

# Create a Rain Garden:

## *Preventing Water Pollution in Your Community*

### ***A Manual for Student Service Projects***

*This manual is intended to assist groups in the planning, design, installation, and advertisement of a rain garden in their community. A large focus of this project is to improve public awareness of stormwater issues and to educate people on how they can improve stormwater management on their own property. The manual is designed to provide step by step instructions for school groups wanting to beautify and improve their local environment with rain gardens. It also provides example documents that can be adapted and used for organizing rain garden development as well as educating and promoting involvement from the public.*



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Teacher Resource Pages

- Runoff Volume: The Importance of Land Cover (Lesson Plan)
- Why is Stormwater so Bad? (Lesson Plan)
- Rain Garden Slows Stormwater Flow (Lesson Plan)
- Hydrology 101: A Reference Document
- Educational Benefits of Program

## **What is a Rain Garden?**

A rain garden is an attractive native plant garden with a special purpose: to capture, soak up and filter stormwater runoff from roofs, driveways, parking lots and other impervious surfaces before it enters local lakes, ponds, rivers or bay. Rain gardens use the concept of bioretention; a water quality practice in which plants and soils remove pollutants from stormwater naturally.



## **Why Should You Create a Rain Garden?**



In addition to adding beauty to your community, rain gardens help protect water quality by reducing stormwater runoff. Stormwater runoff is considered one of the main sources of water pollution nation-wide. As watersheds become developed, rainwater quickly runs off paved surfaces such as roofs, parking lots and driveways increasing flooding while picking up and carrying pollutants into storm drains and surface waters.

By reducing stormwater runoff, rain gardens effectively change these trends. While an individual rain garden may seem like a small contribution, collectively they produce substantial environmental benefits. Rain gardens work for us in several ways:

- Increasing the amount of water that filters into the ground which recharges groundwater;
- Helping protect communities from flooding and drainage problems;
- Reducing erosion of stream banks;
- Helping protect surface waters from pollutants carried by stormwater such as lawn fertilizers and pesticides, oil and fluids that leak from cars, bacteria from pet waste, litter, among others;
- Enhancing the beauty of yards and neighborhoods;
- Providing habitat for birds, butterflies, and other beneficial insects.

## **Developing Your Goals and Work Plan**

You may be installing a rain garden in a neighbor's yard, a local municipal property with high stormwater runoff, or a school in your community. Whatever the case, you will want to understand the goals of the project and develop a work plan accordingly. Some of your goals will be to:

- Reduce impacts of stormwater runoff in your community.
- Enhance awareness of stormwater runoff and non-point source pollution.
- Design, establish, and maintain an educational and sustainable landscape in your community.
- Promote environmental stewardship and community pride.



Your work plan should align with your goals. Whether you are working by yourself or with a group, organize each component of the project, and assign jobs to each participant. Your timeline will vary depending on how you set up your project. Finding the right location and funding your rain garden will be the main factor in determining timing. Develop a timeline based on the work plan tasks. Continue to update and assess your progress and adjust the timeline as necessary.

See **Appendix A** for a Work Plan and Sample Timeline

## **Choosing a Location**

The location of your rain garden should depend on your budget, stormwater management needs, and accessibility to the public. The rain garden should be located in a place where it will receive runoff. Check to make sure runoff flows to your site, or could flow with minor modifications, such as cutting a space out of a curb. It should also be located in an area that is visible to the public. A large focus of this project is to improve public awareness of stormwater issues and educate people on how they can improve stormwater management on their own property. For this reason, place the rain garden in a public area that can be seen by members of your community. Most likely this area will be located on a commercial, industrial or institutional property, so stormwater management regulations will have to be taken into consideration and a professional will be needed to assess the site.



## **Seeking Community Help and Support**



Getting the community involved installing your rain garden helps to reduce costs, educate the public, and develop a sense of pride and ownership within the community. Volunteers can be recruited to help with rain garden construction, provide professional assistance, loan equipment, or offer their property as a location for the rain garden. Even though your rain garden may require the use of paid contractors and engineers, you can invite the community to help plant the rain garden. Seek help from parents, local businesses and professionals in the field.

See **Appendix B** for a [Sample Parent News Letter](#)

See **Appendix C** for a [Sample Donation Request Letter](#)

See **Appendix D** for a list of [Professional Contacts](#)

## **Developing your Budget**

The cost of a rain garden can vary substantially based on size, location, plant variety, soil amendments needed, and availability of volunteers. Residential rain gardens average about \$3 to \$4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between \$10 to \$40 per square foot, based on the need for meeting stormwater regulations and hiring professional contractors. You can locate and design your rain garden to meet your budget.



You can hold fundraisers or look for funders to help with the costs of building your rain garden. You can apply for grants through government organizations such as the Department of Environmental Management, Environmental Protection Agency or US Department of Agriculture, or search for local natural resource organizations that may have funding available. Other options are to ask businesses in your area or your local Department of Public Works to loan you materials that you will need during installation. If you receive donations or loans from organizations, be sure to recognize them in your publicity campaign.

