



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

Chapter 4 - Erosion Prevention and Sediment Control Measures

With site specific EPSC plans, EPSC measures are more effective at reducing, capturing, storing, and treating sediment laden runoff from construction sites. The first and most important step in erosion prevention and sediment control is minimizing soil disturbance and preserving the existing vegetative cover. Well planned projects avoid and minimize adverse impacts, and where disturbance is necessary, the least impactful construction processes are chosen. Final stabilization should be implemented as soon as possible. Broadly, EPSC measures can be classified into three main categories: erosion prevention, runoff velocity control, and sediment control. However, many EPSC measures are multi-functional and reduce sediment pollution by multiple means.

Erosion prevention practices are used to protect exposed soils from erosive forces thereby promoting soil to remain onsite and in place. Runoff velocity controls are implemented to reduce the velocity of runoff for two primary reasons: 1) to limit soil exposure to erosive forces, and 2) so that soil particles have a greater chance of settling before discharged to nearby surface waters. Lastly, sediment controls are designed to reduce or eliminate eroded soils from being transported off the construction site. All forms of EPSC measures will function more effectively when installed and designed with the Five Pillars of construction stormwater management (Section 6.3; Fagan, 2020), innovative methods (Section 6.4), and site specific methods to address common issues (Section 6.5) in mind.

Some EPSC measures are prefabricated and can be purchased from manufacturers for installation on construction sites. Prefabricated devices are manufactured in bulk and are usually devices applicable to areas commonly found on construction sites. Therefore they are not formally designed by the engineer. However, prefabricated devices still require a site specific design aspect. They are to be installed following guidance throughout the manual, per manufacturer specifications, and in accordance with SWPPP details that are specific to the site. That is, site conditions must be appropriate for the prefabricated measure and all site conditions (elevations, stations, etc.) are to be specified in the SWPPP, details that vary from site to site, despite the same product specifications. TDOT's Qualified Product List (QPL) is a resource that includes prefabricated measures and devices approved for use in lieu of a site constructed EPSC measure: (<https://www.tn.gov/tdot/materials-and-tests/research---product-evaluation-and-qualified-products-list.html>). TDEC does not require EPSC measures to be specifically listed in this handbook or in the QPL; these are resources that contain best practices for maintaining construction site compliance.



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4.1 Environmental Impacts

Over the past few decades, copious amounts of research has led to the formulation of design standards and criteria that result in highly effective EPSC measures (in terms of sediment retention onsite) when they are carefully constructed and maintained properly (Moore & Clayton, 2020; Rowlands, 2019). In fact, Moore & Clayton (2020) found that site wide implementation and maintenance of EPSC measures typically resulted in upwards of 90% total sediment retention onsite. However, traditional use of common EPSC measures such as rolled erosion control products (RECPs), silt fences, hydromulches, nettings (typically used on RECPs and wattles), etc., that are highly effective at retaining sediment onsite, can have unintended environmental impacts.

Degradation of plastic EPSC measures (mechanical abrasion, photodegradation, and water-induced erosion of materials) leach chemical additives, microplastics, and macroplastics that are particularly harmful to soil, water, and wildlife (Rich et al., 2020). Byproducts of plastic degradation accumulate in both abiotic and biotic sources (Ali et al., 2021), and because of their persistence in the environment, invertebrates and vertebrates ingest them, leading to accumulation in tissues which then move through the food chain (Horton et al., 2017). Nettings, meshes, and RECPs are usually intended to be left onsite, many of which are not composed of degradable materials. Not only are these products plastic, but they also have great potential for wildlife entanglements, which is perhaps the greatest concern for many agencies across the nation. Further, wildlife entanglement is the most cited environmental harm induced by EPSC measures (Whitman et al., 2025). Other EPSC measures or natural, wildlife-friendly counterparts [materials that use natural fiber or 100 percent biodegradable materials and that use a loose weave with a non-welded, movable jointed netting (USEPA, 2022)] should first be considered. While very limited literature exists regarding the sediment retention capabilities of natural counterparts, agencies across the nation have made visual observations of such measures performing as well or better than their synthetic counterparts (Whitman et al., 2025). Wood and other natural fibers, coconut coir, cotton, and jute are commonly reported natural materials that can replace plastic (Figure 4-A). In addition, while nylon is not a natural material, it may be a better alternative to polypropylene, when measures are to be left in the ground. Nylon is more resistant to degradation than polypropylene and will contribute less microplastics to the environment.



