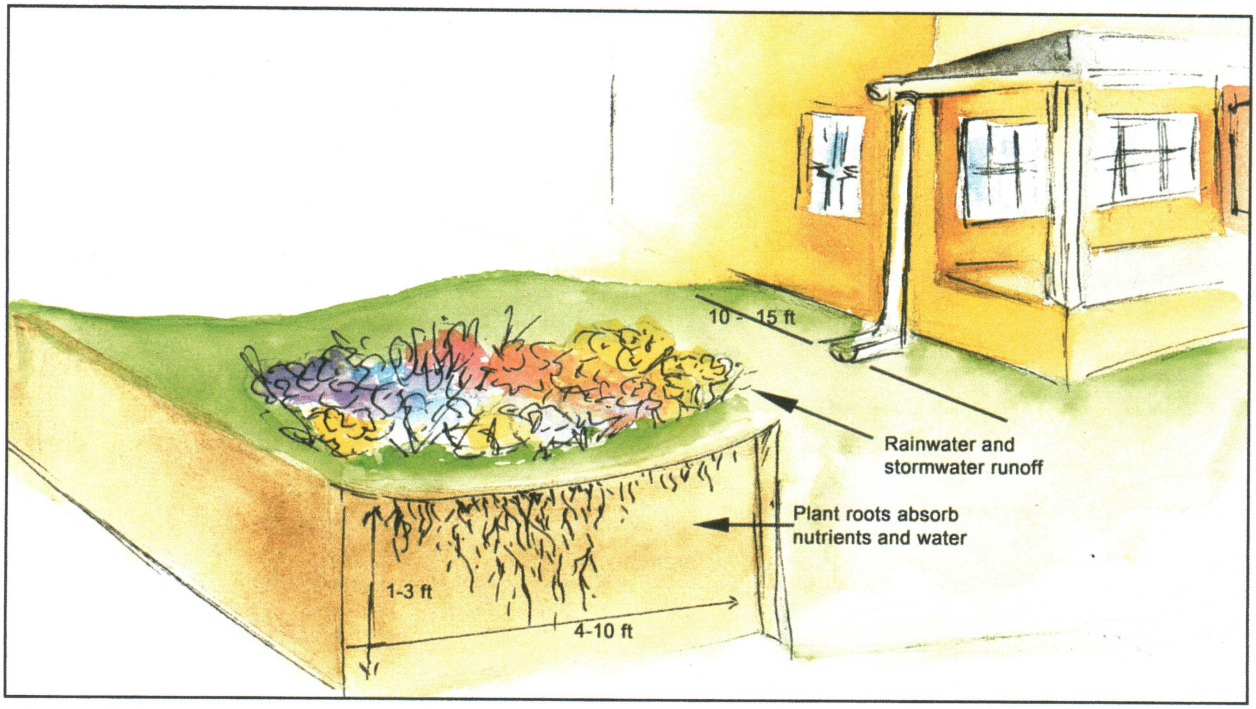


Figure 17. The shortest side should be 4-10 feet wide to balance the effect of slope with the rain garden depth and is best placed perpendicular to the slope. For lawns with a slope greater than 8%, the maximum recommended width is 15 feet.

3d. *Determine length and width*

Estimating the rain garden length (longest side) and width (shortest side) is based on your garden area, personal preferences, and a little bit of math. To begin, estimate how wide your garden should be by considering your garden's shape and unique site conditions. This includes the available yard space, the distance between landscaped areas, and any physical constraints. By considering these elements, you may decide that your garden should be 5 feet wide (figure 17). You've just selected the width of your garden. Use the selected width in the sizing worksheet on the opposite page to calculate the garden's length.

4. Performance measures

With a little bit of math work, you can quantify the impact your rain garden has on capturing stormwater runoff. Following, you will learn how to build your rain garden based on a rainfall amount and calculate your drainage area's recharge volume.