See **Appendix E** for [Sample Budget](#)

## **Sizing and Planning your Rain Garden**

It is important to go through all of the necessary steps to plan the design of your rain garden. Most of the calculations and tests can be done on your own using the pre-installation checklist and soil test provided. A professional contractor will be needed to confirm your work and assess the site.

The size of the rain garden will depend on how deep the garden will be, what type of soils the garden will be planted in, and how much roof and/or lawn will drain to the garden. The following websites and manuals provide detailed descriptions of how to calculate rain garden size, examine soil properties, and determine garden depth. Read through these materials carefully before beginning your rain garden project.



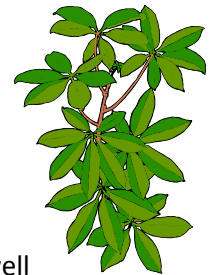
See **Appendix F** for Sizing and Planning Steps

Rain Garden Manuals:

- Coastal Resources Management Council:  
[http://www.crmc.ri.gov/news/2007\\_0207\\_stormwater.html](http://www.crmc.ri.gov/news/2007_0207_stormwater.html)
- Reference CT Brochure: [http://www.sustainability.uconn.edu/landscape/05-rain\\_gardens.html](http://www.sustainability.uconn.edu/landscape/05-rain_gardens.html)

## **Selecting Plants**

Depending on the location and person responsible for maintenance, you can design rain gardens that are low maintenance, high in habitat value, or have an aesthetic focus. You can begin your plant selection process with the help of the RI Coastal Plant Guide Website: <http://www.uri.edu/cels/ceoc/coastalPlants/CoastalPlantGuide.htm>. By choosing the “+” sign above the rain garden column, you can determine the kinds of RI native plants that do well in the dry and wet conditions common to rain gardens. A landscape architect or other professional should be consulted after you choose plants to confirm that the plants align to the maintenance goals and thrive in that environment. Once plants have been chosen, you will have to review your budget to account for the costs.



See **Appendix F** for Sizing and Planning Steps

## **Advertising Your Rain Garden**



One of the main goals of this project is to educate people about stormwater pollution and how they can be part of the solution. A great way to do this is by publicizing the rain garden construction and planting event. This will help to recruit volunteers and spread stormwater awareness. The best outreach campaigns use several techniques. Advertising options include:

- Asking your school’s science teachers to allow you to make a short presentation describing the project and its purpose
- Creating signs and brochures and placing them in your school, public libraries, recreation centers, and walking trails
- Developing a web site or adding the information to your school’s existing web site

- Running an advertisement in school newspapers and parent newsletters at your school
- Discussing the event at various club meetings, community associations, church groups, youth groups, and/or service organization meetings
- Organizing a planting ceremony for the day of the event and inviting press and community to attend
- Distributing press releases about a week in advance to local newspapers, radio stations, and online blogs, calendars, etc. (Take pictures during the event to include in follow-up publicity)
- Working with a local sign distributor to create signage that will be placed permanently at rain garden site

See **Appendix G** for Sample Press Releases

### **Rain Garden Construction and Planting**



It is not enough to have the plants ready for your event—some final preparations need to be made to make your construction and planting day a success. Since there will be many tasks to complete, and volunteers to help, it is useful to organize materials and delegate responsibilities before construction.

See **Appendix H** for Construction Day Checklist

If you are going to have a press event to publicize the rain garden installation, hold it when the rain garden is to be planted. This will be beneficial for many reasons: the other stages of rain garden construction can be technical and may take longer than expected, there is a great sense of accomplishment from having a site go from being bare to being covered with vegetation, the planted garden creates a great visual backdrop for photos and television footage, and a planting event can use many volunteers that need not have great skill or strength.

### **Maintenance**

Your rain garden will require maintenance after installation. The garden should be watered thoroughly once a day, unless there is a significant rainfall, for fourteen days or until the plants are established. Once established, a routine maintenance schedule should be followed for the rain garden. Use the instructions provided in the rain garden manuals you downloaded for maintenance suggestions.



### **Resources**

This manual has been adapted from the following sources:

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

LID Sustainable School Projects: <http://www.lowimpactdevelopment.org/school/index.html>

Rain Gardens: A How-to Manual for Homeowners. Roger Bannerman and Ellen Considine. <http://clean-water.uwex.edu/pubs/raingarden/rgmanual.pdf>

Watershed Activities to Encourage Restoration <http://www.watershedactivities.com>

## ***Appendix A - Work Plan and Sample Timeline***

### ***Communications and Publicity Tasks:***

- Solicit parent involvement and help (See Appendix B for Sample Parent Newsletter)
- Secure partners and community involvement (See Appendix C for Donation Request)
- Develop educational materials and PowerPoint to present to classes and organizations
- Take pictures of site before, during and after rain garden construction.
- Plan and develop publicity campaign (See Appendix G for Sample Press Release)
- Design and order public signage for rain garden
- Advertise work days on school website and newsletters and ask for volunteers.



