NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

STORMWATER RUNOFF CONTROL

CODE 570
(NO. AND ACRE)

DEFINITION
Controlling the quantity and quality of stormwater runoff.

PURPOSE
To control stormwater runoff to achieve one or more of the following:

- Minimize erosion and sedimentation during and following construction activities.
- Reduce the quantity of stormwater leaving developing or developed sites.
- Improve the quality of stormwater leaving developing or developed sites.

CONDITIONS WHERE PRACTICE APPLIES
This practice applies to sites where stormwater runoff causes or may cause undesirable downstream flooding, sedimentation or channel degradation and/or degradation of surface or ground water quality if left untreated. This practice may apply both to sites undergoing development as well as remedial work on already developed sites.

This practice does not apply to sediment basins, see the criteria in Wisconsin NRCS Conservation Practice Standard (WI NRCS CPS), Sediment Basin (Code 350).

FEDERAL, TRIBAL, STATE, AND LOCAL LAWS
Users of this standard should be aware of potentially applicable federal, tribal, state and local laws, rules, and regulations or permit requirements governing stormwater runoff control. This standard does not contain the text of federal, tribal, state, or local laws.

CRITERIA
General Criteria Applicable to All Purposes
Develop a plan to reduce the impacts of stormwater runoff from the site based on an assessment of the downstream area. As applicable include in the plan practices or management activities that will:

- Reduce on-site erosion.
- Reduce off-site impacts from sedimentation.
- Reduce the quantity of stormwater leaving the site to levels that will not adversely affect downstream receiving channels.

- Improve the quality of runoff leaving the site.
- Leave the site in a stable condition after construction.

Vegetative Measures. Where appropriate, stabilize all areas disturbed by construction with vegetation as soon as possible after construction. Refer to WI NRCS CPS, Critical Area Planting (Code 342), for the establishment of vegetation. If vegetation is not appropriate for the site, use other measures to stabilize the area.

Safety. Detention ponds and other areas where water is detained or flows swiftly, can present hazards to the public. Where necessary, include appropriate safety features to warn of potential dangers or deter entry to hazardous areas such as fences, gates and warning signs.

Additional Criteria for the Reduction of Water Quantity

Design stormwater control systems to control flow from the area of concern to rates and volumes that will not cause degradation of downstream areas due to erosion or sedimentation. Acceptable peak rates are dependent upon the capacity and stability of the receiving channel. Local regulations may specify acceptable discharge rates for different storm frequencies.

Runoff is controlled by slowing the release of runoff from the site. This can be accomplished by on-site storage, increasing infiltration on-site, lengthening the flow path of runoff or a combination of these methods.

All runoff control methods must include provisions to safely bypass runoff in excess of the design storm.

Additional Criteria for the Improvement of Water Quality

Runoff from developing areas can be contaminated with a variety of substances including sediment, oils, chemicals and trash. Runoff control systems must include provisions to reduce contaminates in the runoff leaving the site. This can include vegetated filtration areas and other biofilters, trash guards and settling areas that are readily accessible for cleanout. For runoff that is known to be contaminated with substances that may be particularly harmful to the water supply or fish and wildlife, additional measures may be necessary.

Additional Criteria for Erosion and Sediment Control

Control erosion on the site by limiting the amount and length of time that bare soil is exposed to precipitation. This can be accomplished by staging construction and only removing vegetation from a portion of the site at a time, re-vegetating areas incrementally during construction or using temporary seeding and mulching to stabilize areas until permanent vegetation can be established. Structural erosion control practices can also be installed to reduce the flow length and velocity of runoff to limit erosion.

Temporary sediment barriers are used to trap sediment from construction or other disturbed areas where the barriers are needed for less than 2 years and the drainage areas are less than 1 acre. Temporary sediment barriers include synthetic fabric silt fences, straw bale barriers, coarse aggregate barriers, and other appropriate materials.

A temporary sediment barrier may be used where the minimum barrier height is less than 5 feet, and where failure of the barrier would not cause loss of life or damage to high-value property, or significant damage to lower-value property. The barrier shall be adequate to retain the sediment and handle the 10-year, 24-hour duration storm frequency discharge without failure or significant erosion for the anticipated life of the barrier.

1. **Straw Bale Sediment Barriers**
   Straw bale sediment barriers should only be used in situations where a life span of less than 3 months is required.

   Straw bale sediment barriers shall be installed on the contour, except that the ends shall be extended upslope to prevent water from bypassing the ends.

   The maximum length of uncontrolled slope upstream from a straw bale sediment barrier should be 100 feet.

   Bales shall be installed so that the bindings are oriented around the bale, not the top and bottom of the bales.

   The straw bales must be entrenched at least 4 inches into the ground and anchored with two stakes driven through the bale and at least 12 inches into the ground. The stakes shall be 2″ x 2″ (nominal) wooden stakes, standard steel fence posts, or ½-inch diameter steel reinforcing bars.

   Soil shall be compacted against the upstream base of the bales to prevent undermining by runoff. Gaps between bales must be filled by wedging them full of loose straw or equivalent material to prevent water flow between the bales.

   Straw bale sediment barriers shall not be used in channels or other areas of concentrated flow.

   Straw bale sediment barriers shall be removed once the disturbed area is permanently stabilized and no longer susceptible to erosion

2. **Silt Fences**
   Geotextile fabric silt fence used to trap sediment from disturbed areas shall be installed on the contour, except that the ends shall be extended upslope to prevent water from bypassing the structure.

   The maximum length of uncontrolled slope upstream from the silt fence should be 100 feet.

