



RUTGERS UNIVERSITY
Water Resources Program
New Jersey Agricultural Experiment Station



Homeowner Rain Garden Workshop

March 16, 2026 at 6:30 pm

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water.rutgers.edu

Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.





Water Resources Program



Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.

www.water.rutgers.edu

What happens to the rain in our watersheds?



It runs off of rooftops and pavement...

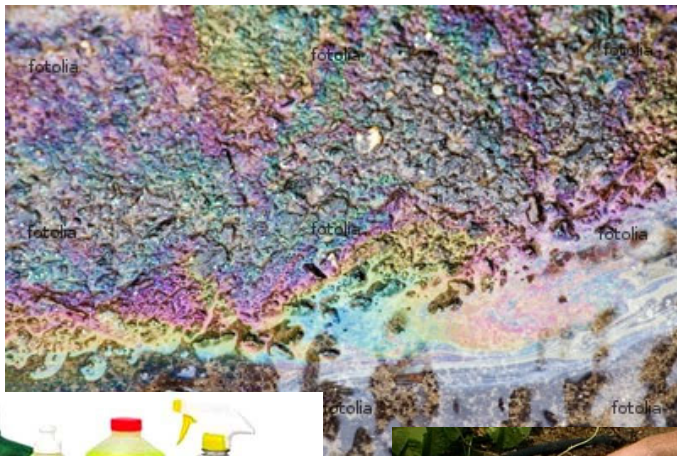
What is stormwater?

Stormwater is the water from rain or melting snows that can become “runoff,” flowing over the ground surface and returning to lakes and streams.

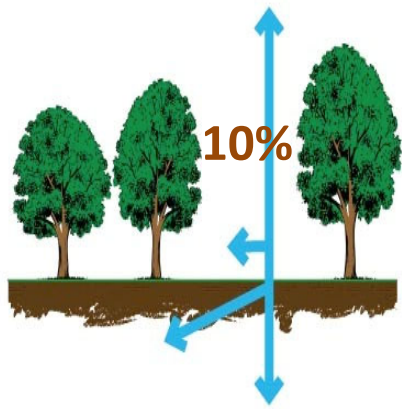


Examples of Nonpoint Source Pollution

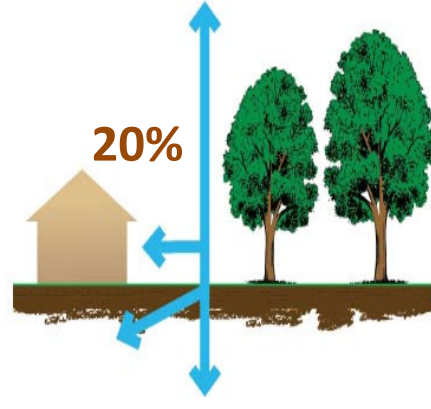
- Oil and grease from cars
- Fertilizers
- Animal waste
- Grass clippings
- Septic systems
- Sewage leaks
- Household cleaning products
- Litter
- Agriculture
- Sediment



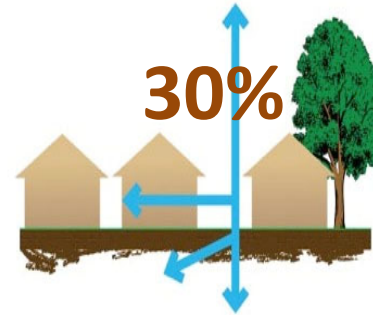
The Impact of Development on Stormwater Runoff



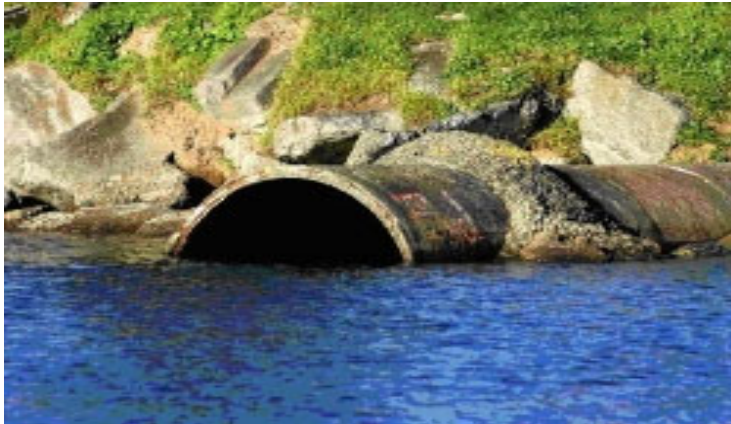
more development



→ *More impervious surfaces*



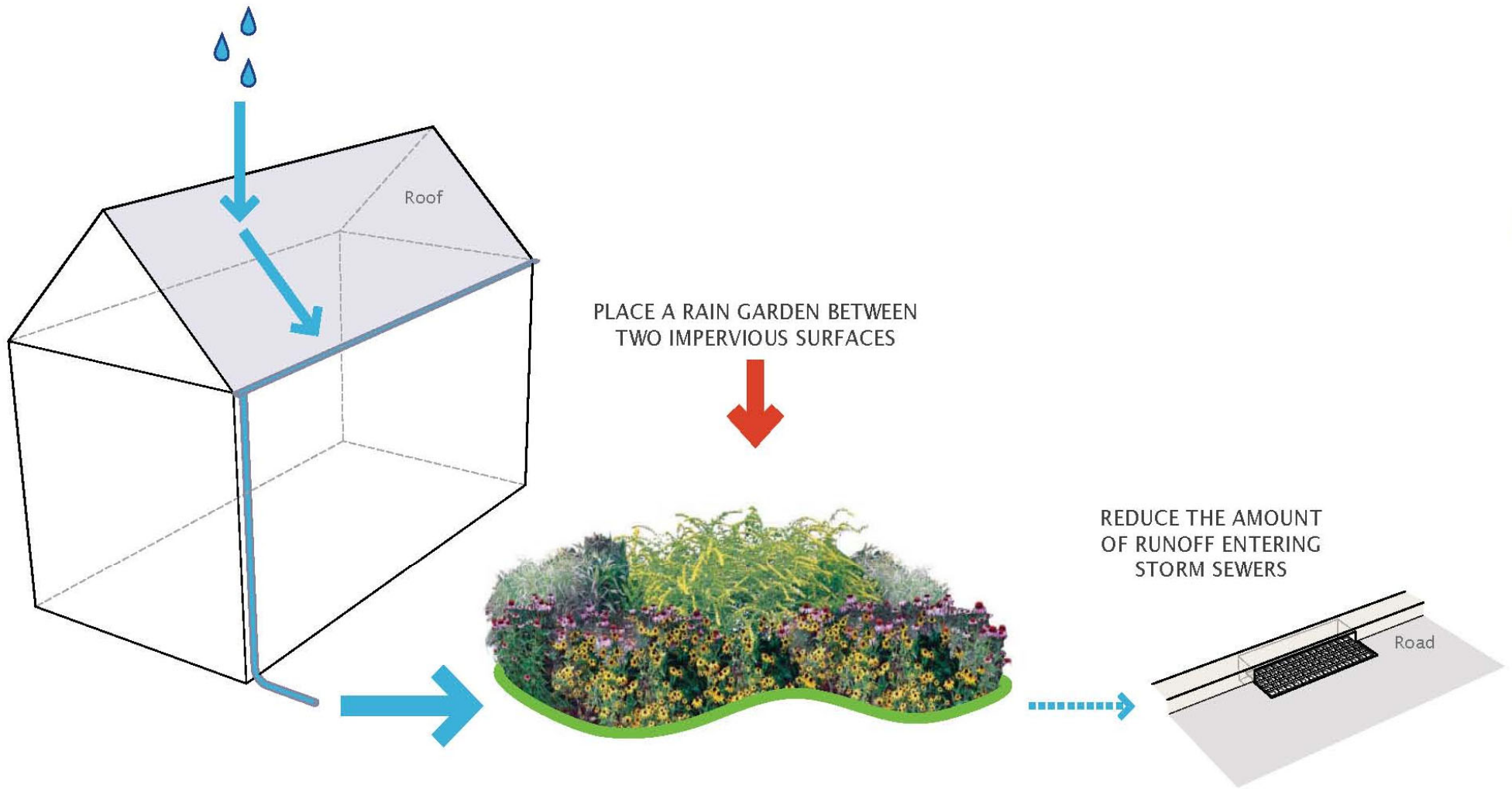
→ *more stormwater runoff*



Connected or Disconnected?



