

# Rain Gardens and Rain Barrels

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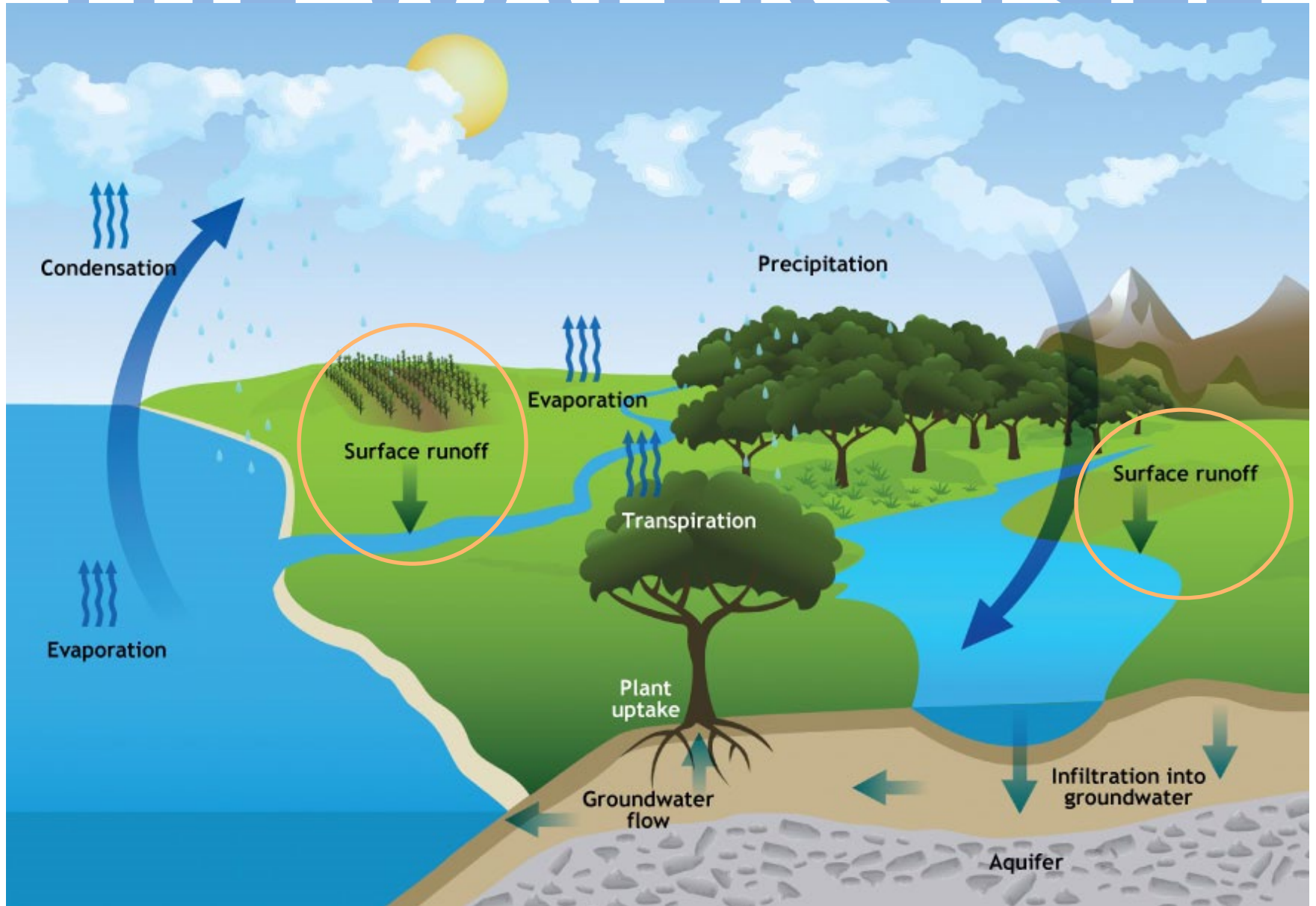


# The RIVER FRIENDLY Partnership



**for Residents, Schools, Businesses, Golf Courses and Farms**

# THE WATER CYCLE



# WHAT IS RUNOFF?

**Stormwater runoff** is precipitation or snowmelt that flows over the ground surface.





# IMPERVIOUS SURFACES

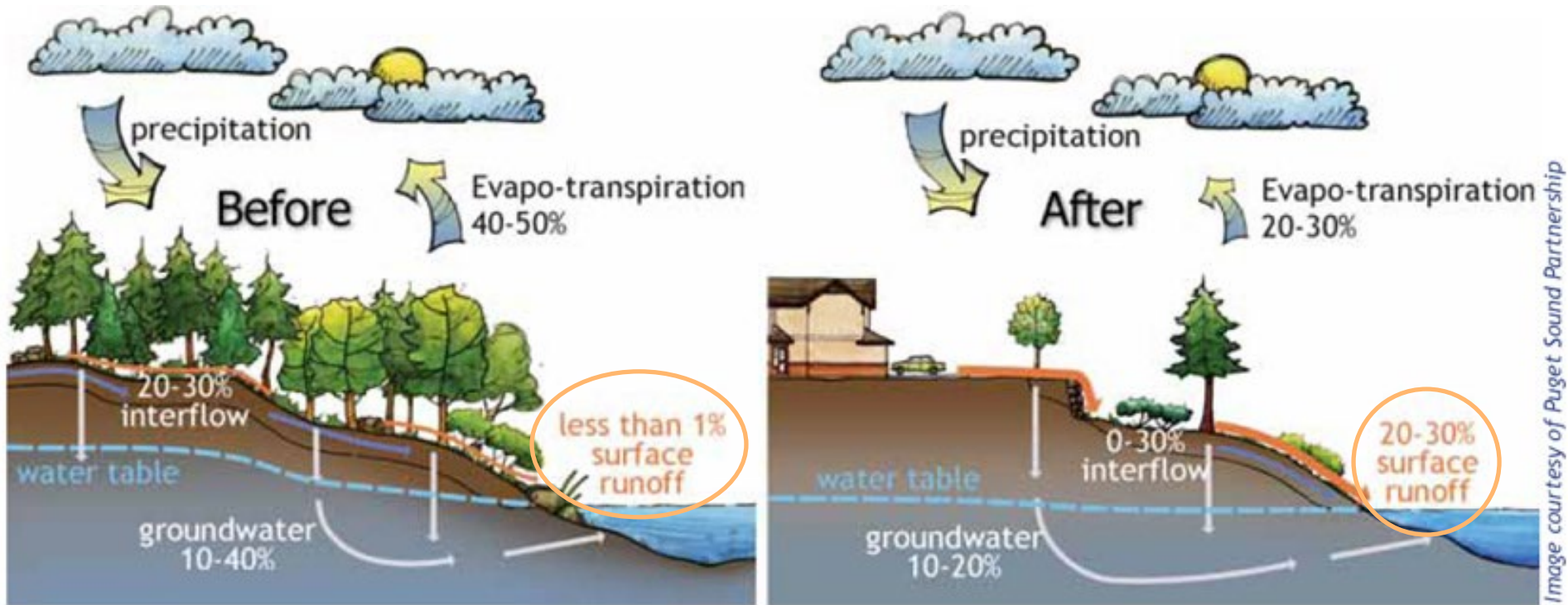
are roads, driveways, parking lots, rooftops and other surfaces that do not allow water to soak into the ground.



