RUTGERS UNIVERSITY
Water Resources Program
New Jersey Agricultural Experiment Station

Green Infrastructure Champion Workshop: Designing Rain Gardens for Property Owners

Long Branch, NJ

September 30, 2025

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water.rutgers.edu

AGENDA

1. Introduction and review of program objective
2. Review of rain garden educational presentation
3. Instruction on how to deliver an in-person technical design workshop
    a) Select rain garden location
    b) Determine rain garden drainage area
    c) Web soil survey
    d) Rain garden sizing
    e) Plant information
    f) Sample designs
    g) Maintenance guide
4. Discuss advertising workshop
5. Questions?

Program Objective

Train Green Infrastructure Champions on how to design rain garden for property owners

How do we get property owners wanting a rain garden?

1. Education people on what a rain garden is and why they are important
2. Emphasize personal responsibility – doing your part to save the planet

Who is our target audience?

1. Environmental Commissioners, Green Team Members, and Shade Tree Commissioners
2. Environmentally Conscientious Property Owners
3. School Teachers and Principals
4. Youth Groups

How do we educate them?

1. Rain Garden Commercial – video and/or PowerPoint (15 minutes)
2. Rain Educational PowerPoint Presentation (45 minutes)
3. Rain Garden Design Session (45 minutes)

What tools do we have to help?

1. Rain Garden Design Manual
2. Rain Garden App
3. Rain Garden Templates (we'll show you later)
4. AmeriCorps Watershed Ambassadors
5. RCE County Agents
6. RCE Water Resources Program

Rain Garden PowerPoint Presentation

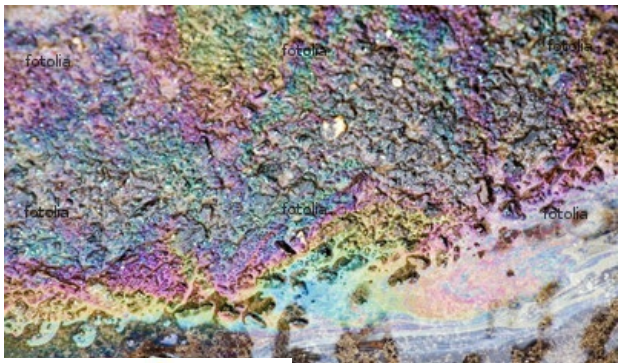
What happens to the rain in our watersheds?

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

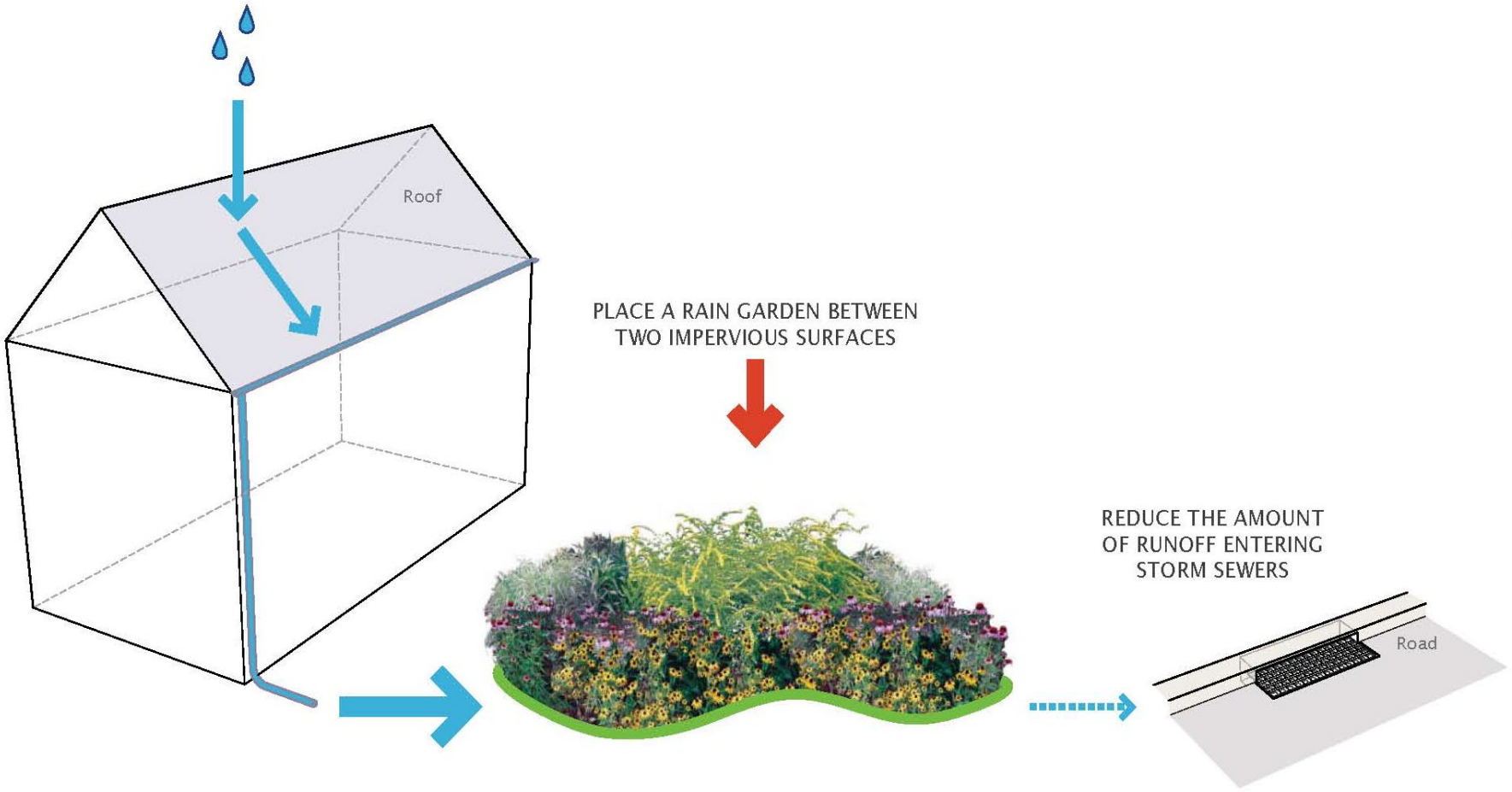


The Impact of Development on Stormwater Runoff

more development → *More impervious surfaces* → *more stormwater runoff*

Connected or Disconnected?

