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# Installing a Rain Garden

## What Is a Rain Garden and What does it do?

A rain garden looks like an ornamental perennial garden, but contains a shallow depression that is designed to collect and filter stormwater that runs off nearby hard surfaces, such as roofs, driveways or walkways. Rain gardens have a ponding depth of only a few inches, and are expected to hold water for just a day or so. The water leaving the garden may enter a storm drain system, or seep into the ground, where it can help to renew our groundwater – especially important in Rockland County, where we depend primarily on wells for our water. The ornamental plants in the rain garden slow the rate of stormwater runoff and help to reduce flooding and erosion. In addition, the vegetation may remove pollutants that could enter our waterways. A properly constructed rain garden will hold and filter approximately 30 percent more rainfall than the same area covered by a lawn.

## Choosing a Site

The optimal site for a rain garden is in full sun. Because the garden is a valuable ornamental feature, place it where it will best fit into your existing landscape and where you will enjoy the view. Many people place their gardens near their homes to catch runoff from the roof.

A rain garden should trap water from an average rainfall. Take note of the direction of flow and destination of runoff leaving your roof, driveway or other hard surface during a moderate to heavy shower. The rain garden should be positioned on a gentle slope in the path of runoff between the source and destination. The site should be at least ten feet away from the foundation of a house or outbuilding, and at least 25 feet from a well head or septic system. It is best if the runoff passes through a grassy area before entering the garden; this will remove some sediment that could impede the rate that water drains from the garden. You will need to make sure that any overflow from the garden is directed to an appropriate place, across vegetated areas, following natural drainage patterns, or to a storm drain, where it will not impact neighboring properties. Before you get started, call Dig Safe NY at 1-800-962-7962 to locate and protect any underground utilities.

As the slope of the land increases, so does the depth of a rain garden. The bottom of the garden should be flat. A rain garden on a steep slope would require special engineering and may not be practical. Rain gardens are designed so that one side is longer than the other; the garden stretches across the slope (or path of runoff) to catch the maximum volume of water possible.

Since the purpose of a rain garden is to filter stormwater, the soil underneath the garden should drain easily, preferably within a day or so. If you have standing water or a very high water table, the site is a candidate for a wetland garden instead of a rain garden (contact Cooperative Extension for assistance). You can conduct a simple percolation test for drainage by digging a hole roughly a foot in depth when the soil surface is somewhat dry. If the hole fills with water, stop and locate your rain garden elsewhere. If the hole remains dry, rough up the sides and fill it with water. Wait 12 to 24 hours; if the water has drained away, the site should be suitable.

As long as size of the area that serves as the source of runoff from a given site is taken into account, the size and depth of a rain garden are flexible. A typical rain garden covers 100 to 300 square feet. A shallow garden will need to be wider than a deeper, narrower site to trap the same amount of water. If your yard will not accommodate a large garden, consider using two or more small sites, or simply the largest area that is reasonable. To calculate how large to make your garden, measure and add together the square foot area of the portions of your roof, driveway, or other surfaces that will drain into the garden, then consult the following chart:

*Building Strong and Vibrant New York Communities*

Impermeable Surface Area*	Required Size of Rain Garden (6" deep)	Potential Rain Garden Dimensions (ft x ft)	Required Size of Rain Garden (3" deep)	Potential Rain Garden Dimensions (ft x ft)
800 ft <sup>2</sup>	40 ft <sup>2</sup>	4x10, 5x8, 6x7	80 ft <sup>2</sup>	7x12, 8x10, 9x9
1000 ft <sup>2</sup>	50 ft <sup>2</sup>	5x10, 6x8	100 ft <sup>2</sup>	7x15, 10x10
1200 ft <sup>2</sup>	60 ft <sup>2</sup>	4x15, 5x12, 6x10, 8x8	120 ft <sup>2</sup>	10x12, 8x15
1400 ft <sup>2</sup>	70 ft <sup>2</sup>	5x14, 7x10	140 ft <sup>2</sup>	10x14, 7x20
1600 ft <sup>2</sup>	80 ft <sup>2</sup>	7x12, 8x10, 9x9	160 ft <sup>2</sup>	8x20, 10x16
1800 ft <sup>2</sup>	90 ft <sup>2</sup>	6x15, 7x13, 8x12, 9x10	180 ft <sup>2</sup>	9x20, 10x18, 12x15
2000 ft <sup>2</sup>	100 ft <sup>2</sup>	7x15, 10x10	200 ft <sup>2</sup>	10x20, 14x15
2500 ft <sup>2</sup>	125 ft <sup>2</sup>	8x16, 10x13	250 ft <sup>2</sup>	10x25, 13x20, 15x17
3000 ft <sup>2</sup>	150 ft <sup>2</sup>	10x15, 12x13	300 ft <sup>2</sup>	10x30, 15x20
3500 ft <sup>2</sup>	175 ft <sup>2</sup>	9x20, 12x15	350 ft <sup>2</sup>	14x25, 18x20
4000 ft <sup>2</sup>	200 ft <sup>2</sup>	10x20, 14x15	400 ft <sup>2</sup>	16x25, 20x20
5000 ft <sup>2</sup>	250 ft <sup>2</sup>	10x25, 13x20, 15x17	500 ft <sup>2</sup>	20x25

Source: North Carolina State University Cooperative Extension; reprinted with permission.

