

HOW DO I... DESIGN & BUILD A RAIN GARDEN?

A rain garden is a dug out basin planted with a variety of plants. Plant roots soak up water and the basin briefly holds and infiltrates rain, which reduces the burden on storm drain systems. As the water filters through the soil, it also reduces pollutants entering streams and rivers. Though some details of this guide focus on the Mid-Atlantic, the basic steps apply anywhere.

This guide introduces designing and building a simple rain garden as an effective tool to reduce pollutants, slow destructive stormwater and beautify communities. Landscape architecture and engineering firms should be used for engineered gardens (where underdrains and intensive grading are needed). Installing a non-engineered rain garden requires calculations and hard labor, but no special skills. It can be accomplished with some motivation and possibly help from a friend.

WHAT YOU NEED



PEN & PAPER



SHOVEL



TARP
Or trash bag



STRING
And stakes



LEVEL
String or carpenter's



PLANTS



WATER
And hose or bucket



PERSISTENCE

BENEFITS



Provides
habitat



Beautify



Pollinators



Eco-friendly

GETTING STARTED

1 SITE SELECTION. First, always get permission from the site owner before you begin. Find natural low spots in the yard, at least 10 feet from any buildings. Identify uphill and downhill slopes to learn where water flows and pools—while raining is best! You can direct roof runoff to your garden with downspouts and/or locate the garden downhill of where stormwater naturally flows. Mapping the property is a useful way to determine the best garden location and note observations. Where does stormwater on your site originate: does it run from a roof, driveway and/or drain pipe? To learn what areas drain quickly enough to support a successful rain garden, try the simple “perc” test in step 2.

2 PERCOLATION TEST. Test your site’s low spots, and make note on your map! Dig an 18 inch deep hole, then fill with water. After 1–2 hours, fill again. Repeat at least 3 more times, until the soil around the hole is saturated. Fill hole 1 last time. Check the hole over the next 24 hours and time how long it takes to drain. If all water drains within 24 hours, the area passes the perc test. If not, it is unsuitable for a simple rain garden and will need an underdrain and professional design. Repeat process until you find a spot with sufficient drainage.

3 UNDERSTANDING SOIL. Identify your site’s soil texture as sandy, silty or clayey, which are the three main texture

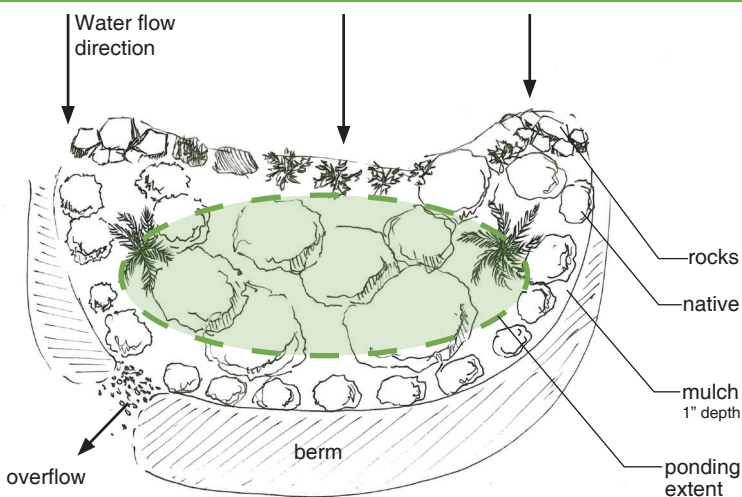


Fig. 1

Plan view of rain garden

descriptors. Soil texture is an important factor for selecting plant species and sizing rain garden volume. Water drains faster through sandy soils and pools more in less permeable clay soils. Many Mid-Atlantic soils are predominately clay, which feels more sticky than other soils. Try a squeeze, jar or lab test as described in the Resources link to determine texture.

4 CALCULATE. An easy method to calculate how big your rain garden should be is to go to the rain garden volume calculator in the *Resources* section.

To calculate sizing, you will need:

- Square footage of the surface area draining into the garden
- Number of downspouts that drain into the garden
- Soil texture on your site (see step 3)
- Slope of yard

5 BEGIN DESIGN. Rain gardens consist of several standard features: the point where water flows into the garden, the ponding area where water collects, plants that tolerate flooding and drought, soil, and berms to contain flow and prevent erosion. The diagrams below (Figs. 1 & 2) show the basic structure. Drawing your garden with the direction of water flow and the elements of the garden may help you visualize your end goal and determine the most effective shape.

