Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

STORMWATER RUNOFF CONTROL

CODE 570

(ac)

DEFINITION

Measures or systems to control the quantity and quality of stormwater runoff.

PURPOSE

This practice is used to accomplish one or more of the following purposes in controlling stormwater runoff:

- 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 conditions such as flooding due to increased flows, sedimentation, 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 developed sites. This practice does not include runoff from areas of livestock facilities. For runoff from livestock facilities use practices such as NRCS Conservation Practice Standards (CPSs) Waste Storage Facility (Code 313) and Vegetated Treatment Area (Code 635).

CRITERIA

General Criteria Applicable to All Purposes

Plan, design, and construct stormwater runoff controls to comply with applicable Federal, Tribal, State, and local laws and regulations, including all necessary permits and utility locations. The owner is responsible for obtaining any needed permits or documenting that none are required.

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.
- Maintain or increase infiltration of precipitation to recharge ground water.
- Improve the quality of runoff leaving the site.
- Leave the site in a stable condition after construction.

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

Stabilization measures
Where appropriate, stabilize all areas disturbed by construction as soon as possible after construction to reduce the potential for erosion. When vegetation is used, refer to Wisconsin NRCS Conservation Practice Standards (WI NRCS CPS) Critical Area Planting (Code 342) or Conservation Cover (Code 327). If vegetation is not appropriate for the site, use other measures such as WI NRCS CPS Mulching (Code 484) that protect the soil from erosion. Include pretreatment measures in the system as necessary to protect plantings from excessive sediment, trash, debris, or other pollutants.

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 with 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 and volumes are dependent upon the capacity and stability of the receiving channel. Refer to local regulations that specify acceptable discharge rates and volumes for different storm frequencies. In the absence of local requirements, use the 2-year 24-hour predevelopment storm for the peak discharge rate and volume to receiving streams.

Control the peak rate of runoff 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. Use one or more of these methods to reduce peak rates of runoff.

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, including farmsteads, access roads, and storage areas, can be contaminated with a variety of substances including sediment, oils, chemicals, and trash. Assess site conditions to determine the type of contaminants that must be controlled. Design practices that will capture or reduce these contaminants before they leave the site. These can include diversion of clean water, vegetated filtration areas, rain gardens and other biofilters, management actions to prevent spills of fuels or other contaminants, and trash guards and settling areas that are readily accessible for cleanout. Provide a minimum of 2 feet of soil depth from bedrock to the bottom of impoundments, vegetated filtration areas, rain gardens, and other biofilters.

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 that reduce overland flow length and velocity such as WI NRCS CPSs Diversion (Code 362) and Terrace (Code 600), straw bale barriers, or silt fences can be used to reduce sheet and rill erosion. Refer to the current NRCS soil loss prediction methodology to determine the appropriate spacing for these practices.

When erosion cannot be stopped at the source, filter or detain sediment-laden runoff to allow sediment particles to settle out to acceptable levels before releasing runoff from the site. This can be accomplished by sediment traps, sediment basins, and other structures designed to detain or filter runoff. Refer to WI NRCS CPS Sediment Basin (Code 350) for design requirements for sediment basins.

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.

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

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.

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 overtop 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.

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

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.

For runoff that is known to be contaminated with substances that may be particularly harmful to the water supply or fish and wildlife, additional treatment methods may be necessary.

Stormwater control practices can affect downstream hydrology. While this is the point of most stormwater control systems, consider the effect (both positive and negative) of changing the peak rate and volume of runoff on downstream areas. Where there are multiple projects in a watershed, consider the effect of a single project in context with other projects in the watershed to determine the cumulative effect. For developed areas consider options for reducing the peak flow from the current developed condition.

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

Improving or maintaining infiltration can be an important component of controlling stormwater runoff. Base the design of infiltration measures on the permeability rate of the most restrictive layer in the soil profile within the infiltration zone. Generally, soils should have a saturated hydraulic conductivity rate greater than

0.2 inches per hour. Design storage measures such as dry wells, stone trenches, and basins to empty within 72 hours.

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.

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 can also include managing the development of the site to limit the amount of disturbed area, ensuring that revegetation occurs in a timely manner and controlling where heavy equipment that will compact soils and destroy vegetation is allowed to travel on a site.

Large storms can quickly fill stormwater runoff practices with sediment. For the practices to function correctly the sediment must be removed and properly disposed of. Consequently, design these practices 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.

Stormwater runoff control plans are often required by local regulations. As a result, the practices will often be part of a larger construction contract. To ensure that the plans will be properly implemented it is helpful to incorporate the requirements of the stormwater runoff control plan into the plans and specifications for the larger project.

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.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan for the operator. The minimum requirements to be addressed in the O&M 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.
- Periodic mowing, fertilization, and control of vegetation where vegetation is specified.

REFERENCES

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