



## Rain Gardens

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### What is a Rain Garden?

A rain garden is a landscaped, shallow depression that allows rain and snowmelt to be collected and seep naturally into the ground. This helps recharge our groundwater supply and prevents a water quality problem called polluted runoff (nonpoint source pollution). Rain gardens are an important way to make our cities and neighborhoods more attractive places to live while enhancing ecological health.

### Benefits

Having a rain garden in your landscape will reap much more than what is easily visible. During a heavy rainstorm much of the water quickly washes into streets from sidewalks, parking lots, and lawns. It then goes down stormdrains and eventually ends up in local water bodies. What you don't see washing away with the rain water are pollutants such as pesticides, fertilizers, and petrochemicals, which may have accumulated on lawns, driveways, and streets. A shallow depression in the lawn to capture stormwater allows this water to penetrate and move into the ground instead of running off and down into the stormdrain. As the captured water slowly percolates into the ground, pollutants are filtered out, nutrients are used by the plants, or pesticides are broken down by microorganisms. Minimizing runoff into stormdrains also results in decreased sediment, flooding, and shoreline damage. Compared to a conventional lawn, rain gardens allow 30% more water to soak into the ground. Because rain gardens are landscaped, they add beauty to a lawn and create a habitat for birds, butterflies, and beneficial insects.

### Getting Started

For best plant establishment and easier digging as a result of spring rains, start the actual construction in the spring.

A summer start will work but you may need to water the plants more often until they are established. The first important step is to observe your property during heavy rains, noting where puddles are forming, which areas are not draining well, and where runoff is flowing, especially from the downspouts. Next proceed to pinpoint an exact site and decide on the size and depth required for success.



An established rain garden in bloom. Garden intercepts runoff before it reaches the impervious surface.

### Site Selection

Rain gardens can be located near downspouts to intercept only roof runoff, placed to collect water from lawn and roof, or along driveways and sidewalks. The topography of your property and where runoff flows will help determine the exact site. Locate an area without existing ponding with a slope between 1% and 10% that is at least 10 feet from the house foundation. Area should not be directly over a septic system. Good soil drainage is important. Determine how fast the soil drains at your site by doing a percolation test. Dig an 8 inch hole and fill with water to saturate soil. Once water has drained, refill with water. If hole completely drains within a few hours, you are assured the area is suitable. Full sun or partial sunlight will allow widest selection of plants, but part shade with the proper plant material will also work (Diagram 1).



## Before You Dig

Avoid damaging underground water, gas, and electrical services. Contact New Jersey's "One Call" system at 1-800-272-1000 for a free markout of underground gas, water, sewer, cable, telephone, and electric utility lines before any outdoor construction or digging. Making this call before you dig will help prevent property damage and potential injuries. Experiment with shapes by using rope to lay out boundary of garden. Next think about the landscape plan and which shrubs, grasses, and flowers to plant.

## Size and Depth of the Rain Garden

The size of the garden is a function of volume of runoff to be treated and recharged and the soil texture on the site. Garden areas are typically 100–300 sq. ft. and depend on your soil type. Identify your soil as sandy, silty, or clayey. A clay soil will have slow percolation rate and will require a larger garden than one located in a sandy or silty soil. Size the garden to treat all the runoff from a 1.25 inch rainfall event; 1.25 inches of rain over two hours is the NJ water quality storm standard. If treating 1,000 sq. ft. of roof runoff for the 1.25 inch rainfall event, you need a garden that can hold 100 cu ft. of water. If space is limited, this can be a garden that is 10 ft x 10 ft x 1 ft deep. With larger areas, 10 ft x 20 ft x 6 in. deep works equally well. A garden of this size will treat approximately 90% of the yearly rainfall. If your property has space limitations, consider multiple smaller rain gardens.

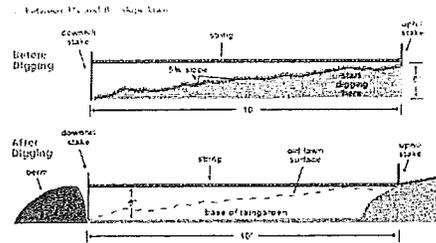


Diagram 2. from Wisconsin Dept. of Natural Resources. Where to dig and where to put the soil you've dug.

