

FILTER STRIP DESIGN PROCEDURES

393DP



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1. GENERAL SPECIFICATIONS

- 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 the grade and dimensions shown in 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.

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2. GENERAL DESIGN CRITERIA

- Filter strip flow length and width shall be determined based on field slope percent and length, and filter strip slope percent, erosion rate, amount and particle size distribution of sediment delivered to the filter strip, density and height of the filter strip vegetation, and runoff volume associated with erosion producing events.

Filter strip design requirements:

- The filter strip shall be located along the downslope edge of a field or disturbed area. To the extent practical the upstream edge of the filter strip shall be placed on the contour. Variation of the upstream edge of the filter strip from level contour should not exceed a 0.5% grade to avoid having the filter strip act as a diversion and to ensure that overland flow is as uniform as possible across the filter strip.
- The minimum ratio of filter strip to drainage area (area draining across filter strip/area at a right angle to length of the filter strip will be 1:30 (e.g. 1 acre of filter strip to 30 acres of drainage area).
- The minimum length of flow (width of filter strip) through vigorous vegetation shall be 20 ft. for slopes (across the filter strip) of less than three percent; 25 ft. for slopes from three to ten percent; and 30 feet for slopes steeper than ten percent (refer to Table 1 in NE393DP, Design Procedures for seeding mixtures best suited to overland flow).
- The average annual sheet and rill erosion rate above the filter strip shall be less than 10 tons per acre per year in order to maintain long-term functionality of the filter strip. If sheet and rill erosion exceeds 10 tons per acre per year above the filter strip, additional practices should be installed prior to (or in lieu of) installing the filter strip in order to reduce sheet and rill erosion.
- If concentrated flows are entering the filter strip they must be treated to control gully erosion. Practices such as grade control structures, sediment basins and grassed waterways will be installed, if necessary.

The filter strip shall be established to permanent herbaceous vegetation consisting of a single species or a mixture of grasses, legumes and/or other forbs adapted to the soil, climate, and nutrients, chemicals, and practices used in the current management system. Species selected shall have stiff stems and a high stem density near the ground surface.

Filter strips to be established on sites where enhanced wildlife habitat is an objective should utilize the Upland Wildlife Habitat Management (645) standard as needed or appropriate. The wildlife habitat index shall be a minimum of 0.5 for the adjacent cropland in conjunction with filter strip and other types of wildlife habitat within the planning unit (refer to FOTG Sec. IV – 645 – Upland Habitat Management for minimum habitat requirements).

3. SEED, SEEDING RATES AND MIXTURES

Seed shall meet all requirements of Nebraska seed law. Use certified seed when available. Use adapted species and varieties listed in the Field Office Technical Guide (FOTG), Section II- Pastureland and Hayland Interpretations, and Section IV Range Planting (550) and Forage and Biomass Planting (512).

Seed mixtures (for all new seedings) must be a minimum of 40 PLS/ft². All seed mixtures must contain at least 60 percent sod-forming, stiff stemmed species (refer to Table 2). All species/varieties used must be adapted to the site according to the Range Planting Standard 550 or Pasture Planting Standard 512 and the current Certified Grass Variety Guide for Nebraska. Species that are resistant to herbicides being applied to adjacent cropland will be used. When glyphosate or other non-selective herbicides will be used, a combination of warm and cool season grasses will be used in the seeding mixture. Recommended mixtures are listed in Table 1. Other mixtures that follow these guidelines can be substituted.

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A diversity of grasses should be used to improve wildlife habitat quality. Monotypic stands of one species are not desired. Aggressive, sod-forming grasses such as smooth brome should be avoided because they provide less water quality and wildlife habitat benefits compared to native grasses. The addition of native forbs or appropriate introduced legumes adapted to the site is acceptable and will enhance the wildlife values associated with this practice. A seeding rate of 4 PLS/ft² (10%) is the recommended rate of forbs/legumes to be added above the amount of grass in seeding mixtures where appropriate (See Table 1 – Recommended forbs/legumes).

