

# **BEST MANAGEMENT PRACTICE (BMP) GUIDANCE MANUAL**

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## **INTRODUCTION**

BMP examples given in this guide provide ways to meet erosion and sediment control requirements in the City of St. Cloud. Best Management Practices are not limited to these examples; many other BMPs may be acceptable. Reference tools given at the end of the guide, and manufacturer information for practices used, will ensure BMPs are selected and installed properly.

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## Sediment Control BMPs

### **SILT FENCE**



Silt fence is generally used as perimeter control to keep sediment on site. Silt fence slows runoff allowing water to flow through while filtering sediment and keeping it on site.

Silt fence is made of geotextile fabric and is machine sliced or trenched into the ground 8 to 12 inches, leaving 2 feet of fabric above ground. The trench is filled and soil compacted next to the fabric. Steel or wooden posts are attached to the fabric located on the downstream side of water flow. Posts must be at least 5 feet long, embedded 2 feet into the ground and secured with three zip ties in the upper 8 inches of fabric.

### **STRAW BIOROLL (Straw Wattle)**

Straw biorolls can be used for perimeter control, ditch checks and inlet protections. Straw biorolls slow runoff velocities allowing sediment to settle out and remain on site.

The straw is encased in a netting with a minimum 6 inch diameter. The bioroll must be slightly trenched into the ground and secured by wood stakes. The stakes should be driven through the back half of the log at a 45 degree angle with the top of the stake pointing upstream. Stakes are placed every foot. When more than one log is used, overlap the ends 6 inches. The end sections of the log should be curled of “J hooked” to keep sediment on site.



## **WOOD FIBER BIOROLL**



Wood fiber biorolls can be used for perimeter control, ditch checks and inlet protections. They slow runoff velocities filtering sediment, and are more effective filters in high flow areas than straw.

The wood fibers are encased in a netting with a minimum 6 inch diameter. The bioroll binds to flat soil and may not have to be trenched in. Wood stakes shall be driven through the back half of the log at a 45 degree angle with the top of the stake pointing upstream. Stakes are placed every foot. When more than one log is used, overlap ends about 6" .

The end sections of the log should be curled of "J hooked" to keep sediment on site.

## **COMPOST LOG**

Compost logs can be used for perimeter control, ditch checks and inlet protections. Compost logs slow water velocity and filter runoff.

The logs are made from a geotextile tube filled with shredded mulch or woodchips. They are easy to install, and multiple logs should overlap about 6 inches so there are no gaps; no stakes are required. These logs are easily reused. Logs should form a smile shape to keep sediment on site.



## **ROCK LOG**



Rock logs can be used for perimeter control, ditch checks and inlet protections. Rock logs slow water velocity and filter sediment.

Typically used on paved surfaces, rock logs are installed by overlapping edges about 6" creating a smile shape. Due to their weight, rock logs are not staked and are a little more difficult handle. However, if not damaged they can be reused multiple times.

## **BERMS**

Berms are an effective perimeter control device as an alternative to other practices and a good reuse option. They are often used as a secondary BMP. Berms slow water velocity and allow for sediments to settle out on site. Berms can also be used to redirect water.

Berms can be made from compost, shredded wood mulch, rock or compacted stabilized soil. To be effective, berms must be at least 1 foot tall and 2.5 feet wide. Berm material must be maintained and reapplied as necessary.





## **INLET PROTECTIONS**



Inlet protections protect storm drain inlets by filtering out sediment while allowing water to pass through.

Some can sit on top of the inlet or surround the inlet, while others are inside the inlet. Inlet protections come in many varieties such as; prefabricated protections, various logs and bags.

When choosing your inlet protection it is important to know **one size does not fit all**. Different protections are designed for different inlets. When choosing your inlet protection consider installation and maintenance ease, safety and effectiveness.

Install inlet protections to specifications provided, and be sure there are no gaps, rips or holes allowing water to be unfiltered. Inlet protections must be cleaned when 1/2 full.

## **ENTRANCE BMPS**

Entrance BMPs are required to limit sediment tracking from vehicle and equipment traffic onto the street and other paved surfaces. The most common is a rock entrance.

Rock entrances must be at least 50 feet long, 20 feet wide, have a filter fabric underliner and be 6 inches thick of clean 1.5 to 3 inch rock. Other prefabricated BMPs exist such as tracking pads and mats. Other BMPs like mulch or different aggregates may be used. Be creative and reuse products available (e.g. slash mulch from clearing & grubbing). Maintenance must occur as the BMP becomes ineffective or full of sediment.