\*Roof, driveway, or other surface that serves as a source of runoff.

## Constructing the Garden

Use a string, rope or hose to outline the footprint of your garden. When you excavate, create a gentle slope into the center of the garden from the edge, then remove the soil inside to the desired depth of the finished garden, **plus additional depth to accommodate any intended additions**, such as compost or mulch. A minimum of a couple of inches of mulch are recommended – for example, if a three inch ponding area is desired, dig to a depth of at least five inches. The bottom of the garden should be flat so water spreads out evenly. If your garden is on a slope, use the excavated soil from the uphill side to level out the downhill side. Save some soil to build a berm.

If you cannot finish the excavation of the garden in one session, mulch the area to prevent erosion until you can complete the task.

To keep runoff contained in the garden and give the water a better chance to seep into the ground, build a berm of mounded earth around the lower perimeter of the garden, or on the side opposite the source of the water flow if the ground is nearly level. The sides of the berm should slope gently. You may leave a slight depression in the berm for overflow – to reduce erosion, these areas may be covered with decorative stones that allow water to pass through. The soil of the berm should be firmly compacted, then planted with grass or a dense groundcover. If you would like to hide the berm, you may plant more perennials or shrubs beyond the outside edge. Be sure to mulch the berm to prevent erosion while the plants become established.

If you must site your garden on level ground, use a downspout extension or buried PVC piping to deliver water directly to the garden. Alternatively, an attachment (available at hardware stores) which spreads out water that drains off a roof can be connected to a downspout and positioned to direct the flow of stormwater toward your rain garden. This helps to distribute the water that enters the garden evenly.

If you cannot reach into the center of the garden from the edge, consider adding a raised pathway, constructed of material such as gravel or stone for access. This will allow you to maintain the garden without compacting the soil.

## Planting the Garden

### Plant Selection:

The plants in a rain garden must be able to withstand periods of wet and dry soil, as well as occasional flooding. Many of our attractive native plants will handle these conditions. Natives often require less maintenance than exotic ornamentals; these tough plants generally do not require fertilizer or pesticide applications; some are deer resistant. Native plants are also less likely to take over the garden than non-natives.

A mixture of species with varying forms, heights and bloom times will add diversity and interest to your rain garden. As in a traditional perennial garden, repeating blocks or drifts of plants (mostly in odd-number groupings) will have a pleasing effect.

Use the chart below as a starting point for plant selection:

<b>Perennials</b>			
<b>Latin Name</b>	<b>Common Name</b>	<b>Height</b>	<b>Bloom Time</b>
<i>Aquilegia canadensis</i>	Columbine	2'	Spring
<i>Amsonia</i> spp.	Blue star	2-3'	E. Summer
<i>Asclepias incarnata</i>	Swamp Milkweed	2-4'	L. Spring
<i>Aster novae angliae</i>	New England Aster	1-6'	Summer - Fall
<i>Chelone</i> spp.	Turtlehead	1-4'	L. Summer - E. Fall
<i>Cimicifuga</i> spp.	Black Snakeroot, Fairy Candles	4-7'	Summer - Fall
<i>Eupatorium</i> spp.	Joe Pye Weed, Mist Flower	4-6'	L. Summer
<i>Filipendula rubra</i>	Meadowsweet	4-6'	Summer
<i>Geranium maculatum</i>	Cranesbill	8-15"	L. Spring
<i>Iris versicolor</i>	Blue Flag	2-4'	L. Spring
<i>Liatris spicata</i>	Blazing Star, Gayfeather	1-3'	Summer
<i>Lobelia cardinalis</i>	Cardinal Flower	2-4'	Summer
<i>Monarda didyma</i>	Bee Balm	1-4'	Summer
<i>Oneothesa</i> spp.	Evening Primrose, Sundrop	1-2'	Summer
<i>Physostegia virginiana</i>	Obedient Plant	2-4'	L. Summer - Fall
<i>Solidago</i> spp.	Goldenrod	1-6'	L. Summer - Fall
<i>Vernonia noveboracensis</i>	New York Ironweed	4-8'	L. Summer - Fall
<b>Ferns</b>			
<b>Latin Name</b>	<b>Common Name</b>	<b>Height</b>	
<i>Onoclea sensibilis</i>	Sensitive Fern	1-2'	
<i>Osmunda cinnamomea</i>	Cinnamon Fern	2-3'	
<i>Osmunda regalis</i>	Royal Fern	2-3'	