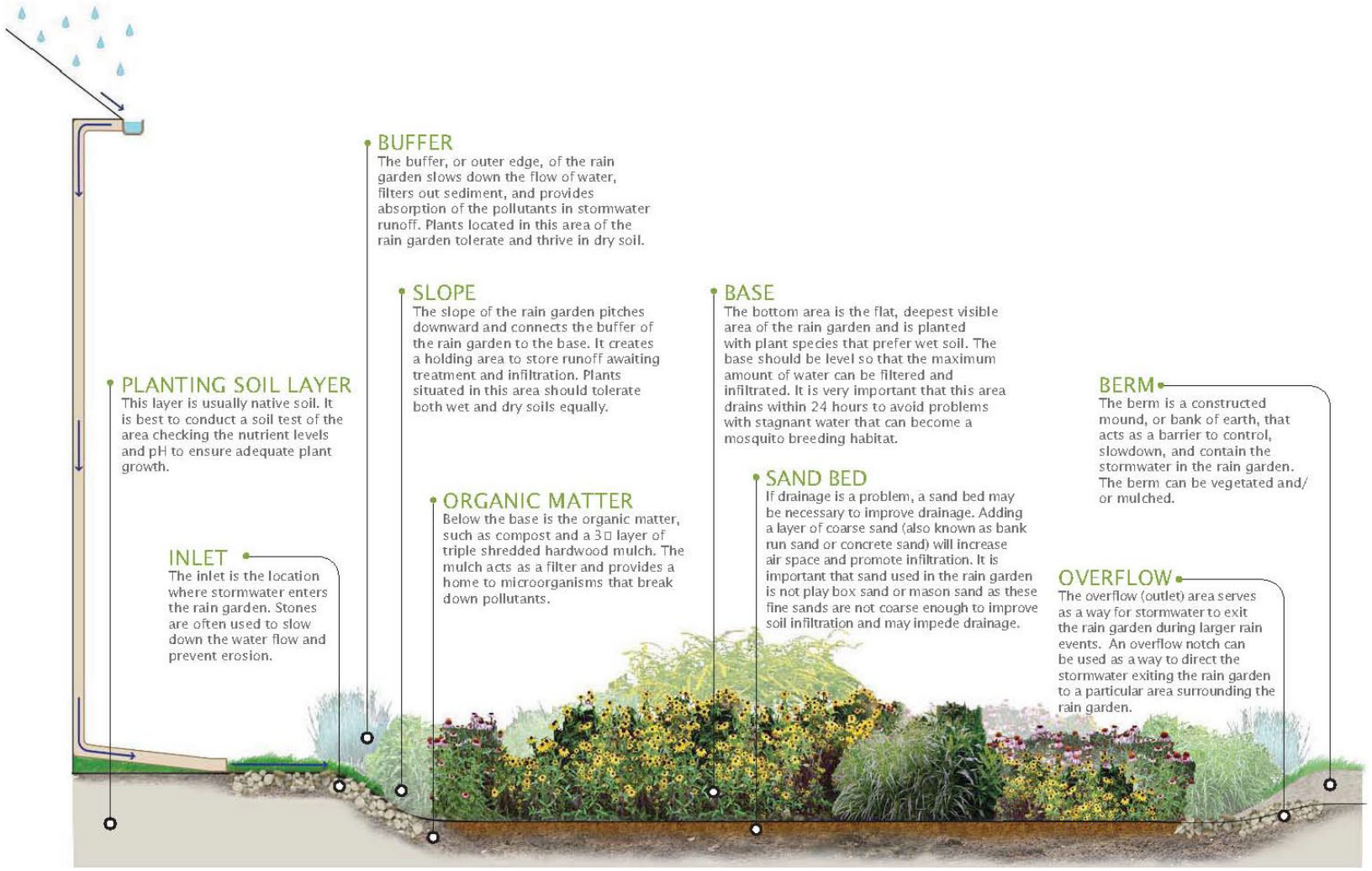
The Solution…



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

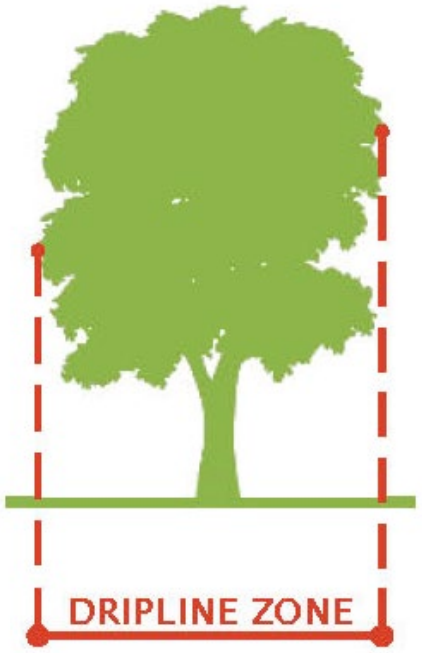


SITE SELECTION & DESIGN

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

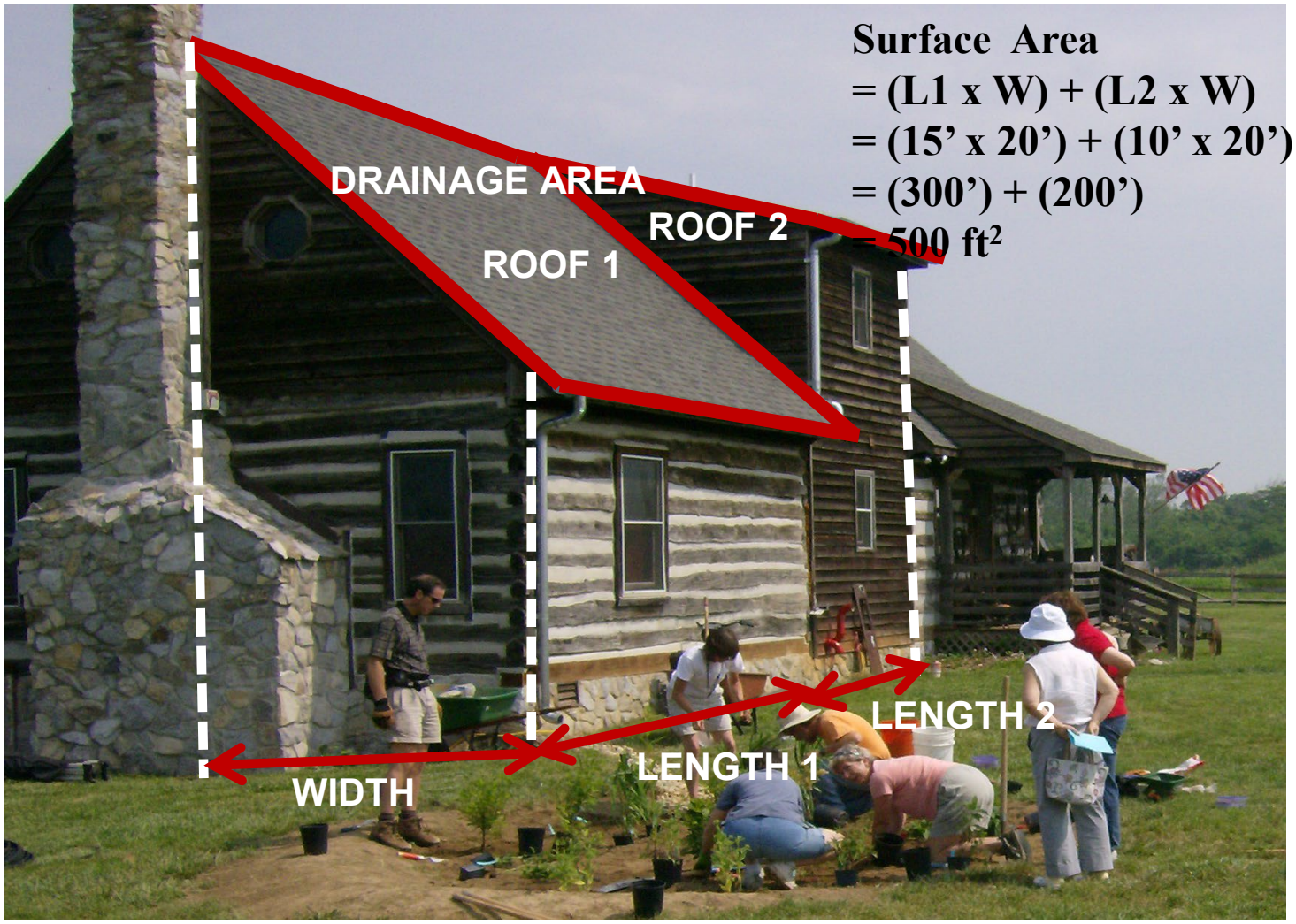



8. 2. 2004

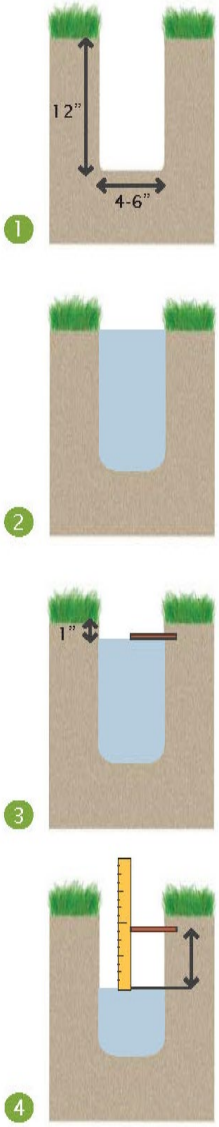
CALL BEFORE YOU DIG

- **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

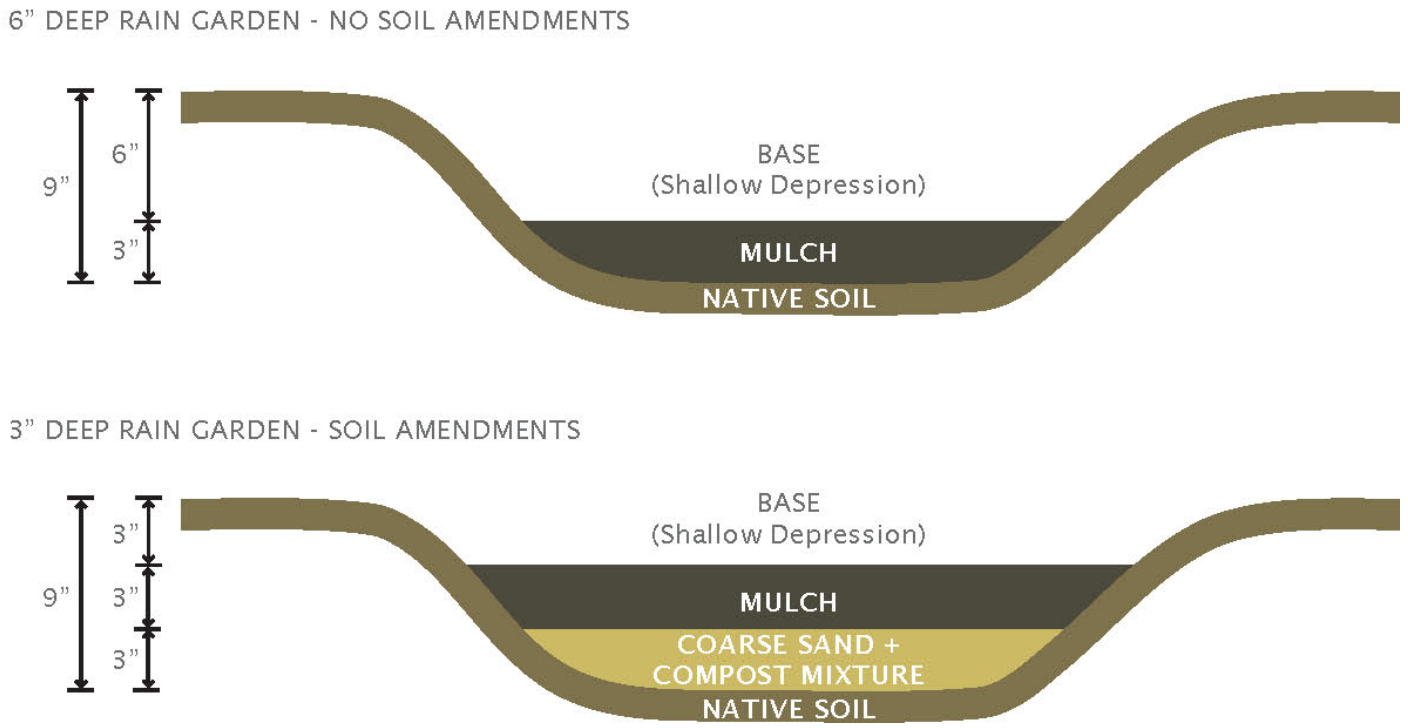


CHECK YOUR SOIL



- 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

DETERMINING THE DEPTH OF THE RAIN GARDEN



- 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)

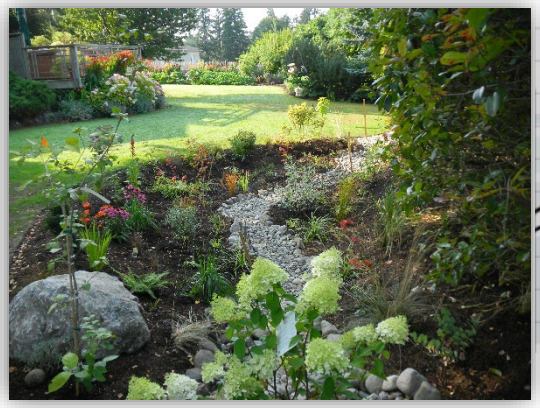
Drainage Area	Size of 3" Deep Rain Garden CLAY SOIL*	Size of 6" Deep Rain Garden SILTY SOIL	Size of 8" Deep Rain Garden SANDY SOIL
500 ft^2	200 ft^2	100 ft^2	75 ft^2
750 ft^2	350 ft^2	150 ft^2	112 ft^2
1,000 ft^2	400 ft^2	200 ft^2	149 ft^2
1,500 ft^2	600 ft^2	300 ft^2	224 ft^2
2,000 ft^2	800 ft^2	400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

