

Rain Garden Design

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What is a rain garden? Rain gardens are landscaped areas that capture rain water from a roof or drainage area. They are planted with appropriate plants that filter runoff back into the ground to recharge our groundwater sources.

Why create a rain garden? On average, Florida gets over 50 inches of rain water annually, especially in summer. Florida's growing population continually increases the demand for water and strains our natural resources. This is largely due to loss of natural green space, increase in impervious surfaces (rooftops, concrete and asphalt), and nonpoint source pollution. One inch of rainfall can result in 16 times more runoff on an acre of asphalt than on a completely vegetated area of equal size. A vegetated yard can reduce runoff by up to 30%, compared to a yard with exposed soil and patchy landscaping.

The many benefits to planting a rain garden include:

- Recharging the local aquifer by increasing the amount of water that filters into the ground.
- Reducing the amount of urban pollutants (fertilizer, pesticides, car oil, etc.) that get carried away by storm water runoff and enter nearby surface water bodies.
- Providing habitat for birds, butterflies, and beneficial insects.
- Improving property value by adding curb appeal to the landscape.

Creating a rain garden requires careful planning, but is well worth the effort to reduce nonpoint source pollution caused by storm water runoff.

Steps to Creating a Rain Garden:

- Select location
- Determine slope
- Determine depth
- Assess soil type
- Calculate drainage area
- Determine length and width
- Design a planting plan
- Install

Factors to consider when selecting a location for your rain garden:

- Place 10 feet away from buildings to prevent water from seeping into foundation.
- Keep 25 feet away from septic tank or well.
- Best in full or partial sun.
- Place away from tree roots.
- Select existing low spot, but only if it normally drains quickly after heavy rain.
- Do not select site with standing water – purpose is to encourage infiltration!

Determine appropriate size for your rain garden by accessing slope, depth, soil type, drainage area length and width. Factors that influence the size of rain garden include garden depth, soil type and total area of roof and/or lawn that will drain into the garden.

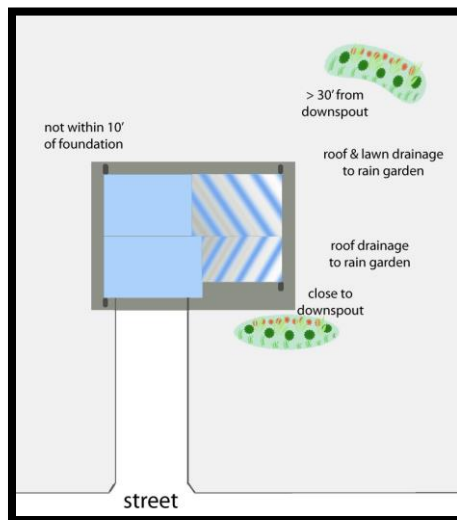


Image Credit: <http://gardeningsolutions.ifas.ufl.edu/pdf/articles/rain-garden-manual-hillsborough.pdf>

Determine Slope:

Slope may not be an issue for your flat, Florida yard, but if it is sloped, this calculation will be valuable:

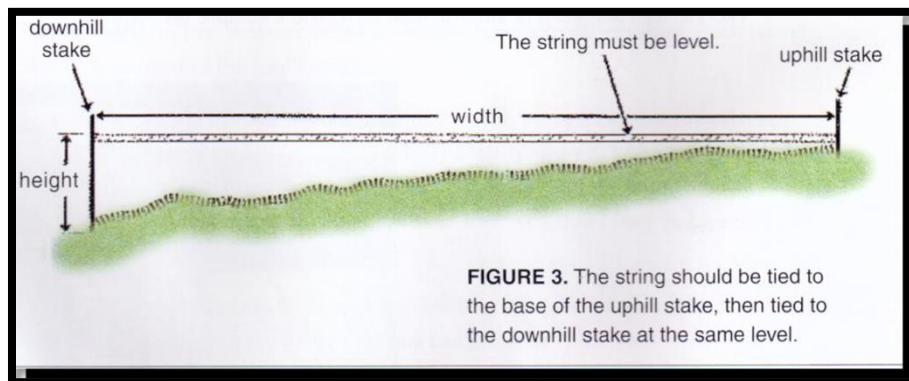


Image Credit: University of Wisconsin Extension Service

Use stakes and string to measure:

- One stake at highest point.
- Second stake at lowest point.
- Use carpenters or string level.
- Measure distance between stakes for width (run).
- On downhill side, measure height from ground to string (rise).

