Rain Garden

What is a rain garden?

A rain garden is a planted shallow depression that uses water-tolerant native plants and landscaping to soak up stormwater flowing from downspouts or hard (impervious) surfaces, such as your driveway, patio, or sidewalk. By absorbing and filtering this runoff, rain gardens allow water to slowly seep into the ground, reducing the amount of water that flows directly into the nearest storm drain, creek, or river. Rain gardens typically consist of an absorbent soil mix, a mulch layer, and shrubs, grasses, and flowering plants. Rain gardens are a beautiful, low-tech, inexpensive way for homeowners, communities, and businesses to help ease stormwater problems and reduce their contribution to the pollution of local streams, rivers, and the Chesapeake Bay.

What are the benefits to property owners and communities?

Rain gardens, when properly designed and installed, can help reduce stormwater problems on your property such as ponding or erosion. Gutters, downspouts, and paved surfaces collect and move the stormwater to the street, where it's carried into the storm drain system and into local streams. As it flows, stormwater picks up pollutants (such as dirt and toxins, fertilizers, trash and pet waste) and carries them into our waterways.

Once here, these pollutants have many harmful effects.

- Bacteria and other pathogens create health hazards for people and wildlife.
- Debris (e.g., plastic bags, six-pack rings, bottles, and cigarette butts) can choke and kill aquatic life such as ducks, fish, turtles, and birds.
- Excess nutrients cause algae blooms that can destroy aquatic habitats and impact recreational opportunities.

Rain gardens can address these problems by filtering pollutants from stormwater and allowing more clean water to soak into the ground before it gets to local streams or enters the storm drain system. Compared to an equal area of traditional lawn, a rain garden allows at least 30% more water to soak into the ground. In addition to reducing the amount of pollution that reaches our streams through runoff, this helps replenish the groundwater supply.

Rain gardens provide many other benefits to the community and the local environment. They can provide habitat for wildlife and increase the diversity of birds and butterflies. Rain gardens provide an attractive and creative alternative to traditional lawns and require less maintenance because they do not need to be mowed, fertilized, or watered once established. Adopted on a community or neighborhood scale, rain gardens can reduce stormwater surges that cause.

How can your rain garden quality for a rebate?

The Rain Check Rebate Program offers rebates to property owners who install rain gardens. The rebate for both residential properties and commercial businesses, homeowner associations, condominium associations, civic

associations, multi-family dwellings, nonprofits and not-for-profit organizations is $10 per square foot with a minimum size of 100 square feet.

To alleviate costs, the Rain Check Rebate Progarm provides a rebate of up to $4,000 for residential properties, and up to $20,000 for commercial businesses, homeowner associations, condominium associations, civic associations, multi-family dwellings, nonprofits and not-for-profit organizations.

How can you determine if your property is suitable for a rain garden?

Most properties are suitable for a rain garden—all you need is some sun exposure and enough space in the right place. Walk around your property while it's raining so you can see how the rain flows across existing landscape features and hard surfaces, like your house, driveway, and sidewalks, and where it ends up. A rain garden should intercept the runoff before it flows off of your property. Consider the following points to help you determine whether a rain garden will work on your property.

- Place your rain garden at least 10 feet away from your home and your neighbors' homes and downhill from the foundations of any nearby homes. When the garden overflows, the excess water must flow away from your home and your neighbors' properties.
- Place your rain garden at least 25 feet away from a septic field or a well head.
- Choose a gently sloping place that regularly receives runoff from patios, sidewalks, or other hard surfaces or where downspouts, rain barrel outlets, or sump pump outlets can direct rainwater into your rain garden.
- Locate your rain garden in full or partial sun.
- Avoid placing your rain garden under a large tree because the roots will make it difficult to dig.
- Identify low-lying areas that naturally pond (as long as they drain well) as they may be good places to locate rain gardens.
- Evaluate the soil type at the location of the rain garden. Water must be able to seep into the soil quickly enough when the rain garden is full so that it will drain in 24 to 36 hours (see the Assessing the soil section).
- Ensure that bedrock and groundwater is located at least 2 feet below the rain garden's surface.

Remember to fit the rain garden into your current landscape—let it complement the house and other yard features and be a source of enjoyment for you.