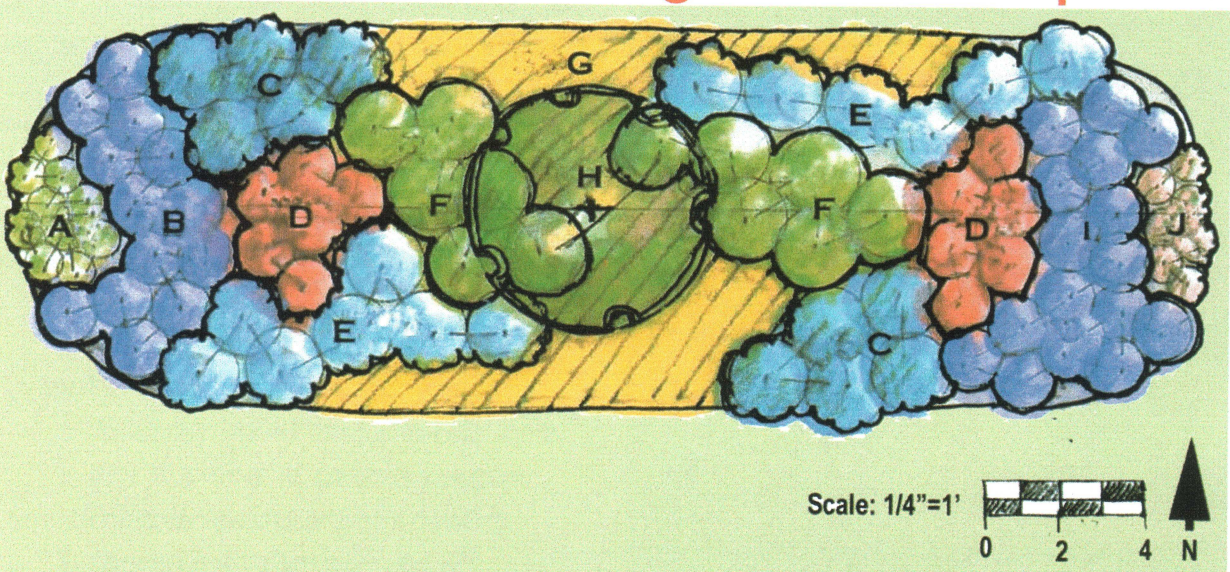
1. *Target rainfall*

Maryland's environmental site design criteria for sizing rain gardens are based on capturing and retaining enough rainfall so that the runoff leaving a site is reduced to a level equivalent to a wooded site in good condition. To estimate the amount of rainfall treated by your rain garden use the formula below.

$$\text{Rainfall} = 10'' \times \frac{\text{Rain garden area}}{\text{drainage area}}$$

If you would like to capture 100% runoff, refer to appendix B for your local rainfall depth and consider installing other small-scale practices discussed on pages 9 to 11 to improve your drainage capacity.

Rain garden template



Butterfly Swale
Low Maintenance, 250 SF, Coastal Plain, Full Sun

A - 10 *Chelone glabra* (White turtlehead)
B - 13 *Verbena hastate* (Blue Vervain)
C - 10 *Amsonia tabernaemontana* (Blue-star flower)
D - 12 *Lobelia cardinalis* (Cardinal Flower)
E - 13 *Amsonia hubrechtii* (Narrow-leaf Blue-Star flower)
F - 12 *Muhlenbergia capillaries* (Pink Muhly Grass)
G - 52 *Carex stricta* (Tussock sedge)
H - 1 *Magnolia virginiana* (Sweetbay)

Butterfly Swale,
Low Maintenance, 250 SF, Coastal Plain, Pt Shade/Shade

A - 10 *Myosotis scorpioides* (Forget-me-not) or *Mertensia virginiana* (Virginia bluebell)
B - 13 *Gentiana andrewsii* (Bottle Gentian) or *Aster cordifolius* (Blue Wood Aster)
C - 10 *Amsonia tabernaemontana* (Blue-star flower)
D - 12 *Lobelia siphilitica* (Great Blue Lobelia)
E - 13 *Phlox divaricata* (Woodland Phlox)
F - 12 *Aruncus dioicus* (Goatsbeard)
G - 32 *Elymus hystrix* (Bottlebrush Grass) or *Ajuga reptans* (Carpetbugle)
H - 1 *Aesculus parviflora* (Bottlebrush buckeye)
I - 16 *Aster cordifolius* (Blue Wood Aster) or *Tradescantia virginiana* (Spiderwort)
J - 7 *Viola papilionacea* (Common Blue Violet) or *Dicentra eximia* (Hardy Bleeding Heart)

Figure 35. Rain barrel artwork.

Figure 36. Highland Beach Town Hall rain barrels.

Figure 37. Connected rain barrels at Arlington Echo.

Maintaining your rain barrel is easy too. Keep these simple tips in mind for a properly functioning rain barrel.

- Clear debris away from the inlet on a regular basis to allow roof runoff to pour into the rain barrel.
- Unless your rain barrel can withstand freezing temperatures, clean out your rain barrel at the end of the season and store it indoors to prevent water from freezing inside of it. Freezing temperatures could damage your rain barrel.

