What is a Rain Garden?

- An area in a man-made landscape that captures a shallow amount of water and holds it for a short time period
- Runoff water is captured and infiltrated into the soil in an indented area where plants and soils utilize and filter the water
- An attractive addition to a landscape

Purpose of a Rain Garden

- Captures runoff from impervious areas such as roofs, driveways, patios
- Reduce runoff leaving landscape to become stormwater
- Ponding should last no more than 48 hours after rain stops

Benefits of Rain Gardens

- Low maintenance, low water use, beautiful landscape feature
- Increases infiltration of rainwater in landscapes with impervious surfaces
  - – - infiltrates as much as 30 % more water than a flat or sloped lawn area
- Reduces flooding risks and stream bed destruction downstream
- Different kind of habitat in the landscape

Planning Your Rain Garden

- Location
- Size
- Plant Mix

Location of the Rain Garden

- At least 10 ft from a building foundation
- Near patio, driveways roads
- Area that water will naturally move to –low area
- Easy viewing from inside
- Fitting into the rest of the landscape

Locations to Avoid

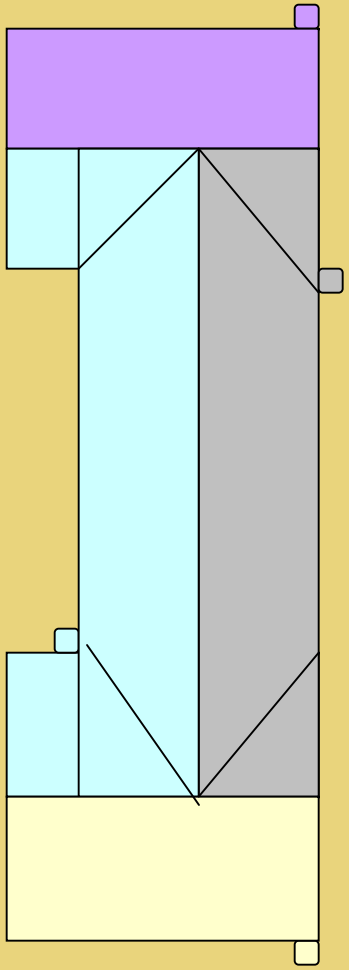
- Next to a building foundation
- Over a septic system
- Where water stands for long periods already
  - High seasonal water table area
- Inside the dripline of any large trees
- Slopes greater 12%

Rain Garden Size

- Depends on
  - Area of drainage
  - Depth of ponding of rain garden
  - Soil and Slope of location

Deciding the Size

- Figure out the size of the area that will have runoff going to the rain garden
- For a house, draw a footprint
- Break whole roof into areas going to each gutter
- Figure areas for each gutter



Soil Testing

- Infiltration Test
  - Dig a hole 6-8 inches deep and wide
  - Fill hole with water
  - If water does not drain out of the hole in 12 hours, not a good location for a rain garden
- Soil Chemistry Test
  - Take 2 cups of soil to the local county extension agent and have a soil test
    - Results will tell whether lime is needed to adjust pH and whether there is enough nutrients in the soil
    - $8 fee, takes about two weeks for results

Problem Soils

- If soils are high in clay or have been compacted during development, they may not have the capacity to infiltrate well
- The rain garden area soil can be removed and replaced with a better draining soil

Problem Soils

- Ideal rain garden soil mix – 50-60% sand, 20-30% topsoil, 20-30% compost
  - No more than 10% of mix should be clay
- Be careful of the nutrient content of composts…lower nutrient concentrations is better for the rain garden soil