*SOIL TEXTURE AMENDMENTS NEEDED

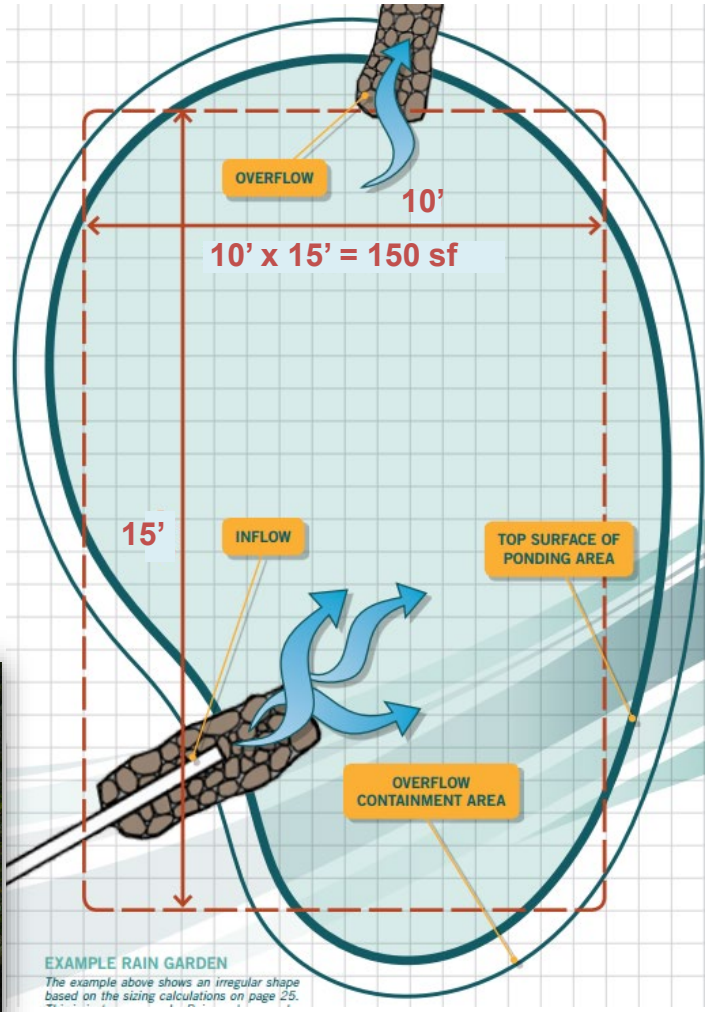
RAIN GARDENS
Typical Size

What is a typical rain garden size?

- Typically100-200 square feet.
- A 100 square feet rain garden will often receive water from an area 5 to 10 times larger than the rain garden..

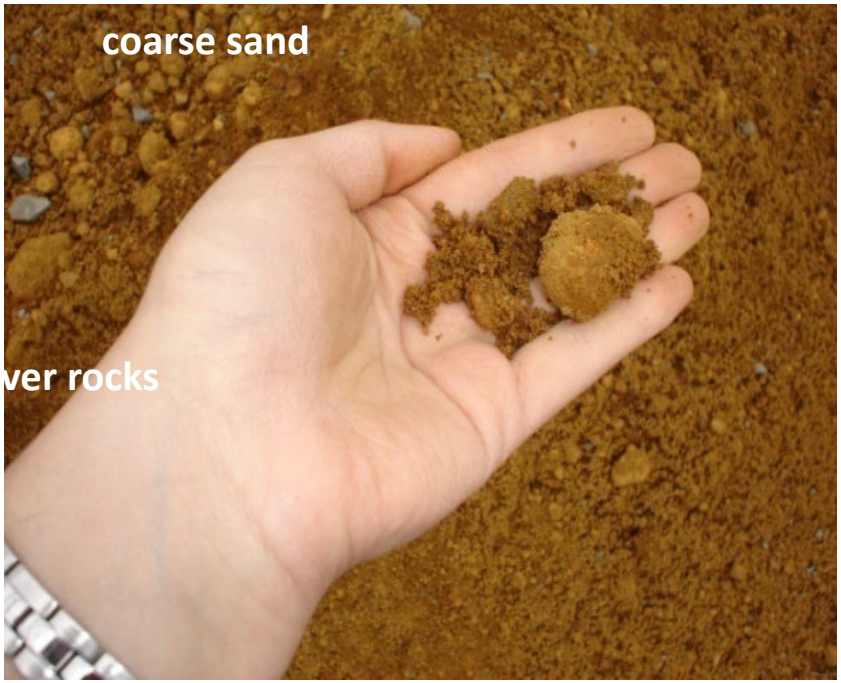


Modified from Rain Garden Handbook for Western WA



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)

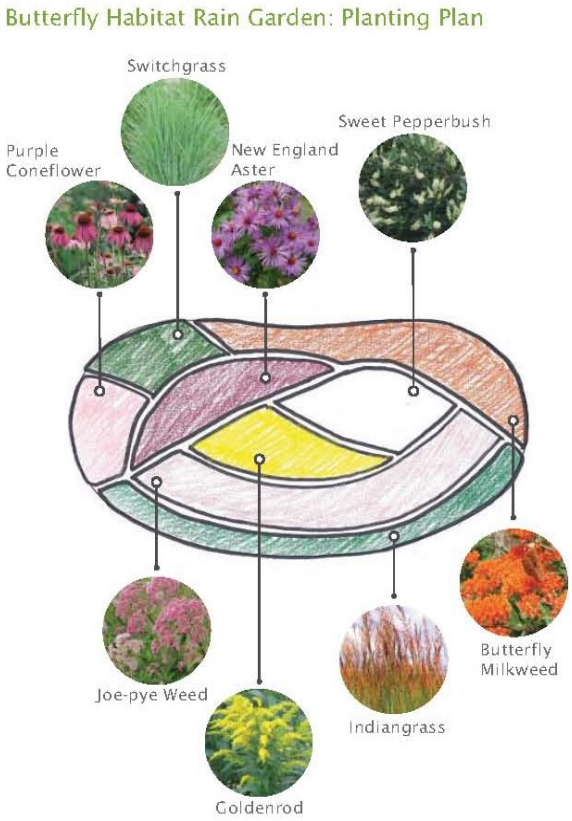
DETERMINING MULCH QUANTITY

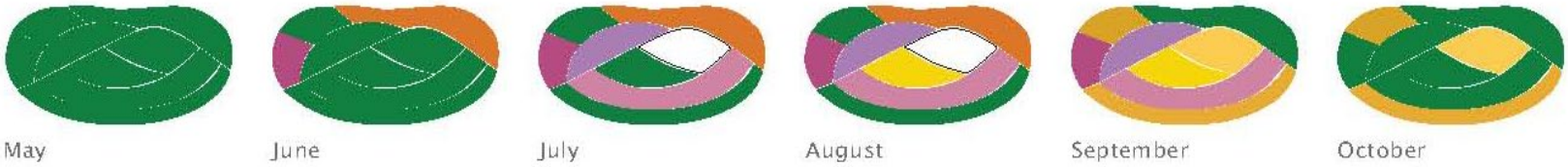
- Allow for a 3” depth mulch (triple-shredded hardwood with no dye) to be spread throughout the entire rain garden
- Every 100 square feet of rain garden needs 1 cubic yards (3” depth)

RAIN GARDEN DESIGN

SHAPING YOUR RAIN GARDEN

- Use a garden hose or rope to outline the desired shape of your rain garden on the ground
- Many rain gardens are in the shape of a circle or kidney bean, but your rain garden can take on whatever shape you prefer





THE FUN PART!

