Rain Gardens for Your Jersey-Friendly Yard

Changing Climate, Changing Yards
Ocean County College

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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.

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Water Resources Program

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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

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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

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The Impact of Development on Stormwater Runoff

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

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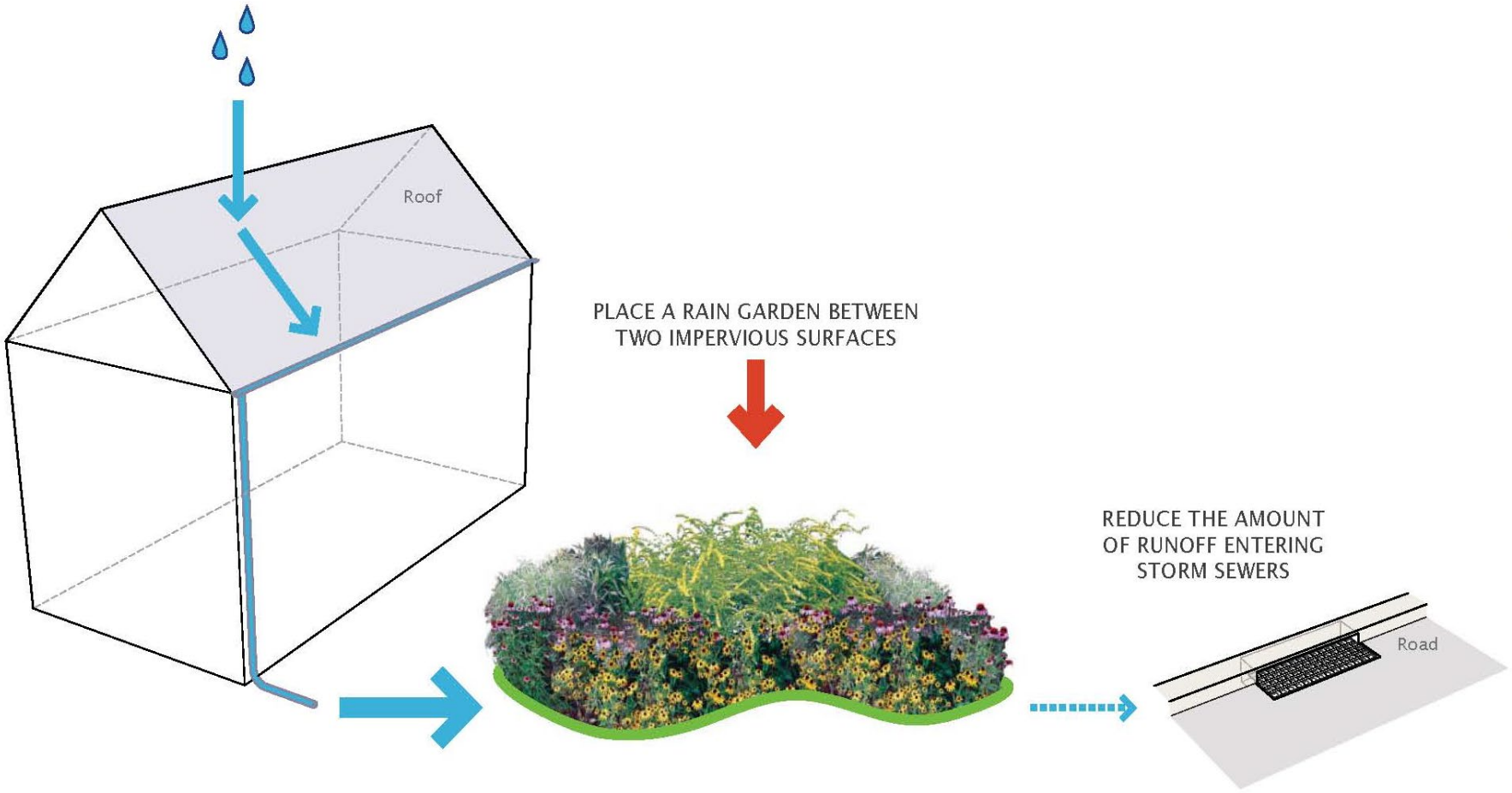
Connected or Disconnected?