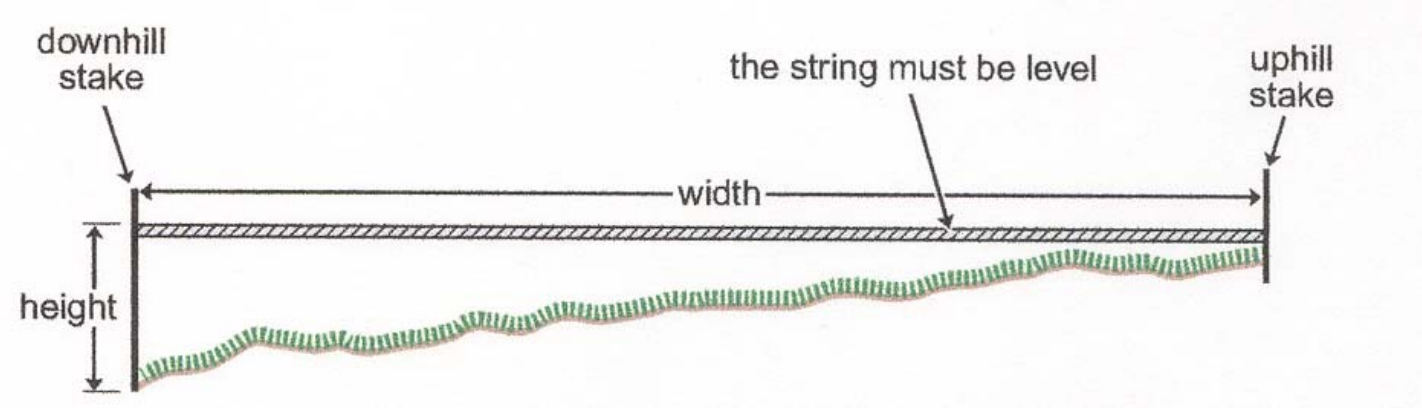
Deciding the Size

- Sandy soils – 5-8% of runoff area
- Clay soils – 10-15% of runoff area
- Example – Area = 1800 sq.ft
  - Sandy soil - .06 X 1800 = 108 sq.ft
  - Clay soil - .12 X 1800 = 216 sq.ft
- If the area of the rain garden needs to be > 300 sq ft, consider making two smaller ones or bring in the earth moving equipment

