

# Rainwater Garden

A rainwater garden is a type of bioretention depression that is often used in parking lots and small residential areas. Rain water drains to the gardens, where it is filtered through layers of vegetation, soil and mulch before recharging groundwater or more typically, collecting in an underdrain and being returned to a storm sewer.

A rainwater garden can typically allow for 30% more infiltration than a conventional lawn. By increasing infiltration, these gardens can help to reduce local flooding. In addition, they provide an asthetical benefit and provide a habitat for various wildlife.

## Advantages

- Reduces the volume of runoff from a site
- Suited to treat runoff from many high impervious areas, such as parking lots
- High pollutant removals of sediment, heavy metals, oil and grease, and nutrients
- One of the only options for ultra-urban areas.













## Limitations

- Ideally not suited for areas containing more than 2 acres of impervious surface
- Construction costs can be substantially higher than other treatment BMP's
- Success of the BMP may be low if infiltration rates of the native soils are low.
- There should be at least 3 feet between the bottom of the rain garden and the top of the water table in order to prevent groundwater contamination.

### AT-A-GLANCE SUMMARY

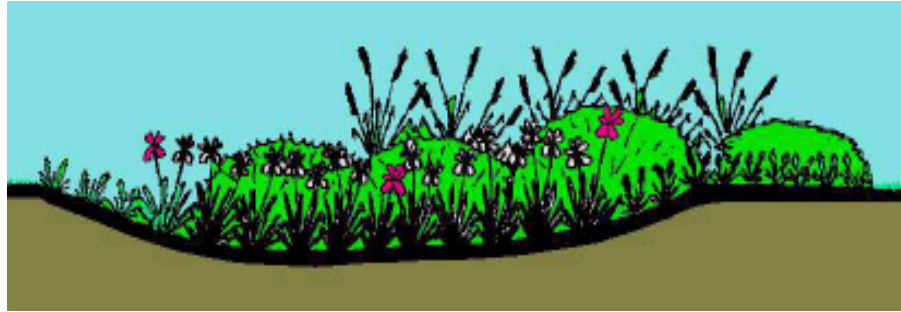
#### Benefit

- High 
- Moderate 
- Minor/None 

Flow attenuation	
Runoff volume reduction	
<u>Pollutant Removals*</u>	
Total Suspended Solids	
Floatables	
Heavy metals	
Oil and grease	
Fecal coliform	
BOD	
Total Phosphorous	
Nitrogen	
Costs	
Maintenance	

\*Provided that the rainwater garden is designed using the prescribed Bioretention concept.

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Source: *Friends of the Bassett Creek website*

## Costs

Rainwater Garden costs can be relatively expensive, compared with other storm water treatment practices. In 1997, Brown and Schueler developed an equation to approximate construction costs, including an adjustment for inflation:

$$C = 7.30 V^{0.99}$$

where:

C = Construction, Design and Permitting Cost (\$)

V = Volume of water treated by the facility (cubic feet)

This equates to approximately \$6.80 per cubic foot of water storage.

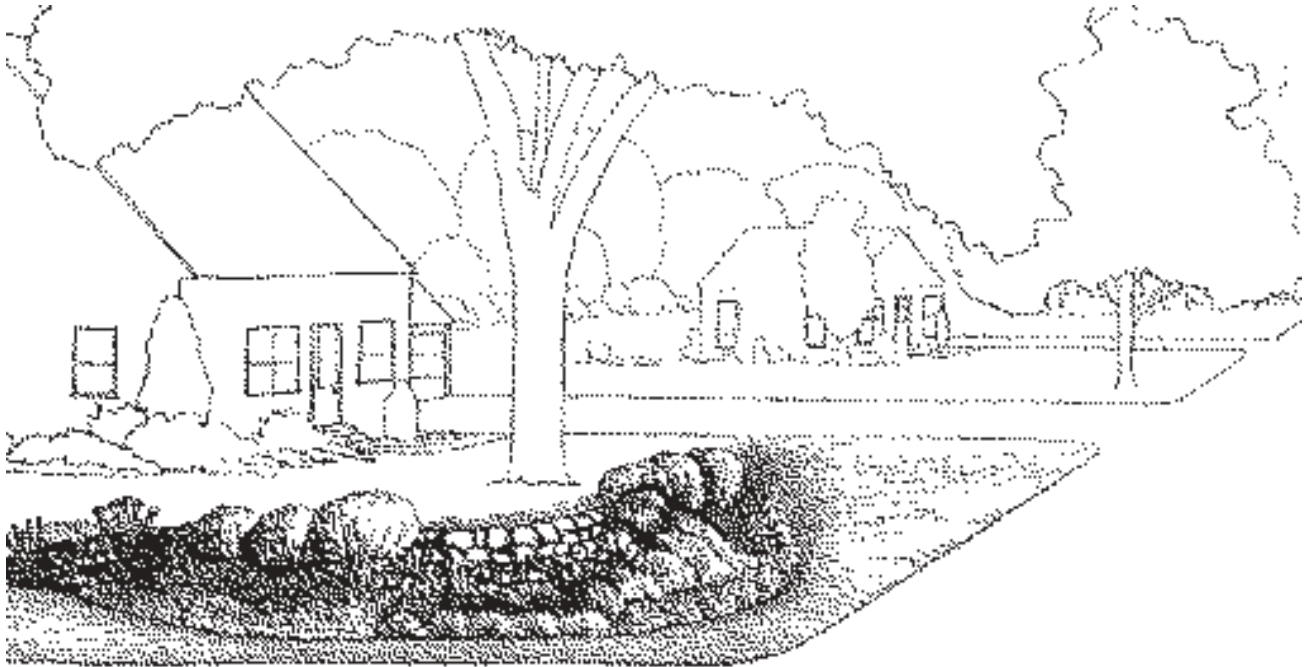
## Maintenance

The maintenance schedule for a rainwater garden is listed below.

