Great Swamp Watershed Association

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RAIN GARDEN EDUCATIONAL PROGRAM

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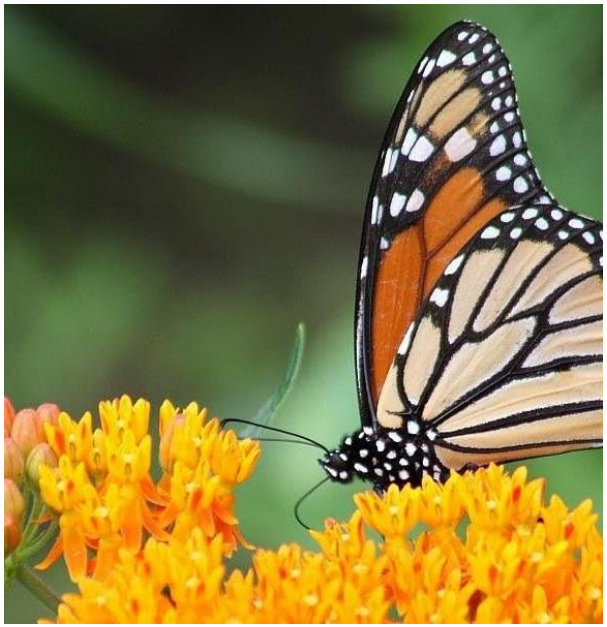

So….Why a Rain Garden?

Hazel England ,
Director of Education and Outreach, Great Swamp Watershed Association
With thanks to Chris Obropta , Rutgers Water Resources

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Who are GSWA?

We support a "One River, One Community" vision for the rural, suburban, and urban communities along the Passaic River,

Building understanding that the health of the watershed is integrally connected to the quality of our daily lives.

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Support from the Stackhouse Foundation

How do we achieve our mission?

Educate

- Educate on current and future water and environmental issues we face.

Advocate

- Advocate for smarter decision-making - and weigh in where needed.

Steward

- Steward the land we own and encourage good stewardship practices in others.

Underpin with Water Quality Testing

- Underpin our work with scientifically conducted water quality testing programs and research.

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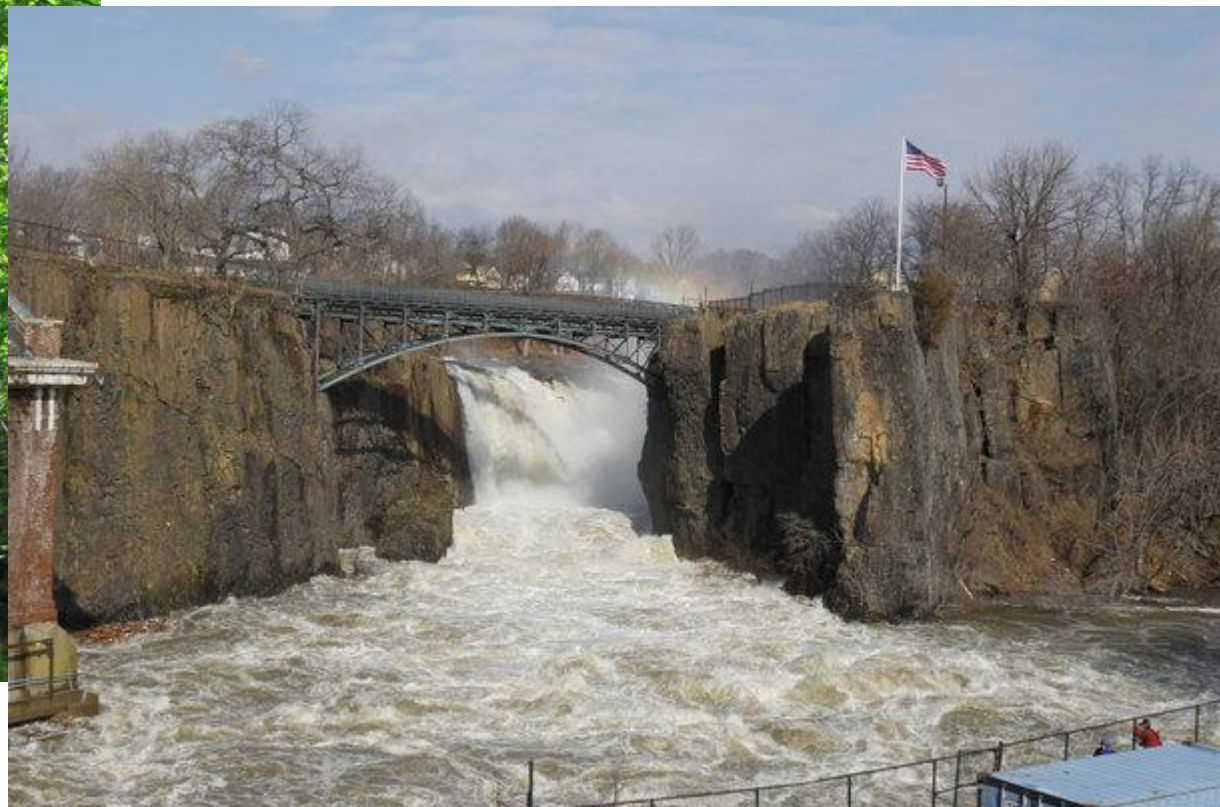
Passaic Watershed from source to sea



So…What happens when it rains anywhere in our watershed?

Pervious vs Impervious surfaces

Erm.. What's stormwater?

Stormwater is water from rain or melting snows that flows over surfaces ,becoming "runoff," as it flows over the ground surface and returns to lakes, streams and rivers.

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How does my property contribute to Stormwater Runoff?

The combined roof drainage areas, patios structures and driveway drainage areas make up the total impervious cover drainage area for your yard.

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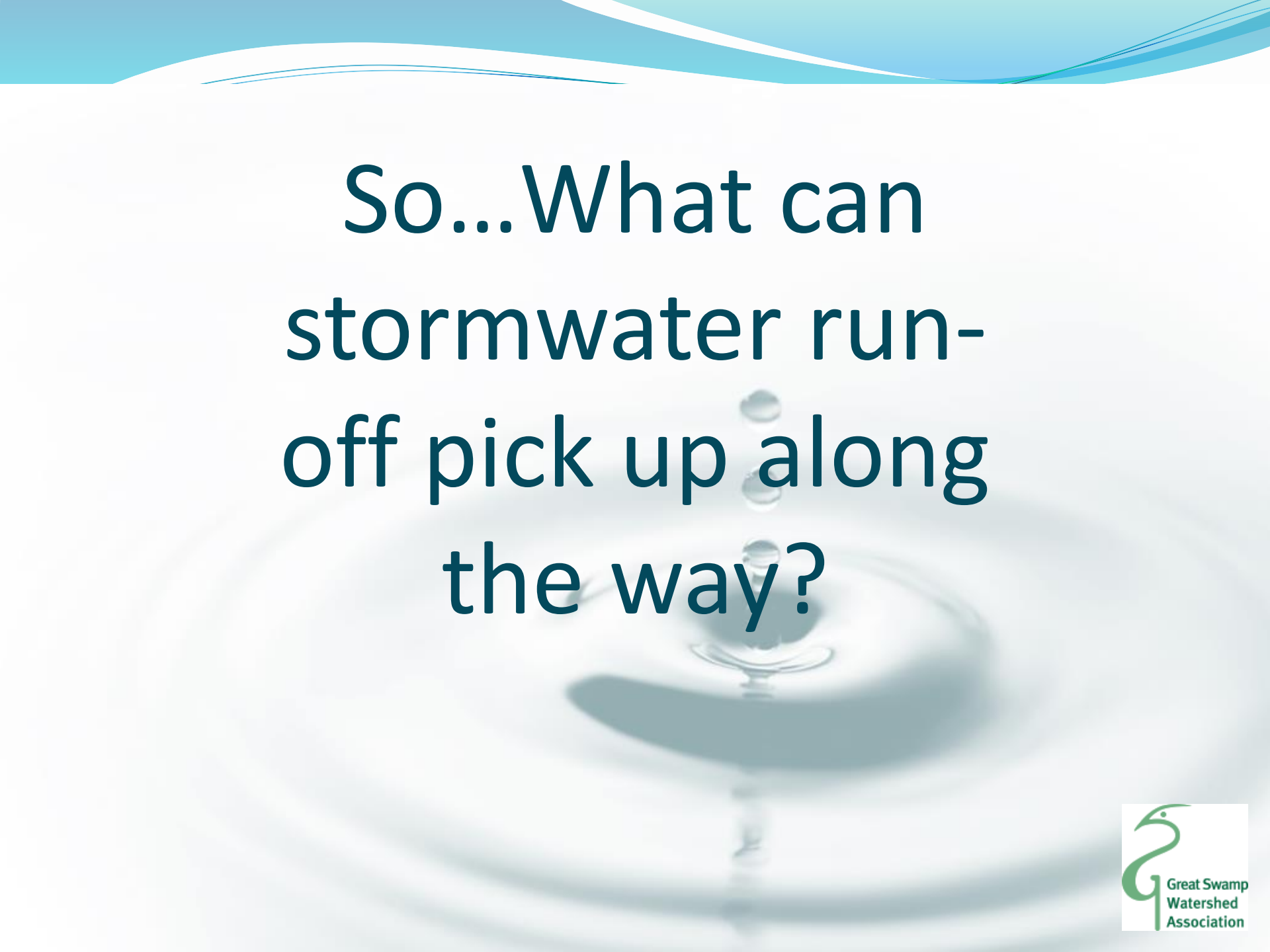
What's so awful about Impervious surfaces?

