# Stormwater Best Management Practice

# Sediment Traps

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

## Description

Sediment traps are small, temporary ponding basins that treat stormwater by allowing sediment particles to settle out of the water. Typically lying in a drainageway or other point of discharge from a construction site, they capture stormwater before it flows into the surrounding area (U.S. EPA, 2007). Sediment traps detain sediments in stormwater to protect receiving streams, lakes and drainage systems.

To create a sediment trap, construction staff excavate an area or place an earthen embankment across a low area or drainage swale. An outlet or spillway often features large stones or gravel to slow the release of stormwater into the receiving water body (Washington Department of Ecology, 2019).

A sediment trap in an unstabilized area with sediment-laden stormwater collected inside.

Photo Credit: USEPA/Wikimedia

## Applicability

Sediment traps are common at the outlets of stormwater diversion structures, channels, slope drains, construction site entrance wash racks, or any other stormwater conveyance that releases waters containing sediment and debris. They are only suitable for small drainage areas—generally 5 acres or less, though some states and localities set smaller thresholds.

## Siting and Design Considerations

Design engineers can place multiple sediment traps on a construction site to treat stormwater in different areas (U.S. EPA, 2007). When siting the traps, they should consider the site's natural drainage patterns and place the traps to manage areas with the highest erosion potential. They should also take care to give construction staff easy access to the traps, so they can periodically inspect the traps and remove any accumulated sediment. Design engineers should also strive to prevent flow from undisturbed areas from entering the traps so as to maximize treatment of disturbed areas.

Specific design requirements vary by location and site conditions, but some design considerations are common to all applications. Many municipalities require sediment traps to have a minimum volume of 1,800 cubic feet per acre of drainage area. Additionally, most design manuals provide equations to calculate the required volume based on the design flow rates and particle settling velocity. Designs should optimize the surface area of the sediment trap to allow for maximum infiltration and settling. This increases the effectiveness of the trap and decreases the likelihood of backup during and after periods of high flow.

The width of the outlet should correspond to the amount of flow the sediment trap receives. For example, the Tennessee Department of Conservation requires the outlet to be at least 4 feet wide for a 1-acre drainage area (TDEC, 2012).

When excavating the area for a sediment trap, construction staff should make sure the side slopes meet local design requirements but are no steeper than 2:1. The embankment height should be no more than 5 feet from the original ground surface. Construction staff should machine-compact all embankments to ensure stability. To reduce the flow rate of the sediment trap discharge, construction staff should line the outlet with well-graded stone.

If the sediment trap is near a residential area or if trespassing is likely, construction staff should secure the area with a fence.



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

## Limitations

Sediment traps are not suitable for large drainage areas (generally greater than 5 acres). They also do not last long—their effective life span is usually 24 months or less (NCDEQ, 2013; TDEC, 2012). Although sediment traps are effective in removing eroded soils, their detention periods are too short for removing fine particles like silts and clays.

## Maintenance Considerations

Over time, captured sediment will accumulate in a sediment trap and interfere with its ability to effectively treat incoming stormwater. Construction staff should remove sediments when the basin reaches 50 percent capacity. Additionally, they should inspect the sediment trap after each rainfall event for damage from erosion and to ensure that the trap is draining properly.

## Effectiveness

Design engineers should construct sediment traps in accordance with design manual specifications to ensure high sediment removal efficiency, generally 50 to 70 percent (Wossink et al., 2005). Still, a trap's performance varies depending on a number of factors including the trap's surface area, rainfall intensity, peak inflow rates, the level of disturbance or erosion in the contributing area, and proper maintenance (NCDEQ, 2013). Traps that provide pools with large length-to-width ratios or incorporate internal baffles—both of which provide greater opportunity for sedimentation—are generally more effective.

## Cost Considerations

The cost of constructing a sediment trap includes excavation, grading, compaction and stone. Excavation can be one of the largest costs and generally ranges from $2 to $3 per bulk cubic yard (RSMeans, 2020).

**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

North Carolina Department of Environmental Quality (NCDEQ). (2013). *Erosion and Sediment Control Planning and Design Manual.* North Carolina Sedimentation Control Commission; North Carolina Department of Environment, Health, and Natural Resources; and the North Carolina Agricultural Extension Service.

RSMeans. (2020). RSMeans data from Gordian [Online data file].

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U.S. Environmental Protection Agency (U.S. EPA). (2007). *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites.* EPA 833-R-06-004.

Washington Department of Ecology. (2019). *2019 Stormwater Management Manual for Western Washington.*

Wossink, A., Mitasova, H., & McLaughlin, R. (2005). *The Cost Effectiveness of Standard and Alternative Sediment and Turbidity Control Systems on Construction Sites in North Carolina*. Water Resources Research Institute of the University of North Carolina. Smolen, M.D., D.W. Miller, L.C. Wyatt, J. Lichthardt, and A.L. Lanier. 1988. *Erosion and Sediment Control Planning and Design Manual*. North Carolina Sedimentation Control Commission; North Carolina Department of Environment, Health, and Natural Resources; and Division of Land Resources, Land Quality Section, Raleigh, NC.