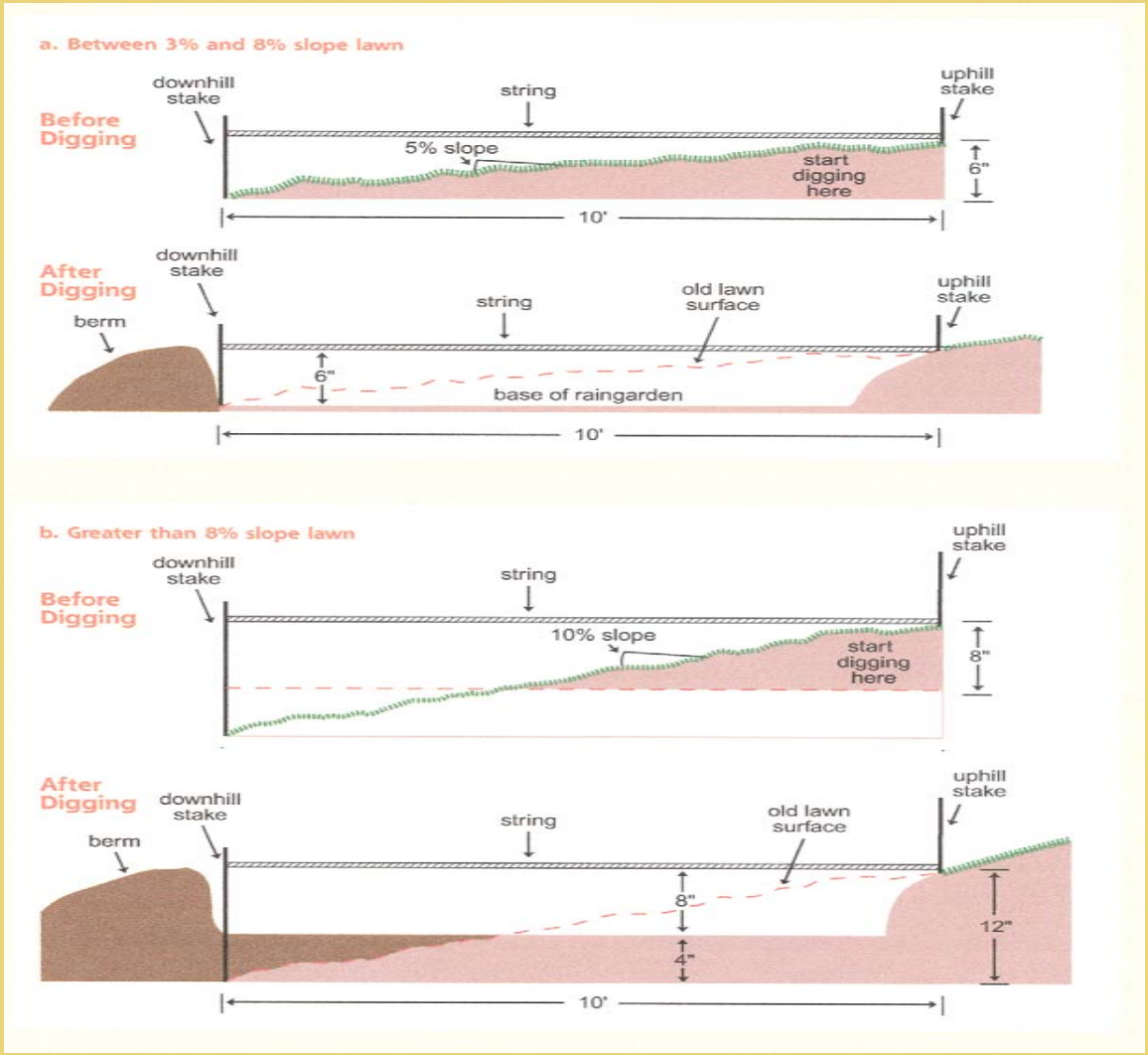
Deciding the Size

A rain garden on a steeper slope can be smaller and deeper than a rain garden on a flatter slope

Measuring Slope

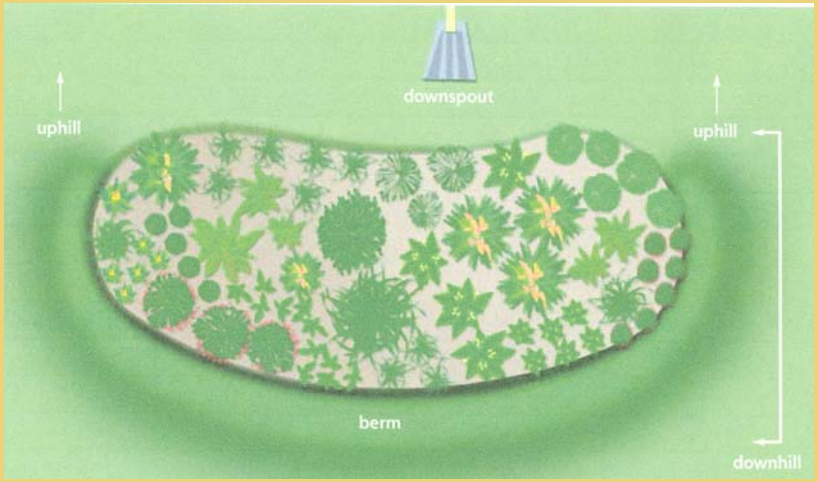


Installing the Rain Garden



Layout of Rain Garden

- Rain gardens are usually not square or a perfect circle
- The long length should be perpendicular to the major slope
- The shorter length should go down the major slope