# CONNECTED IMPERVIOUS SURFACES

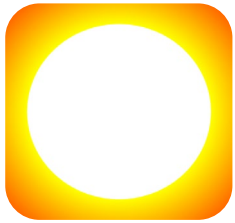
- **No chance** for infiltration, plant uptake, or groundwater recharge
- Peak flow rates and volumes can be **too high** for stream carrying capacity, causing erosion and flooding

# Natural vs. Developed Land



Before development almost all rainfall is taken up by plants, evaporates or infiltrates through the ground. After conventional development, surface runoff increases significantly while evaporation and infiltration into the ground decrease.

# Stormwater Runoff Carries Non-Point Source Pollutants



Heat



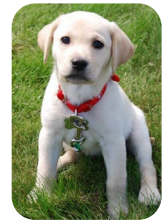
Herbicides and  
Pesticides



Grass clippings



Fertilizer



Animal Waste



Sediment



Household Cleaning  
Products



Litter



Oil and Grease  
from Cars



Road Salt





## Impervious Surfaces and Non-Point Source Pollution cause:



- Increased pathogens in waterways
- Higher temperature
- Higher pH
- Lower dissolved oxygen levels
- Eutrophication
- Erosion
- Flooding
- Turbidity

We can reduce our contribution to  
non-point source pollution...

but how can we reduce stormwater  
**volume** and **velocity**?

# Rain Barrels

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- **Intercept** rain water, reducing stormwater volume and speed
- **Provide** healthy water for your plants
- **Save money**
- **Reduce waste** from the food and beverage industry
- Typically made from a modified 55-gallon, food-grade drum. May also be made from a trash can!
- Can be decorated!
- Building workshops offered through River-Friendly partners, instructions provided



# Installing your Rain Barrel

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- Install about 10 feet of 1.25 sump pump hose on the overflow spout
- Prepare the area under the downspout by leveling the ground, add sand or crushed stone as necessary
- Elevate with bricks or cinder blocks
- Cut the downspout above the rain barrel (leave enough space to attach the downspout elbow)
- Place the rain barrel on the platform, direct the downspout above the screen, and wait for the next storm!



# Remember...

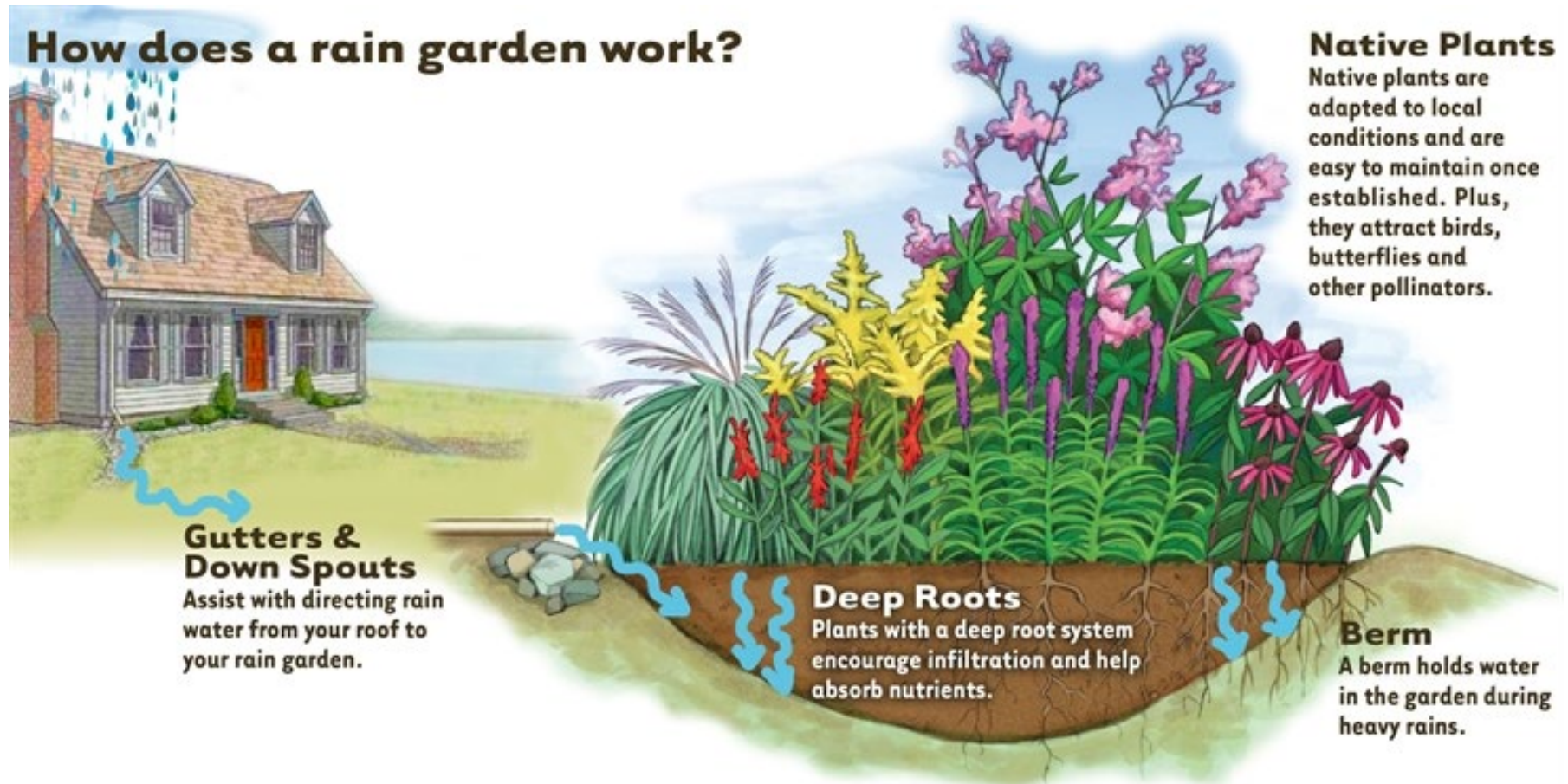
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- Do not use rain barrel water for cooking or drinking
- Always keep the screen on your rain barrel to prevent mosquito breeding. Add a mosquito “dunk” to the barrel (available at pet stores or online).
- Do not collect rain water if you see a moss killer or suspect other chemical contaminants on your rooftop
- Disconnect the barrel in the winter or store it inside
- Use the water within a week or before the next storm event, whichever comes first