### ***Site Selection and Design Tasks:***

- Brainstorm possible rain garden locations based on land use type, budget, stormwater necessity, and public access.
- Visit a rain garden that is already operating (Find a RI rain garden here: [http://www.ristormwatersolutions.org/SW\\_ri\\_lidtour.html](http://www.ristormwatersolutions.org/SW_ri_lidtour.html) )
- Request assistance from a Landscape Architect, Soil Scientist, or Professional Engineer (See Appendix D for professional contact list).
- Perform soil test or send soil sample to UCONN soil laboratory (See Appendix F for Sizing and Planning Steps)
- Determine rain garden size and depth (See manuals for directions)
- Determine materials needed for rain garden (tools, soil amendments, and plants) and include them in your budget.
- Prepare construction procedure and design diagram for volunteers.



### ***Financial Planning and Logistics Tasks:***

- Develop Budget (See Appendix E for Sample Budget)
- Perform communications and publicity financial tasks:
  - Solicit community donations
  - Determine publicity costs (signage, education materials, etc.)
  - Order materials
- Perform Site Selection financial tasks:
  - Determine location based on budget
  - Solicit professional assistance
  - Order materials
- Organize pick up or delivery times
- Develop a construction day plan and materials list (See Appendix H for Construction Day Checklist)



**Week 1:**

- ☑ Research rain gardens and stormwater runoff. Be able to describe what non point pollution is and how rain gardens are part of the pollution solution.
- ☑ Read through materials.

**Week 2:**

- ☑ Develop a budget.
- ☑ Investigate sources of funding through grants, fundraisers or donations.
- ☑ Brainstorm possible rain garden locations based on land use type, budget, stormwater necessity, and public access.

**Week 3:**

- ☑ Seek out support and help from parents in school news letter and website.
- ☑ Continue to investigate funding opportunities.
- ☑ Request assistance from a Landscape Architect, Soil Scientist, or Professional Engineer to help determine location.

**Week 4:**

- ☑ Finalize rain garden location.
- ☑ Begin securing partnership involvement by requesting donations, volunteers, or loaning of materials from public works department, local businesses, residents and organizations.

**Week 5:**

- ☑ Perform soil test or send soil sample to UMass Cooperative Extension.
- ☑ Determine rain garden sizing.
- ☑ Plan education and publicity campaign.

**Week 6:**

- ☑ Have professional confirm sizing and develop a planting design.
- ☑ Review budget to incorporate soils amendments and plants.
- ☑ Develop educational and publicity materials to present to classes and organizations

**Week 7:**

- ☑ Finalize funding and donation arrangements.
- ☑ Begin publicizing in school newspapers, websites, libraries, local businesses.

**Week 8:**

- ☑ Set a rain garden installation date (arrange for multiple work days and set installation ceremony date).
- ☑ Determine method of transporting and storing materials for installation day.
- ☑ Continue education and publicity campaign.

**Week 9:**

- ☑ Order materials and organize pick up, delivery and storage of materials.
- ☑ Continue education and publicity campaign – order sign for rain garden.
- ☑ Advertise work days on school website, newsletters, press releases, and flyers.

**Week 10:**

- ☑ Prepare plant and construction design diagram for volunteers.
- ☑ Develop construction day procedures.
- ☑ Prepare materials for installation day.
- ☑ Send press releases to local newspapers and invite them to event.

**Week 11: Rain Garden Installation Week!!!**

- ☑ Take before pictures of site.
- ☑ Confirm volunteer jobs.
- ☑ Bring all materials to site.
- ☑ Build a rain garden!

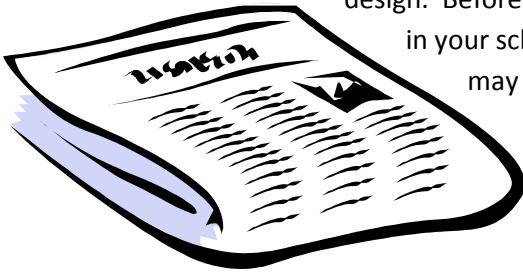
**Week 12: Wait! You're Not Finished!!**

- ☑ Water rain garden and determine maintenance schedule.
- ☑ Follow up with press and send pictures of rain garden and event.
- ☑ Send thank you notes to volunteers and donors.



## **Appendix B – Parent News Letter**

It is very likely that you will need professional assistance to help you with your rain garden sighting and design. Before contacting the professionals in your area, send out an announcement in your school's parent news letter asking for volunteers and assistance. There may be a parent that is a landscape architect, soil scientist, or professional engineer and is willing to help. This is also a great way to begin publicizing the work you plan on doing.