One Solution...

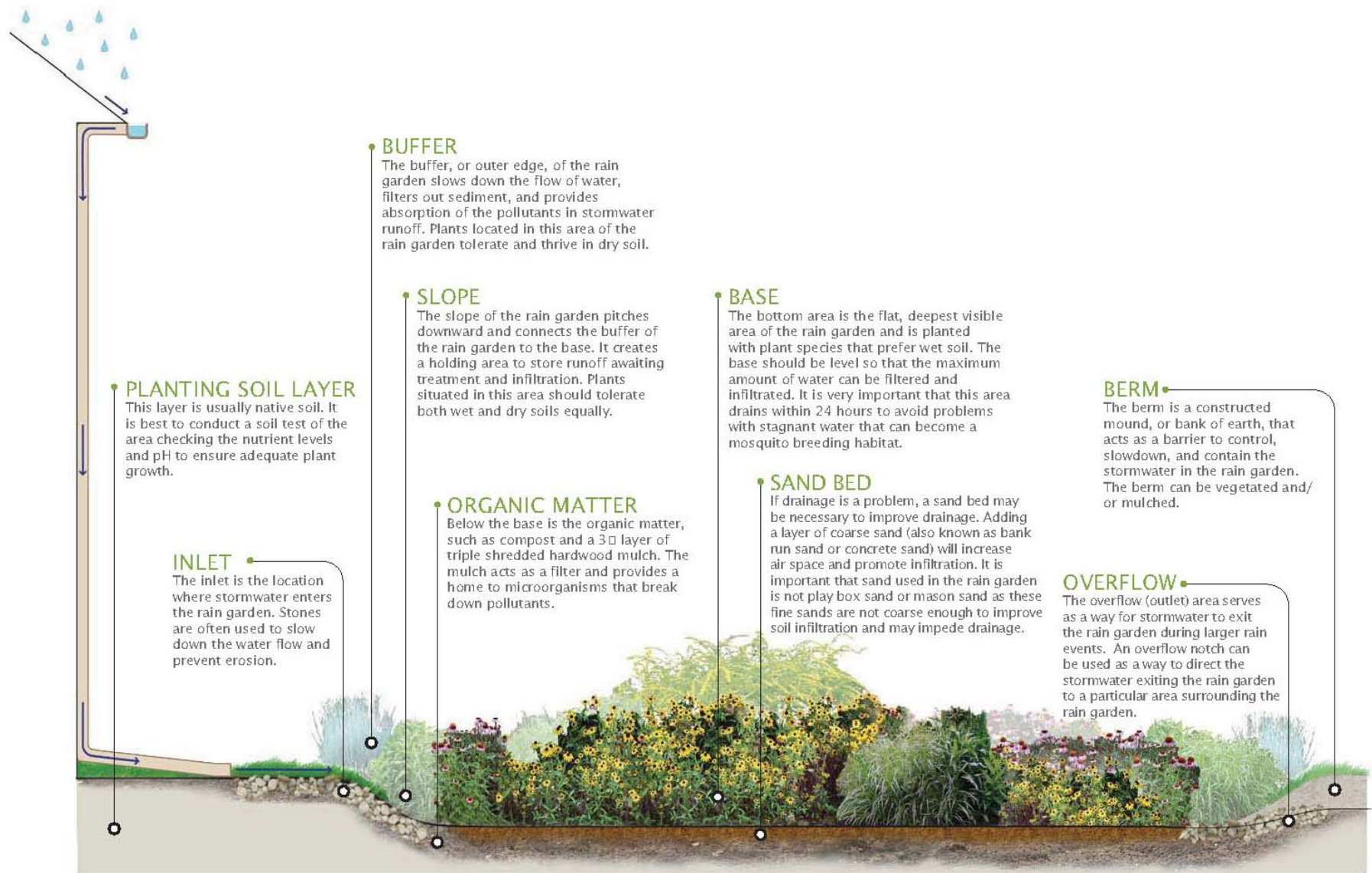


Rain Gardens

A rain garden is a landscaped, shallow depression that is designed to intercept, treat, and infiltrate stormwater at the source before it becomes runoff. The plants used in the rain garden are native to the region and help retain pollutants that could otherwise harm nearby waterways.



PARTS OF A RAIN GARDEN



PLANTING SOIL LAYER
This layer is usually native soil. It is best to conduct a soil test of the area checking the nutrient levels and pH to ensure adequate plant growth.

INLET
The inlet is the location where stormwater enters the rain garden. Stones are often used to slow down the water flow and prevent erosion.

BUFFER
The buffer, or outer edge, of the rain garden slows down the flow of water, filters out sediment, and provides absorption of the pollutants in stormwater runoff. Plants located in this area of the rain garden tolerate and thrive in dry soil.

SLOPE
The slope of the rain garden pitches downward and connects the buffer of the rain garden to the base. It creates a holding area to store runoff awaiting treatment and infiltration. Plants situated in this area should tolerate both wet and dry soils equally.

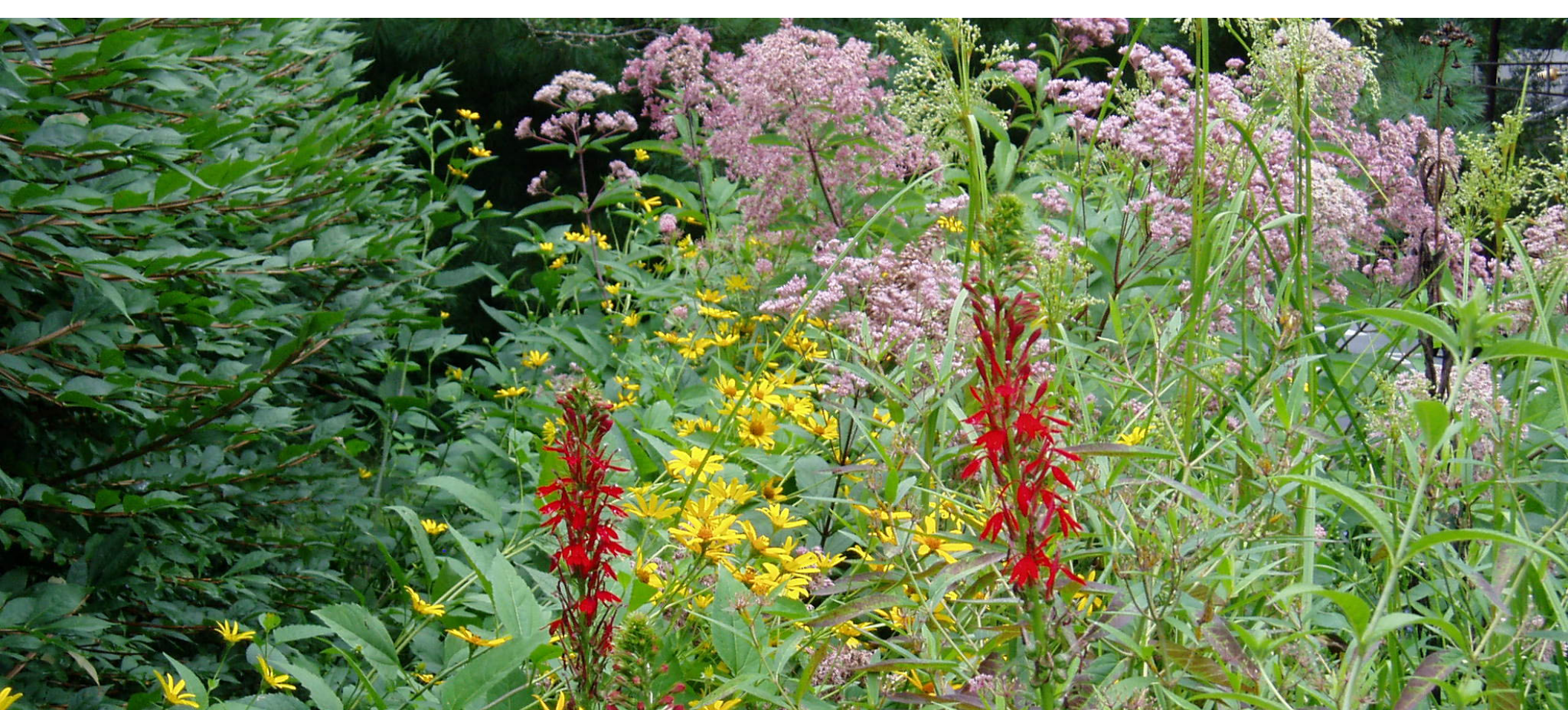
ORGANIC MATTER
Below the base is the organic matter, such as compost and a 3" layer of triple shredded hardwood mulch. The mulch acts as a filter and provides a home to microorganisms that break down pollutants.

