NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

GRASSED WATERWAY
(acre)
CODE 412

DEFINITION

A natural or constructed channel that is shaped or graded to required dimensions and established with suitable vegetation.

PURPOSES

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- To convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding
- To reduce gully erosion
- To protect/improve water quality.

CONDITIONS WHERE PRACTICE APPLIES

In areas where added water conveyance capacity and vegetative protection are needed to control erosion resulting from concentrated runoff and where such control can be achieved by using this practice alone or combined with other conservation practices.

CRITERIA

General Criteria Applicable to All Purposes

Grassed waterways shall be planned, designed, and constructed to comply with all Federal, State, and local laws and regulations.

Capacity. The minimum capacity shall be that required to convey the peak runoff expected from a storm of 10-year frequency, 24-hour duration. When the waterway slope is less than 1 percent, out-of-bank flow may be permitted if such flow will not cause excessive erosion. The minimum in such cases shall be the capacity required to remove the water before crops are damaged.

Velocity. Design velocities shall not exceed those obtained by using the procedures, "n" values, and recommendations in the NRCS Engineering Field Handbook (EFH) Part 650, Chapter 7, or Agricultural Research Service (ARS) Agricultural Handbook 667, Stability Design of Grass-lined Open Channels.

Width. The bottom width of trapezoidal waterways shall not exceed 100 feet unless multiple or divided waterways or other means are provided to control meandering of low flows.

Side Slopes. Side slopes shall not be steeper than a ratio of two horizontal to one vertical. They shall be designed to accommodate the equipment anticipated to be used for maintenance and tillage/harvesting equipment that will cross the waterway.

Depth. The minimum depth of a waterway that receives water from terraces, diversions, or other tributary channels shall be that required to keep the design water surface elevation at, or below the design water surface elevation in the tributary channel, at their junction when both are flowing at design depth.

Freeboard above the designed depth shall be provided when flow must be contained to prevent damage. Freeboard shall be provided above the designed depth when the vegetation

has the maximum expected retardance.

Drainage. Designs for sites having prolonged flows, a high water table, or seepage problems shall include Subsurface Drains (NRCS Practice Code 606), Underground Outlets (NRCS Practice Code 620), Stone Center Waterways or other suitable measures to avoid saturated conditions.

Outlets. All grassed waterways shall have a stable outlet with adequate capacity to prevent ponding or flooding damages. The outlet can be another vegetated channel, an earthen ditch, grade-stabilization structure, filter strip or other suitable outlet.

Vegetative Establishment. Grassed waterways shall be vegetated according to NRCS Conservation Practice Standard Critical Area Planting, Code 342.

Seedbed preparation, time of seeding, mixture rate, stabilizing crop, mulching, or mechanical means of stabilizing, fertilizer, and lime requirements shall be specified for each applicable area.

Establish vegetation as soon as conditions permit. Use mulch anchoring, nurse crop, rock, straw or hay bale dikes, filter fences, or runoff diversion to protect the vegetation until it is established.

PLANNING CONSIDERATION

Food Security Act, Swampbuster, and Section 404 of the Clean Water Act provisions must be considered prior to providing assistance.

Important wildlife habitat, such as woody cover or wetlands, should be avoided or protected if possible when siting the grassed waterway. If trees and shrubs are incorporated, they should be retained or planted in the periphery of grassed waterways so they do not interfere with hydraulic functions. Mid- or tall bunch grasses and perennial forbs may also be planted along waterway margins to improve wildlife habitat. Waterways with these wildlife features are more beneficial when connecting other habitat types; e.g., riparian areas, wooded tracts and wetlands.

Water-tolerant vegetation may be an alternative on some wet sites.

Use irrigation in dry regions or supplemental irrigation as necessary to promote germination and vegetation establishment.

Provide livestock and vehicular crossings as necessary to prevent damage to the waterway and its vegetation.

Planning considerations for water quantity and quality

QUANTITY

- Effects on the components of the water budget, especially on volumes and rates of runoff.

QUALITY

- Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.
- Filtering effects of vegetation on movement of sediment and sediment attached substances.
- Effects of vegetation on movement of dissolved substances into the root zone and eventually into groundwater.
- Short term and construction related effects on downstream water resources.

Establish filter strips on each side of the waterway to improve water quality.

Add width of appropriate vegetation to the sides of the waterway for wildlife habitat.

PLANS AND SPECIFICATIONS

Plans and specifications for grassed waterways shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s).

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be provided to and reviewed with the landowner. The plan shall include the following items and others as appropriate.

