Stormwater Best Management Practice

Filter Berms

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

Description

A gravel or stone filter berm is a temporary ridge made up of loose gravel, stone or crushed rock that filters sediments from sheet flow.

Applicability

Gravel or stone filter berms are most suitable for areas with a shallow slope (10 percent or less) and where stormwater primarily travels as sheet flow. Construction staff can place filter berms at the toe of a slope, at construction site perimeters, at inlet/outlet structures and around potential pollution sources. Staff should not place berms in areas of concentrated flows (DOWL, 2015). Filter berms can divert and filter flows from areas of open traffic (SPU, 2017), and they can be particularly useful in areas where municipalities prohibit earth-disturbing activities or find them undesirable, such as archaeological or historical sites, sites containing historical artifacts, or areas with soil or water contamination (MDE, NRCS, & MASCD, 2011).

Siting and Design Considerations

Design engineers should consult local design criteria and specifications for design requirements and can consider the following general guidelines when building a filter berm (DOWL, 2015; MDE, NRCS, & MASCD, 2011; SPU, 2017; WES, 2008):

- Use washed, well-graded gravel or crushed rock—with sizes ranging from 3/4 inches to 3 inches in diameter—containing less than 5 percent fines.
- Space berms according to the steepness of the slope. Space them closer together as the slope increases.
- The berm should receive flow no greater than 1 cubic foot per second per 8 linear feet of berm.
- Remove and dispose of sediment buildup and replace the filter material as capacity decreases.

A gravel filter berm covered with filter fabric.
Credit: Anthony D'Angelo for USEPA, 2015

Regular inspection should indicate how often construction staff need to remove sediment.

- Filter berms should be at least 2 feet wide at the top, with side slopes of 3:1 or flatter.
- For best sediment removal performance, embed the berm at least 4 inches into the ground (unless ground contamination concerns exist).
- Install filter berms parallel to contours of the site to intercept and slow sheet flow.

Limitations

Construction staff should install filter berms only in gently sloping areas (less than 10 percent). Berms have a limited life span due to sediment clogging. The addition of filter fabric on the upstream side of the berm can extend the life of the berm media (WES, 2008). Filter berms are also susceptible to undermining and washouts (DOWL, 2015).

Maintenance Considerations

Construction staff should inspect filter berms before significant rainfall events to ensure sediment has not built up and that the berms have not been damaged and are still operational. After rainfall events, staff should

EPA-832-F-21-028E
December 2021

also inspect filter berms for sediment buildup, undermining and washout and rebuild the berms as necessary. Construction staff should remove sediment when buildup equals one-third of the berm's height and replace rock or gravel after filter capacity reduces by one-half (WES, 2008). It is important to make repairs at the first sign of deterioration to keep the berm functioning properly.

Effectiveness

The effectiveness of a filter berm depends on rock size, slope, soil, rainfall amount and proper sizing.

Construction staff do not have to stake filter berms into the ground, and the berms require no trenching, though trenching will increase the berm's effectiveness.

Cost Considerations

Construction materials for filter berms can be more expensive than materials for other practices, mainly due to the need for washed gravel or rock (WES, 2008). In addition, labor costs associated with installation and regular maintenance can be high. Costs are lower in areas of less traffic, gentler slopes and low rainfall.

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

DOWL. (2015). Erosion and sediment control best management practices manual. Montana Department of Transportation.

Maryland Department of the Environment (MDE), Natural Resources Conservation Service (NRCS), & Maryland Association of Soil Conservation Districts (MASCD). (2011). *2011 Maryland standards and specifications for soil erosion and sediment control.* Baltimore, MD: Maryland Department of the Environment.

Seattle Public Utilities (SPU). (2017). *City of Seattle stormwater manual* (Vol. 2).

Water Environment Services (WES). (2008). *Erosion prevention and sediment control: Planning and design manual*.