BASE
The bottom area is the flat, deepest visible area of the rain garden and is planted with plant species that prefer wet soil. The base should be level so that the maximum amount of water can be filtered and infiltrated. It is very important that this area drains within 24 hours to avoid problems with stagnant water that can become a mosquito breeding habitat.

SAND BED
If drainage is a problem, a sand bed may be necessary to improve drainage. Adding a layer of coarse sand (also known as bank run sand or concrete sand) will increase air space and promote infiltration. It is important that sand used in the rain garden is not play box sand or mason sand as these fine sands are not coarse enough to improve soil infiltration and may impede drainage.

BERM
The berm is a constructed mound, or bank of earth, that acts as a barrier to control, slowdown, and contain the stormwater in the rain garden. The berm can be vegetated and/or mulched.

OVERFLOW
The overflow (outlet) area serves as a way for stormwater to exit the rain garden during larger rain events. An overflow notch can be used as a way to direct the stormwater exiting the rain garden to a particular area surrounding the rain garden.



SITE SELECTION & DESIGN

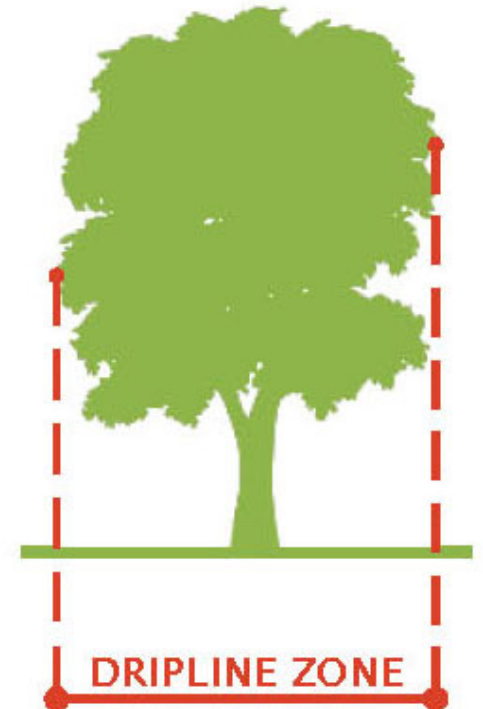
PLANNING YOUR RAIN GARDEN





SITE SELECTION

1. Next to a building with a basement, rain garden should be located min. 10' from building; no basement: 2' from building
2. Do not place rain garden within 25' of a septic system
3. Do not situate rain garden in soggy places where water already ponds
4. Avoid seasonably-high water tables within 2' of rain garden depth
5. Consider flat areas first – easier digging
6. Avoid placing rain garden within dripline of trees
7. Provide adequate space for rain garden









CALL BEFORE YOU DIG

LOCATE YOUR UTILITY LINES!

Call BEFORE You Dig!

*NJ One Call
1-800-272-1000*

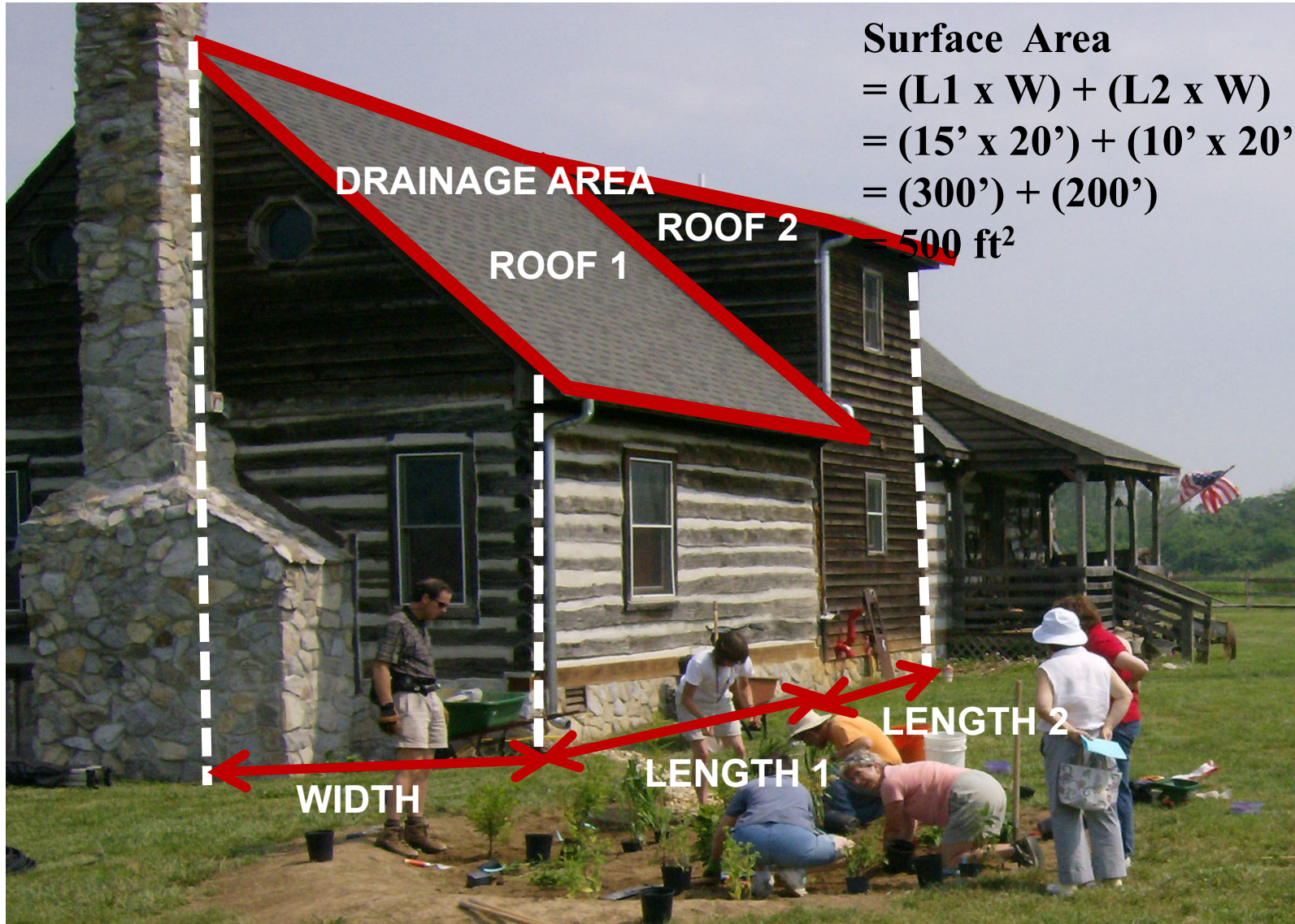
The different colors of the markout flags represent specific utilities.

