

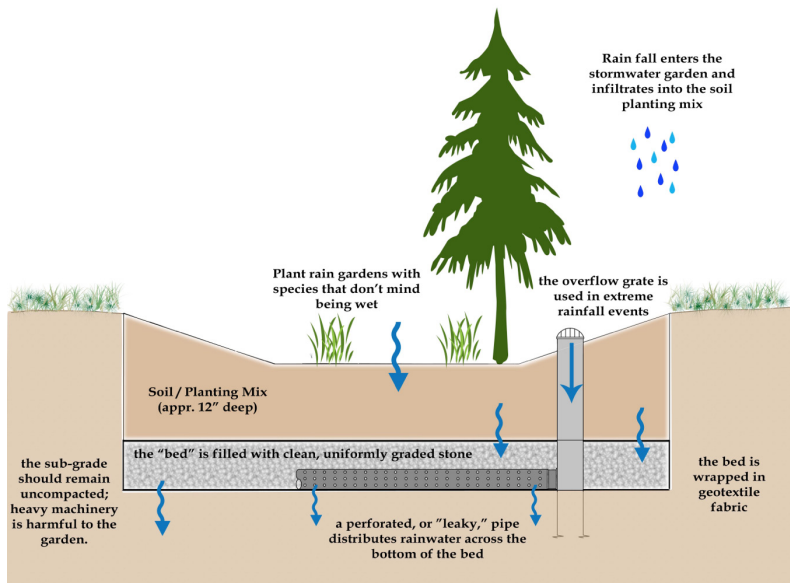
FACT SHEET

Bioretention (Rain Gardens)

DESCRIPTION

Bioretention Areas (often called Rain Gardens) are shallow surface depressions planted with specially selected, native vegetation to treat and capture runoff and are sometimes underlain by a sand or gravel storage/infiltration bed. Bioretention is a method of managing stormwater by pooling water within a planting area and then allowing the water to infiltrate the garden. In addition to managing runoff volume and mitigating peak discharge rates, this process filters suspended solids and related pollutants from stormwater runoff.

Bioretention can be designed into a landscape as a garden feature that helps to improve water quality while reducing runoff quantity. Rain Gardens can be integrated into a site with a high degree of flexibility and can balance nicely with other structural management systems including porous pavement parking lots, infiltration trenches, and other non-structural stormwater Best Management Practices. Bioretention areas typically require little maintenance once established and often replace areas that were intensively landscaped and require high maintenance.



Conceptual diagram showing process of bioretention

BENEFITS

- Volume control & ground water recharge, moderate peak rate control
- Versatile w/ broad applicability
- Enhance site aesthetics and habitat
- Potential air quality & climate benefits



Rain garden at Plum Street parking lot
City of Lancaster, PA



Residential rain garden at the Village at
Springbrook Farm in Lebanon, PA

Potential Limitations

- Higher maintenance until vegetation is established
- Limited impervious drainage area to each BMP
- Requires careful selection & establishment of plants

Potential Applications

Residential	Yes
Commercial	Yes
Ultra Urban	Limited
Industrial	Yes
Retrofit	Yes
Recreational	Yes
Public / Private	Yes / Yes

Stormwater Quality Functions		Stormwater Quality Functions		Additional Considerations	
Volume	Medium / High	Total Suspended Solids	High (70-90%)	Capital Cost	Medium
Groundwater Recharge	Medium / High	Total Phosphorus	Medium (60%)	Maintenance	Medium
Peak Rate	Medium	Total Nitrogen	Medium (40-50%)	Winter Performance	Medium
Erosion Reduction	Medium	Temperature	High	Fast Track Potential	Medium
Flood Protection	Low / Medium	-	-	Aesthetics	High

VARIATIONS

- Subsurface storage/infiltration bed
- Use of underdrain
- Use of impervious liner

KEY DESIGN FEATURES

- Flexible in size and configuration
- Ponding depths 6 to 18 inches for drawdown within 48 hours
- Plant selection (native vegetation that is tolerant of hydrologic variability, salts, and environmental stress)
- Amend soil as needed
- Provide positive overflow for extreme storm events
- Stable inflow/outflow conditions

SITE FACTORS

- Water Table/ Bedrock Separation: 2-foot minimum, 4-foot recommended
- Soils: HSG A and B preferred; C & D may require an underdrain
- Feasibility on steeper slopes: medium
- Potential Hotspots: yes with pretreatment and/or impervious liner
- Maximum drainage area: 5:1; not more than 1 acre to one rain garden
- Set back - 10 feet from any foundation



Linear bioretention area along Plum Street parking lot
City of Lancaster, PA

MAINTENANCE

- Watering: 1 time / 2-3 days for first 1-2 months, then as needed
- Spot weeding, pruning, erosion repair, trash removal, and mulch raking: twice during growing season
- As needed, add reinforcement planting to maintain desired density (remove dead plants), remove invasive plants, and stabilize contributing drainage area
- Annual: spring inspection and cleanup, supplement mulch to maintain a 3 inch layer, and prune trees and shrubs
- At least once every 3 years: remove sediment in pre-treatment cells/inflow points and replace the mulch layer
- Maintenance cost is similar to traditional landscaping

COST

- Cost will vary depending on the garden size and the types of vegetation used; typical costs are \$10-17 per sq. foot



For more information about the Green Infrastructure program please contact:

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