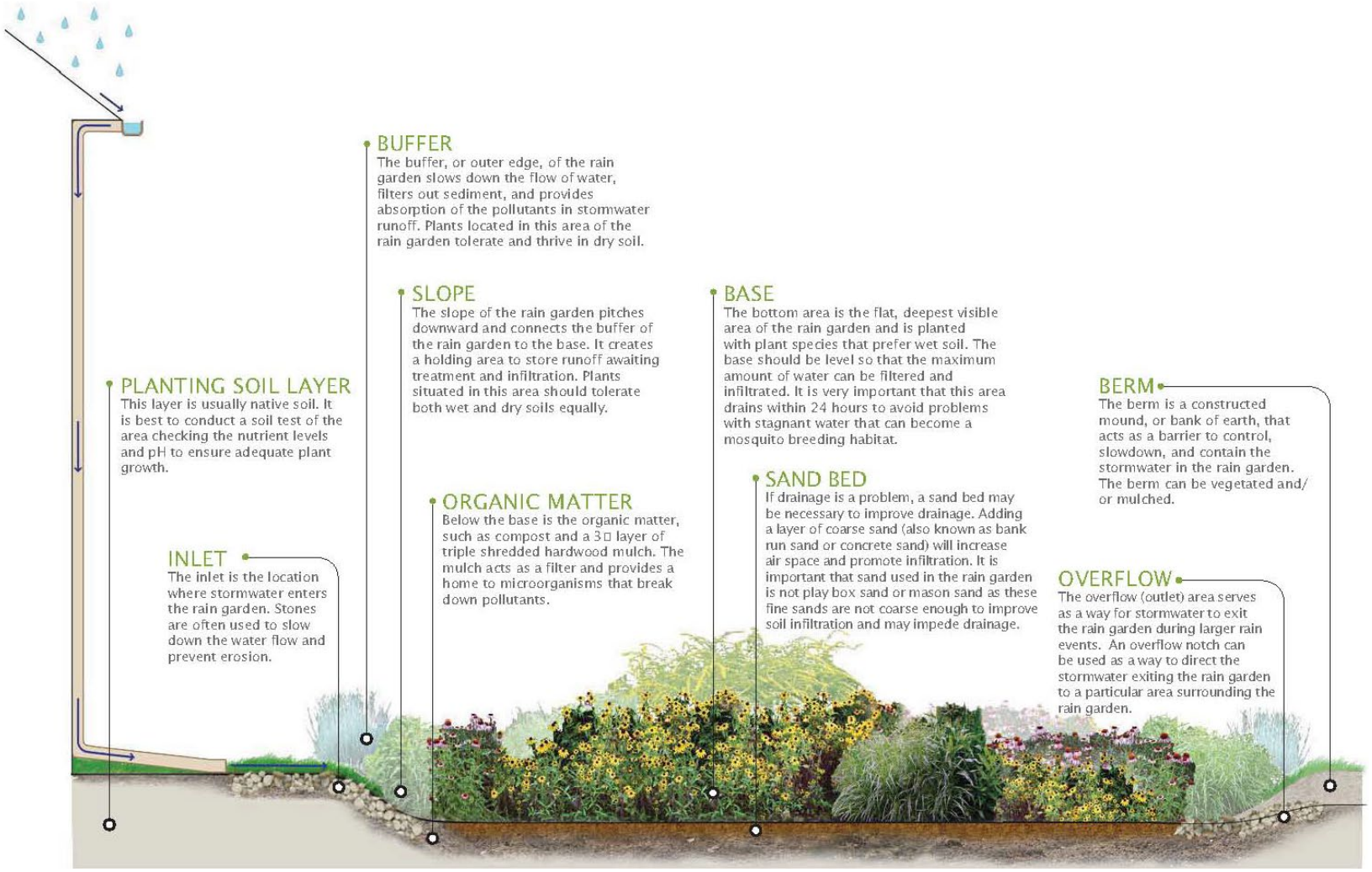
The Solution…



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

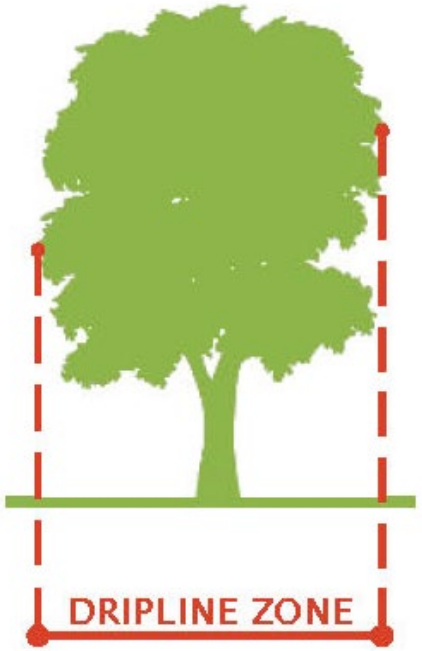


SITE SELECTION & DESIGN

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



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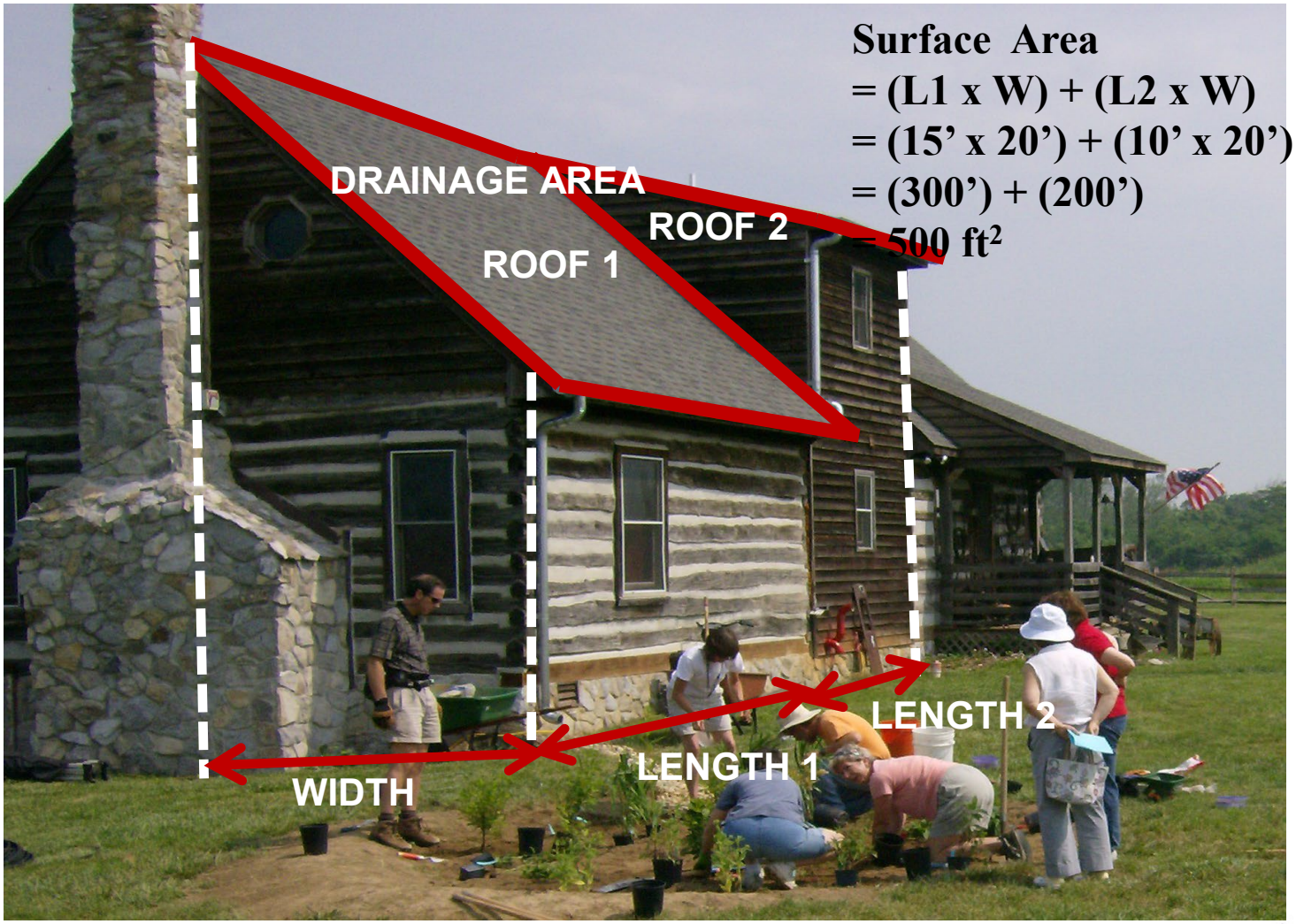
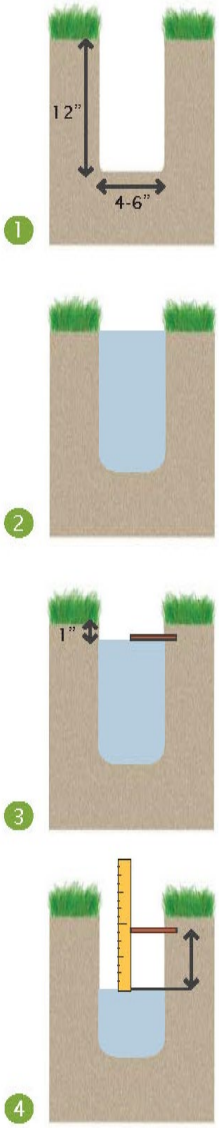
CALL BEFORE YOU DIG

