



Development Engineering Handout 9 Soil Amendment

Summary: Soil amendment is a process of treating disturbed soils on a construction site in order to restore the stormwater treatment capacities of the soil with respect to absorption, storage and filtration. This process serves to reduce runoff and improve water quality from developed sites. Soil amendment is an explicit requirement of Pierce County's National Pollution Discharge Elimination System Permit (NPDES Permit) and was implemented via the 2008 edition of the Pierce County Stormwater Management and Site Development Manual (aka the Stormwater Manual).

Soil Amendment Requirement: The Stormwater Manual requires amendment of disturbed soils for all sites which either create 2000 sf or more impervious surface OR disturb 7000 sf or more of the site. This threshold would include all new home construction, but may exclude some smaller projects with limited site disturbance. All disturbed areas on a project site must be amended except;

- The building footprint and all areas within 10 feet of the actual building.
- Areas that are or will be made impervious in conjunction with the current project such as driveways and sidewalks.
- Areas where actual septic drain fields have been or will be installed in conjunction with the current project (this exception does not apply to reserve drain field areas, these must be amended).
- Areas within the drip line of existing trees to be retained.
- Anywhere the original native soils have not been significantly disturbed and/or displaced. This may be a difficult judgment call in some cases. While it is not our intent that vegetation removal alone trigger the requirement to amend soils, traditional clearing with a bladed piece of equipment will certainly 'significantly disturb or displace' the top layer of native soil.
- Any areas classified as critical slopes or with slopes of 33% or greater.

In many cases an applicant can greatly reduce the cost and effort required to amend soils by strictly limiting the disturbance of native soils on his or her project site.

Soil Amendment Methods: The stormwater manual provides three different approved methods or options for amending soils. Each of the options includes a requirement to scarify or till the existing subgrade and then add a soil mixed with an amending component in order to achieve a target percentage of organic content to a given depth. It is important to note that simply importing and spreading material on top of an existing, undisturbed subgrade is never an acceptable method of soil amendment. It is also important to note that each method or option includes one set of specifications for amending lawn areas and another for amending landscape areas (planting beds and any other landscaped areas not designated to be lawn). Specific requirements for amending soils by each of the acceptable methods are provided on the following pages.

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Option 1 – Amend with Organic Compost

Lawn Areas – Amend to 5% Organic Content

- Scarify or till existing soils to a depth of 10 inches.
- Place and rototill 2 inches of composted material into the top 6 inches of scarified soil for a finished depth of 12 inches of un-compacted soil.
- Water or roll to compact soil to 85% of maximum.
- Rake to level and remove woody debris and rocks larger than 1 inch in diameter.

Landscape Areas/Planting Beds – Amend to 10% Organic Content

- Scarify or till existing soils to a depth of 9 inches.
- Place and rototill 3 inches of composted material into the top 5 inches of scarified soil for a finished depth of 12 inches of un-compacted soil.
- Rake and remove rocks larger than 2 inches in diameter.
- Mulch planting areas with 2 inches of organic mulch.

Compost used for Soil Amendment must be “Class A Compost” per Washington DOE Interim Compost Quality Guidelines (WAC Ch 173-350 Sec 220), which lists the following criteria;

- 35% Organic Content Minimum.
- Ph of 6.0 – 8.0 (up to 8.5 in wetlands or stream banks).
- Carbon to Nitrogen Ratio of < 25:1.
- 100% passing a 1 inch sieve.

The local products “Cedar Grove Compost” & “Corliss Fine Prep Organic Compost” meet these standards.

Option 2 – Stockpile, Protect & Reuse Existing Soils

Lawn Areas – Amend to 5% Organic Content

Landscape Areas/Planting Beds – Amend to 10% Organic Content

- Remove, Stockpile & Protect existing topsoil for reuse.
- Test stockpiled soils to determine organic content & suitability. Submit test results and mix proposal to county for approval.
- Scarify or till existing subgrade 4 inches.
- Place and till a total 9.5 inches of replaced topsoil and imported compost according to approved mix ratio to achieve finished depth of 12 inches (4 inch scarification + 8 settled inches of placed mix) of un-compacted soil.
- Water or roll lawn areas to compact soil to 85% of maximum.
- Rake to level and remove woody debris and rocks larger than 1 inch in diameter in lawn areas or 2 inch in diameter in landscape areas.
- Mulch planting areas with 2 inches of organic mulch or stockpiled duff.

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Option 3 – Amend with Imported Topsoil

Lawn Areas – Amend to 3-5% Organic Content

Use imported topsoil mix comprised primarily of sand or sandy loam and containing 3-5% organic matter (Typically ~25% compost).

- Scarify or till existing subgrade in two directions to a 6 inch depth.
- Place 3 inches of topsoil mix on surface.
- Water or roll to compact soil to 85% maximum.
- Rake smooth and remove surface rocks over 1 inch in diameter.

Landscape Areas – Amend to 10% Organic Content

Use imported topsoil mix comprised primarily of sand or sandy loam and containing 10% organic matter (Typically ~40% compost).

- Scarify or till existing subgrade in two directions 6 inch depth.
- Place 3 inches of topsoil mix on surface and till into 2 inches of soil.
- Place additional 3 inches of topsoil mix on the surface to achieve a finished, uncompacted depth of 12 inches.
- Rake smooth and remove surface rocks over 2 inches in diameter.
- Mulch planting beds with 2 inches organic mulch.

