



RAIN GARDENS

An Introduction

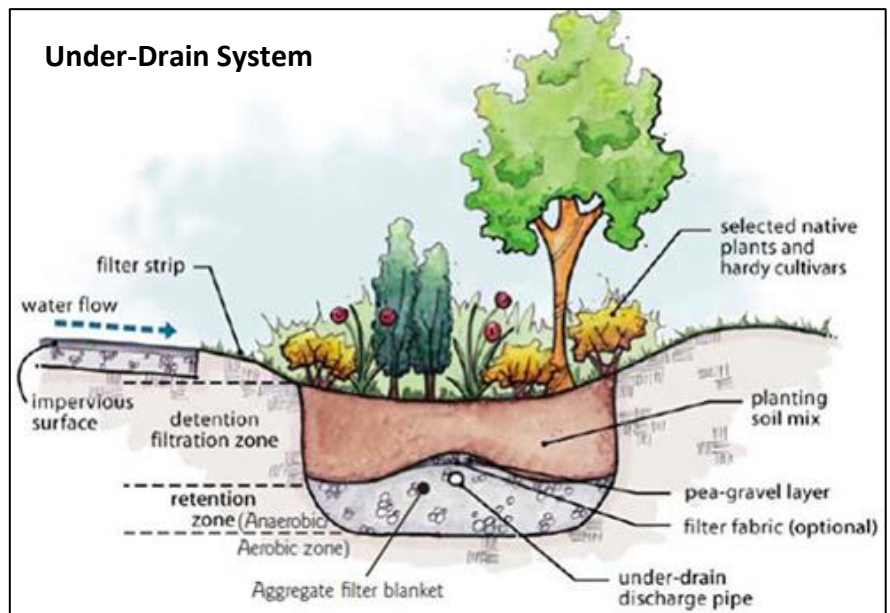
HOW RAIN GARDENS WORK

Rain gardens are stormwater management systems designed to receive, infiltrate, and cleanse concentrated flows of stormwater. They are sometimes called “bio-retention” areas, specifically landscaped to mimic the ecological processes of a wooded area. Rain gardens collect stormwater from roofs, driveways, and lawns, infiltrate the water, filter out nutrients and pollutants, and minimize soil erosion. Rain gardens are designed to drain all ponded water within 2-4 hours after a 1” rain storm. Rain gardens may be stand-alone entities, or may be incorporated as borders of other gardens. The result is an attractive garden that supports habitat for birds and butterflies, while improving the quantity and quality of stormwater that once flowed to nearby streams and lakes.

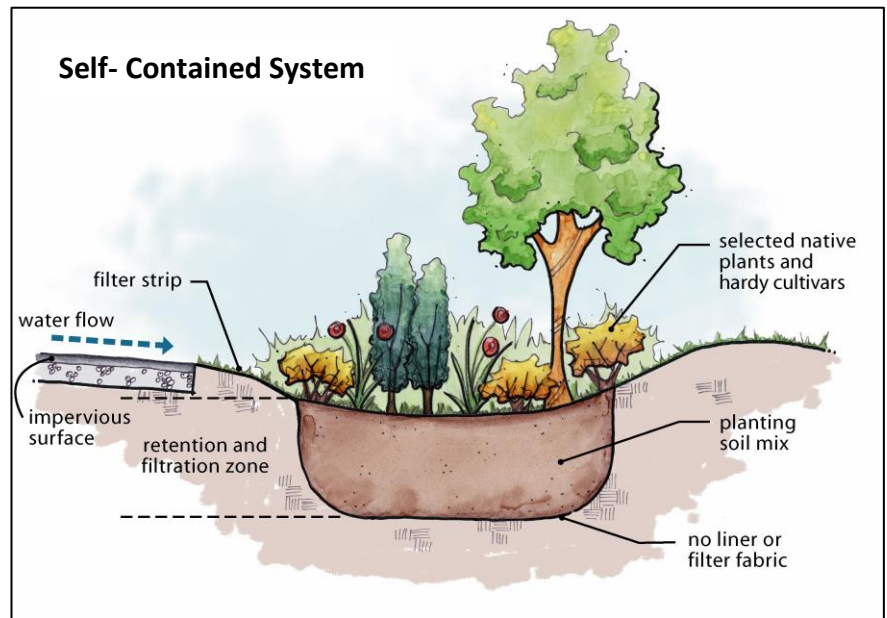
There are two types of rain gardens: **under-drained** and **self-contained**. In both systems, the ground is first excavated and porous planting media is imported to the site. Once the site is prepared, carefully selected native plants are installed, usually a mix of wild flowers and shrubbery. Plants must be able to withstand the extremes of flooding and drought that may occur in the garden. Plants on the edge of the garden must better tolerate dry than plants in the lower areas. Plants with deep, fibrous roots tend to have a competitive advantage in rain gardens and provide the most filtration benefits. Plants should be installed when young to have a chance to adapt to the rain garden conditions as they grow. Choosing either an under-drained or self-contained rain garden depends upon the volume of water to be treated, existing soil conditions, available space, and budget for the project. Complicated sites may benefit from professional design and/or installation. Once installed, well-planted rain gardens require minimal maintenance to continue flourishing.