- **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

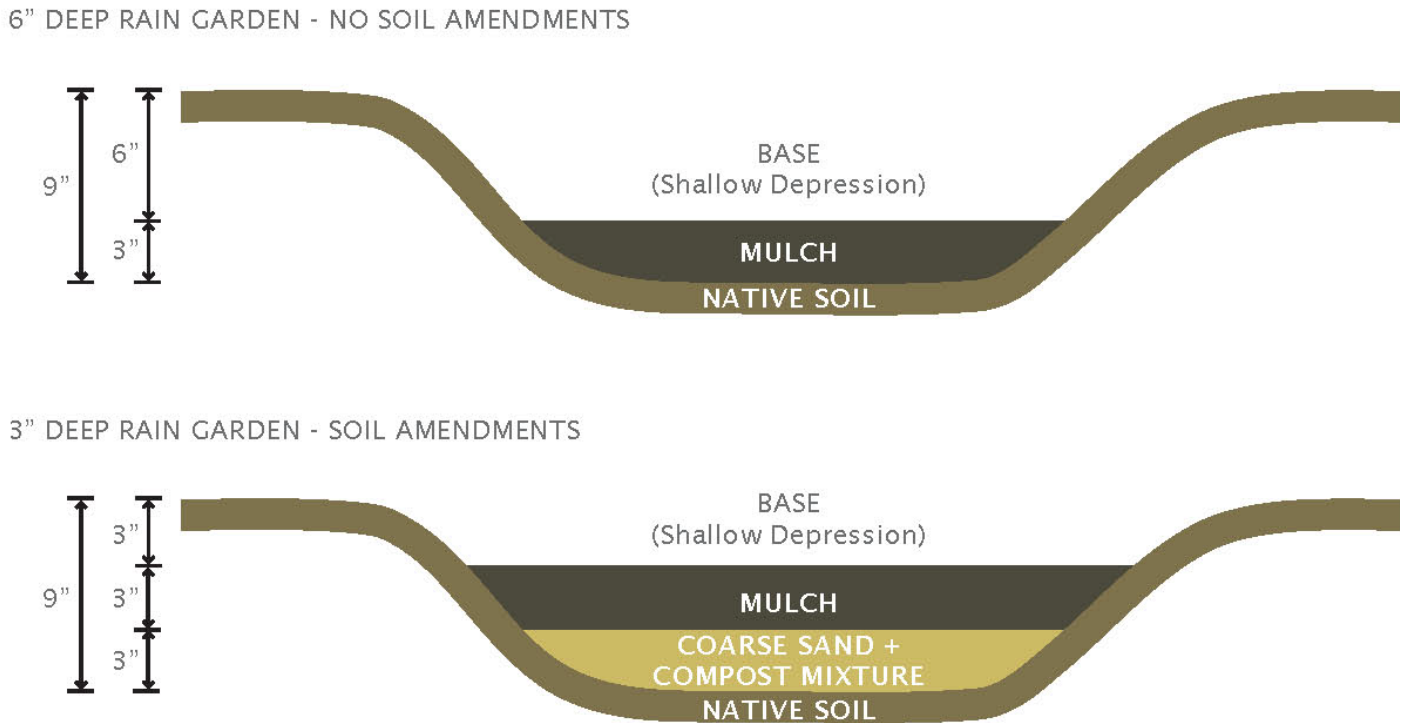


CHECK YOUR SOIL



- 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

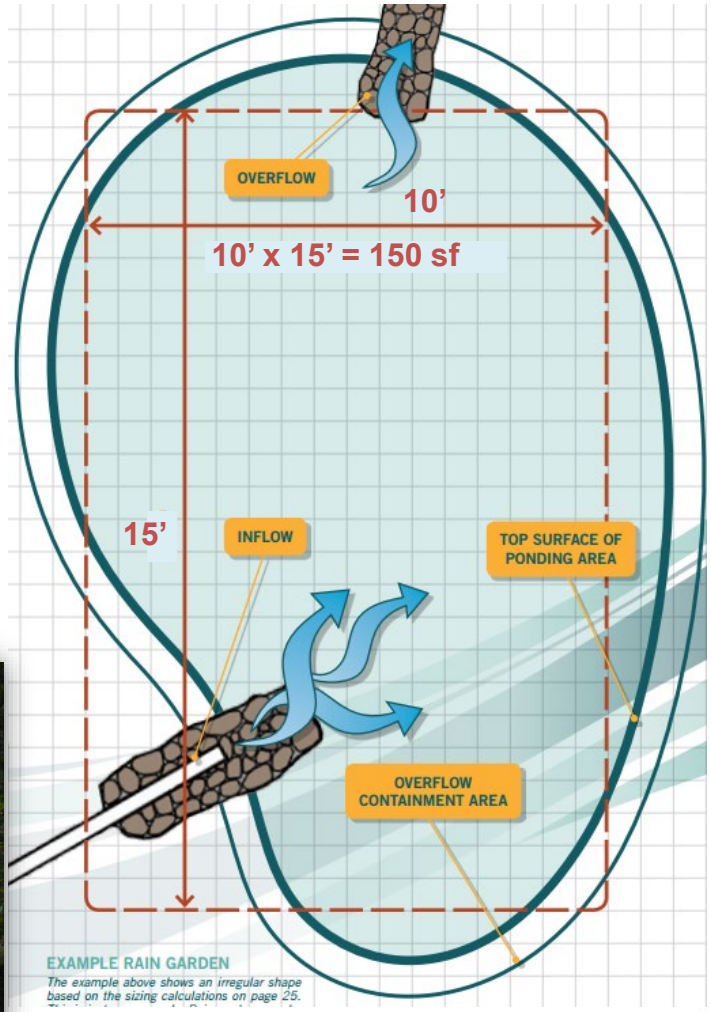
*SOIL TEXTURE AMENDMENTS NEEDED

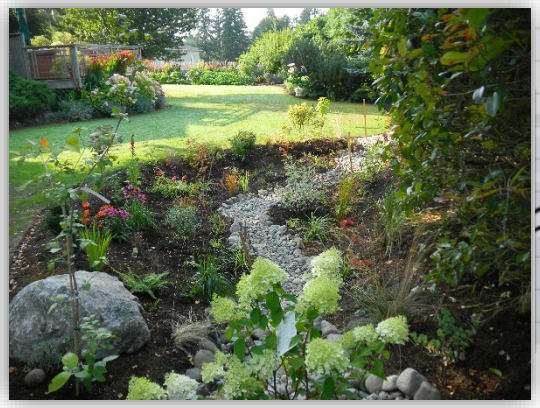
RAIN GARDENS
Typical Size

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..

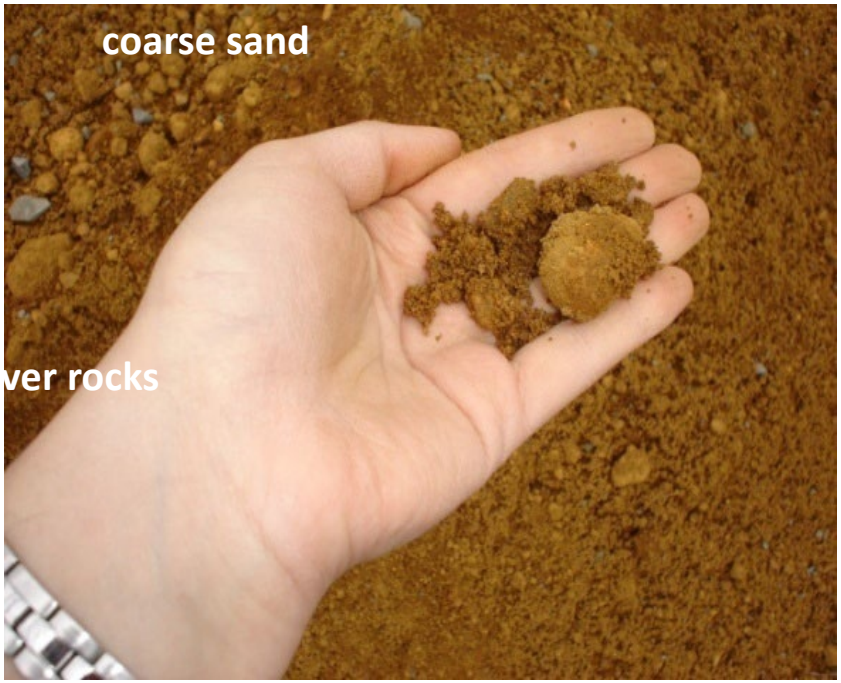
Modified from Rain Garden Handbook for Western WA