<b>Grasses</b>			
<b>Latin Name</b>	<b>Common Name</b>	<b>Height</b>	<b>Bloom Time</b>
<i>Andropogon gerardii</i>	Big Bluestem	3-7'	L. Summer - Fall
<i>Calamagrostis acutiflora</i>	Feather Reed Grass	4-6'	Summer - Fall
<i>Carex</i> spp.	Sedge	6-36"	L. Spring - E. Summer
<i>Chasmanthium latifolium</i>	Northern Sea Oats	2-4'	L. Summer
<i>Panicum virgatum</i>	Switch Grass	3-8'	Summer - L. Summer
<b>Shrubs</b>			
<b>Latin Name</b>	<b>Common Name</b>	<b>Height</b>	<b>Bloom Time</b>
<i>Aronia</i> spp.	Chokeberry	3-12'	Spring
<i>Callicarpa americana</i>	Beautyberry	4-8'	Summer
<i>Cephalanthus occidentalis</i>	Buttonbush	3-10'	L. Summer
<i>Clethra alnifolia</i>	Summersweet	6-10'	L. Summer
<i>Cornus stolonifera</i>	Red Twig Dogwood	7-9'	L. Spring - E. Summer
<i>Ilex glabra, I. verticillata</i>	Inkberry, Winterberry	3-12'	L. Spring - E. Summer
<i>Itea virginica</i>	Virginia Sweet Spire	3-9'	L. Spring
<i>Lindera benzoin</i>	Spicebush	6-12'	Spring
<i>Sambucus canadensis</i>	Elderberry	6-12'	L. Spring
<i>Vaccinium</i> spp.	Blueberry	2-12'	L. Spring
<i>Viburnum</i> spp.	Viburnum	2-18'	Spring

### **Planting the Garden:**

Other than excavation to create the depression that holds stormwater and the construction of the berm, preparing a rain garden is similar to that of other perennial borders. Most of the plants will benefit from an addition of an inch or so of compost incorporated into the soil. This will improve drainage and supply organic matter that holds moisture during a dry spell, and is especially helpful during establishment.

If possible, set your plants out in early spring so they may begin to develop a good root system before the stress of summer heat. Start out with plants that have well established root systems – these will be able to withstand a flood without washing away, and will fill in more quickly than plants started from small plugs or seed. Set the plants at the recommended spacing for the species. If you use containerized plants, you can move them around in their pots to try different patterns and combinations before you settle on a permanent design.

Dig planting holes deep enough to accommodate plants' root balls. Make sure that the crowns of the plants will be set in the garden at the same level that they had grown in their containers; or in the case of transplants, in the original landscape. Dig and loosen the soil of an area at least twice as wide as the root ball, then set the plant in, firm the soil gently to remove air pockets, and water well. Finally, spread two inches of mulch to cover the garden soil. Use a heavy mulch, such as hardwood, that will not float away in a heavy rain. Do not pile mulch around the plants' crowns or stems.

### **Maintenance**

Your newly planted garden will require regular watering for the first season, or until the plants are established. Unless drought restrictions are in effect, supplemental water should be applied whenever there has not been an inch of rainfall in the previous week, and a soaking rain is not predicted. Once the garden is established, it will not require additional water unless there is a long, dry spell (where any wilted plants do not perk up after dark).

As in any other perennial garden, weeds must be kept to a minimum, especially during establishment. Inspect the garden regularly and remove any unwanted vegetation before it takes hold. The mulch layer will naturally suppress many weeds. Renew the mulch at least once a year, or as it decomposes. The composted mulch will supply adequate nutrients for the native plants in your garden – you will not need to add additional fertilizer.

Check the water inflow and overflow areas occasionally; clear them out as necessary. To prevent a layer of debris from filling the ponding area of the garden, remove dead stems and leaves as they accumulate. Prune and thin woody plants as necessary. Cut herbaceous perennials and grasses back to four or six inches each spring, before new growth emerges. Over time, you may also need to remove layers of silt or sediment that accumulate in the depression, to maintain the depth of the ponding area and the rate that water filters through the garden. At this point, you may want to divide plants that are crowded or fill gaps left by plants that have failed to thrive.

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*The information on pest management for New York State contained in this publication is dated February 2007. The user is responsible for obtaining the most up-to-date pest management information. Contact any Cornell Cooperative Extension county office or PMEP (<http://pmez.cce.cornell.edu/>), the Cornell Cooperative Extension pesticide information website. The information herein is no substitute for pesticide labeling. The user is solely responsible for reading and following manufacturer's labeling and instructions*