

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

Filter Strip

(Acre)

CODE 393

DEFINITION

A strip or area of vegetation for removing sediment, organic matter, nutrients, and other pollutants from runoff and wastewater.

PURPOSE

To remove sediment, organic matter, and other pollutants from runoff or wastewater by deposition, infiltration, and sorption, thereby reducing pollution, improving water quality, and protecting the environment.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies:

- On cropland fields adjacent to field ditches, and other water bodies; or above conservation practices such as terraces or diversions;
- In areas requiring filter strips as part of a waste management system to treat polluted runoff,
- On forest land where filter strips are needed as part of a forestry operation to reduce delivery of sediment into waterways
- Adjacent to a riparian forest buffer to reduce sediment delivery.

CRITERIA

Filter Strips For Removal Of Sediment And Related Pollutants

These criteria apply to filter strips on cropland adjacent to water courses, at the lower edge of crop fields, on pastures, or in manure spreading areas adjacent to streams, ponds, and lakes, where a resource management system is in place. These criteria also apply to areas above conservation practices such as terraces or diversions.

In fields with slopes of less than 5 percent and an erosion rate at or below the annual tolerance rate for the field's soil, the minimum filter strip width shall be 5 feet.

In fields with erosion rates above soil loss tolerance and slopes are less than 5 percent the minimum width shall be 15 feet when farming operations adjacent to the strip are parallel to the length of the strip or 25 feet when farming operations adjacent to the strip are not parallel to the length of the strip.

In fields with 5 percent or greater slopes, regardless of the erosion rate, the minimum strip width shall be increased 3 feet for each one percent increase in field slope.

Filter strips may be grass, trees, or other perennial vegetation. Grasses may be selected from Table 2. Trees should be selected from the standard for Tree/Shrub Establishment (Code 612). Care shall be taken to ensure runoff flows perpendicularly across the filter in a uniform manner. The filter width shall be measured in a direction perpendicular to the edge of the pollution source.

Filter Strips For Runoff From Concentrated Livestock Areas

For lounging areas normally void of vegetation during the winter months, establish a filter strip at least 100 feet wide between the lounging area and water bodies. A forest component will be permitted. Level spreaders or similar devices will be installed to ensure uniform flow across the filter strip. Grass filter strips can be designed as a component of an animal waste system.

Filter strips shall be protected by fencing. Short duration grazing may be permitted.

Where a 100 foot filter strip cannot be installed, a settling basin will be considered. A diversion can also be installed to safely convey pollutants to an area better suited for a filter strip or settling basin.

A constructed settling basin, when needed shall have sufficient capacity, as a minimum, to store runoff computed for 15 minutes duration at peak inflow rate resulting 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 is cleaned after every significant runoff event, additional storage equivalent to at least 0.5 inches from the concentrated waste area shall be provided. If only annual cleaning of the basin is planned, additional storage equivalent to at least 6 inches of runoff from a concentrated waste area shall be provided.

In addition when filter strips are to be used in treating waste water or polluted runoff from concentrated livestock areas, the following must be considered:

- Adequate size of the filter strip relative to the soil's permeability to ensure satisfactory performance.
- Enough rest period between dosings to maintain an aerobic soil profile. Storage or alternating filter strips may be desirable to achieve this.
- Reduced effectiveness of filter strips under snow or frozen conditions.
- An adequate filter area and length of flow to provide the desired reduction of pollutants. A serpentine or switchback channel can be used to provide a greater length of flow.
- Provisions for excluding roof water and unpolluted surface runoff .

- Slopes less than 5 percent are more effective; steeper slopes require a greater area and length of flow.
- To maintain the effectiveness of the grass filter area the vegetation needs to be mowed and removed. Controlled grazing may be practiced when the filter area is dry and firm. Burning the filter is permitted.
- The need for a level lip weir, gated pipe, sprinklers, or other devices to distribute flow uniformly across the input side of the filter strip and maintain sheet flow.

Filter Strips On Forest Land

These criteria apply to filter strips for runoff as part of a forestry operation to reduce delivery of sediment into waterways.

As a guide, the length of flow through undisturbed forest floor should meet minimum widths shown in Table 1. Wider strip widths should be used as contributing drainage areas increase.