INSTALLING YOUR RAIN GARDEN

STEP ONE

- Delineate rain garden area

- Remove existing grass with a shovel or machinery

STEP TWO

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

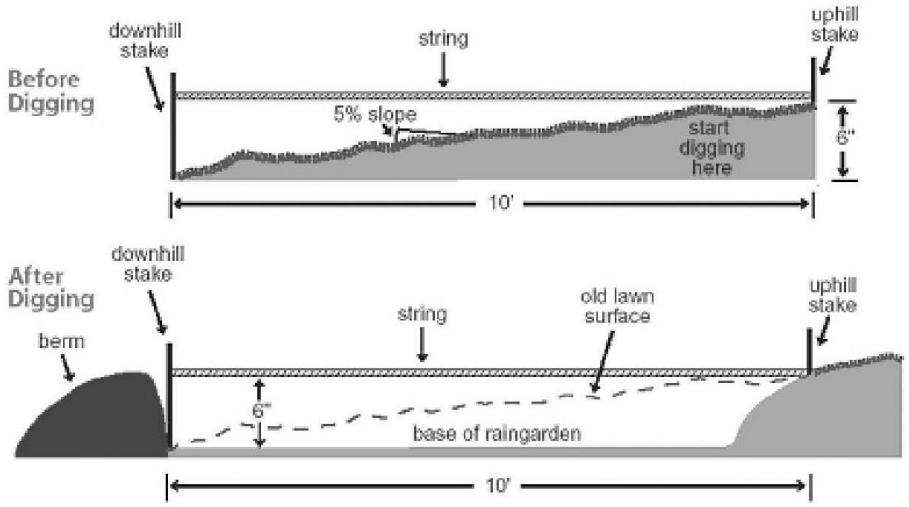
STEP THREE

- Add soil amendments, if necessary

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

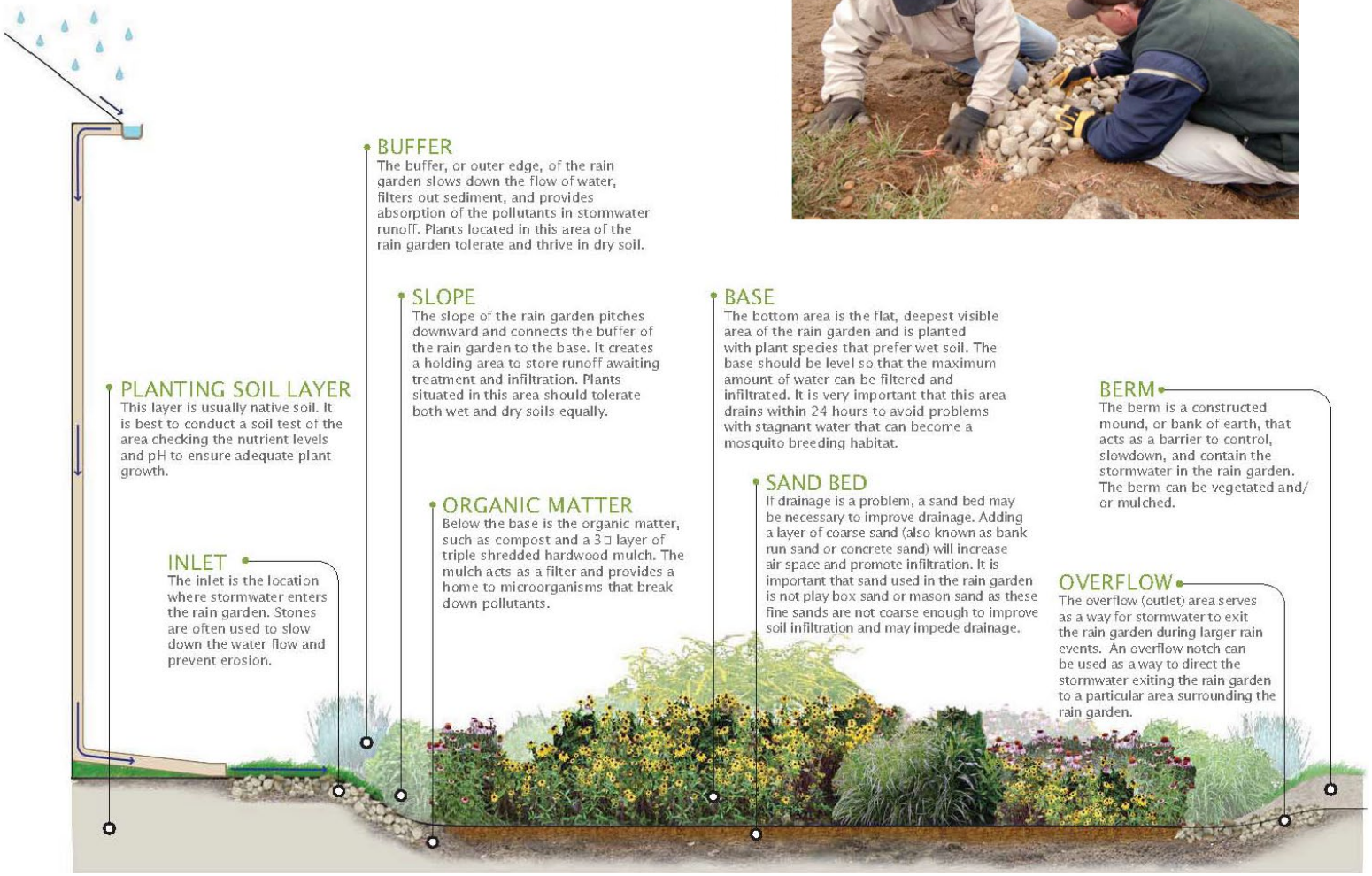
STEP FOUR

- Prepare the berm, if necessary



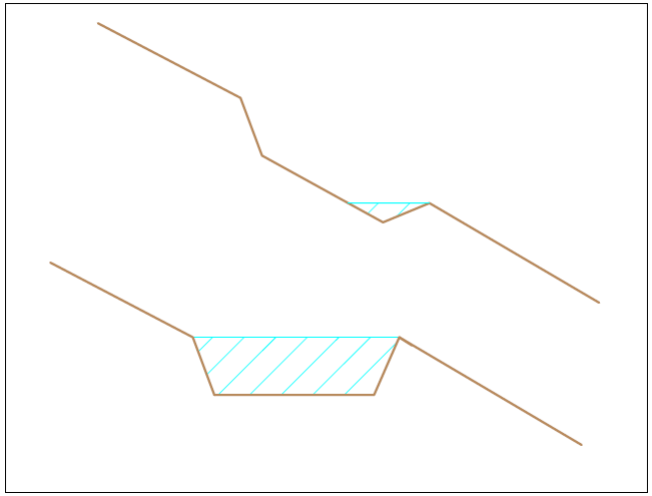
STEP FIVE

- Prepare the overflow



STEP SIX

- Level the rain garden base



STEP SEVEN

- 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

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

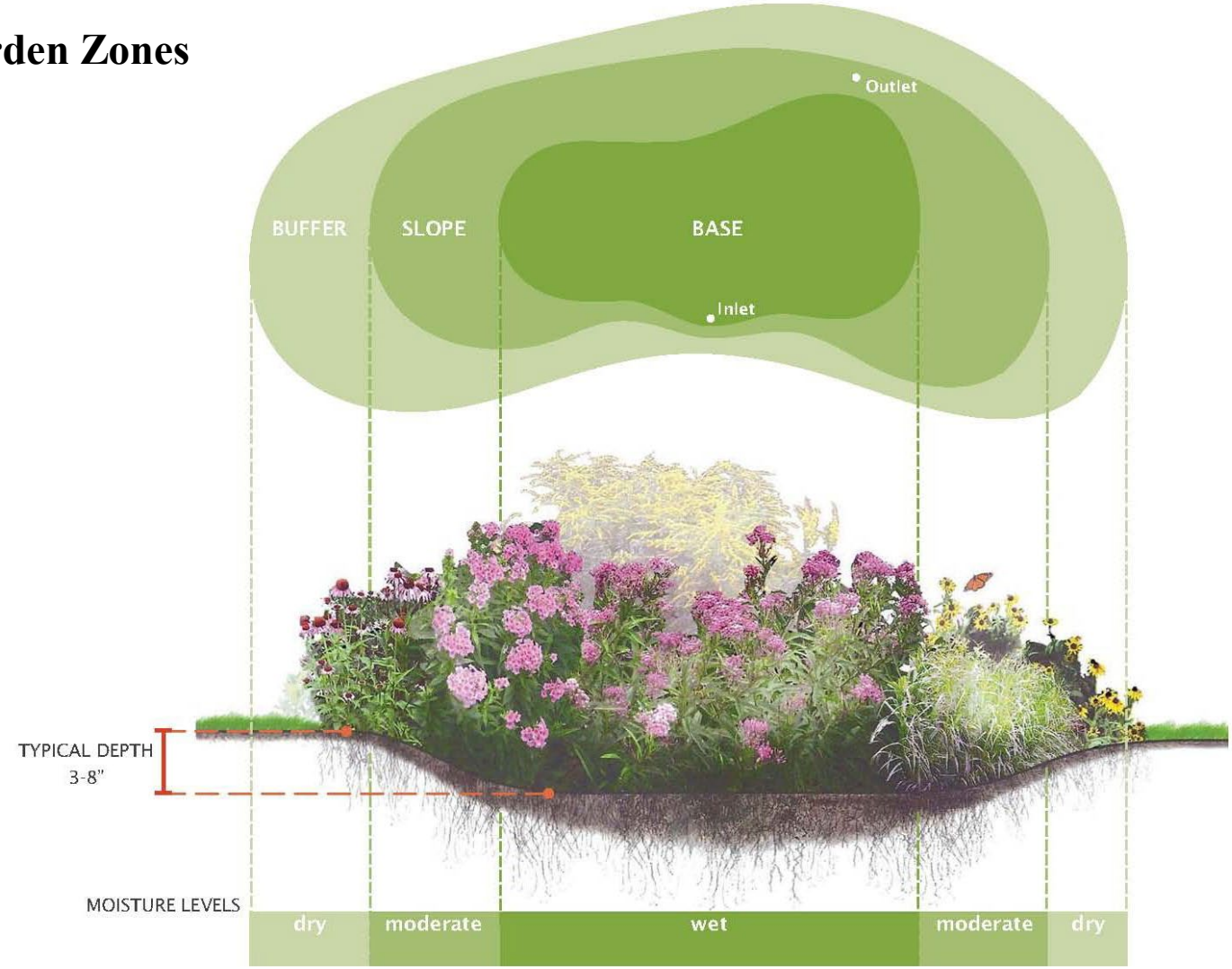
- Sun vs. shade
- Exposure/wind
- Soil characteristics
- Hydrologic conditions
- Road salts
- Vehicle/pedestrian traffic

PLANTS IN THE RIGHT PLACE…

Courtesy of Pinelands Nursery & Supply

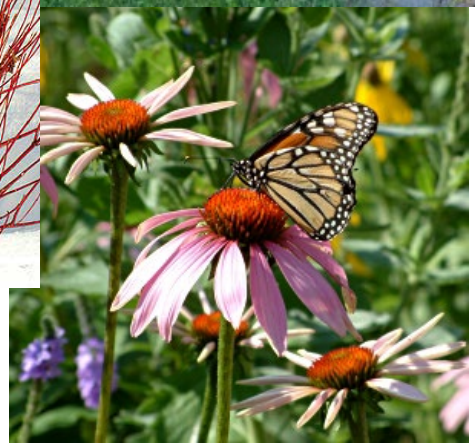
PLANTING DESIGN: Wet + Dry Conditions

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

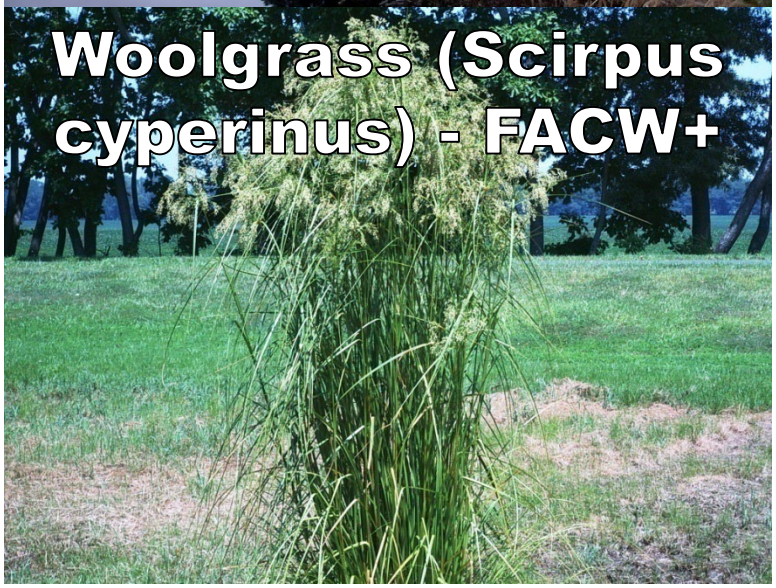
BASE

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

SLOPE

- Bluejoint grass
- Sedges
- Fowl mannagrass
- Softrush

GRASSES & GROUND COVERS



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

WILDFLOWERS

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

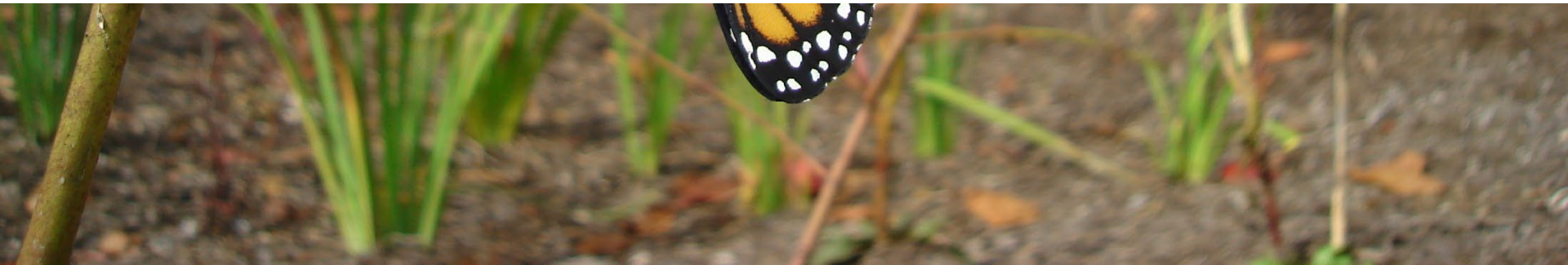
SLOPE

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

TREES & SHRUBS

INSPECTION AND MAINTENANCE

MAINTAINING YOUR RAIN GARDEN



MAINTENANCE MEASURES

WEEKLY TASKS:

