

A How-To Guide for Rain Gardens



Stormwater Runoff from home construction site.

What is Stormwater Runoff?

Stormwater is a term that is used to describe the water that does not soak into the ground after a rainfall or a snowmelt. It is water that flows over the land's surfaces (roads, lawns, rooftops, etc) and eventually makes its way to our local waterways. Along the way stormwater collects many pollutants such as litter, pet waste, fertilizers, pesticides, oils and other pollutants which can harm water quality and aquatic life.



What is a Rain Garden?

A rain garden is a shallow dish-like depression in the ground that is planted with native plants and flowers. In addition to looking nice, the purpose of the rain garden is to soak up stormwater and infiltrate it into the ground. However, rain gardens also provide many other benefits as well....

- Protect rivers and streams
- Reduce the potential for home flooding
- Creates habitat for birds and butterflies
- Reduce mosquito breeding by removing standing water



Constructing a rain garden helps improve water quality while creating a beautiful natural area.

Designing Your Rain Garden

Location

In order to collect water the rain garden should be located down-slope of buildings, driveways, and other parts of the site. Additional factors that should be considered when selecting a location for your rain garden are:

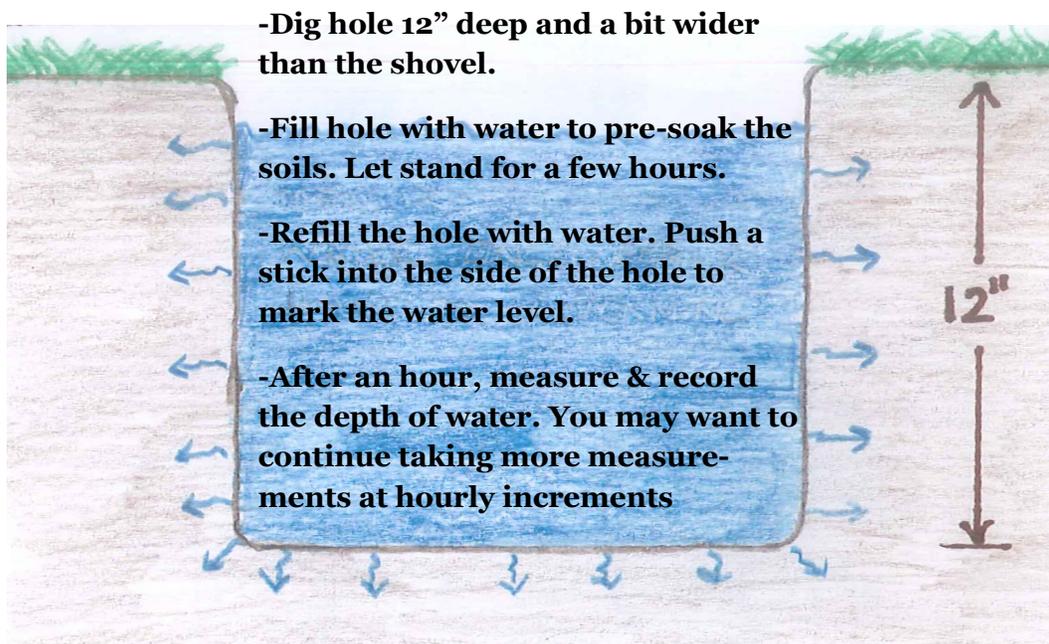
- Choose an area at least 10 ft. from any buildings with basements.
- Do not locate the rain garden over an existing septic system or utility lines such as gas, electric, or water. If you are unsure of their location contact Dig Safely New York (Call 811 or 800-962-7962).
- Your rain garden should not be located in an area where water ponds for several days, because the water cannot drain quickly enough.
- Make sure the slope of your proposed garden is less than 12%*. A site that is too steep will require increased excavation work.
- Try not to build your rain garden under existing trees because it could damage their roots.
- Do not locate your rain garden in the right of way of the road or any easement area (i.e.-drainage, utility, etc.). Refer to your survey map for locations of easements.
- Consider where your overflow (excess) water will go. Do not direct towards neighboring property.
- Soil should have good drainage. To evaluate, follow the testing and amending guidelines provided.

**To determine slope:*

Pound a stake in the ground at the uphill and downhill ends of your garden. Tie a string to the bottom of the uphill stake. Tie the string on the downhill stake where the string will be horizontal between both stakes.