General Criteria Applicable To All The Purposes Stated Above

- Species will be adapted to soil and site conditions.
- Species will be suitable for the planned purpose.
- Seeding and planting rates will be adequate to accomplish the planned purpose.
- Planting dates, and care in handling and planting will be used to ensure that planted materials have an acceptable rate of survival.
- Only viable, high quality seeds from adapted plants will be used.
- Site preparation shall be sufficient for establishment and growth of selected species.
- Equipment and its use will be appropriate for the site and soil conditions.

- The use of native grasses with forbs and legumes is encouraged.
- Existing native vegetation will be used as a filter strip when appropriate.

To realize the greatest functional benefit of the filter strip the following application conditions shall be respected:

- Applied where there is a potential for sheet and uniform shallow flow.
- Applied as close as possible to the contour of the land.
- Applied to slopes with less than 10 percent grade.

CONSIDERATIONS

Evaluate type and quantity of pollutant, slopes and soils, adapted vegetative species, time of year for proper establishment of vegetation, necessity for irrigation, visual aspects, fire hazards, and other special needs. Prevent erosion where filters outlet into streams or channels.

ADDITIONAL CONSIDERATIONS FOR IMPROVING WILDLIFE HABITAT

- Wildlife planning considerations shall not impair the primary practice criteria.
- Filter strips improve on-site and off-site aquatic wildlife and fish habitat by reducing non-point source pollution.
- Filter strip locations, vegetative compositions, use, and management affect the structure's suitability as wildlife habitat.
- Wildlife habitat benefit increase with filter strip width.
- A habitat evaluation procedure will help to determine whether food or cover are limiting factors for wildlife. Plant species selection should be made to reduce limiting factors.
- The use of native species (grasses, forbs, and legumes) will be encouraged for all cover situations.

- When possible, specified seeding rates may be reduced to create open structure that allows increased forb production and wildlife movement. Such rates shall meet minimum requirements for filter performance
- Grasses, forbs, and legumes can be planted in both mixes and separately to encourage maximum plant diversity.
- If a volunteer native cover establishes other than what was planted and it meets the practice criteria and the landowner's objectives, the cover shall be considered adequate.
- Maintenance practices and activities should not disturb cover during primary nesting and brood periods for grassland wildlife species. Exceptions could be granted for periodic mowing or burning when necessary to maintain the health of the plant community. Mowing may be needed during the establishment period of the filter strip.
- Consideration should be given to rotating techniques of management or maintenance or treatments throughout the managed area.
- Methods used will be designed to protect the soil resource from erosion.
- Annual mowing of the filter strip when used as wildlife cover is not recommended.
- Where feasible, prescribed burning is recommended instead of mowing.
- To benefit pollinators and other wildlife insect food sources for grassland nesting birds, spraying or other weed control will be done only in the areas affected.

- Maintenance measures must be provided to control outbreaks of weeds and other undesirable species in order to comply with state noxious weed laws.

OPERATION AND MAINTENANCE

Development of rills and small channels within the filter area must be minimized. Needed repairs must be made immediately to establish sheet flow. A shallow furrow on the contour across the filter can be used to establish sheet flow. Vegetation must be maintained in a vigorous condition. If livestock have access to the filter area, they must be fenced to control grazing.

- Fertilization - Topdress annually, if needed, with fertilizer in accordance with soil test results. Apply lime based on soil test results to maintain pH in the optimum range for the species being grown. This is critical for filter strip performance below concentrated livestock areas. In areas that do not use soil tests for nitrogen applications, apply based on realistic yield expectations.
- When needed, apply fertilizer on warm season perennials in the spring just before growth initiates and on cool season perennials in early spring and fall.
- Weed control and mowing - Mowing operations on grass filter strips should be done during periods that are normally low in rainfall and pollutants when possible. This will ensure a taller, more efficient

filter strip during periods of highest rainfall. Clippings should be removed whenever practicable.

- Care should be taken when using herbicides adjacent to filter strips to ensure that no damage occurs. Sprayers should be shut off before turning or crossing on filter strips. Care will be required to avoid inadvertently killing or contaminating desirable vegetation in the filter strips.
- Control livestock access as needed by fencing and prohibit grazing when ground is wet.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation. When pesticides are recommended or required a statement requiring that the labels be read and followed before use is mandatory.

