

**Beyond Rain Gardens
Advancing the Use of Compost for
Green Infrastructure,
Low Impact Development, &
Stormwater Management**

VORS 2018

Stormwater Management Session 2

Stormwater Management, Green Infrastructure, Low Impact Development & Erosion Control Definitions

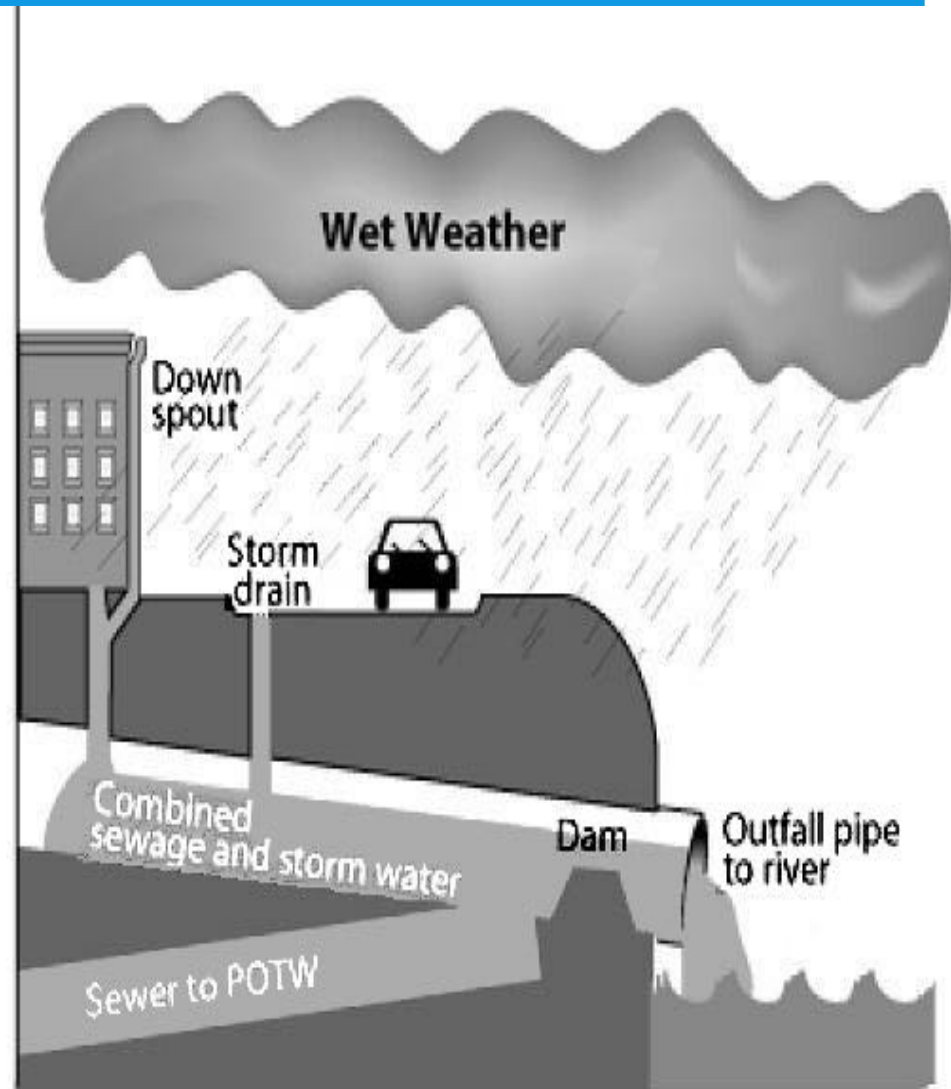
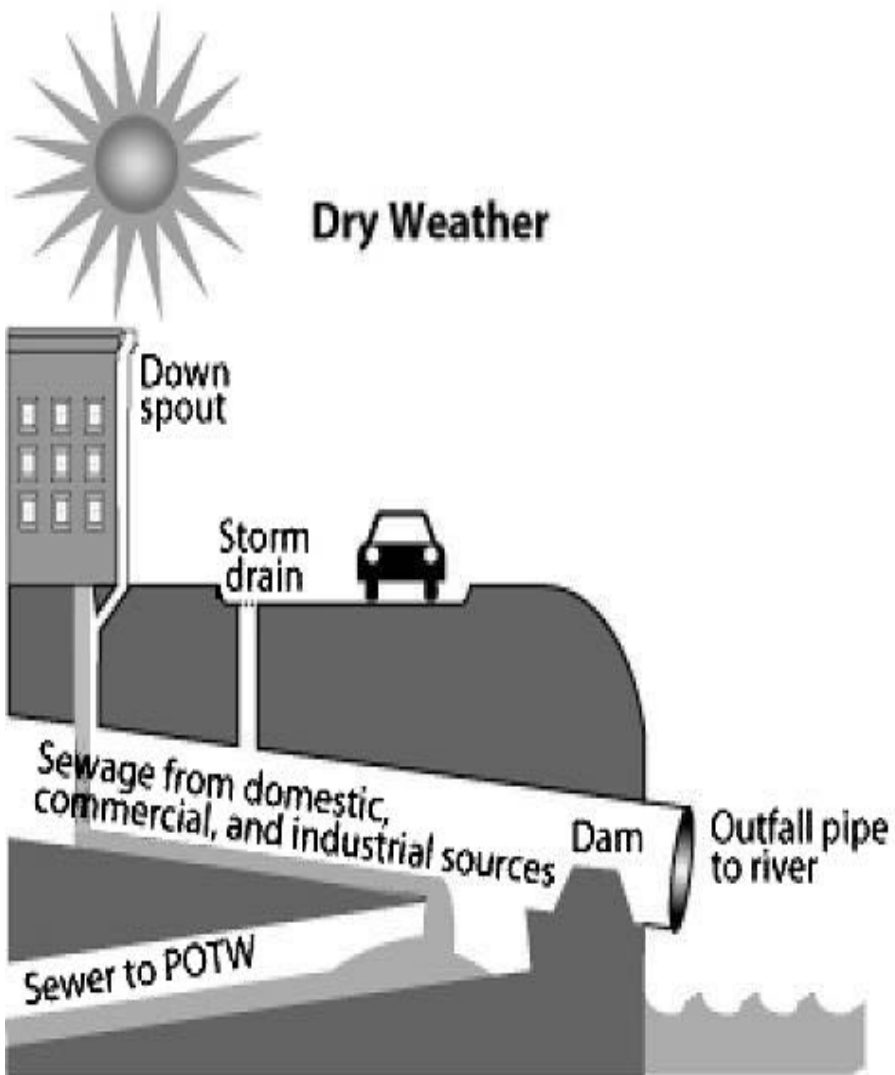
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Stormwater Runoff