### **Sample Parent News Letter Announcement:**

**[Your group name] is Seeking Help with Rain Garden!**

The [your group name] has begun a project to build a rain garden at [location of proposed rain garden] and is looking for help to design and install it. Rain gardens are very important since they capture, soak up, and filter stormwater. Stormwater runoff is considered one of the main sources of water pollution nation-wide. As land becomes developed, rainwater quickly runs off paved surfaces such as roofs, parking lots and driveways, increasing flooding, while picking up and carrying pollutants into [local water body] and other local water bodies. Rain gardens are effective systems that help to change these trends.

In order to properly install a rain garden, the [your group name] will need some professional assistance and some helpful hands to facilitate construction. Please let them know if you or any one you know has experience with landscaping, soils, professional engineering, or are willing to help. You can contact [your name] at [your phone # and/or address]. They are looking forward to creating a cleaner and more beautiful community and hope you can help to make a positive difference in our local environment.

## **Appendix C – Sample Donation Request Letter**

You can use this letter format to ask local businesses or organizations for donations or to lend you supplies or materials that you might need for your rain garden. If you ask for financial assistance, be very clear about how the money will be used. Before you make your request, find out exactly how much money you will need. Be sure to treat the local business with respect and courtesy and ensure that they will be acknowledged in your publicity campaign and signage. If there is more than one person in your group, have your entire group sign the letter. Often by making a trip to the local business or organization, they feel a personal connection to your group and might be more likely to help you.



### **Sample Donation Request Letter:**

Dear Mr./Ms. \_\_\_\_\_ ,

My name is [your name], and I am writing on behalf of [your group name]. As member of [your group name], we are trying to make a positive difference in our local environment through our actions. We have begun a project to build a rain garden at [location where rain garden will be installed]. Rain gardens are very important since they soak up stormwater that flows off of parking lots, driveways, and roofs before it able to pick up and carry pollutants to [local water body] and other local water bodies. Our goal is to make our community a better place by protecting our water systems and the animals and people that enjoy them.

In order to complete this project, we need [write down a short list of the equipment or materials you need that the business you are writing to could donate or lend to you, or specific dollar amount and what it will be used for]. We would be most grateful if [name of business/organization] could [donate/ lend] any of these items to help us install our rain garden. If you are interested, we will be sure to acknowledge [name of business/organization] in our publicity and signage of the rain garden and we will keep you informed with regular updates on the progress of our rain garden.

Please contact me at [your phone # and/or email address] if you are able to help. If we don't hear from you within a week, we will contact you personally. Thank you for your time and for considering this request. We look forward to working with you and creating a cleaner and more beautiful community.

Sincerely,  
(Your name signed)  
Your name typed

## ***Appendix D – Professional Contacts***

For information on funding opportunities and possible grants:

- Your town's Department of Public Works
- Rhode Island Department of Environmental Management: 401-222-6800, <http://www.dem.ri.gov>
- United State Department of Agriculture: <http://www.usda.gov>

Dig Safe - Before you dig, make sure there are no utilities lines:

- DIG-SAFE (1-888-DIG-SAFE) [www.digsafe.com](http://www.digsafe.com)

Soil Professionals:

- Listing of Southern New England Certified Soil Scientists: [http://nesoil.com/ssssne/Registry\\_2009.pdf](http://nesoil.com/ssssne/Registry_2009.pdf)
- Natural Resources Conservation Service: <http://www.ri.nrcs.usda.gov/contact/>
- UCONN Soil Testing Resources and Form: <http://soiltest.uconn.edu/sampling.php>
- UMass Soil Testing Resources and Form: <http://www.umass.edu/soiltest/>



Landscape Architect and Plants:

- RINLA – Rhode Island Nursery and Landscape Association: <http://www.rinla.com/index.asp>
- RIASLA –Rhode Island Chapter of American Society of Landscape Architects <http://www.riasia.org>
- Out in Front Horticulture: Dave Renzi , [treefairy@cox.net](mailto:treefairy@cox.net), 401-294-7335
- Rhode Island Wild Plant Society, [www.riwps.org](http://www.riwps.org) for more information on native plant sources.
- New England Wildflower Society, 508-877-7630, [www.newfs.org](http://www.newfs.org)
- New England Wetland Plants, 413-548-8000 [www.newp.com](http://www.newp.com)
- RI Coastal Plant Guide: <http://www.uri.edu/cels/ceoc/coastalPlants/CoastalPlantGuide.htm>

Sign Distributors:

- Signs By Tomorrow, Warwick, RI, 401-826-6446 <http://www.signsbytomorrow.com/warwick/>
- Search for signs: <http://www.signsrhodeisland.com/>

RI Stormwater Regulations:

- DEM Stormwater Design and Installation Standards Manual: <http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/t4guide/desman.htm>
- Coastal Resources Management Council: [http://www.crmc.ri.gov/news/2007\\_0207\\_stormwater.html](http://www.crmc.ri.gov/news/2007_0207_stormwater.html)

### ***Appendix E – Sample Budget***

This information has been adapted from the Rutgers Cooperative Extension Rain Garden Training information: [http://www.water.rutgers.edu/Rain\\_Gardens/RGWebsite/landscaper.html](http://www.water.rutgers.edu/Rain_Gardens/RGWebsite/landscaper.html)

The cost is based on a 300 sq. ft rain garden and seems comparable to local rain garden costs.