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)

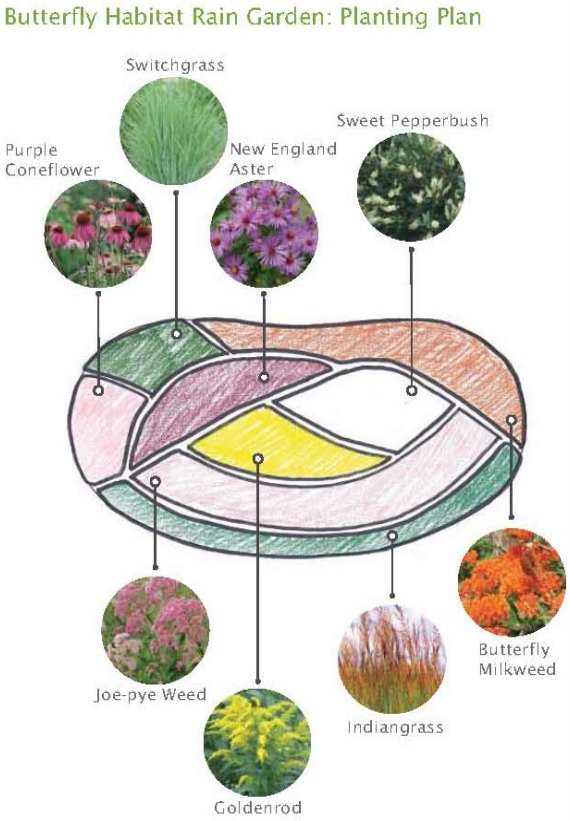
DETERMINING MULCH QUANTITY

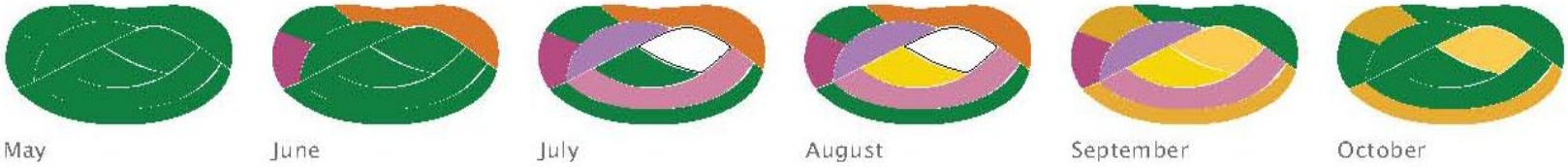
- Allow for a 3” depth mulch (triple-shredded hardwood with no dye) to be spread throughout the entire rain garden
- Every 100 square feet of rain garden needs 1 cubic yards (3” depth)