- Prevent groundwater infiltration
- Enable rapid stormwater runoff causing increased erosion and flooding
- Increase nonpoint source pollution entering waterways

So…What can stormwater run-off pick up along the way?



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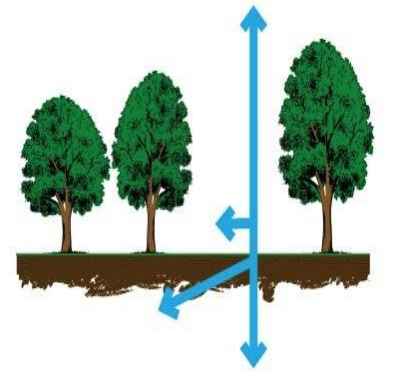
Examples of Nonpoint Source Pollution

- Oil and grease from cars
- Fertilizers
- Pesticides
- Animal waste
- Grass clippings
- Septic systems

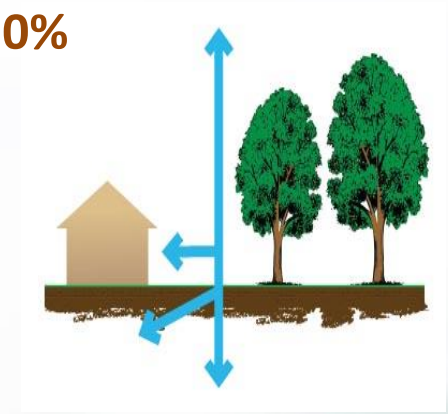
- Sewage leaks
- Household cleaning products
- Litter
- Agriculture
- Sediment and soils

How does development Impact Stormwater Runoff?

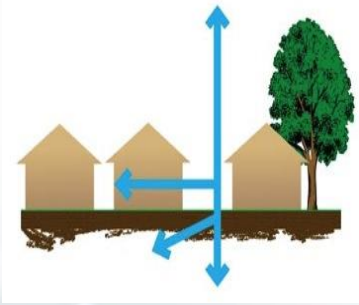
10%



20%



30%



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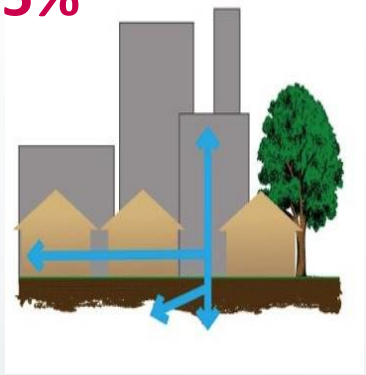

more development → *More impervious surfaces* → *more stormwater runoff*

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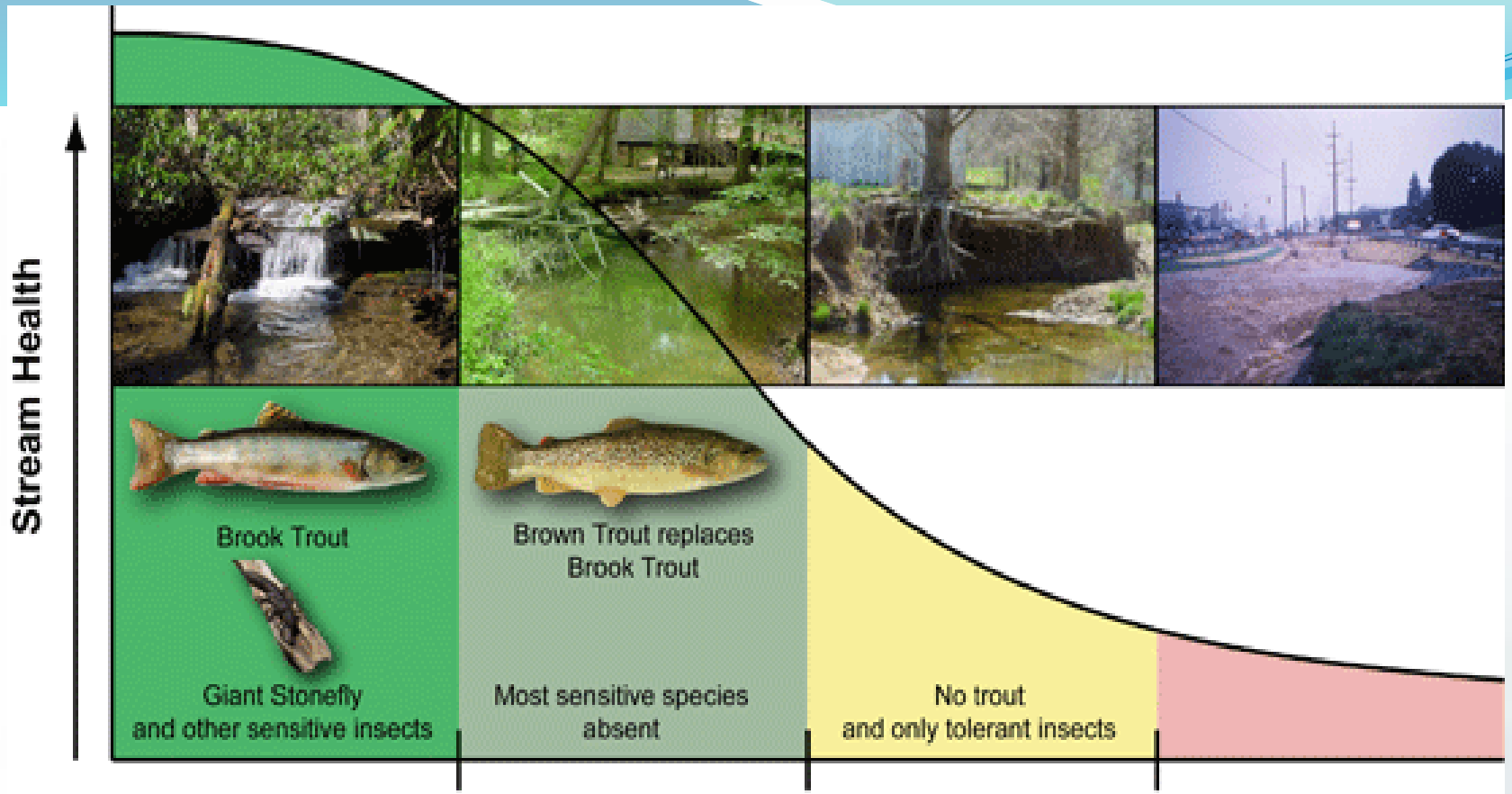