Assessing the soil

Soils that are suitable for a rain garden will drain within 24 or 36 hours. Soils high in sand and silt usually provide good drainage. Soils high in clay will not drain well and may not be suitable unless you amend the soil (mix in soil of a more appropriate type) or add an underdrain system. An example of an underdrain system is a slotted pipe that collects water below the surface of the rain garden and discharges it into the storm drain system or to a stable outfall. In cases where infiltration is not possible due to existing soils, you will need to consult with Rain Check Rebate staff or a qualified professional to find out whether a rain garden with an underdrain is an option for you.

It's easy to find out whether your soil is suitable for a rain garden. Dig a hole in the ground about 1 foot wide by 2 feet deep and fill it with water. If the water drains in less than 24 hours, the soil should be suitable. To be sure, refill the hole with water within 12 hours and make sure that it takes no longer than 36 hours to drain. Do this test in the spring, not in the middle of the summer when the soil is dry and cracked and may give an erroneous result. This test should not be performed within 24 hours of a rain event, as that might also give an erroneous result.

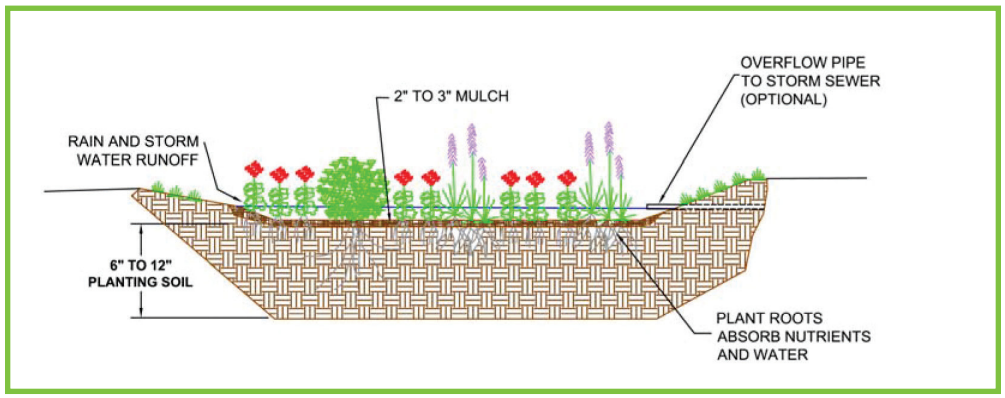
You may have excess soil after completing your garden that you will need to dispose of. If your rain garden is on a slight hill you may want to use some of the soil for a berm on the downhill side. Any excess soil can be used or stored somewhere else on your property, as long as it does not create drainage problems elsewhere.

Identify and avoid utilities

Prior to starting your rain garden project, find existing underground utilities, such as water mains, telecommunication lines, and gas lines, so you can avoid them. Call Miss Utility at 811 or 1-800-257-7777, or visit their website at www.missutility.net/maryland/ for assistance.

How can you determine the proper size and configuration?

Rain gardens are highly versatile and can be constructed in a wide variety of shapes and sizes. The size of your rain garden is determined by a number of variables. Some of these are established by the conditions of your yard (such as soil type), while others are determined by you (such as amount surface area collected). To properly size your rain garden, estimate the area of the hard surface (rooftop, driveway, patio, etc.) that will drain to the rain garden. If you plan to connect a downspout to the rain garden, estimate the footprint (ground area, measured as length x width) of your house or other structure and determine how much of the rooftop area drains to the downspout you will be directing to the rain garden. For gutters with a downspout at each end, assume that half of the water goes to each downspout. Do not take into account the slope of the roof when calculating the roof area, just use the house footprint. If your rain garden will capture runoff from other hard surfaces, such as a patio, just determine the area that will drain to the rain garden.



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The surface area of your rain garden should be between 20% and 30% of the roof area (or other hard surface) that will drain into the rain garden. If your soils are very sandy, use 20%. For example, if your rooftop measures 30 feet by 30 feet, the area (footprint) would be 900 square feet. If one-quarter of this area drains to the downspout that will connect to the rain garden, then the roof area draining to the rain garden is 900 square feet divided by 4 = 225 square feet. 20% of 225 square feet = 45 square feet, and 30% of 225 square feet = 67 square feet. In this example, the rain garden area should be between 45 and 67 square feet. If you do not have enough space to install a properly sized rain garden, look at reducing the amount of area draining to your rain garden or splitting your drainage area into two rain gardens.

