



Slope and Site Stabilization

NPDES/SDS Construction Stormwater Permit Requirements

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Improperly treated and untreated runoff from exposed soils of a construction site can cause soil erosion and sedimentation problems resulting in the pollution of lakes, and other water bodies. This factsheet provides guidance on stabilizing a construction site to protect the quality of our water resources.

The Erosion Process

Erosion is the natural process in which soil and rock material is weathered and carried away by wind, water or ice. On a construction site there are factors such as rainfall, climate, location, and soil type that influence erosion and may not be controllable.



Sediment entering a storm sewer inlet as a result of construction related erosion.

Construction activities can increase erosion by removing vegetation, disturbing soil and exposing sediment to the elements. Eroded soil quickly becomes a sedimentation problem when wind and rain carry the soil off the construction site and sediment is deposited in our surface waters. Through proper slope and site stabilization, the use

of conservation practices, and temporary and permanent cover, erosion and sedimentation problems can be managed.

What is required by the NPDES/SDS construction stormwater permit?

The NPDES/SDS construction stormwater permit identifies slope and site stabilization requirements that, if followed properly, can control erosion and sediment problems on a construction site.

- Prior to construction, areas not to be disturbed should be clearly flagged, staked or identified with signs and noted on the plan sets.
- All exposed areas must be stabilized no later than 14 days after the construction activity in that area is temporarily or permanently completed.
- The normal wetted perimeter of any temporary or permanent drainage ditch must be stabilized within 200 feet from the property edge.
- Drainage ditches and conveyance systems must be inspected for evidence of erosion and sediment deposition. All deltas and sediment deposited must be removed and the areas must be restabilized where sediment removal results in exposed soil.
- In order to maintain sheet flow and minimize rills and gullies, there shall be no unbroken slope lengths of greater than 75 feet for slopes with a grade of 3:1 or steeper.

If the construction site is within 1 mile of a special or impaired water, the following revised and additional requirements are listed in Appendix A of the permit:

- All exposed areas must be stabilized no later than 7 days after the construction activity in that area has temporarily or permanently ceased.
- An undisturbed buffer zone of not less than 100 feet from special waters shall be maintained at all times.

For full details of the permit requirements, a copy of the NPDES/SDS construction stormwater permit is available online: www.pca.state.mn.us/water/stormwater/stormwater-c.html.

What can I do to keep my site stabilized and prevent sediment and erosion problems?

There are several ways to keep a site stabilized and limit and control sediment and erosion:

- Develop and implement a sound stormwater pollution prevention plan (SWPPP) prior to the start of construction.
- Utilize conservation practices.
- Leave as much vegetation on site as possible and reduce the overall disturbed area.
- Prevent runoff from flowing across disturbed areas by diverting the flow to vegetated areas.
- Break up slope lengths and steepness.
- Use sufficient sized temporary basins.
- Protect stock piles.
- Minimize the total area of a site exposed at once.
- Minimize the length of time that soil is exposed.
- Temporarily or permanently stabilize disturbed soils as quickly as possible after construction activity has stopped.



Leave as much vegetation on a site as possible to reduce the overall disturbed area.

Any and all tools that you plan to implement on the site should be included in the site's SWPPP. When writing the SWPPP, include a description of the practices and integrate them into the time line of all construction activities. In addition, label the locations of the practices on site plans and include detailed specifications for each practice. Including these elements into the SWPPP before construction activity begins will aid in proper planning for the site and ensure that the sediment and erosion control techniques are implemented effectively and efficiently.

What are conservation practices?

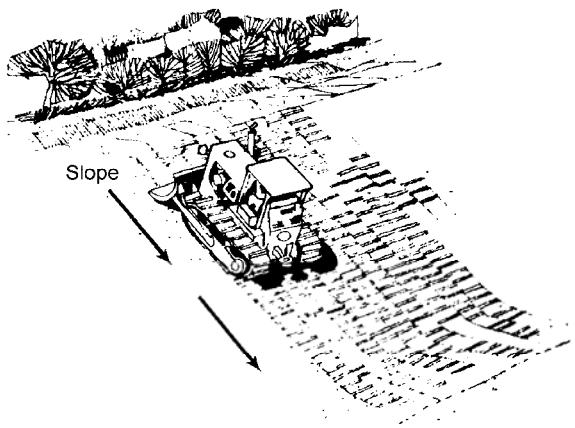
Conservation practices are treatments and management strategies used in construction planning to reduce soil erosion, shelter critical areas, create wildlife habitat, and protect soil and water quality. Successful conservation practices are integrated into the early stages of planning for construction and implemented throughout the life of a project. The following are a few examples of conservation practices that could be utilized to ensure proper site and slope stabilization.