-  ELECTRIC
-  GAS, OIL, STEAM
-  COMMUNICATIONS, CATV
-  WATER
-  SEWER

- **NJ One Call: 1-800-272-1000**
- Free markout of underground gas, water, sewer, cable, telephone, and electric utility lines
- Call at least 3 full working days, but not more than 10 days, prior to planned installation date
- Do not place rain garden within 5' horizontally and 1' vertically from any utilities

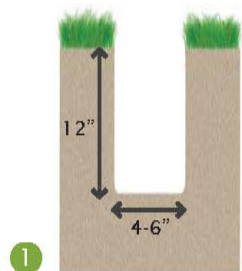


DRAINAGE AREA CALCULATION



Surface Area
= (L1 x W) + (L2 x W)
= (15' x 20') + (10' x 20')
= (300') + (200')
= 500 ft²

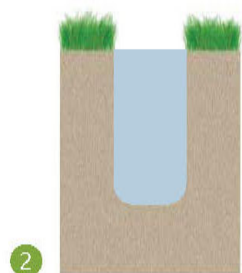
CHECK YOUR SOIL



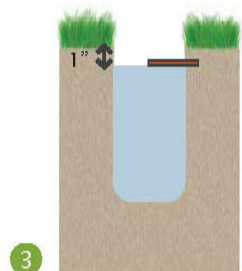
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• Infiltration/Percolation Test

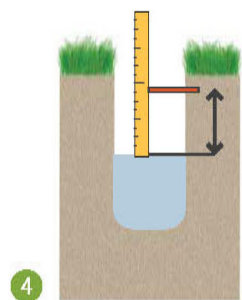
1. Dig a hole in the proposed rain garden site (12” deep, 4-6” wide)
2. Fill with water to saturate soil and then let stand until all the water has drained into the soil
3. Once water has drained, refill the empty hole again with water so that the water level is about 1” from the top of the hole
4. Check depth of water with a ruler every hour for at least 4 hours
5. Calculate how many inches of water drained per hour



2



3



4

DETERMINING THE DEPTH OF THE RAIN GARDEN



6" DEEP RAIN GARDEN - NO SOIL AMENDMENTS



3" DEEP RAIN GARDEN - SOIL AMENDMENTS



- Depth of rain garden is dependent upon the soil texture found at the site of the rain garden
- Depth is usually 3-8 inches

DETERMINING THE SIZE OF THE RAIN GARDEN



- The size of the rain garden is dependent upon the amount of runoff entering the rain garden

Rain Garden Sizing Table

Based on New Jersey's Water Quality Design Storm (1.25" of rain over 2 hours)

Drainage Area	Size of 3" Deep Rain Garden CLAY SOIL*	Size of 6" Deep Rain Garden SILTY SOIL	Size of 8" Deep Rain Garden SANDY SOIL
500 ft ²	200 ft ²	100 ft ²	75 ft ²
750 ft ²	350 ft ²	150 ft ²	112 ft ²
1,000 ft ²	400 ft ²	200 ft ²	149 ft ²
1,500 ft ²	600 ft ²	300 ft ²	224 ft ²
2,000 ft ²	800 ft ²	400 ft ²	299 ft ²

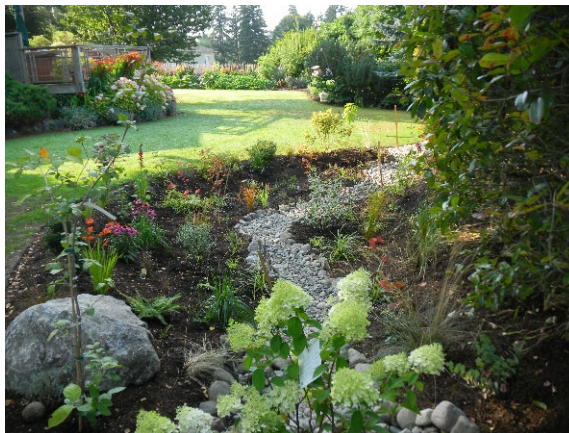
*SOIL TEXTURE AMENDMENTS NEEDED

RAIN GARDENS

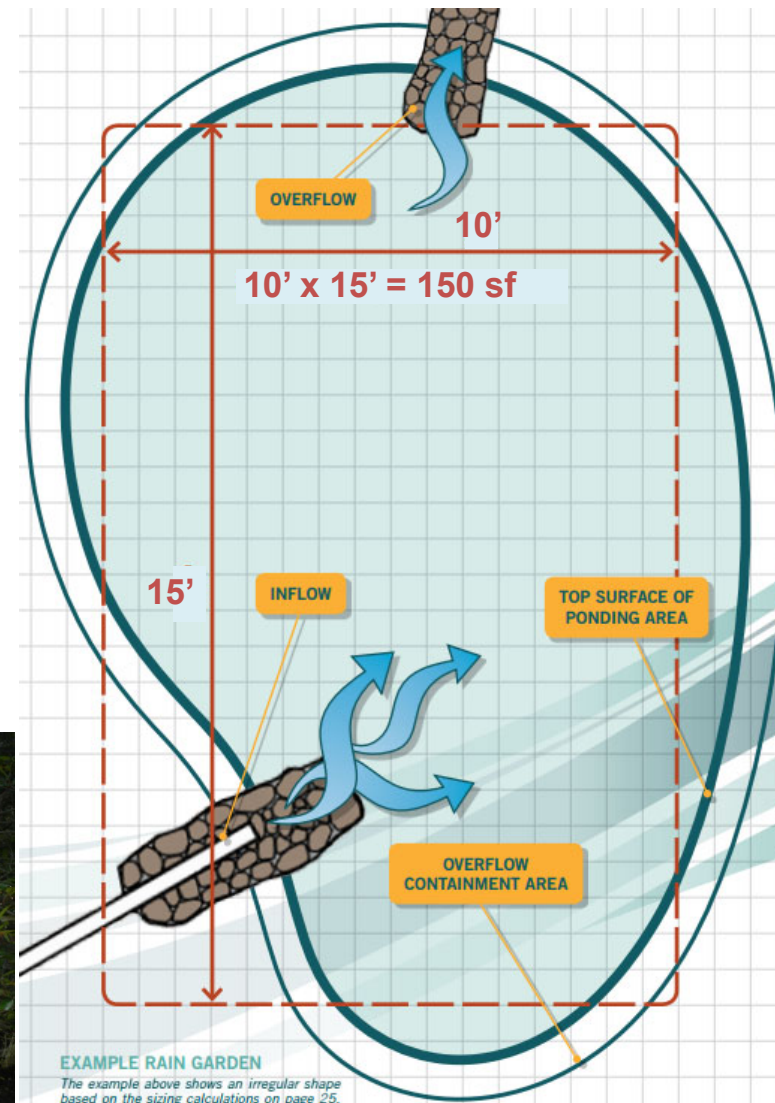
Typical Size

What is a typical rain garden size?

- Typically 100-200 square feet.
- A 100 square foot rain garden will often receive water from an area 5 to 10 times larger than the rain garden..



Modified from Rain Garden Handbook for Western WA



EXAMPLE RAIN GARDEN
The example above shows an irregular shape based on the sizing calculations on page 25.

SOIL AMENDMENTS

- Soil amendments improve the rain garden's infiltration rate and help the plants grow



DETERMINING THE INLET AND OVERFLOW

- Stormwater runoff enters the rain garden from an **inlet**
- Stormwater exits through the **overflow**



PREVENTING EROSION

- Slope no greater than 3:1
- Slow down velocity of water flowing through rain garden
 - Add rocks to inlet area (River Stone)



DETERMINING MULCH QUANTITY



- Allow for a 3” depth mulch (triple-shredded hardwood with no dye) to be spread throughout the entire rain garden
- Every 100 square feet of rain garden needs 1 cubic yards (3” depth)





RAIN GARDEN PLANTING DESIGN



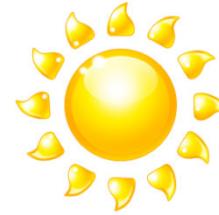
DESIGN AESTHETICS

- Formal or traditional design
 - Shrub bed
 - Perennial garden
 - Hedges
- Naturalized planting & design
 - Butterfly garden
 - Meadow (warm season grasses & wildflowers)
 - Buffer plantings



SITE CONSTRAINTS

- Sun vs. shade
- Exposure/wind
- Soil characteristics
- Hydrologic conditions
- Road salts
- Vehicle/pedestrian traffic