	<b>Item</b>	<b>Cost/unit</b>	<b># of units</b>	<b>Total Cost</b>	<b>Donated / Loaned</b>
<b>Standard Supplies</b>	White mark-out paint	\$5	1	\$5	
	Landscape pins	\$1/pack	4	\$4	
	Weed block fabric	\$12	2	\$24	
	Hose (75' soaker hose)	\$14	1	\$14	
	Shovels/soil rakes				✓
	UCONN Soil Texture Test	\$12	1	\$12	
<b>Bobcat Rental (not always required)</b>	Rental	\$200	1	\$200	
	Fuel	\$50	1	\$50	
	Delivery	\$80	1	\$80	
	Insurance	\$20	1	\$20	
<b>Delivery Fees (not needed if picking up)</b>	Mulch	\$65	1	\$65	
	Plants	\$175	1	\$175	
<b>Soil Amendments</b>	Organic Fertilizer	\$6	1	\$6	
	Mulch	\$28/yard	2	\$56	
	1 ½" stone	\$25/ton	2	\$50	
	¾" crushed stone	\$28/ton	2	\$56	
	Coarse Sand, Concrete, or Bank run sand	\$35/ton	3	\$105	
<b>Plants</b>	1 gallon container shrub	\$4.75	15	\$71.25	
	Gallon Perennials	\$4.25	10	\$42.50	
	Quart Perennials	\$2.00	5	\$10	
	2" plugs	\$0.65	50	\$32.50	
<b>Professionals and Labor</b>	Soil Scientist				✓
	Landscape architect				✓
	Student Time				✓
<b>Total Cost</b>				\$1,078.25	

### *Your Rain Garden Costs*

	<b>Item</b>	<b>Cost/unit</b>	<b># of units</b>	<b>Total Cost</b>	<b>Donated / Loaned</b>
<b>Standard Supplies</b>	White mark-out paint				
	Landscape pins				
	Weed block fabric				
	Hose (75' soaker hose)				
	Shovels/soil rakes				
	UMass Soil Texture Test				
<b>Bobcat Rental (not always required)</b>	Rental				
	Fuel				
	Delivery				
	Insurance				
<b>Delivery Fees (not needed if picking up)</b>	Mulch				
	Plants				
<b>Soil Amendments</b>					
<b>Plants</b>					
<b>Professionals and Labor</b>	Soil Scientist				
	Landscape architect				
	Student Time				
<b>Total Cost</b>					

## **Appendix F – Sizing and Planning Steps**

*This material is adapted from Rutgers Cooperative Extension Rain Garden Resources.*

### **Things to Remember:**

- Call 1-800 – DIG – SAFE for a utility mark-out.
- Do not put rain garden in places where the water already ponds or the lawn is always soggy.
- Do not put rain garden in former sites of built-in pools or parking lots.
- Place in full or partial sunlight as a first option.
- Select a flat part of the yard for easier digging as a first option.
- Avoid large tree roots.

### **Step 1 – Determine Contributing Drainage Area**

Determine the surfaces you want to capture stormwater from and measure the area:

Surface	Contributing Drainage Area (Square Feet)
Rooftop*	
Driveway/Parking Lot	
Other	
<b>Total Drainage (Square Feet) =</b>	

\*Be sure to find the area of the roof that actually feeds to that downspout. Multiply the roof area by the estimated percentage of the roof that feeds to the rain garden downspout.

% Roof feeding to downspout	Area of Roof	Contributing Area

### **Step 2 – Determine Location**

The Rain Garden location must meet the following criteria as specified in RI Stormwater Design and Installation Standards Manual:

- Be at least 10 ft from building
- Is not over utilities (already called 1 – 800 – DIG - SAFE)
- Is at least 15 ft from a septic tank or field and 25 ft from a private drinking well.
- Is uphill or level with a septic tank
- Has a slope that is less than 12% (12’ height over 100’ length)
- Seasonably high water table and bedrock is at least 2 ft from the proposed bottom of rain garden depression.

### **Step 3 – Percolation Test**

When you conduct a site visit, a percolation test can be used to check the drainage in a potential rain garden site. This is helpful in determining site suitability or if you may require soil amendments.

#### **Percolation Test Steps:**

1. Dig a hole 12 inches deep by 6 inches in diameter.
2. Fill hole with water and let stand until all the water has drained into the ground (this will give you saturated soil conditions).

- Refill the empty hole with water again. Measure the depth of the water with a ruler. Record depth in the table below.
- Check the depth of water with a ruler every hour for at least 4 hours. Record depths for each hour in the table below.
- Calculate the percolation rate (how many inches of water drained per hour).