<5%	5-10%	10-20%	>20%
• Water cool and clean • Stream banks and bottom typically stable • Trout can be found • Endangered species can be found • Many fish species • Many salamander species • Many freshwater mussels • Many insect taxa	• Water may be warmer and slightly polluted • Erosion may be evident • No brook trout • Most rare and endangered species absent • Many pollution tolerant fish • Fewer salamander species • Only tolerant mussels • Fewer insect taxa	• Water warmer • Erosion usually obvious • Trout absent • Rare stream species absent • Fewer fish species • Only three tolerant salamander species • No native mussels • Mostly tolerant insects	• Water warm and pollution usually evident • Unstable habitat • Trout absent • Non-native species dominate some streams • Only tolerant fish species • One salamander species • No native mussels • Only tolerant insects

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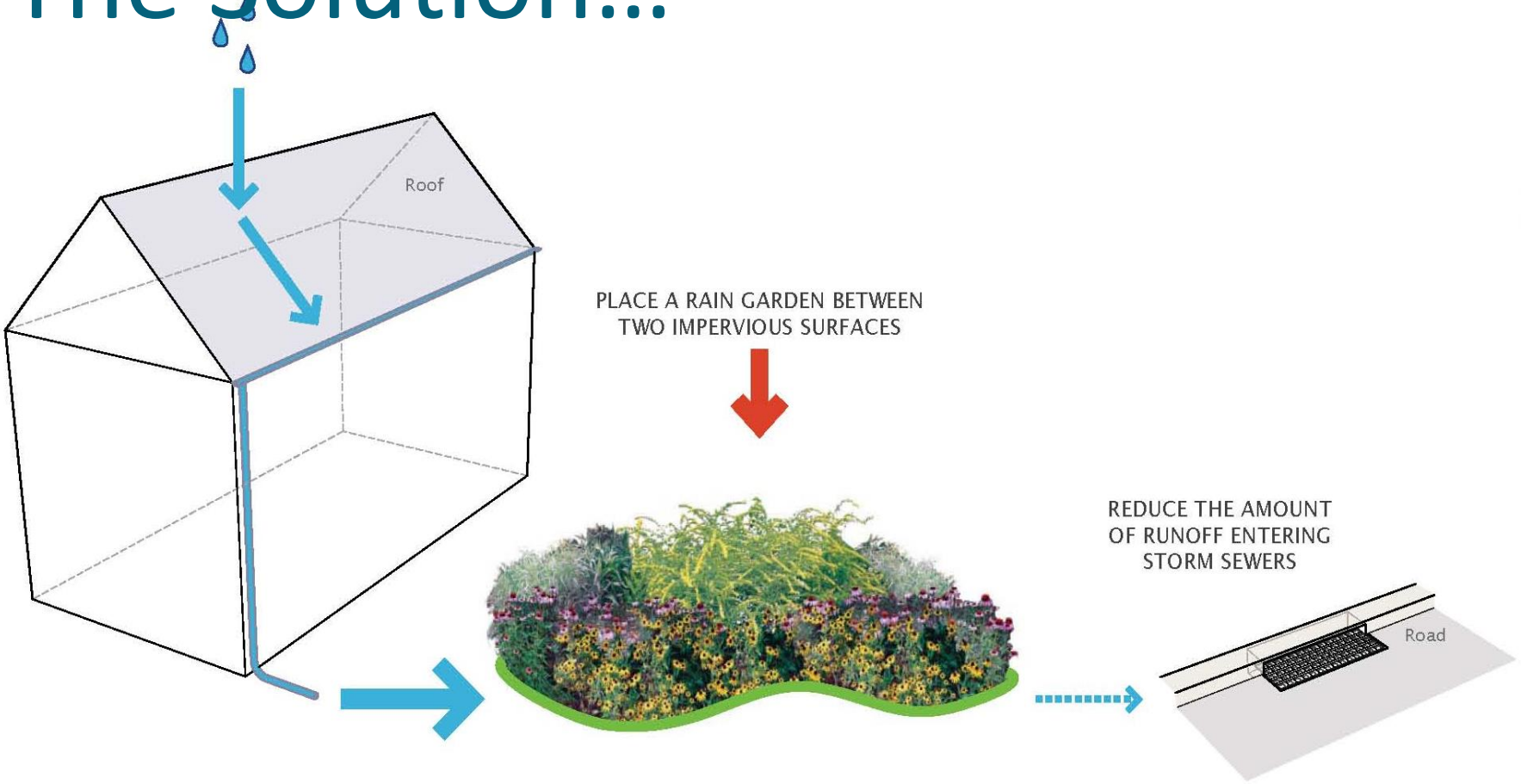
Is your home Connected or Disconnected?

Green infrastructure or GI:

- Helps reduce runoff
- Recharges groundwater
- Controls erosion
- Gradually improves water quality
- Offers an opportunity to increase valuable native planting
- Offers watering-free landscaping in the yard

The Solution…



Rain Gardens

Rain gardens are a landscaped, shallow depressions that are 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.

GI Mimics Natural Forest Systems

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Mindset change

- Rainwater is an asset and not a waste product.
- By infiltrating rainwater into the ground we can significantly reduce the threat of downstream flooding as well as pollution impacting waterbodies and drinking water supplies.

Enhance water quality by allowing water to be naturally filtered by soil instead of being piped,untreated into large bodies of water.

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Water quality benefits

Soil particles: Remove dissolved metals and phosphate

Plant uptake: Removes small amounts of nutrients

Microbial Processes: remove pathogens from water

Sedimentation: removes suspended solids, debris, trash, phosphates and pathogens

Provides: flood control, groundwater recharge and nutrient removal

How much water can a rain garden intercept? Some Math…..

- 9 out of 10 rainfall events are less than 1”
- NJ has around 44” of rain per year
- Typical rain garden treats and recharges:

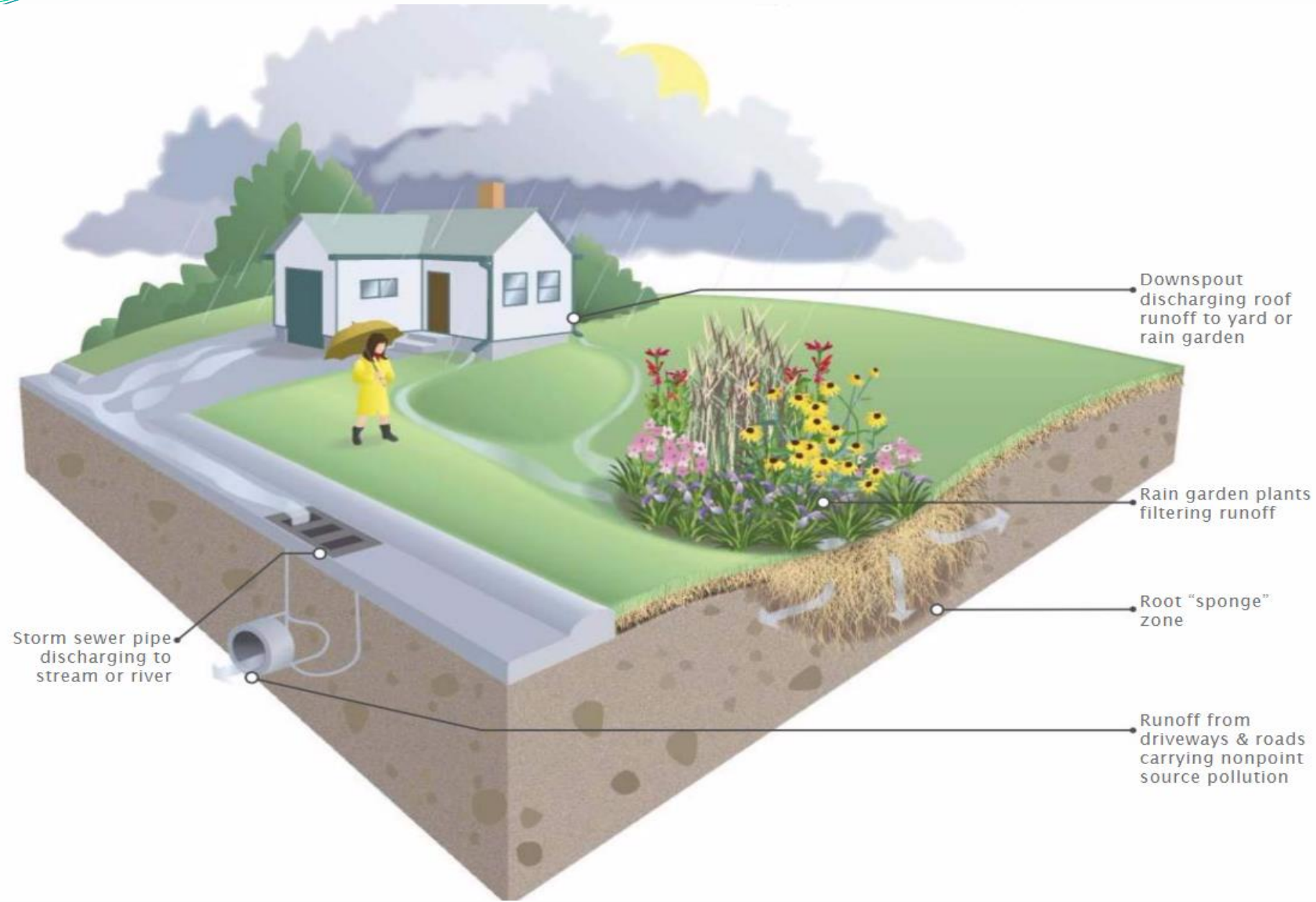
  0.9 x 44” = 40”/year = 3.3 ft water/yr
- If rain garden receives runoff from