Distance between string and ground at the downhill stake (in inches) ÷ Distance between the two stakes (in inches) X 100 = Percent Slope of the Rain Garden

Infiltration Test



Design Calculations

Calculating the Depth of Depression

Water should not pond in the rain garden for longer than one day.

Using the results of the infiltration rate test, calculate the depression depth of your garden.

Inches of water level drop in one hour (averaged) x 24 hours = depth of depression

My infiltration test showed:

_____ Inches in one hour x 24 hours = _____ inches/day
depth of depression

Make your Rain Garden this Deep!

Rain Gardens are generally no more than 2 feet deep

Drainage Area

In order to determine what size you should make your rain garden, you need to know the size of the area that will be draining to the garden. Only include areas which will flow into the rain garden.

Drainage Area	Area (Square Feet*)
Roof Area/Downspout(s)*	_____
Driveway	_____
Sidewalk	_____
Lawn	_____
Other	_____
Total Drainage Area =	_____

To calculate Area measure the length in feet and width in feet. Then:

Area= length X width

**Many homes have more than one downspout. Do your best to estimate the area of roof draining to the downspout(s) you would like to direct to your rain garden.*

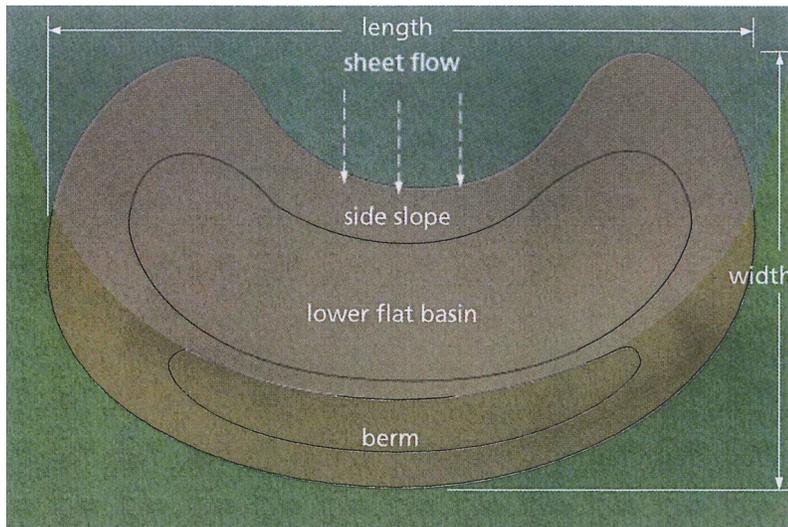
Sizing your Rain Garden

Divide the total drainage area (above) by the depth of the depression to calculate the size that your rain garden should be:

$$\frac{\text{Drainage Area (sq. ft.)}}{\text{Depth of Depression in inches}} = \text{Rain Garden Size} \quad \frac{\text{sq. ft.}}{\text{in.}} = \text{sq. ft.}$$

This calculation gives the area of a garden that will infiltrate the first inch of rainfall.

Once you know the total square footage that your rain garden needs to be, you can make it whatever length and width combination you want!



Shape of the Rain Garden

- Generally twice as long as wide.
- Length is perpendicular to slope.
- Mark the site by laying a string around the perimeter of the garden.

Construction

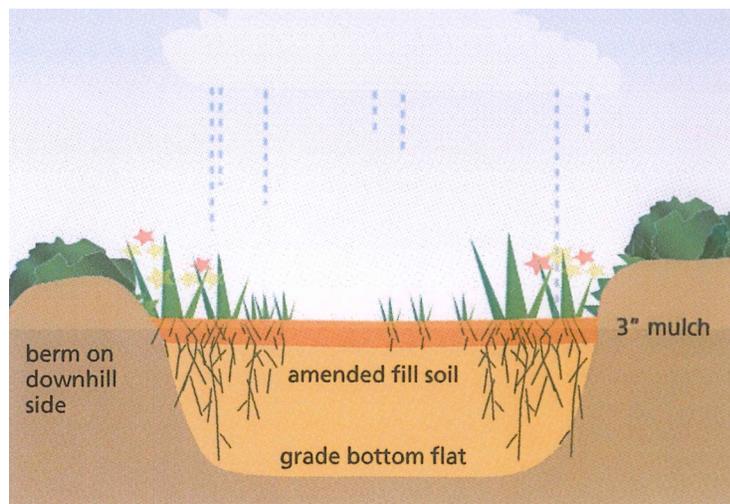
Start digging at the up-slope side of the garden. Dig until you reach the depth you calculated your depth of depression to be. When digging the rain garden to the suggested depth, slope the sides, make the bottom flat and use the remaining soil to build a berm (mound of earth) on the down slope side. If the lawn is flat, dig the same depth throughout the garden and use the soil for the berm.

