Best Management Practices Fact Sheet

Bioretention Areas

PURPOSE: Bioretention areas are landscaping features adapted for filtering pollutants from runoff. They can also assist with slowing the velocity of runoff and promoting infiltration of runoff into the groundwater supply.

A bioretention area is a shallow, landscaped depression that receives runoff from impervious surfaces. The layered design of the bioretention area, which consists of an underdrain, a permeable sand/soil mix layer, and a top layer of rock and/or vegetation, filters debris particles, sediment, and other pollutants from runoff, prevents them from draining into a storm sewer system or waterway.

The rocky or vegetated surface layer initially slows the velocity of runoff. Water retained in the depression is then absorbed into the sand/soil mix layer, which acts as a filter for removing sediment and other pollutants. A layer of geotextile material should be laid under the soil mix layer to keep the mix from migrating to the underdrain area, which could clog the system. The filtered water then passes into the underdrain connected to the storm drainage system for release. Bioretention areas can also be designed to promote infiltration of runoff into the groundwater supply by incorporating vegetation *(see Rain Garden fact sheet)*.

Bioretention areas are effective at capturing and treating the "first flush" of stormwater runoff – the initial wave of runoff that carries the highest amount of pollutants. Bioretention areas can also be used in conjunction with stormwater inlets to maximize the amount of treated runoff entering storm drains. To accomplish this, the inlet drain is constructed with its grate approximately two inches off the ground. This allows the first flush of runoff to flow past the grate into the bioretention area. After the bioretention area has filled to the level of the inlet drain, subsequent runoff, which contains a lower concentration of pollutants than the first flush, will flow directly into the inlet.

General Design Considerations

- Allow for space between basin bottom and water table to prevent groundwater contamination
- Not recommended for sites that contribute a high sediment load
- Follow erosion control procedures
- Modify soil with compost if needed
- Effective for draining areas of less than 5 acres
- Design for slope of 5% to ensure runoff can be routed to storm drain system
- Effective for nearly all types of soils and topography
- Inspect regularly for clogging, litter, or rills or gullies caused by erosion
- Design should include overflow drainage to remove excess stormwater
- Ponding depth restricted to six inches or less for draw down within 72 hours
- Test soil pH regularly

Benefits and Uses

- Filters contaminants from runoff prior to its discharge to the storm sewer system
- Reduces peak velocity and volume of stormwater runoff delivered to storm sewer system
- Can alleviate flooding and erosion downstream
- Inexpensive to install and maintain
- Enhances aesthetics of local landscape
- Recharges groundwater supply
- Reduces total amount of impervious cover
- Applicable to all types of sites (residential/ commercial/industrial)
- Can be used to treat runoff along residential streets, stream corridors, and small parking lots

Additional Resources

PA Department of Environmental Protection
www.depweb.state.pa.us - search for Pennsylvania Stormwater Best Management Practices Manual

US Environmental Protection Agency
www.epa.gov

Low Impact Development Center
- www.lid-stormwater.net - click on "Site Map" and select Bioretention
- www.lowimpactdevelopment.org

Bioretention.com

Metropolitan Council Environmental Services
www.metrocouncil.org and click on "Environmental Services" to find the link to the *Urban Small Sites BMP Manual*

Stormwater Manager's Resource Center
www.stormwatercenter.net

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