  1,000’ sq.ft.
- Total volume treated and recharged is

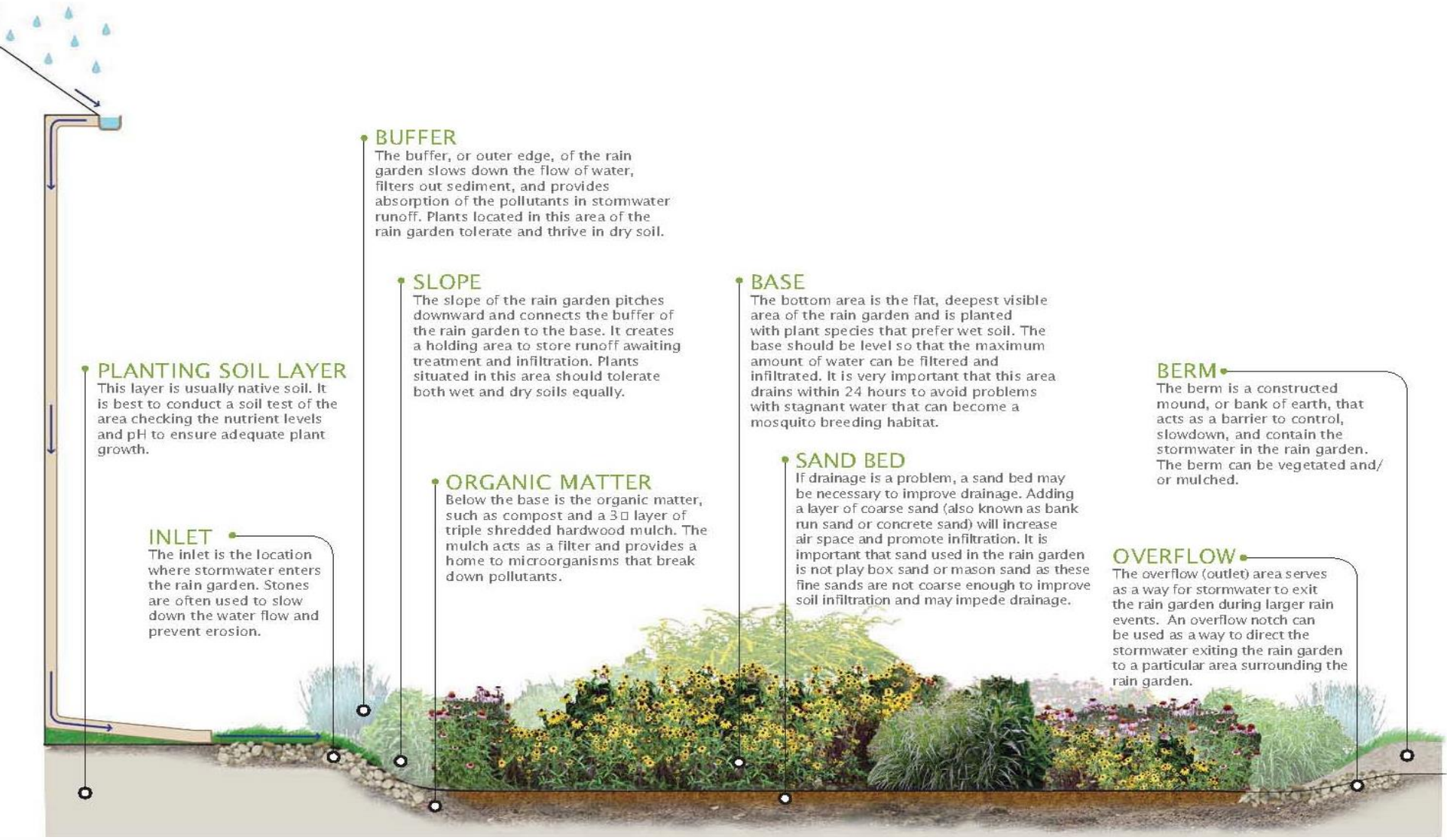
  1,000 sq. ft. x 3.3 ft/year = 3,300 cubic ft/yr,

  = **25,000 gallons per year!**

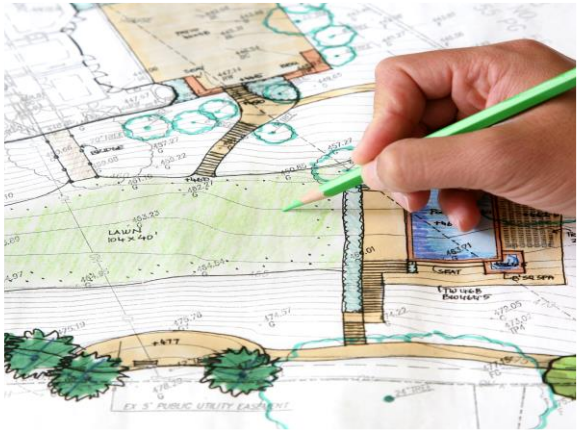
Rain Garden concept



Anatomy of the Rain Garden



Parts of the Rain Garden Process



Planning

Installing

Plant Choice

Maintaining

Plan it

Investigate your property, heres what to consider.

Plan it: Where to put it?

Rain gardens should ideally be located between the source of runoff (roofs & driveways) and the runoff destination (drains, streams, low spots).

Plan it: Things to Consider

1. Identify drainage area run off that will be captured
2. Look for current drainage issues such as ponding, wet spots
3. Consider current landscaping practices
4. Look at current flow direction in heavy storms
5. Measure impervious surfaces

continued

Plan it: Things to consider

1. Determine location of buried lines
2. Conduct a percolation test
3. Know your soil type- conduct a soil test
4. Figure the approximate soil amendment materials needed
5. Choose correct native plants and numbers
6. Design the plant layout

Plan it: 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

Plan it: Conduct a percolation Test

Dig a hole 12” deep by 6” diameter.

Fill hole with water and let stand until all the water has drained into the ground.

Refill the empty hole with water again. Measure the depth of water with a ruler.

Check the depth of water with a ruler every hour for 4 hours.

Calculate how many inches of water drained per hour.