A berm is needed to trap the water in the rain garden. The berm should be along the down-hill side of the garden. The berm should be well-compacted and have smoothly sloping side slopes. You may want to construct an overflow outlet in the berm to allow water greater than your design depth to safely escape. It is important that your overflow outlet be at a height that will allow water to pool in the garden to the desired depth. To prevent erosion of the berm, cover it with mulch or plant grass. If planting grass, use straw or an erosion control mat to protect the berm from erosion.

Soil Amendments

If your soil percolated well when you did your infiltration rate test (for example you got 12 inches of infiltration per day) and there is some soil at the site that is suitable for growing plants in, then you really don't need to add soil amendments. If you have mostly clay or sand or your infiltration test didn't show an outstanding percolation rate, then you should amend the soils under the depression using the following method:

1. Shape the garden and dig the depression roughly to the desired depth (Calculating the Depth of Depression)..
2. Now dig 4-6 inches deeper (8 inches if you have heavy clay soils) and remove the soil.
3. Break up the next 6 inches of soil on the bottom of the bed with a rototiller, shovel, or pitchfork.
4. Add compost (and sand if you have clay soils) and work it into the bed, mixing it with the broken up native soils. Repeat this process until the depth of the garden is back up to the desired depth of the depression.



Rain Garden Cross Section

Mulching

In order to keep moisture in your garden and suppress weeds, spread 2-3" of shredded or double-shredded hardwood mulch over the whole garden bed before planting.

General Rule: 1 cubic yard (27 cubic feet) will cover 100 square feet at 3 inches thick.

Why "double-shredded hardwood" mulch? Because shredded mulch binds together and forms a semi-solid mat whereas wood chips simply float away!

Plant Selection

Perennial native plants and flowers are strongly recommended for your rain garden because these plants have the greatest chance of growth and survival in New York State. A listing of native plants that require different amounts of sunlight is shown below along with other native trees and shrubs:

Wildflowers-Full Sun

Red Milkweed (*Asclepias incarnate*)
Little Blue Stem (*Andropogon scoparius*)
Partridge Pea (*Chamaecrista fasciculata*)
Big Bluestem (*Andropogon gerardii*)
Black Eyed Susan (*Rudbeckia hirta*)
Wild Senna (*Senna hebecarpa*)
Wild Blue Lupine (*Lupinus perennis*)
Beard Tongue (*Penstemon digitalis*)
New England Aster (*Aster novae-angliae*)



Wildflowers-Partial Shade

Joe-pye weed (*Eupatorium maculatum*)
Blue lobelia (*Lobelia siphilitica*)
Cinnamon Fern (*Osmunda cinnamomea*)
Ox Eye Sunflower (*Heliopsis helianthoides*)
Wild Blue False Indigo (*Baptisia australis*)



Trees and Shrubs

Buttonbush (*Cephalanthus occidentalis*)
Silky Dogwood (*Cornus amomum*)
Winterberry Holly (*Ilex verticillata*)
American Elderberry (*Sambucus Canadensis*)
Arrowwood (*Viburnum dentatum*)

Plant Spacing

When deciding how many plants to get for your rain garden a good estimate is that you will need one plant per square foot. BUT, keep in mind how large the plants that you choose will be by maturity. If you will be planting shrubs in your rain garden, allow more space. Follow the spacing recommendations for each plant.

Note to first-time gardeners:

Your garden will probably look kind of sparse at first, but give it time and it will fill in nicely— all gardens take a few years to mature and look their best.

Your garden will also need to be weeded periodically.

Your rain garden will need to be watered every other day for 2 weeks until the plants are established. After 2 weeks, watering is not required, except during extended periods of dry weather.



Sources and Credits:

Western New York Stormwater Coalition [Rain Gardens: A How-To Guide](#)

Farbault County Soil and Water Conservation District [Start to Finish Rain Garden Design: A Workbook for Homeowners](#)

For more information go to: www.chemungstormwater.org

This Workbook was compiled by:



Funding provided through the Environment Protection Fund