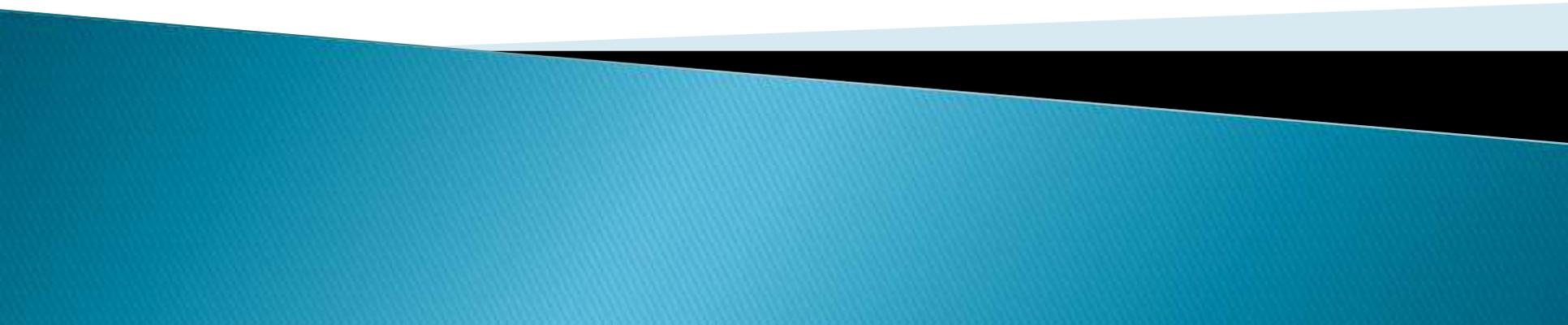


# Rain Gardens

Sustainable Landscaping

Dan Brellis



# Dan Brellis

- ▶ Alliance for the Chesapeake Bay
- ▶ Chesapeake Conservation Landscaping Council



[allianceforthebay.org](http://allianceforthebay.org)



[chesapeakelandscape.org](http://chesapeakelandscape.org)

# Stormwater

<http://vimeo.com/23640933>

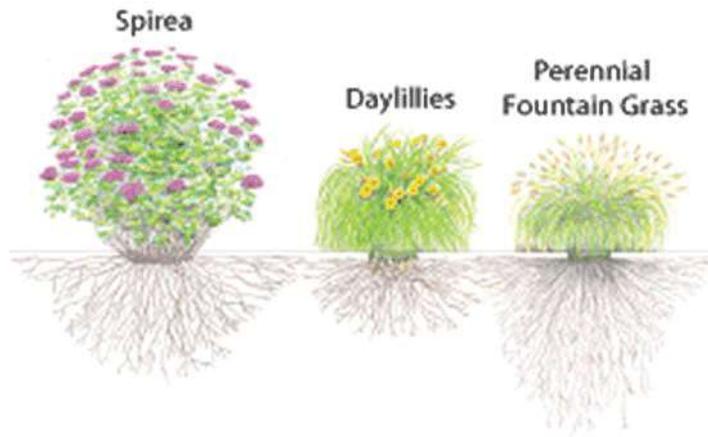
# Native Species

- ▶ Fertilizing is not necessary
- ▶ Tolerant of local climate and water conditions
- ▶ Attract wildlife
- ▶ Deep root systems