REFERENCES

Hartung, Robert E., and James M. Kress, Woodlands of the Northeast. 1977. USDA Soil Conservation Service and Forest Service. 25 pp.

TABLE 1

The following table provides a guide for minimum filter strip widths for forest land:

Slope of Land Between Road and Stream	Width of Filter Strip for Common Logging Areas	Width of Filter Strip in Municipal Watersheds and Critical Areas
Percent	Feet	Feet
0-9	35	70
10-19	45	90
20-29	65	130
30-39	85	170
40-49	105	210
50-59	125	250
60 and greater	150	300

TABLE 2**Vegetative Specifications**

Methods of seedbed preparation, adapted plants, planting dates, fertilization rates, and rates of seeding or sprigging should be specified as well as need for mulching, use of a stabilizing crop, or mechanical stabilization. The following is recommended for North Carolina:

PLANT	RATE PER ACRE¹	PLANTING DATES	FERTILIZER PER ACRE	REMARKS
Pensacola Bahiagrass ²	25-30 lbs.	Mar. 15 - June 1	2 T Lime; 600 lbs. 10-10-10	Cover seed 1/2" to 3/4" deep. Firm soil.
Tall Fescue	40-60 lbs.	Aug. 1 - Oct. 15	2 T Lime; 800 lbs. 10-10-10	
Common Bermudagrass	Hulled 8-10 lbs.	April - June 30	1 to 1-1/2 T Lime; 800 lbs. 0-10-10, plus 75 lbs. of N	Minimum 200 lbs. per ac. total N in at least 3 applications.
Hybrid Bermudagrass	15-18 bu. in rows; 50-70 bu. broadcast	March - April	1 to 1-1/2 T Lime; 800 lbs. 0-10-10, plus 75 lbs. of N	
Ladino Clover with Tall Fescue	4-6 lbs. clover; 40-60 lbs. fescue	Aug. 1 - Oct. 15	2 T lime; 800 lbs. 0-10-10 ³	
Shrub Lespedeza	Seed: 20-25 lbs.	March 1 - June 1	1 T Lime; 800 lbs. 0-10-10	Plant 1/2" deep
	Plants: 6,223-9,680	Dec. - March 15	1 T Lime; 800 lbs. 0-10-10	18-24" apart in 36-42" rows. Minimum: 2 rows. Do not plant on wet sites.
Weeping Lovegrass	5 lbs.	April and May	2 T Lime; 600 lbs. 10-10-10	Becomes clumpy with age. May need to introduce companion plant.
'Atlantic' Coastal Panicgrass	6-8 lbs. alone; 5 lbs. in mixtures	Mar. 1 - Apr. 30	1 T Lime; 400 lbs. 5-10-10 2 nd or 3 rd growing season after establishment	Cover seed 1/4"-3/4" deep. Firm soil.
Switchgrass	6-8 lbs. alone; 3 lbs. in mixtures	Mar. 1 - Apr. 30	1 T Lime; ; 400 lbs. 5-10-10 2 nd or 3 rd growing season after establishment	See 'Atlantic' Coastal Panicgrass
Annual Lespedeza (companion planting)	20 lbs. alone; 10 lbs. In mixtures	Feb. 1 - April 15	1 T Lime; 400 lbs. 5-10-10	
Subterranean Clover	10 lbs. in mixtures	September 15 - October 30	400 lbs. 5-10-10	Must inoculate; can grow in pH 5.5. Use with small grain.
Small Grains (companion planting)	1 bu. wheat, barley, or rye; or 2 bu. oats	August 30 - November 15	1 T Lime; 400 lbs. 10-10-10	Use in mixture with tall fescue.
Big Bluestem	6 lbs. Alone; 3 lbs. In mixtures	Mar. 1 - Apr. 30	1 T Lime; 400 lbs. 5-10-10	

¹Use Critical Area Planting Specifications for eroded sites.

²Southeastern counties.

³Use any low N analysis fertilizer - e.g. 2-12-12 or 5-10-10.

Note: Other adapted perennials may be used for this type seeding. (See Critical Area Planting - Code 342.)