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

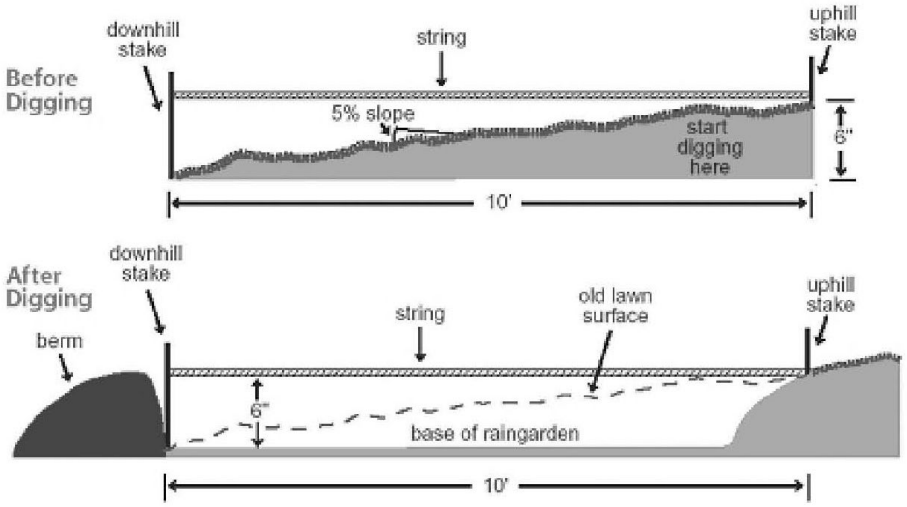
STEP THREE

- 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

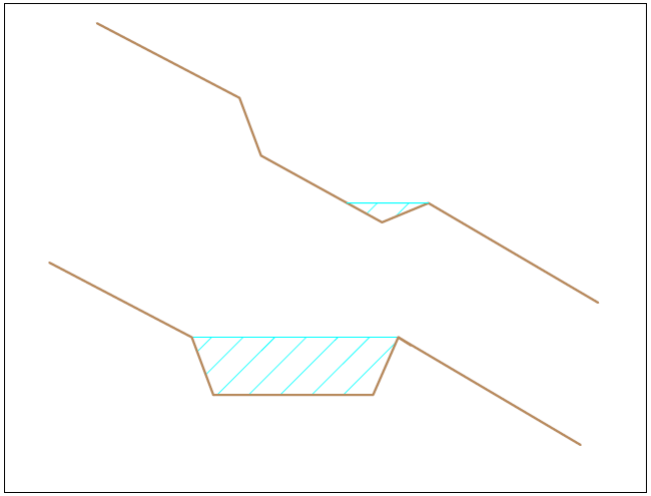


STEP FIVE

- 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

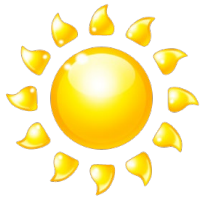
RAIN GARDEN PLANTING DESIGN

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

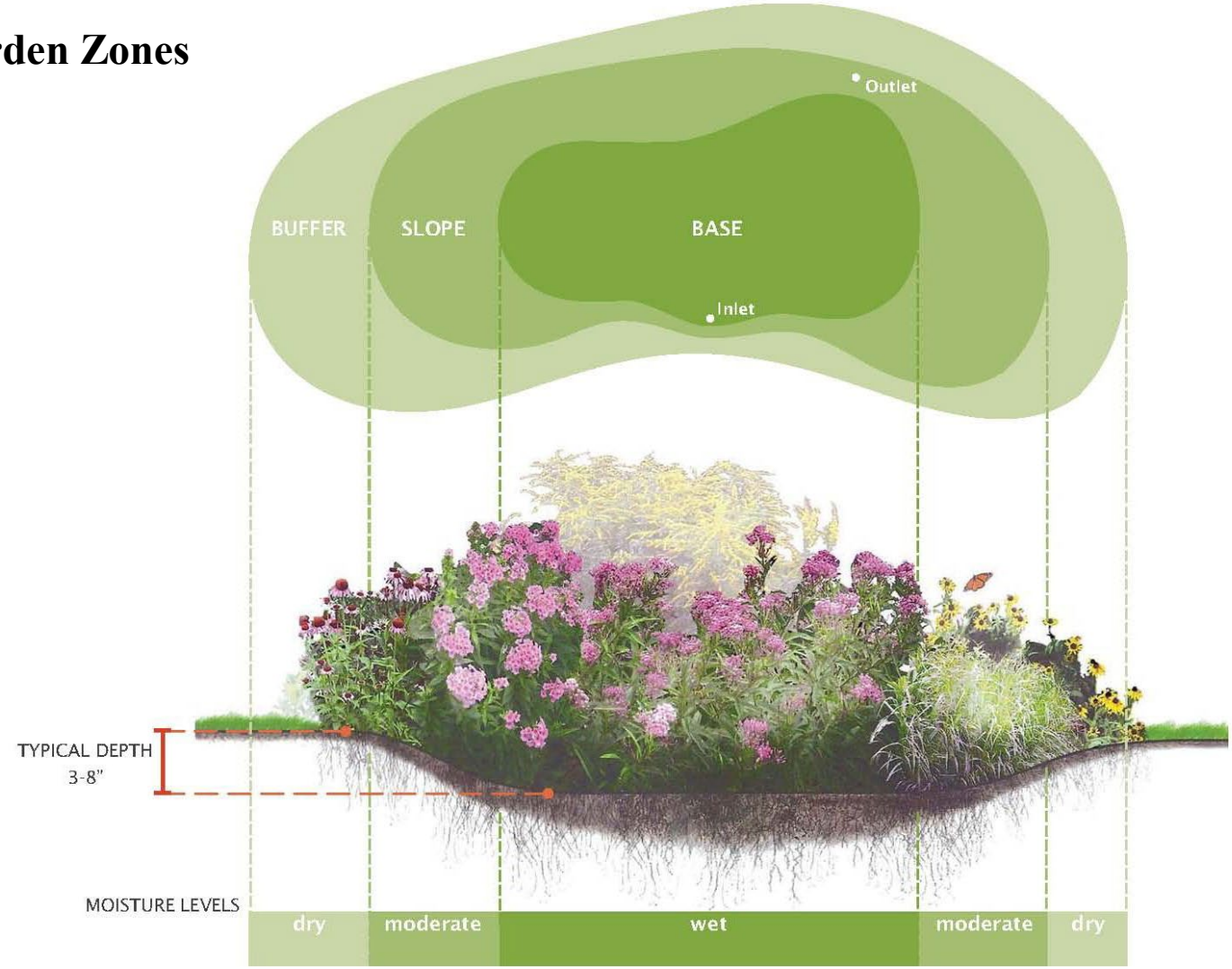


PLANTS IN THE RIGHT PLACE…

Courtesy of Pinelands Nursery & Supply

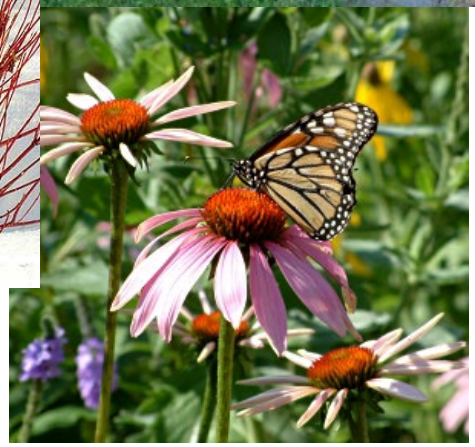
PLANTING DESIGN: Wet + Dry Conditions

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

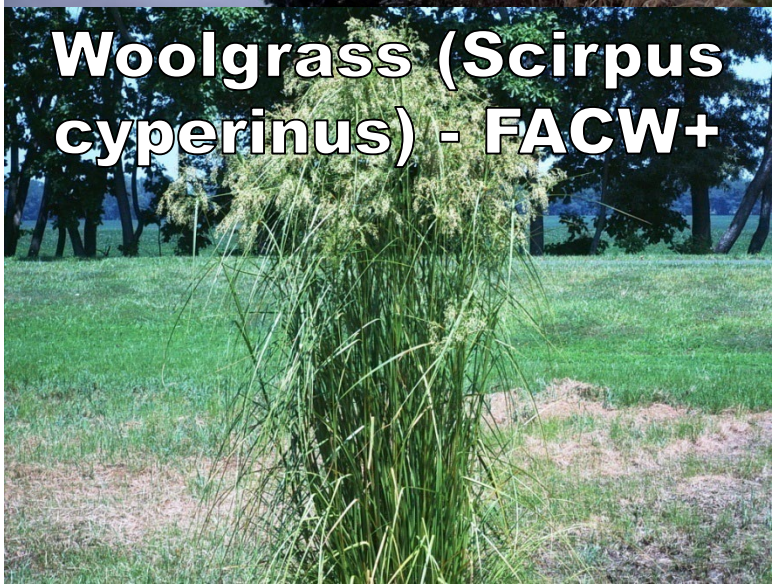
BASE

- 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

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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

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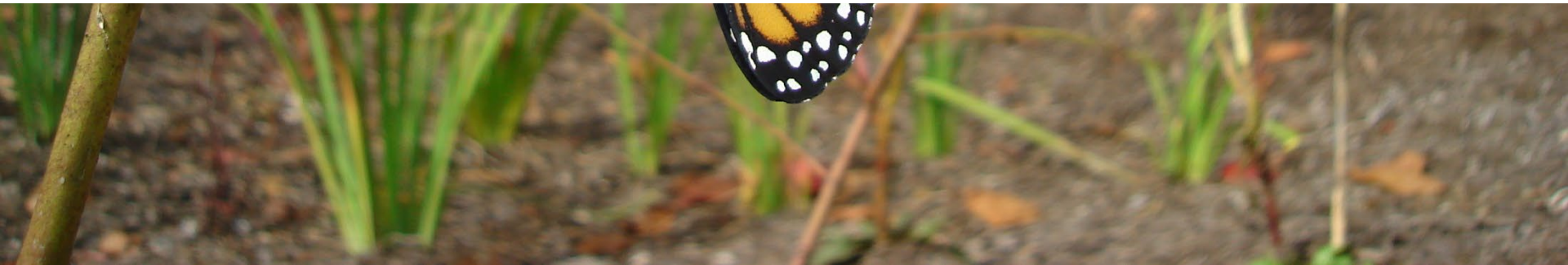
TREES & SHRUBS

INSPECTION AND MAINTENANCE

MAINTAINING YOUR RAIN GARDEN



MAINTENANCE MEASURES

WEEKLY TASKS:

