NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

FILTER STRIP

(Ac.)

CODE 393

DEFINITION

A strip or area of herbaceous vegetation situated between cropland, grazing land, or disturbed land (including forestland) and environmentally sensitive areas.

PURPOSE

- To reduce sediment, particulate organics, and sediment adsorbed contaminant loadings in runoff
- To reduce dissolved contaminant loadings in runoff
- To serve as Zone 3 of a Riparian Forest Buffer, (391)
- To reduce sediment, particulate organics, and sediment adsorbed contaminant loadings in surface irrigation tailwater
- To restore, create or enhance herbaceous habitat for wildlife and beneficial insects
- To maintain or enhance watershed functions and values

CONDITIONS WHERE PRACTICE APPLIES

This practice applies (1) in areas situated down gradient from cropland, grazing land, or disturbed land (including forest land) (2) where sediment, particulate organic matter and/or dissolved contaminants may leave these areas and are entering environmentally sensitive areas; (3) in areas were permanent vegetative establishment is needed to enhance wildlife and beneficial insects, or maintain or enhance watershed function. This practice applies when planned as part of a conservation management system.

CRITERIA

General Criteria Applicable to All Purposes

Filter strips shall be designated as vegetated areas to treat runoff and are not part of the adjacent cropland rotation.

Overland flow entering the filter strip shall be primarily sheet flow. Concentrated flow shall be dispersed prior to entering the filter strip.

The filter strip shall be established to permanent herbaceous vegetation consisting of a single species or mixture of grasses, legumes, and/or forbs adapted to the site and practices used in the management system. Annuals may be used in conjunction with surface irrigation tail water.

Species suitable for use in filter strips along with planting rates and optimum planting dates are contained in Table 1 and Table 9 of this standard.

Vegetation in filter strips will have a high stem density near the soil surface. Ideally, stem density spacing should not exceed 1 inch. Where bunch grasses are planted for wildlife enhancement, stem density spacing may exceed 1 inch.

State listed noxious weeds will not be established in the filter strip and will be controlled if present.

Filter strip establishments shall comply with local, state and federal regulations.

The filter strip shall be located along the downslope edge of a field or disturbed area. To the extent practical it shall be placed on the approximate contour of the topography. At no point will the filter strip be less than the design

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width in the tables included in this standard. However, the width may need to be increased to account for topography, uneven field boundaries or equipment size. The width of the filter strip may be increased for the reasons above up to the following:

Design Width	% Increase
20 to 50 ft.	50%
51 to 100 ft.	25%
101 to 125 ft.	10%
126 ft.+	0%

The above variance does not apply to filter strips enhanced for wildlife.

The contributing drainage area immediately upslope of the filter strip shall be no more than 10% slope.

The ratio of the drainage area to the filter strip area shall be less than 50:1.

The average annual sheet and rill erosion rate immediately upslope of the filter strip shall be less than 10 tons per acre per year.

Seed Source

All seed and planting materials will be labeled and meet state seed quality law standards. Seeding rates will be determined based on pure live seed (PLS) or percent germination information found on the seed tag. Percent PLS can be computed using decimal values with the following equation.

% PLS = [(Percent germination + Percent hard seed) x Percent purity] / 100.

Use certified seed of locally adapted and proven cultivars of commercially available seed. Locally harvested or commercially available local ecotypes seed that come from sources within a 200 mile radius of the seeded area can be used with approval from area or state specialists. Local eco-types should be used when trying to restore or enhance historic grasslands.

Seeding rates for individual species in mixtures should be calculated by multiplying the full seeding rate for each species by the desired percentage represented by that species

Legume seed shall be inoculated with the recommended strain of Rhizobia bacteria for the species being planted. Do not use chlorinated water with legume seed inoculant as a sticking agent. Chlorine can kill the Rhizobia bacteria. Soft drinks (colas) containing sugar make excellent sticking agents for inoculating legume seed.

Seedbed Preparation

Limit soil disturbing activities to the minimum needed to prepare a suitable seedbed. Consider using no-till drills when establishing native grasses and/or legumes on sites with an erosion hazard.

Weed pressure or competition from introduced sod forming grasses (i.e. bermudagrass or bahiagrass) can cause stand failure. In these areas, it will be necessary to chemically control vegetation with herbicide. Herbicides need to be labeled specifically for this purpose (non-cropland) and applied according to label directions and LSU AgCenter recommendations and according to Pest Management (595) specifications.

