Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

FILTER STRIP

Code 393

(Ac)

DEFINITION

A strip or area of herbaceous vegetation that removes contaminants from overland flow.

PURPOSE

- Reduce suspended solids and associated contaminants in runoff and excessive sediment in surface waters.
- Reduce dissolved contaminant loadings in runoff.
- Reduce suspended solids and associated contaminants in irrigation tailwater and excessive sediment in surface waters.

CONDITIONS WHERE PRACTICE APPLIES

Where environmentally sensitive areas need protection from sediment, other suspended solids, and dissolved contaminants in runoff.

CRITERIA

General Criteria Applicable to All Purposes

Overland flow entering the filter strip will be uniform sheet flow.

Disperse concentrated flow before it enters the filter strip.

The maximum gradient along the leading edge of filter strip will not exceed one-half of the up-and-down-hill slope percent, immediately upslope from the filter strip, up to a maximum of five percent.

Do not use filter strips as a travel lane for equipment or livestock.

Additional Criteria to Reduce Dissolved Contaminants, Suspended Solids and Associated Contaminants in Runoff and Excessive Sediment in Surface Waters.

The filter strip will be designed to have a 10-year life span, following the procedure in Agronomy Technical Note No. 2, “Using Revised Universal Soil Loss Equation, Version 2 (RUSLE2) for the Design and Predicted Effectiveness of Vegetative Filter Strips (FVS) for Sediment,” based on the amount of sediment delivery to the upper edge of the filter strip and ratio of filter strip flow length to length of flow path from the contributing area. The minimum flow length through the filter strip will be 20 feet for suspended solids and associated contaminants in runoff and 35 feet for dissolved contaminants and pathogens in runoff.

The filter strip will be located immediately downslope from the source area of contaminants.

The drainage area immediately above the filter strip will have a slope of one percent or greater.

Establish the filter strip using permanent herbaceous vegetation. Use NY NRCS approved seeding/planting references for species selection, seeding rates, timing and planting methods.

Species selected will be:

- Able to withstand partial burial from sediment deposition.
- Tolerant of herbicides used on the area that contributes runoff to the filter strip.
- Stiff stemmed and a high stem density near the ground surface.
- Suited to current site conditions and intended uses.
- Able to achieve adequate density and vigor within an appropriate period to stabilize the site sufficiently to permit suited uses with ordinary management activities.

Plant species, rates of seeding (lbs/ac), vegetative planting (plants/ac), minimum quality of planting stock (pure live seed [PLS] or stem caliper), and method of establishment shall be specified before application. Use only viable, high quality seed or planting stock.

Perform site preparation and seeding/planting at a time and in a manner that best ensures survival and growth of selected species. Successful establishment parameters, (e.g., minimum percent ground/ canopy cover, percent survival, stand density, required soil amendments) will be specified before application.

Schedule planting dates during periods when soil moisture is adequate for germination and establishment. Time seeding so that tillage for adjacent crop does not damage the seeded filter strip.

Where the purpose is to remove phosphorus, remove (or harvest) the filter strip aboveground biomass at least once each year.

The minimum seeding and stem density will be equivalent to the seeding rate for a high quality grass hay seeding rate for the climate area or the density of vegetation selected in current water erosion technology to determine trapping efficiency, whichever is the higher seeding rate.

Additional Criteria to Reduce Suspended Solids and Associated Contaminants in Irrigation Tailwater and Excessive Sediment in Surface Waters.

Filter strip vegetation will be a small grain or other suitable annual plant.

The seeding rate shall be sufficient to ensure that the plant spacing does not exceed 4 inches (about 16–18 plants per square foot).

Establish filter strips prior to the irrigation season so that the vegetation is mature enough to filter sediment from the first irrigation.

CONSIDERATIONS

General Considerations.

Increase filter strip width (flow length) as necessary to accommodate harvest and maintenance equipment.

Filters strips with the leading edge on the contour will function better than those with a gradient along the leading edge.

Seeding rates that establish a higher stem density than the normal density for a high quality grass hay crop will be more effective in trapping and treating contaminants.

Control invasive plant species by mowing, treatment with herbicides, or hand weeding.

Avoid species that may harbor pests and adversely affect nearby crops, plant communities, or species in the planting. Diversify species to avoid loss of function due to species-specific pests.

