

Practical Primer for a Homeowner Rain Garden

By  **SUSTAINABLE
AUDUBON**

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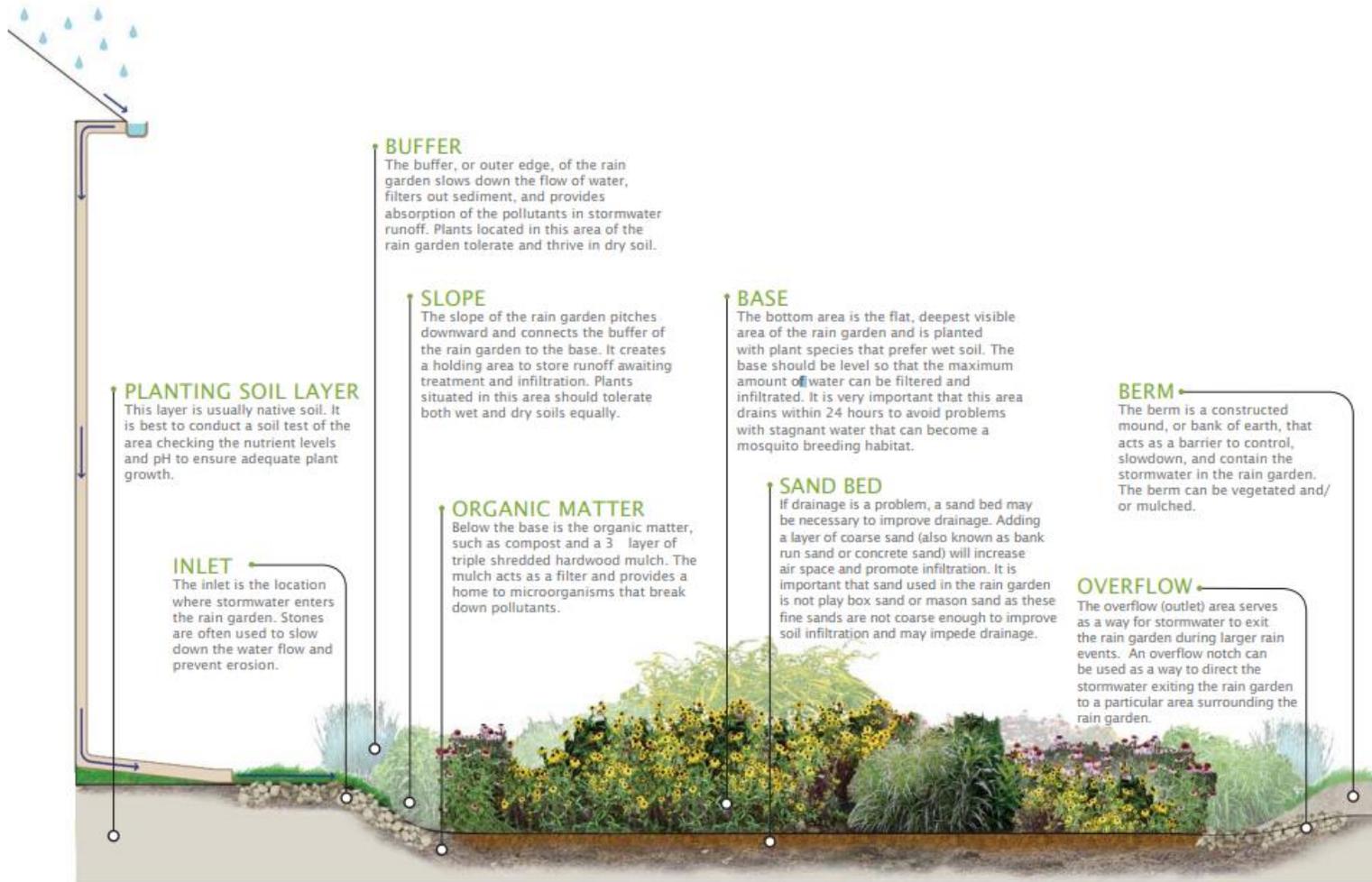
Why Build a Rain Garden?

- ▶ 1. Each homeowner can contribute to the reduction of stormwater runoff and the associated contaminants that negatively impact an area's surface water quality.
- ▶ 2. The cumulative impact of many individual rain gardens together can be significant.
- ▶ 3. Stormwater runoff is considered one of the main sources of water pollution nationwide and each person can assist in solving this problem.