TWO TYPES OF RAIN GARDEN

Under-Drain Systems accept and clean all stormwater biologically, then move excess ponded water into a conventional storm drain system via a pipe installed at the bottom of the rain garden. Under-drain rain gardens typically drain within two hours of a storm event.



Self-Contained Systems infiltrate all stormwater, so typically hold water longer, particularly in the lower areas of the garden. Soils are amended with a very porous planting material to a depth of 4"-3'. Installing deep amended soils will allow the water to drain more quickly than shallow gardens, and also place less stress on plants that must adapt to various periods of wetness. The self-contained system requires clean soils and adequate clearance (roughly 4') from the seasonal mean high water table.



- For a guide on designing rain gardens, see Urban Waterway's 'Designing Rain Gardens': <http://www.bae.ncsu.edu/stormwater/PublicationFiles/DesigningRainGardens2001.pdf>
- For the EPA's overview of rain gardens, see the EPA's 'Rain Gardens': http://water.epa.gov/learn/resources/adulttrn/npsout/upload/2002_03_11_NPS_toolbox_other_WI_homegardens.pdf

PERMIT REQUIREMENTS

A **Conservation permit** may be required if the installation of a rain garden involves:

- Installation of pipes
- Alteration of drainage to or on any wetland resource area.

A simple **Conservation Administrative Approval form** should be obtained for the installation of a rain garden in Riverfront Area or wetland buffer zone. Contact the Newton Conservation Office (617-796-1134) for Administrative Approval. Under the State Wetland Protection Act and Regulations homeowners may, *without a Conservation permit*:

- Plant "native species of trees, shrubs, or groundcover, but excluding turf lawns" and
- Convert "impervious to vegetated surfaces, **provided erosion and sedimentation controls are implemented during construction.**"

Other City permits may be required if the installation involves:

- Connection to or disconnection from a city drainage system
- Alteration of drainage to or on any abutting property

Tips on Installation

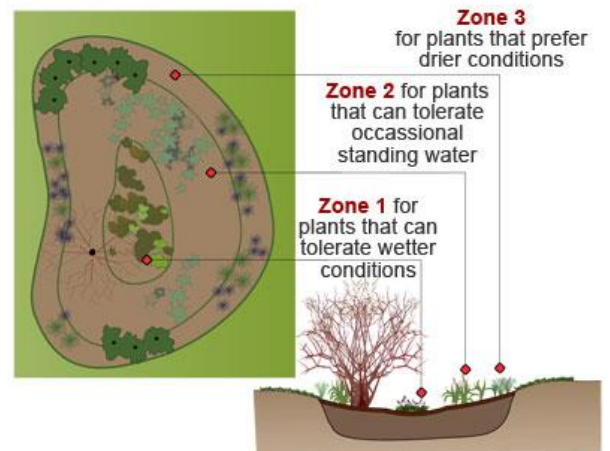
Rain gardens are stormwater management systems designed to receive, infiltrate, and cleanse concentrated flows of stormwater, therefore, careful planning and installation are necessary. It may be beneficial to hire professional assistance.