+/- 1” of water draining /hour is a good site

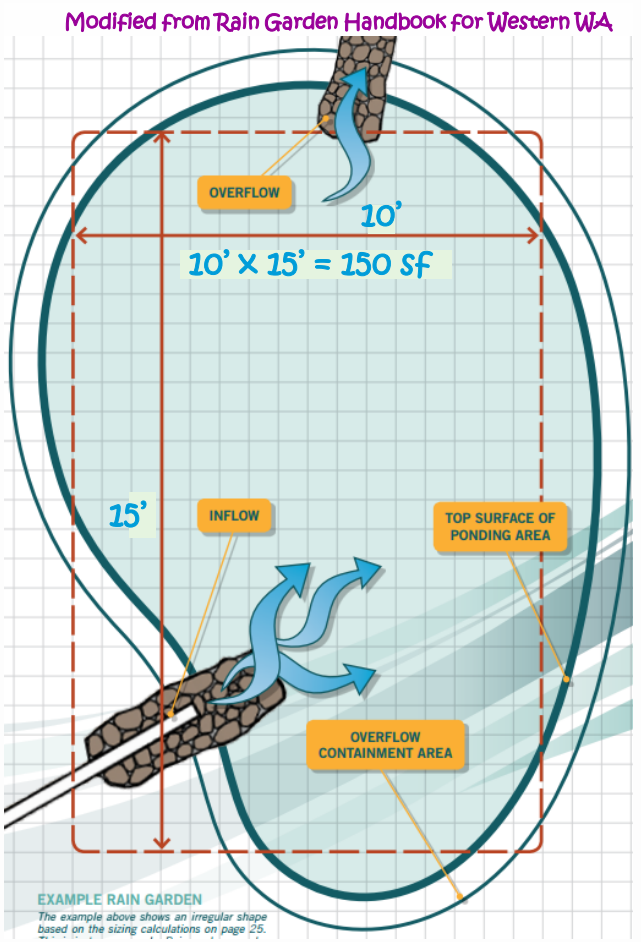
Plan it: How Big should the Rain garden Be?

Q. What size does a rain garden have to be?

A. It depends!

10ft x 10ft – 15ft x 20ft is typical.

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



Plan it: Calculate Roof Line Runoff

Plan it: Drainage Area Calculation

Example: House is 60ft x 40ft .

Roof area is +/- 2,400 square ft

Downspout collects 25% of roof,
Downspout drainage area is equal to
600 square feet drainage.

Plan it: Determining the size Things to Consider

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

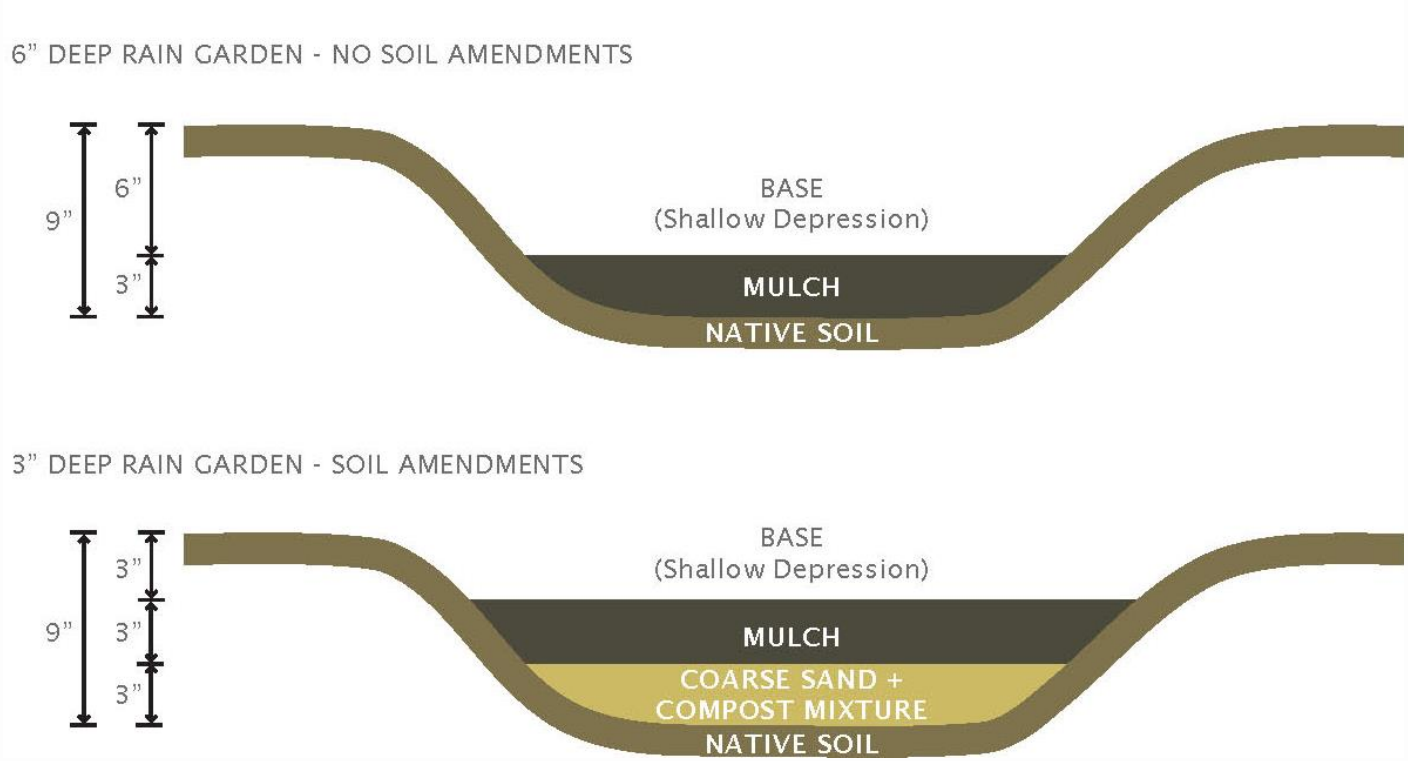
Rain Garden Sizing Table

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

Plan it: Determining depth of the Rain garden



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

Plan it: tips and things to consider

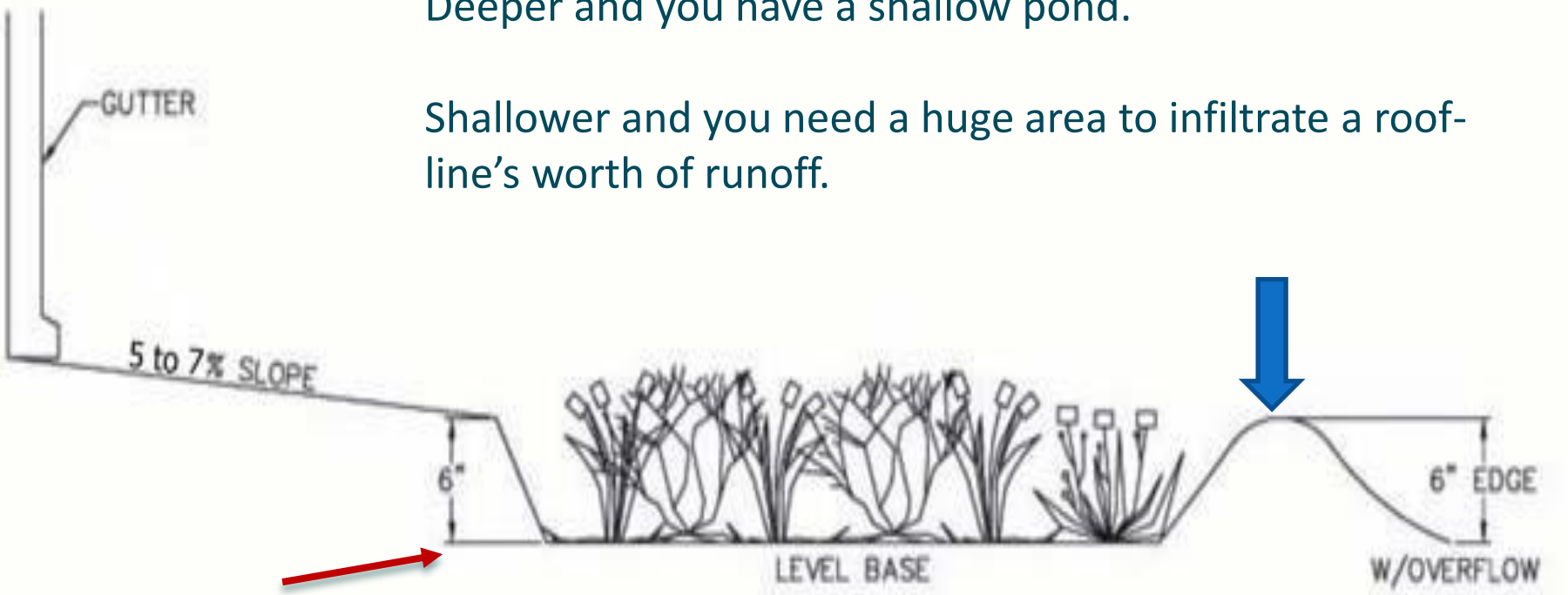
- Rain garden should be at least 10’ from the house so infiltrating water doesn’t seep into foundations.
- Do not place the rain garden directly over a septic system.
- Do not put rain garden in places where the water already ponds, or the lawn is always wet.
- Avoid large tree root zones.
- A flat portion of the yard will be easier to dig.
- Place in full or partial sunlight as a preferred option to maximize plant choice

Plan it: the ideal site

A typical rain garden is 4-8”deep.