How Do You Build a Rain Garden?

- ▶ 1. Identify a source of runoff water.
- ▶ 2. Locate where you want the rain garden to be.
- ▶ 3. Evaluate the soil conditions at the proposed location.
- ▶ 4. Determine the size and shape of the proposed rain garden.
- ▶ 5. Determine the plants that will be in the rain garden.
- ▶ 6. Prepare the ground.
- ▶ 7. Plant the rain garden.
- ▶ 8. Maintain the rain garden.

Parts of a Rain Garden



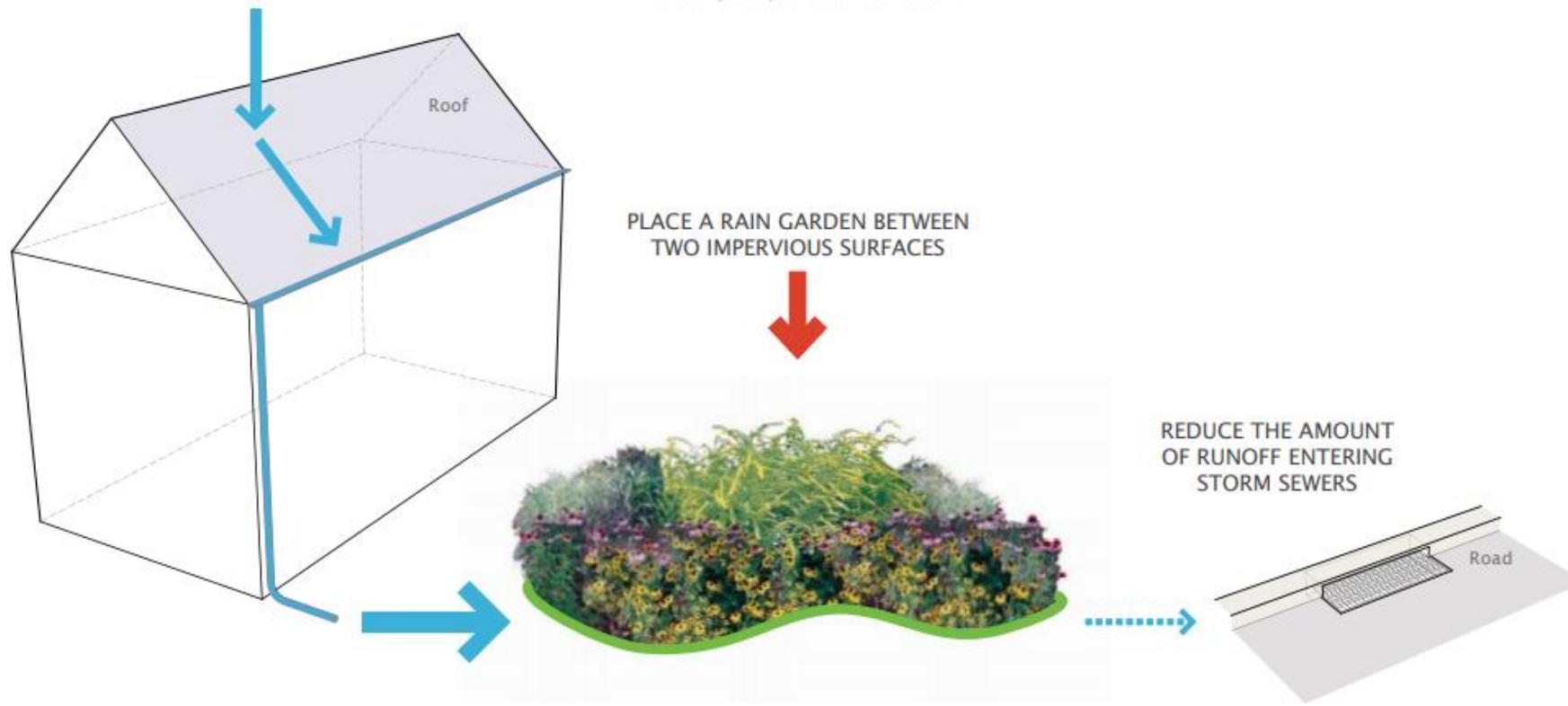
Identify the Source of the Runoff Water

- ▶ 1. The typical source in a residential setting is a downspout that is part of a roof/gutter system.
- ▶ 2. The runoff can be directly discharged to the rain garden through a pipe or via a swale, a shallow ditch.
- ▶ 3. Alternatively, the runoff can be diverted first to a rain barrel or linked rain barrels which serve to store the water for later distribution to the rain garden. Again, this can be done using piping, hose, or swales.
- ▶ 4. The amount of roof (area in square feet) draining to the downspout should be estimated in order to help size the rain garden.