Be sure to maintain a gentle slope from the surrounding area down to the rain garden. You may have to create a shallow ditch, swale (low area), or underground pipe to carry the stormwater runoff from a disconnected downspout to the rain garden.

If you build a rain garden around your yard drain, the water that overflows from the garden will be conveyed safely to that drain. Otherwise, be sure the overflow is directed away from neighboring properties.

Planting your rain garden

A rain garden planted with a variety of plants adapted to rain garden conditions will provide years of enjoyment. General garden composition principles apply to rain gardens. For example, choose plants that bloom at different seasons so that you have year-round interest. Select plants and flowers of a variety of shapes, textures, heights, and colors. If you prefer a neater, more landscaped appearance, you may wish to select relatively short plants and plants that do not seed or root aggressively. Remember to keep maintenance requirements in mind as you develop your planting plan.

Plant selection for your rain garden is very important to its success. The best plants for rain gardens are native plants. Native plants are adapted to the local environment, do not need extra water or fertilizer once they are established, provide food and habitat for wildlife, and are attractive to pollinators. Native plants tend to have deep root systems that help hold the soil. In addition, the Rain Check Rebate Program requires the use of native species in rain gardens. Native plant lists and information are provided in the resource links beginning on page 8, including the County Planning Department's *Native Plants of Prince George's County, Maryland* and the U.S. Fish and Wildlife Service's *Native Plants for Wildlife Habitat and Conservation Landscaping*.

Most importantly, be sure to match a plant's water tolerance to its position in the rain garden. The center is usually the lowest point, so it will be the wettest. Plants that can withstand wet soil should go here. Plants at the edge will be those that prefer dry conditions. In between, put plants that prefer average soil conditions. All of your plants should be able to tolerate wet soils for up to 24 hours. The U.S. Fish and Wildlife Service resource mentioned above provides moisture tolerance information for each species listed.

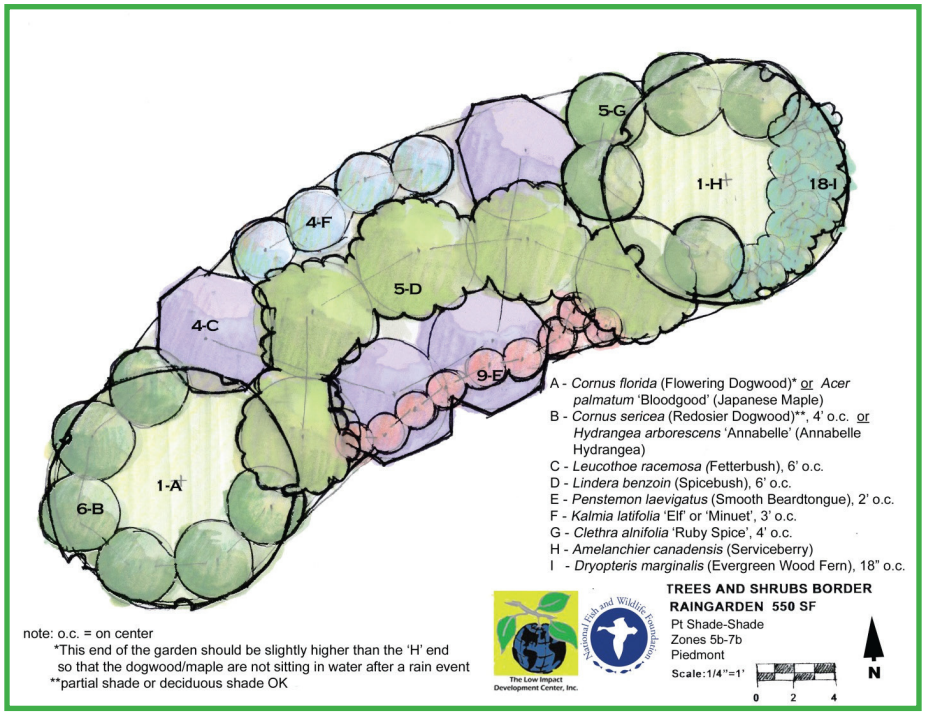
Placing the plants close together will reduce the amount of weeding you will need to do. Planting closely (as nature does) also helps ensure that your rain garden won't wash out during heavy storms. In a few years, you will be able to divide some plants for use elsewhere in your yard, or to share with neighbors.