Deeper and you have a shallow pond.

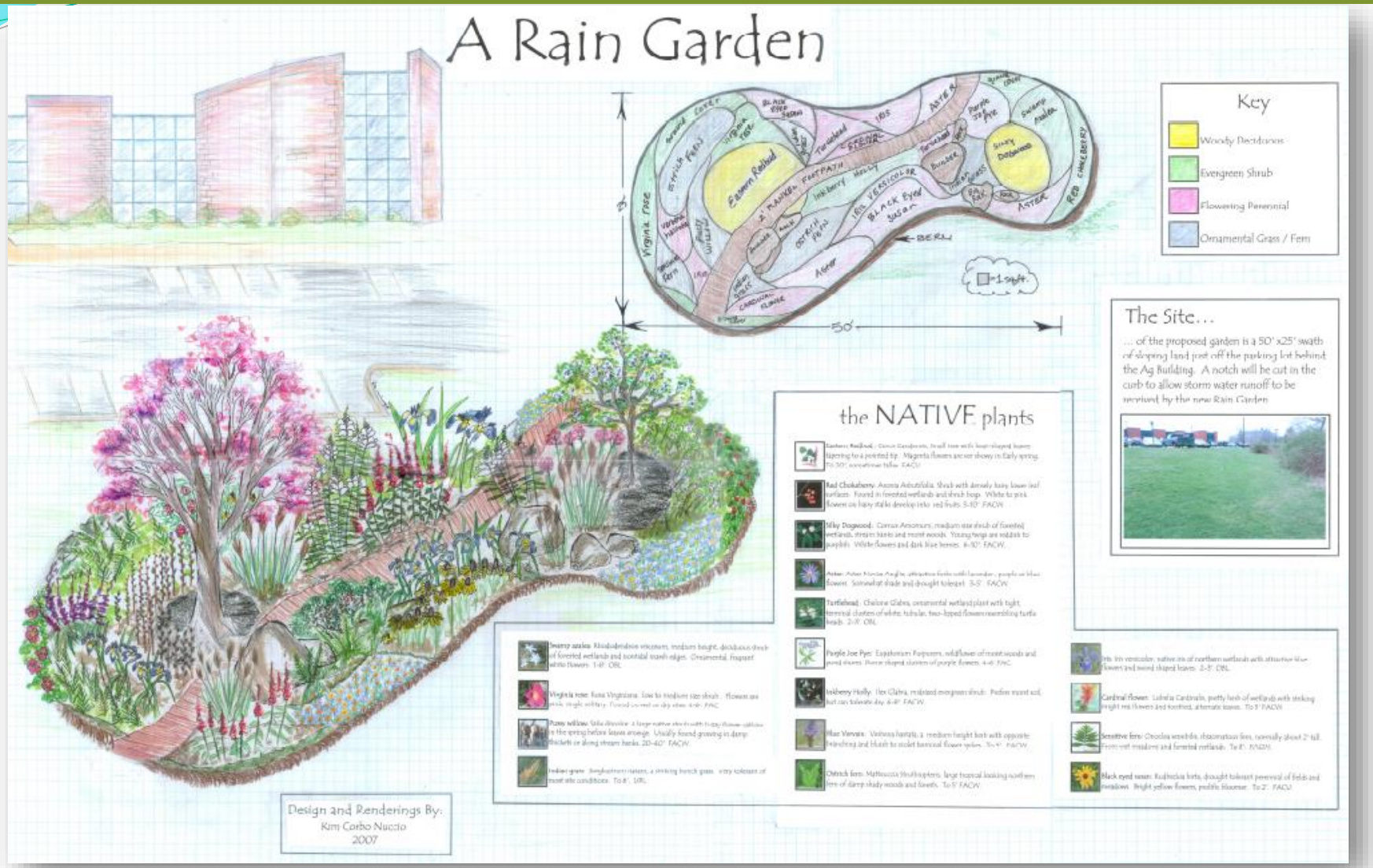
Shallower and you need a huge area to infiltrate a roof-line’s worth of runoff.



•Rain garden should be a level bed to allow rainfall to spread out over entire area.

•Create a lip or berm to allow rainwater to infiltrate, and store temporarily but have an overflow for heavy storms.

Plan it: plan to finished concept



Plan it: In the Zone

Rain gardens have 3 distinct planting zones:

- Berm/lip or upland area (Driest)
- The walls or slope of the depression (wetter)
- Ponding area. (wettest)

Each zone will stay wet for a different amount of time and plants need to match the wetness zone.

Install It!

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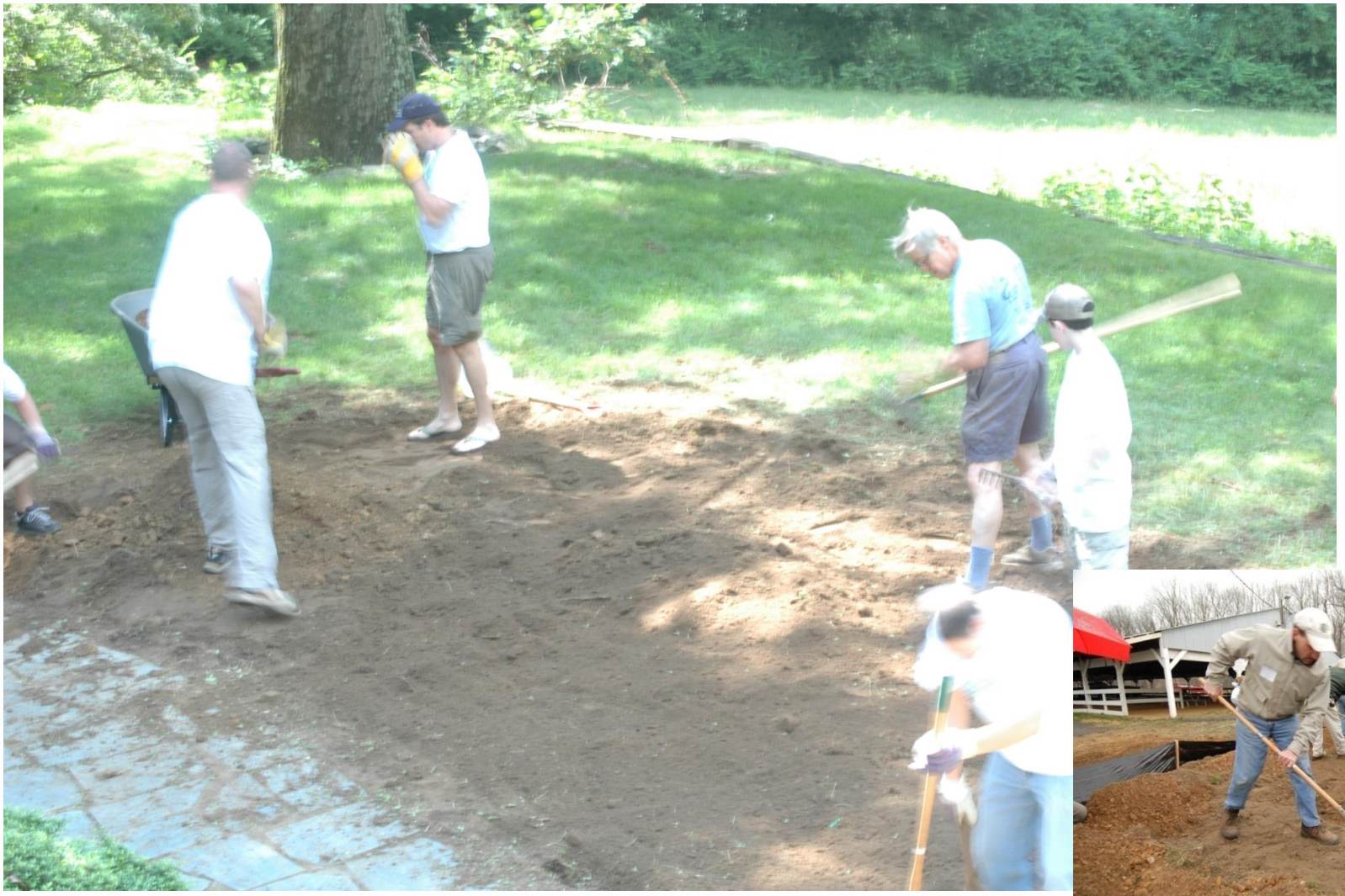
Install it: delineate the area

Install it: Excavate the area

Install it: Get friends and family involved and dig to desired depth and profile

Install it: Grade and shape the area

Install it: add in soil amendments



Install it: How do I amend the soil?