Rain Garden Location

- ▶ 1. The rain garden should be located away from any building foundation. Ideally this should be 10 feet or more if the buildings have no basement flooding issues.
- ▶ 2. It is preferable that the rain garden be located downhill from the downspout. The rain garden should not be uphill from the downspout to facilitate water movement as well as to reduce potential flooding concerns.
- ▶ 3. Utility mark out or knowledge of all underground utilities is needed to avoid potential hazards or service disruption.
- ▶ 4. While a southern exposure would encourage plant growth, it is not a requirement. Exposure conditions can be adjusted for proper plant selection.
- ▶ 5. Caution: This is generally not an issue for most homeowners, but if the rain garden is in a regulated area, such as a flood hazard zone, environmental regulations may apply. Please consult the appropriate agencies if necessary.

Rain Garden Location



Evaluate the Soil Conditions

- ▶ 1. It is essential to perform a soil percolation test in order to help determine the runoff capacity of the rain garden. The preference is for a rate equal to or greater than 1 inch per hour. If the rate is less than that, the addition of sand (coarse sand not play sand) or a similar material to improve the percolation rate should be considered. High clay content soil would warrant such an action.
- ▶ 2. A soil chemistry test should be considered to help determine what kind of plants will thrive in the rain garden. Amendments may be used to improve the growing conditions for the preferred plant species.



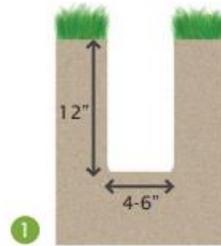
Evaluate the Soil Conditions

Check Your Soil: Infiltration Test (Percolation Test)

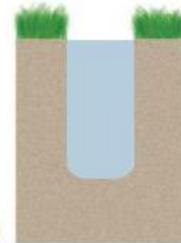
Good soil drainage is important. Determine how fast the soil drains at your site by conducting an infiltration test (also referred to as a percolation test). This test will let you know how well the existing soil infiltrates water. Ideal soils will infiltrate completely within 24 hours at a percolation rate of approximately 1.5 inches per hour.

As the diagram to the right indicates, complete the following steps:

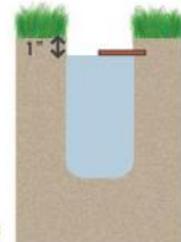
1. Dig a hole in the proposed rain garden site, approximately 12 inches in depth and four to six inches in diameter. To be more accurate, dig two holes. A standard post-hole digger is typically the tool of choice for this activity.
2. Fill with water to saturate the soil and then let stand until all the water has drained into the soil.
3. Once the water has drained, refill the empty hole again with water so that the water level is about one inch from the top of the hole. Use a stick to indicate the location of the starting water level. Record the time using a watch. Measure the depth of the water with a ruler.
4. Check the depth of water with a ruler every hour for at least four hours.
5. Calculate how many inches of water drained per hour. With sandy soils, the water should descend quickly. With clay soils, the water should descend slowly.



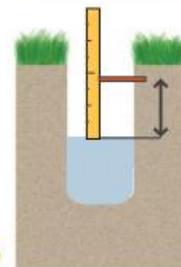
1



2



3



4

If the drainage rate is less than 1.5 inches per hour, or the water does not drain within 24 hours, add soil texture amendments such as coarse sand during installation. Alternatively, consider placing the rain garden in a different location on your property.

It is important to note that sometimes an infiltration test provides a false reading of a site's soil conditions. For example, during dry conditions, an infiltration test may demonstrate that the soil drains quickly and does not need amendments. However, during a rainy season, an infiltration test on that same soil may reveal that it is clayey and does not infiltrate well.

A GOOD RULE OF THUMB:

The rain garden should be about twice as long (perpendicular to the slope) as it is wide.