## **BUFFERS**

Grass buffers or maintaining existing vegetation as perimeter control and throughout the site can provide effective, inexpensive sediment control. Buffers should always be left when possible and utilized in conjunction with other sediment control BMPs.

# Erosion Control BMPs

## MULCH



Mulch is primarily used as temporary stabilization; it can also be used to establish permanent vegetation after seeding occurs, or as an entrance BMP. Mulch holds soil in place to reduce erosion. Temporary mulch can be placed on soils not ready for permanent seeding, and on exposed soils outside of seeding dates to meet temporary stabilization requirements.

There are two main types of mulch products: 1) straw or hay material; 2) wood material. Straw mulch should be applied evenly with 90% coverage (about 2 tons/acre). Disc anchoring straw mulch will help hold it in place.

Wood mulch can be produced on site from clearing and grubbing material.

## EROSION CONTROL BLANKETS

Erosion control blankets are commonly used where mulch is not appropriate such as steeper slopes, concentrated flow areas like ditch bottoms and narrow areas. Blanket can be used as a stand alone product to hold soil in place temporarily. It is most commonly used to reduce erosion until vegetation establishes.

Erosion blankets can be made of straw, wood or coconut fibers held together by netting. There are nine categories of blankets, each corresponding to different site conditions. Slope, length of time in place and flow velocity dictate what type is used.



When installing blanket, the underlying soil should be smooth so the blanket can lay flat. Blanket should be laid parallel to the direction of water flow with the netting on top. Blanket must be stapled down appropriately with adjacent blankets overlapping at least 4 inches.

## HYDRAULIC SOIL STABILIZERS



Hydraulic soil stabilizers are hydraulically applied tackifiers (glues), or mulch material with a tackifier. These products are used for temporary soil stabilization, with or without seed, or for erosion control to establish permanent vegetation. Typical uses are in areas with limited access, steep slopes and stockpiles; not to be used in concentrated flow areas.

There are four main products, all can be used with or without seed: 1) Natural Tackifier - glue used to hold soils and straw mulch in place; 2) Hydromulch - glue and wood fibers to hold soil and straw mulch in place;

3) Hydromulch Blend - hydromulch with recycled paper and a green dye added; 4) Bonder Fiber Matrix - wood product and glue used on steep slopes for permanent mulch cover.



## **TEMPORARY COVERING**



Temporary cover BMPs are used to meet stockpile or slope stabilization requirements. Instead of using silt fence, mulch or vegetation, a tarp can be pulled over a stockpile and anchored down. Geotextile or burlap are also great materials for temporary stabilization on slopes or piles.

## **DITCH CHECKS**

Ditch checks are used to slow water runoff velocities in a ditch or on steep slopes reducing erosion. Ditch checks also trap sediment reducing stress on the final sediment BMP.

Common ditch checks are similar to sediment control products and installed in similar manner: 1) silt fence; 2) straw bioroll; 3) wood bioroll; 4) compost & rock logs; 5) rock check dams.



## **TEMPORARY DIVERSIONS**



Diversion BMPs such as extenders can direct runoff from roof gutters to paved or grassed areas until vegetation is established reducing erosion potential. Temporary down drains can also be used to carry water down an un-vegetated slope.

## **EROSION STABILIZATION MATS (Turf Reinforcement Mats)**

These mats are designed to reinforce vegetation withstanding higher velocity flows than blankets. They can be used as an alternative to riprap. There are 5 classes of mats based on strength. Mats are composed of non-degradable synthetic fibers, filaments, netting and wire mesh.



## Other Important BMPs

### CONCRETE/WASTE WASHOUT



Concrete and other waste materials must be disposed of in compliance with MN Pollution Control Agency regulations. These wastes must not cause contamination of the ground or surface waters prior to disposal. Liquids and slurry can be contained using compacted impermeable soils, impermeable plastics or containers.

Washout areas must be marked with a sign and should be located on flat surfaces, away from waterways and stormdrains, not in boulevards and not on paved surfaces.

### DEWATERING TECHNIQUES

Pumping and discharging water is a common occurrence during construction projects. Sediment is the main concern when dewatering, however, if other pollutants exist, different BMPs must be applied. Discharge water must not cause a nuisance in the receiving water and cannot create erosion.

BMPs to consider include: 1) Temporary pond; 2) Grass buffer; 3) Filtering with rock or wood chips; 4) Dewatering dumpster; 5) Floating pumps; 6) Dewatering bag; 7) Flocculent - material used to bind and settle out sediment.

