Temporary Erosion & Sediment Control Overview

Temporary construction erosion and sediment control is the practice of preventing or reducing the movement of sediment from a site during construction through the implementation of man-made structures, land management techniques, or natural processes. Note that this Fact Sheet does not contain detail on the use of specific BMPs. Because there are many good resources on erosion and sediment contol, this Fact Sheet merely discusses their use and refers the reader to other useful resources for detail.

1. Introduction

Temporary construction erosion and sediment control limits the amount of sediment that is carried into lakes, streams and rivers by storm water runoff. Sediment carries nutrients and pollutants that degrade water resources and harm aquatic wildlife. Proper planning of construction site activities greatly reduces the impact of soil disturbance activities on nearby resources and diminishes the need for costly restorations. A construction plan that limits sediment disturbance in potential problem areas and uses effective temporary sediment control practices will lessen negative impacts to local water resources and natural areas.

Photo: MPCA

2. Planning

To establish a construction plan that will minimize sediment movement, designers will need information on existing site conditions and neighboring resources that require special consideration including water bodies, natural areas, bluffs and other highly erodible or sensitive areas. Construction activities should be designed in a manner that minimizes overall soil disturbance and phases areas of disturbance such that the amount of land disturbed at any one time is reduced. This type of planning will limit the need for larger structural sediment control solutions. Additionally, the designer should determine which local, state, and federal agencies require permits for the type of work planned. The site plan will need to account for the requirements of all agencies issuing permits.

3. Permits

Projects disturbing one acre or more of land or part of a commmon area that is disturbed will require a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit from the Minnesota Pollution Control Agency. The size threshold can be smaller if the site is a part of a "common plan of development or sale" and if the larger common plan will ultimately disturb more than one acre (see NPDES Construction General Permit). The permit requires the establishment of a Stormwater Pollution Prevention Plan (SWPPP) for the construction site.

Other Minnesota agencies requiring permits typically might include watersheds, municipalities, and soil and water conservation districts.

4. Sequencing Activities

The practices included in the site plan and SWPPP will need to control runoff, stabilize slopes and exposed soils, and limit the movement of soils into drainage systems and natural areas. A key factor in accomplishing these goals is the sequencing of construction activities such that the minimum possible area is disturbed at any one time. Initial site work should include establishing protective buffer zones adjacent to onsite resources that require protection and setting up perimeter sediment controls.

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Site without temporary sediment control

Site with temporary sediment control

During the course of construction, a variety of erosion prevention and sediment control practices may be necessary in order to stabilize slopes and drainageways, protect inlets to the storm water conveyance system, limit gully formation, and capture sediment. Table 12.CONST.1 summarizes some of the most common temporary erosion and sediment control practices, the on-site areas to use the practices, and the method of use for each of the practices. Table 12.CONST.2 indicates NPDES requirements and the temporary sediment control practices that can be used to fulfill these requirements. Temporary seeding is not erosion protection or sediment control until vegetation is established or until the area is protected with an erosion control blanket. Projects that are actively under construction in winter/frozen months should include additional inspection and clean-up activities. Temporary sediment basins should be sized to include extra storage for snowmelt, as discussed in Chapter 9.

5. Inspection and Maintenance

A final key element to ensure effectiveness of the erosion and sediment control plan is the implementation of an inspection and maintenance program. Frequent inspection and maintenance activities ensure that the installed temporary sediment control practices are operating effectively throughout the course of the project.

6. References

Minnesota Department of Transportation, 2003. 2003 Seeding Manual. http://www.dot.state.mn.us/environment/pdf_files/SeedingManual2003.pdf

Minnesota Department of Transportation, 2000. *Mn/DOT Standard Specifications for Construction*. http://www.dot.state.mn.us/tecsup/spec/

Minnesota Erosion Control Association and Minnesota Department of Transportation, 2001. Erosion & Sediment Control Certification & ETeam Training Program 2001. http://www.dot.state.mn.us/environment/pdf_files/TrnManCl.pdf

Minnesota Local Road Research Board, Federal Highway Administration, and Minnesota Department of Transportation, 2003. Erosion Control Handbook for Local Roads. Manual Number 2003-08. http://www.lrrb.gen.mn.us/pdf/200308.pdf

Minnesota Pollution Control Agency, 2005. NPDES General Permit for Storm Water Discharges From Construction Activities. http://www.epa.gov/npdes/pubs/cgp2003_entirepermit.pdf

Minnesota Pollution Control Agency, 2000. Protecting Water Quality in Urban Areas. http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html

Minnesota Pollution Control Agency, 2004. Storm water Compliance Assistance Toolkit for Small Construction Operators. http://www.pca.state.mn.us/publications/wq-strm2-09.pdf

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Table 12.CONST.1 Temporary Sediment Control Practices