Calculate Slope: Slope = Rise over Run

Horizontal distance of string between stakes (ex: 180 in).

Height from ground to string (ex: 9 in).

Divide height by horizontal distance between stakes and multiply by 100 to find slope of lawn:

Ex:
$$\frac{9 \text{ in height}}{180 \text{ in width}} = \frac{1}{20} = 0.05$$

$0.05 \times 100 = 5\% \text{ slope}$

In this example, the rain garden has a 5% slope. Next, use the following chart to determine the appropriate depth.

Determine Appropriate Garden Depth:

Using the slope of the area, select the depth of the rain garden from the following options:

- If the slope is less than 4%, build a 4 to 5-inch deep rain garden.
- If the slope is between 5% and 7%, build a 6 to 7-inch deep rain garden.
- If the slope is between 8% and 12%, build an 8 to 9 -inch deep rain garden.

Slope	Depth
< 4%	4" – 5"
5 – 7%	6" – 7"
8 – 12%	8" – 9"

Assess Soil Type:

- Sandy soils have the fastest infiltration.
- Clay soils have the slowest infiltration and take longer to absorb water, so they need to be larger than rain gardens in sand or silt.

Calculate Drainage Area:

For rain gardens within 30 ft. from water source (downspout):

- Calculate the portion of roof that drains into garden:
 - Estimate the percentage of the roof that feeds to the downspout (often houses have 4 downspouts, each taking 25% of roof runoff).
 - Calculate area of the house to get approximate area of the roof (multiply length x width of house).
 - Multiply area of the roof by estimated percent of roof that feeds the downspout leading to the rain garden to calculate the roof drainage area.

Ex: House is 75' x 50' = 3750 sq. ft.

Multiply by .25 = 938 sq. ft. drainage area

For rain gardens greater than 30 ft. from water source:

- If a significant area of ground is uphill from garden and will drain into garden, add that area to the roof drainage area:
 - Estimate area of that ground (L x W) and add to roof drainage area.

Determine Size of Rain Garden:

To determine the recommended area of the garden, multiply the size factor by the drainage area (using chart).

Table 1: Size factors for rain gardens within 30 feet of the water source			
Soil Type	3-5 inches deep	6-7 inches deep	8 inches deep
Sand	0.19	0.15	0.08
Silt	0.34	0.25	0.16
Clay	0.43	0.32	0.20

Table 2: Size factors for rain gardens greater than 30 feet from the water source	
Soil Type	Size Factor (regardless of depth)
Sand	0.03
Silt	0.06
Clay	0.10

Image Credit: <http://gardeningsolutions.ifas.ufl.edu/pdf/articles/rain-garden-manual-hillsborough.pdf>

Size factor x Drainage area = Recommended area of rain garden

Ex: 0.15 x 938 sq. ft. = 141 sq. ft. garden

Determine Length and Width of Garden:

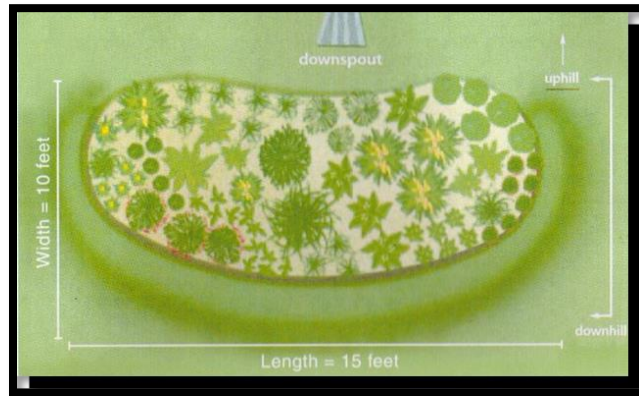


Image Credit: University of Wisconsin Extension Service

- Select a width that fits the area (typically 10' to 15')
- To determine length of garden, divide square footage of garden by width:
 - Ex: 150 sq. ft. divided by 10 ft. width = 15 ft. length
 - Garden will be 10 ft. wide x 15 ft. long