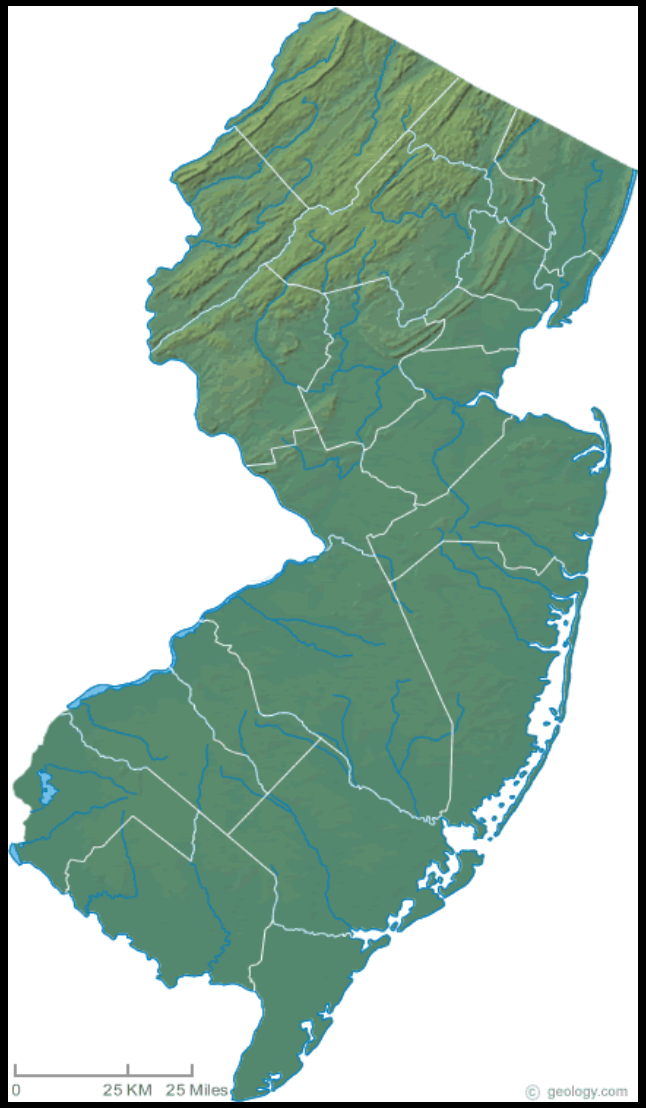
1. Watering
2. Weeding
3. Inspecting

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)

Climate Change in New Jersey

- More warm extremes and fewer cold extremes
- Heavy rains become more intense
- More intense dry spells
- Rising sea level with increased frequency and intensity of coastal flooding



NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

Rainfall Amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Engineering Field Handbook NJ Supplement/ NOAA Atlas 14

Future Adjusted (per NJDEP Factors 2023)

County	2-YR	10-YR	100-YR
Atlantic	4.04	6.40	12.37
Bergen	4.01	6.24	11.60
Burlington	3.93	6.11	11.63
Camden	3.91	6.17	11.84
Cape May	3.93	6.29	11.52
Cumberland	3.92	6.16	12.18
Essex	4.09	6.37	11.52
Gloucester	3.92	6.21	12.06
Hudson	3.94	5.97	10.22
Hunterdon	4.02	6.15	11.40
Mercer	3.84	5.86	11.33
Middlesex	3.99	6.20	11.48
Monmouth	4.02	6.22	11.26
Morris	4.35	6.71	12.19
Ocean	4.04	6.34	11.41
Passaic	4.20	6.64	12.93
Salem	3.91	6.15	11.15
Somerset	3.97	6.21	12.15
Sussex	3.99	6.06	11.37
Union	4.07	6.36	11.73
Warren	4.01	6.11	10.71

DETERMINING THE SIZE OF THE RAIN GARDEN FOR CLIMATE CHANGE

Rain Garden Sizing Table

Based on New Jersey's Water Quality Design Storm (1.5" 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	250 ft^2	125 ft^2	94 ft^2
750 ft^2	438 ft^2	188 ft^2	140 ft^2
1,000 ft^2	500 ft^2	250 ft^2	186 ft^2
1,500 ft^2	750 ft^2	375 ft^2	280 ft^2
2,000 ft^2	1000 ft^2	500 ft^2	374 ft^2

*SOIL TEXTURE AMENDMENTS NEEDED

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Installed Rain Gardens from the Rain Garden Rebate Program

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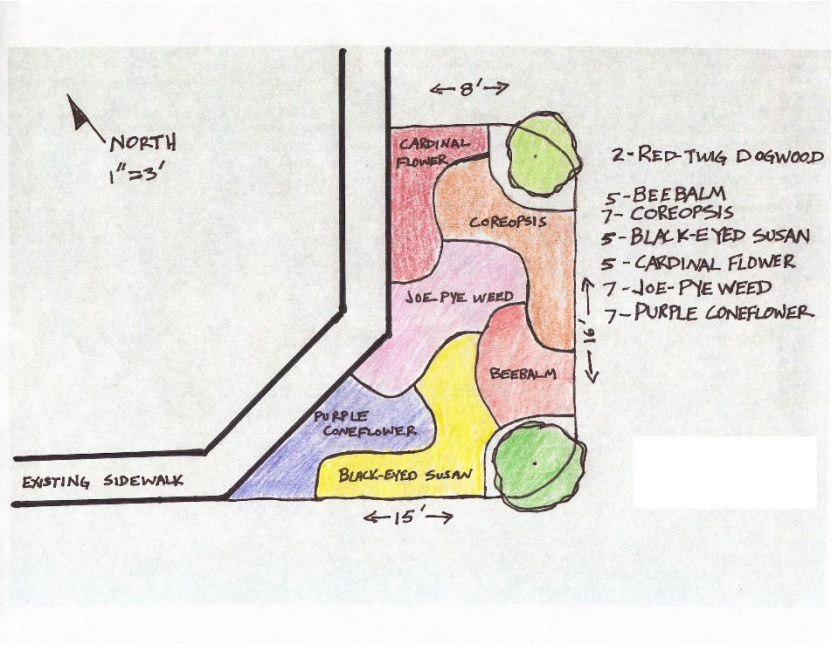
Design Example for Roof Runoff

Design



Installed Rain Garden

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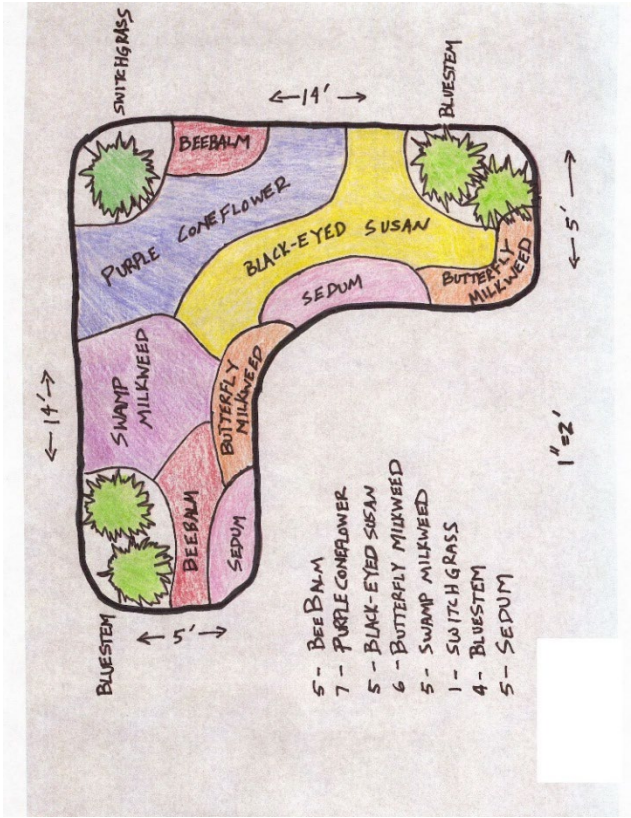
Design Example for Parking Lot Runoff