Time	Depth (inches)
0 hour (before walking away)	
1 <sup>st</sup> hour	
2 <sup>nd</sup> hour	
3 <sup>rd</sup> hour	
4 <sup>th</sup> hour	
<b>Percolation rate (inches/hour)</b>	

**JUST IN CASE...**

$$[\text{Depth at 0 hour (inches)} - \text{Depth at 4}^{\text{th}} \text{ hour (inches)}] / 4 \text{ hours} = \text{Percolation Rate (inches/hour)}$$

**EXAMPLE...**

$$[10'' - 6.5''] / 4 \text{ hours} = 0.875''/\text{hour}$$

**Interpreting the Percolation Rate Results:**

A rate of one inch per hour to one and a half inches per hour is considered ideal for a rain garden. If the water does not drain in 12 hours, the site is only appropriate if the soils are amended (see professional).

**Step 4 – Determine Slope**

The slope of the land will help to determine the depth of the rain garden. To find the slope of the rain garden location, a string should be tied to the base of an uphill stake then tied to a downhill stake using a string level to be sure the string is perfectly level.

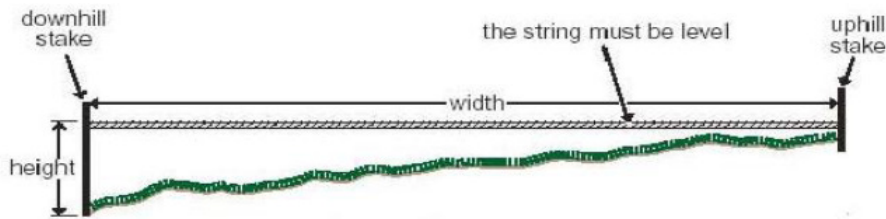


Figure 1: Measuring Slope  
(Credit: University of Wisconsin)



String Level found at Home Depot

To calculate the percent slope, divide the height (distance the string is above ground on the downhill stake) by the width (distance between the two stakes), which should both be in feet. Multiply this number by 100 to obtain the percent slope.

	Measurement (Feet)
Height	
Width	
[height/width] x 100 = <b>Percent Slope</b>	

**Step 5 – Determine Rain Garden Depth**

The depth of the rain garden depends upon the percent slope (calculated in Step 4). Use the table below to determine the typical depth of the rain garden.

Percent Slope	Typical Depth
Less than 4%	3 – 5 inches
Between 5% - 7%	6 – 7 inches
Between 8% - 12%	8 inches
Greater than 12%	Consider another location

NOTE: Rain gardens with poor percolation rates should be shallower with a larger surface area since they percolate slowly.

**Step 6: Soil Texture and Compaction**

**A. Soil Texture**

Test more than one area of potential rain garden location. Take soil sample 6” below the proposed rain garden depth. Have a soil test done by UConn Soil Testing Lab (<http://soiltest.uconn.edu/sampling.php>).

**B. Soil Compaction**

Conduct wire flag test (poke wire flag in ground)

- Easily penetrates 6”-8” or more
- Compacted, difficult to insert

**Step 7 – Determine Rain Garden Size**

The size of the rain garden is based upon the drainage area (calculated in Step 1), and predominant soil texture (determined from soil test). The following table provides sizing factors, based on soil type and depth, which can be multiplied by the drainage area to determine size.

Rain Garden Sizing Factors			
	3-5” deep	6-7” deep	8” deep
Sandy soil	0.19	0.15	0.08
Silty soil	0.34	0.25	0.16
Clayey soil	0.43	0.32	0.20



You will need to interpret your soil results to classify your texture as “sandy, silty, or clayey”. Under “Comments” in your soil report it will indicate Soil Textural Classification. An example would be Loamy Sand. The first texture: Loamy is the adjective describing the primary soil texture, which is the second texture: Sand. Use the following chart adapted from CT NRCS Rain Garden Site and Soil website to determine your general soil type.

Soil Texture	General Soil Type
Sand	Not Suitable for Rain Garden
Clay	
Loamy Sand	Sandy
Sandy Loam	
Silt Loam	Silty
Loam	
Silt	
Sandy Clay	Clayey
Sandy Clay Loam	
Silty Clay Loam	
Silty Clay	
Clay Loam	

Once you have determined your sizing factor, you can multiply this value by the drainage area.

**Example Sizing Calculation:**

- Drainage Area = 450 ft<sup>2</sup>
- Rain Garden Depth = 8 in
- Predominant Soil Type = Silty
- Sizing Factor = 0.16