Activity	Schedule
<ul style="list-style-type: none"><li>• Remulch void areas</li><li>• Treat diseased trees and shrubs</li></ul>	As needed
<ul style="list-style-type: none"><li>• Water plants daily for two weeks</li></ul>	At project completion
<ul style="list-style-type: none"><li>• Inspect soil and repair eroded areas</li><li>• Remove litter and debris</li></ul>	Monthly
<ul style="list-style-type: none"><li>• Remove and replace dead and diseased vegetation</li></ul>	Twice per year

Source: *www.stormwatercenter.net, "Fact Sheet: Bioretention"*

# Rainwater Garden



**Typical Rainwater Garden Layout**

## Design Specifications

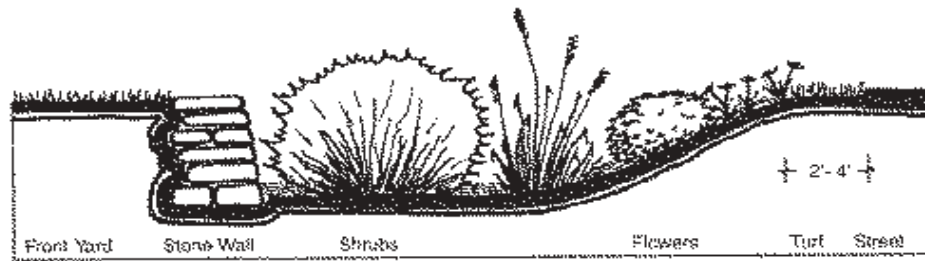
- Rainwater Gardens should be designed to treat runoff from areas no larger than 2 acres.
- The surface area of the garden should be between 5% and 10% of the impervious area draining to it.
- Most applicable in areas with relatively shallow slopes (5%).
- Garden should be designed so that the bottom of the garden is at least 3 feet from the water table.

### **Major Design Components** (Source: Minnesota Small Sites Urban BMP Manual)

- **Pretreatment:** Because rainwater gardens are susceptible to clogging from sediment, pretreatment measures, such as filter strips, are necessary. Pretreatment devices should be designed to remove 25-30 percent of sediment loads.
- **Ponding Area:** Rainwater Gardens should be designed to pond 6 to 9 inches above the filter bed to allow for surface water storage, settling of particulates and evaporation.
- **Organic Mulch Layer:** 2" - 3" of mulch should be installed to prevent soil bed erosion and retain moisture for plant roots.

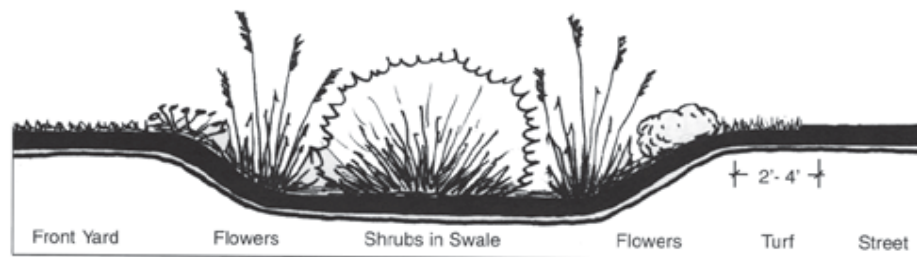
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- Planting soil bed: The soil bed layer serves as a filtration layer, where pollutants are removed through filtration, plant uptake, adsorption and biological degradation.
- Underdrain (if runoff is to be collected, rather than infiltrated): Underdrains should be installed to direct filtered runoff into a storm drain system. Typically, underdrains consist of a perforated pipe in a gravel bed, which is installed along the bottom of a sand bed.
- Overflow structure: An overflow structure should be installed to convey excess water from large storms directly to the storm sewer system.
- Plants: Plants remove pollutants and nutrients through uptake, and their root systems increase infiltration. Please see the Appendix for a list of suggested plant species.



## High-Volume, Asymmetrical Rainwater Garden with Masonry Wall

Source: Adapted from Nassauer et al., 1997.



## High-Volume, Symmetrical Rainwater Garden

Source: Adapted from Nassauer et al., 1997.

## Additional Resources

Rain Gardens of West Michigan

<http://www.raingardens.org>

Friends of Bassett Creek, Minnesota

<http://www.mninter.net/~stack/rain/>

Thornapple River Watershed Group

<http://www.thornappleriver.com/TREI/raingardens.html>