Determine the Size and Shape

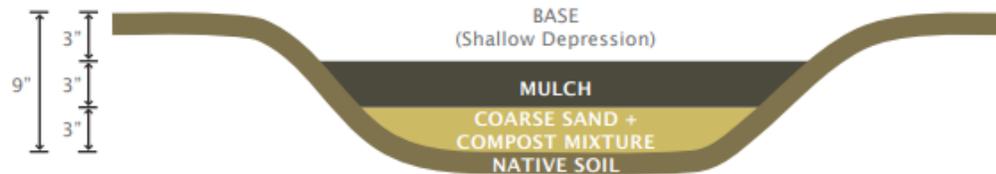
- ▶ 1. The shape of the rain garden is largely an aesthetic choice, but may be guided by the desired water flow through the garden.
- ▶ 2. The size is determined in part by the expected runoff volume. The rain garden should be designed to detain the runoff for 24 hours. Note that rain garden depth and area are factors in determining the ideal size of the rain garden.
- ▶ 3. The expected runoff volume can be calculated by multiplying the square footage of the roof being drained by an assumed rainfall of 2 inches. This is an estimate of the volume from a large storm that should be addressed or retained by the rain garden for 24 hours. Other values may be substituted.
- ▶ 4. The expected runoff capacity is calculated by multiplying the square footage of the garden by the hourly percolation rate and 24 hours and then adding that result to the volume of the garden itself. While this excludes the effects of certain factors like evapotranspiration and porosity, comparison of the runoff volume and the runoff capacity is a crude indicator of appropriateness of a given rain garden size.
- ▶ 5. Rain barrels are typically around 50 gallons and if used offer additional detention capacity.
- ▶ 6. Because the runoff volume may at times temporarily exceed the rain garden capacity, a downhill overflow discharge should be established so that the garden does not remain flooded.

Determine the Size and Shape

6" DEEP RAIN GARDEN - NO SOIL AMENDMENTS



3" DEEP RAIN GARDEN - SOIL AMENDMENTS



Rain Garden Sizing Table Based on New Jersey's Water Quality Design Storm

Drainage Area	Size of 3" Deep Rain Garden CLAY SOIL*	Size of 6" Deep Rain Garden SILTY SOIL	Size of 8" Deep Rain Garden SANDY SOIL
500 ft ²	200 ft ²	100 ft ²	75 ft ²
750 ft ²	350 ft ²	150 ft ²	112 ft ²
1,000 ft ²	400 ft ²	200 ft ²	149 ft ²
1,500 ft ²	600 ft ²	300 ft ²	224 ft ²
2,000 ft ²	800 ft ²	400 ft ²	299 ft ²