- * Precipitation that runs off surfaces such as rooftops, paved streets, highways, & parking lots, as well as hard grassy surfaces like lawns, play fields, & from graveled roads & parking lots
- * It can become polluted as it flows over impervious surfaces
 - Pollutants: oils, grease, sediment, fertilizers, pesticides, herbicides, bacteria, debris, litter
- * Stormwater washes these pollutants through the storm sewer system, into local streams & drainage basins

Impervious Surfaces

- * Impervious (hard) surfaces prevent precipitation from soaking into the ground
 - Thus, more precipitation becomes runoff
- * Additional volumes/velocities of stormwater can lead to sewer overflow, erosion & sediment problems



Source: US Environmental Protection Agency

Stormwater Management

- * The application of site design principles & construction techniques to prevent sediments and other pollutants from entering surface or ground water; source controls; and treatment of runoff to reduce pollution.
- * It should best preserve or mimic the natural hydrologic cycle & fit within the capacity of existing infrastructure

Best Management Practices (BMPs)

- * A schedule of activities, prohibitions or practices, maintenance procedures, green infrastructure, & other management practices to prevent or reduce water pollution

Source: Vermont Stormwater Management Statute

Green Infrastructure

- * An approach to wet weather management that uses natural systems - or engineered systems that mimic natural processes - to enhance overall environmental quality & provide utility services
- * Techniques use soils & vegetation to infiltrate, evapotranspire, and/or recycle stormwater runoff