In addition to the sunlight and water tolerance considerations mentioned earlier, consider these factors when deciding on a plant list:

- Salt tolerance
- Height and width of full grown plants
- Color and type of seeds, berries, flowers, or other growth
- Species of wildlife you wish to attract
- Coordination with existing landscape

Plant trees 10 feet apart (center to center) and plant large shrubs 7 feet apart (center to center). Plant small shrubs 4 feet apart (center to center) and plant perennials 2 feet apart (center to center). An example rain garden planting plan is presented below.

It's a good idea to plant a variety of plants. Plants with different root types and growth habits will fill in all the available habitat layers both above ground and below ground, helping your garden function more like a natural plant community. A diverse array of plants is also more resilient to stress from pests or disease. However, this only works if whoever maintains the garden is familiar with the plants' appearance throughout their life cycles. If the garden is going to be maintained by a landscaper who is not familiar with native plants, a simple planting design will work better.



Additional resources listing native plants that work well in rain gardens and where to buy them are provided in the For More Information section.

Getting water into the rain garden

You can direct stormwater to your rain garden from a roof downspout or a rain barrel using a grass- or rock-lined swale or a buried PVC pipe. If you use a pipe, you will need to place rocks or smaller stones at the pipe's entrance to the rain garden to prevent erosion caused by water gushing out of the pipe. If you are collecting runoff from a driveway or other hard surface, you can create a shallow trench drain or install a short (about 1-inch tall) speed bump to divert water to your rain garden. To capture stormwater in a rain garden that is located on a hill, create a low berm around the downhill the edges of your rain garden.

Providing for overflow during periods of heavy rainfall

Any rain garden will overflow during periods of heavy rainfall. Overflow can be released from a 4- to 8-inch notch cut in the berm that surrounds your rain garden on the downhill side, if located on a slope. Reinforce the notch with grass, stepped stones, or an erosion control blanket to prevent erosion. Locate the notch so that the water goes where it normally went before the rain garden was constructed. If your rain garden is located in a flat landscape, you can create a shallow channel filled with stones that directs flow to a suitable area. This channel should be no more than half as deep as the rain garden so as not to drain the garden during rain storms. A lawn or shrub planting area is usually the best destination for overflow. Be sure that the overflow does not go toward the foundation of your home or onto your neighbors' properties.

Which other techniques work well with rain gardens?

Rain gardens can work well together (two rain gardens in tandem); they can also work with rain barrels or green roofs to absorb some of the overflow.

What are the costs?

The cost of completing a rain garden varies considerably, typically ranging from $4 per square foot to $35 per square foot, depending on the source of the materials and who does the work. Use of a professional contractor and landscaper will result in higher costs. Important factors in estimating the cost include (but are not limited to):

- material costs, such as landscaping, seed, stone, and plants;
- the size of the rain garden;
- size of the plants selected for the installation;
- whether heavy equipment and machinery will be required;
- ease of access to the site;
- whether soil will need to be disposed of offsite; and
- duration of construction.

Approval of your rain garden project through the Rain Check Rebate Program can help reduce costs.

Can you do this project yourself?

Yes. You can do this project yourself under most circumstances. You may need to consider hiring a professional designer and/or a qualified contractor if you are trying to treat off-site drainage, have a steep slope, are considering terracing, or have many trees (and roots) on your property. You may also need a qualified professional or contractor when the existing soils do not drain well and an underdrain system is needed.

How can you build a rain garden?

Once you have sized your rain garden, you will need to locate it and mark it out. Use a measuring tape and a rope, string, or hose to lay out the boundaries of the rain garden. Next, dig the rain garden. To be sure that the rain garden will hold several inches of water during a storm, the surface of your rain garden will have to be at least 4 inches below the surface of your yard. Dig out the garden bed 4 to 5 inches deep across the entire surface of the garden, creating a flat-bottomed bowl with gently sloping sides. You can improve the soil if needed by digging 6 to 7 inches deep, and adding 2 to 3 inches of humus or other organic planting material. Make sure the bottom of the garden is level.