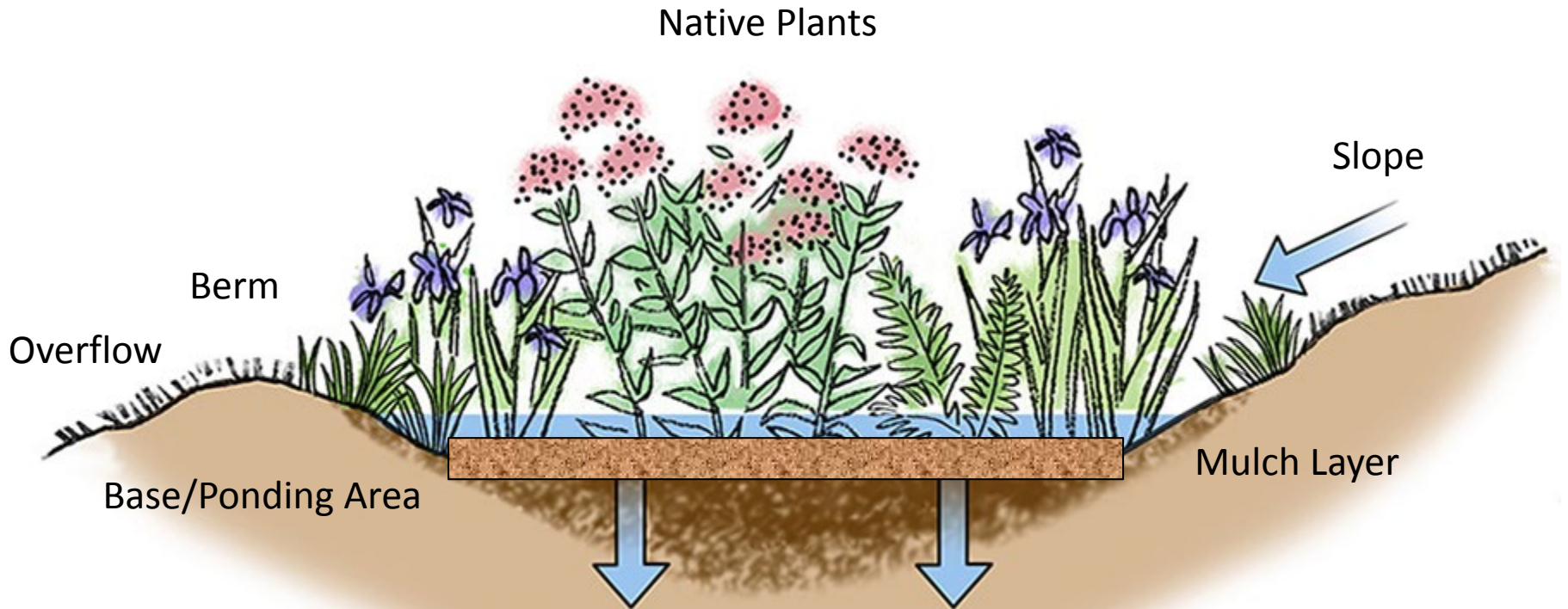


# Rain Gardens

A **rain garden** is a planted depression that slows and treats rainwater runoff from impervious areas like roofs, driveways, walkways, parking lots, and compacted lawn areas. They disconnect impervious surfaces and give stormwater the opportunity infiltrate into the soil, replenishing groundwater aquifers.



# Parts of a Rain Garden







# Easy as 1, 2, 3!

## 1. Planning



## 2. Installation



## 3. Maintenance



*Mendham Township Elementary School, Morris County*

# Reading your Landscape

Your property map (with 2ft contour lines)

Find where your rain garden should go!: Hint: follow the flow



NAME  
STREET ADDRESS  
CITY, ZIP  
Sassafras sandy loam  
SOIL GROUP: B  
DRAINAGE: Well Drained

NOTES:



