

Bioretention

A Guide for Stormwater Retention & Water Quality Improvement

Overview & References



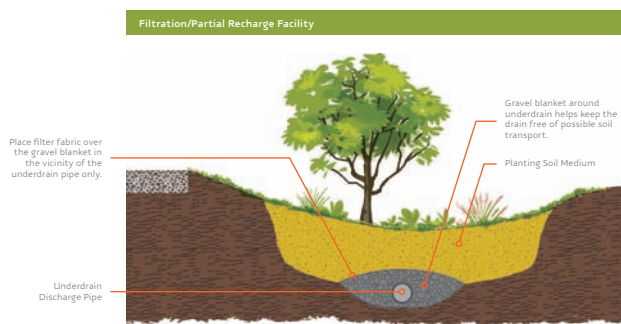
Bioretention Overview

BIORETENTION: DEFINITION & PURPOSE

Suburban and urban development often creates a loss of natural land, negatively impacting natural aquatic systems through an increase of runoff and polluted waters. Bioretention is a regenerative upland-based water quality and quantity control practice that uses the physical, biological and chemical properties of plants, microbes and soils to remove pollutants from stormwater runoff.

Bioretention facilities provide several benefits, including water quality improvements, environmental stewardship opportunities, aesthetic enrichment and wildlife habitat creation/preservation. There are also various types of bioretention facilities that can be used in an area, and it is important to choose one that suits the particulars of the impacted site. When making a decision

on the type of facility to be implemented, the land manager must consider both the aesthetic aspect and stormwater management needs.



Bioretention can be used in both residential and industrial settings. The difference between the two is the scale of the design. When placing bioretention within residential communities, the chief concern is aesthetics and visibility. With thoughtful design and consideration of local building codes, bioretention can be successfully used on residential lots. Typical residential bioretention includes landscaped raingardens, shallow dish design raingardens, shrub and tree

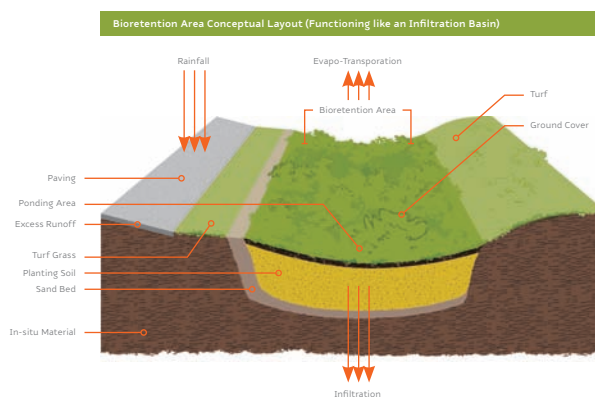
pits, sloped “weep” gardens, and side-swale gardens. More information about these types can be found in the Prince George’s County, MD Bioretention Manual (2007). Within industrially zoned and commercial areas where landscaping traditionally has not been a focal point, combining stormwater management with bioretention landscaping options has a significant, positive impact.

Design Phases

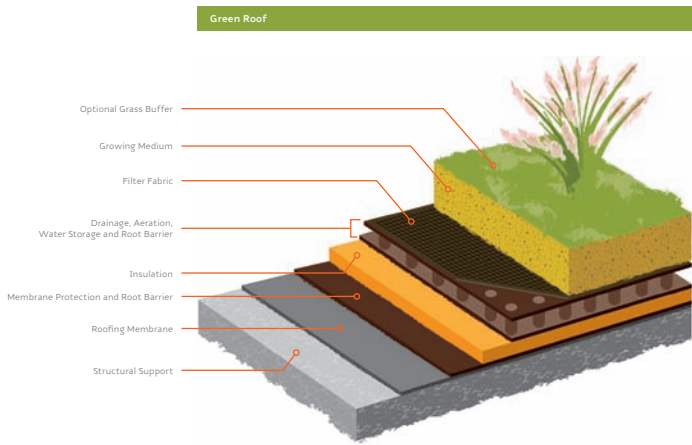
Although procedures for residential and industrial bioretention areas vary, there are basic design phases necessary no matter the scale.

Different issues and responsibilities occur with each phase of bioretention facility development. The development phases for commercial and industrial bioretention facilities are specific and

include: Concept, Engineering and Design, Engineering Plan Review, Pre-Construction, Construction, Final Closeout and Maintenance. For residential bioretention gardens, the steps are much simpler and involve sizing and siting, building, planting and maintenance.



The Concept Phase is the preliminary phase of all development activities, when the site is first evaluated for development potential and any environmental requirements. It is at this time that the designer should consider incorporating bioretention as means to manage stormwater. For residential bioretention, the concept aspects include location, size and depth — and how it will fit into the overall property landscape plan.