Performance evaluation

Once you've constructed your rain garden you'll need to maintain proper drainage and healthy plants. Consider the following tips to maintain your rain garden's performance.

Rain garden performance

Visual inspections offer the easiest way to evaluate your garden for proper drainage. After a storm ends, visually inspect the rain garden for standing water at 24 and 48 hours. You'll need about an inch of rain or more. If there is still standing water after 48 hours, you'll need to make adjustments based on your site's conditions (refer to pages 9 to 11). To verify proper construction and ensure long-term performance, check for the items below.

- Sediment accumulation in the basin from the drainage area
- Clogged inlet or outlet
- Excessive erosion within the garden

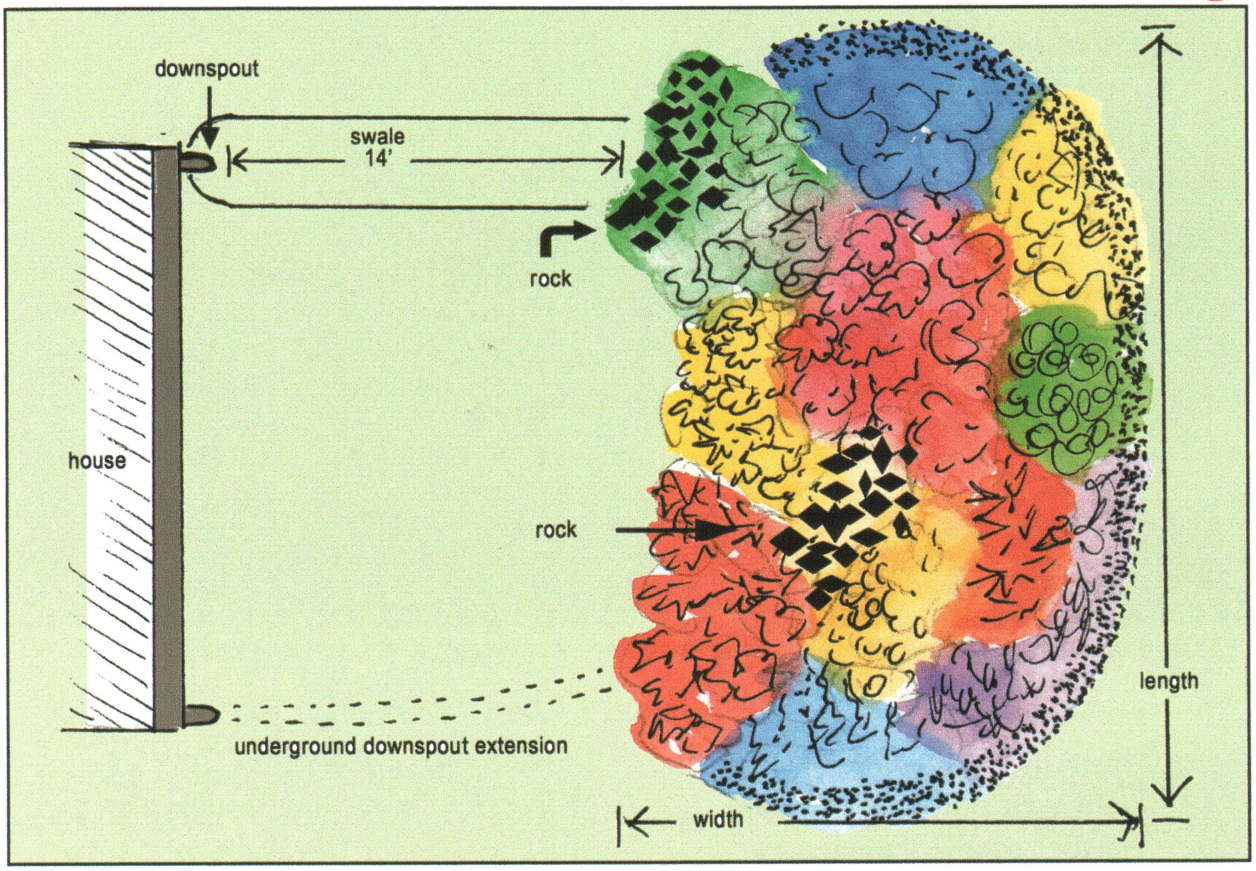


Figure 27. Sketch out your basic rain garden design. You don't have to be an architect!

With the grunt work done, you're now ready to bring your rain garden to life with your native plant selection (figure 26). In this section, you will learn how to select plants, lay out a rain garden design, install plants, and apply mulch.