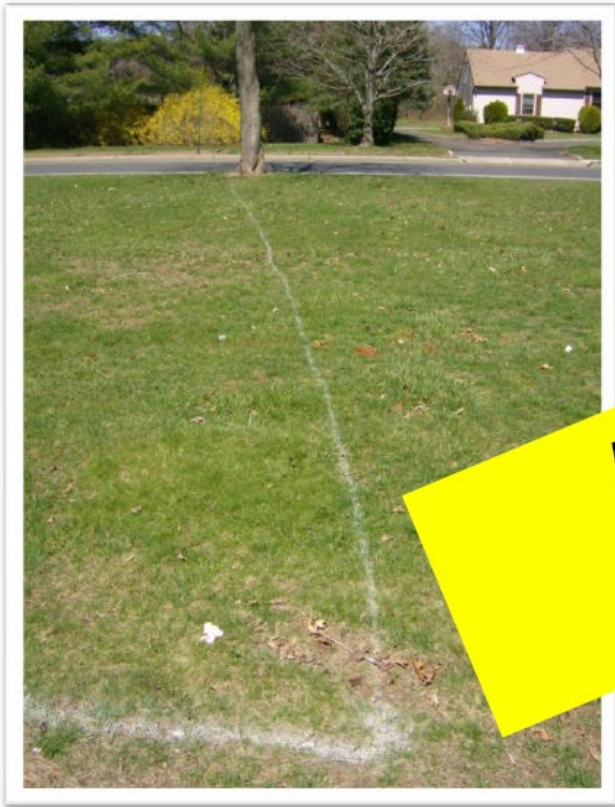
# Determine Stormwater Flow



*Union County Vocational School*

# Determine Existing Utility Lines

<http://www.nj1-call.org>



**NJ One Call:  
811**



## Do:

- Install your rain garden at least 10 feet from house (so infiltrating water doesn't seep into foundation)
- Select a flat part of the yard, if you have the option
- Place in full or partial sunlight, if you have the option
- Avoid large tree roots

## Do Not:

- Install your rain garden over a septic system
- Install your rain garden where the water already pools or the lawn is always soggy



# Identify the Drainage Area

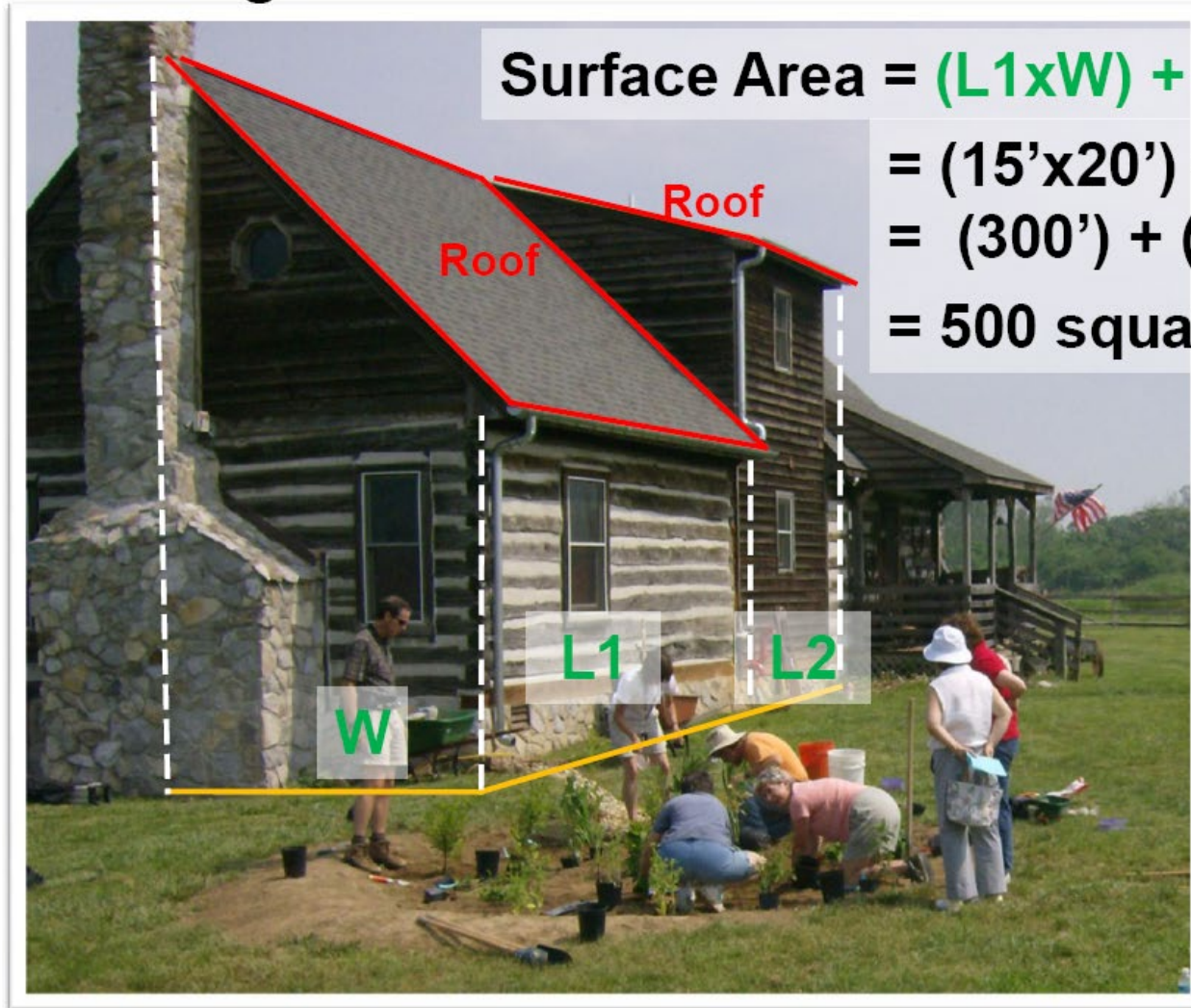


*Union County Vocational School*



*Hockman Farm, Winchester, Virginia*

# Measure Drainage Area



$$\text{Surface Area} = (L1 \times W) + (L2 \times W)$$

$$= (15' \times 20') + (10' \times 20')$$

$$= (300') + (200')$$

$$= 500 \text{ square feet}$$

Hockman Farm, Winchester, Virginia

# Drainage Area Informs Garden Size

<b>Rain Garden Sizing Table</b>			
<b>Based on New Jersey's Water Quality Design Storm</b>			
<b>Drainage Area</b>	<b>Size of 3" Deep Rain Garden</b>	<b>Size of 6" Deep Rain Garden</b>	<b>Size of 8" Deep Rain Garden</b>
500 ft <sup>2</sup>	200 ft <sup>2</sup>	100 ft <sup>2</sup>	75 ft <sup>2</sup>
750 ft <sup>2</sup>	300 ft <sup>2</sup>	150 ft <sup>2</sup>	112 ft <sup>2</sup>
1000 ft <sup>2</sup>	400 ft <sup>2</sup>	200 ft <sup>2</sup>	149 ft <sup>2</sup>
1500 ft <sup>2</sup>	600 ft <sup>2</sup>	300 ft <sup>2</sup>	224 ft <sup>2</sup>
2000 ft <sup>2</sup>	800 ft <sup>2</sup>	400 ft <sup>2</sup>	299 ft <sup>2</sup>