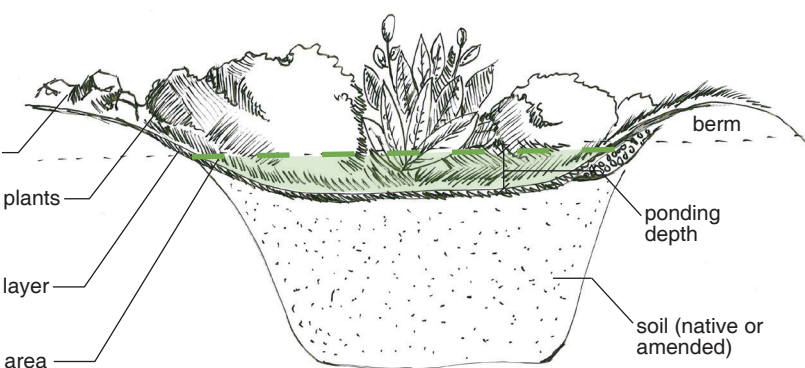


Fig. 2

Rain garden cross-section

6 PICK YOUR PLANTS. Now that you've figured shape, size and location, plan plant placement and species. Plants that tolerate wet sites and droughts are ideal for rain gardens. Many Mid-Atlantic native plants are great. Because native grasses, sedges and rushes have deep roots, use them in at least $\frac{1}{3}$ of the garden. Some factors in plant choice include: mature height; aesthetic value; wildlife value; is it low maintenance, edible or medicinal? See our "**HOW DO I...PICK SUITABLE NATIVE PLANTS?**" Action Guide for discussion on natives.



Common native plants for rain gardens in the Mid-Atlantic



JOE-PYE WEED
Eutrochium purpureum



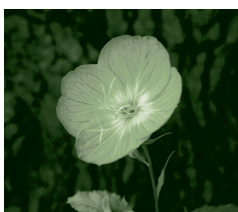
BLUE FLAG IRIS
Iris versicolor



BLUE LOBELIA
Lobelia siphilitica



HUBRICHT'S BLUESTAR
Amsonia hubrichtii



EVENING PRIMROSE
Oenothera speciosa



SILKY ASTER
Symphyotrichum sericeum

Photo Source: Ladybird Johnson Wildflower Native Plant Database

7 DIG YOUR BASIN. The online calculator used in step 4 gave the depth of your rain garden basin (the ponding depth). Excavate soil to this depth. Using a tarp to put soil on helps, since you will use some to build berms. While digging the basin, keep the bottom as level as possible to ensure stormwater will spread evenly. Fig. 3 shows a simple way to level your garden. See *Resources* for more about slope and basin depth.

8 FILL BASIN WITH SOIL. Sometimes people want to amend soil by mixing in compost and sand; that's an option though this Guide aims to use native soil. If you want to amend soil, you'll need to dig farther down than the ponding depth to loosen soil below enough to mix in amendments. Learn more in *Resources*. Create berms with excavated soil on the downhill side of the basin.

9 PLANT YOUR PLANTS. “HOW DO I...PLANT A TREE?” offers detailed instructions!

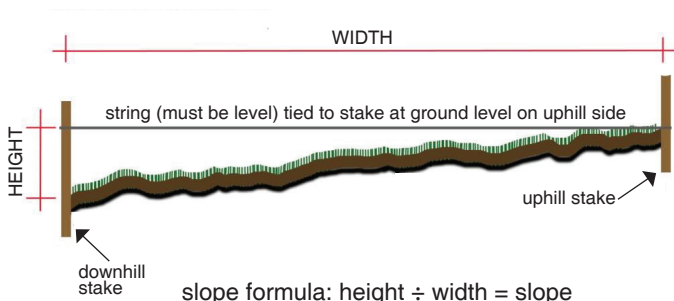


Fig. 3

How to determine slope

10 MULCH! WATER, WATER, WATER! Mulch is not required, however it helps maintain soil temperature and moisture, controls weeds and provides helpful organic matter to soil. Regular watering is especially critical during the first few weeks after planting to ensure the plants establish themselves. Well-established plants have healthier root systems, and happy roots suck up more stormwater! After the first 2 years, watering should only be necessary during droughts.

11 MAINTENANCE IS KEY! Typical maintenance activities include watering to promote plant growth, especially during the first two years, and weeding to maintain appearance as needed. Be careful mowing near the garden so you do not damage the plants. Because rain gardens filter excess nutrients from stormwater, fertilizing soil isn't needed—and can even reduce your garden's effectiveness. Each rain garden is site specific and plant choices also effect the amount of maintenance required.