Test how the garden will hold water during a storm by letting water flow from a hose onto the hard surface or from the direction of the downspout or outlet. Make any adjustments needed. Finally, add your plants to the rain garden. After all of the plants are in the ground, add a layer (at least 2 inches deep) of doubleshredded hardwood mulch to support moisture retention during the dry periods of the year.

How should you choose a contractor?

Use of a professional is recommended for large and complex projects. If you decide to have a contractor design and install your rain garden, choose carefully. Ask potential contractors how much experience they

have installing rain gardens and developing planting plans. Ask them for a description of projects they have completed in the past and for references from past clients. An experienced contractor should be able to make a recommendation regarding the type, dimensions, and location of a rain garden that would best suit your property. Find out if they are insured, bonded, certified, or trained for accurately sizing and properly constructing rain gardens by a local jurisdiction, university, or state cooperative extension service. Ask potential contractors to explain what is included in their services, how long it should take to complete the project, and whether their work would be guaranteed. Ask potential contractors if large and heavy machinery would be used and, if so, whether noise will be kept to a minimum and in compliance with local laws and regulations.

Is a permit required?

A permit is not required for most rain gardens. However, if installing your rain garden (on its own or in combination with a concurrent project on your property) results in more than 5,000 square feet and/or 100 cubic yards of earth-moving disturbance (such as grading, cutting, and filling), a permit will probably be required Contact the County's Department of Permitting, Inspection & Enforcement for more information: call 311 or www.princegeorgescountymd.gov/sites/dpie/Pages/default.aspx.

What maintenance will be required?

Rain gardens require less maintenance compared to traditional gardens. Primary maintenance requirements involve weeding, repair, and replacement of components in the treatment area. The use of native plants reduces fertilizer, pesticide, water, and overall maintenance requirements. During the first growing season, the garden must be watered regularly during dry periods. However, if the soil is moist at a depth of 4 inches, and wilting plants recover at night, watering is not needed. Regularly remove any weeds, litter, sand, and sediment that enter the garden. Weeding should be accomplished routinely, at least monthly during the growing season. Rainwater entering a rain garden normally carries nutrients, so fertilization is normally not needed; however, if a soil test indicates very low soil fertility, an organic fertilizer may be applied. At least once a year, apply a new layer of double-shredded hardwood mulch, maintaining between 2 and 3 inches of cover. You may need to remove old mulch every year or two to maintain the appropriate depth for your rain garden to function properly. As with any garden, divide overcrowded plants in the spring or fall, and prune dead vegetation annually. Perennial plants can be cut back in the spring, when new growth starts, if desired for neatness, but it is not required for plant health. Plants can be pinched, pruned, sheared, or deadheaded during the growing season to encourage flowering, bushier growth, or fresh leaves. Diseased or damaged portions of plants should be pruned, as needed, and trees and shrubs can be pruned in the fall for shape or to increase fruit production.

MAINTENANCE SCHEDULE FOR URBAN RAIN GARDENS

		Spring			Summer			Fall			Winter		
Plant Care	Trimming, Pruning, and Thinning	Required	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required	Required	Required as Necessary	Required as Necessary	Required as Necessary
	Mowing (turf areas only)		Required at Low Frequency	Required	Required	Required	Required	Required	Required at Low Frequency				
	Weeding	Required as Necessary	Required at Low Frequency	Required at Low Frequency	Required	Required	Required	Required at Low Frequency	Required at Low Frequency	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary
	Watering (established and drought)		Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary			
	Fertilizing	Required as Necessary	Required as Necessary					Required as Necessary	Required as Necessary	Required as Necessary			
	Pest Management	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary
	Plant Replacement	Required as Necessary	Required as Necessary	Required as Necessary				Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary
Infiltration Maintenance	Ponding and Drainage Problems	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary
	Trash and Debris Removal	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary
	Mulching	Required	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary
	Pet Waste Removal	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary	Required as Necessary

Required — Required at Low Frequency — Required as Necessary

Rain gardens are designed to have water standing for up to four hours. If this period is routinely exceeded, the garden may not be functioning properly. The surface blockage problem can often be corrected by removing the mulch layer and raking the surface. For blocked filter fabric, use lengths of small reinforcing bar (2′-3′ #4 rebar) to puncture the fabric with holes every 1′ on center. If the soils themselves are causing the problem, punch holes in the soil to increase aeration. In a worst case scenario, the entire rain garden may need to be re-installed. Check where the water enters the garden to be sure it is not being clogged by soil, mulch,or debris; and remove obstructions, as needed. Pet waste should not be left to decay in rain gardens.