**Parking Lot/  
Driveway**

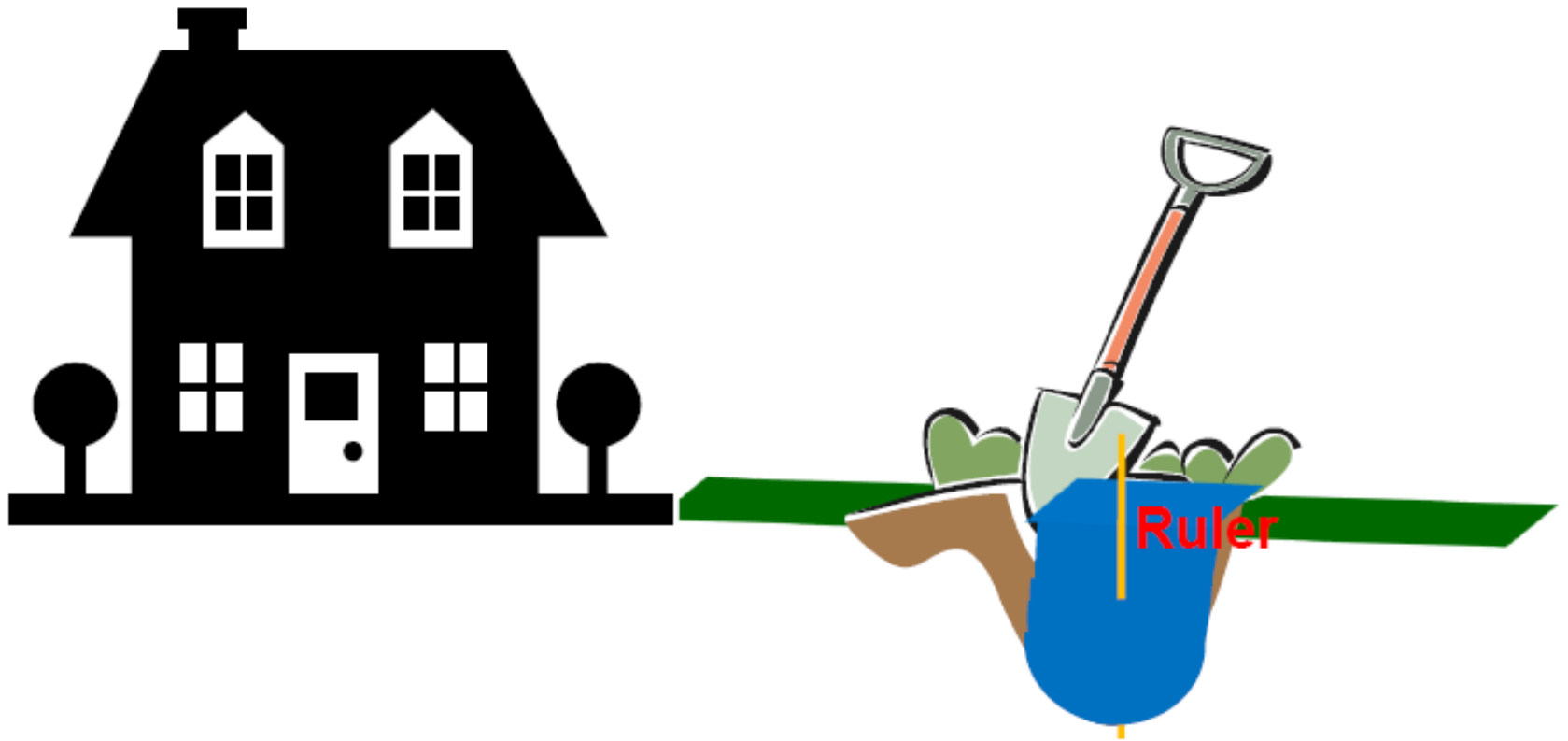
*Union County Vocational School*



**Roof**

*Hockman Farm, Winchester, Virginia*

# Percolation Test



Dig a 1-foot deep hole and fill with water.  
It should completely drain within 24 hours!

# Soil Test

- Sample the soil and send to the Rutgers Soil Testing Lab for:
  - Nutrient analysis/ recommendations
  - pH analysis/ recommendations
  - Percent sand/ silt/ clay

- Soil Texture Test

Roll soil into a ball in hand and see how it forms

- Hard ball – Clay/Silt soil
- Soft ball – Loamy soil
- No ball – Sandy soil

Loamy soil is the BEST soil for a rain garden



Gloucester County 4-H Fairgrounds

*But, don't worry – clay/silt and sandy soils can be amended to get the preferred loamy soil texture*

# General Soil Amendments for a 100 sq ft garden that is 6 inches deep

Soil Amendment	Amount for 100 sq ft Rain Garden
Coarse Sand (Bank Run Sand)	1 cubic yard
Compost	1 cubic yard
Fertilizer	Follow Soil Test Result Recommendations
Lime	Follow Soil Test Result Recommendations



*Gloucester County 4-H Fairgrounds*

# Mulch

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- Use triple shredded hardwood mulch with no dye
- Maintain at a depth of 3 inches

## Benefits:

- Keeps soil moist
- Allows for percolation of rain water
- Protects plants, makes weeding easier
- Minimizes erosion
- Harbors valuable microorganisms that filter out pathogens and break down chemicals



