banks.	Occasional boulders and deeper pools, some woody debris and overhanging vegetation.	Fish cover is sparse; limited variety of habitat.	No fish cover, no variety to stream bottom.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>9. Shading by streamside vegetation</b>	More than 75% shaded.	50 to 75% shaded.	25 to 50% shaded.	Less than 25% shaded.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>10. Extent of streamside vegetation</b>	Tree, shrub, and grass vegetation protecting streamside.	Tree, shrub, and grass vegetation protecting some streamside areas.	Sparse streamside vegetation and/or heavily grazed.	No streamside vegetation.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>11. Obnoxious weeds</b>	Obnoxious weeds are not present.	Obnoxious weeds are present in very rare, small patches.	Obnoxious weeds are present in various small patches along the stream bank, making up 10 to 20% of the vegetation.	Obnoxious weeds are present on at least a quarter of the stream bank, and they are increasing their cover.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>12. Stream channel alteration*</b>	No alteration or dredging.	————	Slight alteration.	More than 50% of channel length has been changed or dredged.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

\* Please note that drainpipe outlets, constructed cattle crossings, and channel alterations require Title 25 PA Code Chapter 105 (Dam Safety and Waterway Management) permits. Check with the USDA Natural Resources Conservation Service, your local Conservation District, or PA Department of Environmental Protection (DEP) for more information.

Site Identification #1. \_\_\_\_\_

#2. \_\_\_\_\_

#3. \_\_\_\_\_

**TOTAL**

Use this total to calculate overall performance ranking.

## HOW TO USE THESE RANKINGS

- Step 1.** Now that each feature has been ranked, add all these rankings together and put that value in the “Total” box at the end of the worksheet. Transfer that number to the box below.
- Step 2.** Divide the value in the “Total” box by the number of features ranked.
- Step 3.** Repeat for the remaining sites. Calculate the average ranking for all sites combined.

_____	divided by	_____	equals	_____
(total of rankings)		(# of features ranked)		(average ranking)*
*carry your answer out to one decimal place				

- Step 4.** Evaluate the overall management practices and site conditions.
- 3.6-4.0 = best management  
2.6-3.5 = good management  
1.6-2.5 = fair management  
1.0-1.5 = poor management
- This ranking gives an idea of how stream and drainage conditions and management practices **as a whole** might affect both surface water and groundwater quality. This ranking should serve only as a **very general guide, not a precise diagnosis**. Since it

represents an **averaging** of many individual rankings, it can mask any individual rankings (such as 1’s and 2’s) that should be of concern.

- Step 5.** Look over the rankings for individual features of **each** site:

**Best** (4’s): the current ideal

**Good** (3’s): provides reasonable surface water and groundwater protection

**Fair** (2’s): inadequate protection in many circumstances

**Poor** (1’s): poses a high risk of polluting surface water or groundwater

***Regardless of the overall ranking, any individual rankings of “1” should receive immediate attention. Some concerns can be taken care of right away; others could be major or costly projects, requiring planning and prioritizing before taking action.***

- Step 6.** Consider how to modify farm management practices or site conditions to better protect water quality. For more information, contact the **local conservation district, Penn State Cooperative Extension office, or the USDA Natural Resources Conservation Service** for ideas, suggestions, or guidance.

## GLOSSARY

- Berm:** An elevated strip of vegetated land next to a stream that helps to reduce erosion by directing surface water to a safe outlet, such as a surface water entry structure.
- Buffer strip:** A permanent strip of vegetation along the side of a watercourse. It helps reduce soil erosion and water pollution. Trees can provide extra water quality benefits such as shade, leaf litter and woody debris. A 4:1 ratio of forest buffer to grass buffer width generally provides the greatest benefits.
- Channel:** The pathway of a stream through which water flows.
- Channel alteration:** Changing the flow path of a stream.
- Drainageway:** Waterway, generally vegetated, that carries runoff or shallow surface water.
- Drop structure:** A structure to control erosion by directing water from a high level to a lower level. May include rock chute spillways or drop pipe inlets.
- Groundwater:** Water beneath the earth’s surface that supplies wells, springs, and base flow in streams.
- Obnoxious weeds:** Weed plants that are undesirable because of their appearance, invasive nature, or seed-spreading capabilities, including noxious weeds that are illegal to propagate, sell, or transport in Pennsylvania.

**Slumping:** A downward movement of the slope of the streambank leaving an exposed soil surface behind.

**Stream:** A natural watercourse that carries water for all or part of the year.

**Stream crossing:** A structure for livestock and machinery to cross a stream. It is constructed at the bottom of the stream and has an erosion resistant surface. All water flows over the structure, and livestock and machinery must cross through the water.

**Surface water:** Water at the earth’s surface, such as ponds, lakes, streams, creeks, etc.

**Surface water entry structure:** A structure to control erosion by conveying concentrated flows of surface water from the top of the streambank to the watercourse. May include rock chute spillways, drop pipe inlets, or grade control structures.

**Tile outlet protection:** The use of an erosion-resistant material, such as rock riprap, on top of a filter cloth, to protect the streambank area where water exits a tile drain.

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## ACKNOWLEDGMENTS

The Pennsylvania Farm•A•Syst package contains the following materials:

- Farm Evaluation System
- Introduction
- Preliminary Screening Quiz
- Farmstead Map
- Overall Farmstead Ranking
- A Sample Post-Evaluation Survey
- Program Packet Folder
- Worksheet #1—Water Well Condition and Construction
- Worksheet #2—Pesticide and Fertilizer Storage and Handling
- Worksheet #3—Household Wastewater Treatment System
- Worksheet #4—Barnyard Conditions and Management
- Worksheet #5—Milkhouse Wastewater Management
- Worksheet #6—Stream and Drainageway Management
- Worksheet #7—Petroleum Storage and Handling
- Worksheet #8—Silage Storage Management
- Worksheet #9—Animal Waste Storage and Management
- Worksheet #10—Wasteland Application Management
- Worksheet #11—Soil Conservation Management

Material for the Pennsylvania Farm•A•Syst package was developed by revising Farm•A•Syst material from the University of Wisconsin Cooperative Extension Service, University of Minnesota Extension Service, and the National Farmstead Assessment System Program. The format and style for the Pennsylvania package was based on the Ontario Environmental Farm Plan published by Ontario Farm Environmental Coalition, Ontario, Canada.

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