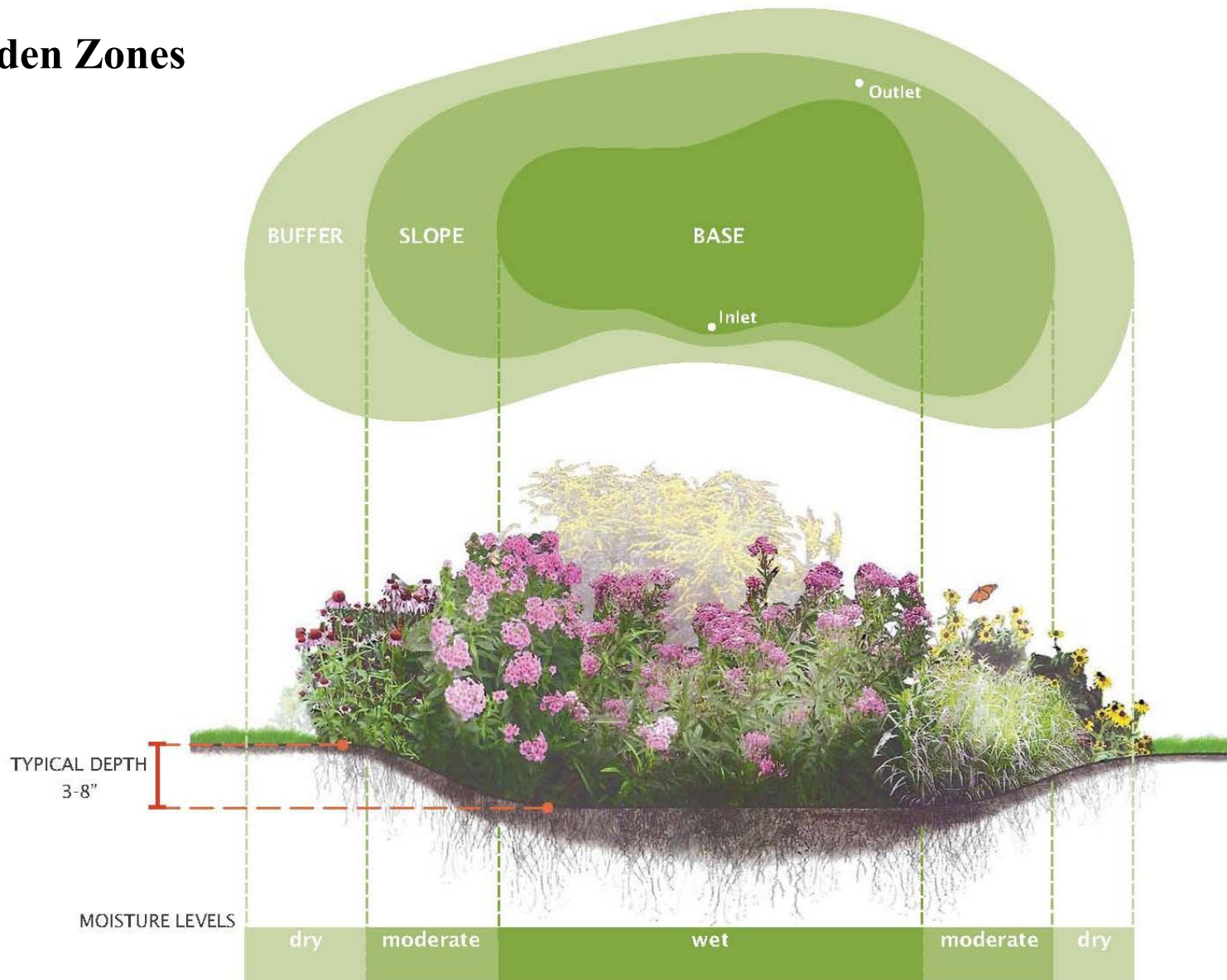
PLANTS IN THE RIGHT PLACE...



Courtesy of Pinelands Nursery & Supply

PLANTING DESIGN: Wet + Dry Conditions

Rain Garden Zones



SELECTING PLANT SPECIES

- Mature plant size
 - Proximity to buildings and utility lines
 - Pruning and shaping
- Seasonal interest
 - Flowers
 - Fall color
 - Winter character
- Beneficial wildlife
 - Flowers for butterflies
 - Fruits for song birds



GRASSES & GROUND COVERS



BUFFER

- Broomsedge
- Bearberry
- Panic grass
- Switchgrass
- Little bluestem
- Indiangrass

BASE

- Big bluestem
- Virginia wild-rye
- Switchgrass
- Wool grass

SLOPE

- Bluejoint grass
- Sedges
- Fowl mannagrass
- Softrush



WILDFLOWERS & FERNS



BUFFER

- Butterfly milkweed
- Wild indigo
- Purple coneflower
- Beebalm
- Black-eyed susan

BASE

- New England aster
- New York aster
- Columbine
- Coreopsis
- Joe-pye weed
- Blazing star
- Sensitive fern
- Cinnamon fern
- Ironweed

SLOPE

- Swamp milkweed
- Marsh marigold
- Turtlehead
- Boneset
- Rose-mallow/hibiscus
- Blueflag iris
- Cardinal flower
- Blue lobelia
- Monkey flower



TREES & SHRUBS



BUFFER

- Hackberry
- Red Bud
- Pepperbush
- American Holly
- Bayberry
- Witchhazel
- White Oak
- Red Oak
- Arrowwood
- Viburnum

BASE

- Red Maple
- Service Berry
- River Birch
- Silky Dogwood
- Red-twig Dogwood
- Inkberry Holly
- Winterberry
- Sweetbay
- Magnolia

SLOPE

- River Birch
- Buttonbush
- Silky Dogwood
- Green Ash
- Swamp White Oak
- Pin Oak
- Cranberrybush
- Viburnum





THE FUN PART!

INSTALLING YOUR RAIN GARDEN



STEP ONE

- Select and design a rain garden location during your 45 minute session with Rutgers Team
- Outline the rain garden area with marking paint or flags



STEP TWO

- Complete the Call Before You Dig- NJ One Call: 1-800-272-1000
- They will come out and mark the area for your utilities



STEP THREE

- Remove existing grass with a shovel or machinery (sod cutter/ small backhoe)



STEP FOUR

- Excavate to design depth based on necessary storage and soil amendment requirements



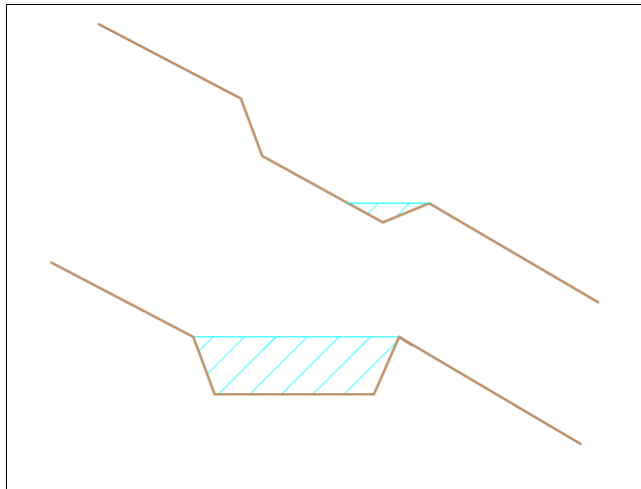
STEP FIVE

- Add soil amendments, if necessary
- Combine amendments with existing soil using shovels or rototiller
- Loosen and prepare soil for grading and planting



