Rain Gardens

In a Nutshell

A rain garden is a landscape depression with native deep-rooted plants designed to to slow down, temporarily store, and treat stormwater. While some rain gardens use amended soil, in the homeowner rain garden it is preferable to use the existing soil as long as a percolation test confirms that it will drain in a 48 hour period.

The “How To”

How To Build a Rain Garden

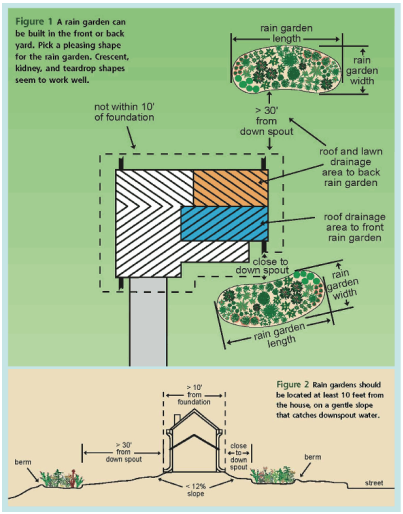
A rain garden is a type of Low Impact Development (LID) stormwater management Best Management Practice (BMP). BMPs can be utilized in residential and commercial settings to reduce the need for stormwater transportation and treatment, reduce flooding, and improve water quality. Rain gardens capture and hold stormwater while it slowly infiltrates into the ground, reducing runoff, replenishing ground water supplies and reducing nonpoint source pollution, which provides clean water to local rivers, streams, wetlands, and lakes.

Rain gardens utilize naturally low areas on a property and are made up of layers of infiltration material (such as gravel) and planted with native plants. Why native plants? Because they have deep root systems (helping stormwater to get into the ground - deep-rooted trees may even be used) can survive both drought and flooding conditions, and will not become invasive, taking over your yard. Infiltration is key! Rain gardens must be designed and constructed to infiltrate stormwater quickly to limit the time plants are in standing water.

Typical Design Considerations of A Rain Garden:

A complete guide for constructing a homeowner rain garden is available through the Missouri Botanical Garden Rainscaping website.

INFILTRATION is the key to a rain garden's success. SOIL is the key to infiltration. Rain gardens can be planted in almost any type of soil, although some amending may be necessary. The soil in a rain garden MUST drain water at a rate of 0.25 inches per hour or greater, or it needs to be amended (adding organic material, sand, or gravel to increase permeability). SIZE - rain gardens are typically 100-300 square feet in size, depending on the size of the building footprint (impervious surface), which provides the water for the rain garden, and soil type.



Rain Garden Design DO's:

- DO plant a rain garden 10 feet or more from the foundation of the building
- DO identify the location of underground facility and utility infrastructure to locate the rain garden away from service lines
- DO plant a rain garden in the flattest part of the yard
- DO plant a rain garden 25 feet or more from a well head
- DO plant a rain garden where the water table is at least 2 feet below the soil
- DO design the rain garden with a length to width ratio of 2:1 (with the longest side perpendicular to where the water enters)

Rain Garden Design DON'Ts:

- DON'T plant a rain garden under trees
- DON'T plant a rain garden over a septic tank
- DON'T plant a rain garden where water naturally pools

Planning & Zoning

HeartLands Conservancy assists communities with green infrastructure planning.

Example Incentive Program from Kansas City

Detention Basin Credit: Stormwater detention structures are installed and maintained to reduce the peak flow of and runoff volume of stormwater from a drainage area, thereby reducing flooding and erosion downstream. Properties served by a privately owned, and properly maintained, detention structure will be granted a stormwater fee credit. The amount of the credit shall be based on the reduction of stormwater runoff provided by the detention structures and be calculated according to guidelines established by the Director of Water Services Department. The minimum credit shall be 10 percent and the maximum credit shall be 50 percent.

To apply for a Detention Basin Credit, complete the application form (see the Detention Credit Application Form) and submit it to the following address:

Stormwater Utility Division
Attention: Philip Boyles
4800 E. 63rd St.
Kansas City, MO 64130.

The division will evaluate the information provided and inspect the detention basin for proper operation and maintenance. If you wish to talk with a Stormwater Utility Division representative about credits, call (816) 513-0563.

Municipal Incentives

Some municipalities and organizations offer incentives to homeowners who install a rain garden on their land.

The Metropolitan St. Louis Sewer District offers grants for rainscaping projects, including planting rain gardens, restoring woodlands, and replacing turf grass or invasives with native plants. The Deer Creek Watershed Alliance also offers a Rainscaping Cost-Share Program for landowners in the program focus areas.