Construction site phasing is the development of a construction work schedule that strategically coordinates the timing of land disturbing activities to minimize soil exposure and plans for the timely installation of all erosion and sediment control practices. The goal of construction site phasing is to disturb a smaller portion of an overall site, substantially finish grading and other construction activities and achieve temporary or permanent stabilization in the area before disturbing the next portion of the overall site. Soil exposure time is decreased, soil and erosion control practices are more manageable, and permit violations can be easily avoided.

Lot benching is often utilized in subdivision developments. Lots are strategically graded to direct the runoff from each lot to a stable outlet rather than to an adjacent lot. Lot benching can result in reduced slope lengths and steepness, decreasing the potential for soil erosion. Lot benching establishes drainage patterns early in the construction process for each lot therefore avoiding potential drainage problems in the future when home construction begins.

Surface roughening involves roughening the surface of the soil on slopes in a horizontally grooved pattern. This is often accomplished by tracking, stair-step grading or ripping and grooving. The roughened surface reduces erosion by decreasing runoff velocity, increasing

infiltration, and aiding in the establishment of temporary or permanent vegetation and cover.



Slope tracking roughens the surface of a slope and decreases the velocity of runoff.

Low impact development (LID) is a stormwater management approach with the goal of keeping stormwater where it falls and reducing or even eliminating stormwater runoff from a site. LID integrates stormwater management practices into the planned or existing infrastructure in a way that mimics the predevelopment hydrology of the site. The techniques provide the filtering of sediment, nutrients, heavy metals and other pollutants from the runoff and result in decreased erosion, increased infiltration, and improved water quality. LID techniques such as protecting natural and existing vegetation, avoiding steep slopes, protecting infiltration areas and minimizing soil compaction can be utilized to prevent unnecessary erosion and sediment pollution problems. For additional information on LID visit:

www.pca.state.mn.us/publications/p-gen3-06.pdf

Using temporary and permanent cover

It is important to utilize stabilization techniques throughout the duration of the project as well as at the end of the project to achieve final stabilization. Temporary covers seek to vegetate or cover bare soil to reduce the potential of soil erosion. Plan to utilize temporary cover on portions of the site that will sit dormant for periods of time whether or not final grading is reached. Permanent cover should be used to accomplish final stabilization at the end of a project or on areas that will sit dormant for an extended period of time. The following are commonly used temporary and permanent cover practices that can be combined and used in conjunction with each other depending on the specifics of a site:

- Seed mixes are available to establish temporary and permanent vegetative cover on exposed soil. The Minnesota Department of Transportation (Mn/DOT) has researched various seed mixes and has identified mixes for specific site characteristics and uses. Reference the MN/DOT Standard Specifications for Construction and the MN/DOT Seeding Manual for specifics on seed mixes for your site. Links to both MN/DOT documents are in Resources at the end of this fact sheet.
- Providing proper nutrients and fertilization are important to establishing permanent vegetation. Fertilization is site specific and should be chosen after a soil test is completed. For more information on soil testing, see the Soil Testing Laboratory at the University of Minnesota at <http://soiltest.cfans.umn.edu/>.
- Mulch is applied to form a temporary and protective cover on exposed soils. Mulch can help retain moisture in the soil to promote vegetative growth, reduce evaporation, insulate the soil, and reduce erosion. A common mulch material used is straw.



Hydroseeding promotes the rapid growth of vegetation and prevents erosion.

- Hydroseeding is the process by which a seed and mulch mixture or "slurry" is sprayed onto a prepared slope or site. Hydroseeding traps in moisture to promote rapid germination and growth.
- Erosion control blankets and turf reinforcement mats are single or multiple layer sheets made of natural and/or synthetic materials that provide structural stability to bare surfaces and slopes. Blankets and mats are often used in conjunction with seed mixes

to promote vegetation establishment. A wide variety of blankets and mats exist for use under varying circumstances. In addition, compost can be used for erosion control and site stabilization. For more information, see the Minnesota Stormwater Manual at <http://www.pca.state.mn.us/publications/wq-strm9-01.pdf>.



Erosion control blanket stabilizes pond slopes.

