

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WASTEWATER TREATMENT STRIP

(Ac.)
CODE 635

DEFINITION

A treatment component of an agricultural waste management system consisting of a strip or area of herbaceous vegetation.

PURPOSES

The purpose of this practice is to improve water quality by reducing loading of nutrients, organics, pathogens, and other contaminants associated with animal manure and other wastes, and wastewater by treating agricultural wastewater and runoff from livestock holding areas with:

- Filter Strip
- Filter Area

CONDITIONS WHERE PRACTICES APPLY

- In areas requiring filter strips as part of Comprehensive Nutrient Management Plan (CNMP) to treat polluted runoff or wastewater.
- Where less than 300-1000 lb. Animal Units are confined.
- Where filter area is required for renovation of supernatants from settling basins, lagoons, or other waste holding facilities, which are capable of storing, as a minimum, runoff from a 1-year, 24-hr. storm event.

CRITERIA

Criteria applicable to all purposes

Where filter strips are used in treating wastewater or polluted runoff from concentrated livestock areas, the following must be considered:

Adequate soil drainage to insure satisfactory performance must be present.

Provisions for preventing continuous or daily discharge of liquid waste into the filter strip must be part of the waste storage and transfer systems.

Sufficient rest periods to maintain an aerobic soil profile in the strip must be included in the design. Storage or alternating filter strips may be desirable.

An adequate filter area and length of flow must be provided for the desired reduction of pollutants. A serpentine or switchback channel can be used to provide greater length of flow.

Provisions for excluding roof water and unpolluted surface runoff must be included as part of the CNMP.

Provisions for mowing and removing vegetation to maintain the effectiveness of the filter area must be included in the plans and specifications.

The filter strip design is to distribute flow uniformly across the top of the filter strip and maintain sheet flow through the strip.

Soils in the filter area must have infiltration rates in the range of 1.0 to 6.0 inches per

hour. Infiltration rates outside this range require special design.

Filter strips by themselves will not meet the "no-discharge" requirement applicable to livestock operations requiring permits under the National Pollutant Discharge Elimination System. More stringent pollution abatement measures may be necessary where receiving waters must be highly protected.

The Illinois Environmental Protection Agency criteria for filter strips are identified as "Design and Maintenance Criteria Regarding Runoff Field Application Systems" and are a component of the agency's rules and regulations as promulgated under Title 35: Environmental Protection; Subtitle E: Agriculture Related Water Pollution; Chapter II: Environmental Protection Agency; Part 570.

CONSIDERATIONS

Reduced effectiveness of filter strips under snow or frozen conditions.

Slopes less than 5 percent are most effective, as steeper slopes require a greater area and length of flow.

PLANS AND SPECIFICATIONS

Design Criteria

Design criteria for filter strips and filter areas are contained in IL-Supplements to Chapter 10 of the Animal Waste management Field Handbook.

Filter Strips for Runoff from Concentrated Livestock Areas

These criteria apply to filter strips for feedlot and barnyard runoff, where facility confines less than or equal to 300 animal units.

Settling Facilities. A settling basin shall be provided between the waste source and filter strip to store 1,100 cu. ft. per acre- inch of runoff from a 2-year, 24-hour rainfall. Any basin outflow shall be disregarded in computing minimum storage. Additional

storage capacity, based on frequency of cleaning, shall be provided for manure and other solids settled within the basin. When the basin will be cleaned after every significant runoff event, additional storage equivalent to at least 0.5 in. from the concentrated waste area shall be provided. If only annual cleaning of the basin is planned, additional storage equivalent to at least 6 in. from the concentrated waste area shall be provided.

Effluent Transport System. The transport system between the settling basin and the filter strip shall be designed to keep as uniform of flow as possible to prevent solids depositions. Distribution system should uniformly spread effluent across the top of the filter strip.

Filter Strip. The filter strip shall be located on gently sloping soils of moderate permeability with adequate fertility to grow a heavy stand of vegetation. The filter strip shall:

- Be shaped to provide uniform flow.
- Have adequate length to provide a minimum contact time of 2 hours. **Table 1** gives minimum flow lengths needed to provide a contact time of 2 hours.
- Have a minimum width of 20 feet and a maximum width of 100 feet.
- Provide adequate filter area to infiltrate the runoff from the 1- year, 2-hour rainfall event. **See AWMFH, Chapter 10, pg. IL10-66 for instructions on the design of filter strips and areas.**
- The filter strip will be capable of conducting the peak flow from a 1- year, 2-hr. rainfall event at 0.5 inch depth, or less.