# How many plants?

Size of Rain Garden	Approximate Amount of Plants
100 square feet	1 Small Tree (Optional) 7 Shrubs 24 Herbaceous Species
200 square feet	1 Small Tree (Optional) 14 Shrubs 48 Herbaceous Species



*Leonard Park, Morris County*

# Plant Types

<http://plants.usda.gov>

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



# In the manual...

Native Plants of New Jersey  
(from left to right)

Lady's Slipper  
White Pine  
Sweet Gum



Mountain Laurel  
American Beech  
Giant's Soloman Seal  
Strawberry Bush



Toad Trillium  
Culver's Root  
Sneezewood  
Bloodroot



Turk's Cap Lily  
Culver's Root  
Blue Cohosh  
Chokeberry







**Big Bluestem (Slope)**



**Soft Rush (Base)**



**Switchgrass (Buffer)**

# Grasses

**Wild Onion/Leek (Allium)**



**Blazing Star (Slope)**



**Wildflowers**

**Boneset (Base)**



**Wild Bergamot (Buffer)**





**Silky Dogwood (Base)**

**Trees and  
Shrubs**

**Witchhazel (Buffer)**

**Winterberry Holly (Slope)**

**Wild Cherry**

# Rain Garden Design Samples

## DEER TOLERANT RAIN GARDEN

### Base

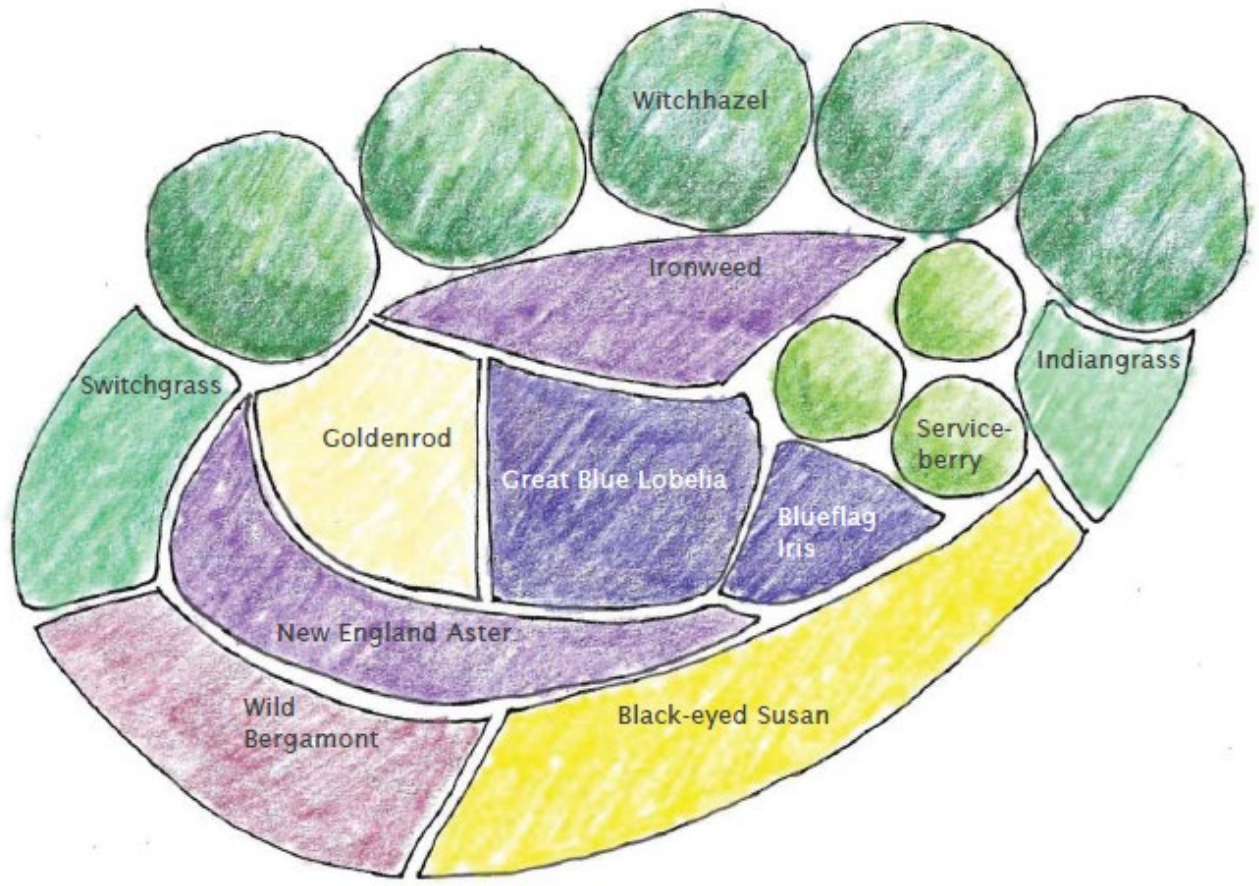
- Blueflag Iris
- Goldenrod
- Great Blue Lobelia

### Slope

- Ironweed
- New England Aster
- Serviceberry

### Buffer

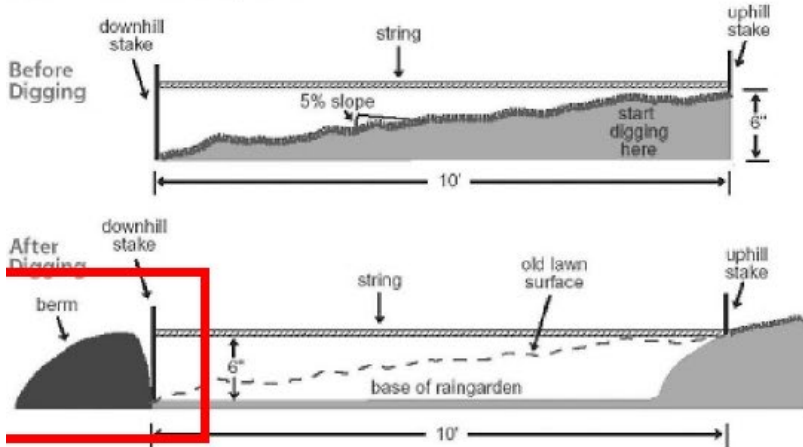
- Black-eyed Susan
- Indiangrass
- Switchgrass
- Wild Bergamont
- Witchhazel