1. Determine the best location for the rain garden

- Determine where stormwater enters the site or can best be captured (via swales or pipes).
- A rain garden should be at least 10 feet from any house so infiltrating water doesn't seep into the foundation. Make sure underground utilities aren't in the way.
- It may be tempting to put the rain garden in a part of the yard where water already ponds. Don't! The goal of a rain garden is to encourage infiltration, and a yard's wet patches show where infiltration is slow. It is best to build a rain garden in the spring -- it is easier to dig, and plants are more likely to thrive.
- Try to build the rain garden in full or partial sun, not under big trees.
- Put the rain garden in a flat part of the yard; digging will be easier. If the slope is more than 12%, it's best to find another site or talk to a professional landscaper.
- Test the soil's percolation rate. Dig a hole 2 feet deep and time how long it takes for 8" of water to disappear. For example, if 8" drains in 12 hours, the rate is 8"/12 hrs, or 0.67 inches per hour. A rate higher than 0.5 inches per hour is great. If the percolation rate is less than 0.1 inches per hour, the site isn't suitable for a rain garden.

2. Design the garden

- Determine an appropriate size for the rain garden. Estimate the volume of water that will drain into the garden in a 1" rain storm. Provide for that volume to be stored in the "pond".
- Based on the slope of the lawn, select the finished depth of the rain garden. A typical rain garden, when finished, is 4"-8" deep. A garden more than 8" deep might pond water too long; one less than 4" deep may need too much surface area to infiltrate larger storms.
 - If the slope is 0-4%, build it 3"-5" deep.
 - If the slope is 5-7%, build it 6"-7" deep.
 - If the slope is 8-12%, build it 8" deep.
- The rain garden must have a level, flat bottom so water doesn't pool at one end and spill over before it has a chance to infiltrate.
- Select plants that will tolerate the anticipated regimes of flooding and desiccation. Select a combination of trees, shrubs, and herbaceous plants that will grow well with one another.



3. Prepare the site

- Outline the area to become the rain garden with string.
- Strip away the sod (grass) by slicing off the roots with a sharp spade as level as you can. Roll up sections of sod as if they were pieces of carpet.



- Dig out the native soil to the depth you need for putting in the planting soil. Create a flat bottom of native soil so water will percolate evenly.
- If the rain garden is on a slope, pile some of the excavated soil into a berm on the low side to retain the water. The peak of the berm should be at least 6 inches higher than the water level when the rain garden is full. For stability, make the base of the berm at least 2 feet wide and the top at least 1 foot wide, and stomp the soil down well.
- Install whatever piping has been designed for. If you are creating a dry well, fill that with washed round stones 1½ to 2 inches in diameter. Also pack stones around the overflow area to prevent erosion.
- Add appropriate soil amendments* to within 6-12" of the top of the garden berm. Slope the sides gently.
 - * If the excavated soil is relatively sandy and free of clay, use a mixture of 65% native soil and 35% compost (2 scoops of soil for each scoop of compost).
 - * If the excavated soil is clayey, refill the garden with a mixture of 60 percent screened sand and 40 percent compost.

4. Install plants and mulch – water until plants are well-established

- Group plants in zones, based on how well they tolerate having "wet feet". Plants that thrive in the wettest environment go in the center of the rain garden; that area tends to stay wet the longest after a storm. Put plants that are suited to drier conditions on the edges.
- Once the plants are in the ground, cover the inside of the rain garden with a 3-inch layer of mulch to keep the soil moist and to prevent weed seeds from sprouting.
- Water rain garden during establishment period and maintain as needed. Until the plants are established, even drought-tolerant plants require supplemental watering to survive dry seasons.



5. Maintain the rain garden annually

- Check the mulch depth annually and replenish as necessary.
- Rain gardens don't require fertilizers beyond the compost used in the soil mix.
- Weed and prune to keep the rain garden looking its best.

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