

Is There a Rain Garden in Your Future?

The management of stormwater is one of the most important considerations in the development of any site. Stormwater, as defined for development purposes, is water from rain or snowmelt that flows over the land surface and infiltrates, accumulates, or discharges from a site through natural or man-made conveyances. Predominantly, stormwater is the result of water flowing off impervious surfaces, primarily roofs and paved areas (parking lots, walkways, etc.). Traditionally, stormwater is collected (into catch basins, for example), conveyed via piping to collection systems, and is ultimately discharged into wetlands, streams, rivers, and lakes.

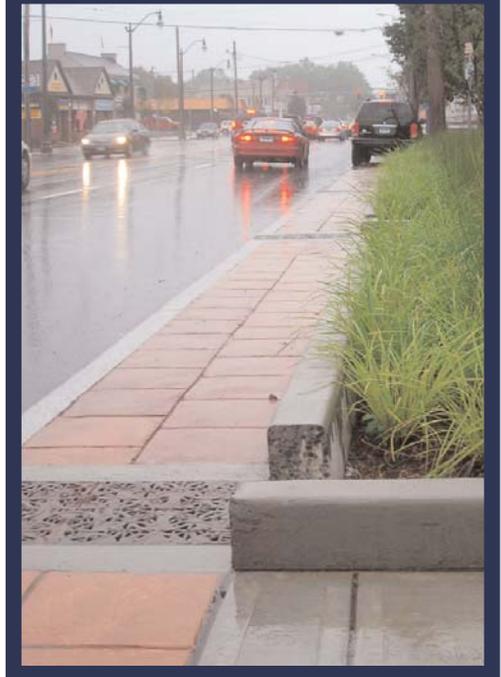
The regulation of stormwater primarily focuses on quality and quantity. Stormwater *quality* is a concern because as it flows over impervious surfaces various contaminants such as oils, gasoline, antifreeze, brake dust, fertilizers, pesticides, and sediment are entrained and transported “downstream.” Consequently, these contaminants have an adverse effect on the quality of the receiving water body. Stormwater *quantity* is a concern due to limitations in the ability of existing drainage systems to accept additional flows, resulting in reduced groundwater recharge and damage to existing stream systems from increased velocity and volume.

Challenged with increasing scrutiny and regulation, stormwater management practices that were acceptable even a few years ago are no longer viewed as acceptable. As a result, “low impact” stormwater management techniques have gained favor with regulators and become standard practice.

Typically, the key to these systems are engineered devices such as detention facilities, separation chambers, and filter systems. Taking the low impact concept one step further, rain gardens utilize natural systems to manage stormwater flows, and address both quality and quantity.

Rain gardens look like a slightly depressed landscaped garden area, but the selection of plant material and the soil mixture is unique. Rain gardens are constructed of a specific soil mix that allows water to be retained while it is absorbed by roots or cleaned by microorganisms that live in the soil before it passes to deeper soils and groundwater. This system allows rain gardens to receive and retain stormwater so that it can be treated and infiltrated, and ultimately mimic the natural/pre-construction site conditions.

Rain gardens are versatile and can be incorporated into more formal looking sites such as streetscape projects. The above photos of Main Street in Bridgeport, CT depict a streetscape application where BSC created a series of bays for stormwater treatment. The use of bays allows for pedestrian access from the sidewalk to the curb. Stormwater enters the first bay through a curb cut in the street, passes through a curbed forebay to remove sediment and is collected in the first bay for infiltration. If the stormwater volume is great enough, excess water will overflow to the second and third bays. If needed, the third bay will overflow back into the street to be picked up by a catch basin.



BSC created a series of rain garden bays for stormwater treatment as part of the streetscape design for Main Street in Bridgeport, CT

In certain cases where depth to groundwater is insufficient for proper treatment of the stormwater, where existing soil is contaminated, or where ledge prevents the infiltration of stormwater, stormwater infiltration may not make sense. In these circumstances the rain garden cross section can be modified by adding stone and installing a perforated pipe, which allows for more storage capacity and the ability to carry excess water off to either another rain garden or to a storm sewer system. This approach was used by BSC at Riverfront Park in Orange, MA where contaminated soils on a portion of the former brownfield site prevented infiltration in those locations.

A forebay of stone is usually included at the entrance of the rain garden. The stone slows down the water and allows for sediments and trash to drop out before reaching the plants. This also concentrates the sediment and trash in an area that is easily accessed by maintenance staff.

Soil for a rain garden is typically a mixture of organic soil, compost, and sand. The intent of the mixture is to provide a suitable growing medium, adequate retention of the water to allow for removal of contaminants, and root uptake of the water. The depth of the rain garden soil mixture should allow for water to be held for 12-24 hours to provide full treatment prior to infiltration. Soil mix depth can vary depending on site conditions but is preferably 2 to 3 feet deep. The infiltration rate of the existing soils below the rain garden should be tested prior to design to assure that water will be stored for the desired time. Placement and compaction of rain garden soil should be done with care to avoid a "bathtub" effect where the water pools in the garden and causes root rot.

Selection of plants for the rain garden depends on where the garden is located, type of soil, amount of maintenance the owner wishes to spend on it, and the amount of sun or shade it will receive. Plants that can handle a periodic inundation of water and survive long dry spells in between are ideal. Plant types can include grasses, ground-cover, perennials, shrubs, and trees. The use of annuals is not recommended because they are labor intensive to replace each year and their root systems are too small to provide the rain garden with the absorption capacity necessary for effective water uptake. Trees may, depending on their height and canopy type, limit the amount of sun that reaches the lower plants in the garden requiring sun loving plants to be replaced with shade tolerant plants as the tree matures.

Maintenance of the rain garden can vary depending on the location of the rain garden and the type of plants selected. The forebays should be checked several times a year and cleaned out, similar to catch basins. Plants should be maintained based on the specific plant requirements. Springtime maintenance should include replacement of plants that did not survive the winter and either loosening or adding to existing mulch to maintain a 3-inch depth on top of the soil. Fall maintenance should include leaf removal and cutting back ornamental grasses, unless they will be left for winter interest and cut down in the spring.

Rain gardens, where feasible, can significantly enhance the appearance and performance of site stormwater treatment, becoming part of a more comprehensive approach to sustainable development. Proper design, installation, and maintenance are critical to the effectiveness of rain gardens. BSC has proven success designing these systems and working with owners, contractors, and facility operators to assure all aspects of rain garden system design are understood and effectively implemented during and after construction.

Why not consider a rain garden for your site?



BSC utilized a unique approach to capture stormwater at Riverfront Park in Orange, MA, a former brownfield site



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