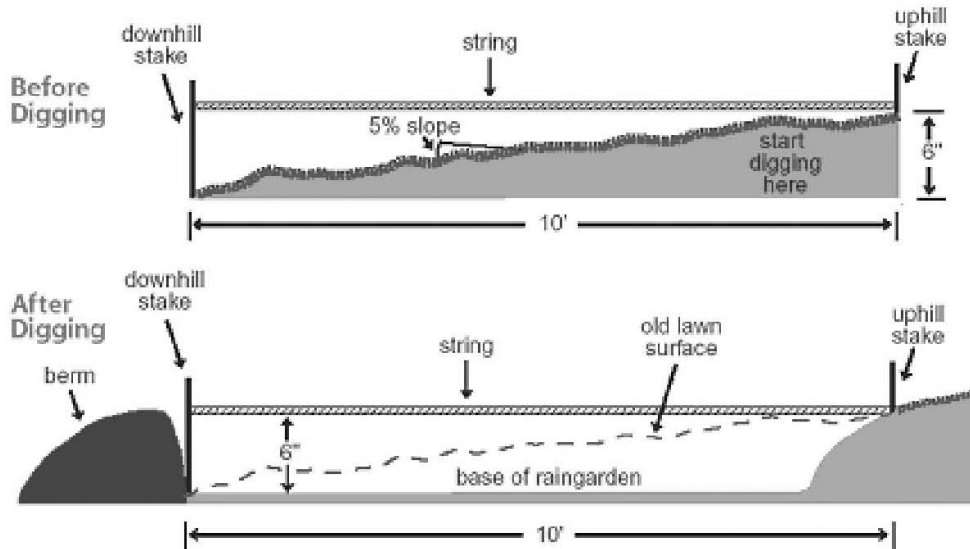
STEP SIX

- Level the rain garden base



STEP SEVEN

- Prepare the berm, if necessary



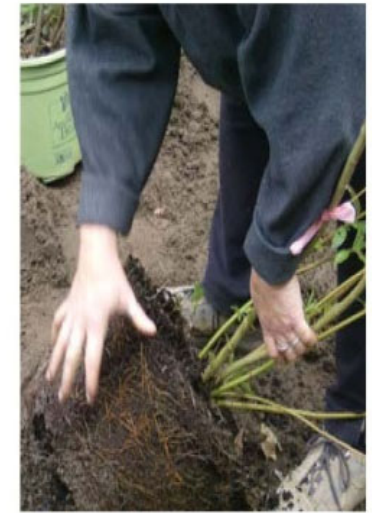
STEP EIGHT

- Prepare the inlet and overflow



STEP NINE

- Plant native species



STEP EIGHT

- Apply mulch



- Allow for a 3” depth mulch (triple-shredded hardwood with no dye) to be spread throughout the entire rain garden
- For every 100 square feet of rain garden, you will need about 1 cubic yard of mulch (3” depth)

STEP NINE

- Water Plants



STEP TEN

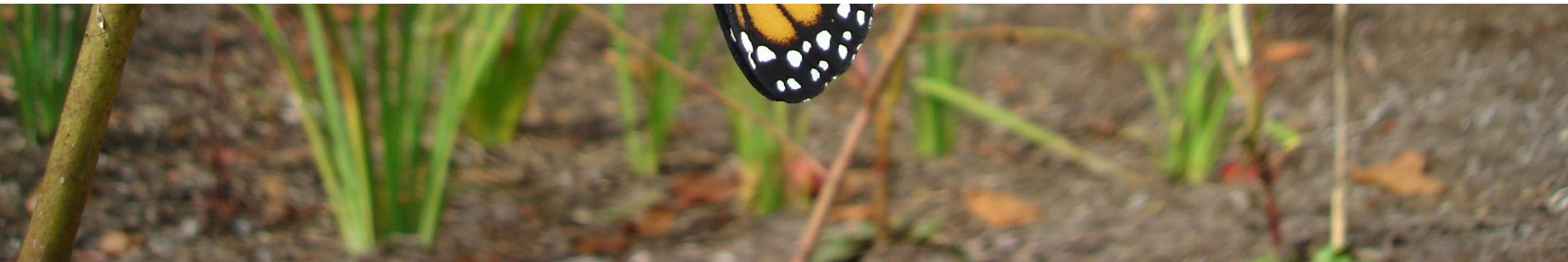
- Appreciate a job well done





INSPECTION AND MAINTENANCE

MAINTAINING YOUR RAIN GARDEN



MAINTENANCE MEASURES

WEEKLY TASKS:

1. Watering
2. Weeding
3. Inspecting

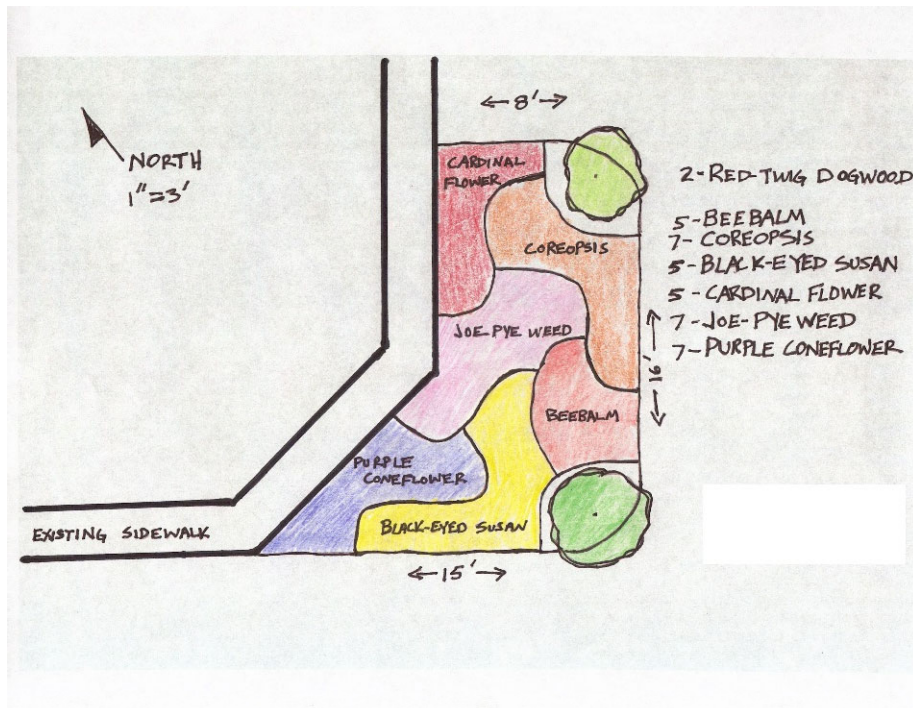
ANNUAL TASKS:

1. Mulching
2. Pruning
3. Re-planting
4. Removing sediment
5. Soil Testing
6. Harvesting Plants
7. Cleaning of Gutters
8. Replacing materials (stone, landscape fabric)