Dollars & Cents

Costs and Benefits of Rain Gardens

It is difficult to generalize the cost/benefit of a rain garden. In developed communities, rain gardens can significantly reduce the volume of stormwater flow into nearby streams, and thereby reduce streambank erosion. Studies in selected St. Louis area communities have shown significant savings can be achived by using rain gardens to slow stormwater runoff. In strategic locations, rain gardens can also capture and filter pollutants picked up by surface stormwater, for example in catching runoff from a parking lot. Wide-spread use of rain gardens has potential to improve stream quality to the benefit of aquatic organisms.

Economic Valuation of Green Infrastructure Benefits

Methods of Economically Valuing Ecosystem Services

Economists use a range of methods to value ecosystem services, and many of these methods are applied in valuation of the benefits of green infrastructure practices. What follows is a brief summary of methods of ecosystem service valuation, followed by a review of how these methods can be applied to the green infrastructure practices and associated benefits discussed above.

Ecosystem services are most easily valued where a market exists that can set a price for the good being provided. For GI practices that displace potable water use, such as water harvesting, local water rates might be used in order to determine the value of benefits. In many cases, however, non-market valuation methods must be used. Non-market valuation methods include revealed preference methods, stated preference methods, and avoided cost analysis. Revealed preference methods attempt to infer the value of a non-market good or service using other market transactions. Hedonic pricing, for example, assumes that the price of a good is a function of relevant characteristics of that good, and attempts to isolate the contribution of a given characteristic to the total price (most commonly used with housing prices). Stated preference methods ask individuals how much they are willing to pay for a given good or service, or how much they would be willing to accept as compensation

for a given harm. These methods are often used to assess non-use values; e.g., what is the value of a protected wilderness for people who never see it? Finally, avoided cost analysis examines the marginal cost of providing the equivalent service in another way; e.g., valuing rainfall retention and infiltration by using a water utility.

Measuring Success

Success

Success can be measured in a variety of ways. How much water does the rain garden hold? How much water does it filter, and is the water entering the raingarden polluted? Does the rain garden beautify the location?

Rain gardens can serve to reduce the volume of stormwater rushing directly to streams after a rain event. In this context, a raingarden may be significantly less expensive than additional pipes and treatment; rain gardens also filter water that may be contaminated with pollutants, thus improving water quality; and rain gardens can beautify a property, thus providing aesthetic benefits.

Discover More

More Information about Rain Gardens

- Metropolitan St. Louis Sewer District
- Rainwater Harvesting for Drylands and Beyond by Brad Lancaster
- EPA - Water Quality Standards Handbook: Second Edition

Case Studies

Cornell Avenue Rain Garden Pilot Project

Contact

Deer Creek Watershed Coalition and MSD

Description

To assist in reducing stormwater run off in the Deer Creek Watershed, the Metropolitan St. Louis Sewer District installed rain gardens in the 8300 blocks of Cornell and Gannon Avenues this fall. MSD coordinated directly with property owners regarding temporary easements and maintenance agreements for the rain gardens, which are planted areas that help absorb rainwater runoff from roofs, driveways, and sidewalks. This is a pilot program and a combined effort between MSD, Washington University (to monitor the efficiency of the garden), Shaw Nature Reserve/Botanical Garden (consulting for native plant selection and maintenance) and the Deer Creek Watershed Coalition.

Cost $0

Lessons Learned

This project was completed with the intent to evaluate the efficiency of the rain gardens. Washington University is still collecting data. Washington University is collecting rain data prior and after the installation of the rain gardens. WASHU will monitor the amount of storm water run off for a total of 5 years. The end of Phase II monitoring will be in 2014.

Ranken Jordan - Pediatric Specialty Hospital

Contact

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11395 Dorsett Road - Maryland Heights, MO 63043

Description

Project increased impervious area greater than 1 acre, with the installation of a parking lot at the hospital. A combination of systems were employed to help spread the need for a BMP. The use of an internal rain garden with in the parking lot allowed Ranken Jordan to help satisfy landscape requirements in adding to the MSD requirements thus allowing a double use of this infrastructure. The project included the installation of pervious pavers and a rain garden.

Cost

Rain Garden Cost - $45,000

Rain Garden/Basin is maintained weekly during growing season for erosion, weed control, litter and debris. Annual cut back and disposal of vegetation is scheduled in March. Annual Cost - $850.00

Lessons Learned

It was desirable to install a rain garden and native landscape within the bottom of the detention basin in lieu of an underground filtration structure and mown lawn. The BMP was seen as a visual amenity to the campus and an opportunity for habitat enhancement. We anticipate that a majority of the water born particulates to be captured and retained within the bio filtration.

Silt control is critical throughout construction and growing period of project to keep structures clean.