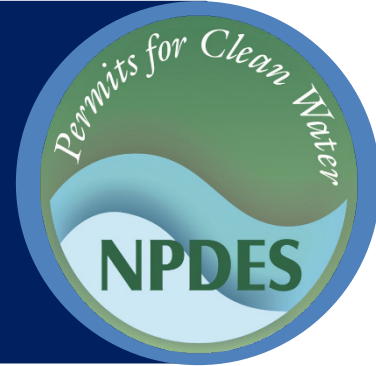




Stormwater Best Management Practice

Grass-Lined Channels



Minimum Measure: Construction Site Stormwater Runoff Control
Subcategory: Runoff Control

Description

A grass-lined channel is a graded, vegetated channel that collects and conveys stormwater while encouraging infiltration into the ground. Vegetation lining the channel slows down concentrated flow. Because grassed channels usually cannot control peak flows by themselves, construction staff typically use them with other stormwater control measures, such as riprap stabilization. Small grass-lined channels can also be used to transport stormwater—via gravity—from one stormwater control measure to another. For example, a grass-lined channel can connect a series of check dams or energy disruption devices to a sediment basin.

Where moderately steep slopes require drainage, grassed channels can include excavated depressions to increase storage, decrease flow rates and further enhance the sediment settling. Grass-lined channels with extra storage can also reduce peak discharges by temporarily holding stormwater in the channel.

Applicability

Grass-lined channels primarily provide stormwater conveyance and velocity control. Although they also provide limited filtration capacity, construction staff should not use grass-lined channels as a primary sediment control practice. If the velocity in the channel would erode the grass or sod, construction staff can use riprap, concrete or gabions (U.S. EPA, 2009). Geotextile materials can be combined with either grass or riprap linings to provide additional protection at the soil-lining interface. Grass-lined channels are applicable to areas that need erosion-resistant conveyances, including areas with highly erodible soils and moderately steep slopes (only up to 5 percent). Construction staff should only install grass-lined channels where space is available for an adequately large cross section.

Siting and Design Considerations

Developers should site grass-lined channels in accordance with the natural drainage system. The



Grass-lined channel in a construction area.

Credit: Anthony D'Angelo for USEPA, 2017

channel design should not cross ridges, have sharp curves or feature significant changes in slope. The channel should not receive direct sedimentation from disturbed areas, and designers should site them only on the perimeter of a construction site to convey relatively clean stormwater discharge. To reduce sediment loads, developers can separate channels from disturbed areas using a vegetated buffer or another primary sediment control practice.

In addition to any local design specifications and requirements, basic design recommendations for grass-lined channels generally specify that construction staff should (WDE, 2014):

- Construct and vegetate the channel before site grading and paving activities begin, allowing vegetation to fully stabilize before stormwater is conveyed.
- Base maximum design velocities on soil conditions, vegetation type and expected flow rates and ensure that velocities do not exceed 5 feet per second. If design velocities are expected to exceed 2 feet per second before vegetation is established, construction staff should install a temporary liner.

- Use triangular channels for low velocities and small quantities of stormwater and parabolic or trapezoidal channels for larger flows.
- Install riprap lining or subsurface drainage, if necessary, in areas that experience prolonged wet conditions.
- Install outlet stabilization structures if the discharge velocity is expected to be high.
- Ensure that side slopes are 2:1 or flatter for safety and erosion purposes.

Limitations

If construction staff do not properly install grass-lined channels, the channels can change the natural flow of surface water and adversely affect downstream waters. Also, if a large storm event exceeds the design capacity, the vegetation might not be adequate to prevent erosion, which might damage or destroy the channel. Clogging with sediment and debris reduces the effectiveness of grass-lined channels for stormwater conveyance. Increased infiltration could be a concern for buildings near the grass-lined channel with below-grade basements or downgradient slope failure (MPCA, 2019).

Maintenance Considerations

The maintenance requirements for grass-lined channels are relatively minimal. During the establishment of

vegetation, inspect the channels after every storm. After vegetation establishment, mow it, remove litter and perform spot vegetation repair. Check for areas of scour or undercutting near outlet and inlet structures. The most important objective in grass-lined channel maintenance is to maintain a dense and vigorous growth of turf because it is the primary erosion protection for the channel. Remove vegetation and soil buildup to eliminate water flow obstructions within the channel. During the growing season, cut the channel grass no shorter than the level of the design flow (WDE, 2014).

Cost Considerations

Installation costs will vary greatly depending on the amount of earthwork the channel requires, the use of seed or sod, and any required additional protection measures such as lining or riprap. However, installation is generally quick, and (after vegetation establishment) the channel will need minimum maintenance if the channel is appropriately sited and designed by developers. Developers can design grass-lined channels as post-construction stormwater controls that are permanently left in place after construction staff stabilize the construction site. The channels, in combination with other practices that detain, filter or infiltrate stormwater, can substantially reduce the size of permanent detention facilities like stormwater ponds and wetlands, thereby reducing the overall cost of post-construction stormwater management.

Additional Information

Additional information on related practices and the Phase II MS4 program can be found at EPA's National Menu of Best Management Practices (BMPs) for Stormwater website

References

MPCA (Minnesota Pollution Control Agency). (2019). *Sediment control practices—Buffer zones*. In *Minnesota stormwater manual*.

U.S. Environmental Protection Agency (U.S. EPA). (2009). *Development document for final action for effluent guidelines and standards for the construction and development category*. (EPA-821-B-04-001).

Disclaimer

This fact sheet is intended to be used for informational purposes only. These examples and references are not intended to be comprehensive and do not preclude the use of other technically sound practices. State or local requirements may apply.