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Figure 4-A: Example of a plastic double net coconut rolled erosion control product (left) and a natural, biodegradable counterpart (right) composed of a double jute netting. Source: Theissen and Deem (2025).

Hydromulches are typically dyed green using malachite green, a triphenylmethane, to help operators visualize coverage. However, triphenylmethanes degrade slowly, bioaccumulate, have adverse effects on macroinvertebrates, fish, and various other aquatic and semi-aquatic organisms when used at sufficiently high concentrations (Lyle, 2020). It is therefore recommended that construction personnel purchase hydromulches premixed with dye, as most manufacturers are aware of environmental thresholds and produce hydromulches that are environmentally safe (Theissen and Deem, 2025). Premixed hydromulches are typically considered an environmentally preferred alternative to synthetic RECPs.

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4.2 Erosion Prevention

Erosion prevention practices are ground covers, grading techniques, diversions, and liners that limit erosion through various processes. Ground covers include vegetation, mulch, blankets, and other stabilizers that absorb the energy of raindrop impact, thereby reducing sheet erosion. Grading techniques disrupt continuous slopes, preventing runoff from gaining erosion potential while traversing downslope. Diversions can include slope drains and temporary channels or berms that divert or bypass concentrated flows away from disturbed areas. Grading techniques and diversions help control rill and gully erosion. Lastly, liners such as riprap, RECPs, and vegetation stabilize channels conveying concentrated flows. Refer to Sections 3.3.2, 3.3.2.1, and 3.3.2.2 for definitions and guidance on the different types of riprap: conventional, soil, and void-filled. Stable liners that can withstand shear stress are critical for reducing channel erosion. Implementing these controls helps maintain soil integrity onsite, reduces long-term site maintenance costs, and enhances the overall sustainability of the construction project. It is critical to control erosion by various processes depending on which type of erosion (sheet, rill, gully, or channel) is most likely to be observed due to site specific characteristics. Upon completion of construction, the site must be stabilized. For phased projects, contractors may proceed to the next phase once stabilization measures have been implemented on the previous phase; however, inspections of the stabilized area should continue until vegetative coverage of 70% or greater is achieved, where applicable.

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4.3 Runoff Velocity Control

Controlling the velocity of runoff on construction sites is crucial in preventing soil erosion and minimizing sediment transport. High velocity runoff can dislodge soil particles and carry them into nearby water bodies, contributing to sedimentation impairments. Managing runoff velocity through practices such as check dams, energy dissipators, benching and terracing, etc. helps reduce erosion rates and may enhance infiltration. This reduces the volume of polluted stormwater entering conveyance or drainage infrastructure while slowing the velocity of runoff, a critically important aspect in providing sufficient time for particulates to settle. Furthermore, controlling runoff velocity mitigates the risk of structural damage to construction site infrastructure and neighboring properties caused by uncontrolled water flow. Implementing these measures promotes sustainable construction and perseverance of nearby ecosystems.

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4.4 Sediment Control

Sediment control practices attempt to prevent sediment that has already been eroded from leaving the construction site via stormwater runoff. These practices are generally installed at the most downgradient locations of a construction site and are therefore one of, if not the, last line of defense in mitigating sediment pollution. Engineers and construction personnel cannot solely rely on sediment control measures to comply with regulations. While sediment control measures can be incredibly efficient at trapping sediment onsite, the best way to prevent sediment impairment is for sediment not to be eroded and transported in the first place. The Tennessee CGP requires maintenance of all sediment control measures once 50% of the sediment storage capacity is reached. However, if maintenance is needed and recent rainfall has led to saturated site conditions, it may be acceptable to postpone maintenance operations for some measures as this could inadvertently contribute to erosion and sediment loss. When postponing maintenance operations, consult the engineer to understand if the remaining 50% capacity is sufficient for any imminent rainfall. Additionally, it is best to install supplemental sediment control measures that do not require heavy machinery such as wattles, filter socks, slash mulch berms, or silt fence, especially if site conditions are expected to remain saturated for an extended period of time because saturated conditions still must comply with all requirements in the CGP. By capturing eroded soils, these measures reduce water pollution, protect aquatic ecosystems, and maintain the integrity of stormwater drainage systems. However, there must be a plan in place for captured sediment once removed from the sediment control measure. Soils that have been eroded once, will surely erode again. It is typically encouraged for collected sediment to be moved to a location distant from concentrated flow paths (whether it be onsite or offsite) and stabilized.

