NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

STORMWATER RUNOFF CONTROL

(No. and Ac.)

CODE 570

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.

CRITERIA

General Criteria Applicable to All Purposes

Plan, design and construct stormwater runoff controls to comply with applicable federal, state, and local laws and regulations.

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 onsite erosion.

Reduce offsite 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 Conservation Practice Standard, (342) Critical Area Planting 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 onsite storage, increasing infiltration onsite, 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.

For specific design criteria, follow the methods located in the *Maryland Stormwater Design Manual, Volumes I & II* (Effective October 2000, Revised May 2009).

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, revegetating 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.

When erosion cannot be stopped at the source, sediment laden runoff must be filtered or detained to allow sediment particles to settle out to acceptable levels before runoff is released from the site. This can be accomplished by sediment traps, sediment basins and other structures designed to detain or filter runoff. Refer to Conservation Practice Standard, (350) Sediment Basin for design requirements for sediment basins and the ***2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control*** for all other required practices.

CONSIDERATIONS

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 revegation 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.
- Where appropriate, cross-sections and/or profiles showing elevations and distances.
- Where appropriate, plans for structural details.

- Where appropriate, seeding requirements.
- Construction specifications that describe in writing site specific installation requirements for the stormwater runoff control systems.
- Refer to the section SUPPORTING DATA AND DOCUMENTATION for additional requirements.

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.
- If fences are installed, they shall be maintained to prevent unauthorized public or livestock entry.
- Immediately repair any damage caused by erosion, vandalism, vehicles, or livestock to earth fills, spillways, or outlets.
- Make sure all structure drains are functional and soil is not being transported through the drainage system. The screens and/or rodent guards shall also be kept in place.
- Eradicate or otherwise remove all rodents or burrowing animals and repair any damage caused by their activity. (If threatened species are involved, follow policy on endangered or threatened species.)
- Determine and eliminate causes of settlement or cracks in the earthen sections and repair damage.
- Replace weathered or displaced rock riprap to constructed grade.

SUPPORTING DATA AND DOCUMENTATION

Field Data and Survey Notes

The following is a list of the minimum data needed:

1. System plan sketch;
2. Soil investigation, auger logs to determine any special construction conditions if needed;
3. Dimensions of buildings, land features and proposed locations of measures needed.

Design Data

For guidance on the preparation of engineering plans see chapter 5 of the EFH, Part 650 and National Engineering Handbook Part 641 or Maryland Amendment Number 1. The following is a list of the minimum required design data:

1. Design computations needed consistant with design criteria, follow the methods located in the *Maryland Stormwater Design Manual, Volumes I & II* (Effective October 2000, Revised May 2009) and *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control*;
2. Quantities estimate;
3. Planting plan. This must meet the criteria, specifications, and documentation requirements of the Maryland conservation practice standard, Critical Area Planting, code 342;
4. Drawings to include the following as a minimum: Plan view showing location of design measures; construction details, cross sections and construction and material specifications;
5. Written Operation and Maintenance plan.

Construction Check Data/As-built

Plot survey data in red. The following is a list of minimum data needed for As-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Actual location, length, size, cross sections and dimensions of the installed measures;
3. Final quantities, documentation for quantity changes, and materials certification;
4. Sign and date plans to include statement that practice meets or exceeds NRCS practice standard.

REFERENCES

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

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

United States Environmental Protection Agency. 1999. Stormwater Technology Fact Sheet: Bioretention. Publ. EPA-832-F-99-012. Office of Water, Washington, D.C.

Maryland Department of the Environment, Water Management Administration, http://www.mde.state.md.us, *Maryland Stormwater Design Manual , Volumes I & II* (Effective October 2000, Revised May 2009)

Maryland Department of the Environment, Water Management Administration, http://www.mde.state.md.us, *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control*