To prepare a seedbed, use equipment and methods that will result in a clean, firm seedbed without excessive weed competition. For soils with good physical condition, use a tandem disk, or other equipment to break or mix at least the top 3 inches of soil. Lightly disk, harrow, sweep, or use chemicals about one month prior to planting to eliminate any living vegetation should it exist. If the seedbed is not firm at planting time, firm it with a cultipacker, roller, or similar implement.

On fields which have a history of compaction, use a chisel plow or similar implement capable of operating at least 1 to 2 inches below the compacted zone to shatter the compacted layer. More complete destruction of the compacted layer is achieved when deep tillage is performed in the fall when soils are usually their driest. Prior to planting the desired vegetation, lightly disk, harrow, sweep, or use chemicals to eliminate any living vegetation should it exist.

Prepared seedbeds should be firmed with a roller or cultipacker after tillage operations are complete, but prior to seeding. Loose uneven seedbeds are a major cause of poor stands.

Your foot print should not sink more than ½ inch into a properly prepared seedbed. Seeds sown on the surface without coverage or greater than ½ inch deep have little chance of germinating and developing into seedlings. If seed are surface broadcast, cover the seed immediately with a roller or cultipacker, spike-tooth harrow, or similar implement no deeper than ¼ inch.

Old terraces or other conditions which pond water or causes concentrated flow will be drained, repaired, or leveled and smoothed before seedbed preparation. Gullied, rilled, or rough sites will be smoothed and shaped to permit the use of tracked or wheeled equipment for establishment and maintenance of vegetation.

All loose roots or other obstructions that will interfere with establishment and maintenance of vegetation must be removed from the surface. Any brush should be removed and the area smoothed to the extent necessary to perform required seedbed preparation, planting, and subsequent management practices (see 314-Brush Management).

Establishment Method

A grass seed drill equipped with double disk openers and depth bands followed by a cultipacker, press wheels, or drag chains is the preferred seeding method. Seed should be planted 1/8 to 1/2 inch deep if adequate moisture is present, or 1/2 to 3/4 inch deep if soil surface is dry. Distance between rows should not exceed 20 inches in most cases. Eastern gamagrass should be planted in 20 to 38 inch rows at a depth of one inch.

Drills used for seeding native plants should be equipped with an agitator in the seed hopper and extra large seed delivery tubes for handling native grasses. Native seeds which have been debearded or are smooth in nature can be used in conventional drills. If legumes and/or forbs are included in the seeding mixture, the drill should be equipped with a small seed attachment.

Use of a broadcast seeder, broadcasting seed by hand, and aerial seeding are acceptable methods of seeding where conditions permit seed to be placed in contact with mineral soil on a firm seedbed and where uniform seed distribution can be achieved. Regardless of method, it will be necessary to use a cultipacker, press wheels or similar techniques following broadcast seeding to aid coverage of seed. Seeds sown on the surface without coverage or greater than ½ inch deep have little chance of germinating and developing into seedlings.

Fertility

Fertilizer for establishment purposes will be done according to a current soil test for all introduced species. A variation of 25% above or below the specified amount of fertilizer for establishment is allowable. For planning purposes on native grasses, a ratio of 0-60-60 (N, P_2O_5, K_2O) will be used. Plant nutrients necessary for establishment of the cover shall be applied according to specifications in the conservation practice standard, Nutrient Management (590).

Nitrogen fertilization should be delayed until native grass seedlings have reached a height of 12 to18 inches to prevent excessive use of fertilizer by competing vegetation. Nitrogen fertilization can also be delayed until the second year of growth after establishment.

When acid soils are present, lime may be needed for adequate grass growth or for legume establishment. Use dolomitic limestone where magnesium is needed. Lime should be incorporated into the soil during seedbed preparation. Lime shall be applied according to soil test recommendations. Legume seed and fertilizer will not be broadcast together because the fertilizer will damage and kill the legume inoculants.

Herbicides

Chemicals used must be federally and locally registered and must be applied in accordance with registered uses, label directions and all applicable laws, regulations, and policies and according to Pest Management (595) specifications. Pre-emerge herbicides may be used as appropriate prior to germination of desired species. When post-emerge herbicides are used, native grass seedlings should be in the 3 to 5 leaf stage. Weed control is needed when there are 3 or more weeds per square foot or when they form a canopy of 50% of more.