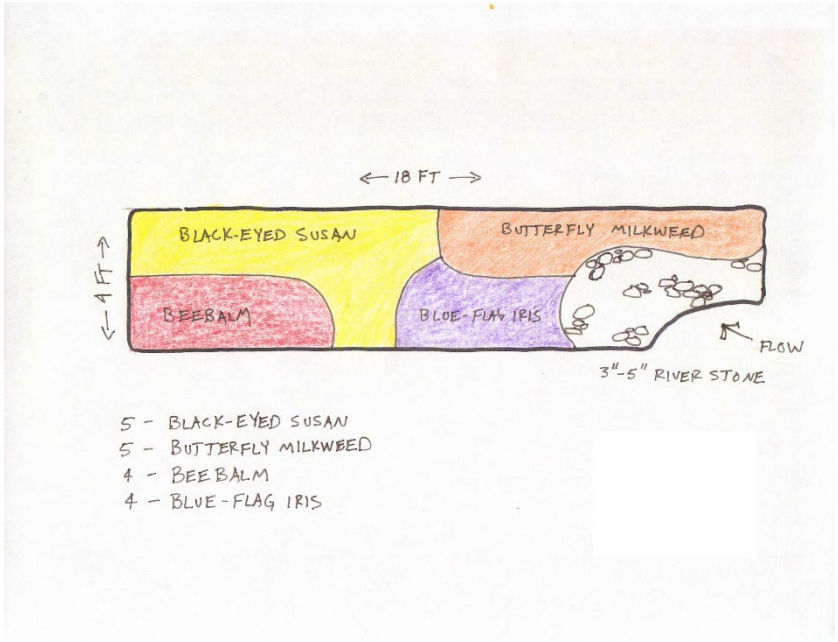
Design



Installed Rain Garden

Roof, Sump Pump and Driveway Runoff – WOW!

Design



Installed Rain Garden

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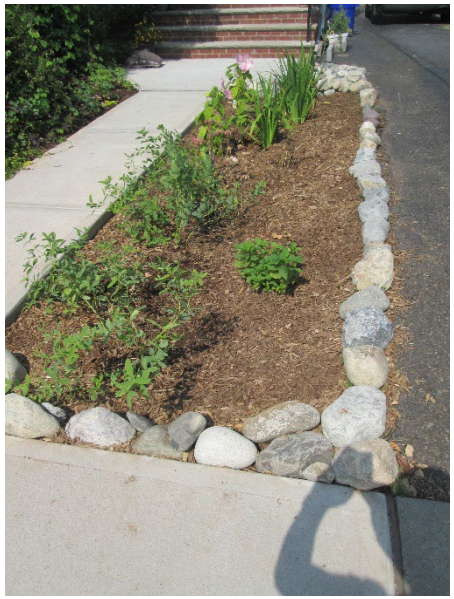
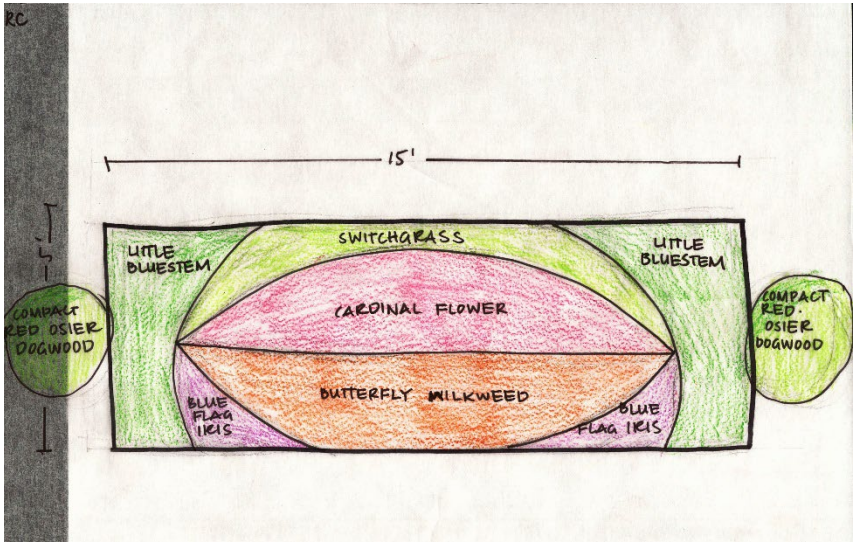
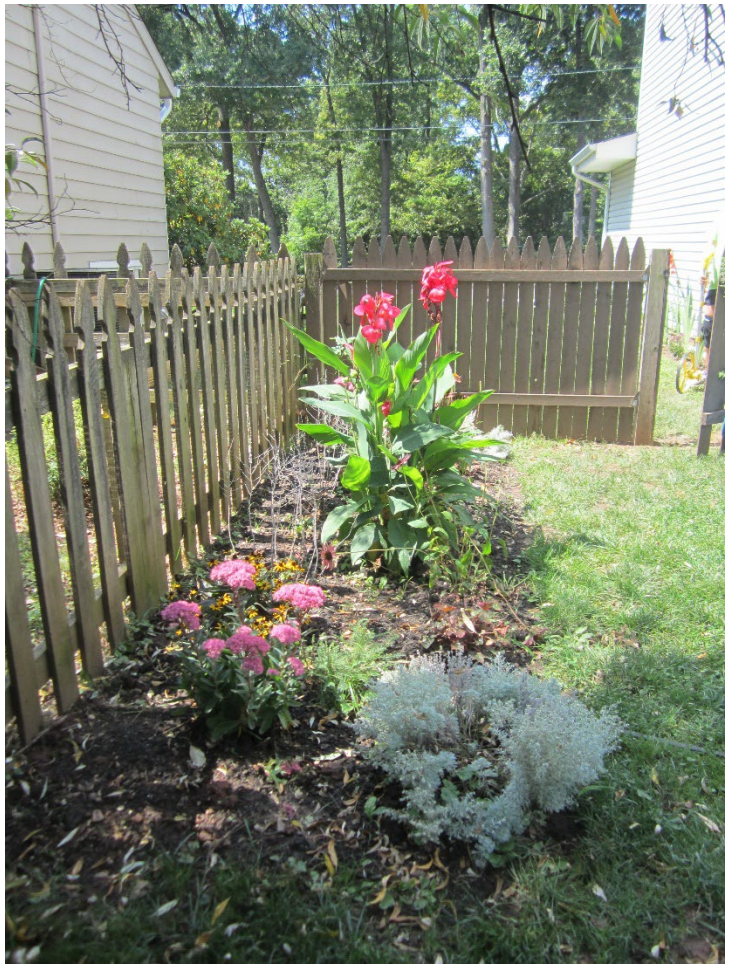