   The geotextile fabric silt fence shall not be used in channels or other areas of concentrated flow.

   Commercially available silt fence products may consist of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride geotextile fabric. A heavy-duty nylon top support cord or equivalent is required.

   Where joints are necessary, each end of the fabric shall be securely fastened to a post. The posts shall then be wrapped around each other to produce a stable, secure joint.

The bottom edge of the silt fence fabric must be anchored by burying in a trench 6 inches deep by 4 inches wide on the upslope side of the posts. The fabric shall be folded to fit the trench and backfilled and compacted to the existing ground line.

The maximum spacing of support posts for non-woven silt fence shall be 3 feet and for woven fabric, 8 feet.

Wood support posts shall be a minimum length of 4 feet and the full height of the silt fence. The posts shall be a minimum dimension of 1⅛ inches by 1⅛ inches hardwood.

All posts shall be driven at least 2 feet into the ground.

Steel support posts shall be the full height of the silt fence. The posts shall be at least 5 feet long with a strength of 1.33 pounds per foot and have projections for the attachment of fasteners.

The silt fence fabric shall be attached to the posts in at least three places on the upslope side.

Silt fences shall be removed once the disturbed area is permanently stabilized and no longer susceptible to erosion.

3. Storm Drain Inlet Protection Barriers

Inlet protection barriers include, but are not limited to, filter fabric barriers, straw bales, sandbags, other material filled bags and socks, and stone weepers.

For temporary barriers that are installed around storm drain inlets, the perimeter length of the barrier must be at least 4 times the perimeter of the storm drain inlet. Where storm flows could over-top the barrier, the top of the barrier needs to be level throughout the perimeter length.

Barriers shall be located where a traffic hazard will not be created and where traffic and construction activities will not destroy or cause constant need for maintenance of the barriers. Barriers shall be located so that any resulting ponding of storm water will not cause excessive inconvenience or damage to adjacent areas or structures.

4. Fabric Barriers

Fabric barriers used as gully checks during vegetative establishment shall be spaced 50 to 100 feet apart. The fabric must be 36 inches wide with 18 inches buried and 18 inches lying on the ground. Barriers shall extend across the waterway bottom and up the side slopes to a minimum depth of (0.7) x (design depth) or 0.5 ft., whichever is greater.

CONSIDERATIONS

Considerations include additional design recommendations that are not required criteria, but may be used to enhance or avoid problems with the design and function of this practice.

Research has shown that the first runoff from a site is often the most contaminated. After this initial flush, less pollutants are available for removal and dilution lessens the impact. Consequently treatment of this "first flush" of runoff is often sufficient to address the water quality concern. The exact amount of runoff to treat varies depending upon the surface and level of contamination. Determine the amount of runoff to treat based on appropriate research or experience.

Stormwater control practices can affect downstream hydrology. While this is the point of most stormwater control systems the effect of changing the peak rate and volume of runoff should be considered on downstream areas. The effect of a single project should also be considered in context with other projects in the watershed to determine the cumulative effect. Generally peak rates of runoff should be kept at or below pre-development rates of runoff from the site for the 2-year, 24-hour storm. For already developed areas consider reducing the peak flow from the current developed condition.

Design stormwater control practices to fit into the visual landscape as well as to function for runoff control. Since stormwater control practices are generally installed in public spaces, consider how the space will be used and the visual impact the practices will have.

If properly designed, stormwater control practices can be beneficial to wildlife. When possible use native vegetation to provide food and habitat for wildlife and pollinators. Since most stormwater control practices are in aquatic environments, they can inhibit the movements of aquatic organisms. When designing these structures, include provisions for the safe passage of aquatic organisms that may inhabit the site.

To be most effective, stormwater control should include a system of practices working together. This might include detention along with infiltration areas and the maintenance of natural, undisturbed areas.

However, it could also include managing the development of the site to limit the disturbed area, ensuring that re-vegetation occurs in a timely manner and controlling where heavy equipment is allowed to travel on a site.

Large storms can quickly fill stormwater runoff practices with sediment that must be removed in order for the practices to function correctly. Consequently these practices should be designed for easy access and maintenance.

Since stormwater control practices are often installed in urban and public spaces, vandalism may be a problem. Consider using practices that cannot be easily vandalized such as grouting rock in place and installing barriers and locks where appropriate.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for stormwater runoff control systems that describe the requirements for applying the practice according to this standard. As a minimum the plans and specifications shall include:

- A plan view showing the extent of the practice.
- Cross-sections and/or profiles showing elevations and distances.
- Plans for structural details.
- Seeding requirements or other site stabilization measures.
- Construction specifications that describe in writing site specific installation requirements for the stormwater runoff control systems.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for the operator. The minimum requirements to be addressed in the operation and maintenance plan are:

- Periodic inspections, especially immediately following significant rainfall events.
- Prompt repair or replacement of damaged components especially surfaces that are subjected to wear or erosion.
- Regular inspection of settling basins, trash guards and other practices to collect and remove accumulated sediment and debris.
- Where vegetation is specified, periodic mowing, fertilization and control of vegetation.

REFERENCES

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.

Bannerman, Roger, and E. Considine, 2003. Rain Gardens: A How-to Manual for Homeowners. University of Wisconsin Extension Publication GWQ037 or Wisconsin Department of Natural Resources Publication PUB-WT-776 2003. Madison, WI.

US Environmental Protection Agency. 2007. Developing Your Stormwater Pollution Prevention Plan. Washington, DC.

US Environmental Protection Agency. 1999. Stormwater Technology Fact Sheet: Bioretention. Publ. EPA-832-F-99-012. Office of Water, Washington, DC.