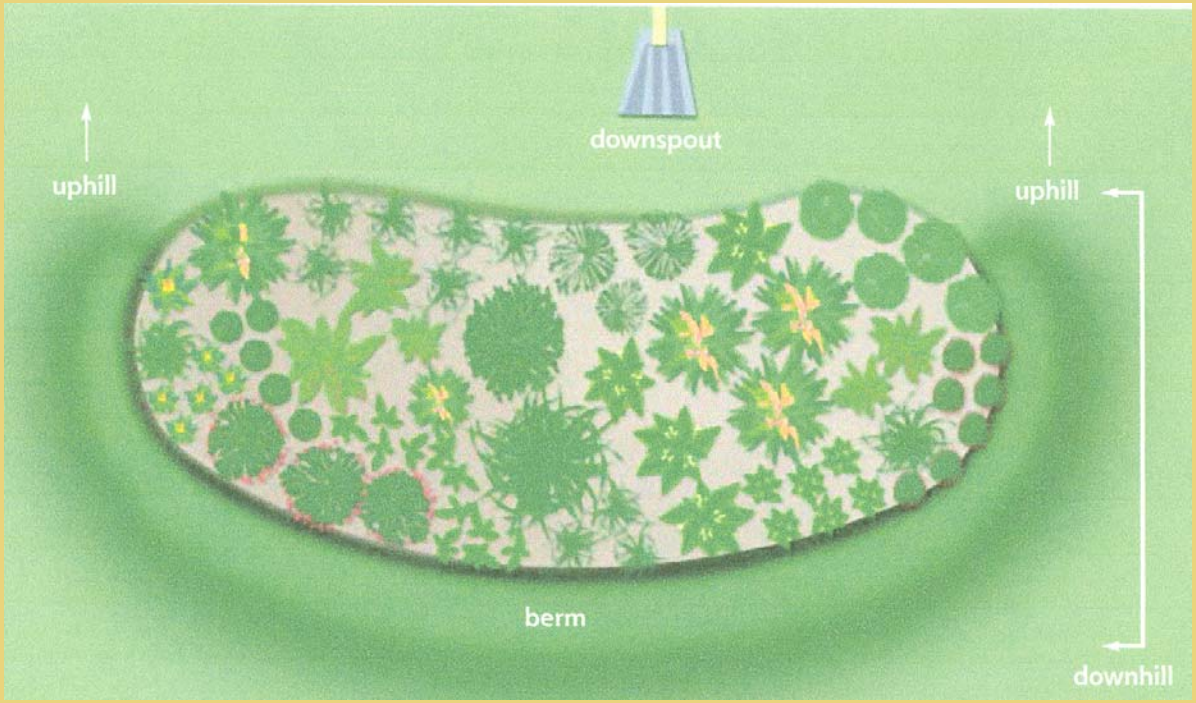


Layout of Rain Garden

- Think about where excess storm water will go
- You cannot send your overflow onto your neighbors property
- Local government has jurisdiction over land disturbing activities

Installing the Rain Garden

- Pointers
  - Bottom of the rain garden should be level
  - Top of berm should be about the same elevation as the uphill edge of the rain garden



Overflow Area

- Always have an overflow method for larger storms
  - Lower area in the berm somewhere
  - Drain pipe within rain garden

Connecting the Rain Garden

- Create a shallow wide swale or bury a corrugated drain pipe to carry flow from gutter into the rain garden
- Line swales with turfgrass or gravel to prevent erosion

Installing the Rain Garden

- Layout edge of rain garden with rope or garden hose
- Set aside the top 4-6 inches of soil (topsoil), excavate the hole then use the top soil to backfill the planting area.
- Move the soil in the rain garden area down to the bottom edge of the rain garden

Installing the Rain Garden

- Prepare the soil for planting
  - Add lime and fertilizer as recommended by soil test
  - Spread 2 to 4 inches of compost and mix or till it into the whole area of the rain garden
- Now you are ready to plant

Plants

- A wide variety of plants in both size texture and color makes for an interesting rain garden
- Rain gardens can be designed to attract butterflies and birds with the right plant choices
- Mix trees, shrubs, perennials, ornamental grasses and turfgrasses
- Plants must be wet and drought tolerant
  - Really tough plants

Trees for Rain Gardens

- Red Maple
- River Birch
- Crape Myrtle
- Black Gum
- Bald Cypress
- Green Ash
- Willow Oak
- Serviceberry
- Hornbeam
- Sweetbay Magnolia
- Dahoon Holly
- Winter King Hawthorn
- Sugar Hackberry
- Fringetree
- Gingko
- Persimmon
- Loblolly Pine

