

## Grassed Waterway (Ac.) 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 system to support one or more of the following purposes:

- To convey runoff from terraces, diversions, or other water concentrations without causing soil 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. Grassed waterways shall not be designed for the conveyance of polluted runoff from livestock facilities.

The drainage area above the grassed waterway must be protected against erosion to the extent that expected sedimentation will not shorten the planned effective life of the grassed waterway.

The grassed waterway practice is not applicable to watercourses where construction of a waterway would destroy important woody wildlife cover and the present watercourse is capable of handling the concentrated runoff without excessive erosion.

### 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 designed waterway slope is less than 1 percent, out-of-bank flow may be permitted if such flow will not cause erosion. A maximum of 50 percent of the peak runoff from the 10-year frequency, 24-hour duration storm may be carried out-of-bank.

Grassed waterways that are part of a waste management system shall have the capacity to carry the peak runoff from the 25-year frequency, 24-hour duration storm.

**Velocity** - Design velocities shall not exceed 4.5 feet/sec. or those obtained by using the procedures, “n” values, and recommendations in the NRCS Engineering Field Handbook (EFH), Part 650, Chapter 7; whichever is less. Agricultural Research Service (ARS) Agricultural Handbook 667, Stability Design of Grass-Lined Open Channels may be used in place of NRCS EFH, Chapter 7. Maximum velocities shall be determined using a retardance of “D” or less. See Exhibit 7-2 and Michigan Supplement Exhibits 7-2.1 and 7-2.2 in NRCS EFH, Part 650, Chapter 7.

**Width** - The bottom width of trapezoidal waterways shall not exceed 50 feet.

**Side Slopes** - Side slopes shall not be steeper than a ratio of three horizontal to one vertical. Side slopes 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.

The minimum total depth of the grassed waterway shall be 0.8 feet. When out-of-bank flow will cause erosion or other damage, a minimum of 0.2 feet freeboard above the designed depth shall be provided.

**Earth Fill Areas** - All steep gully banks shall be sloped before filling. The slope before filling shall

not be steeper than a ratio of 1 horizontal to 1 vertical. Earth fill shall be compacted.

**Drainage** - Designs for sites having prolonged flows, a high water table, or seepage problems shall include: Subsurface Drains Practice Standard (606); Underground Outlets Practice Standard (620); Stone Center Waterways (NRCS Engineering Field Handbook (EFH), Part 650, Chapter 7), 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** - Grassed waterways shall be vegetated according to Critical Area Planting Practice Standard (342).

Use vegetation adapted to the site that will accomplish the desired purpose. Preference shall be given to native species in order to reduce the introduction of invasive plant species; provide management of existing invasive species; and minimize the economic, ecological, and human health impacts that invasive species may cause. If native plant materials are not adaptable or proven effective for the planned use, then non-native species may be used. Refer to the NRCS Field Office Technical Guide, Section I, Invasive Plant Species for plant materials identified as invasive species.

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, 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.

Use 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 grassed waterway to provide wildlife habitat and improve water quality by reducing sediment, fertilizer, and pesticides entering the grassed waterway.

Provide an outlet that meets the Filter Strip Practice Standard (393A) on small watersheds, especially downstream from manure application areas.

Use the Michigan Grassed Waterway Design Charts in the NRCS Engineering Field Handbook (EFH), Part 650, Chapter 7, as appropriate.

## PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s).

Support data documentation requirements are as follows:

- Inventory and evaluation records
  - Assistance notes or special report
- Survey notes, where applicable
  - Design survey
  - Construction layout survey
  - Construction check survey
- Design records
  - Physical data, functional requirements and site constraints, where applicable
  - Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:
  - Location map
  - “Designed by” and “Checked by” names or initials
  - Approval signature
  - Job class designation
  - Initials from preconstruction conference
  - As-built notes
- Construction inspection records

- Assistance notes or separate inspection records
- Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable.

#### **OPERATION AND MAINTENANCE**

An Operation and Maintenance (O&M) plan shall be developed for this practice. The O&M plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.