For more information

While Prince George's County does not endorse any one method of building or installing a rain garden, or any particular rain garden vendor, the following information is supplied for your consideration.

General Information

Low Impact Development Center, Urban Design Center, Bioretention
www.lid-stormwater.net/biotrans_home.htm

Center for Watershed Protection, Stormwater Management
www.cwp.org/2013-04-05-16-15-03/stormwater-management

Down the Drain: A Story About Urban Water, this booklet explains how multiple stormwater management techniques (including a rain garden) were used to retrofit the Yorktowne Square Condominium community
www.forlandsandwaters.org/downloads/dl/DownTheDrainAStoryAboutUrbanWater.pdf

EcoScaping: EcoScaping,RainScaping,BayScaping,GreenScaping...It's All About Conservation Landscaping! (contains general conservation landscaping information as well as rain garden instructions)
www.chesapeakeecologycenter.org/index.asp?Type=B_BASIC&SEC={0AD37F93-6C9A-4325-A664-B21EF83783B1}

Chesapeake Bay Trust, Rain Gardens
www.cbtrust.org/site/c.miJPKXPCJnH/b.5458177/k.891D/Rain_Gardens.htm

Prince George's County, Maryland, Department of the Environment, Programs and Planning Division, Low-Impact Development Design Strategies: An Integrated Design Approach
www.lowimpactdevelopment.org/publications.htm (*located under LID National Manuals*)

Rain Garden Design, Installation, and Maintenance

Chapter 5.0 – Environmental Site Design, Maryland Stormwater Design Manual, This chapter of the Design Manual includes guidance on micro-scale practices like rain gardens
www.mde.state.md.us/programs/Water/StormwaterManagementProgram/MarylandStormwaterDesignManual/Documents/www.mde.state.md.us/assets/document/Design Manual Chapter 5 03 24 2009.pdf

Rain Gardens Across Maryland – Worcester County Natural Resources Division (guidebook includes easy rain garden instructions as well as more technical information for citizens required to install stormwater management
www.co.worcester.md.us/website/sites/default/files/departments/env/Rain_Gardens.pdf

Rain Garden manual (includes information on where to put excess soil) and fact sheet on rain garden care and maintenance
http://geaugaswcd.com/publications

Low Impact Development Center, Rain Garden Templates
www.lowimpactdevelopment.org/raingarden_design/templates.htm

Low Impact Development Center, Rain Garden Maintenance
www.lid-stormwater.net/bio_maintain.htm

Washington State University Pierce County Extension, Rain Garden Handbook for Western Washington Homeowners
https://fortress.wa.gov/ecy/publications/publications/1310027.pdf

New Jersey Native Plant Society, Rain Garden Manual of New Jersey
www.npsnj.org/pages/nativeplants_Rain_Gardens.html

Metro Blooms, 8-Minute Video of Rain Garden Installation
http://metroblooms.org/raingarden_video.php

Information on Native Plants

Prince George's County Planning Department, Native Plants of Prince George's County, Maryland
www.pgplanning.org/Resources/Publications/Native_Plants_1998.htm

Searchable Chesapeake Region Native Plant database
www.nativeplantcenter.net/

Searchable National Native Plant Database
www.wildflower.org/plants/

Izel Plants
www.izelplants.com

U.S. Fish & Wildlife Service, Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed
www.nps.gov/plants/pubs/chesapeake/

U.S. Fish and Wildlife Service, Native Plants Nurseries in the Chesapeake Bay Watershed
www.fws.gov/chesapeakebay/BayScapes/bsresources/bs-nurseries.html

Maryland Native Plant Society
www.mdflora.org

Rain Garden Calculator

Rain Garden Alliance
http://raingardenalliance.org/right/calculator

For more information, call 410-974-2941 or contact cbtrust.org.