Digging the Rain Garden:

- Lay out hose or string to desired shape of garden.
- Dig the depth of the garden at the uphill stake.
- Maintain same depth across the bottom.
- Pile the dirt on the low side to create the berm.

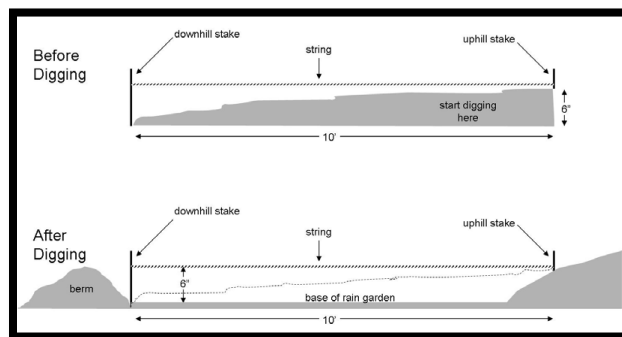


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Building the Berm

- Berm is a "wall" across bottom and up the sides of the garden.
- Berm will keep water in the garden so it doesn't run off downhill edge.
- Berm should be as high as or slightly higher than the uphill edge.
- Compact the soil in the berm by tamping hard.
- Have gently sloping sides and plant to integrate into the rest of the surrounding garden.

Mulch

- Apply a 2 to 3 inch layer of mulch.
- Irrigate until established if insufficient rainfall.

Maintenance

- The first couple of years will require regular maintenance to keep out weeds and replenish mulch, but once the plants fill in, the garden should be relatively self-sustainable.

Plant Selection:

Rain garden plants need to have the ability to survive prolonged inundation and drought and be equipped with expansive root systems capable of absorbing and filtering large amounts of water. For depth and dimension, incorporate a mixture of heights, shapes, and textures; and include sedges, rushes and grasses with flowering plants.

Perennials for North Florida Rain Gardens

- Blue Flag Iris - *Iris virginica*
- Cardinal Flower - *Lobelia cardinalis*
- Swamp Sunflower - *Helianthus angustifolius*
- Scarlet Hibiscus - *Hibiscus coccineus*
- Stokes Aster - *Aster laevis*
- Swamp milkweed - *Asclepias incarnata*
- Tickseed - *Coreopsis leavenworthii*
- Blue-eyed Grass - *Sisyrinchium angustifolium*
- Climbing Aster - *Aster carolinianus*
- Cinnamon Fern - *Osmunda cinnamomea*

Shrubs for North Florida Rain Gardens

- Beautyberry - *Callicarpa americana*
- Virginia Sweetspire - *Itea virginica*
- Summersweet - *Clethra alnifolia*
- Buttonbush - *Cephalanthus occidentalis*

Trees for North Florida Rain Gardens

- Dahoon Holly - *Ilex cassine*
- Yaupon Holly - *Ilex vomitoria*
- Sweetbay Magnolia - *Magnolia virginiana*

References:

- UF/IFAS Extension and FDOT; *Rain Gardens: A Manual for Central Florida Residents*; <http://gardeningsolutions.ifas.ufl.edu/pdf/articles/rain-garden-manual-hillsborough.pdf>
- *Rain Gardens- A How-to Manual for Homeowners; Your Personal Contribution to Cleaner Water*; City of Tallahassee Stormwater Management, TAPP- Think About Personal Pollution. www.TAPPwater.org. The original concept and illustrations derived from the University of Wisconsin Extension Service. <http://tappwater.org/downloads/Rain%20Garden%20Manual.pdf>

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