Roof Runoff from Rain Barrel Overflow

Design



Installed Rain Garden



Lots of Rain Gardens


116

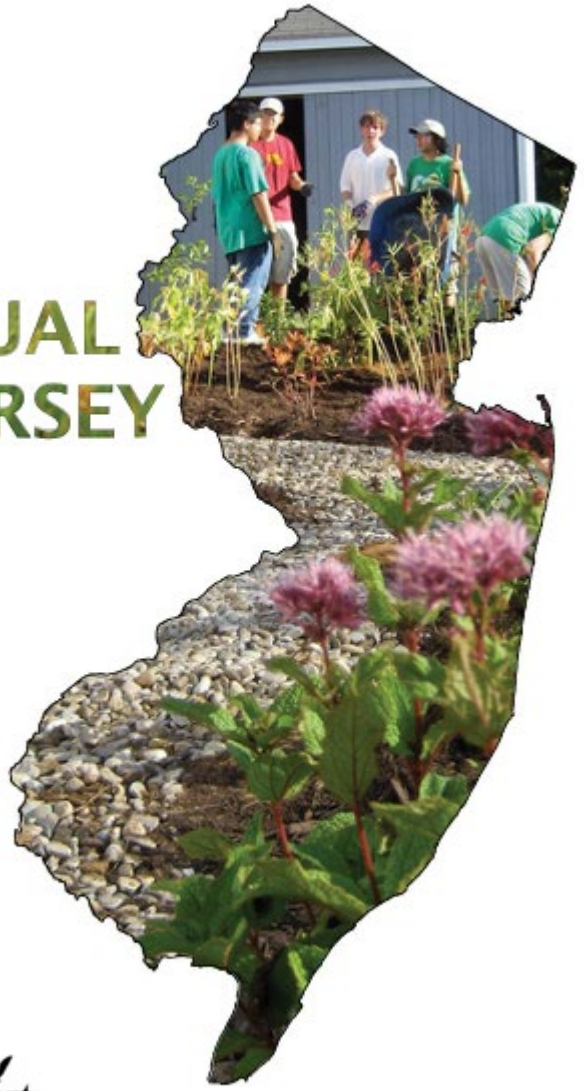

10/12/2018


10/12/2018


Season 2
10/12/2018

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

RAIN GARDEN MANUAL OF NEW JERSEY



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Northeast States & Caribbean Islands Regional Water Center

Sea Grant NJ Sea Grant Consortium

Rain Garden 4+

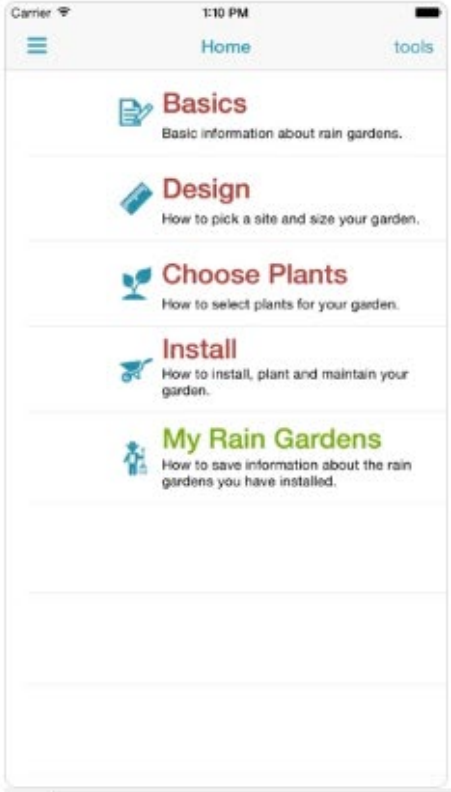
University of Connecticut

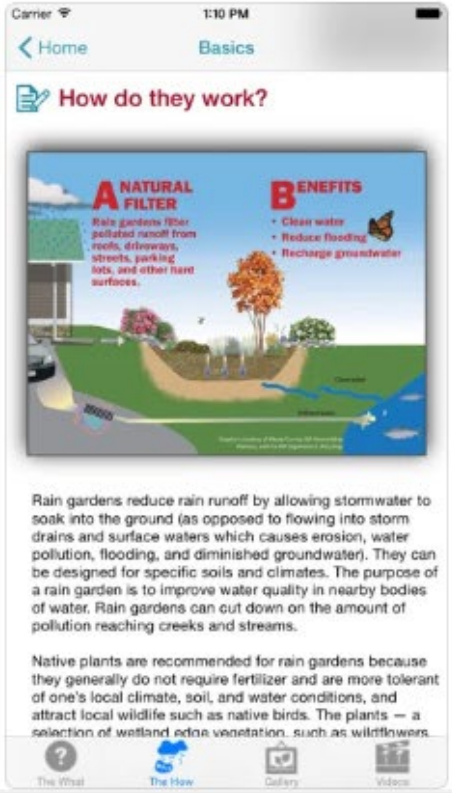
Designed for iPhone

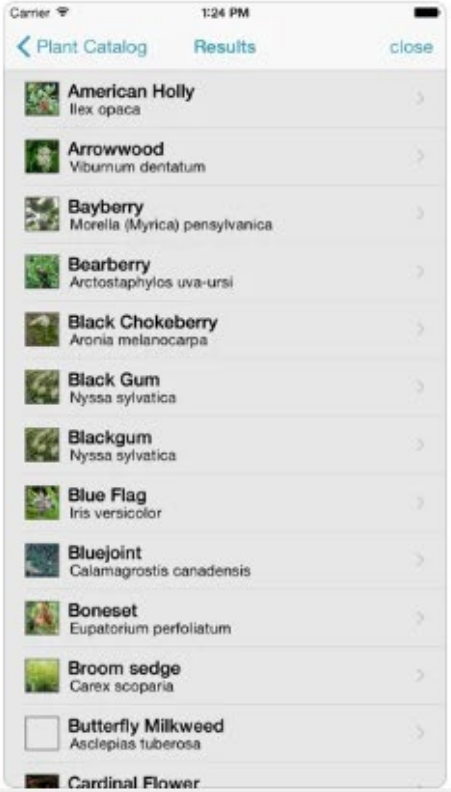
★★½☆☆ 2.6 • 11 Ratings

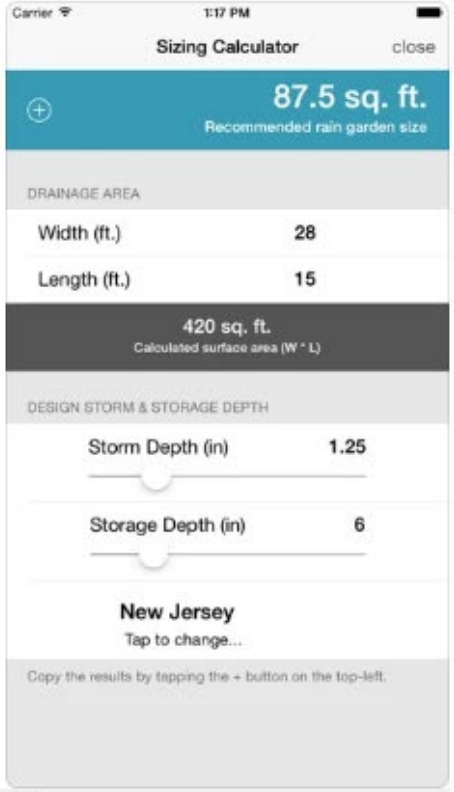
Free

iPhone Screenshots









THANK YOU!

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