TIPS & FAQs

- ✓ **Keep your rain garden away from utility lines.** Call Miss Utility before you dig! 1-800-257-7777 (MD, DC & DE residents).
- ✓ **Are rain gardens breeding grounds for mosquitos?** To reproduce, mosquitos require at least 3 days of standing water. If the rain garden is well designed, the water will drain faster than the mosquitos can reproduce.
- ✓ **How long does water stay in a rain garden?** If designed correctly, the water should not stay longer than 24–36 hours.
- ✓ **Why should I install a rain garden?** When rainwater leaves your property, it becomes stormwater runoff, which picks up pollutants that end up contaminating local waterways. Rain gardens filter some of these pollutants before they reach the Chesapeake Bay.
- ✓ **Be aware of runoff coming from neighboring properties.** Capturing runoff from other properties may greatly increase the volume of stormwater and the size of the rain garden needed to treat it.
- ✓ **Do rain gardens attract pollinators?** There are many pollinator plants that are good choices to include in your plant selection process. Since many pollinator plants are disappearing, utilizing them in your rain garden is a way to help keep these important species alive.
- ✓ **What happens to the plants during a dry period?** Native plants can often withstand and thrive in a wide range of weather conditions. While selecting your plants, be sure to determine whether they can live in wet and/or dry climates.
- ✓ **Look beyond the garden!** Consider views of your garden from different angles and distances. This is an aesthetic factor in choosing garden location and plant species. Do you have utility equipment you want to visually screen? How will the garden look within the context of the rest of the yard?

GLOSSARY TERMS:

Basin. A shallow, planted depression designed to retain stormwater and filter it before it is absorbed into the soil.

Berm. A low wall constructed out of earth around three sides of the garden. Prevents water from overflowing on the downhill slope.

Impervious/impermeable. Does not allow water to pass through. Surfaces include conventional concrete and asphalt. The two words are often used interchangeably.

Infiltration. The process of the water being absorbed into the garden soil.

Invasive species. A plant or animal that is non-native to the ecosystem and whose introduction causes harm to the environment.

Mulch. Typically mulch is made of shredded, hardwood tree bark used to prevent erosion and control weeds around plantings; provides insulation for plant roots.

Native plants. A plant that has evolved over hundreds or thousands of years in a balanced, natural ecosystem in a particular region. (Check out “**HOW DO I...PICK SUITABLE NATIVE PLANTS?**” for much more on natives!)



Percolation. The process of water filtering down through soil layers.

Pervious/permeable. Able to let water pass through. Surfaces include landscaping, gardens, turf and soil. Permeable pavers and permeable concrete and asphalt are commercially available.

Ponding depth. The maximum depth of standing water (above the soil mix layer in your rain garden).

Stormwater runoff. The water that runs off of impervious surfaces such as rooftops and roadways during storm events.

RESOURCES

SOILS, SIZING & DESIGN

Instructions and advice on the **soil squeeze test, jar test, lab test and understanding soil texture** are at <https://extension.umd.edu/hgic/soils/soil-testing> and <http://www.ext.colostate.edu/mg/Gardennotes/214.pdf>. Learning about texture can help if you decide to amend the existing soil.

MORE SOILS, SIZING & DESIGN

Use a **rain garden volume calculator** to enter site conditions and estimate garden size and depth.

www.raingardenalliance.org/right/calculator

Learn more on **how slope helps determine basin depth** here: www.raingardenalliance.org/right/slope.

<http://chesapeakestormwater.net/be-bay-friendly/rain-gardens> is a storehouse of **how-to know-how**.

Find useful **design templates** at

www.lowimpactdevelopment.org/raingarden_design/

Check out www.bluewaterbaltimore.org/protect/create-a-rain-garden/ for **well-rounded rain garden resources**.

BALTIMORE AREA NURSERIES & RESOURCES

Herring Run Nursery

www.bluewaterbaltimore.org/herring-run-nursery

Poor Boy's Garden Center

www.poorboysgardencenters.com

Valley View Farms www.valleyviewfarms.com

Civic Works greening **implementation assistance**

www.civicworks.com

Stormwater grant opportunities at Parks & People

www.parksandpeople.org

PRINCE GEORGE'S NURSERIES & RESOURCES

The Behnke Nurseries Co. www.behnkes.com

Ed's Plant World www.edsplantworld.com

Homestead Gardens www.homesteadgardens.com

Anacostia Watershed Society are **stormwater and stewardship** experts. www.anacostiaws.org

The Chesapeake Bay Trust explains the **Rain Check Rebate program** and more in the Grants section. www.cbtrust.org

MORE PLANT RESOURCES

For a list of **native plant nurseries in the Mid-Atlantic**, click on the gray drop-down menu.

www.xerces.org/pollinators-mid-atlantic-region

Find a **wealth of plant knowledge** at

www.wildflower.org/plants.

CONSERVATION & FUNDING

See conservation resources for the Mid-Atlantic.

Also find **funding opportunities by state and county** in the Grants section. www.cbtrust.org