Mechanical - Weeds should be mowed when they reach a height of 6 to 8 inches. Mowing height should be above the height of the seeded plants. Mowing should not be done when daily maximum air temperature exceeds 95 degrees to avoid dehydration of seedlings.

Where wildlife habitat enhancement, maintenance activities shall not be performed from April 15 – July 15 which coincides with the primary nesting season for most ground nesting bird species in Louisiana.

Additional Criteria to Reduce Sediment, Particulate Organics, and Sediment Adsorbed Contaminant Load in Runoff

The tables listed below shall be used to design filter strip widths for the following land uses:

Cropland, Grazing Land, and Disturbed Land

Filter strip widths used for this purpose and landuse, shall be designed using the widths in Table 3.

Forestland

Filter strips used as part of a forestry operation will be placed upgradient from roads and waterbodies. Filter strip widths used for this purpose and land use, shall be designated using the widths in Table 4.

Additional Criteria to Reduce Dissolved Contaminant Load (Nitrogen, Phosphorus, Pesticides, and Pathogens) and Animal Waste or Other Organic By-products in Runoff

The tables listed below shall be used to design filter strips widths for the following contaminants:

Nitrogen and Pesticides

Filter strips where nitrogen or pesticides in runoff is a concern shall be designed using the widths in Table 6.

Phosphorus

Filter strips where phosphorus in runoff is a concern shall be designed using the widths in Table 7.

Pathogens

Filter strip where pathogens in runoff are a concern shall be designed using the widths in Table 8.

Animal Wastes and Other Organic By-products

Filter strips where animal wastes or other organic by-products are applied shall be designed, regardless of land use, using the widths in Table 9.

Additional Criteria To Serve as Zone 3 of a Riparian Forest Buffer (391)

Filter strips used in conjunction with Riparian Forest Buffers (391) shall be designed using the widths in Table 5.

Additional Criteria to Reduce Sediment, Particulate Organics, and Sediment Adsorbed Contaminant Load in Surface Irrigation Tailwater

Filter strips established for this purpose shall be designed using the widths in Table 3.

Vegetation for the filter strip may be planted to either perennial grasses or a suitable annual. Plant spacing for annuals shall not exceed 4 inches.

Filter strips shall be established prior to irrigation season so that vegetation can withstand sediment deposition from the first irrigation.

Additional Criteria to Restore, Create, or Enhance Herbaceous Habitat for Wildlife and Beneficial Insects

Filter strips may be enhanced for wildlife but must meet one of the above intended purposes. Filter strips enhanced for wildlife shall be increased to at least 100 feet in width and shall not exceed 150 feet in width. Native species suitable for enhancing the filter strips along with planting rates and optimum planting dates are contained in Table 2 of this standard.

Native forbs and legume species may be included in the enhancement portion of the filter strip plantings with native grasses, but shall not be seeded alone and shall not make up more than 30% of the seeding mixture.

The filter strip shall not be mowed nor shall livestock or vehicular traffic be allowed on the filter strip from April 15 – July 15, which coincides with the primary nesting season for most ground nesting bird species in Louisiana.

At least 100 feet of the overall width shall be planted to a mixture of native grasses with legumes and/or forbs (Table 2).

If strips of introduced grass species are to be used in conjunction with strips of native species, they shall be used on the upslope portion of the strip only and be no less than 15 feet and no more than 30 feet in width. See examples below:

Examples of Filter Strip Designs for Wildlife Enhancement

Example 1 – The design width of the filter strip is 100 feet.

Solution – The entire 100' shall be seeded to native species.

Example 2 – The design width is 20 feet.

Solution – The strip must be at least 100 feet wide. An additional 80 feet must be added to the filter strip and the entire strip planted to native species.

Example 3 – The design width is 150 feet.

Solution 1 – All 150 feet may be planted to a native mixture.

Solution 2 – The upslope 30 feet may be planted to an introduced species and the remaining 120 feet may be planted to native species.

Solution 3 – The upslope 15 feet may be planted to an introduced species and the remaining 135 feet may be planted to native species.

