

“The nation that destroys its soil, destroys itself.” Franklin Delano Roosevelt, 1938



WHAT ARE ENGINEERED SOILS?

Engineered soils are soils that are manufactured from soil and soil components – sand, silt, clay and organic matter/compost - to achieve a prescribed ratio of ingredients, suitable for a specific application. Locally manufactured compost, is the most sustainable and cost effective source of this organic matter.

WHAT IS ‘GREEN INFRASTRUCTURE?’



“**Green infrastructure**” is a relatively new term, and it has been used differently in different contexts. The US EPA intends the term “green infrastructure” to refer to systems and practices that use or mimic natural processes to infiltrate, evapotranspire (the return of water to the atmosphere either through evaporation or by plants), or reuse stormwater or runoff on the site where it is generated. Green infrastructure can be used in a wide range of landscape scales in place of, or in addition to, more traditional stormwater control elements to support the principles of Low Impact Development. (US EPA, 2013b) “By weaving natural processes into the built environment, green infrastructure provides not only stormwater management, but also flood mitigation, air quality management, and much more.” (US EPA, 2013a).

Additionally, engineered soils containing compost are being shown to help to mitigate climate change. The beneficial microbes in the compost help to stimulate the soil cycles where they have been interrupted by use of insecticides, herbicides or fertilizers¹. This encourages the soil to act as a carbon storehouse.

VEGETATION AND SOILS:



It is important that both quality soil and vegetation be viewed together as

an essential part of a dynamic system used to control stormwater quantity and quality. Together they are the best storm water management tool for use in land disturbing activities to re-establish the pre-development volume of runoff, recharge, storage, and evaporation. Green Building Programs are

incorporating functional soil and landscape techniques as highly effective, cost-efficient, and attractive approaches to managing stormwater, protecting developing watersheds, and water conservation. Some examples of engineered soils manufactured for green infrastructure include; green roofs, green walls, green streets, rain gardens, bioinfiltration, bioswales and more.



COMPOST IS A RAPIDLY RENEWABLE RESOURCE THAT IS LOCALLY PRODUCED FROM RECYCLED ORGANIC RESIDUALS



Both the **US Green Building Council's LEED2** and the **Sustainable Sites programs (SITES)³** now offer credits for the use of compost in projects seeking certification. These credits are offered due to the variety of benefits that compost provides in the landscape for the uses described below. Include compost in your projects and realize these benefits and credits!

LEED - USE COMPOST AND SPECIFY COMPOST FOR LEED CREDITS - WHERE CAN COMPOST APPLY?

- 5.1: Site Development: Protect and Restore Habitat
- 6.1: Storm Water Design: Quantity Control
- 6.2: Storm Water Design: Quality Control
- 7.2: Heat Island Effect: Non-Roof
- 7.2: Heat Island Effect: Roof
- LEED/Water Efficiency
- Credit 1.1 & 1.2: Water Efficient Landscape: Reduce 50% & Reduce 100%
- Credit 2: Innovative Wastewater Technologies

LEED/Materials and Resources

- Credit 4.1 & 4.2: Recycled Content 10% & 20%
- 5.1 & 5.2: Regional Materials
- 6.0: Rapidly Renewable Materials

SITES - SPECIFY COMPOST AND USE COMPOST FOR SUSTAINABLE SITES CREDITS

- Prerequisite 1 .1 Limit development of farmland soil
- 7.1 Control and retain construction pollutants (EPA-530-F-97-042)
- 7.2 & Credit 7.3 Restore soils disturbed during construction & Restore soils disturbed by previous development
- 7.5 Reuse or recycle vegetation, rocks, and soil generated during construction
- 8.3 Recycle organic matter generated during site operations and maintenance
- 5.7 Use regional materials

USE LOCALLY PRODUCED COMPOST FOR ALL LEED & SITE PROJECTS

The benefits of engineered soils containing compost in greenscapes or green building include:

- Reduce Life Cycle Cost for Stormwater Infrastructure
- Shifts maintenance burdens away from local governments
- Provide superior control of non-point source pollution and hydrologic control of small, frequently-occurring storms
- Help with NPDES Phase II final Rule Compliance
- Help Mitigate Combined Sewer Overflows
- Help with Watershed Pollutant load management



GREEN INFRASTRUCTURE APPLICATIONS BENEFIT FROM COMPOST USE

GREEN ROOFS:

Green roofs employ vegetated roof covers, with growing media and plants covering or taking the place of bare membrane, gravel ballast, shingles or tiles. A green roof system is an extension of the existing roof which involves a high quality water proofing and root repellent system, a drainage system, filter cloth, a lightweight growing medium and plants.