Additional Consideration for Reducing Suspended Solids and Associated Contaminants in Runoff.
Increasing the width of the filter strip beyond the minimum required will increase the potential for capturing more contaminants in runoff.

Additional Considerations for Creating, Restoring or Enhancing Herbaceous Habitat for Wildlife and Beneficial Insects and Pollinators. Filter strips provide diversity to areas that consist of intensively-cropped mono-cultures. Enhance wildlife and pollinator benefits of this herbaceous cover by using the following techniques:

- When appropriate, use native grass species that fulfill the purpose(s) of the practice while also providing habitat for priority wildlife.
- Adding herbaceous plant species (including native forbs) to the seeding mix that are beneficial to wildlife and pollinators and are compatible for one of the listed purposes. Changing the seeding mix should not detract from the purpose for which the filter strip is established.
- Increasing the width beyond the minimum required. The additional area can increase food and cover for wildlife and pollinators.
- Limit management activities on filter strips (mowing, burning, or light disking), to every other year with frequency dependent on geographical location to maintain the purpose(s) of the practice.
- Complete management activities outside of the primary nesting, fawning, and calving seasons. Time activities to allow for adequate regrowth before the growing season ends.
- Organic producers should submit plans and specifications to their certifying agent for approval prior to installation, as part of the organic producer's organic system plan.

Additional Considerations to Maintain or Enhance Watershed Functions and Values. Use filter strips to enhance connectivity of corridors and noncultivated patches of vegetation, enhance aesthetics, and reduce runoff at strategic locations, increase infiltration and groundwater recharge throughout the watershed.

Increasing the width of the filter strip beyond the minimum required will increase potential for carbon sequestration and storage.

PLANS AND SPECIFICATIONS

Prepare specifications for establishment and operation of this practice for each field or treatment unit. Record the specifications using the Filter Strip Implementation Requirements document. The specifications will identify at a minimum the following:

- Practice purpose(s).
- Site characteristics including soil type and drainage class
- Length, width (width refers to flow length through the filter strip), and slope of the filter strip to accomplish the planned purpose(s).
- Life span documentation and associated calculations for sedimentation rates.
- Plant species selection and seeding/planting/sprigging rates to accomplish the planned purpose.
- Planting dates and planting method(s).
- Required soil admendments.
- Specific care and handling requirements of the seed and/or plant materials to ensure an acceptable rate of survival and cover establishment of the planted species.
- Documentation that viable, high quality, and adapted seed is used.
- Site preparation instructions sufficient to establish and grow selected species.

OPERATION AND MAINTENANCE

For the purposes of filtering contaminants and nutrients (phosphorus), harvest/remove as appropriate, filter strip vegetation to encourage dense growth, maintain an upright growth habit, and remove nutrients and other contaminants that are contained in the plant tissue.

Control undesired weed species, especially State-listed noxious weeds.

Do not maintain the filter strip with burning unless certified individuals have developed an approved burn plan following Conservation Practice Standard (CPS) Prescribed Burning (Code 338) and all local, state, and federal regulations.

Inspect the filter strip after storm events and repair any gullies that have formed, remove unevenly deposited sediment accumulation that will disrupt sheet flow, reseed disturbed areas and take other measures to prevent concentrated flow through the filter strip.

Apply supplemental nutrients as needed based on soil tests to maintain the desired species composition and stand density.

Periodically regrade and reestablish the filter strip area when sediment deposition at the filter strip-field interface jeopardizes its function. Reestablish the filter strip vegetation in regraded areas, as needed.

Clearly mark and maintain edge of filter strip to avoid cropping operations from impacting filter strip function.

If grazing is used to harvest vegetation from the filter strip, a grazing plan must ensure that the integrity and function of the filter strip is not adversely affected.

REFERENCES

Dillaha, T.A., J.H. Sherrard, and D. Lee. 1986. Long-Term Effectiveness and Maintenance of Vegetative Filter Strips. VPI-VWRRC Bulletin 153.

Dillaha, T.A., and J.C. Hayes. 1991. A Procedure for the Design of Vegetative Filter Strips: Final Report Prepared for U.S. Soil Conservation Service.

Foster, G.R. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation (In Draft). USDA-ARS, Washington, DC. 2005.

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture. Agriculture Handbook 703.

Revised Universal Soil Loss Equation Version 2 (RUSLE2) Web site (checked May 2007): http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm.

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