CONSIDERATIONS

Filter strips should be strategically located to reduce runoff, increase infiltration, and ground water recharge throughout the watershed.

To avoid damage to the filter strip, consider using species, which are tolerant to herbicides used in the upslope crop rotation.

Consider using this practice to enhance the conservation of declining species of wildlife, including threatened or endangered species.

Consider using filter strips to protect National Register listed or eligible (significant) archeological and traditional cultural properties from potentially damaging contaminants.

Filter strip size should be adjusted to a greater flow width to accommodate harvest and maintenance.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared for each specific field site where a filter strip will be installed according to the specifications contained in this standard. Information regarding the location, construction, sequence, vegetation establishment and management and maintenance requirements will be recorded in narrative statements and included in the conservation plan.

Specifications will include as a minimum:

- Length, width, and slope of the filter strip to accomplish the planned purpose (width refers to length across the filter strip).
- Species selected and seeding or sprigging rates to accomplish the planned purpose.
- Planting dates, care, and handling of the seed to ensure that planted materials have an acceptable rate of survival.
- Seedbed preparation sufficient for the establishment and growth of selected species.

OPERATION AND MAINTENANCE

Filter strips should be harvested at least once every three years to encourage dense growth, maintain an upright growth habit and remove nutrients and other contaminants that are contained in the vegetative tissue. Haying and/or prescribed burning are the preferred methods of removing vegetation from filter strips and shall be carried out in accordance with Forage Harvest Management (511) and Prescribed Burning (338). Hay bales should be removed from the filter strip in a timely

manner. An approved burn plan shall be prepared when using a prescribed burn for management/maintenance.

Grazing may be used to manage excess vegetation on filter strips where receiving waters are not listed as impaired due to livestock grazing according to the most recent Louisiana Department of Environmental Quality (LDEQ) Water Quality Management Plan, Water Quality Inventory, Section 305(b) report. It should be noted that up to 80% of the nutrients in the forage will be recycled on the site in the form of livestock feces and urine. Grazing shall be in accordance with Prescribed Grazing (528). Grazing shall be done only when the filter strip is dry and firm enough to support livestock traffic without excessive compaction.

Annuals may be left in place, moved, or harvested. Stubble or residue shall be left at least 4 inches in height until the next crop is planted.

Undesirable species shall be controlled or removed at least once every 3 years.

Vegetation shall be maintained in a vigorous condition. On sites where maintenance fertilizer is required, the Nutrient Management (590) practice standard shall be used as guidance for determining nutrient needs.

To maintain and restore the filter strips function (sheet flow), periodic regrading may be needed when sediment deposition at the filter strip-field interface reaches an accumulations of 6 inches. At that point it may become criteria for removal of sediment and reestablishment of the filter area. If wildlife habitat enhancement is a purpose, disturbance of vegetation within the portion of the strip devoted to wildlife should be minimized by regrading only to the extent needed to remove sediment and redirect concentrated flow areas.

Where wildlife habitat enhancement, maintenance activities shall not be performed from April 15 – July 15 which coincides with the primary nesting season for most ground nesting bird species in Louisiana. Exceptions may be granted when activities are necessary to facilitate the establishment of desirable cover.

TABLE 1. RECOMMENDED INTRODUCED SPECIES, SEEDING DATES AND RATES FOR FILTER STRIP

INTRODUCED SPECIES	RATES PER ACRE	SEEDING DATE
Bermudagrass- common, Cheyenne	5 lbs	March 15 – June 1
Bermudagrass (sprigs) – Alicia, Brazos, Coastal, Grazer, Tifton 44, Tifton 85, Russell, Jiggs, Sumrall	40 bu (Sprigs) or 1750 lbs green hay	April 15 – June 30
Tall fescue – Kentucky-31, Georgia 5, Jesup, AU Triumph, Forager, Penngrazer	20 - 30 lbs	September 1 – November 15
Bahiagrass – Argentine, Pensacola, Tifton 9	15 lbs	March 15 – June 1

Companion Crop Species[1/]		
Ryegrass	20-30 lbs	October 1 – November 15
Rye	90-120 lbs	September 1 – December 31
Oats	100-120 lbs	September 1 – December 31
Wheat	90-120 lbs	October 1 – November 15
Browntop Millet	40 lbs	March 1 – August 31

[1/] Companion crop species should only be used as a nurse crop in combination with a perennial species. These species should not make up more than 25% of the total perennial seeding mixture.

