

Summary Fact Sheet

Category: 5.0 Soil Amendments

Practice: 5.1 Soil Amendments

General Description: Soil amendments, which include both soil conditioners and fertilizers, make the soil more suitable for the growth of plants and increase water retention capabilities. Compost amendments and soils for water quality enhancement are also used to enhance native or disturbed and compacted soils. These measures change the physical, chemical, and biological characteristics of the soil allowing it to more effectively reduce runoff volume and filter pollutants. Soil amendments are valuable in areas with poor soils because they can help add available plant nutrients and sustain vegetative cover, reduce long-term erosion, and help reduce runoff peak volumes and discharges by absorption of rainfall and runoff.

Water Quantity Controls

Soil amendments increase the spacing between soil particles so that the soil can absorb and hold more moisture. Studies have indicated an increase in total soil storage capacity of 65% in compost amended soils.

Water Quality Controls

By promoting infiltration into a modified soil medium, soil amendments provide water quality benefits similar to those of bioretention cells. Phosphorus removal efficiencies for bioretention cells are set by Fairfax County as follows:

- 50% removal for cells that capture 0.5" of runoff from the impervious area
- 65% removal for cells that capture 1.0" of runoff from the impervious area

Amended soils have the ability to remove pollutants through sorption, precipitation, filtering, and bacterial and chemical degradation. Also, the decrease in runoff volume improves water quality by reducing pollutant mass transport. Finally, compost materials used for amendments are less prone to erosion than topsoil or compacted subsoil decreasing sedimentation.

Location: Soil amendments can improve the water retention capacity and properties of almost any soil but have the greatest impact in areas with poorly draining native soils. Many BMPs discussed in these fact sheets use infiltration into the soil to improve runoff water quality and reduce runoff volume. Therefore, soil amendments may be used during the construction and/or maintenance of BMPs to increase soil permeability and the BMP's effectiveness. For example, water quality swales can be treated with soil amendments. Soil amendments can be used to increase the permeability of grass filter strips surrounding infiltration trenches to increase their effectiveness as pretreatment devices.

Design Construction and Materials: A variety of techniques are included as potential soil amendments including aerating; fertilizing; and adding compost, other organic matter, or lime to the soil.

Costs associated with soil amendments will include the amending materials and the methods of integrating the amending materials into the existing soil. Typical costs are provided below.

Item	Unit	Estimated unit cost (2005 Dollars)
Soil and site preparation	S.Y.	\$5 - \$8
Mechanical grading and tilling	S.Y.	\$18 - \$27
Soil amendments	C.Y.	\$15 - \$30
Blower application	S.Y.	\$0.45 - \$1.00

Cost: The cost for soil amendments to treat runoff from ½ impervious acre is comprised of both the installation cost and annualized costs. These cost calculations were based upon amending soils on ¼ acre to control stormwater runoff for a ½ acre site. Soil amendments are assumed to be effective for 25 years, at which point the area will need to be amended again.

Item	Required Cost per Year (2005 Dollars)													
	0	1	2	3	4	5	6	7	8	9	10	...	25	
Installation ¹	25,000													
Aerate			250		250		250		250		250			
Re-amend														25,000
Total Cost	25,000		250		250		250		250		250			25,000
Annualized Cost	\$1,125 / year (includes re-amending in year 25)													

¹Developer Cost. Not included in annualized cost.

Maintenance: Routine inspection of amended soils should evaluate factors that may decrease the soil's infiltration capacity, aeration and organic content. Typical post-construction concerns include areas subject to compaction, hydric or waterlogged soils, poor cover conditions, increased development, and a decrease in organic content. In addition, a routine soil infiltration rate analysis of amended soils in potential problem areas is recommended. Corrective actions for soil amendments involve restoring the infiltration capacity of the soil by aeration, deep tilling, and adding additional amendments. Reductions in infiltration capacity typically result from compaction or extensive root matting of groundcovers, such as grasses.

Performance and Inspection: To ensure proper performance, visually inspect amended soils for compacted soils, waterlogged soils, or diseased vegetation. All may be signs of soil function loss or failure. The first step of corrective action should be extensive mechanical aeration. If this does not restore the infiltration rate, organic amendments should be disked into the soil for a depth of several inches and the site restabilized. Diseased vegetation should be removed and replaced. Soil samples may be taken prior to any remedial actions to determine the condition of the soils. Annual visual inspections should be conducted to observe the presence and location of any problem areas.



**Southern Maryland Wood Treating Site:
Final Grading and LeafGro Placement**
Source: U.S. EPA

Potential LEED Credits:

Primary: N/A

Other: Innovation & Design Process (1-4 Points)

Links to Additional Information:

Fairfax County PFM:

<http://www.co.fairfax.va.us/dpwes/publications/pfm/6.htm>

Virginia Stormwater Management Handbook:

<http://www.dcr.virginia.gov/sw/stormwat.htm#pubs>

Northern Virginia BMP Handbook:

<http://www.novaregion.org/pdf/NVBMP-Handbook.pdf>