- River Birch

- Bald Cypress

Loblolly Pine

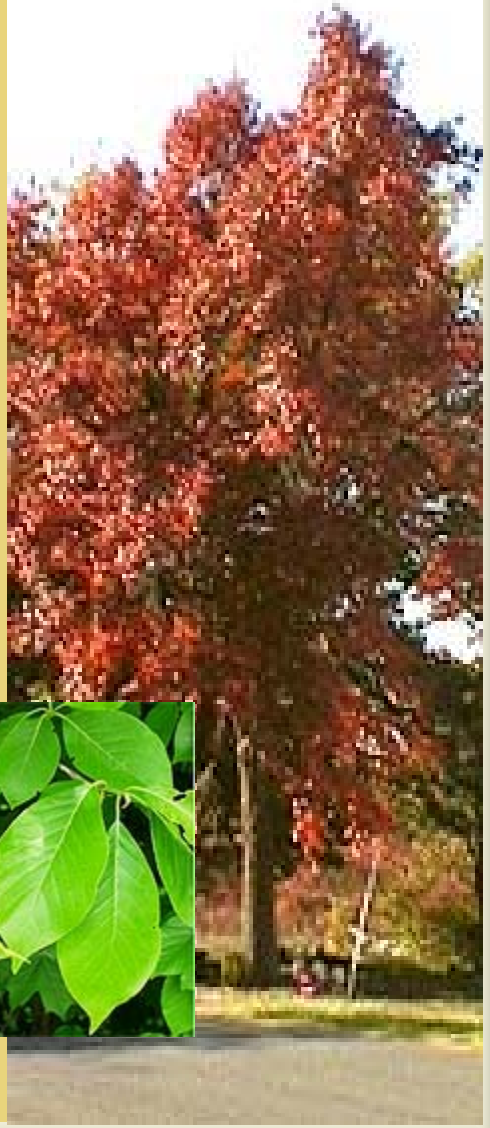
- **Red Maple**

Gingko

- Crape Myrtle

Sweetbay Magnolia

Black Gum



Willow Oak

- Winter King Hawthorn

Shrubs for Rain Gardens

- Winterberry
- Arrowwood
- Buttonbush
- Summersweet Clethra
- Wax Myrtle
- Chokeberry
- American Beautyberry
- Bottlebrush Buckeye
- Inkberry
- Oakleaf Hydrangea
- Virginia Sweetspire

Deciduous Shrubs

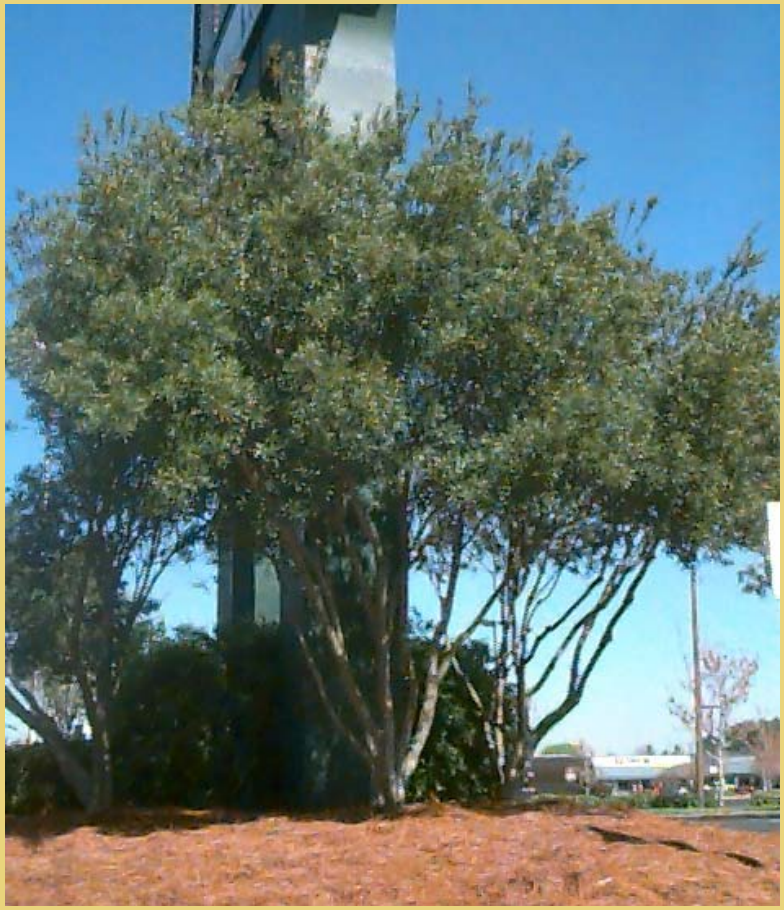
- Provide Seasonal Interest
  - Flowers
  - Berries
  - Fall Color
- More Natural Growth Form
- Majority of Wetland Plants are Deciduous