Rain garden design

Create a sketch of your rain garden design to help guide your plant selection (figure 27). To help you brainstorm, refer to appendix C for a sample design and review the tips below.

- For a bold impact, reduce the amount of space between plants by a few inches from the

ESD Criteria # 16. Design

Landscaping plans shall clearly specify how vegetation will be established and managed. A rain garden should be located in full to partial sun, at least two feet above the seasonal high water table and have a total rain garden depth of 12 to 18 inches (refer to figure 11 on page 8). Plants selected for use in the rain garden should tolerate both saturated and dry conditions and be native or adapted to Maryland. Neatly trimmed shrubs, a crisp lawn edge, stone retaining walls, and other devices can be used to keep a rain garden neat and visually appealing.

Figure 26. Rain gardens add color and life to your landscape.

Construction

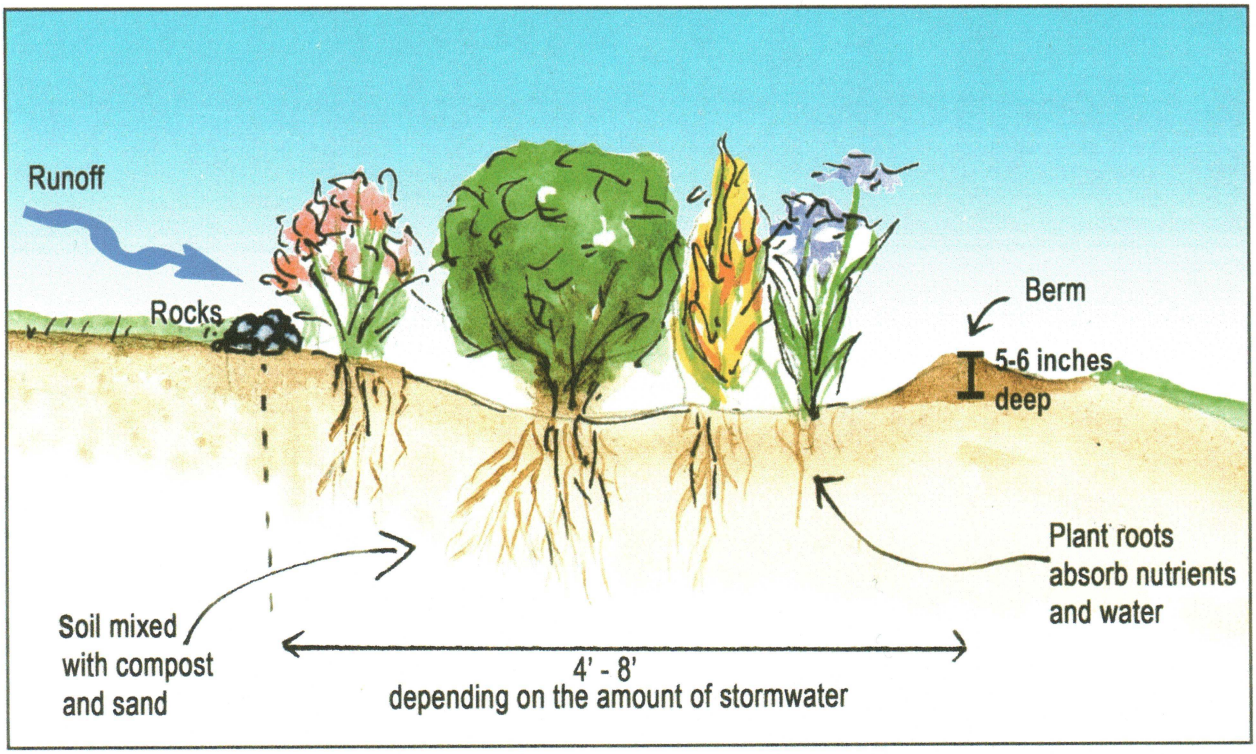


Figure 19. A sketch of your rain garden can help guide the construction process. In the example above, the rain garden is about 4-8 feet wide and has a surface ponding depth of 5-6 inches. Rocks located at the entrance point

In this section, you will learn how to prepare the site and dig your rain garden. To help guide you through the construction process sketch out the garden's dimensions and surroundings. A sketch similar to figure 19 is an example that can help you during construction.

Preparing the site

To avoid digging on or near utility lines or pipes, contact Miss Utility at 1-800-257-7777 or www.missutility.net 48 business hours prior to digging. To be on the safe side, you may consider contacting Miss Utility one week prior to digging. The following tips will also help you prepare your site for digging.