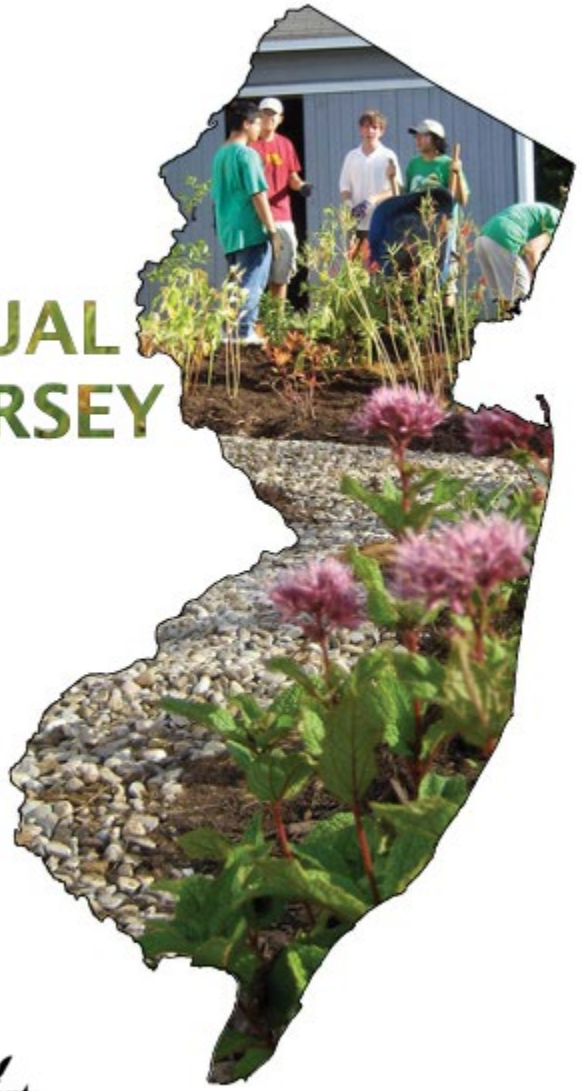
1. Watering
2. Weeding
3. Inspecting

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)

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

RAIN GARDEN MANUAL OF NEW JERSEY



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Water Resources Program

Northeast States & Caribbean Islands Regional Water Center

Sea Grant NJ Sea Grant Consortium

Rain Garden 4+

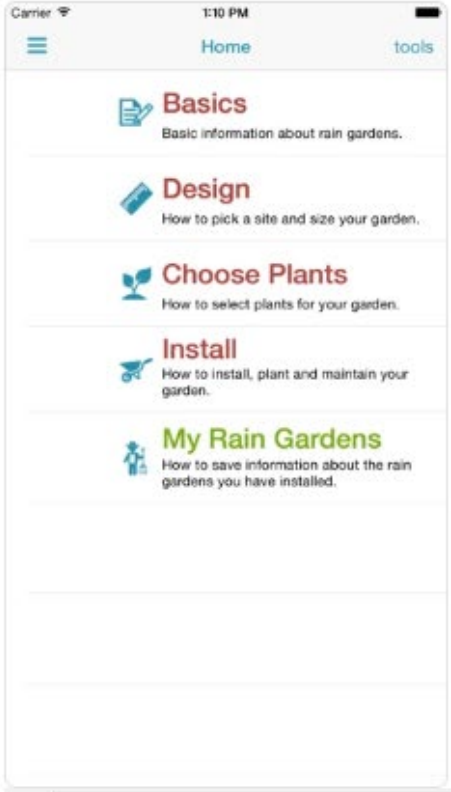
University of Connecticut

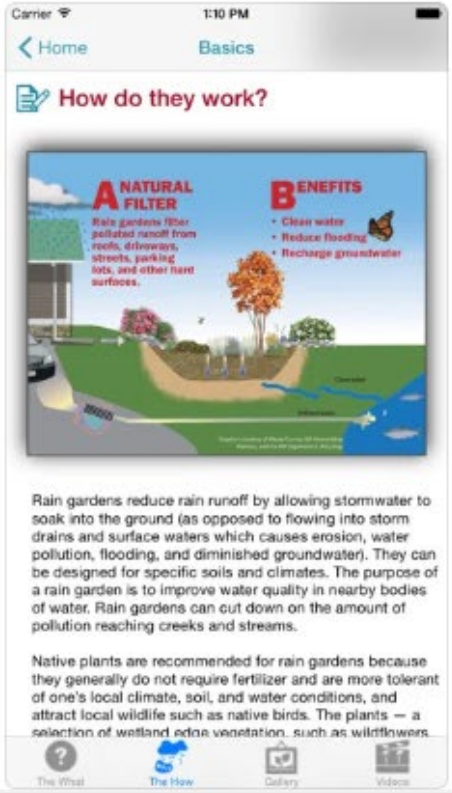
Designed for iPhone

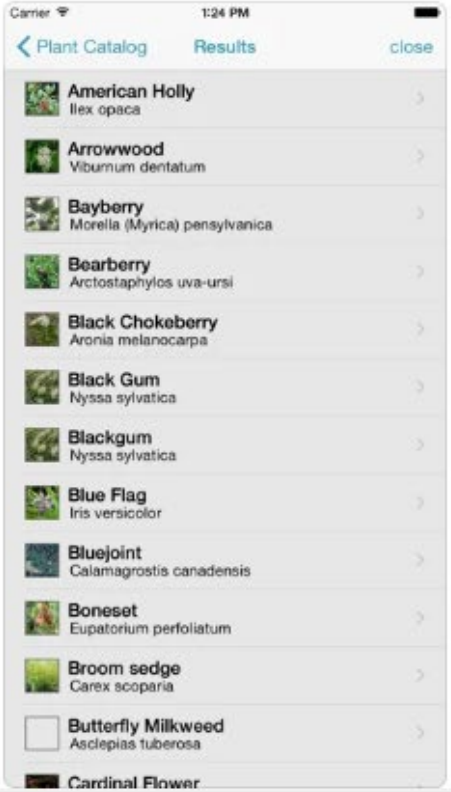
★★½☆☆ 2.6 • 11 Ratings

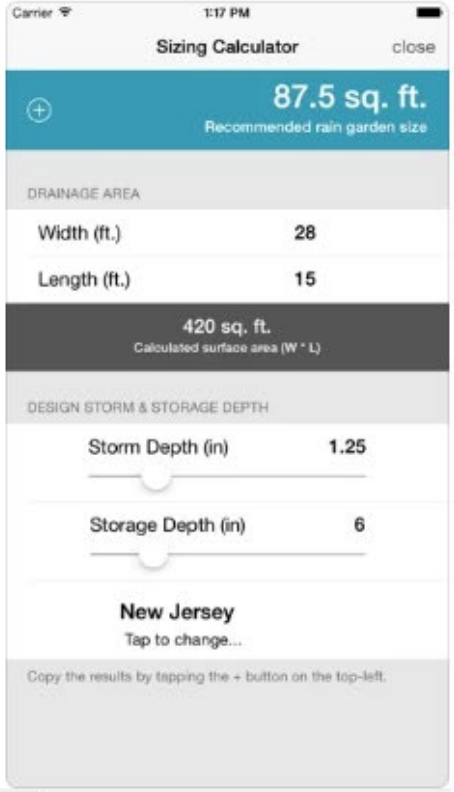
Free

iPhone Screenshots









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The design session will be held on _____from _____ to _____. Contact your local Green Infrastructure Champion to sign up to get your free rain garden design.

Josephine Smith, GI Champion
JSmith999@aol.com

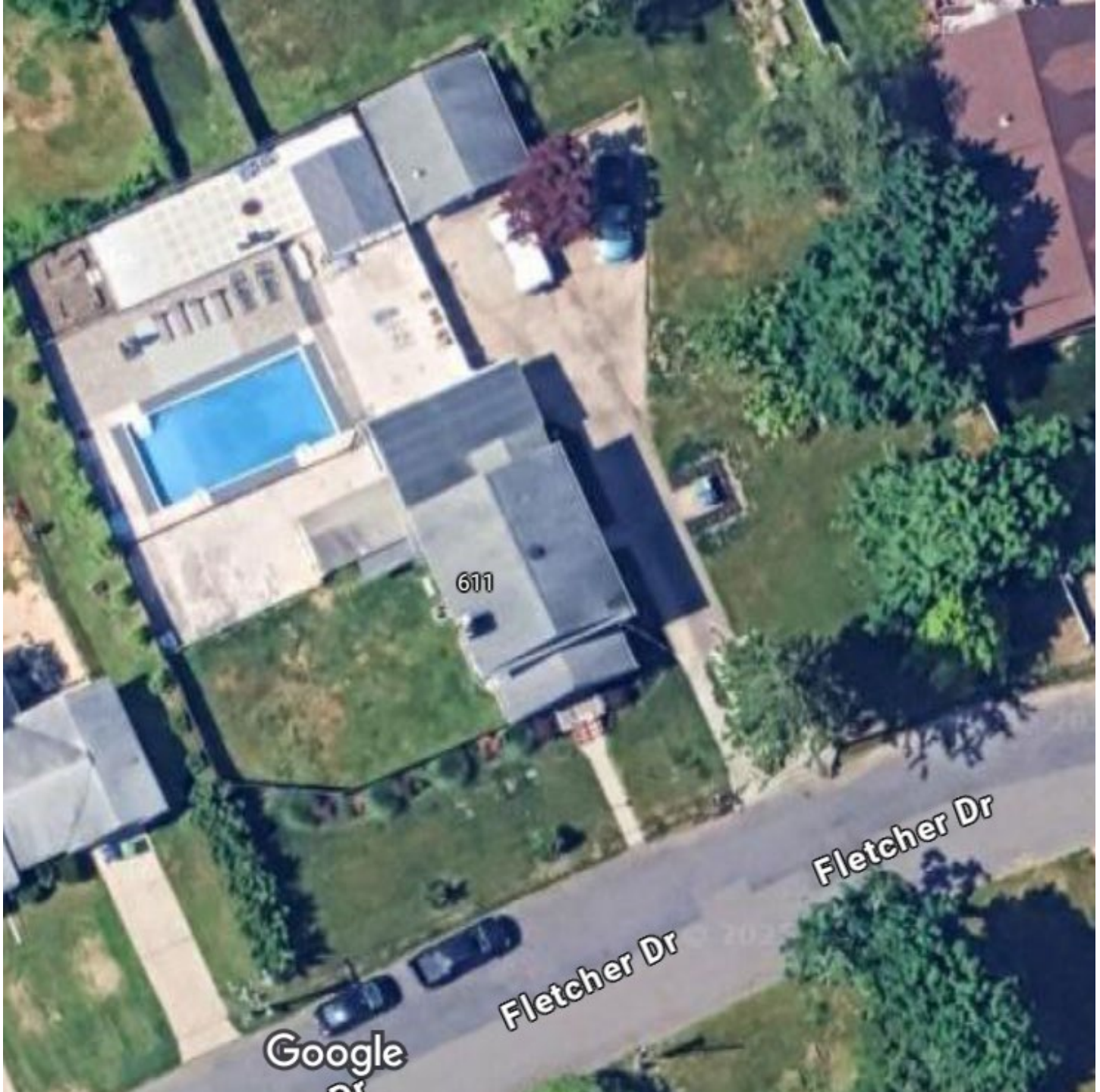
Rain Garden Design Session

Materials available sample designs

1. Posterboard of sample designs are available for each GI Champion that hosts a workshop (12 posters)
2. Rain garden manual will be provided
3. Homeowner rain garden throughout the years PowerPoint presentation and booklet will be provided
4. Plant fact sheet books will be provided
5. Green infrastructure guidance manual will be provided