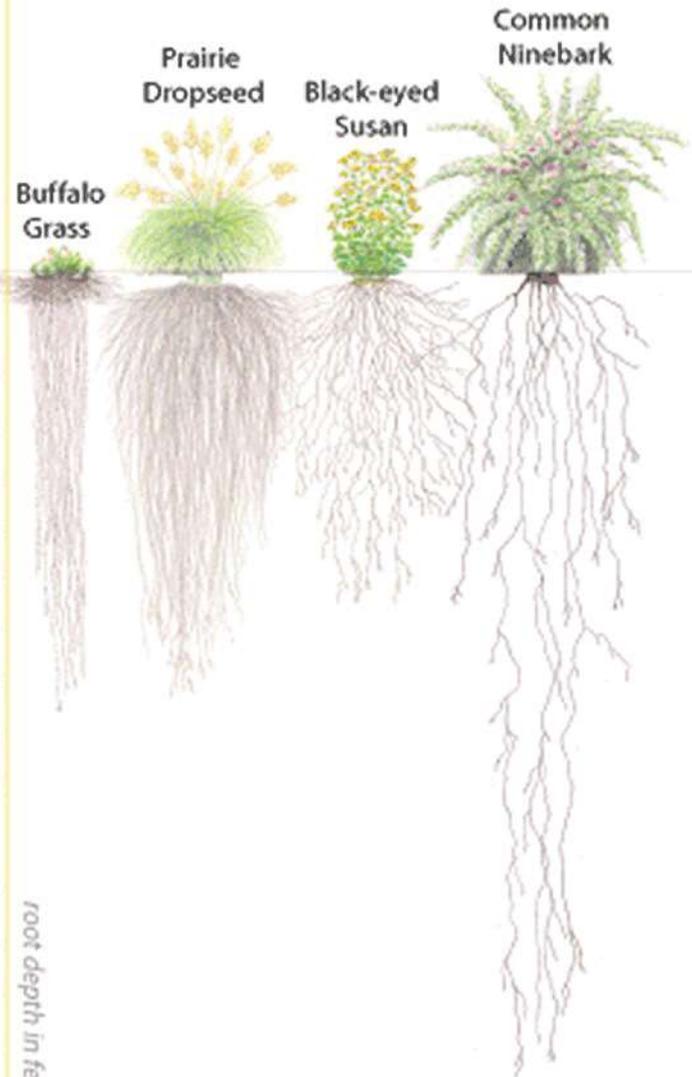
*Iris versicolor*

# Non-Natives



Fescue Turf

# Natives



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
root depth in feet

Illustration from <http://marc.org/>

# Rain Garden

- ▶ Planted depression
- ▶ Collects water runoff from roofs, driveways
- ▶ Allows water to absorb into soil
- ▶ Stormwater filtration and containment
- ▶ Rain garden  $\neq$  pond



# Components



*Hypericum densiflorum*

Plants



Soils



Cover

# Components

Plants

Soils

Cover

- ▶ Native Plants
- ▶ Wetland edge vegetation
- ▶ Sun, partial sun, shade
- ▶ Contribute to native wildlife
- ▶ Aesthetically pleasing



*Spiraea tomentosa*

# Components

Plants

Soils

Cover

- ▶ Loose soils
- ▶ Offer filtration
- ▶ Allow easy root growth
- ▶ Amend soils if necessary
  - 50–60% sand
  - 20–30% topsoil (no clay)
  - 20–30% compost



# Components

Plants

Soils

Cover

- ▶ Offers erosion control
- ▶ Traps moisture keeping soil moist
- ▶ Moderates soil temperature
- ▶ Gravel or Mulch
- ▶ Large stones for reinforcement during storms

