

Soil Amendment Guidelines

Introduction

Soil may relate to stormwater management as a pollutant or as a best management practice (BMP). According to the Minnesota Pollution Control Agency, approximately 30% of the state's rivers and streams are impaired by sediment. Undesirable soils are compacted, low in organic matter content, and are easily eroded by stormwater. During erosion, pollutants such as metals or organic compounds are transported by overland flow to water bodies.

Desirable soils are high in organic material and support a variety of ecosystem functions. Healthy soils retain pollutants, support biological activity, provide media for plants, and facilitate ground water infiltration. During mass grading, soil must be preserved to maintain desirable soil conditions.

Requirements

CCWD Rules, Section 3 Stormwater Management, Subpart 3.1 Modeling Requirements requires that:

In determining Curve Numbers for the post-development condition, the Hydrologic Soil Group (HSG) of areas within construction limits shall be shifted down one classification for HSG C (Curve Number 80) and HSG B (Curve Number 74) and ½ classification for HSG A (Curve Number 49) to account for the impacts of grading on soil structure unless the project specifications incorporate soil amendments in accordance with District Soil Amendment Guidelines. This requirement only applies to that part of a site that is being mass graded as part of the proposed project.

Hydrological models shall be updated to meet the CCWD Stormwater Management rules. If required conditions cannot be met with updated Curve Numbers, soil amendments may be made.

Materials to be Submitted as Part of the Permit Application

1. Hydrologic model.
2. Plan set with grading plan and outline of soil amendment areas.
3. Construction plan specific to a chosen variant (Option A-E listed below in Design Guidance #2) with details.
4. Construction plan should also include the following note: Contractor shall submit an Amended Soils Work Plan to CCWD staff at preconstruction meeting. Amended Soils Work

Plan shall include information on method, equipment to be used, phasing, name of restoration subcontractor, and other information relevant to ensuring the goal of the amended soils will be met. Final approval will not be granted without a satisfactory amended soils work plan.

Design Guidance

1. Determine site conditions.
 - a. Verify that site conditions match plan details.
 - i. Review grading plan.
 - ii. Verify soil amendment area.
 - b. Verify soil conditions using a shovel.
 - i. Dig several holes to determine if soil amendments are practical.
 - ii. Determine if plowing/tilling or spoil imports are required.
 - iii. Determine where soil may be stockpiled on site.
2. Design Variant Options - Identify soil amendment procedure.
 - a. **Option A-** Leave native soil undisturbed.
 - i. Only if the site has the original, undisturbed native soil.
 - ii. Fence off areas of vegetation and desirable soils.
 - b. **Option B-** Stockpile existing site soils. Stockpile site duff and topsoil and reapply after grading and construction.
 - i. Applicable where native and original, undisturbed soils must be disturbed.
 - ii. Prior to grading, remove duff layer and topsoil, and stockpile separately in an approved location prior to grading.
 - iii. After land disturbances are completed, reapply soil to a minimum 6-inches for HSG A soils or 12-inches deep for all other soil types.
 - iv. Before applying the topsoil mix, till the compacted subsoil at least 2 inches deep or rototill some of the newly applied topsoil into the subsoil.
 - v. Apply a 2-inch layer of stockpiled duff as mulch after planting.
 - c. **Option C-** Import topsoil with desired organic content.
 - i. Import and apply a topsoil mix with 8-13% organic matter, 30-40% compost by volume, of clean sand or sandy soil.
 - ii. Apply to a depth of 8 inches and ensure that soil pH is suitable for the

proposed plants. Retain soil pH test results.

- iii. Before applying the topsoil mix, till the compacted subsoil at least 2 inches deep or rototill some of the newly applied topsoil into the subsoil.

d. **Option D-** Amend existing soil in place.

- i. Used when soil has been compacted or topsoil has been removed.
- ii. Apply a layer of compost to existing soil to a depth of 2.5 inches.
- iii. Retain copies of compost test results and receipts for compost delivered to the site.
- iv. Rototill compost into soil to a depth of at least 6-inches for HSG A soils or 12-inches for all other soil types.

e. **Option E-** Stockpile site soils, reapply, and amend in place.

- i. Only applicable where the soil is not the original, undisturbed soil native to the site.
- ii. Remove soil and stockpile in an approved location prior to grading.
- iii. After grading and other disturbances are completed, reapply soil to a minimum 6-inch depth for HSG A soils or 12-inch depth for all other soil types.
- iv. Before applying the topsoil mix, till the compacted subsoil at least 2 inches deep or rototill some of the newly applied topsoil into the subsoil.
- v. Apply a layer of compost to the reapplied soil to a minimum 2.5-inch depth. Use MN DOT 3890 grade 2-certified compost (this compost shall not contain any biosolid/mixed municipal compost/animal manure components).
- vi. Retain compost test results and receipts for compost delivered to the site.
- vii. Rototill compost into soil to a depth of at least 8 inches.

3. Specify final inspection.

a. Compare site conditions with the approved Plan Set.

- i. Ensure site conditions match approved drawings.
- ii. Verify that amended soils have been fenced off to prevent compaction.

b. Inspect delivery tickets for compost and topsoil.

- i. The permittee must provide original delivery tickets and necessary soil tests to verify site conditions.

- c. Verify depth of amended soils and scarification.
 - i. Dig at least one test hole per acre to verify 8-inch topsoil depth.
 - ii. The top 8 inches should be easy to dig using a garden spade and be dark in color.
 - d. Check soil depth in several spots.
 - i. Use a “rod penetrometer” to confirm that soil is uncompacted twelve inches deep at 10 locations per acre – with a minimum of ten on smaller sites.
4. Procedure should not be applied to the following areas:
- a. In areas where tree roots are to be protected, which generally extends to the tree canopy dripline;
 - b. On slopes exceeding 10 percent unless permanent erosion control measures are implemented;
 - c. When surface soils are saturated or wet (exceed field capacity) or on dry soils;
 - d. Surface drainage is toward an existing or proposed building foundation; and
 - e. The contributing impervious surface area exceeds the surface area of the amended soils.

For information regarding how this guidance was developed, please refer to the sites below:

1. [Alleviating compaction from construction activities - Minnesota Stormwater Manual \(state.mn.us\)](#)
2. [Stormwater and soil, engineered \(bioretention\) media, and media amendments - Minnesota Stormwater Manual \(state.mn.us\)](#)
3. [Guidance for amending soils with rapid or high infiltration rates - Minnesota Stormwater Manual \(state.mn.us\)](#)
4. [Best Management Practices for Preservation and Restoration of Soil | Minnesota DNR \(state.mn.us\)](#)
5. [Post-construction soil standard for green building projects in King County, WA - King County](#)