Install it: soil amendments

- Soil amendments improve the rain garden's infiltration rate and help the plants grow, they improve the capacity to manage stormwater

Install it: Amendments

Soil amendments increase percolation, it's a worthwhile step

Install it: Create the lip or berm

Install it: Getting runoff to the entry point of the rain garden

Install it: Create an overflow for a really heavy storm-

Install it: Ready to plant!

Install it: lay out plants to figure spacing before planting

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Install it: ensure plants are well watered in

Install it: Mulch deeply around plants to increase water holding and deter weeds

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Plant Choice: Go Native!

- Native plants have deeper root systems than many ornamentals and annuals.

- They penetrate and break up soils deep into lower water recharge layers.

- Deep roots and tolerance for drought mean they are well adapted to the vagaries of NJ climate.

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Plant Choice: Additional benefits of going native

- Winter Interest
- Fall Color
- Sun/Shade tolerance
- Nectar Source- Pollinators baby!
- Screening for privacy
- interest through the year
- Low maintenance
- Wildlife specifica beneficial species

Plant Choice: Right plant , right place

- Assess the site conditions:

  base soil and sun/shade

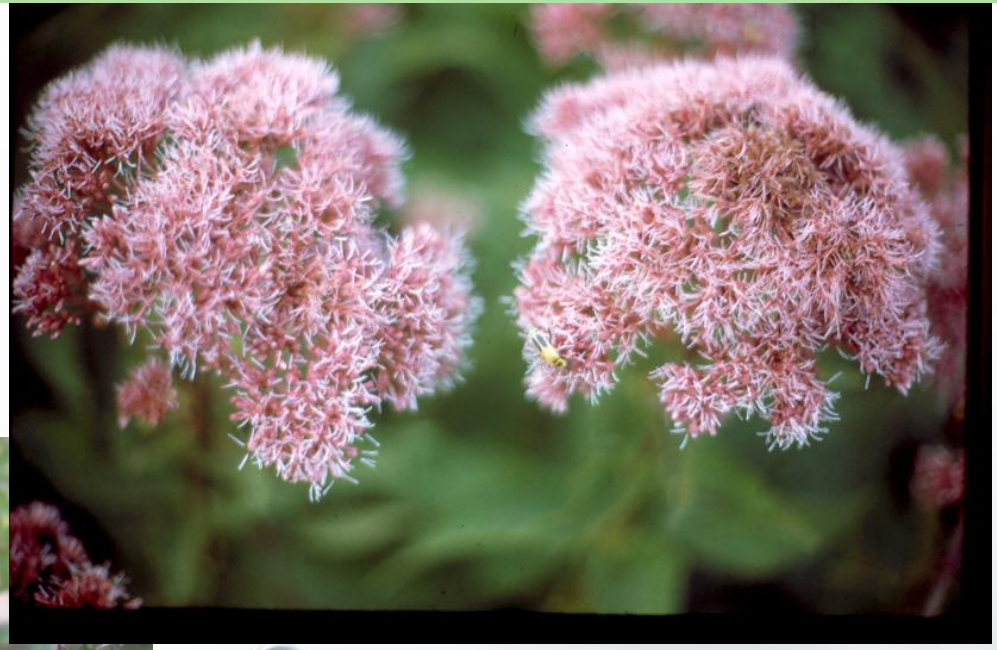
- Select plants that thrive in those conditions
- Match final size & shape of plants to site
- Avoid invasive plants

There are many resources out there!!

Plant Choice: Lowest zone, ponding area

Plant Choice: Depression slope, middle area plants

Plant Choice: These plants can deal with a range of wetness over time as the depression fills and empties



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Plant Choice: Driest upper zone, upland area plants

Plant Choice: Shrubs and small stature trees for structure

Red and Yellow Twig Dogwoods in the winter

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Plant Choice: Shrubs can give winter interest and shelter

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Plant Choice: Design Aesthetics

Design Aesthetics

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

Plant Choice: Grasses and Groundcovers

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

Plant Choice: Wildflowers and 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

Plant Choice: Trees and 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

Rain Garden Examples

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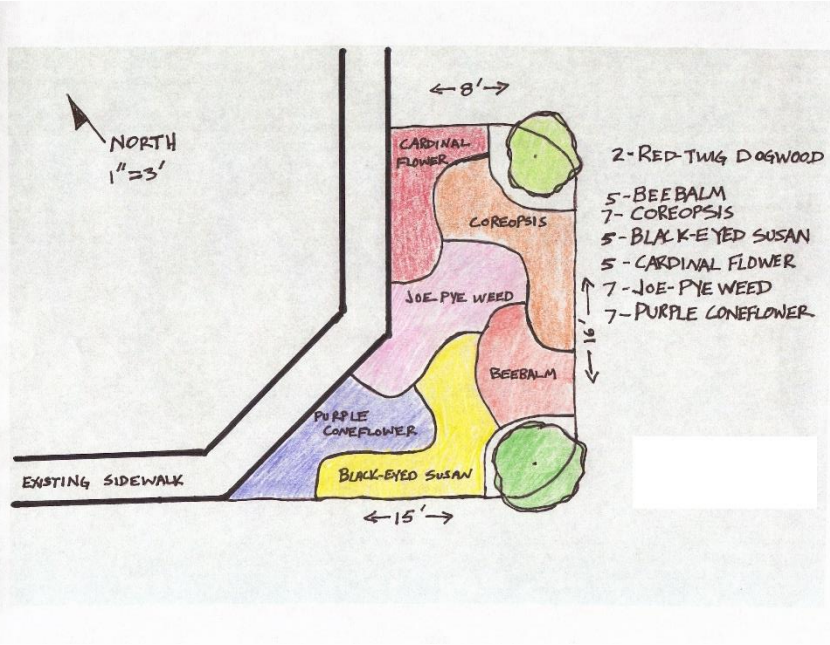
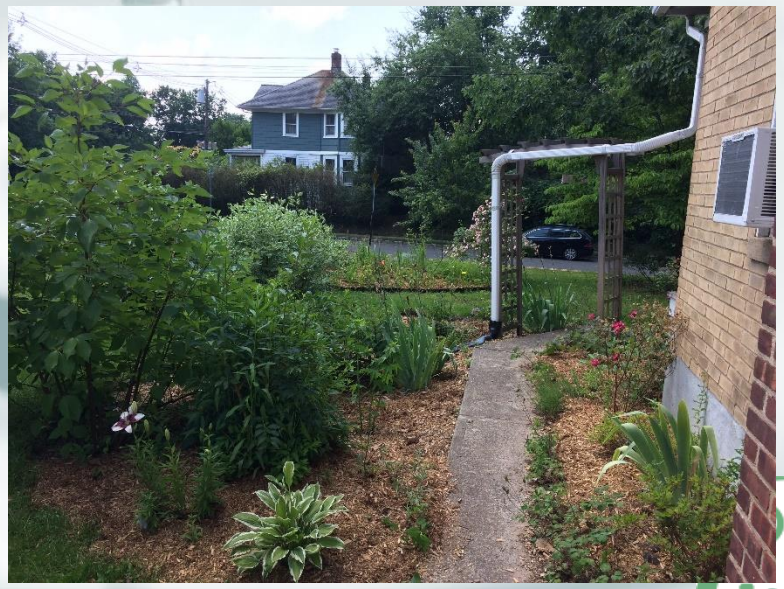
Rain Garden Examples: Roof Runoff design

