PENNSYLVANIA
Farm•A•Syst
FARM EVALUATION SYSTEM

WORKSHEET 6

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 cows 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 which are important to everyone.

HOW TO RANK GROUNDWATER AND SURFACE WATER PROTECTION USING THIS WORKSHEET

- You can select from a wide range of stream and drainageway conditions and management practices that are related to potential groundwater or surface water contamination.
- You can rank your conditions and management practices according to how they might affect the water quality of the stream or drainageway running through your property.
- 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 stream water.

HOW TO COMPLETE THE WORKSHEET

Follow the directions listed on page 2 of the worksheet. It should take 15 to 30 minutes to complete the evaluation and determine your ranking. Evaluate each stream or drainageway on your farmstead. Space is provided to rank up to three sites on your farmstead. If you have more than three sites, please use another worksheet. If you are unfamiliar with any of the terms used, refer to the glossary provided with this worksheet.

Information derived from Pennsylvania Farm•A•Syst worksheets 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.

Pennsylvania Farm•A•Syst is a cooperative effort among Penn State Cooperative Extension, Pennsylvania Association of Conservation Districts, Pennsylvania Department of Agriculture, Pennsylvania Department of Environmental Protection, and USDA Natural Resources Conservation Service.

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 farmstead, read across to the right and circle the statement that most closely describes your situation. Leave blank any features that don't apply to your farmstead. Find the corresponding "rank number" (4,3,2,1) for each description you circled and enter that number in the blank under "your rank". If the conditions and practices in any one description do not match your situation exactly, use an in-between score of one-half unit; for example, 2.5 or 3.5. Directions on overall scoring appear at the end of the worksheet. Allow 15 to 30 minutes to complete the worksheet and to determine level of protection you are providing for streams or drainageways which run through your property.

STREAM AND DRAINAGEWAY MANAGEMENT

	4 Best	3 Good	2 Fair	1 Poor	RANK (up to 3 sites) Site Identification #1 #2 #3
STREAMS AND DRAINAGEWAYS					
1. Frequency of stream or drainageway flow	Rarely flows.	Flows less than 6 months per year; frequently dry.	Flows more than 6 months per year; occasionally dry.	Flows year-round.	☐ ☐ ☐
2. Entry of surface water	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.	☐ ☐ ☐
3. Buffer strips	More than 50 feet of permanent vegetation.	10-50 feet of any type of permanent vegetation (includes managed or maintained area).	1-10 feet of any type of permanent vegetation.	No buffer area. Animal access to stream or muddy conditions down to stream.	☐ ☐ ☐
4. Drainpipe outlets [a]	No erosion around tile outlets. Pipes do not discharge 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.	☐ ☐ ☐
5. Inspection and maintenance	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.	Rarely or never inspected.	☐ ☐ ☐

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

Site Identification #1. _____

#2. _____

#3. _____

	4 Best	3 Good	2 Fair	1 Poor	RANK (up to 3 wells)
STREAMS AND DRAINAGEWAYS (continued)					**Site Identification** **#1 #2 #3**
6. Streambank conditions	No evidence of erosion. Bank is covered with grass or forest vegetation.	Banks are slumping in a few spots. Most of bank is covered with vegetation.	Some vertical banks, some erosion occurring.	Mostly vertical banks, no vegetation, and severe erosion.	☐ ☐ ☐
7. Livestock access to stream or drainageway[a]	Livestock do not have access.	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.	☐ ☐ ☐
AQUATIC AND WILDLIFE HABITAT					
8. Stream bottom	Clean bottom; less than 25% of stream bottom covered by silt; with exposed gravel, stones, or rocks.	25-50% of bottom covered by silt.	50-75% of bottom covered by silt.	Over 75% of stream bottom covered by silt, little or no exposed gravel, stones, or rocks.	☐ ☐ ☐
9. In-stream fish cover	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.	☐ ☐ ☐
10. Shading by overstory vegetation	More than 75% shaded.	50-75% shaded.	25-50% shaded.	Less than 25% shaded.	☐ ☐ ☐
11. Type of vegetation	Forested, with vegetation protecting ground.	Shrubs and grasses.	Sparse vegetation and/or heavily grazed.	No vegetation.	☐ ☐ ☐
12. Channel alteration[a]	No alteration or dredging.	————————	Slight alteration.	More than 50% of channel length has been changed or dredged.	☐ ☐ ☐

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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 each additional site. 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 indicates how stream and drainageway conditions and management practices as a whole might affect surface-water quality. This ranking should serve only as a general guide, not a precise diagnosis. Since it represents an average 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): best management according to current guidelines

Good (3's): provides reasonable surface water protection

Fair (2's): inadequate protection in many situations

Poor (1's): poses a high risk of polluting surface water

Regardless of the overall ranking, any individual rankings of "1" should receive immediate attention. Some problems can be taken care of right away; others could be major or costly projects, requiring careful planning before action is taken.

Step 6. Consider how farmstead management practices or site conditions could be modified to better protect groundwater and surface water. For more information, contact the local Conservation District, Penn State Cooperative Extension office, or the USDA Natural Resources Conservation Service.

GLOSSARY

Berm: An elevated strip of vegetated land next to a ditch or 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 at least 10 feet wide along the side of a watercourse that helps reduce soil erosion and water pollution. Trees can provide extra water quality benefits. 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 that controls 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 and springs.

Slumping: A downward movement of the slope of the stream or ditch bank that leaves 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 or ditch 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, or ditches.

Surface water entry structure: A structure that controls 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 stream or ditch bank area where water exits a tile drain.

ACKNOWLEDGMENTS

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

- Introduction
- Farmstead Map
- Preliminary Screening Quiz
- 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
- Overall Farmstead Ranking

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.

Partial funding for the development of the Pennsylvania Farm•A•Syst package was provided by the Pennsylvania Association of Conservation Districts through the Chesapeake Bay Program from the U.S. Environmental Protection Agency and the Pennsylvania Department of Environmental Protection.

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Development of this publication was supported in part by the Extension Service, U.S. Department of Agriculture, under Special Project No. 91-EHUA-1-0061.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Cooperative Extension is implied.

Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

Issued in furtherance of Cooperative Extension Work, Acts of Congress May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and the Pennsylvania Legislature. T. R. Alter, Interim Director of Cooperative Extension, The Pennsylvania State University.

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