Steps to developing a design

1. Ask homeowner where they want the garden (google maps can be used to view the home to determine if this is an appropriate location)
2. Determine the area that would drain to the garden (google maps' measure tool can be used to calculate the drainage area)
3. Use Web soil survey to identify soil type and infiltration test data to determine if the soils drain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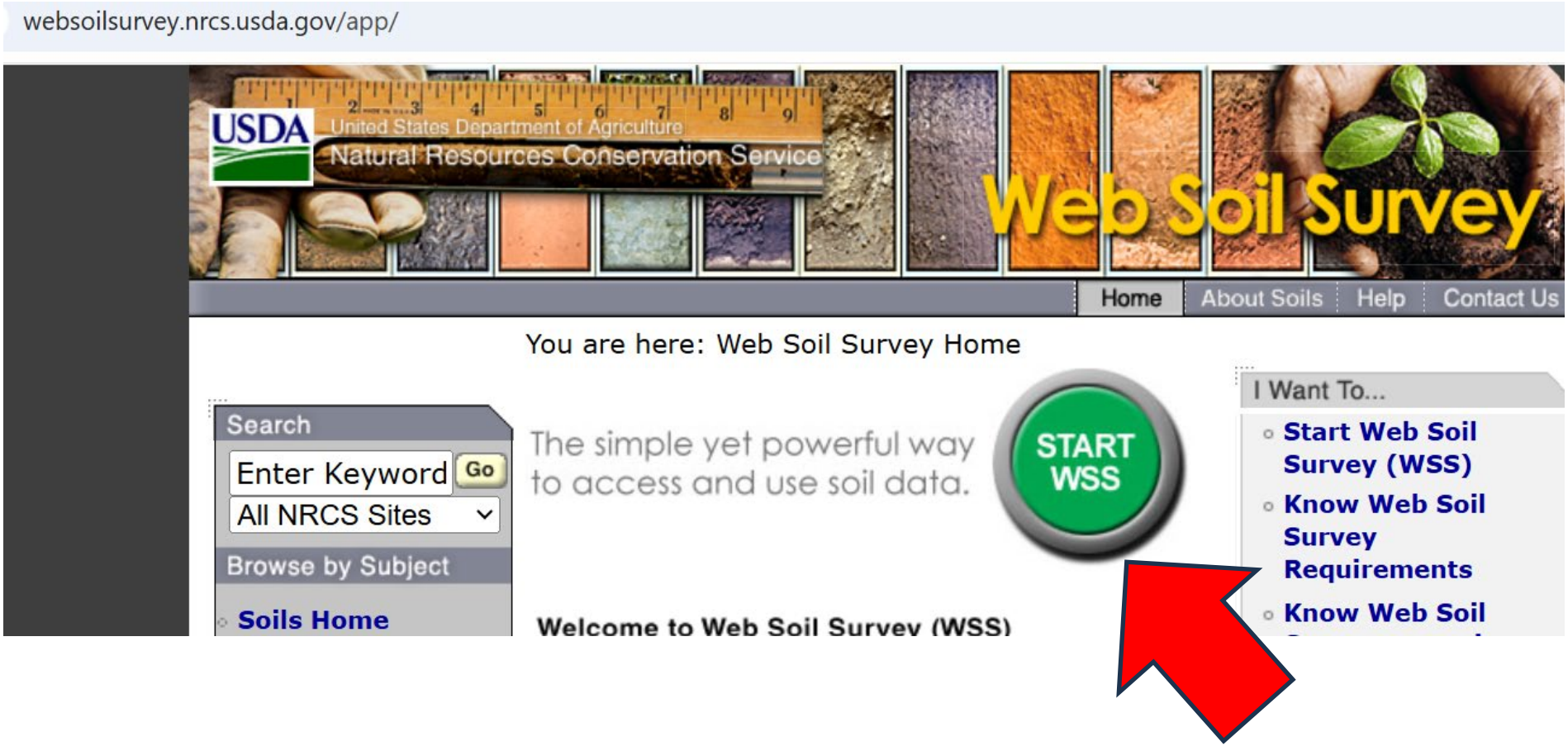
https://websoilsurvey.nrcs.usda.gov/app/



Area of Interest (AOI) | Soil Map | Soil Data Explorer | Download Soils Data | Shopping Cart (Free)

Search

Area of Interest

Import AOI

Quick Navigation

Address

View

Address: 611 Fletcher Dr Neptune NJ

Show location marker

View

State and County

Soil Survey Area

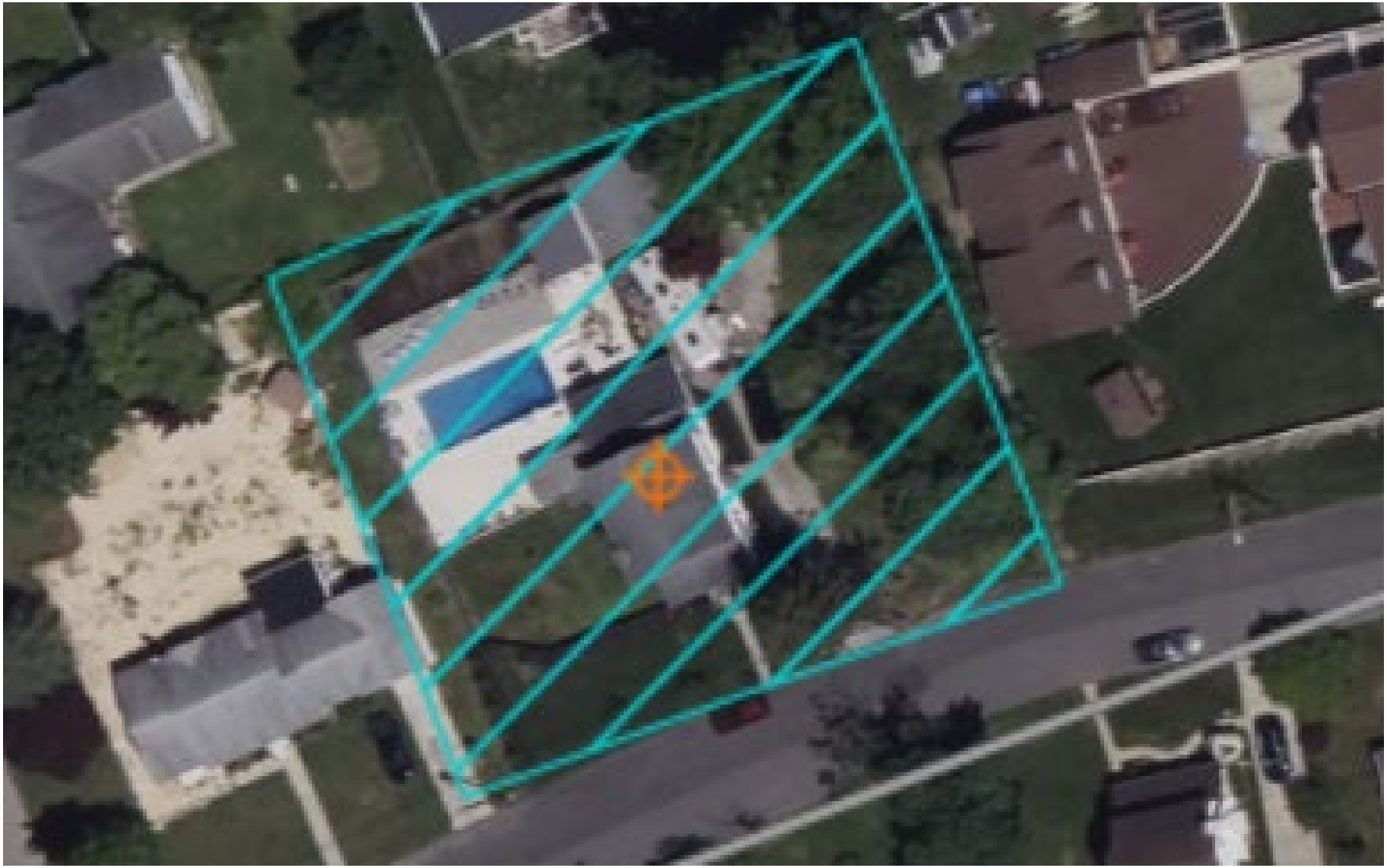
Latitude and Longitude or Current Location

PLSS (Section, Township, Range)

Legend

Area of Interest Interactive Map

View Extent: Contiguous U.S.



Area of Interest (AOI) | **Soil Map** | Soil Data Explorer | Download Soils Data | Shopping

Search

Map Unit Legend

Monmouth County, New Jersey (NJ025)

Monmouth County, New Jersey (NJ025)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DouB	Downer-Urban land complex, 0 to 5 percent slopes	0.5	100.0%
Totals for Area of Interest		**0.5**	**100.0%**

Legend

Soil Map

Scale (not to scale)

Map Unit Description

Printable Version

Report — Map Unit Description

Monmouth County, New Jersey

DouB—Downer-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 4j72
Elevation: 0 to 170 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Downer and similar soils: 60 percent
Urban land: 30 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and trans
mapunit.

