

BMP T5.13 “POST CONSTRUCTION SOIL QUALITY AND DEPTH” IN THE STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON

Excerpted from the Washington State Department of Ecology's Stormwater Management Manual for Western Washington, Vol. V: Runoff Treatment BMPs, Chapter 5, pages 5-13 to 5-15 (or pages 100 to 102 in the online PDF file) as revised May 2005.

“BMP” means “Best Management Practice”, a term used for techniques that are recommended or (in this case) required. The Manual can be found online at www.ecy.wa.gov/programs/wq/stormwater/manual.html

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution-generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved onsite management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is important that the materials used to meet the soil quality and depth BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

Design Guidelines

Soil retention. The duff layer and native topsoil should be retained in an undisturbed state to the maximum extent practicable. In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

Soil quality. All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

- 1) A topsoil layer with a minimum organic matter content of ten percent dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the original undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.
- 2) Planting beds must be mulched with 2 inches of organic material.
- 3) Quality of compost and other materials used to meet the organic content requirements:
 - a) The organic content for “pre-approved” amendment rates can be met only using compost that meets the definition of “composted materials” in WAC 173-350 section 220. This code is available at the Dept. of Ecology’s website: <http://www.ecy.wa.gov/programs/swfa/compost/>
The compost must also have an organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25:1.

The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

- b) Calculated amendment rates may be met through use of composted materials as defined above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and meeting the contaminant standards of Grade A Compost.

The resulting soil should be conducive to the type of vegetation to be established.

Implementation Options. The soil quality design guidelines listed above can be met by using one of the methods listed below:

- 1) Leave undisturbed native vegetation and soil, and protect from compaction during construction.
- 2) Amend existing site topsoil or subsoil either at default “pre-approved” rates, or at custom calculated rates based on specifiers tests of the soil and amendment.
- 3) Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default “pre-approved” rate or at a custom calculated rate.
- 4) Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

Local governments are encouraged to adopt guidelines and procedures similar to those recommended in Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington, which is available at <http://www.soilsforsalmon.org>.

Maintenance

- Soil quality and depth should be established toward the end of construction and once established, should be protected from compaction, such as from large machinery use, and from erosion.
- Soil should be planted and mulched after installation.
- Plant debris or its equivalent should be left on the soil surface to replenish organic matter.
- It should be possible to reduce use of irrigation, fertilizers, herbicides and pesticides. These activities should be adjusted where possible, rather than continuing to implement formerly established practices.

Flow Reduction Credits

Flow reduction credits can be taken in runoff modeling when BMP T5.13 is used as part of a dispersion design under the conditions described in:

- BMP T5.10 Downspout Diversion
- BMP T5.11 Concentrated Flow Dispersion
- BMP T5.12 Sheet Flow Dispersion
- Chapter III, Appendix III-C, Section 7.5: Reverse Slope Sidewalks
- Chapter III, Appendix III-C, Section 7.2.4: Road projects

Related BMP's in the same volume (Vol. V, Ch. 5) of the Stormwater Management Manual for Western Washington available online at

www.ecy.wa.gov/programs/wq/stormwater/manual.html

- **BMP T5.20 Preserving Natural Vegetation** (pages 5-16 to 5-17 in paper Manual, or pages 103-104 in online PDF version)
- **BMP T5.21 Better Site Design** (pages 5-18 to 5-21 in paper Manual, or pages 105-108 in online PDF version)
- **See also Chapters 7 and 9 in on Infiltration and Biofiltration/Bioretention BMPs** (Vol. V page 7-1 or 116 in PDF, and page 9-1 or 144 in PDF)
- **and see Volume III, Appendix C “Low Impact Design and Flow Modeling Guidance”** (Vol. III, pages C-1 to C-22 in paper manual, or pages 158-159 in online PDF)