

**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**

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.

The minimum capacity shall be that required to remove the water before crops are damaged. Out-of-bank flow may be permitted if such flow will not cause excessive erosion or crop damage.

Capacity shall be based on the highest vegetative retardance expected for the

established waterway.

**Velocity.** Design velocities shall not exceed those obtained by using the procedures, “N” values, and recommendations in the NRCS Engineering Field Manual Chapter 3, or Agricultural Research Service (ARS) Agricultural Handbook 667, Stability Design of Grass-lined Open Channels.

Velocities shall be based on the lowest vegetative retardance expected for the established waterway.

**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 built to accommodate the equipment that will be used for farming and maintenance that may cross the waterway.

**Depth.** The minimum depth of a waterway shall be such that the design water surface elevation in the waterway is at or below the design water surface elevation from 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 be in keeping with the Standards for Subsurface Drains (606), Underground Outlets (620), 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, a grade-stabilization structure, filter strip or other suitable outlet.

**Vegetative establishment.** Vegetation for grassed waterways shall be established and maintained according to the NRCS Standard for Critical Area Planting (342).

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.

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

Waterways require protection from channel flows until the vegetation is fully established.

**Access.** Waterways must have continuous protection from vehicular travel. While grazing can be used for maintenance, it must be controlled

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

If trees and shrubs are incorporated, they shall be retained or planted in the periphery of grassed waterways so they do not interfere with hydraulic functions.

## CONSIDERATIONS

Grassed waterways are suitable for collecting field runoff and conducting it down slope only when the combination of drainage area, waterway grade, soil type, and vegetation are such that an outlet of reasonable size can be built to keep peak flows at non-erosive velocity.

The drainage area should be treated adequately against sheet and rill erosion before a waterway is installed. This reduces peak flow and sediment load in the waterway.

Vegetated waterways perform most dependably in areas where dense stands of sod

forming perennial grass can be used that will permit increasing water velocities by several feet per second as compared to a bare earth channel. In areas where available sod forming grasses are not adapted, safe velocities cannot appreciably exceed those for bare earth and supporting grade control structures will probably eventually be needed for gully control.

Grassed outlets are easily damaged by continuous flows over long periods. Waterways receiving irrigation tail water or prolonged flows will often require mechanical conveyances of sufficient capacity to contain the sustained flows.

Where water is available for establishment and maintenance, properly vegetated waterways can often provide esthetically pleasing solutions to erosion control problems for parks, golf courses, recreation areas, and other green-belt areas. In such settings, the waterways will require protection from excessive traffic. Turf grasses that will withstand close frequent mowing should ordinarily be used for waterways on nonagricultural land.

When siting a grassed waterway, important wildlife habitat, such as woody cover or wetlands, should be avoided or protected.

Medium or tall bunch grasses and perennial forbs may be planted along waterway margins to improve wildlife habitat. Waterways with these wildlife features are more beneficial when connecting other habitat types such as riparian areas, wooded tracts, or wetlands.

Water tolerant vegetation may be suitable for some wet sites.

Filter strips on each side of the waterway can help improve water quality. Additional width of appropriate vegetation along the sides of the waterway could improve wildlife habitat.

Consider filtering effects of vegetation on movement of sediment and dissolved and sediment attached substances.

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

Effects on erosion and the movement of sediment and dissolved and sediment attached substances.

Short term and construction related effects on downstream water resources.

### **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) not limited to the following:

- All trees, stumps, 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.
- If necessary, excess water shall be diverted away until vegetation is established. Any protective works shall be removed, and the disturbed areas that are not to be farmed shall be seeded to permanent grass.
- Topsoil shall be stockpiled and spread where necessary to provide a seedbed for the grass.
- The waterway shall be shaped so that final dimensions, after replacement of the topsoil, will be as shown on the plans.
- Seedbed preparation, time of seeding, seeding mixture and rate, stabilizing crop, mulching, mechanical means of stabilizing, soil amendments such as fertilizer, lime, sulfur, or gypsum, shall be specified on the plans.
- Any spoil shall be spread where it will not interfere with flow into the waterway.

### **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.

Prevent sustained flows.

Minimize damage to vegetation by excluding livestock except for desired maintenance whenever possible and 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.

Herbicides that have the potential to damage the waterway cover should not be allowed to drift onto the grassed waterway.

Avoid using waterways as turn-rows during tillage and cultivation operations.

Prescribed burning and mowing may be appropriate to enhance wildlife values. These practices must be conducted to avoid large seasonal rainfall events, peak nesting seasons, and/or reduced winter cover.

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

Control noxious weeds.

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

Maintenance plans should make provisions for prompt control of small burrowing mammals that might cause damage to waterways.