- **Inkberry**

Arrow wood

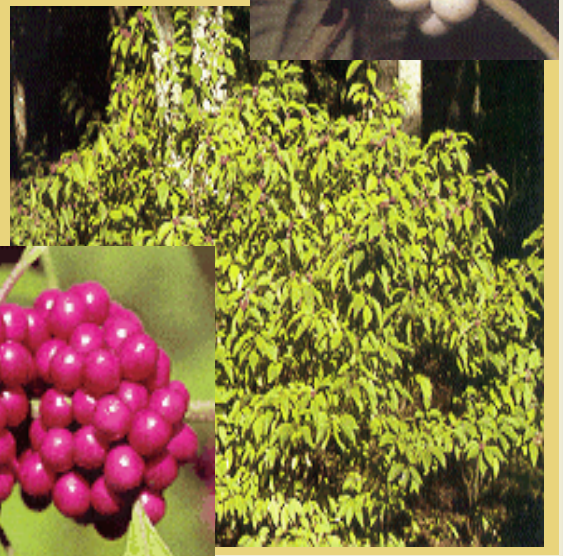
Yaupon Holly

Southern Wax Myrtle



Bottlebrush Buckeye

Oakleaf Hydrangea



American
Beauty Berry

Virginia Sweetspire

Spice Bush

Winterberry

Buttonbush

Herbaceous Plants for Rain Gardens

- Asters
- Blackeyed Susan
- Lobelia
- Northern Sea Oats
- Cardinal Flower
- Goldenrod
- Ironweed
- Joe Pye Weed
- Rose or Swamp Mallow
- Swamp Milkweed
- Royal Fern
- Cinnamon Fern
- Netted Chain Fern
- Broad Beech Fern
- Canna Lilies
- Yellow Flag Iris
- Rushes
- St. Johns Wort
- Foam Flower
- White Arrow Arum
- Jack-in-the-Pulpit

Herbaceous Plants for Rain Gardens- Groundcovers

- Shuttleworth ginger
- Partridge berry
- Zoysia
- Liriope
- Mondograss

Canna Lilies

St. Johns Wort

Ironweed

Cinnamon Fern

Swamp Milkweed

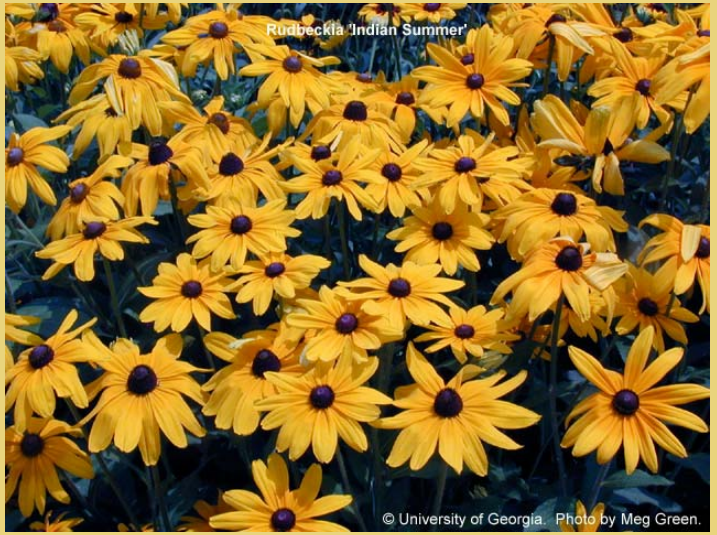
- Royal Fern

Asters

Joe Pye Weed

Liriope

Blackeyed Susan



Chasmanthium latifolium
Northern Sea Oats


Miscanthus sinensis
Silver Grass
Phalaris arundinaceae
Ribbon Grass
Festuca cinerea
Silver Fescue
Pennisetum alopecuroides
Fountain Grass

Plants to Avoid

- Those Susceptible to Root Rots
  - Most coniferous shrubs
  - Azaleas
  - Indian Hawthorn
  - Camelias

Maintenance

- No special maintenance required...
- Routine periodic landscaping maintenance
  - Weeding
  - Pruning
  - Replacing plants
  - Plant Division
  - Replacement of mulch

Plants for Rain Gardens

Soil conditions in rain gardens alternate between wet and dry, making them tough places for many plants to grow. The following plants are adapted to these conditions, though some plants will tolerate more moisture than others. Each plant is marked according to its flooding tolerance, with 3's being tolerant of longer flooding, 2's only tolerating brief flooding, and 1's indicate plants that tolerant extended drought once established.