Description of Downer

Setting

Landform: Low hills, knolls
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits and/or grave
fluviomarine deposits

Typical profile

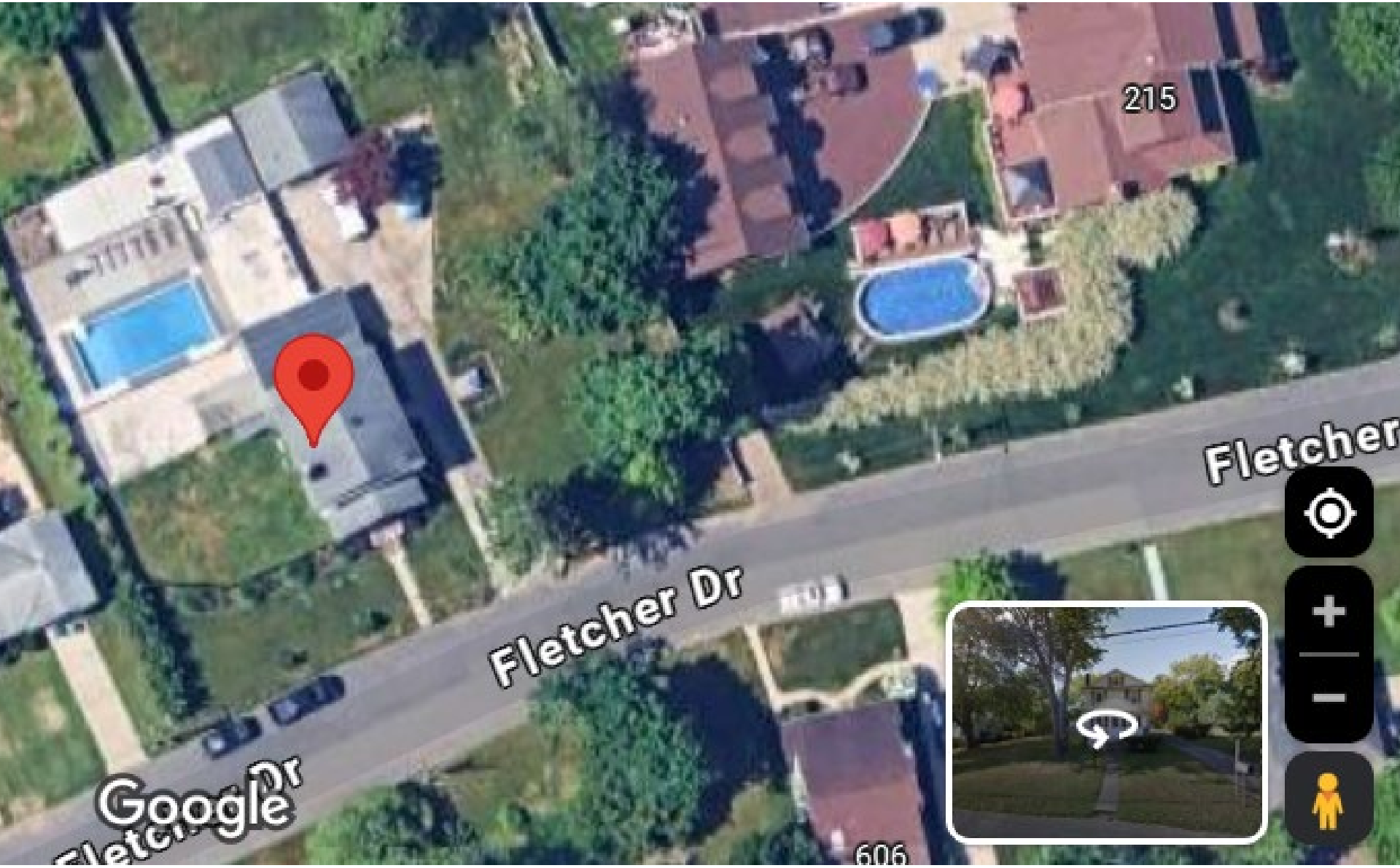
Ap - 0 to 10 inches: sandy loam
Bt1 - 10 to 16 inches: sandy loam
Bt2 - 16 to 36 inches: sandy loam
C1 - 36 to 48 inches: loamy sand
C2 - 48 to 80 inches: stratified sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat):
Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F153DY160NJ - Well Drained Coarse-Loamy Upland
Hydric soil rating: No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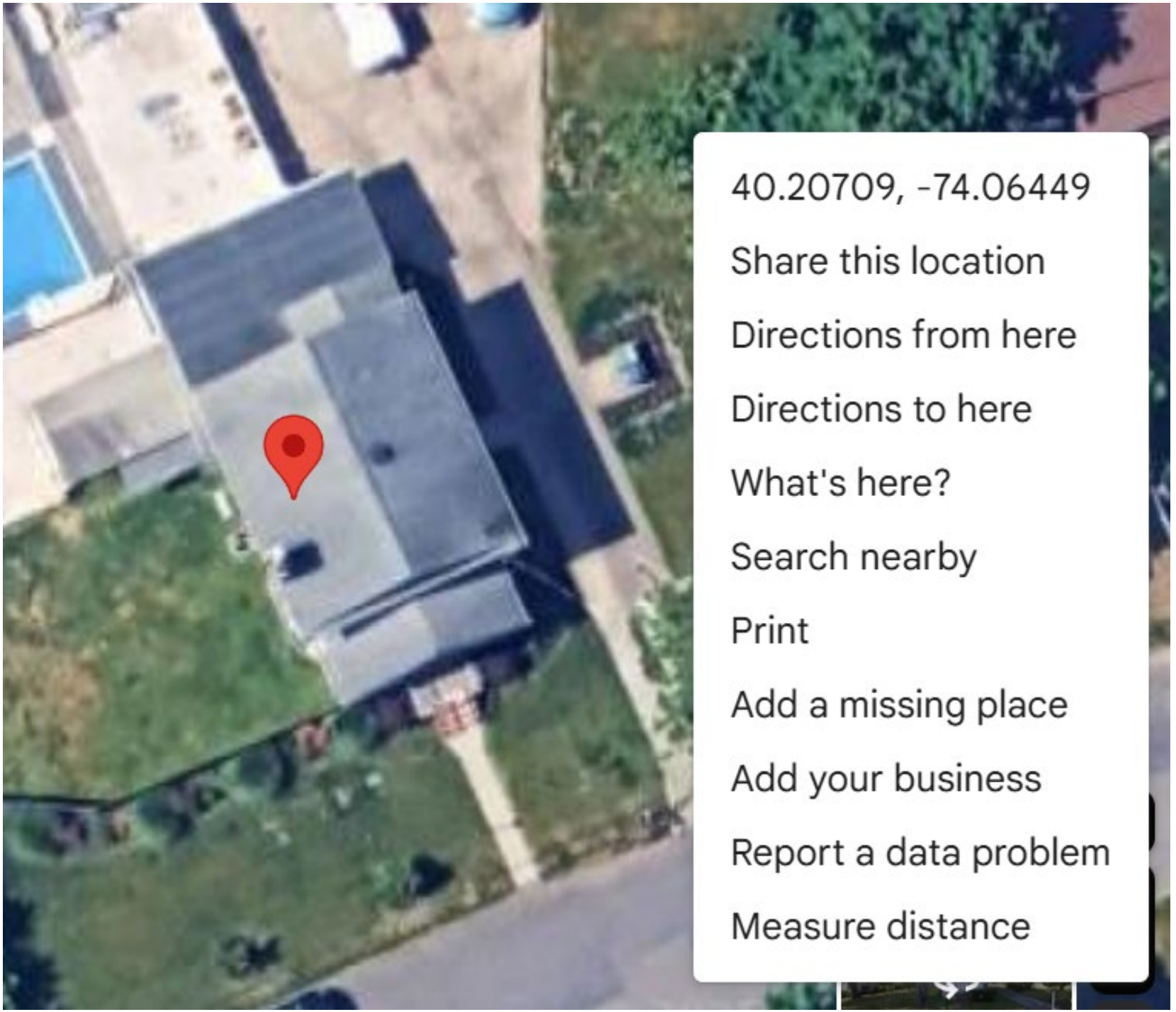
40.20709, -74.06449
Share this location
Directions from here
Directions to here
What's here?
Search nearby
Print
Add a missing place
Add your business
Report a data problem
Measure distance

15.0 ft x 33.3 ft = 500 sq.ft.

Steps to developing a design

1. Select a rainfall total for the design
2. Use residential rain garden design form to determine rain garden size or
3. Use the spreadsheet to determine size of rain garden
4. If soil amendments are needed, use the spreadsheet to calculate quantities
5. Add dimensions to the rain garden cross-section of the rain garden design form

Steps to developing a design

2. Complete rain garden design program form

Date:

Time:

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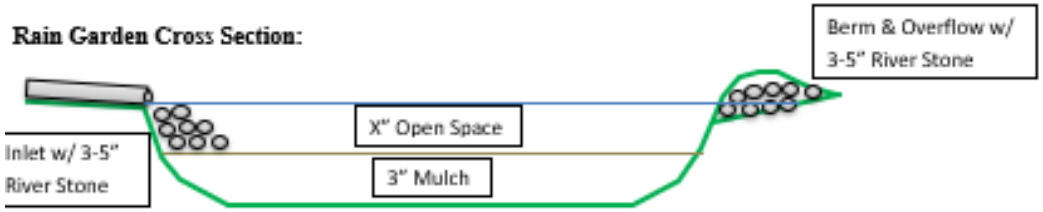
Residential Rain Garden Design Program

Name:	**Address:**
Impervious Cover Calculation:	**Property Soil Type:**
Rain Garden Size:	**Amendments (if necessary):**
Notes:	

Rain Garden Cross Section:



For Reference:

Depth (Soils)	Rainfall	Drainage Area (SF)						
		100	200	300	400	500	750	1000
3" (Clay)	1.25"	40 SF	85 SF	125 SF	165 SF	210 SF	315 SF	415 SF
	1.5"	50 SF	100 SF	150 SF	200 SF	250 SF	375 SF	500 SF
6" (Silt/Loam)	1.25"	20 SF	40 SF	65 SF	85 SF	105 SF	155 SF	210 SF
	1.5"	25 SF	50 SF	75 SF	100 SF	125 SF	190 SF	250 SF
8" (Sand)	1.25"	15 SF	30 SF	45 SF	65 SF	80 SF	115 SF	155 SF
	1.5"	20 SF	40 SF	55 SF	75 SF	95 SF	140 SF	190 SF