Compost is the preferred and recommended organic material in the lightweight growing media that is used to build green roofs. Green Roofs are beneficial because they:

- Store water in the substrate which is taken up by the plants from where it is returned to the atmosphere through transpiration and evaporation.
- In summer, depending on the plants and depth of growing medium, green roofs retain 70-90% of the precipitation that falls on them; in winter they retain between 25-40%.
- Green roofs not only retain rainwater, but also moderate the temperature of the water and act as natural filters for any of the water that happens to run off.
- Moderate the 'heat island effect' through the daily dew and evaporation cycle, plants on vertical and horizontal surfaces are able to cool cities during hot summer months

Learn more at: *Green Roofs for Healthy Cities* <http://www.greenroofs.org/index.php/about/greenroofbenefits>



RAIN GARDENS:

A rain garden is a strategically located area typically planted with native vegetation that intercepts runoff. Other terms include mini-wetland, storm water garden, water quality garden, stormwater marsh, backyard wetland, low swale, wetland biofilter or bioretention pond. Rain gardens are designed to direct runoff into a low, vegetated area, where the pollutants can be captured or filtered, as well as keeping stormwater on that site.

Compost should be included in engineered soil that is used to build Rain Gardens. Compost in Rain Gardens will:

- Increase the amount of water that filters into the ground, which recharges local and regional aquifers
- Help protect communities from flooding and drainage problems
- Help protect streams and lakes from pollutants carried by urban stormwater
- Enhance the beauty of neighborhoods and provide valuable habitat for birds and beneficial insects

Learn more at: *Rain Gardens - A how to manual for homeowners, University of Wisconsin-Extension*

<http://ddoe.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/RaingardenHow2HomeownerUWExtension.pdf>



BIORETENTION:

Bioretention systems are soil and plant based facilities employed to filter and treat runoff from developed areas. Bioretention systems are designed for water infiltration and evapotranspiration, along with pollutant removal by soil filtering, sorption mechanisms, microbial transformations and other processes. Examples of Bioretention systems include; Bioretention basins (landscaped depressions or shallow basins used to slow and treat on-site stormwater runoff), traffic and parking lot islands and rain gardens. Compost is often used as the source of organic matter in the engineered soil that is used to build these.



GREEN STREETS:

A green street is defined as a streetscape designed to integrate a system of stormwater management within its right of way, reduce the amount of runoff into storm sewers, and make the best use of the street tree canopy for stormwater interception as well as temperature mitigation and air quality improvement. The goal of converting grey infrastructure into green infrastructure can be achieved by increasing compost use in the soil, installing porous pavement and increasing street planting plantings. Engineered structural soils designed to solve the conflict between highly compacted soils under the pavement in an urban environment and the trees whose roots are unable to grow beyond the confines of the tree bed into the compacted soil.



US Composting Council
Seal of Testing Assurance®

The US Composting Council supports and strongly recommends regular compost testing to insure product quality and safety. **The Seal of Testing Assurance Program (STA)** is the ONLY nationally recognized compost testing program. Read more about it at:
<http://compostingcouncil.org/seal-of-testing-assurance/>

Cited References

¹[Compost-New Applications for an Age Old Technology, USEPA530-F-97-047](#)

²Denver Water Authority – Soil Amendment Program

<http://www.denverwater.org/Conservation/SoilAmendmentProgram/>

³Using Compost to Reduce Irrigation Needs

<http://www.usawaterquality.org/conferences/2007/PPTs&Posters/AgBMPs/Friend.pdf>

⁴Sharma G and Campbell A, 2003, Life Cycle Inventory and Life Cycle Assessment for Windrow Composting Systems, Recycled Organics Unit, New South Wales Department of Environment and Conservation, Sydney, NSW, Australia

⁵Summarized from “Innovative Uses of Compost: Bioremediation and Pollution Prevention”, USEPA 1997

⁶USDA NCRS Soil Health Key Points, Feb. 2013

Other Useful References:

How To: Soil Best Management Practices, Tools, & Specifications

<http://www.soilsforsalmon.org/how.htm>

Choosing a Soil Amendment

<http://www.ext.colostate.edu/pubs/Garden/07235.html>

Compost Effect on Water Retention and Native Plant Establishment on a Construction Embankment

http://ars.usda.gov/research/publications/publications.htm?seq_no_115=187864

Landscape Architect Specifications for Compost Use

<http://compostingcouncil.org/seal-of-testing-assurance/>

Please visit www.compostsolution.org for many more references on the use of compost for increasing soil organic matter and water conservation.



US Composting Council®

Compost: THE Sustainable Solution

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