Installed Homeowner Rain Gardens

Design Example for Roof Runoff

Design



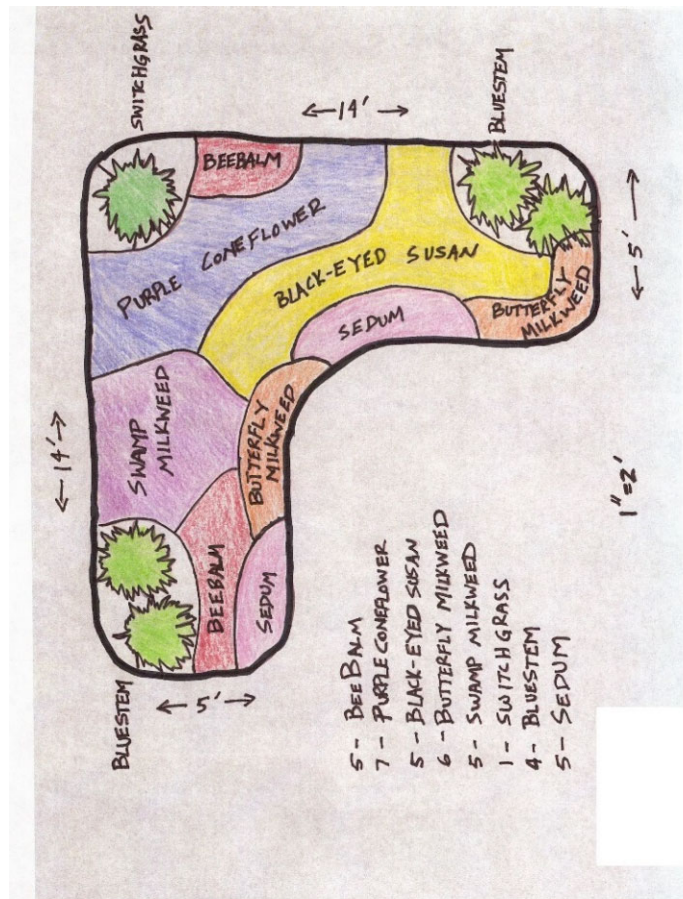
Installed Rain Garden





Design Example for Parking Lot Runoff

Design



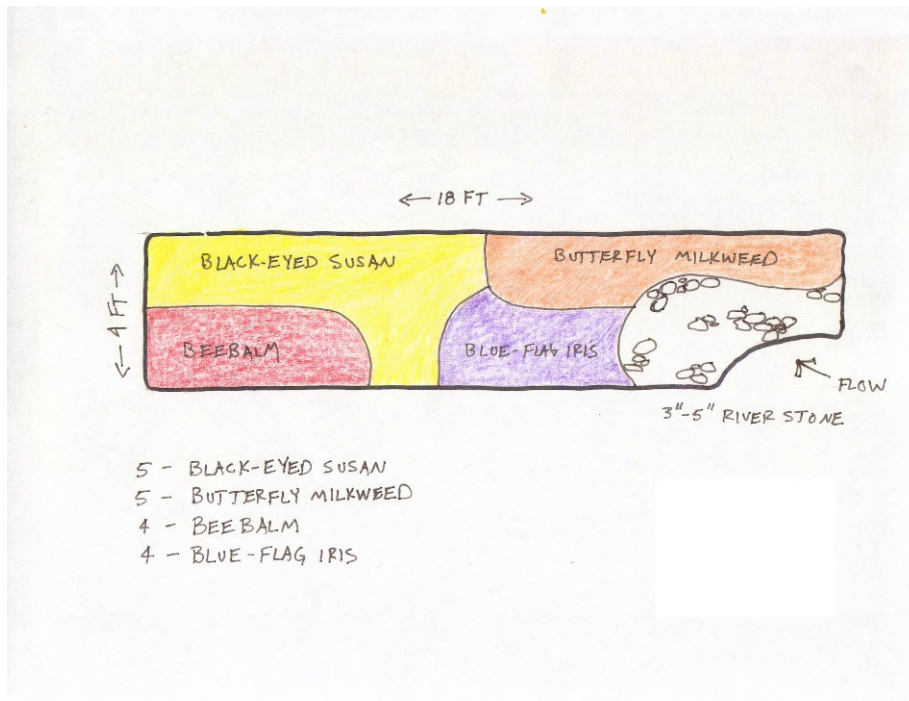
Installed Rain Garden



Roof, Sump Pump and Driveway Runoff – WOW!

