

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

GRASSED WATERWAY

(Acre)
CODE 412

DEFINITION

A natural or constructed channel that is shaped or graded required dimensions and established in suitable vegetation for the stable conveyance of runoff.

Scope

This standard applies to natural or constructed channels that are to be established to vegetation and used for water disposal. Grassed waterways with stone centers are also included.

PURPOSES

To convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding and to improve water quality.

CONDITIONS WHERE PRACTICE APPLIES

All sites where added capacity, vegetative protection, or both are required 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. This practice is not applicable where its construction would destroy important woody wildlife cover and the present watercourse is not seriously eroding.

CRITERIA

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 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.

The procedures of Ag-Handbook 667 shall be used.

Velocity

Design velocities shall not exceed those obtained by using the procedures, "n" values, and recommendations in the Engineering Field Manual or SCS-TP-61, Handbook of Channel Design for Soil and Water Conservation.

The permissible velocity for waterways lined with vegetation of good cover and with proper maintenance shall not exceed 5 ft./sec. For channels with poor cover and little maintenance, the velocity shall not exceed 3 ft./sec.

Width

The bottom width of trapezoidal waterways shall not exceed 100 ft 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 should be designed to accommodate the land user's equipment.

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 terrace, diversion, or other tributary channel at their junction when both are flowing at design depth.

Protective Armor

When the grade of the waterway for any reach is sufficiently steep to create velocities greater than 5 ft. per sec., a protective armor of a 3-dimensional nylon filament mat may be used. In these cases the maximum velocities shall not exceed 10 ft./sec. When velocities exceed 10 ft./sec. for any reach, the waterway for that reach shall be designed in

accordance with Practice Standard 468-Lined Waterway or Outlet.

Drainage

Subsurface drains (606), underground outlets (620), stone center waterways, or other suitable measures shall be provided for in the design for sites having prolonged flows, a high water table, or seepage problems. Water-tolerant vegetation such as reed canarygrass may be an alternative on some wet sites.

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 earth ditch, a grade stabilization structure, or other suitable outlets.

Establishment of vegetation

Grassed waterways will be vegetated according to practice standard Critical Area Planting (342).

CONSIDERATIONS

The most critical time in successfully installing grassed waterways is when vegetation is being established. Special protection such as mulch anchoring, straw or hay bale dikes, or other diversion methods are warranted at this critical period. Supplemental irrigation may also be warranted. The vegetation should be well established before large flows are permitted in the channel.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service,

National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning, eggs in gravel's, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quantity

This practice is used either to stabilize an active gully or serves as a stable outlet channel for contouring, contour stripcropping, diversions, terraces, rock barriers, water control structures, hillside ditches, and underground outlets. Since they are usually installed in areas of concentrated flow, their effect on the quantity of ground and surface water is minor. There may be a slight reduction in the peak discharge from the drainage area.

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

Water Quality

This practice may reduce the erosion in a concentrated flow area, such as in a gully or in ephemeral gullies. This may result in the reduction of sediment and substances delivered to the receiving waters. Vegetation may act as a filter in removing some of the sediment delivered to the waterway, although this is not the primary function of a grassed waterway.

Any chemicals applied to the waterway in the course of treatment of the adjacent cropland may wash directly into the surface waters in the case where there is a runoff event shortly after spraying.

1. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substance carried by runoff.
2. Filtering effects of vegetation on movement of sediment and dissolved and sediment-attached substances.
3. Short-term and construction-related effects on downstream water resources.

Planning

1. The drainage area must be treated adequately against sheet and rill erosion before a grassed waterway is installed to keep sediment from damaging the vegetation and reducing capacity of the grassed waterway.
2. Vegetated waterways perform most dependably in areas where dense stands of sod forming perennial grass can be used that will permit increasing water velocities several feet per second as compared to the bare earth channel. When only shallow rooted annual species can be maintained, safe velocities cannot appreciably exceed those for bare earth. When annual species are the only choice for waterway cover, supporting grade control structures will usually be needed for gully control.
3. Planting should be timed so plants will be established prior to expected runoff. Grassed outlets are easily damaged by continuous flows over long periods. Waterways receiving irrigation tailwater or prolonged trickle flows from snow melt will often require mechanical conveyances of sufficient capacity to contain the low-volume sustained flows.
4. Where irrigation water is available for establishment and maintenance, properly vegetated waterways can often provide esthetically pleasing solutions to erosion control problems for parks, golf courses 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 non-agricultural land.
5. Waterways require protection from channel flows until the vegetation is fully established and must have continuous protection from damage by vehicular traffic and grazing. Herbicides that would damage the cover must not be used. When temporary berms or dikes are used to keep runoff from entering the waterway during establishment,

allow sufficient distance from the waterway edge to accommodate removal without damaging the waterway.

6. Invading pocket gophers can cause excessive damage to waterways if not controlled. Maintenance plans should make provisions for prompt eradication.
7. Waterway shaping must be completed and associated mechanical structures (drops, pipes, permanent sprinkler systems, etc.) installed and inspected for conformance to design before starting vegetative measures.
8. The vegetative species chosen must be compatible with the overall crop management system. This is of special importance when selecting perennial or reseeding type annual species.
9. Annual species used for erosion control should be capable of rapid vigorous establishment and growth. Species should be selected for machine operations minimal and avoid use of equipment when soils are wet.
10. The planting mixture will be in conformance with the Vegetative Guide in Section II-D of the Field Office Technical Guide.
11. When used as a stable outlet for another practice, waterways may increase the likelihood of dissolved and suspended pollutants being transported to surface waters when these pollutants are delivered to the waterway.

PLANS AND SPECIFICATIONS

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

OPERATION AND MAINTENANCE

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