Planning Considerations: Many contractors have been frustrated by delays in securing final project approvals because they did not properly plan to meet amended soil requirements. Pierce County recommends proponents consider the following issues when planning site work for projects subject to amended soil requirements;

1. **Cost** – When this requirement was first implemented, Pierce County requested estimates from several contractors to amend soil on 10,000 square feet of a typical residential lot. Four contractors responded and the least expensive estimate was \$4,816 utilizing Option 1.
2. **Placement** – Soil amendment requires significant manual labor to avoid compaction of soils by traditional heavy equipment.
3. **Elevation Changes** – Soil amendment results in a finished elevation increase of approximately 3-8 inches over pre-existing subgrade depending on the method of amendment.
4. **Materials Availability** – Don't wait to the last minute to verify that the materials you hope to use for soil amendment are both suitable and readily available. See Material Quantity Estimates section below.
5. **Inspection and Documentation Requirements** – Pierce County inspectors will verify soil amendment and will require documentation for the testing and/or purchase of the media used to amend. Insure that your receipts or product documentation clearly state that the product conforms with the applicable specification for the method chosen.

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- 6. Native Site/Soil Preservation** – As mentioned on page 1, native soils which have not been removed or disturbed do not have to be amended. Planning for and strictly controlling soils disturbance on your site can greatly reduce your soil amendment burden.

Material Quantity Estimates: The following are generic estimates of the required amounts of materials required to amend each 1000 square feet of disturbed area by either Option 1 or 3 above;

Option 1 – Amend with Organic Compost – Lawn Areas

2 inches compost material per square foot = $.167 \text{ cf/sf} \times 1000 \text{ sf} = 167 \text{ cf} \div 27 \text{ cf/cy} = 6.2 \text{ cy}$

Plan on 6.2 cubic yards of compost material per 1000 sf to be amended.

Option 1 – Amend with Organic Compost – Landscape Areas

3 inches compost material per square foot = $.25 \text{ cf/sf} \times 1000 \text{ sf} = 250 \text{ cf} \div 27 \text{ cf/cy} = 9.26 \text{ cy}$

Plan on 9 ¼ cubic yards of compost material per 1000 sf to be amended.

Option 3 – Amend with Imported Topsoil – Lawn Areas

3 inches imported topsoil per square foot = $.25 \text{ cf/sf} \times 1000 \text{ sf} = 250 \text{ cf} \div 27 \text{ cf/cy} = 9.26 \text{ cy}$

Plan on 9 ¼ cubic yards of imported topsoil per 1000 sf to be amended.

Option 3 – Amend with Imported Topsoil – Landscape Areas

6 inches of imported topsoil per square foot = $.5 \text{ cf/sf} \times 1000 \text{ sf} = 500 \text{ cf} \div 27 \text{ cf/cy} = 18.5 \text{ cy}$

2 inches of organic mulch per square foot = $.167 \text{ cf/sf} \times 1000 \text{ sf} = 167 \text{ cf} \div 27 \text{ cf/cy} = 6.2 \text{ cy}$

Plan on 18.5 cubic yards of imported topsoil per 1000 sf to be amended.

Plan on 6.2 cubic yards organic mulch per 1000 sf planting beds to be amended.

Amended Soils Inspection Method: When the approved site development plan indicates that soil amendment is required, the Pierce County inspector will verify soil amendment prior to final inspection approval for residential and commercial projects, and prior to bond release for subdivisions. The inspector will take the following steps to verify soil amendment;

1. Look to see that it appears that soil amendment has been completed over all disturbed areas.
2. Take at least three soil samples per acre (2 minimum for very small sites) using a step probe. This should reveal that soil is loose and contains organic material to the design depth by method employed.
3. Require delivery tickets, receipts (specifying delivery address) or lab test results for suitable amending media according to method chosen. The document provided will be reviewed to

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verify utilization of appropriate amending media at reasonable quantities given the extent of areas being amended.

Sources for Suitable Materials: While not specifically endorsed or recommended by Pierce County, the following commercial establishments are known to carry materials suitable for amending soils:

- Cedar Grove Composting, 17825 Cedar Grove Rd SE, Maple Valley, WA 98038, www.cedar-grove.com, 877-764-5748.
- Lloyd Enterprises Inc., 80 5th Ave, Milton, WA 98354 www.lloydenterprisesinc.com, 253-874-6692.
- Randles Sand & Gravel, Inc., 19209 Canyon Rd E, Puyallup, WA 98375, www.randlessandandgravel.net, 253-531-6835.
- Corliss Resources, 18001 Meridian Ave E, Puyallup, WA 98375 www.corlissresources.com, 253-891-6680.
- Purdy Topsoil and Gravel, 5819 133rd St NW, Gig Harbor, WA 98332, <http://randlessandandgravel.net/purdy-topsoil-and-gravel-.html> (253) 857-5850.

References: The guidance in this handout is based on relevant material from the following documents;

- 2008 Pierce County Stormwater Management and Site Development Manual (with 2012 amendments).
- Low Impact Development Technical Guidance Manual for Puget Sound, December 2012, published by the WSU Puyallup Research & Extension Center and the Puget Sound Partnership.
- “Building Soil” Guidelines and Resources for Implementing Soil Quality and Depth - BMP T5.13 from the 2012 WDOE Stormwater Management Manual for Western Washington.

Questions or Comments: Questions or comments concerning this handout may be directed to Scott Murdock, Development Engineering Inspection Supervisor at Scott.Murdock@co.pierce.wa.us or 253-798-3756.