



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026
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4.4.9 Sediment Tubes and Socks



****SOCK ** SOCK ** SOCK FILTER SOCK**
TUBETUBE**TUBE SEDIMENT TUBE**

Source: TNWRC

Definition and Purpose

Sediment tubes (often referred to as wattles) and socks are sediment barriers often used in place of traditional barriers such as silt fence or conventional riprap in concentrated flow applications. They are used to slow the velocity of water, thereby allowing sediments to settle out, in addition to some filtering capacity.

Sediment tubes consist of weed- and seed-free straw or hardwood mulch wrapped in a tubular plastic, biodegradable netting, or similar encasing. Tubes should have sufficient density to hold their shape when saturated, but must also have open space to allow water to pass through. Sediment tubes are pre-assembled.

Sediment socks, often referred to as filter socks, filter logs, or compost socks, consist of flexible mesh tubes (preferably made from natural materials) filled with wood chips, composted material, or a combination of the two. Filter socks are constructed in the field with pneumatic equipment blowing the material into the casing, providing greater flexibility to obtain a sediment barrier of a specific length.

Appropriate Applications

Sediment tubes and socks are versatile perimeter and slope control practices that reduce runoff velocity, filter sediment, and capture pollutants in areas subject to sheet or rill erosion.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

They are typically placed along slope contours, at the top or toe of slopes, around soil stockpiles or inlets, and along site perimeters, but can also function as check dams, diversion berms, or protection around sensitive trees and natural features where trenching is not feasible. They mostly function to retain sediment on site but can filter pollutants, particularly when composted fill is used. These measures are generally used in combination with other EPSC measures such as surface roughening, mulching, or seeding.

Limitations and Maintenance

These devices should never be used in streams and provide little to no benefit on pavement, rocky soils, or areas with heavy traffic where stakes cannot be properly anchored or where they may be damaged by vehicles. Correct installation along horizontal contours is critical; otherwise, flows can concentrate at low points, leading to bypass. Regular inspection helps to identify gaps, undercutting, or damage. Accumulated sediment is to be removed once it reaches one-half the device height, and repairs or replacements should be made promptly to maintain functionality. Over time, wattles and socks degrade, with straw wattles generally lasting 12 to 18 months and socks lasting six months to a year, necessitating a replacement schedule for longer projects (VDEQ, 2024). Nonbiodegradable tubes and socks must be removed and disposed of properly after site stabilization. Any trenches or depressions that were created during installation or removal need to be backfilled. Fully biodegradable options may be left on-site once construction is complete. Consider removal operations, as saturated tubes and socks can become heavy and difficult to move. Whenever feasible, use plastic-free alternatives as they promote more environmentally- and wildlife-friendly conditions and are biodegradable (can be left in place once construction operations are complete).

Planning and Design Considerations

Both sediment tubes and filter socks require careful preparation of the installation area to ensure effectiveness. The ground should be cleared of vegetation, debris, stones, and irregularities to maintain continuous contact between the surface and the device to prevent undercutting. For sediment tubes, shallow trenching, typically at least two inches, is needed to securely anchor them in place in addition to stakes. Wooden stakes are ideal for tubes, driving them in at an angle on the downstream side of the tube or driving two in on either side to form an A-frame. Install wooden stakes at four-foot intervals (shorter if applied in concentrated flows), leaving only a couple of inches of stake exposed above the wattle. This method of staking locks the wattle in place, preventing lateral movement and floatation. Avoid staking through the wattle as this will loosen the filling material, forming a preferential flow path, which may potentially lead to floating and undercutting. On the other hand, sediment socks generally do not require trenching, but staking is advised. It is especially important not to stake through sediment socks.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

Sediment tubes may contain straw, which must be certified weed-free, or other approved media, or mulch. Sediment socks are typically filled with compost or coarse organic blends, with specifications provided in Table 4.4.9-A, compacted pneumatically for consistency and performance. Refer to Section 4.2.6.2 for guidance on recommended compost products. Filter socks can be assembled on-site by filling mesh sleeves to the desired length or delivered prefilled for immediate placement. Because socks can be assembled to various lengths (generally up to 250 feet), they offer flexibility in coverage across long slopes or perimeters. Sediment tubes, by contrast, are generally shorter and require segments to overlap at least 24 inches to eliminate the likelihood of bypass. Longer-duration projects may require periodic replacement.

Table 4.4.9-A: Minimum filler specifications for compost sediment sock filling. Source: TDOT.

Property	Standard
pH (pH Units)	5 - 8.5
Moisture Content (% Wet Weight)	< 60
Organic Matter Content (% Dry Weight)	25 - 100
Physical Contaminants (% Dry Weight)	< 1
Particle Size (% Passing)	2 inch - 99%; 3/8 inch - 30% to 50%

The selection of diameter and length for sediment tubes and filter socks depends on site slope, drainage area, and flow conditions. On slopes, both devices should be installed along contours with their ends turned upslope to prevent bypassing. Filter socks are generally available in diameters of eight, 12, 18, and 24 inches, with larger diameters suited for steeper or longer slopes. Similarly, sediment tubes range from 8 to 24 inches on slopes, but should have a minimum of 20 inches when installed in ditches to function effectively as velocity control devices.



Spacing between rows is based on slope gradient and length (Table 4.4.9-B). The drainage areas to only one row of sediment tube or similar should not exceed the maximum allowable load; a best practice is to have roughly one-quarter acre of drainage area per 100 linear feet for both measures (TDOT). In ditch or channel applications, both practices must extend up the side slopes high enough to prevent overtopping. Because individual segments are rarely long enough to span a ditch, overlapping or staggering joints are required to avoid gaps. For



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

filter socks, stacking smaller-diameter units can substitute for a single larger sock to meet height requirements. Refer to Figure 4.3.3-B for spacing requirements for sediment tubes and socks in concentrated flow applications.

Table 4.4.9-B: Horizontal spacing recommendations for sediment tubes and socks on slope applications. Source: TDOT.

Slope	Tube Diameter (inch)			
	8	12	18	24
2%	70	80	-	-
5%	30	60	80	-
10%	20	30	70	80
6H:1V	-	20	40	55
4H:1V	-	20	30	30
3H:1V	-	-	20	25
2H:1V	-	-	20	20

- Spacing not recommended to exceed 80 feet.

Finally, the design must consider flow volumes and project-specific water quality concerns. Sediment tubes and filter socks are not sized to convey large storm events; rather, they act as velocity reducers and sediment barriers, with filtration occurring primarily during smaller flows. This makes contour placement and spacing critical to avoid concentrating runoff between devices. In addition, designers should weigh nutrient considerations when using compost-filled socks, especially near sensitive or nutrient-impaired waters, as compost can both retain and release nutrients depending on site conditions. Thoughtful design that accounts for slope, drainage, material selection, and water quality ensures that both sediment tubes and filter socks function effectively within an erosion and sediment control system.

Example Application

No formal design or quantities are required for this measure and therefore are not presented here.

References

TDOT. *Drainage Manual Ch10*.
VDEQ. (2024). *Virginia Stormwater Management Handbook*.