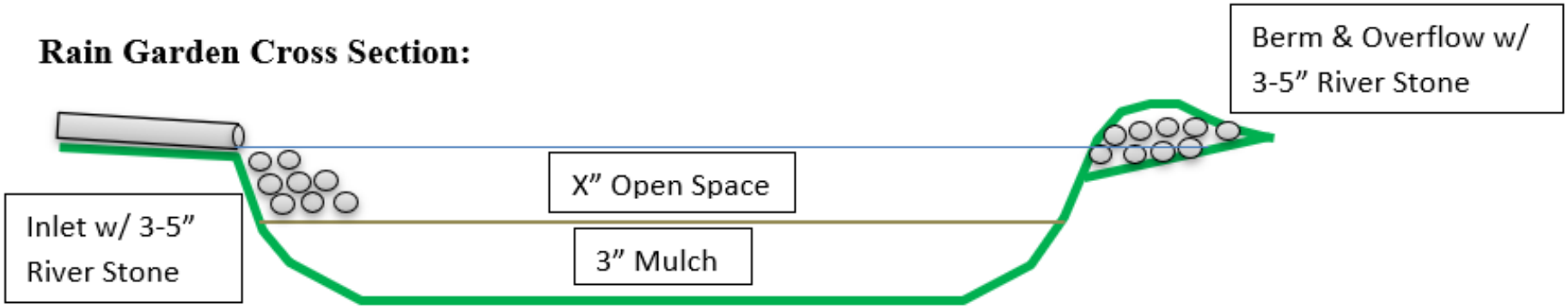
Date:
Time:

RUTGERS UNIVERSITY
Water Resources Program
New Jersey Agricultural Experiment Station

Residential Rain Garden Design Program

Name:	**Address:**
Impervious Cover Calculation:	**Property Soil Type:**
Rain Garden Size:	**Amendments (if necessary):**
Notes:	

Rain Garden Cross Section:



For Reference:

Depth (Soils)	Rainfall	Drainage Area (SF)						
		100	200	300	400	500	750	1000
3" (Clay)	1.25"	40 SF	85 SF	125 SF	165 SF	210 SF	315 SF	415 SF
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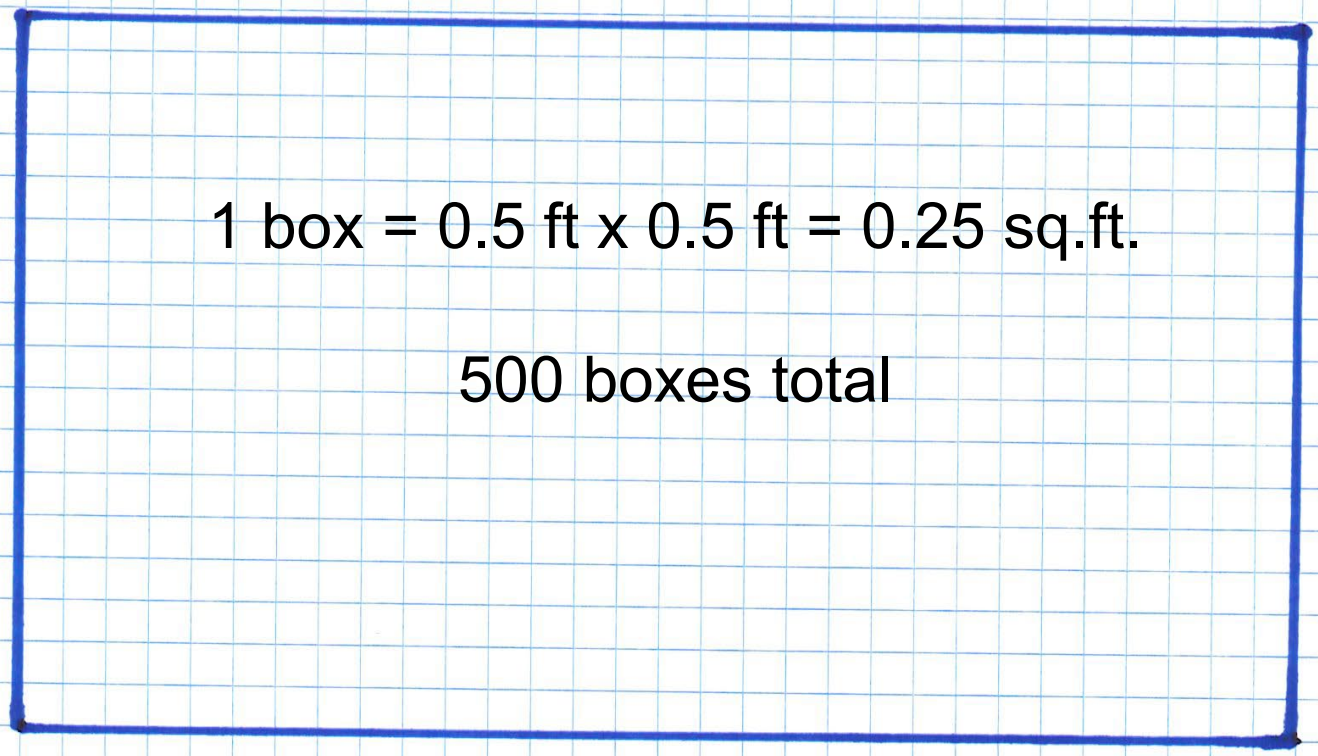
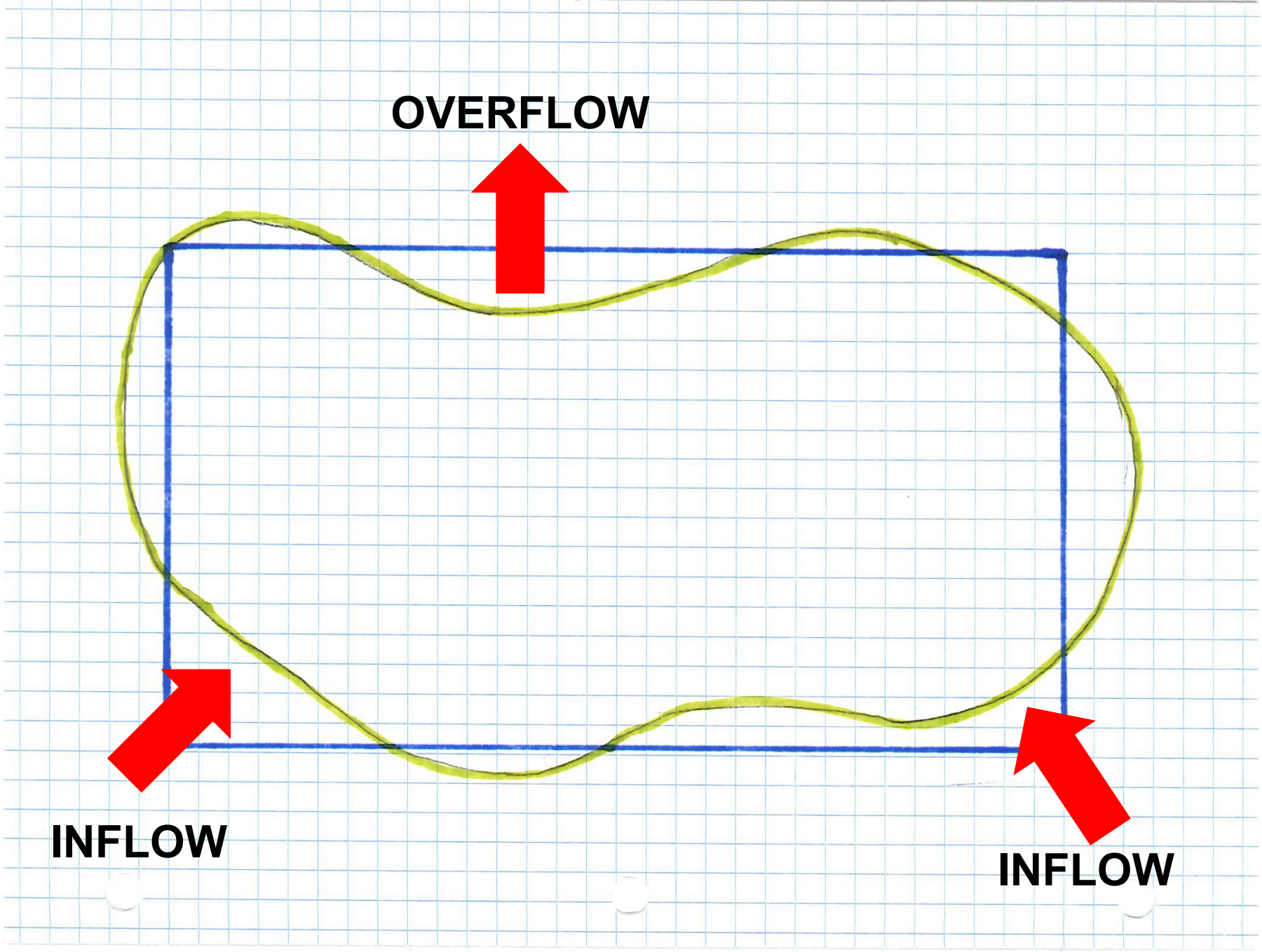

1 box = 0.5 ft x 0.5 ft = 0.25 sq.ft.
500 boxes total
8.3 ft = 16.6 boxes
15 ft = 30 boxes


OVERFLOW
INFLOW
INFLOW

Input Cells		
Calculated Cells		
Name		
Address		
Drainage Area Size	0	
Rain Garden Sizing	WQ (Min) 1.25"	Suggested 1.5"

Let's go to the Excel Spreadsheet!

Width	#DIV/0!	FT
Mulch	0.00	CY
	0.0	Bags
Soil Amendments (clay soils)		
Depth of amendments	0.25	FT
bioretention media	0.0	CY
sand	0.0	CY
	0.0	Bags*
compost	0.0	CY
	0.0	Bags*
*Bags @ 2 CF/Bag		

Steps to developing a design

6. Use the spreadsheet to determine amount of mulch needed (1 cubic yard per 100 sq.ft. of rain garden)
7. Review piping needed to get water from impervious surface to rain garden
8. Discuss stone inlet/outlet/border

Steps to developing a design

9. Discuss with homeowner planting style
    a) Manicured or Natural
        i. All shrubs
        ii. Perennial and shrubs
        iii. Deer tolerant
        iv. Shade
        v. All perennial
        vi. Salt tolerant

Let's Review Design Samples

Manicured or Natural

i. All shrubs
ii. Perennial and shrubs
iii. Deer tolerant
iv. Shade
v. All perennial
vi. Salt tolerant

Maintenance

Weekly:

1. Watering
2. Weeding
3. Inspecting

Annual:

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)

Maintenance Guide

(all available on the RCE Website)

1. General guide
2. One-pager

Questions

Next: Hands on Activity

- Break out into 2-3 groups
- Each group will be given an address to design a rain garden for the property
- Chris and Hollie will come around to answer questions