4. FILTER STRIP ESTABLISHMENT

Refer to FOTG Section IV – Range Planting (550) - Herbaceous Vegetation Design Procedures (550DP) for guidance on establishment of vegetation.

All areas disturbed during construction shall be vegetated.

To aid in the establishment of vegetation, prevention of surface water runoff from entering the filter strip through the use of temporary diversions should be considered until vegetation is established to a minimum height of 4 inches and 90 percent ground cover.

Refer to Statement of Work documentation requirements (393SOW) for guidance on deliverables for design, installation, and checkout of this practice.

Fence (382) may be needed to manage livestock use within the buffer zone. An alternative water source may need to be established using one or more of the following standards: Dam, Multiple Purpose (349), Pond (378), Pipeline (516), Spring Development (574), Watering Facility (614), or Water Well (642).

For sites without an off-site water source, utilize the Streambank and Shoreline Protection (580) standard to prevent excessive erosion where livestock enter the riparian corridor. A stream crossing may be needed to facilitate livestock movement to both sides of the riparian buffer.

5. FILTER STRIP MANAGEMENT

Allowing haying or grazing on filter strips may be acceptable on a periodic basis depending upon site conditions. Short-term grazing events, less than 30 days, will improve habitat conditions without negative impacts to the integrity of the site. Haying/mowing activities should occur after July 15 to protect nesting birds. Refer to Upland Wildlife Habitat Management (645) for more information. Note: periodic exceptions may be warranted to implement a specific management treatment to achieve a desired wildlife habitat objective. The timing/duration of grazing or haying operations should allow for adequate residual vegetation or vegetative regrowth to allow the filter strip to provide the intended function and to accommodate nesting birds and other wildlife species (refer to Prescribed Grazing (528) or Forage Harvest Management (511)).

For sites that require management to meet desired objectives, Early Successional Habitat Development/Management (647) may be utilized. Caution should be used to ensure tillage for the purpose of enhancing wildlife habitat is not implemented at an intensity or during a time of year which will promote the establishment of gullies in areas of concentrated flow. Selective use of herbicides with appropriate timing may be useful to prevent undesirable plant species from dominating the site. For example, use of glyphosate herbicide in late September or early October may help suppress reed canarygrass while still protecting native plant species. Prescribed Burning (338) may also be an appropriate management option throughout the buffer.

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6. GENERAL OPERATION AND MAINTENANCE REQUIREMENTS

Refer to the Operation and Maintenance recommendations within the Filter Strip (393) standard and specification for additional information.

Periodic inspection for concentrated flow erosion causing gullies to implement repair as needed.

Note: certain conservation programs (e.g., Conservation Reserve Program) prohibit livestock grazing as a management option. Any fertilizers, pesticides and other chemicals used to maintain or improve riparian area function shall not compromise the intended purpose (refer to the current Guide for Weed Management in Nebraska for herbicide use guidelines).

Maintenance is needed on certain sites to control unwanted vegetation (e.g., undesirable tree cover in herbaceous communities and invasive, non-native herbaceous species).

7. SUPPORT REFERENCES

[Herbaceous Design Procedures \(550DP\)](#)

[Range Planting \(550\)](#)

[Forage and Biomass Planting \(512\)](#)

[Filter Strip \(393\)](#)

[\(393SOW\)](#)

[Upland Wildlife Habitat Management \(645\)](#)

[Fence \(382\)](#)

[Prescribed Burning \(338\)](#)

[Upland Wildlife Habitat Management \(645\)](#)

[Forage Harvest Management \(511\)](#)

[Early Successional Habitat Development/Management \(647\)](#)

[NE-CPA-43](#)

[Guide for Weed Management in Nebraska](#)

[Nebraska Biology Technical Note #65 – Terrestrial Natural Communities of Nebraska](#)