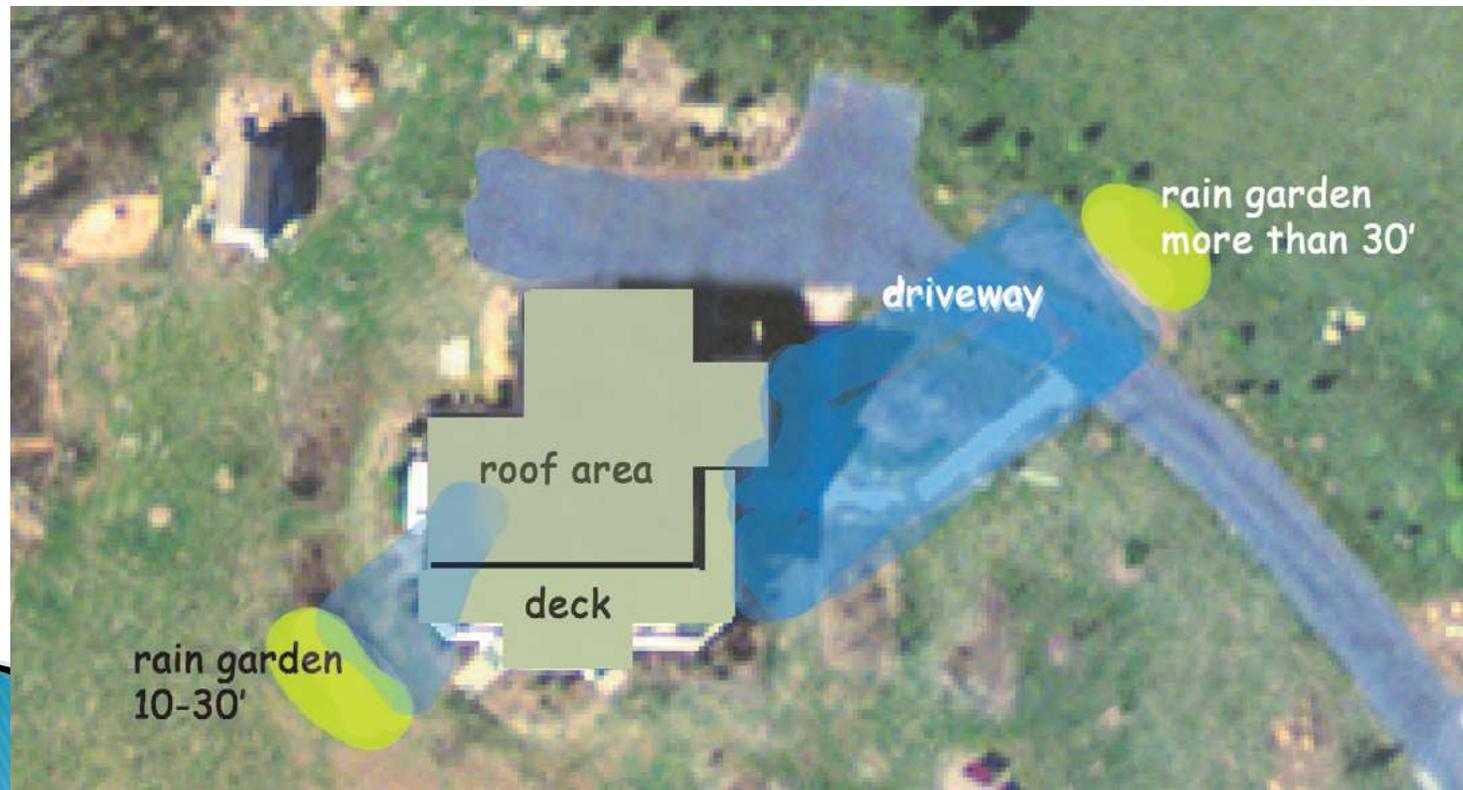


# Planning

Location

Dimensions

- ▶ Plan for aesthetics
- ▶ Account for sunlight
- ▶ 10 – 30 feet down slope from ‘water source’



# Planning

- ▶ Shape
- ▶ Drainage area
- ▶ Garden depth
- ▶ Garden area
- ▶ Width and length

Location

Dimensions



# Dimensions

Drainage

Depth

Area

- ▶ Encompasses all inputs of water
  - Impervious surface area
  - Ground level surface
- ▶ Calculate drainage area
- ▶ Roof Drainage Area (RDA)
  - length x width x percentage
  - $RDA = 40' \times 60' \times 25\% = 600 \text{ ft}^2$

# Dimensions

Drainage

Depth

Area

- ▶ Slope implies depth
- ▶ Determine slope
  - Change in height
  - Distance
- ▶ Increase depth per inch for cover layer
- ▶ More sloping sites, remove or add soil to level base

$$\begin{aligned}\text{Slope \%} &= (\text{height/length}) \times 100 \\ \text{Slope \%} &= (9''/180'') \times 100 \\ \text{Slope \%} &= 0.05 \times 100 \\ \text{Slope \%} &= 5\%\end{aligned}$$

Slope	Depth
$m < 5\%$	5" deep
$5\% < m < 7\%$	6-7" deep
$7\% < m < 12\%$	~8" deep