All of these plants are native to the southeastern United States in wetland habitats and most are readily available at local nurseries. Wetland plants can generally grow well in moist or well-drained soils, whereas plants adapted to dry soils rarely survive in soggy conditions. How wet a rain garden stays will vary considerably depending on the site where it is installed. Rain gardens created on sandy soils will rarely hold water for more than a few hours. On these sites it is most important to choose plants for their drought tolerance. Rain gardens created on loamy or silty soils could pond water for 2-4 days (if your site ponds water for more than 5 days, you should consider creating a wetland). On these sites, choosing plants tolerant of extended flooding is critical to success.

Remember you are not limited to planting just within the excavated area! Extending plantings around this area will help the rain garden to blend in with the overall landscape. Any plants adapted to the site conditions can be used outside of the excavated area.

Large Trees (over 30' tall)

Deciduous

Red Maple (2) – *Acer rubrum*
River Birch (1,3) – *Betula nigra*
Green Ash (3) – *Fraxinux pennsylvanica*
Black Gum (2) – *Nyssa sylvatica*
Willow Oak (1,2) – *Quercus phellos*
Willows (3) – *Salix* species
Bald Cypress (1,3) – *Taxodium ascendens*
Nutall Oak (1,2) – *Quercus nuttalii*

Evergreen

Atlantic White Cedar (1,3) – *Chamaecyparis thyoides*
Southern Magnolia (1,2) – *Magnolia grandiflora*
Longleaf Pine (1,2) – *Pinus palustris*
Swamp Laurel Oak (3) – *Quercus laurifolia*

Small Trees (under 30' tall)

Deciduous

Redbud (1,2) – *Cercis canadensis*
Fringe Tree (2) – *Chionanthus virginicus*
Washington Hawthorn (3) – *Crataegus phaenopyrum*
Possumhaw (1,3) - *Ilex decidua*

Evergreen

American Holly (1,2) – *Ilex opaca*
Red Cedar (1,2) – *Juniperus virginiana*
Sweet Bay (3) – *Magnolia virginiana*
Red Bay (1,2) – *Persea borbonia*
Evergreen shrubs that can be grown as small trees include Yaupon, Wax Myrtle, and Anise Shrub.

Shrubs

Deciduous

Chokeberry (1,3) – *Aronia arbutifolia*
Beautyberry (2) – *Callicarpa americana*
Sweet Shrub (2) – *Calycanthus floridus*
Buttonbush (3) – *Cephalanthus occidentalis*
Pepperbush (2) – *Clethra alnifolia*
Fothergilla (2) – *Fothergilla gardenii*
Winterberry (3) – *Ilex verticillata*
Virginia Willow (3) – *Itea virginica*
Possumhaw (3) – *Viburnum nudum*

Evergreen

Inkberry (2) – *Ilex glabra*
Yaupon (1,2) – *Ilex vomitoria*
Anise Shrub (1,2) – *Illicium parviflorum*
Wax Myrtle (1,2) – *Myrica cerifera*
Dwarf Palmetto (3) – *Sabal minor*

Perennials

Blue Star (3) – *Amsonia tabernaemontana*
Swamp Milkweed (3) – *Asclepias incarnata*
Climbing Aster (3) – *Aster carolinianus*
False Indigo (1,2) – *Baptisia species*
Boltonia (3) – *Boltonia asteriodes*
Turtlehead (3) – *Chelone glabra*
Tickseed (1,2) – *Coreopsis lanceolata*
Joe Pye Weed (3) – *Eupatorium dubium*
Swamp Sunflower (3) – *Helianthus angustifolius*
Swamp Mallow (3) – *Hibiscus moscheutos*
Texas Star (3) – *Hibiscus coccineus*
Seashore Mallow (3) – *Kosteletskya virginica*
Gayfeather (2) – *Liatris spicata*
Cardinal Flower (3) – *Lobelia cardinalis*
Garden Phlox (2) – *Phlox paniculata*
Rudbeckia (1,2) – *Rudbeckia fulgida*
Green Headed Coneflower (3) – *Rudbeckia laciniata*

Goldenrod (3) – *Solidago rugosa*
Stoke's Aster (2) – *Stokesia laevis*
Ironweed (3) – *Vernonia novaboracensis*
Verbena (1,2) – *Verbena canadensis*

Ornamental Grasses

River Oats (1,3) – *Chasmanthium latifolium*
Muhly Grass (1,2) – *Muhlenbergia capillaris*
Panic Grass (1,3) – *Panicum virgatum*
Indiangrass (1,2) – *Sorghastrum nutans*

Non-native perennials and ornamental grasses suitable for rain gardens include: Liriope (1,2) (*Liriope muscarii* and *L. spicata*), Siberian Iris (2) (*Iris sibirica*), Daylily (1,2) (*Hemerocallis* hybrids), Rain Lilies (3) (*Zephyranthes* species), Crinum Lilies (3) (*Crinum* species), and Maiden Grass (1,2) (*Miscanthus* cultivars).