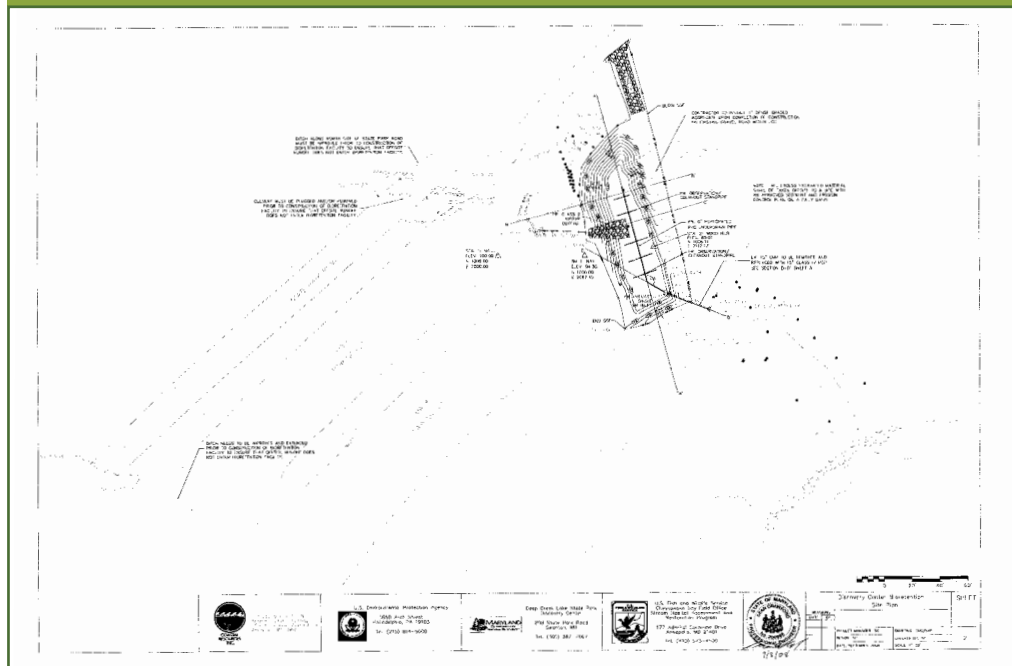


The Engineering Design Phase is next for commercial and industrial bioretention facilities. This phase determines whether the specific site identified is appropriate for bioretention. It is also where the designer will determine how to distribute bioretention uniformly across the site, resulting in smaller and more manageable subwatersheds. To determine if a site is suitable for a bioretention, several characteristics must be evaluated, including soil types/conditions, topography, existing drainage patterns, existing vegetation and utilities. Additional considerations can include sizing, underdrain pipes, overflow design, drain outlet structure and rain garden medium, depending on the scale of the bioretention facility or garden.

Once the construction plan is completed, it is the designer’s responsibility to determine what information is needed for the review (i.e., contour intervals, sediment and erosion control plan, setbacks, grading plans, etc.) and what offices need to be contacted for the review, if any. This is the Engineering Plan Review Phase. A residential bioretention may not need review, other than a neighborhood ordinance/standards approval.

The Pre-Construction Phase is critical to commercial projects and includes a pre-construction meeting with the county inspector to evaluate the timeline of the construction and sediment controls, as well as when inspections during construction will occur. The Construction Phase follows. During this phase the designer needs to be onsite to make sure the project is implemented correctly and to address any problems. The designer or construction manager must make sure that the design sequence is followed and inspections occur on time.

Proposed Conditions and Site Plan for Deep Creek Lake State Park Discovery Center, Swanton, MD



With residential garden construction, the critical pre-construction issue involves checking with local utility companies to be certain that digging will not interfere with underground lines.

The point at which the designer ensures the project is completed as designed is called the Final Closeout Phase. Any changes to the original plan must be documented. This is also the phase in which any final inspections required for permit compliance are completed and on time. The final phase, Maintenance and Operation, entails developing a maintenance schedule to ensure the project operates as designed and addresses the primary problem identified at the beginning of the project.

It is rather simple to maintain a residential bioretention garden, as this primarily involves weeding for the first couple of growing seasons; thereafter the native plants will out-grow the weeds. Each spring, dead overgrowth will need to be cut back, but other than some isolated weeding, no other maintenance should be necessary.

FIGURE 03.12: Landscaped Garden



Kramer Center, Centreville, MD
Photo courtesy of: McCrone, Inc., Civil Engineers and Surveyors

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