*SOIL TEXTURE AMENDMENTS NEEDED

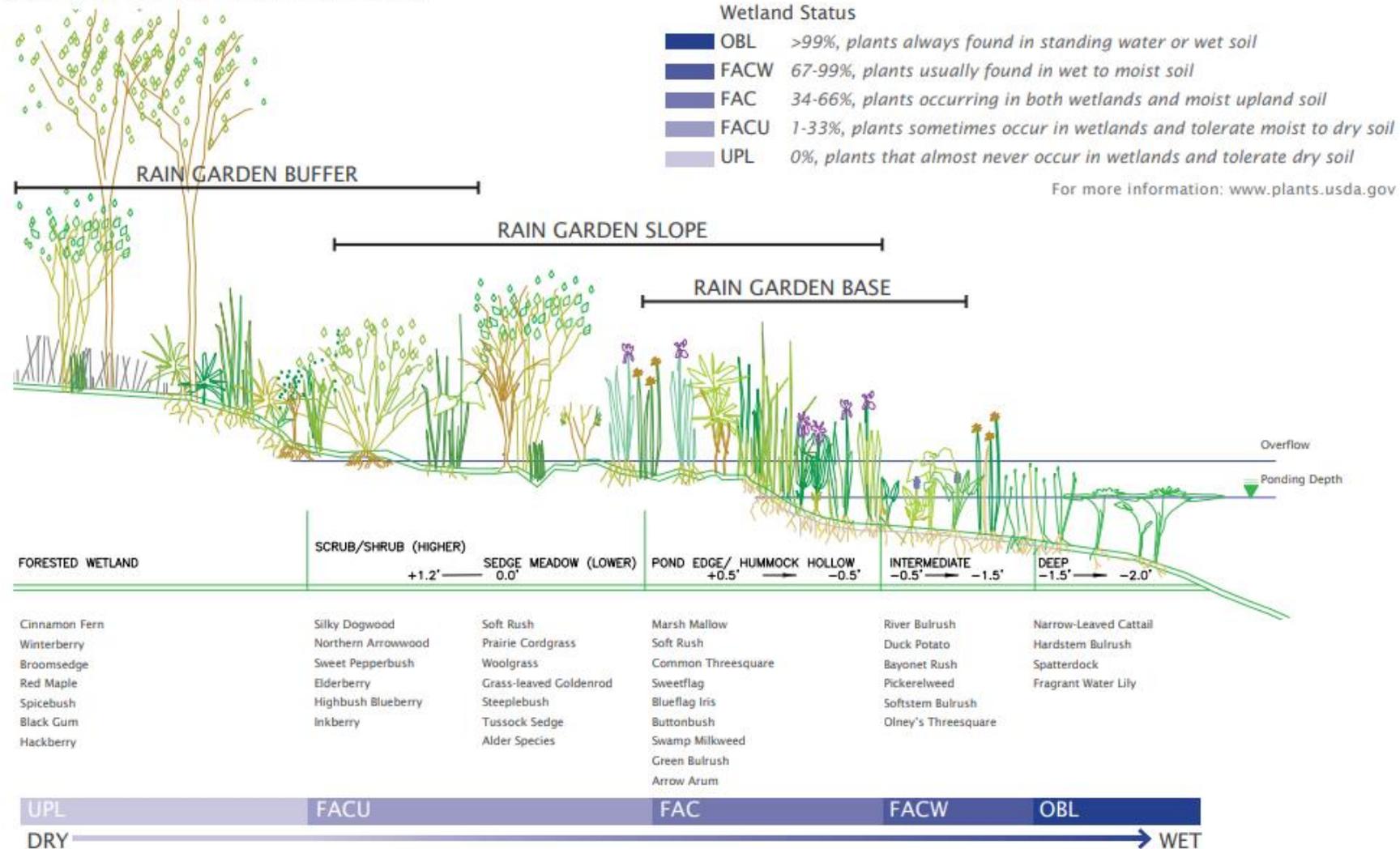
What to Plant

- ▶ 1. Plant species that are compatible with the conditions in the rain garden should be selected. Dry versus Wet. Sunny versus Shady. Acidic versus Alkaline.
- ▶ 2. While native species and pollinators are environmentally preferred, others can be considered. This is a personal choice, but the species selected must be compatible with the specific rain garden conditions.
- ▶ 3. Consider selecting plants species that will collectively provide year-round appeal.
- ▶ 4. Take into account plant height and blooming periods when determining how to place the plants. Two to three foot horizontal spacing is not uncommon, but is really determined by the growth habits of the selected plants.
- ▶ 5. While larger species can be used, it is easier to deal with smaller plants (rather than trees).

Wetland Indicator Status

Generalized Planting Guideline for Ponds + Wetlands Typical Planting Zones

This diagram illustrates typical planting zones for ponds and wetlands in New Jersey. Use a plant's wetland indicator status as a guide to where it should be planted in a rain garden.