- Sod is commonly used for permanent stabilization and for immediate visual aesthetics on a bare site. Sod can provide immediate stabilization around drop inlets and in swales, ditches, and channels.

What techniques do I choose for my site?

Choosing erosion and sediment control practices, and temporary or permanent cover can be challenging with so many options. Often price is a deciding factor, however the least expensive erosion protection techniques may not be the longest lasting, the most cost effective or the most appropriate for your site. Insufficient protection may leave you with the cost of cleaning up an eroded slope, permit violations, or the task of implementing additional practices over and over again. Carefully consider the specifics of your project including the climate, existing soils, and slope lengths and steepness before choosing a cover or practices. In the long run, choosing the right products and practices for your site will save you time and money.

Cold climate considerations

The best approach to winter months is to plan ahead at the start of a project and develop a sequenced construction schedule to ensure that all exposed areas have cover before the first freeze. Preparation of vegetative cover should begin in the fall. Seeds must be started early enough for them to germinate, establish

roots and provide cover before the winter begins. Reference the Mn/DOT Standard Specification for Construction for specifics on the month in which seeding should begin. If construction is continuing through winter and new areas are disturbed, cover material can be applied over a snowpack.

It is important to note that all construction sites must remain in compliance with the NPDES permit throughout the winter even if no construction is occurring. For this reason, regular inspection and maintenance must continue throughout the winter months.

Maintenance and Inspection

The NPDES permit requires that the entire construction site be inspected once every 7 days or within 24 hours of a rainfall event greater than 0.5 inches in 24 hours. All non-functioning perimeter controls must be replaced, repaired or supplemented with functional practices within 24 hours of discovery or as soon as field conditions allow access. The permittee is responsible for the operation and maintenance of all erosion prevention and sediment control Best Management Practices (BMPs) for the duration of the project. All inspections and maintenance and any changes throughout the construction process should be recorded and kept onsite with the SWPPP.



Image Courtesy of Emmons & Olivier Resources, Inc.

Stabilization BMPs should be inspected and maintained through the winter season.

You can use the Construction Stormwater Compliance Calender for easy recordkeeping. See references.

What is final site stabilization?

As defined in the NPDES/SDS construction stormwater permit, final stabilization is achieved when all soil disturbing activity is completed and the exposed soils have been stabilized with a vegetative cover with a

density of 70% over the entire site. Note that simply seeding and mulching is not considered acceptable cover for final stabilization.

Final stabilization and permit termination can also be achieved if the proposed construction activity on a site is 90% complete and has been complete for 90 days if the site is established with permanent cover.

The permanent stormwater treatment system must be in place and functioning. Drainage ditches and other conveyance systems must have all collected sediment cleaned out and be stabilized with permanent cover. Temporary erosion and sediment control BMPs must be removed.



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For residential construction sites, individual lots are considered to have final stabilization if the structure or building is completed, temporary erosion protection and down gradient perimeter control is in place, and the residential lot has been sold to the homeowner. The permittee is required to give the new homeowner a copy of the MPCA's "Homeowner Fact Sheet." <http://www.pca.state.mn.us/publications/wq-strm2-07.pdf>.

For construction projects on land used for agricultural purposes such as pipelines across crop land, final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use.

Resources

Metropolitan Council Urban Small Sites Best Management Practice Manual
<http://www.metrocouncil.org/environment/Watershed/bmp/manual.htm>

Mn/DOT Approved Products

List <http://www.mrr.dot.state.mn.us/materials/ApprovedProducts/appchart.asp#ipl>

Mn/DOT Seeding

Manual http://www.dot.state.mn.us/environment/pdf_files/seedingmanual.pdf

Mn/DOT Standard Specifications for Construction <http://www.dot.state.mn.us/pre-letting/spec/index.html>

MPCA Protecting Water Quality in Urban Areas – Manual – Chapter 6: Erosion Prevention and Sediment Control <http://www.pca.state.mn.us/water/pubs/sw-bmpmanual.html>

MPCA Stormwater Construction Inspection Guide
<http://www.pca.state.mn.us/publications/wq-strm2-10.pdf>

Small Business Environmental Assistance Program Compliance Calendar for Construction Stormwater
<http://www.pca.state.mn.us/publications/wq-strm2-08.pdf>

USEPA National Pollutant Discharge Elimination System (NPDES) Menu of BMPs <http://cfpub.epa.gov/npdes/stormwater/menuofbmps>