## Plant Selection

Use native hardy perennial species with well-established root systems that survive in both dry and wet conditions. Natives do not require substantial fertilization, absorb water more efficiently than turf-style lawns, and are much easier to maintain than exotic species. Plants should be different heights, shapes, and textures and bloom at different times (Photo 1) for aesthetic appeal. Table 1 lists some suggested plants; check references for additional native plants or call your county extension office.

## Digging and Planting

Dig the area to desired depth and use shoveled out soil to build up a berm, especially around the lower perimeter (Diagram 2). Compact firmly, leaving one section open where the water can flow in. Grass should be planted on

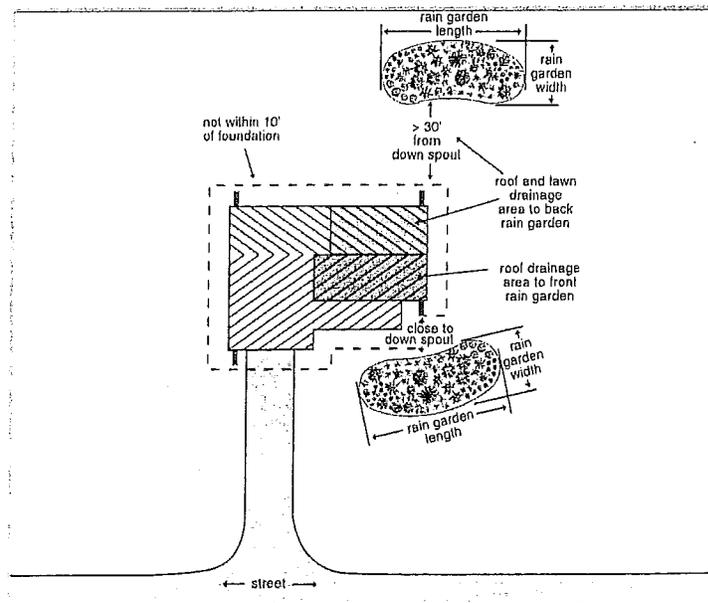


Diagram 1. from Wisconsin Department of Natural Resources.

<http://clean-water.uwex.edu/pubs/raingarden/rgmanual.pdf>

For more detailed information, see the suggested references at the end of this fact sheet.

the berm to help filter and slow down water's flow. (Contact county extension office for grass species recommendations for your area.) If soil is sandy, compost can be directly mixed into the dug out area. If soil type is clay, compost should be rototilled in order to break up soil and improve drainage. Next, carefully level the base to prevent ponding in one area. Use string to outline the planting scheme and then place your plants in the ground. Plants should be watered immediately after planting and twice a week (unless it rains) until established. After the first year, the plants will be established, and will only need water during hot, dry spells.

## Maintenance

A rain garden will not require as much care as a lawn area but will need some maintenance to ensure long-term success. Measures include:

**Weeding**—critical in the first few months after planting until maturing plants begin to grow and crowd the weeds out. Watch for invasive, overly-competitive weed species (RCRE NJ Weed Gallery for more info <http://www.rce.rutgers.edu/weeds/default.asp> and NRCS Plants database <http://plants.usda.gov>). Mulch to prohibit weed seed germination and loss of soil through erosion.

**Pruning**—dense shrub growth is encouraged to increase filtering capacity. Stems and seed heads can be left for winter interest, wildlife cover, and bird food. Tattered and discolored plants should be cut back after spring growth is 4–6 inches tall. Deadhead flowers for new growth.

**Mowing**—if mower can be raised to six inches, mow or use a string trimmer to cut the spent stems to 6–8 inches in early spring. Use hand clippers for thicker stems.

**Revegetating**—remove or replace plant material that is not thriving.

**Sediment**—sediment accumulating within the garden is a sign of success; however, occasionally use a flat shovel to remove any excess.

**Soil testing**—should be done before you plant to determine nutrient and pH (acidity) levels, and every 3 to 5 years. Follow the recommendations to maintain the soil pH in an acidic range. If pH is less than 5.2, apply limestone; if greater than 7.0 to 8.0 add iron sulfate and sulfur to reduce pH. Add amendments when no storms are expected to prevent runoff.

**Fertilizing**—not a part of maintaining your rain garden. The garden sustains itself with the help of organic material in the topsoil.