A maintenance program shall be established to maintain waterway capacity, vegetative cover, and outlet stability. Vegetation damaged by machinery, herbicides, or erosion must be repaired promptly.

Seeding shall be protected from concentrated flow and grazing until vegetation is established.

Minimize damage to vegetation by excluding livestock whenever possible, especially during wet periods.

Inspect grassed waterways regularly, especially following heavy rains. Damaged areas will be filled, compacted, and seeded immediately. Remove sediment deposits to maintain capacity of grassed waterway.

Landowners should be advised to avoid areas where forbs have been established when applying herbicides. Avoid using waterways as turn-rows during tillage and cultivation operations. Prescribed burning and mowing may be appropriate to enhance wildlife values, but must be conducted to avoid peak nesting seasons and reduced winter cover.

Mow or periodically graze vegetation to maintain capacity and reduce sediment deposition.

Control noxious weeds.

Do not use as a field road. Avoid crossing with heavy equipment when wet.

GRASSED WATERWAY OR OUTLET SPECIFICATIONS

ENGINEERING SPECIFICATIONS

All trees, stumps, brush, and similar material are to be removed from the site and disposed of in a manner consistent with environmental concerns and proper functioning of the waterway.

The waterway shall be shaped to grade and dimensions as shown on the plans. Topsoil shall be stockpiled and re-spread where necessary to provide a seedbed for the grass.

Any soil shall be spread where it will not interfere with flow into the waterway. If necessary, excess water shall be diverted away until vegetation is established. Any protective works shall then be removed, and the disturbed areas that are not to be farmed shall be seeded to permanent grass.

DESIGN

Plans for grassed waterways and outlets will be in keeping with Engineering Standard for Grassed Waterway or Outlet.

CROSS SECTION

Where shaping of grassed waterways is required, enough topsoil will be left in the shaped area to support a good cover of vegetation. In some cases it may be necessary to add topsoil after the waterway is shaped. Fertilizer and lime should be added where needed to insure adequate cover.
Where an outlet must be excavated, the cross section shall be large enough to permit placement of sufficient depth of topsoil to

support a good cover of vegetation. Water shall not be diverted into the outlet until a good vegetative cover has been established.

Fills shall be compacted as needed to prevent unequal settlement that would cause damage in the completed waterway.

The waterway shall be shaped or constructed to the specified dimensions, free of bank projections or other irregularities.

VEGETATIVE SPECIFICATIONS GUIDE

1. Fertilizing and seedbed preparation. Loosen or pulverize surface (4 to 6 inches of soil) by using a disk, field cultivator, or other suitable tool. Leave a smooth weed-free seedbed. In some soils a drag or harrow may be needed. A cultipacker after seeding or sprigging is an excellent tool to firm the soil around the seed or roots.

   Fertilizer shall be applied at the rate of 40-60-60 lbs./acre of actual NPK for grasses, or 0-60-60 lbs./acres for legumes. It shall be mixed into the surface soil no deeper than 2 to 4 inches. This may be done in the last stage of seedbed preparation. Maintenance fertilizer will be needed on most sites. Fertilize to maintain plant vigor and cover.

   Distribute seed uniformly with a drill, broadcast, or hand seeder. Cover seed ¼ to ½ inch, except bermuda. Seed bermuda on surface of freshly prepared seedbed and firm with a roller.

2. Mulching may be needed in specific or critical areas. where needed, use the planting rates and mulching data in the critical area planting-342, standards.

3. Plant section for grassed waterways will be limited to a small group of plants that produce a thick sod. Bermudagrass (common) is the most vigorous sod producer, followed closely by the hybrid bermudas. In areas where bermuda would be undesirable switchgrass could be used. Other useful grasses; where adapted, are bahiagrass and tall fescue.

   (See table, "Varieties, Seeding Rate and Dates.")

4. Weed control will be required. Normal mowing will not be enough control. If chemicals are needed, follow latest Cooperative Extension Service publication MP-44. It is revised annually.

5. Mowing should be performed at least annually or whenever necessary to remove excess vegetation that will restrict design flow rates. Minimum cutting heights will be:

Bermudagrass (hybrid)	4 inches
Bermudagrass (common)	2 inches
Bahiagrass	3 inches
Tall Fescue	5 inches
Swithchgrass (last mowing before August 1)	5 inches

6. Waterways will be vegetated before terraces and diversions are diverted to the area.

7. Avoid the use of waterways as roads. If hayed, bales should be promptly removed from channel of waterway.

CHECKING FOR COMPLETION

Grassed waterways and outlets shall be checked for completion in accordance with procedures given in TR-62.