

# Sustainable drainage management

## Best management practice

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## 7 Grassed waterway

Complexity			Environmental value			Cost		
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High

### Definition & purpose

A broad, shallow, natural or constructed channel that is grassed. Surface storm water flows into and down the channel without causing soil erosion (e.g. rills, gullies).

### Location

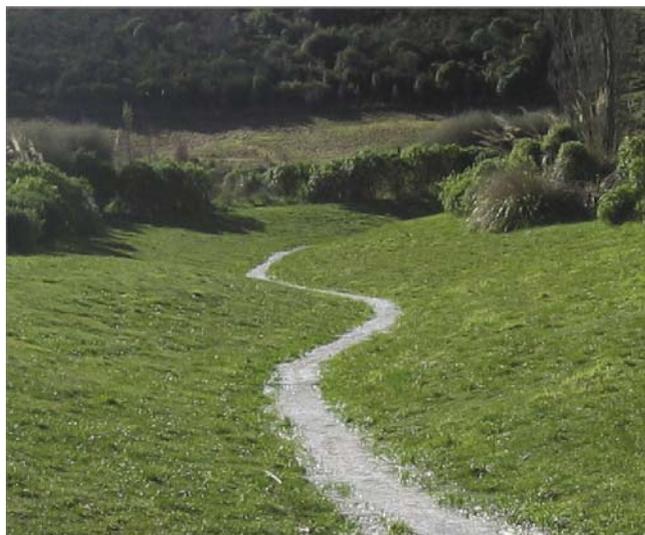
Grassed waterways are often constructed in natural depressions that channel water to a stream or wetland. These depressions are prone to erosion if they have poor vegetative cover. They work best on gentle slopes.

### Work window

- Undertake any earthmoving and outlet construction so that the grass cover is established prior to winter storm runoff.
- Avoid construction and maintenance if birds are breeding in the waterway course.

### Treatment objectives

1. Carry relatively large stormflows to streams without erosion.
2. Farm machinery and stock can cross the waterway.
3. Maintenance is low once vegetation is established.
4. Waterways should only be wet during storm runoff, otherwise development of good cover is inhibited and vehicle crossings are not possible without damage to the waterway.
5. If the channel is wet for long periods, use water tolerant plants.



Vegetation cover in the waterway slows the surface runoff and protects the land from erosion.

### Before you start

- Consult with District/Regional Council staff about design requirements such as stormflows and hydraulic roughness of grass cover.
- Obtain necessary approvals from the local authority.

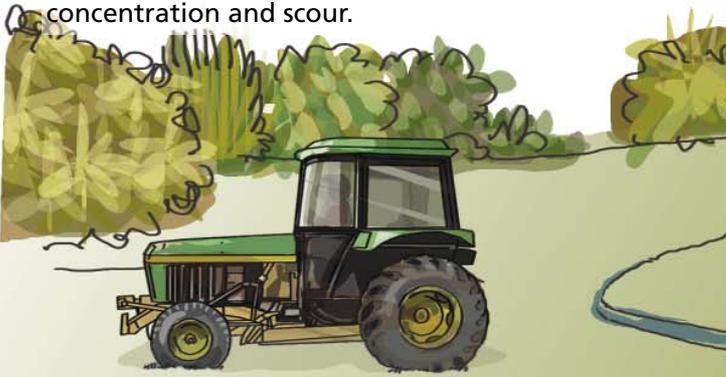
## Procedures

Correctly size the channel so that it will contain the design runoff without spilling onto surrounding land (e.g. cultivated field) and will spread the water sufficiently so that the bed does not erode. Steeper gradient channels require creation of a wider, shallower waterway.

Channel capacity depends upon the width, depth and grade, as well as soil erodibility and vegetative cover in the channel area.

Grassed waterways usually exit into open drains or streams and a stable outlet is necessary. If the waterway abruptly falls into the drain or stream, a rock chute spillway or vertical grade control structure is required.

Ensure that side slopes are less than 1:10 (rise over run) to allow machinery to cross. A common design error is to make the channel too deep, too narrow or too V-shaped, which encourages flow concentration and scour.



Waterways are constructed to natural field grade where possible, but experience shows the most satisfactory grade range to be 1-5%. Steeper grades require drop structures and/or an erosion resistant material in the waterway centreline (e.g. riprap).

Stabilising the soil surface during the establishment of grass (e.g. chemical soil stabilisers, spray on mulch).

During construction temporary erosion control measures may be required because severe storms could cause washouts. Use interceptor (diversion) drains to prevent large flows from entering the waterway until vegetation is established.

The main determinant of the allowable water velocity is the type, condition and density of the grass cover. Uniform cover is important so that flows do not concentrate. Patchy cover is prone to erosion. Often grasses or grass-legume mixtures can be used as an erosion-resistant cover for water velocities up to 1.2 m/s.

Maintenance is required, especially during the first year after establishment. Keep the waterway in good condition, with checks after storms:

- Repair and reseed bare or eroded spots quickly and remove sediment deposits
- Mow the waterway to maintain grass about 10-15 cm high
- If grazing is used, ensure that compaction or pugging does not occur
- Control pest plants
- Do not use the grassed waterway as path for stock or machinery
- Raise farm implements when crossing the waterway and keep sprayers shut off
- Plough the surrounding land at right angles to the waterway to allow surface water to flow into the waterway. Never plough a headland furrow parallel to the waterway, a gully will develop there in the future
- Manage land to reduce the accumulation of sediment in the waterway and avoid the possible future destruction of the waterway structure

## Additional reading

Stone, R. 1994. *Grassed waterways*. Ontario Ministry of Agriculture and Food Factsheet Queens's Printer, Ontario.