Table 1. Minimum Flow Lengths for Vegetative Filters Utilizing Overland Flow and Having Various Slopes a

Slope %	Velocity (feet/sec. ⁻¹)	Flow Length (ft.)
0.5	0.04	290
0.75	0.05	360
1.0	0.06	435
1.5	0.07	505
2.0	0.08	575
3.0	0.10	720
4.0	0.12	860

a/ Design flow depth is 0.5 inch. The assumed Manning's roughness coefficient is 0.3.

Filter areas for treating supernatants from settling basins, lagoons, and other holding facilities.

Nutrient Loading. The area to which wastes are to be applied shall have Nitrogen (N) uptake capability equal or in greater than the rate of (N) loading. Concentrations of (N) in supernatants used for design shall be the average of 3 or more analysis from the facility from which supernatant will be removed.

Filter Area. The filter area shall be located on sloping soils with adequate fertility to grow the vegetation/crop assumed in design. The filter area shall:

- Be shaped to provide uniform flow.
- Have adequate length to provide a minimum contact time of 30 minutes.

Flow through time and filter area width shall be adequate to infiltrate the design rate of flow. **See AWMFH, Chapter 10, pg. IL10-66 for instructions on the design of filter strips and areas.**

Site, Seedbed Preparation, and Seeding

All areas disturbed during construction shall be vegetated.

To aid in the establishment of vegetation, surface water runoff shall be prevented from entering the filter strip using temporary diversions until after vegetation is established to a minimum height of 4 inches and 90 percent ground cover.

Site Preparation

All trees, stumps, brush, rocks, and similar materials that can interfere with installing the filter strip shall be removed.

The materials shall be disposed of in a manner that is consistent with standards for maintaining and improving the quality of the environment and with proper functioning of the filter strip.

The filter strip shall be shaped to grade and dimensions shown on the plan or as staked in the field. If necessary, topsoil shall be stockpiled and spread to the required grade and thickness. Excess spoil shall be disposed of in areas where it does not interfere with the required flow characteristics of the filter strip.

Seedbed Preparation

On sites where excavation and shaping removes topsoil and/or exposes subsoil material, apply 120 lbs./ac each of N-P₂O₅-K₂O and limestone, if necessary, for the species to be grown. Fertilizer and lime shall be applied immediately prior to seedbed preparation.

Where construction activities leave topsoil relatively undisturbed, apply 120 lbs./ac each of N-P₂O₅-K₂O only where soil tests are below 15 lbs. P/ac and or 150 lbs. K/ac.

Incorporate the required lime and fertilizer and prepare a firm seedbed to a depth of 3 inches. The seedbed shall be free from clods, stones, or other debris that might hamper proper seeding. Seedbeds will be

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firmed with a corrugated metal roller or cultipacker.

Seed may be drilled or broadcast. Drilled seed shall not be placed deeper than 1/4 to 1/2 inch. Rolling is required after seeding where broadcast methods are used. Species and seeding rates are found in Table 2.

OPERATION AND MAINTENANCE

Protect the filter from damage by farm equipment, traffic, and livestock. Do not use as a roadway. Avoid operations that leave tillage marks or wheel marks. Avoid damaging filter area with herbicides.

Harvest when the forage is at the proper stage of maturity for maximum quality. Refer to **Forage Harvest Management** (NRCS Practice Code 511) or **Prescribed Grazing** (NRCS Practice Code 528A) for management specifications of forage crops.

Repair damage caused by erosion or equipment immediately.

Reshape and re-seed areas where concentrated flow occurs or vegetation fails.

To prevent excess organic solids from entering the filter:

- Scrape waste into a separate storage area away from settling basin.
- Remove solids from the settling basin after each runoff event or when 2 to 4 inches accumulate.
- Redistribute wastes that accumulate in the filter strip and damage the vegetation.

Table 2. Seed Mixtures

Species	Seeding Rate PLS/acre	Nitrogen Removed Per Ton Harvested (Lbs./ac.)
Tall Fescue	24	30
Smooth Bromegrass	24	22.4
Orchard Grass	6	25
Tall Fescue	20	
Tall Fescue	12	25
Smooth Bromegrass	12	