- For a self-installed rain garden, expect to pay between $3 and $5 per square foot in plant costs and soil amendments. When working with a landscaping company to design and install your rain garden, the cost will

ESD Criteria # 11. Inspection

Regular inspections shall be made during the following stages of construction.

- *During excavation to subgrade and placement of planting soil.*
- *Upon completion of final grading and establishment of permanent stabilization.*

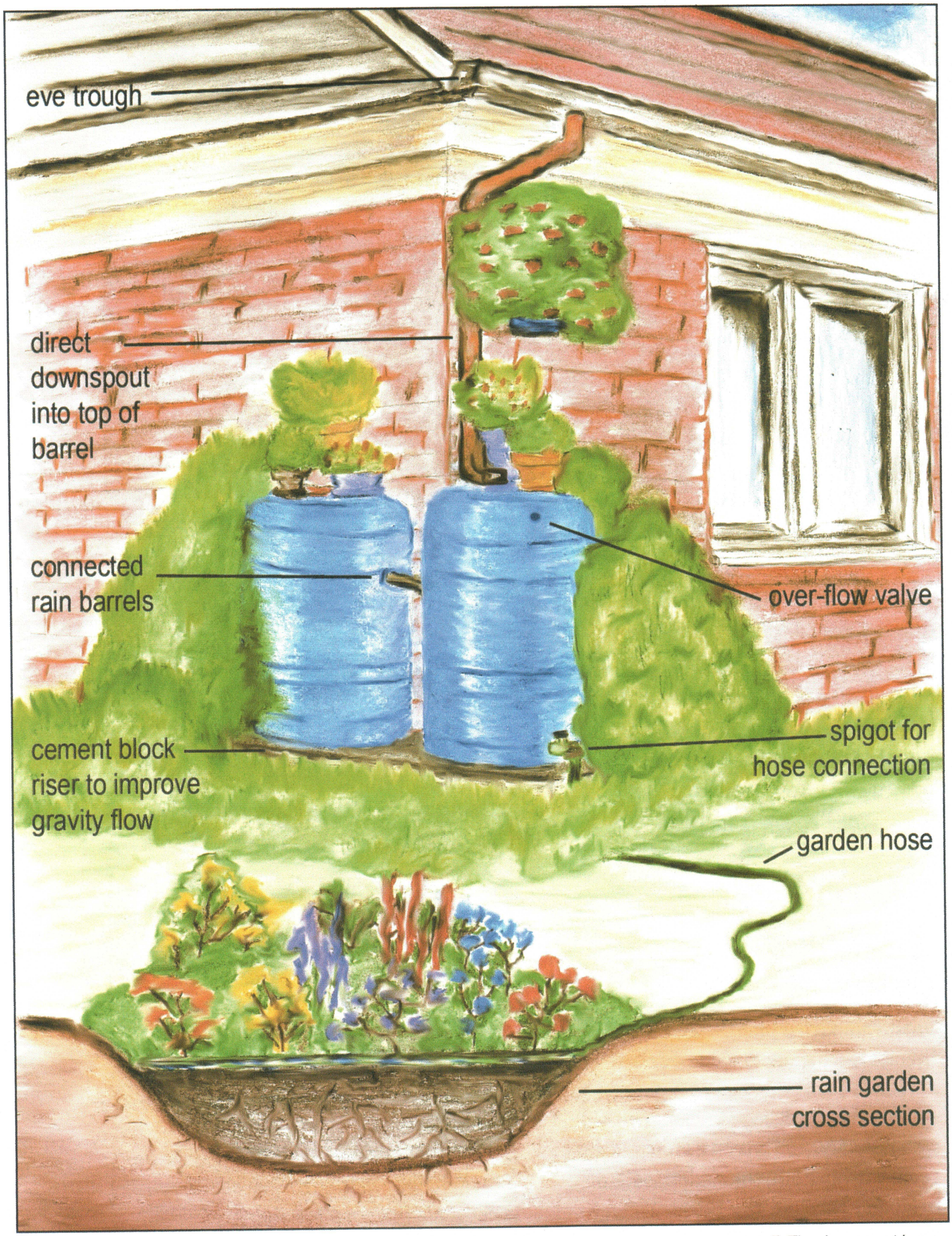


Figure 33. The drawing above illustrates how rain gardens and rain barrels work together to capture runoff. The downspout is directed into a rain barrel to collect roof runoff. In order to collect more roof runoff, two rain barrels are connected to each other. The excess runoff will pour out through the rain barrel's over-flow valve. You can attach an overflow hose to the valve to help direct flow towards your rain garden. By storing the stormwater runoff in rain barrels, you'll be able to water your rain garden