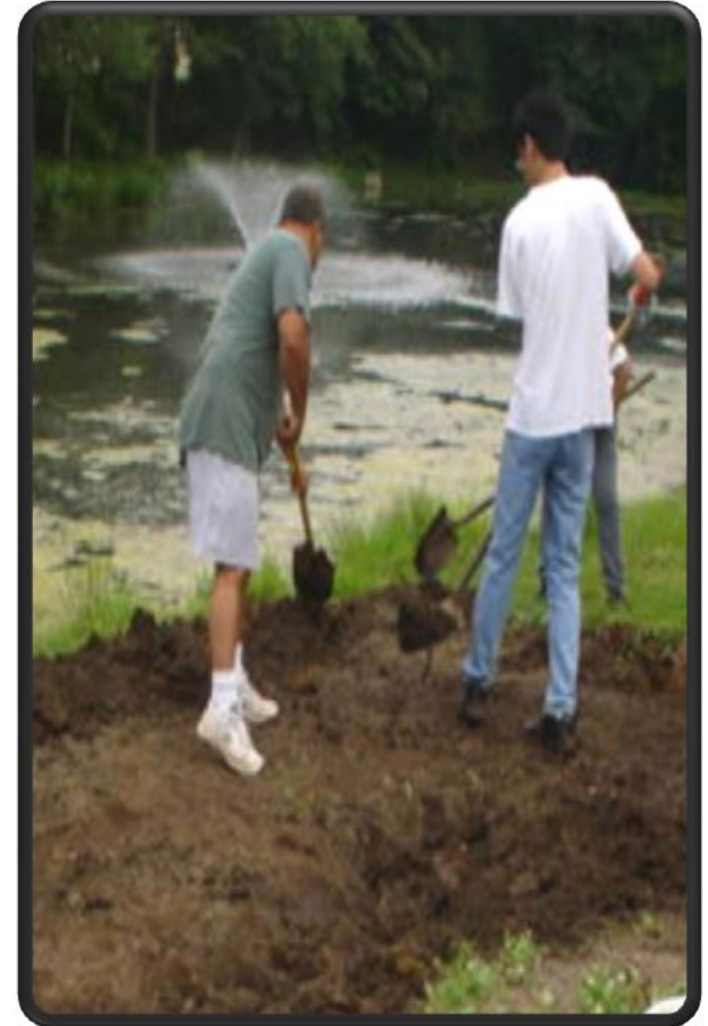
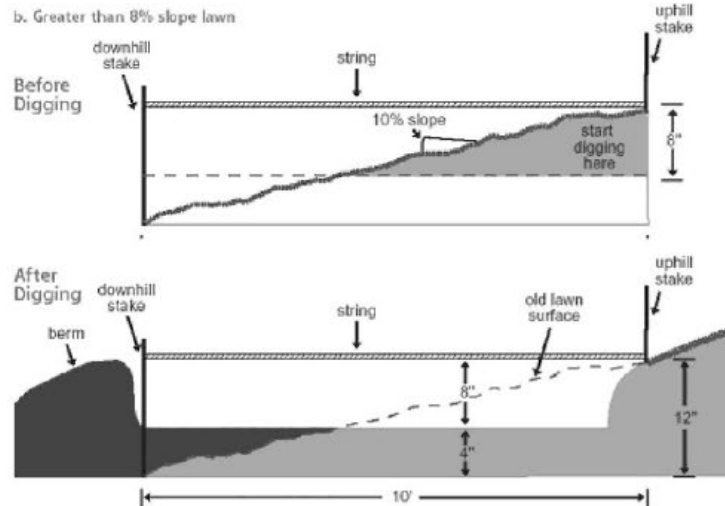
# Installation

## Prepare the Berm

a. Between 3% and 8% slope lawn



b. Greater than 8% slope lawn



*Leonard Park, Morris County*

# Installation

## Prepare the Overflow



*Gloucester County 4-H Fairgrounds*

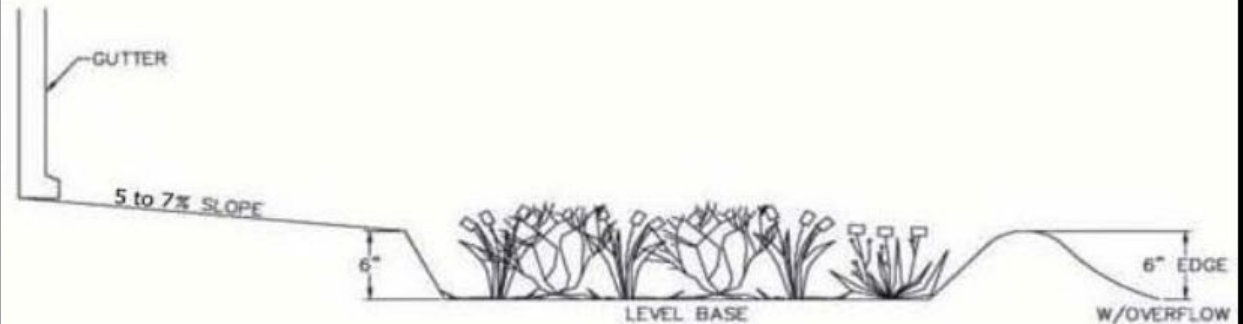


*Leonard Park, Morris County*

# Installation

## Level the Lowest Zone/ Ponding Area

Figure 4. Plants at base of a 6-inch deep Rain Garden



*Wheaton Arts and Cultural Center, Cumberland County*

# Installation

## Plant the Native Plants



*Ulster County, New York*



*Hockman Farm, Winchester, Virginia*



# Installation

Apply the Mulch

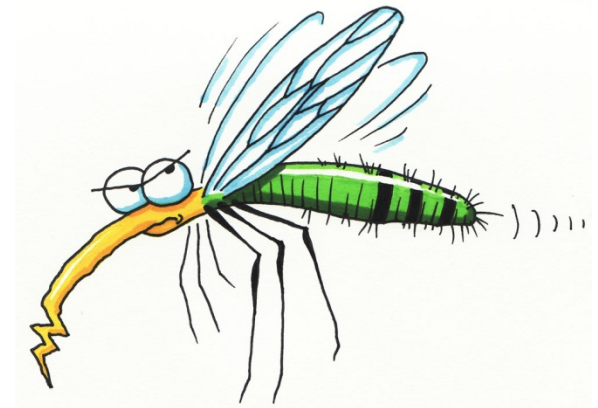


*Ulster County,  
New York*

# FAQ's

## *Will my rain garden cause a mosquito problem?*

- There shouldn't be a mosquito problem if the garden is properly sited and designed. Rain gardens should drain in less than two days.
- Mosquitoes have a 10 day life cycle from egg to adult.
- Mosquitoes that carry most diseases do not live in ponds. They prefer small amounts of standing water such as holes in trees, old tires or bird baths.