Multiple treatment methods may be needed depending on dirtiness of the water and where it is being discharged. Discharges must be monitored to ensure BMPs are working properly.



## More BMP Examples



Rock sediment traps used to capture sediment and debris prior to the inlet protection



Temporary sediment basin with rock berm and grass buffer. Used to capture sediment and filter runoff prior to discharging to a wetland during a mass grading project.





Rock used as entrance BMP, perimeter control and sediment trap all in one.



Mulch used as erosion control BMP on a haul road with a rock ditch check; geotextile slope BMP.



Small scale concrete washout BMP; a small depression with plastic liner. Must make sure not to overflow.



Cement truck reclaiming concrete waste - most trucks now have this capability to avoid washouts on site.



Hay bales used as ditch checks along with seed and blanket to stabilize a slope.



Bioroll used as ditch check with blanket for erosion control until vegetation established; silt fence perimeter BMP.



Plastic swimming pool used as secondary containment.



One strip of blanket used on flat slope as perimeter control until vegetation establishes.

# Winter BMPs



Erosion and sediment control BMPs are required during winter construction; snowmelt is considered stormwater runoff and is required to be treated. To prevent pollutants from leaving the construction site during the winter season, it is recommended that the following are considered:

- Stop land disturbing activities until warm weather returns. Sequence work so land disturbing activities occur prior to freeze up.
- Stabilize all exposed soil surfaces with vegetation, mulch, blankets or other BMPs before the ground freezes. Remember, the City requires that all soils be stabilized if no land disturbing activity has occurred for 14 days, this includes winter.
- Maintain construction entrance BMPs to limit tracking during snow melts.
- If new land disturbing activities occur, proper BMPs must be installed. See the Erosion and Sediment Control Pocket Guidebook for details on installing winter BMPs.
- Inlet protections may be removed after freeze up as appropriate because they can pose problems in the winter (flooding, damaged by plows). These BMPs must be installed in the spring appropriately to weather conditions and/or resuming work.
- Perimeter control devices may need to be moved or enhanced to avoid winter damage.

## References

### Information was gathered from:

- Erosion and Sediment Control Pocketbook Guide 2009 - University of Minnesota ESC Program
- 2005 Mn/DOT Stormwater Pollution Prevention Specifications
- City of Apple Valley - Erosion & Sediment Control Compliance Information: Examples of Best Management Practices
- City of Moorhead - Residential Erosion/Sediment Control Standards

*\*Links available on the next page\**



## Links For Additional Information

**Erosion and Sediment Control Pocketbook Guide (2009)** - This is an awesome reference everyone should look at about BMP types and installation. It can be downloaded or purchased.

*To View:* [http://www.dot.state.mn.us/environment/pdf\\_files/pocketbook-09%20.pdf](http://www.dot.state.mn.us/environment/pdf_files/pocketbook-09%20.pdf)

*To Order:* <http://www.erosion.umn.edu/PocketbookPurchase.pdf>

**Mn/DOT Standard Specifications for Construction** - Sections 2573 & 3876 thru 3898 contain most of the erosion/sediment control and stormwater information, will assist with understanding products and installation

<http://www.dot.state.mn.us/pre-letting/spec/>

**Mn/DOT Approved/Qualified Product list** - Erosion Control and Landscaping section provides quality BMP product examples.

<http://www.dot.state.mn.us/products/index.html#>

**MN Pollution Control Agency - Construction Stormwater** - Lots of good BMP guidance and information.

<http://www.pca.state.mn.us/water/stormwater/stormwater-c.html>

**City of St. Cloud - Construction Stormwater** - More BMP guidance, City ordinance and permit information.

<http://www.ci.stcloud.mn.us/Utilities/ConstructionInfo2.aspx>

**University of MN - Erosion and Stormwater Management** - Education and training source.

<http://www.erosion.umn.edu/>

**City of Apple Valley - Erosion & Sediment Control Compliance Information: Examples of Best Management Practices**

[http://www.ci.apple-valley.mn.us/natural\\_resources/erosion\\_control/Best\\_Management\\_Practices.pdf](http://www.ci.apple-valley.mn.us/natural_resources/erosion_control/Best_Management_Practices.pdf)

**City of Moorhead Residential/Sediment Control Standards**

[http://www.ci.moorhead.mn.us/city\\_services/pdf/Residential\\_Erosion\\_Sediment\\_Control\\_Standards.pdf](http://www.ci.moorhead.mn.us/city_services/pdf/Residential_Erosion_Sediment_Control_Standards.pdf)