1 = Plants that once established* can withstand considerable drought (3-4 weeks without rainfall)
2 = Plants that grow best in moist to average soils and will only tolerate short periods (1-2 days) of flooding.
3 = Plants that will tolerate longer periods of flooding (3-5 days), but will also grow in moist to average soils.

*Establishment usually takes 1-2 years for trees and shrubs and 1 year for perennials.

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GCES Recommended Resources

- A Compilation of Low Maintenance Plants for Georgia Landscapes

http://pubs.caes.uga.edu/caespubs/Agriculture/horticulture/H-91-009.htm

- Environmentally Friendly Landscape Practices

http://pubs.caes.uga.edu/caespubs/Agriculture/horticulture/H-00-060.htm

- Landscape Plants for Georgia

http://pubs.caes.uga.edu/caespubs/pubcd/B625.htm

- Soil Preparation and Planting Procedures for Ornamental Plants in the Landscape

http://www.ces.uga.edu/pubcd/B932-w.htm

- Soil Testing for Home and Gardens

http://pubs.caes.uga.edu/caespubs/pubs/PDF/L387.pdf

BIORETENTION BASIN NOTES:

BIORETENTION BASIN PLANTING MIXTURE:

NOTE: MIXTURE SHALL BE UNIFORM, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS SHALL BE MIXED OR DUMPED WITHIN THE AREA THAT MAY BE HARMFUL TO PLANT GROWTH AND/OR MAINTENANCE. THE MIXTURE SHALL BE FREE OF BERMUDA GRASS, QUACKGRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADIAN THISTLE, TEARTHUMB, OR OTHER NOXIOUS WEEDS. AVOID OVER-COMPACTION OF BIORETENTION SOILS DURING CONSTRUCTION.

MIXTURE:
15 % BY VOLUME DOUBLE SHREDDED HARDWOOD MULCH
50 % BY VOLUME WASHED SHARP SAND - ASTMC-33
30 % TOPSOIL
5% BY VOLUME PEATMOSS

FERTILIZER:

TREES: ONE 21 GM TIGHTLY COMPRESSED, SLOW RELEASE FERTILIZER PER 1/4" TRUNK DIAMETER.

SHRUBS: 21 GM TIGHTLY COMPRESSED, SLOW RELEASE FERTILIZER WITH MINIMUM GUARANTEED ANALYSIS 20-10-5.
3 GAL. CONT. = 2 TABLETS IN BOTTOM OF PIT
5 GAL. CONT. = 3 TABLETS IN BOTTOM OF PIT

GRASSES: 10-6-4 ANALYSIS FERTILIZER WET APPLICATION AT RATE OF 3 LBS./1000 S.F.

PLANT INSTALLATION:

SHRUB PLANTING PITS SHALL BE 6" WIDER THAN THE DIAMETER OF THE ROOT BALL.
ADD FERTILIZER TO SHRUB PITS, INSTALL SHRUBS & BACKFILL W/ TOPSOIL.
1/8TH OF ALL ROOTBALLS MUST REMAIN ABOVE GRADE.
PLACE 2" LAYER DOUBLE-SHREDDED, WELL-AGED HARDWOOD MULCH.
INSTALL DEGRADABLE EROSION CONTROL NETTING PER MANUF. DIRECTIONS.
CUT HOLES & INSTALL GRASS PLUGS THROUGH NETTING & MULCH.
FERTILIZE GRASSES.
THOROUGHLY WATER ONCE INSTALLATION IS COMPLETE.

Deciding the Size

- > 30 ft from gutter
  - include lawn area between house and rain garden for sizing rain garden
- < 30 ft to gutter
  - only the roof area needs to be included in sizing