Design



Installed Rain Garden

Rain Garden Examples: Roof Runoff Design



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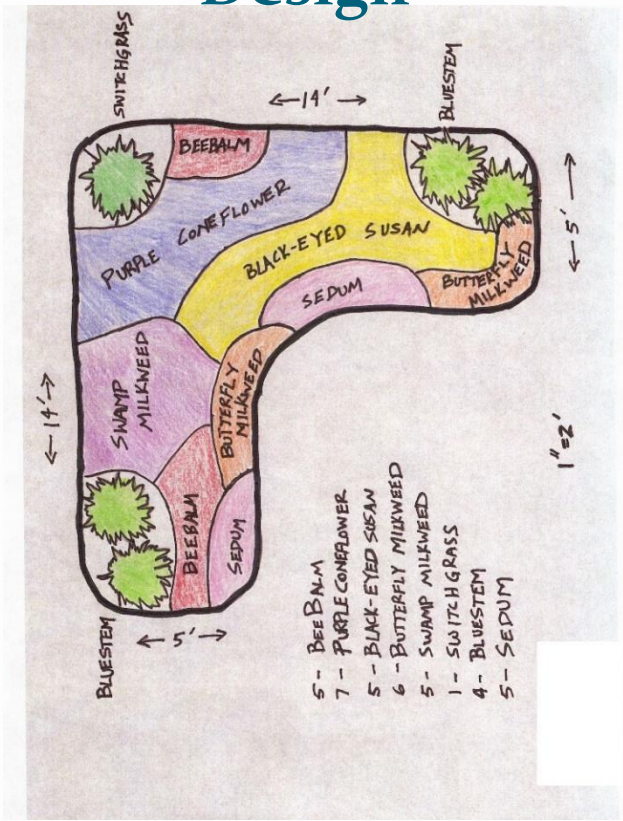
Rain Garden Examples: Parking Lot Runoff

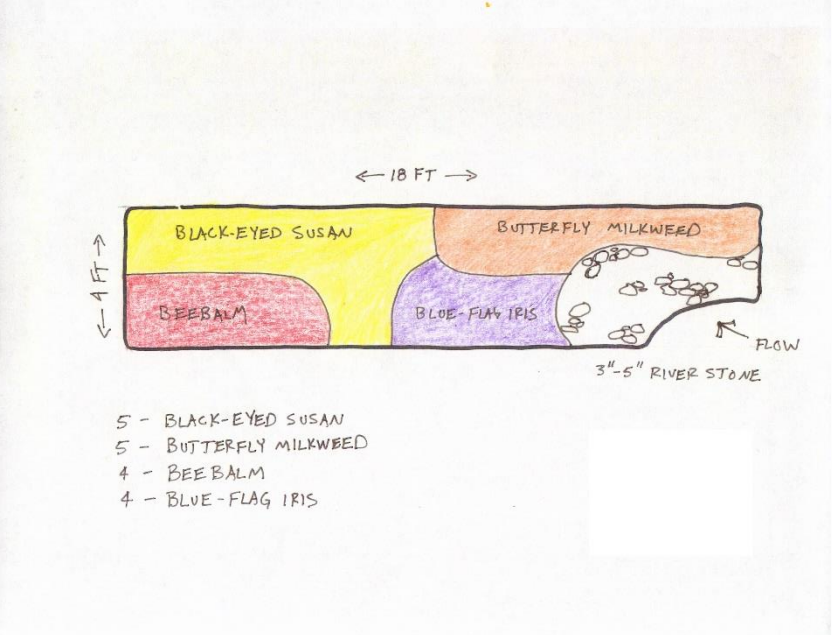
Design



Installed Rain Garden

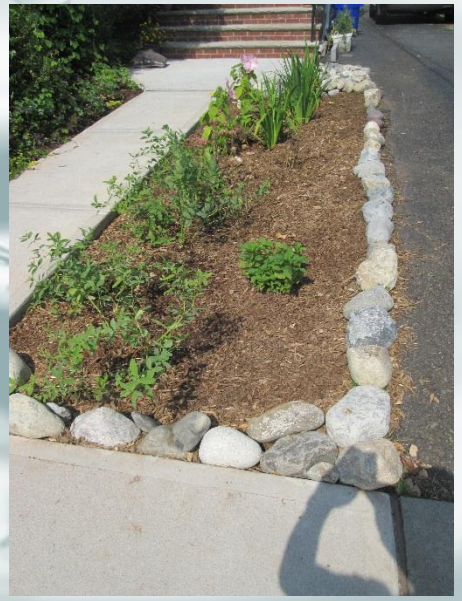
Rain Garden Examples: Roof, sump pump and Driveway Runoff !!!

Design



Installed Rain Garden

Rain Garden Examples: Driveway and Sump pump



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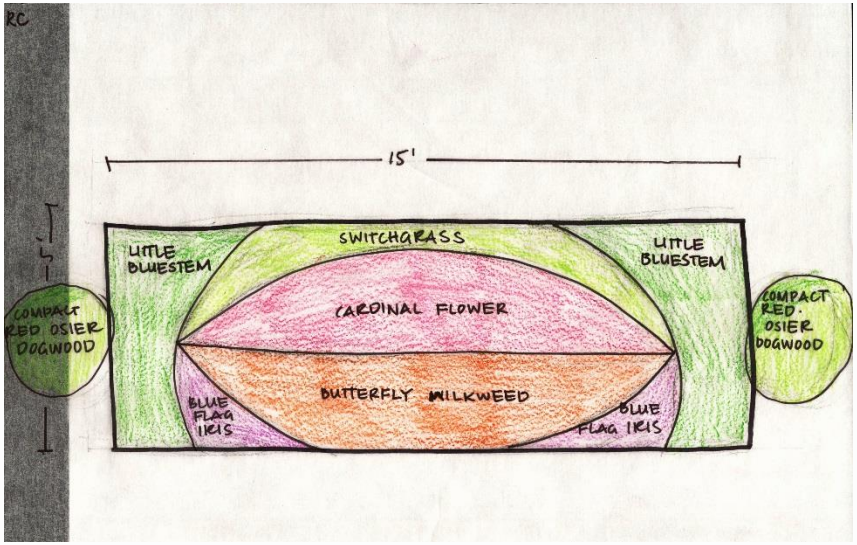
Rain Garden Examples: Rain Barrel overflow

Design



Installed Rain Garden

Maintenance

Maintain it: Short Term maintenance

- Mulch with top dressing such as undyed cedar mulch
- Water until established-soaker hose can help initially
- Remove unwanted weeds- little and often
- Fertilize at planting, and check soil after 3 years
- Inspect during and after rain events for issues
- Remove collected trash frequently
- Black top chippings or other sediments

Maintain it: Long-Term maintenance

- Troubleshoot problems- if erosion occurs, build up berm, plant more grasses or add more mulch or stone to harden area.
- Prune, thin and cut back shrubs to encourage multiple stem growth
- Remove excess sediment, trash or debris as it collects

Maintain it: Troubleshoot problems

- Slowing down the speed of water as it enters the garden:
- Attach a perforated plastic diffuser to the end of your gutter/ downspout.
- Use river rock at the entrance point of the rain garden.
- 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.

Resources and Thanks

- Thanks to Chris Obropta from Rutgers University Water Resources Page for use of their Rain garden educational materials, used in the creation of this presentation.
- Rutgers University Cooperative Extension has many useful articles, homeowner guides and rain garden design and installation information:
- http://water.rutgers.edu/Projects/Projects.htm

continued

Resources

http://www.npsnj.org/rain_garden_home.htm

Site Visits

- If you live in the Summit area, we can schedule a 30-45 minute visit to help you plan and design your garden and plan for success.
- Contact Ginger Von Ryzin at gvonryzin@greatswamp.org and cc Hazel at Hazele@greatswamp.org
- We will schedule a time that works for you and make a plan tht will allow you to move forward with your rain garden wither this fall or next spring

continued