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4.5 Multipurposed Measures

Understanding site specific conditions and drainage patterns will assist the designer in selecting which measure to use at various locations throughout the site. Certain practices are best suited for specific hydrologic conditions such as dissipating raindrop impact, managing sheet flow, shallow concentrated flow, or open channel flow, while others may be more broadly applicable. Selecting an unsuitable measure increases the risk of failure, potentially resulting in sediment discharges and violating the CGP. For example, a common design error involves placing silt fence along the entire site perimeter without considering concentrated flow paths or topography. When exposed to concentrated flows, silt fences are prone to failure and would not be an appropriate measure. Moreover, installing silt fence along the upslope side of a site is generally unnecessary, as it would only intercept run-on from adjacent properties rather than treating onsite runoff. In some cases, this may inadvertently obstruct stormwater and cause localized flooding. A more effective strategy would be to install a diversion to reroute run-on around the site. Additionally, the materials used in constructing a measure influences their applicability. For example, a Type I RECP (Section 4.2.6.6) may only be pertinent on a hillside, while Type IV may be applicable on the hillside or in areas of shallow concentrated flow.

In many cases, multiple EPSC measures may be equally appropriate for a given condition (Table 4-A). When this occurs, consider factors such as cost, material availability, reusability during different phases of construction, logistical considerations, and environmental impacts. From a regulatory perspective, these factors are not of concern, provided that the selected measure is appropriate for the intended treatment type and is implemented effectively. For example, both wattles and silt fences are commonly used to manage sheet flow. Substituting one for the other is generally acceptable to regulators; however, site specific conditions, such as shallow bedrock that prevents proper silt fence installation, may necessitate the use of wattles to ensure functionality and compliance. Further, wattles with a biodegradable netting would pose less to no environmental impact compared to silt fence. As another example, wattles may be used as barriers to treat sheet flow or as check dams within ditches to slow runoff and promote sedimentation of turbid waters. The effectiveness of such measures depends not only on the selection of an appropriate product but also on its proper application and installation. EPSC measures are versatile tools, and it is ultimately the responsibility of the engineer to determine the most effective measure for each location, as well as the correct method of installation.



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Table 4-A: EPSC measures and their primary (bolded font) and secondary purposes (normal font).

EPSC Measure	Erosion Prevention	Runoff Velocity Control	Sediment Control
Diversion Berm or Dike	X		
Diversion Channels	X		
Diversion Pipes and Culverts	X		
Grade Control	X	X	
Slope Drain	X		
Channel and Swale Stabilization	X	X	
Compost Blanket	X		
Gravel Access Road Stabilization	X		
Hard Armoring	X	X	
Hydroseeding, Soil Binders, and Tackifiers	X		
Rolled Erosion Control Products	X	X	
Sod	X	X	
Stabilization with Plastic Covering: Emergency	X		
Stabilization with Straw or Mulch: Temporary	X		
Topsoil Stockpiling	X		
Vegetation and Landscaping: Permanent	X	X	
Vegetation: Temporary	X	X	
Benching and Terracing		X	
Channels and Swales		X	
Check Dams, Enhanced, Gabion		X	X
Energy Dissipator		X	
Level Spreader		X	X
Riprap Apron		X	X
Stilling Basin		X	X
Surface Roughening		X	X
Brush Fabric Barrier		X	X
Filter Berms: Slash Mulch		X	X
Filter Strip		X	X
Inlet Protection: Area			X
Catch Basin Filter Assemblies			X
Inlet Protection: Curb			X
Inlet Protection: Filter Rings for Culverts		X	X
Sediment Basin		X	X



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Sediment Trap	X	X
Sediment Tubes and Socks	X	X
Silt Fence and Associated Variants	X	X
Weep Berms	X	X
Baffles: Porous, Solid	X	X
Perforated Riser Pipe, Skimmer	X	X
Dewatering Structure	X	X
Floating Turbidity Curtain		X
Flocculants and Polymers		X
Sediment Filter Bag		X

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