Drainage Area x Sizing Factor = Rain Garden Area

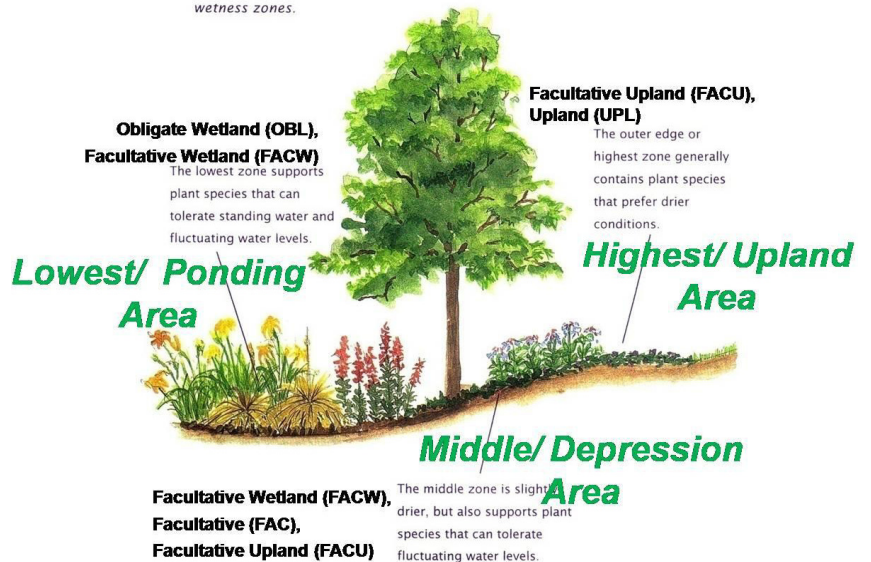
$450 \text{ ft}^2 \times 0.16 = 72 \text{ ft}^2$

**Step 8 – Planting Methods and Materials**

**A. Create Design**

- Use the RI Plant Guide to find proper plants for your rain garden:  
<http://www.uri.edu/cels/ceoc/coastalPlants/CoastalPlantGuide.htm>
- List plants for ponding area
- List plants for depression area
- List plants for upland area
- Determine if plants will be mixed or massed
- Sketch a rain garden design

*Your Rain Garden is composed of woody plants (trees and shrubs) and herbaceous species (flowers, grasses, and ground covers) planted in three wetness zones.*



Cross section image credit:  
University of Wisconsin

**B. Spacing**

Plant Size	Typical Spacing
Plugs	12" – 15"
2" – 4" pots	15" – 18"
≥ 6" pots	Depends on species
Trees and shrubs	Depends on species

**C. Number of plants**

Determine the number of plants for the rain garden by dividing the size of the rain garden (in square feet) by 100. Then, multiply this number by the number of plants recommended in the table below (determined from the plant size typical spacing).

Number of Plants Needed for 100 Square Foot Rain Garden	
Spacing	Number of Plants
12"	100
16"	56
18"	45
24"	25
48"	6

**Just In Case:**

[Size of Rain Garden(measured in square feet)/100] x Number of Plants(from Table) = Total # of Plants

Example:

200ft<sup>2</sup> Rain Garden with Plugs (12" Spacing)

$$[200\text{ft}^2/100] \times 100 = 200 \text{ Plants}$$

200ft<sup>2</sup> Rain Garden with 2"-4" Pots (18" Spacing)

$$[200\text{ft}^2/100] \times 45 = 90 \text{ Plants}$$

**Step 9 – Final Factors**

**A. Add Mulch**

The rain garden will need a 2- 3 inch thick layer of non-dyed, aged shredded hardwood mulch.

Here is a table to help you determine amount of mulch needed:

Size of Rain Garden	Approximate Amount of Mulch
50 ft <sup>2</sup>	0.50 yd <sup>3</sup>
100 ft <sup>2</sup>	1.0 yd <sup>3</sup>
200 ft <sup>2</sup>	2.0 yd <sup>3</sup>

**B. Summarize the Design**

Once you have determined the size of the rain garden, you can calculate the amount of soil amendments and mulch you need to purchase.

<b>Depth of Rain Garden</b> (Step 5)	
<b>Size of Rain Garden</b> (Step 7)	
<b>Amount of mulch needed</b> (Step 8)	
<b>Other materials needed</b> (Step 6A and 6C)	

**C. Professional Considerations**

A professional contractor or landscape architect is required to confirm these important features:

- Determine Inlet – Determine or design a way for water to enter the rain garden.
- Determine Overflow – Consider how the design will handle large storms.
- Choose Plants – A professional will help to determine plants that will thrive in this environment and double check the choices you made using the RI Coastal Plant Guide:

<http://www.uri.edu/cels/ceoc/coastalPlants/CoastalPlantGuide.htm>

## **Appendix G – Sample Press Releases**

Contact: [your name and title]

[City/town]

[Phone and fax number]



FOR IMMEDIATE RELEASE *(To be released prior to installation date)*

### **(Your Group) is Part of the Pollution Solution**

*Building a rain garden to beautify the community and improve water quality*

(City, Town Name), R.I. – (Date) – The members of (Your group) are taking important steps to protect Narragansett Bay. On (Date) they will be installing a rain garden at (Location).