[Prescribed Grazing \(528\)](#)

Table 1 VEGETATIVE MIXTURES FOR FILTER STRIPS

Perennial Mixtures T = atrazine tolerant	%	PLS Pounds/Ac	Comments
Big bluestem T	40%	4.2	Warm season native mixture for Tallgrass Prairie Sites
Switchgrass T	35%	1.6	
Indiangrass T	25%	2.5	
Switchgrass T	60%	2.7	Cool/Warm season native mixture
Big bluestem T	20%	2.1	
Western wheatgrass T	20%	3.2	
Big bluestem T	40%	4.2	Cool/Warm season native mixture (wildlife food benefits)
Switchgrass T	40%	1.8	
Canada wildrye	20%	3.0	
Big bluestem T	40%	4.2	Cool/Warm season native mixture for non-sandy sites
Switchgrass T	35%	1.6	
Sideoats grama T	15%	1.4	
Western wheatgrass T	10%	1.6	
Big bluestem T	30%	3.2	Cool/Warm season native mixture for non-sandy sites
Switchgrass T	25%	1.1	
Indiangrass T	20%	2.0	
Sideoats grama T	15%	1.4	
Western wheatgrass T	10%	1.6	
Pubescent wheatgrass	30%	5.2	Cool/Warm season mixture for non-sandy sites
Western wheatgrass T	30%	4.8	
Switchgrass T	40%	1.8	
Sand bluestem T	20%	3.1	Cool/Warm season native mixture for sandy sites
Sideoats grama T	10%	0.9	
Prairie sandreed T	20%	1.3	
Sand lovegrass T	10%	0.1	
Switchgrass T	20%	0.9	
Western wheatgrass T	20%	3.2	
Western wheatgrass T	20%	3.2	Native cool season mixture for wet sites, good for nesting
Canada wildrye	40%	6.1	
Virginia wildrye	40%	9.6	

Table 1 VEGETATIVE MIXTURES FOR FILTER STRIPS (Continued)

Perennial Mixtures T = atrazine tolerant	%	PLS Pounds/Ac	Comments
Sand bluestem T	30%	4.6	Cool/Warm season native mixture for sandy sites
Switchgrass T	10%	0.5	
Indiangrass T	20%	2.0	
Western wheatgrass T	30%	4.7	
Sand lovegrass T	10%	0.1	
Sand bluestem T	30%	4.6	Cool/Warm season native mixture for sandy sites
Prairie sandreed T	30%	1.9	
Western wheatgrass T	40%	6.3	
Pubescent wheatgrass	35%	6.1	Cool season mixture, good for nesting.
Western wheatgrass T	35%	5.5	
Intermediate wheatgrass	30%	5.9	
Intermediate wheatgrass	40%	7.9	Cool/Warm season mixture.
Switchgrass T	30%	1.4	
Big bluestem T	30%	3.2	
Recommended forbs/legumes: (added above and beyond the grasses from above when appropriate based on landowner or program objectives e.g. CRP, WHIP)			
Illinois bundleflower	5%	1.45	For predominantly native grass mixes. Add both species.
Maximilian sunflower	5%	0.58	
Alfalfa	12.5%	1.1	For both native and introduced grass mixes. Add both species.
Red clover	12.5%	0.8	

Table 2 STIFF-STEMMED SOD-FORMING SPECIES Utilize if developing alternative mixtures not in Table 1

Species	Warm/Cool Season	Aggressive (yes/no)	Native/Introduced Species
Switchgrass	Warm	No	Native
Big bluestem	Warm	No	Native
Indiangrass	Warm	No	Native
Prairie sandreed	Warm	Yes	Native
Prairie cordgrass	Warm	Yes	Native
Western wheatgrass	Cool	Yes	Native
Pubescent wheatgrass	Cool	No	Introduced
Intermediate wheatgrass	Cool	Yes	Introduced