TABLE 2. RECOMMENDED NATIVE SPECIES, SEEDING DATES AND RATES FOR FILTER STRIPS.[1/]

NATIVE GRASSES SPECIES/CULTIVAR	FULL SEEDING RATES (PLS LBS)[2/]	PLANTING DATES
Switchgrass Alamo	4 – 9	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Eastern gamagrass Pete IUKA IV Highlander San Marcos Germplasm	8 – 13	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Big bluestem Kaw Earl	7 – 10	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Little bluestem Aldous OK Select Germplasm	7 – 10	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Indiangrass Cheyenne Lometa	7 – 10	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Virginia wildrye Omaha Kinchaffoonee Germplasm	15 – 20	Optimum range: September 1 - October 15 Maximum range: August 1 – November 30
Canada wildrye Lavaca Germplasm	15 – 20	Optimum range: September 1 - October 15 Maximum range: August 1 – November 30

NATIVE LEGUMES AND FORBS SPECIES/CULTIVAR	FULL SEEDING RATES (PLS LBS)[2/]	PLANTING DATES
Illinois bundleflower Sabine	12 – 14	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Partridge pea Comanche Lark Selection	8 – 10	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Maximilian sunflower Aztec	1 – 2	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Purple Prairie Clover Cuero Germplasm	3 – 4	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
White Prairie Clover	3 – 4	Optimum range: February 1 - May 15 Maximum range: December 1 - May 31
Black eyed Susan	1 – 2	Optimum range: September 1 - October 15 Maximum range: August 1 – November 30
Plains Coreopsis	1 – 2	Optimum range: September 1 - October 15 Maximum range: August 1 – November 30

[1/] Native plant species occur naturally in mixtures. The formula for calculating a seed mixture is:

Full Seeding Rate (FSR) X Desire Percent of Mix (DPM) = Seeding Rate per Acre

[2/] All seeding rates are in pounds of pure live seed (PLS) per acre. PLS% = (% germination X % purity).

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TABLE 3. (FILTER WIDTH TO REDUCE SEDIMENT FROM RUNOFF)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)			
	Hydrologic Soil Group of Filter Area			
	A	B	C	D
0 –1	20	20	22	24
1 – 3	20	25	28	30
3 – 5	24	30	33	36
5 – 8	28	35	40	42
8 – 10	32	40	44	48

TABLE 4. (FILTER WIDTH FOR UNDISTURBED FOREST FLOOR)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)
0 – 3	25
3 – 5	35
5 – 8	45
8 – 10	55

TABLE 5. (WIDTH FOR FILTER USED AS ZONE 3 OF A RIPARIAN FOREST BUFFER)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)
0 – 8	20
9 – 10	30

TABLE 6. (FILTER WIDTH TO REDUCE NITROGEN AND PESTICIDES)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)			
	Hydrologic Soil Group of Filter Area			
	A	B	C	D
0 –1	30	32	34	36
1 – 3	32	40	44	48
3 – 5	40	50	55	60
5 – 8	48	60	66	72
8 – 10	56	70	77	84

TABLE 7. (FILTER WIDTH TO REDUCE PHOSPHOROUS)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)			
	Hydrologic Soil Group of Filter Area			
	A	B	C	D
0 –1	30	32	34	36
1 – 3	40	50	55	60
3 – 5	56	70	77	84
5 – 8	72	90	100	108
8 – 10	96	120	132	144

TABLE 8. (FILTER WIDTH TO REDUCE PATHOGENS)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)			
	Hydrologic Soil Group of Filter Area			
	A	B	C	D
0 –1	30	30	30	30
1 – 3	30	30	33	36
3 – 5	32	40	44	48
5 – 8	48	60	66	72
8 – 10	100	125	137	150

TABLE 9. (FILTER WIDTH WHERE ANIMAL WASTE OR OTHER ORGANICS ARE APPLIED)

Percent Slope of Land in Contributing Area	Width of Filter (Feet)			
	Hydrologic Soil Group of Filter Area			
	A	B	C	D
0 –1	35	35	35	35
1 – 3	35	40	44	48
3 – 5	43	53	59	64
5 – 8	56	70	77	84
8 – 10	84	105	115	126