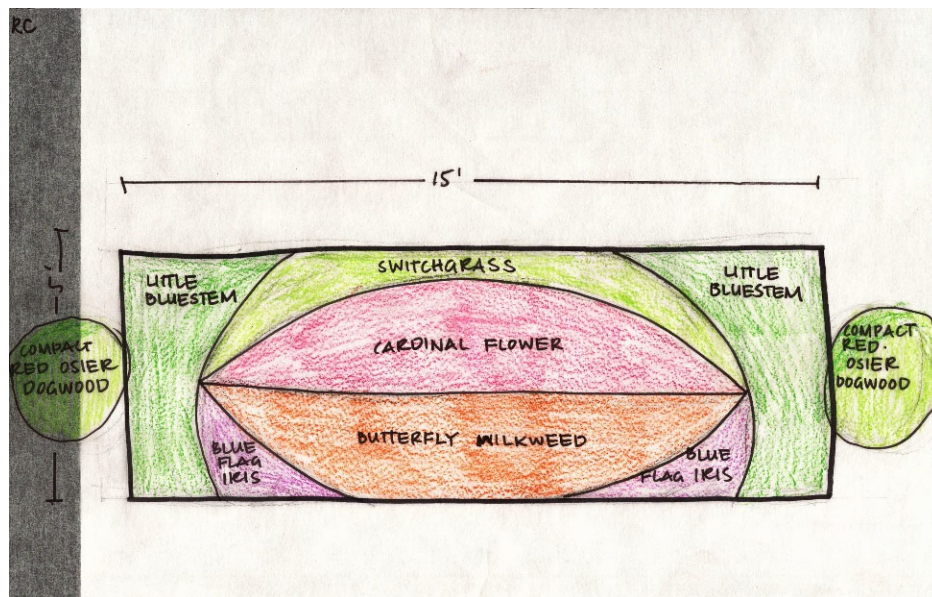
Design

Installed Rain Garden



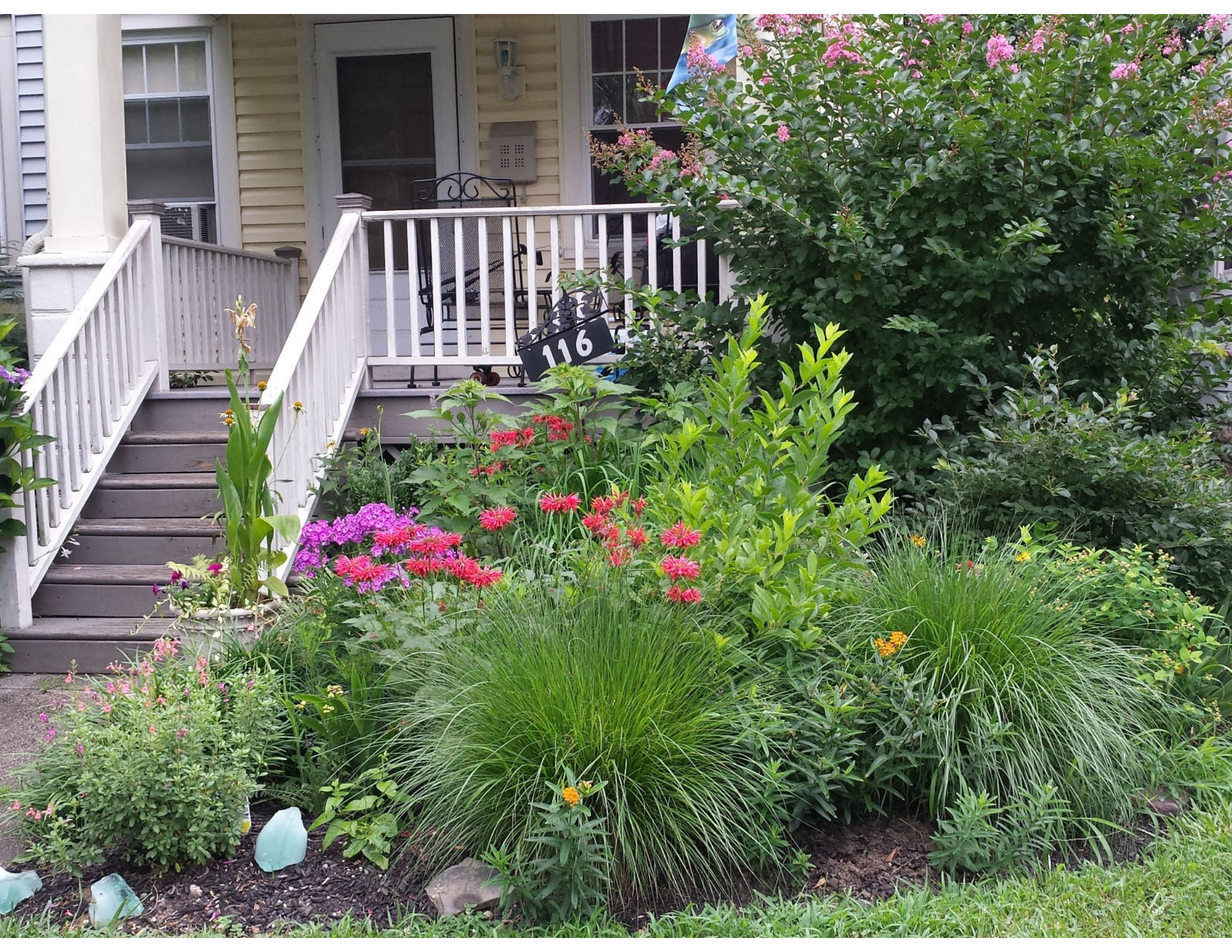
Roof Runoff from Rain Barrel Overflow

Design



Installed Rain Garden





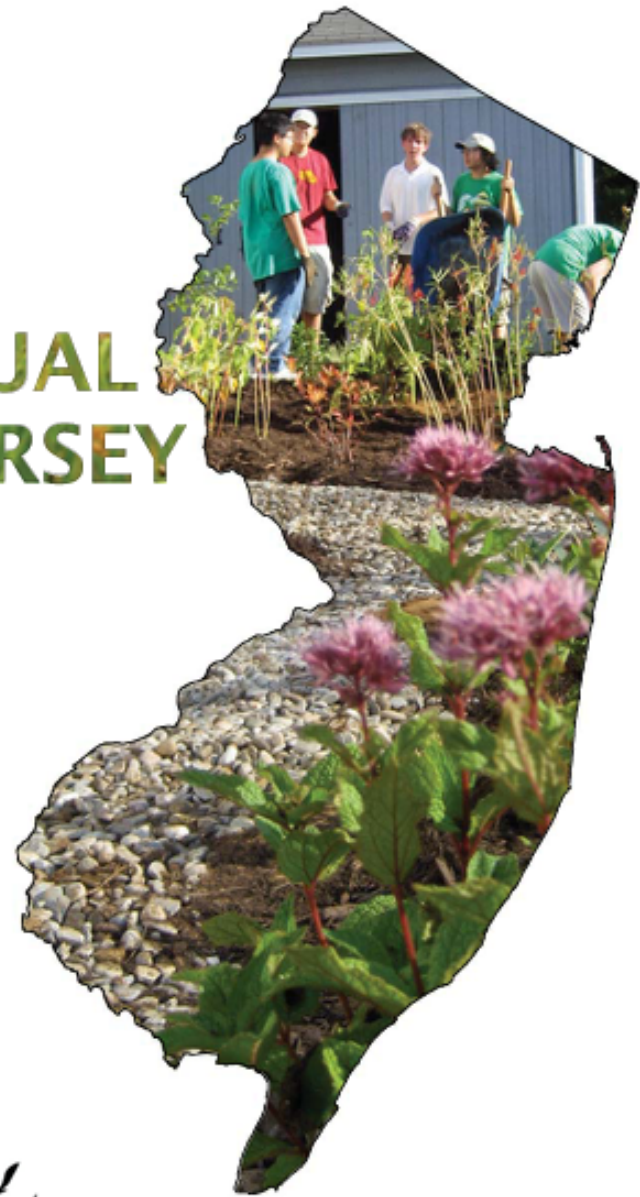
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http://water.rutgers.edu/Rain_Gardens/RGWebsite/rginfo.html

RAIN GARDEN MANUAL OF NEW JERSEY



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Rain Garden 4+

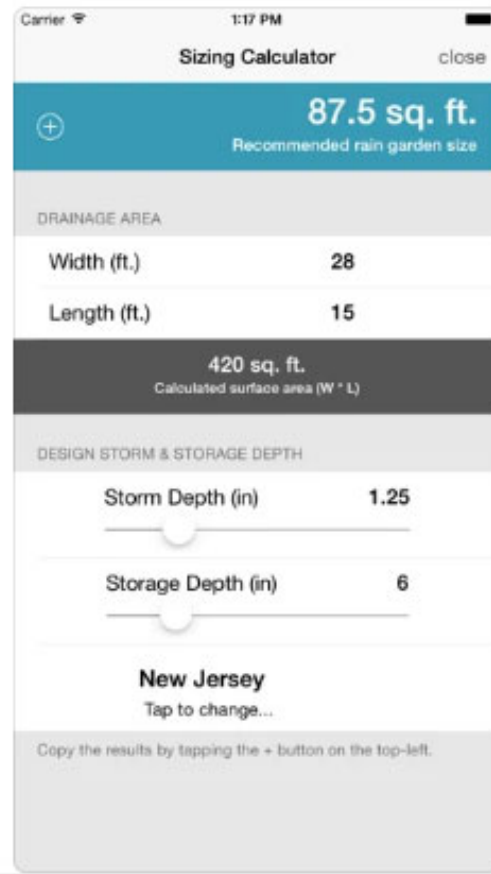
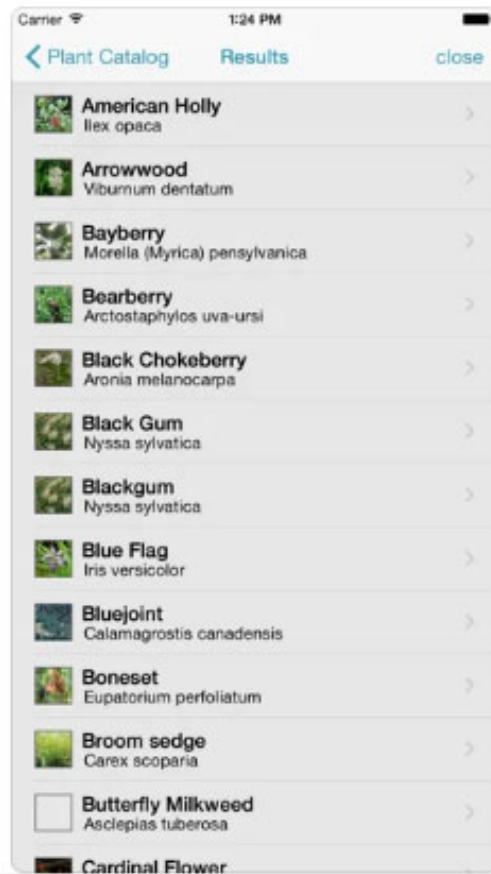
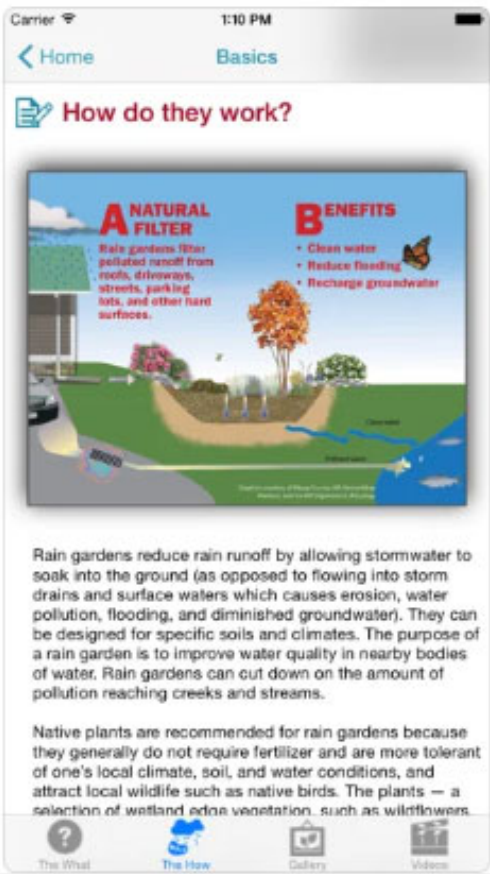
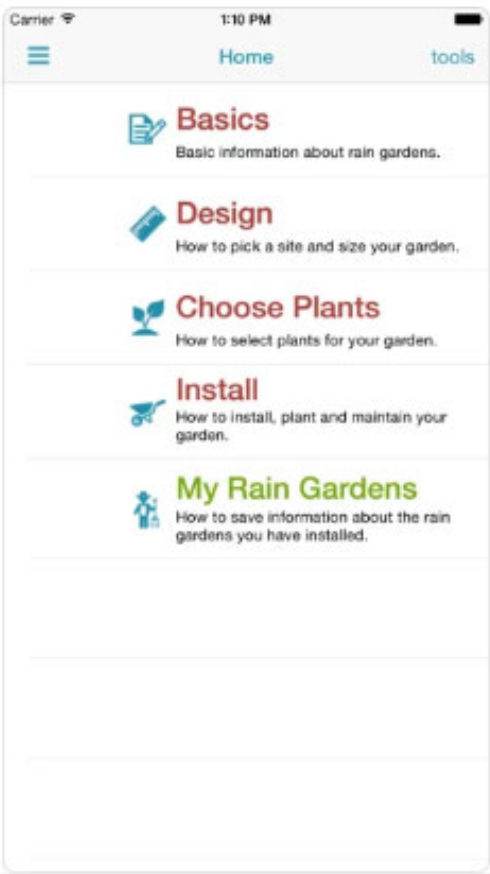
University of Connecticut

Designed for iPhone

★★★★☆ 2.6 • 11 Ratings

Free

iPhone Screenshots



NEXT STEPS

The technical session will be on Tuesday, March 24th, from 8 am to 6 pm, with a session every half hour. Send Hollie an email after this presentation to sign up.

Hollie DiMuro, Senior Program Administrator Supervisor
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