# FAQ's

## *Will my rain garden cause flooding?*

If your rain garden does not drain out the water after ~24 hours, it is time to re-evaluate your rain garden. Maybe try:

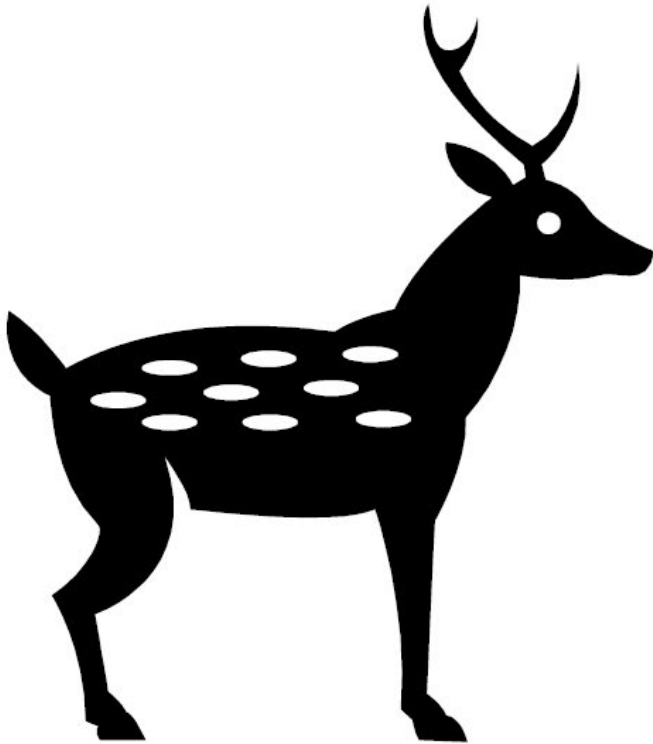
- Building berms and/or adding plants
- Adding COARSE sand (not sandbox sand) with organic mulch to the rain garden to help infiltrate the water



# FAQ's

## *What about deer?*

Try fencing, deer resistant plants, or deer retardant sprays.



*New Jersey Highlands Council Building, Morris County*

# FAQ's

## *How do I slow down the speed of water as it enters the garden?*

Try one or more of the following:

- (1) Attach a perforated plastic diffuser to the end of your gutter/ downspout
- (2) Use river rock at the entrance point of the rain garden
- (3) Site your rain garden within a 10 – 15 foot grass buffer between the garden and the gutter/downspout. Use native grasses and let them grow tall.



# In summary...

- Rain gardens are designed to intercept, treat, and infiltrate stormwater at the source, before it becomes runoff.
- The plants are native to the region and help retain contaminants that could otherwise harm nearby waterways.
- Rain gardens are beautiful, inexpensive and low-maintenance gardens that you can easily install at home.



# Rain Garden at Fairview Farm

## Woody Plants

Dwarf Pussy Willow – *Salix gracillistyla*

Inkberry - *Ilex glabra*

Red Osier Dogwood - *Cornus sericea*

Summersweet Clethera - *Clethera alnifolia*

## Herbaceous Plants

Phlox - *Phlox paniculata*

Blue Star - *Amsonia hubrichtii*

Bee Balm - *Monarda fistulosa*

Blueflag Iris - *Iris versicolor*

Bee Balm - *Monarda didyma*

Obedient plant - *Physostegia virginiana*

Black Eyed Susan – *Rudbeckia hirta*

**+ Native Warm Season Grasses**



# Rain Garden at The Watershed Institute



SOLIDAGO RUGOSA = *Wrinkle Leaf Goldenrod*  
ECHINACEA PURPEREA = *Purple Coneflower*  
LOBELIA CARDINALIS = *Cardinal Flower, Red Lobelia*  
CAREX STRICTA = *Tussock Sedge*  
JUNCUS EFFUSUS = *Soft Rush*  
IRIS VERSICOLOR = *Blue Flag, Harlequin Blueflag, Northern Blue Flag*  
LIATRIS SPICATA = *Dense Blazing Star or Prairie Gay Feather*

LOBELIA SIPHILITICA = *Great Blue Lobelia*  
ASCLEPIAS INCARNATA = *Swamp Milkweed, Rose Milkweed*  
ASTER NOVAE-ANGLIAE = *New England Aster*  
RUDBEKIA TRILOBA = *Brown-Eyed Susan*  
OSMUNDA CONNAMOMEA = *Cinnamon Fern*  
CAREX PENNSYLVANICA = *Pennsylvania Sedge*  
CAREX PLATYPHYLLA = *Broad Leaf Silver Sedge*  
CAREX AMPHIBOLA = *Creek Sedge, Eastern Narrow-Leaf Sedge*



# Maintenance



- Water the first year while plants are being established
- Watch for drainage
  - Add/Amend
- Reapply mulch annually

# Some of our favorite nurseries

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- Toadshade Wildflower Farm (Frenchtown)
- Wild Ridge Plants (Alpha)
- Bowmans' Hill Wildflower Preserve (Bucks County, PA)
- Cooper's Hollow Farm (Bernardsville)
- Back to Nature Home and Garden (Basking Ridge)
- Pinelands Nursery (Bordentown)





Raritan  
Headwaters

# Thank you!



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