Temporary Sediment Control Practice		Erosion Protection	Sediment Control	Areas to Use				Method
				Perimeter	Slopes	Drainageways	Other	
 Photo: MPCA	Vegetated Buffers	X		X	X	X	Around Trees, Water Bodies, Natural Areas	Vegetated buffers are areas designated to remain undisturbed in order to protect trees, lakes, bluffs, or natural areas. Buffers should be marked and maintained around all resources requiring protection.
	Silt Fence		X	X	X	X	Drainage System Inlets	Silt fence filters sediment from runoff by allowing water to pass through a geotextile fabric or by creating a pool to allow sediment to drop out of the water column. Silt fence is installed primarily at downslope boundaries of the work area but can also be used for inlet protection, and around the perimeter of stockpiles.
	Fiber Log		X	X	X	X	Drainage System Inlets	Fiber logs include straw, wood, or coconut fiber logs, compost logs, and rock logs that slow water and filter sediment. Fiber logs are used for inlet protection, ditch checks, and as perimeter control where silt fence is infeasible.
	Rock Construction Entrance		X	X				A rock construction entrance is a bed of rocks that helps to remove sediment from vehicle tires. Rock construction entrances should be placed at all site access points. The use of 1 1/2 inch - 3 inch clear aggregate is recommended. Periodic cleaning or replacement is recommended.
	Grade Breaks		X		X			Grade breaks are changes in slope that break up concentrated flow, preventing the formation of gullies. Grade breaks should be incorporated into long slopes.
	Temporary Seeding	X	X		X	X		Temporary seeding allows plants to stabilize the soil through vegetation and root growth. A large variety of plants are available for temporary seeding of different conditions; the most common are rye grass, winter wheat, and oats.
	Erosion Control Blanket	X	X		X	X		Erosion control blanket is a mat made of netting layered with straw, wood, coconut or man-made fibers that prevents erosion by sheltering the soil from rainfall and runoff while holding moisture for establishing plants. Blankets are installed in channels or on slopes where mulch would not be adequate.

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Temporary Sediment Control Practice		Erosion Protection	Sediment Contol	Areas to Use				Method
				Perimeter	Slopes	Drainageways	Other	
	Mulch	X			X			Mulch is wood fibers, compost, wood chips, straw, or hay that is applied as a cover to disturbed soil. Mulch reduces erosion by absorbing energy from rainfall and runoff and provides protection and moisture for the establishment of vegetation, when properly disc anchored or spread.
	Hydraulic Mulch	X			X			Hydraulic mulches for erosion control are typically comprised of wood fibers and are applied by hydroseeding equipment. Hydraulic mulches are typically used in areas with steeper slopes or where equipment access would be difficult.
	Temporary Pipe Downdrains	X			X			A temporary pipe downdrain conveys runoff down slopes in a pipe so that runoff will not cause erosion. Pipe downdrains are installed where concentrated flow would drain onto a disturbed slope.
	Floatation Silt Curtain		X				Lakes, Wetlands, Streams	Floatation silt curtain is fabric fence installed in water bodies to contain sediment near the banks of the work area. Must be used in conjunction with other sediment control techniques
	Rock or Compost Bags		X		X	X	Drainage System Inlets	Rock and compost bags are filled bags that are used to filter water, control ditch grade, or to provide inlet protection.
	Rock Check Dam		X			X		Rock check dams are rocks piled across a ditch to slow flows and capture sediment. Rock checks are installed perpendicular to flow and should be wide enough to ensure that flow remains in the center.
	Riprap	X				X	Drainage System Outlets	Riprap is appropriately sized rocks that reduce the energy of fast moving flows. Riprap is used along channels and at outfalls.
	Temporary Sedimentation Basin		X				Throughout Site	Temporary sedimentation basins are depressions that capture runoff to slow the flow of water and allow sediment to settle out.
	Filter Bag		X				Drainage System Inlets	Filter bags are mesh bags that capture sediment but allow water to pass through. Filter bags are installed in storm drain inlets.

Photo: Dandy Corp.

Table 12.CONST.2 NPDES Requirements and Associated Erosion Protection and Sediment Control Practices

NPDES General Construction Storm water Permit Requirement * *specific requirements may vary as specified in General Permit Appendix A	Temporary Erosion Protection and/or Sediment Control Practice															
	Vegetated Buffers	Silt Fence	Fiber Log	Rock Construction Entrance	Grade Breaks	Temporary Seeding	Erosion Control Blanket	Mulch	Hydraulic Mulch	Temporary Pipe Downdrains	Floatation Silt Curtain	Rockbags/Sandbags/ Compostbags	Rock Check Dam	Riprap	Sedimentation Basin	Filter Bag
Delineate areas of no disturbance before beginning site work.	X															
Sediment control must be established on all down gradient perimeters prior to commencement of land disturbing activities.		X	X								X					
Vehicle tracking of sediment must be minimized.				X												
All storm drain inlets must be protected.		X	X									X				X
Install energy dissipation measures at pipe outlets within 24 hours of connecting to a surface water.														X		
Drainage ditches within 200 feet of a surface water or the property edge must be stabilized within 24 hours of connection to a surface water.			X			X	X	X*	X*				X	X		
No unbroken slope of length greater than 75 feet for slopes of 3:1 or steeper.			X		X	X	X	X	X	X						
Slopes within 200 feet of a surface water must have temporary protection or permanent cover within the following timeframe based on slope: **Slope** / **Time** Steeper than 3:1 — 7 days 10:1 to 3:1 — 14 days Flatter than 10:1 — 21 days																
Install temporary basin where 10 acres or more drains to a common location.															X	

* Not recommended for areas of concentrated flow - such as channel bottoms