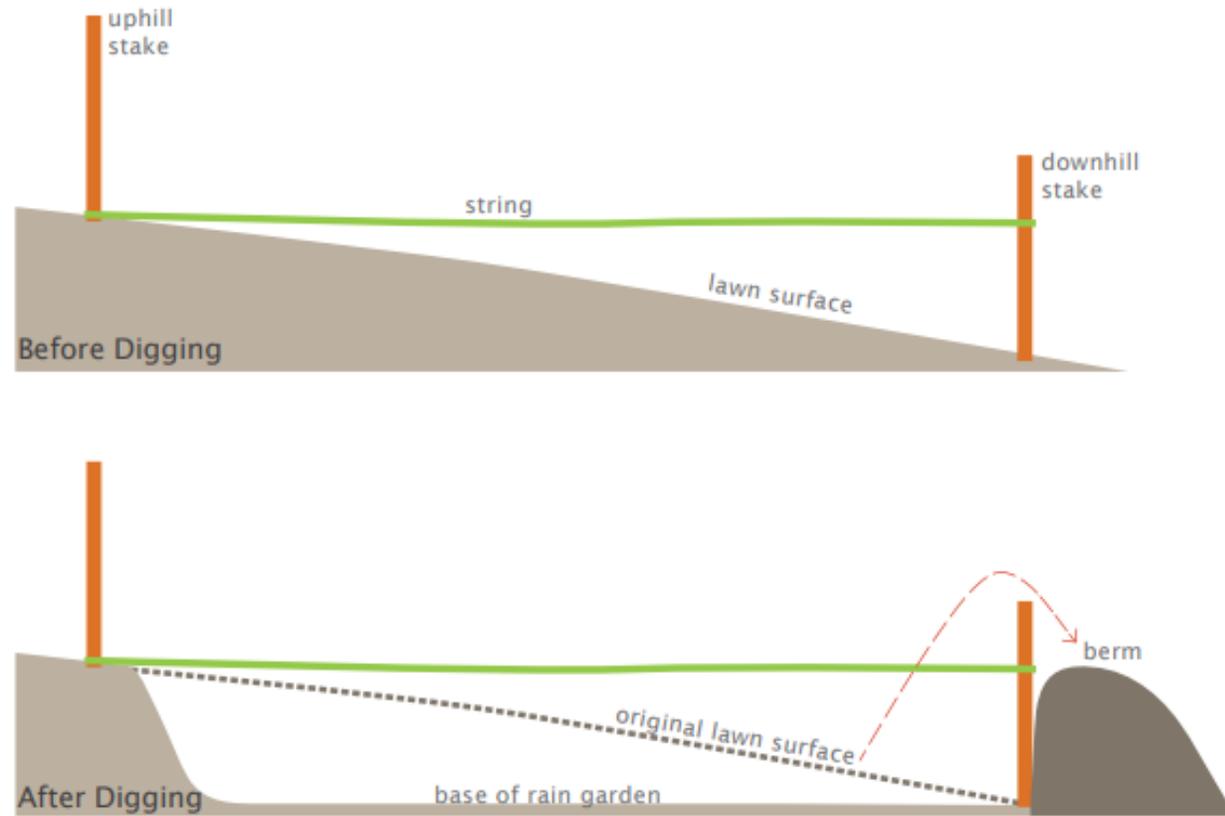


Prepare the Ground

- ▶ 1. Any existing turf grass should be removed.
- ▶ 2. Depth of excavation and amendments needed will primarily be determined by the percolation characteristics of the soil in the rain garden and any chemical test results.
- ▶ 3. The prepared ground ready for planting should be relatively flat at the surface. However, underlying ground slope or even surface slope should always be taken into account.
- ▶ 4. Important Note: Each location will present site-specific conditions that will cause you to modify the ground preparations in order to build a successful rain garden. The information presented here is intended only as general guidance.

Prepare the Ground

Building the Berm



Planting

- ▶ 1. This is the fun part! Create a visually appealing design.
- ▶ 2. Using your design, place the plants in their proposed locations.
- ▶ 3. Step back and make sure the visual impact is what you want. Adjust as needed. Be sure to also “view” your plant locations from the “perspective” of the plants as mature specimens.
- ▶ 4. Plant using the standard techniques for the plant species selected.
- ▶ 5. Make sure you cover the area with at least 3 inches of double cut hardwood mulch. This will aid in moisture retention and weed control. However, you should avoid allowing the mulch to be in contact with the stems of the planted species.

Maintenance

- ▶ 1. After the initial planting, water as needed to help overcome transplant shock.
- ▶ 2. Periodic watering during the next year may be needed to allow the plants to become establish or to avoid damage during periods of drought.
- ▶ 3. Weeding, clearing, and pruning will have to be done at least on an annual basis.
- ▶ 4. Monitor how your rain garden handles the actual runoff volume and make modifications as needed.
- ▶ 5. Additional mulch may have to be added as decomposition and matting subsequently occur.

Acknowledgements

- ▶ 1. This document was made possible through a grant provided by New Jersey American Water.
- ▶ 2. Information from many sources was used as a basis for this document. The compilation is the sole responsibility of Sustainable Audubon.
- ▶ 3. Enjoy your rain garden and know that you have helped improve the environment.

Sources Include

- ▶ 1. Christopher Obropta, Ph.D., Rutgers Cooperative Extension. Rain Garden Webinar, April 6, 2020.
- ▶ 2. John Nystedt, RLA, LEED AP. Personal communication 2020.
- ▶ 3. Native Plant Society of New Jersey. Rain Garden Manual for New Jersey. April 2005.
- ▶ 4. Rutgers Cooperative Extension Water Resources Program. Rain Garden Manual of New Jersey. April 6, 2015.