

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.

Design velocities shall be based on:

1. The erodibility of the soil.
2. Conditions under which vegetative cover is established.
3. The type and height of vegetation used.
4. The probability of obtaining a complete vegetative cover in a short length of time.

When used as an outlet for other conservation practices, a stable waterway shall be established prior to the construction of other practices such as terraces, diversions, or water and sediment control basins that outlet into the waterway.

Where site conditions warrant the use of a structural lining, the design shall be in accordance with NRCS conservation practice standard, Lined Waterway or Outlet, Code 468.

Under normal conditions where vegetation is to be established by seeding, maximum design velocity should not exceed 4 feet per second on erosion resistant soils and 3 feet per second on easily eroded soils.

Shape. Waterways and outlets shall be either parabolic or trapezoidal in cross section.

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. The minimum width shall be that necessary to carry the designed capacity either at or below designed depth. Waterways and disposal areas which will be crossed by farm equipment shall be designed to accommodate the land user's equipment.

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), Lined Waterway or Outlet (NRCS Practice Code 468), or other suitable measures to avoid saturated conditions. Water-tolerant vegetation may be an alternative on some wet sites.

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

Waterways shall be designed and constructed on a constant slope for a minimum of 300 ft. from the outlet unless the waterway has rock or appropriate geosynthetics to control grade, or a grade stabilization structure. The bottom elevation of the waterway at its confluence with the outlet shall not be higher than the outlet, unless stable rock bottom is present to prevent headcuts.

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.

CONSIDERATIONS

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.

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.

Consideration should be given to fencing the waterway where needed to protect the vegetation.

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).

A vegetative plan shall be developed for each waterway or group of waterways. Vegetation includes seedbed preparation, liming, fertilizing, seeding, and either natural mulch or manufactured mulches when needed.

Any job sheets, drawings, plans, or narrative statements needed shall be included in the plans and specifications.

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.

Hay can normally be harvested from waterways. Hay should be harvested early enough during the growing season so that vegetation can partially grow back out before frost and freezing. If hay is not harvested, mow or clip to control weeds and undesirable vegetation. Waterways should never be burned to remove vegetation.

Maintain the waterway to its established width. Do not narrow the waterway when plowing the field or spraying with herbicides. Cut spray equipment off when crossing waterways. Disallow the location of fences and farm roads on grassed waterways. Vehicles should not be allowed on waterways during wet periods or when ruts would develop.

Do not allow the edges of the waterway to become higher than the adjacent area and exclude runoff into the waterway. High places should be removed and reseeded to enhance drainage into the waterway. Spoil shall be spread into adjacent areas so as not to interfere with surface drainage.

REFERENCES

NRCS National Engineering Handbook
Part 650, Engineering Field Handbook,
Chapter 7

ARS Agricultural Handbook 667, Stability
Design of Grass-Lined Open Channels

NRCS Conservation Practice Standards:

- Critical Area Planting, Code 342
- Lined Waterway or Outlet, Code 468
- Filter Strip, Code 393
- Subsurface Drain, Code 606
- Underground Outlet, Code 620