A rain garden is an attractive native plant garden with a special purpose: to capture, soak up and filter rain water runoff before it enters local water bodies. When it rains, water collects remnants of our everyday activities such as litter, motor oil, bacteria from pet waste, excess fertilizers and pesticides, and leaves and grass clippings. This polluted stormwater runs off roofs, driveways, parking lots and other hard surfaces to storm drains and then directly to local waters. Pollutants in stormwater close beaches and fishing grounds, threaten water resources, harm natural areas, and contribute to flooding. Rain gardens allow stormwater to soak into the ground instead of flowing into storm drains or local waterways.

In collaboration with (Partners) and donations from (Donors), (Your group) is working to install a rain garden at (Location). The students have studied how stormwater has affected our local water bodies and decided to take steps to improve their community. (Describe why you chose the site and how it will impact the area).

(Your group) invites you to the installation ceremony on (Date). You can volunteer or just stop by to show your support for their hard work and dedication to improving the community. (Your group) has worked hard to organize the event and is looking forward to planting a beautiful garden at (Location) that will also help to reduce stormwater in (your town). To volunteer at the event, contact (your information).

Every drop of rain you keep on your property helps to keep our local waters clean. To learn more about rain gardens and how you can install a rain garden on your property (provide website or contact information).

Contact: [your name and title]

[City/town]

[Phone and fax number]

FOR IMMEDIATE RELEASE *(To be released after installation date)*

## **(Your Group) is Part of the Pollution Solution**

### *Building a rain garden to beautify the community and improve water quality*

(City, Town Name), R.I. – (Date) – You may have noticed a new garden located at (Location). On (Date) the members of (Your group) installed a rain garden with the goals of beautifying the area and improving the health of Narragansett Bay and local water bodies.

Members of the (your group) noticed a problem with rain runoff near (Location). (Describe some of the problems associated with the area prior to installing the rain garden – quote local residents on what it was like before). Under the guidance of their advisor, (Advisors name), they discovered that there are solutions to the stormwater pollution problem. They decided it was a perfect spot to build a rain garden.

A rain garden is an attractive native plant garden with a special purpose: to capture, soak up and filter rain water runoff before it enters local water bodies. When it rains, water collects remnants of our everyday activities such as litter, motor oil, bacteria from pet waste, excess fertilizers and pesticides, and leaves and grass clippings. This polluted stormwater runs off roofs, driveways, parking lots and other hard surfaces to storm drains and then directly to local waters. Pollutants in stormwater close beaches and fishing grounds, threaten water resources, harm natural areas, and contribute to flooding. Rain gardens allow stormwater to soak into the ground instead of flowing into storm drains or local waterways.

In collaboration with (Partners), (Your group) has spent (length of project time) planning, designing, and publicizing the rain garden. (Be sure to credit companies and organizations that lent or donated materials or money)

On (date) students in (your group) completed the final step of their project by planting native plants in their rain garden. Volunteers and community members supported their efforts by lending a hand planting or spreading mulch and attending the installation ceremony. (Quote volunteers and community members from the event.)

Every drop of rain you keep on your property helps to keep our local waters clean. To learn more about rain gardens and how you can install a rain garden on your property (provide website or contact information).

## ***Appendix H – Construction Day Checklist***

### Prior to Construction:

- Keep a running list of Materials you will need (this is a general list of – your materials and amounts will vary):
  - Topsoil
  - Mulch
  - Soil Amendments
  - Plants
  - Screwdrivers
  - Hammers
  - Shovels
  - Rakes
  - Garden Hose
  - String and Stakes
  - Wheelbarrows
  - Gardening Gloves
  
- Be sure you have enough tools to share among participants
- Provide refreshments and snacks if possible or at least provide water
- Create and print a sign-in sheet
- Create and print a liability waiver form
- Prepare a task list so that you use your volunteer's time and skills wisely
- Print Rain Garden Brochure and Fact Sheet to distribute to volunteers and onlookers
- Label the tools
- Create and print a Construction Sequence
- Print the rain garden schematic with plants labeled
- Call key volunteers and asked them to arrive early and be Team Leaders
- Put together an emergency medical kit and set up an emergency plan in case of an accident
- Make sure that bathroom facilities are available for volunteers
- Make sure to have access to water hose if possible
- Contact local newspaper

### Day of Construction:

- Take "Before" photo
- Position plants where they are to be planted
- Place tools in a central location
- Put Emergency Kit on hand in the central location
- Greet and organize volunteers:
  - Have volunteers sign in and sign liability waiver

- Delegate responsibilities
  - Provide info on emergency plan, bathroom locations, and refreshments
  - Announce the schedule and breaks
  - Distribute and explain construction sequence
  - Take photo of all volunteers
- Take photos of all the construction phases, emphasizing the volunteers

Post - Construction:

- Water the rain garden
- Take "After" photo
- Follow up with press – provide pictures and details
- Send out thank you cards to all who participated
- Visually inspect and repair erosion monthly
- Every 6 months, in the spring and fall, add a fresh mulch layer
- Prune excess growth annually or more often
- After rainstorms, inspect the garden and make sure that drainage paths are clear and that ponding water dissipates over four to six hours