- * **Bioinfiltration** - Bioretention systems are soil- and plant-based facilities employed to filter and treat runoff from developed areas
- * Designed for water infiltration & evapotranspiration, along with pollutant removal by soil filtering, sorption mechanisms, microbial transformations, and other processes

- * **Green Roofs** - employ vegetated roof covers, with growing media & plants covering or taking the place of bare membrane, gravel ballast, shingles or tiles
- * An extension of the existing roof which involves a high quality water proofing & root repellent system, a drainage system, filter cloth, a lightweight growing medium & plants

* **Green Streets** - a streetscape designed to integrate a system of stormwater management within its right of way, reduce the amount of runoff into storm sewers, make the best use of the street tree canopy for stormwater interception as well as temperature mitigation & air quality improvement

- * **Rain Garden** - a strategically located low area planted with native vegetation that intercepts runoff
 - Mini-wetland, storm water garden, water quality garden, stormwater marsh, backyard wetland, low swale, wetland biofilter, or bioretention pond
- * Designed to direct runoff into a low, vegetated area, where the pollutants can be captured & filtered

- * **Street Trees** - When properly designed, tree plantings along street & road edges can capture, infiltrate, & transpire stormwater
 - These virtues can be expanded by incorporating trees into more extensively designed “tree pits” that collect & filter stormwater through layers of mulch, soil & plant root systems, where pollutants can be retained, degraded & absorbed

Low Impact Development (LID)

- * An approach to stormwater management that mimics a site's natural hydrology as the landscape is developed
 - Using low impact development approach, stormwater is managed on-site; the rate & volume of predevelopment stormwater reaching receiving waters is unchanged
- * Low impact development principles complement, & sometimes replace, traditional stormwater management systems
- * LID emphasizes conservation & use of on-site natural features to protect water quality

Source: Minnesota Pollution Control Agency

Erosion

- * The wearing down or washing away of the soil & land surface by the action of water, wind or ice
- * Eroded debris (silt or sediment) may become a pollutant via stormwater runoff
- * Occurs naturally but can be intensified by human activities such as farming, development, road-building, & timber harvesting

- * **Berm** - a shelf that breaks the continuity of a slope; a linear embankment or dike
- * **Buffer** - Designated area adjacent to & part of a steep slope or landslide hazard area which protects slope stability, attenuation of surface water flows, & landslide hazards reasonably necessary to minimize risk
 - Or a designated area adjacent to or a part of a stream or wetland that is an integral part of the stream or wetland ecosystem

- * **Compaction** - The loss of soil porosity due to the weight of heavy machinery, continuous lightweight application, or lack of adequate moisture
- * **Compost-amended flow path** - Soil restoration within the flow path using compost

- * **Filter strip** - Densely vegetated, uniformly graded areas that intercept runoff from impervious surfaces
- * **Mulch** - An organic material applied on the surface above the media to protect vegetation & underlying media, & enhance certain characteristics, such as water retention qualities

- * **Nutrients** - Substances required for growth of all biological organisms.
- * When considering water qualities, the nutrients of greatest concern in stormwater are nitrogen and phosphorus, because they are often limiting in downstream waters
 - Excessive amounts of these substances are pollution and can cause algal blooms and dead zones to occur in downstream waters

- * **Soil restoration** - The technique of using compost to amend soils to improve their porosity & nutrient retention
 - * Restored soils are less compacted & can replicate runoff from forested areas
- * **Soil structure** - How individual soil particles bind together, & the arrangement of soil pores between them

Compost-based tools:

- * Soil amendment, engineered soil, topsoil
- * Compost filter berms, blankets, socks
- * Green roofs, bioswales, bioretention, rain gardens, etc.
- * Constructed wetlands

Resources

- * [BANKING ON GREEN: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide](#)
- * [Vermont Stormwater Treatment Manual & other materials](#)
- * [Minnesota Pollution Control Agency](#)
- * [Minnesota Stormwater Manual](#)
- * [US Composting Council Compost Specifications & Publications](#)
- * [Texas Department of Transportation Compost & Mulch](#)
- * [R. Alexander Associates, Inc. Publications/Specifications](#)
- * [US Environmental Protection Agency Green Infrastructure](#)