Advanced Methods and Materials AMM304

Amended Soils

This **Advanced Method and Material** was developed jointly by the City of Bellingham Public Works Department and Sustainable Connections to describe how stormwater infiltration is increased by providing means for the incorporation of amended soils.

BENEFITS

Soil amendments increase the spacing between soil particles so that the soil can absorb and hold more moisture. This in turn reduces runoff and the damaging effects of excessive runoff on local streams. Additional benefits include:

- Improve plant growth, disease resistance, and overall aesthetics of the landscaping
- Reduced pesticide and fertilizer inputs for plant maintenance
- Reduced peak summer irrigation need
- Improved stormwater infiltration
- Reduced erosion

Organic material is a critical component of a healthy soil system. Mixed into the soil, organic matter absorbs water, physically separates clay and silt particles, and reduces erosion (Balousek 2003 and Washington Organic Recycling Council, 2003).

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 (Stormwater Management Manual for Western Washington, 2005).

Compacted, non-amended soil in landscape areas can have similar characteristics of impervious surfaces and generate considerable overland or shallow subsurface flows that rapidly reach receiving waters (Low Impact Technical Guidance Manual for Puget Sound, 2005).

DESIGN GUIDELINES

Amended soils will follow these guidelines:

- The duff soil layer, including leaves, twigs, and other detritus that accumulates on the ground, and the native topsoil should be retained in an undisturbed state to the maximum extent practicable.
- Amend the topsoil layer with a minimum organic matter content of 10% 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. Sub-soils, below the topsoil layer, should be scarified at least 4 inches with some incorporation of the upper material.
- Compost that is used to as the organic matter must 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.
- Planting beds must be mulched with 2 inches of organic material.

SCOPE

Any soil area that has been disturbed through construction or other activities, soil areas that have historically poor drainage and areas where plant growth is inhibited by deficient soil conditions.

DEFINITIONS

Amended soils are soils that have had certain constituents (such as organic matter) added to mimic naturally occurring (undisturbed) soil characteristics and to improve the soils capacity to support plant life.

PERMIT REQUIREMENTS

City of Bellingham
500 square feet of land disturbance requires a stormwater permit & clearing permit.
100 cubic yards of imported and/or exported materials requires a fill grading permit.

Working within the City right-of-way may require a public works permit. Working within critical areas requires a Critical Areas Permit.

Contact the Permit Center (360)778-8300 for additional information.

Sustainable Connections

Amended Soils (cont'd)

Maintenance

Soil quality and depth should be established toward the end of construction but compaction of soils should be avoided altogether during and after construction. This includes keeping vehicles and machinery off the soils or providing BMPs when it can't be avoided. Soil should be planted and mulched after installation. Plant debris or its equivalent should be left on the soil surface to replenish organic matter.

COMPLIANCE WITH THESE STANDARDS

- Bellingham Municipal Code 15.42
- Low Impact Development Technical Guidance Manual for Puget Sound
- Stormwater Management Manual for Western Washington

REFERENCES / SOURCES

Puget Sound Action Team – Low Impact Development – Technical Guidance Manual for Puget Sound
Washington Department of Ecology – Stormwater Management Manual for Western Washington
Washington Organic Recycling Council

FINANCIAL INCENTIVES

City of Bellingham (Flow Reduction Credits)

Impervious surface areas can be hydrological modeled as landscape areas when soil amendment is performed in accordance with BMP T5.13 from the 2005 Stormwater Management Manual for Western Washington and 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.

LAKE WHATCOM WATERSHED FRIENDLY PRACTICES

Lake Whatcom is an impaired water body and extra considerations must be used to protect the Lake. Though the use of amended soils has stormwater management benefits, if materials are not carefully selected those benefits can be greatly outweighed by the impacts. Please refer to the Lake Whatcom **"Guidelines for Gardening Materials and Practices in the Lake Whatcom Watershed"** located on the City of Bellingham website for greater details about appropriate soil amendment products for the Lake Whatcom watershed.

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