## Next Steps

Additional maintenance includes seed collection and taking cuttings from successful plants, planting more of a particularly successful species, re-seeding the berm if necessary, replacing rocks that may be diverting flow out of the garden, and building up areas where more protection is needed.

## Conclusion

In New Jersey, 90% of rainfall events are less than 1.25 inches, with approximately 44 total inches of rain per year. The rain garden will treat and recharge  $0.9 \times 44 \text{ inches} = 40 \text{ inches per year} = 3.3 \text{ ft. per year}$ . If the rain garden receives runoff from 1,000 sq. ft., total volume treated and recharged is  $1,000 \text{ sq. ft} \times 3.3 \text{ ft} = 3,300 \text{ cubic feet}$ , which is 25,000 gallons per year. Build 40 of these gardens in your neighborhood and we have treated and recharged 1,000,000 gallons of water per year.

## Native Plant Information

### Native Plant Society of New Jersey

<http://www.npsnj.org/>

### Native garden and invasive plant guide

[www.enature.com/native\\_invasive/natives.asp](http://www.enature.com/native_invasive/natives.asp)

### Brooklyn Botanical Gardens Rain Garden Plants

[www.bbg.org/gar2/topics/design/2004sp\\_raingardens.html](http://www.bbg.org/gar2/topics/design/2004sp_raingardens.html)

### Wisconsin Native Plants for Rain Gardens

<http://www.dnr.state.wi.us/org/water/wm/nps/rg/plants/PlantListing.htm>

## For More Specific Information

### Rain Garden Manual for New Jersey

The Native Plant Society of New Jersey

<http://www.npsnj.org/>

### Rain Gardens: A Household Way to Improve Water Quality in Your Community

(University of Wisconsin Extension) (608)264-6217

<http://clean-water.uwex.edu/pubs/raingarden>

### Rain Gardens: Improve Stormwater Management in Your Yard

[http://www.cmhc-schl.gc.ca/en/burema/gesein/abhose/abhose\\_075.cfm](http://www.cmhc-schl.gc.ca/en/burema/gesein/abhose/abhose_075.cfm)

### Healthy Landscapes

<http://www.uri.edu/ce/healthylandscapes/raingarden.htm>

Table 1 - Northeast/Mid Atlantic Native Plant Suggestions for Wet Sites

	Common Name	Mature size	Bloom Time	Exposure
<b>Perennials</b>				
<i>Asclepias incarnata</i>	Swamp Milkweed - pink	5 ft.	May/June	Sun-partial shade
<i>Chelone glabra</i>	White Turtlehead	2-3 ft.	Aug./Oct.	Sun-partial shade
<i>Eupatorium maculatum</i>	Joe-Pye Weed - pink	2-7 ft.	July/Sept.	Sun
<i>Helenium autumnale</i>	Sneezweed - gold to red	2.5-3 ft.	Aug./Sept.	Sun
<i>Lobelia cardinalis</i>	Cardinal flower - red	1-5 ft.	July/Sept.	Sun-partial shade
<i>Lobelia siphilitica</i>	Great Blue Lobelia - blue	1-3 ft.	Aug./Oct.	Sun to shade
<b>Ferns &amp; Sedges</b>				
<i>Athyrium filix-femina</i>	Lady Fern	2-3 ft.	N/A	part sun to shade
<i>Osmunda regalis</i>	Royal Fern	2-5 ft.	N/A	part sun to shade
<i>Osmunda cinnamomea</i>	Cinnamon Fern	4 ft.	N/A	part sun to shade
<i>Carex pendula</i>	Drooping Sedge	2-3 ft.	May/June	part shade
<i>Carex stipata</i>	Tussock Sedge	1-3 ft.	July/Aug.	Sun to part shade
<b>Shrubs</b>				
<i>Fothergilla gardenii</i>	Dwarf Fothergilla - white	1.5-3 ft.	April/May	Sun to part shade
<i>Cephalanthus occidentalis</i>	Buttonbush - white	3-10 ft.	Jul./Aug	Sun
<i>Viburnum dentatum</i>	Arrowwood - white	8-10 ft.	May/June	Sun to part shade
<i>Lindera benzoin</i>	Spicebush - chartreuse	6-12 ft.	March/May	Sun to shade

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