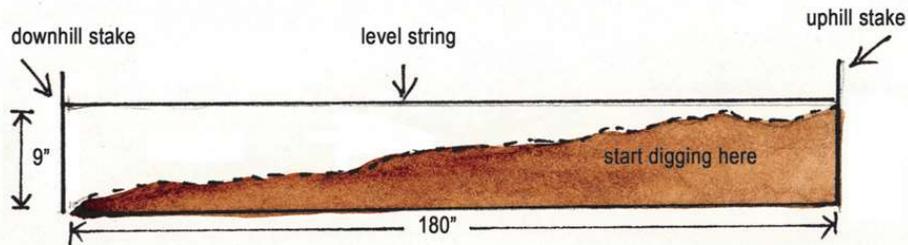
# Dimensions

Drainage

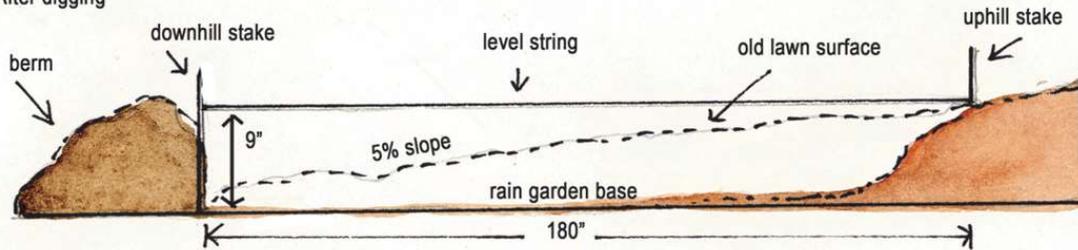
Depth

Area

Before digging



After digging



# Dimensions

Drainage

Depth

Area

- ▶ Summarize previous calculations
- ▶ Determine 'size factor'

Distance:	Less than 30 feet			More than 30 feet
	Depth			
Soil type	5"	6-7"	8"	All depths
Sand	0.19	0.15	0.08	0.03
Silt	0.34	0.25	0.16	0.06
Clay	0.43	0.32	0.20	0.10

- ▶ Rain Garden Area = Drainage area x size factor

# Dimensions

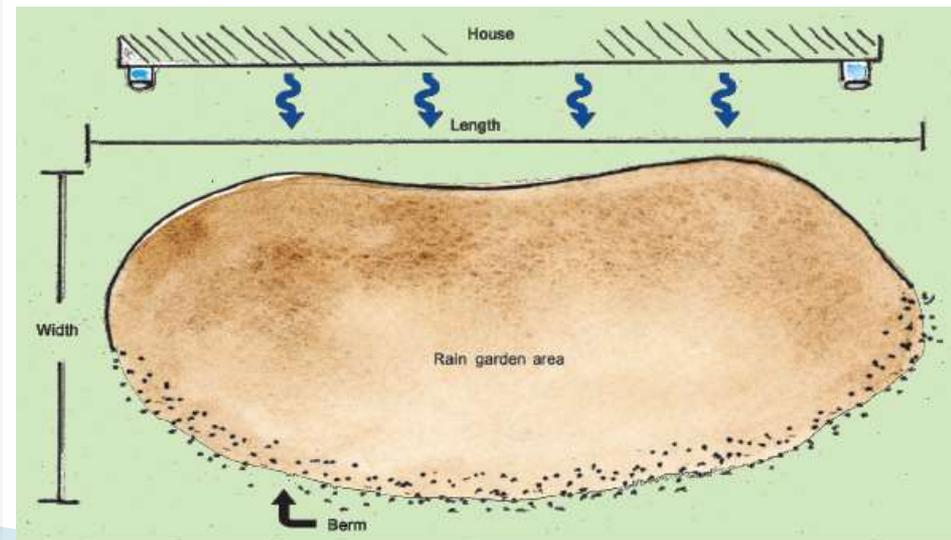
1. Rain garden's distance from impervious surface(s): 10 to 30'
2. Soil type: sand
3. Shape: Kidney bean
- 4a. Drainage area: 600 ft<sup>2</sup>
- 4b. Depth equals 6 to 7" (table 1, page 10). The size factor is 0.15 (table 2 below).
- 4c. Rain garden area  
 = drainage area x size factor  
 = 600 ft<sup>2</sup> x 0.15  
 = 90 ft<sup>2</sup>
- 4d. Width = Rain garden area / length  
 Width = 90 ft<sup>2</sup> / 15 ft  
 Width = 6 ft

Drainage

Depth

Area

Distance:	Less than 30 feet			More than 30 feet
	Depth			
Soil type	5"	6-7"	8"	All depths
Sand	0.19	0.15	0.08	0.03
Silt	0.34	0.25	0.16	0.06
Clay	0.43	0.32	0.20	0.10



# Construction

- ▶ Safety with underground utilities
  - ▶ Build and plant in late spring
  - ▶ Capture runoff
  - ▶ Outline rain garden shape
  - ▶ Remove grass
  - ▶ Construct berm if necessary
  - ▶ Dig rain garden basin
  - ▶ Amend soil mixture
- 

# Capture Runoff



Vegetated swale

Downspout extension



# Construction

- ▶ Safety with underground utilities
  - ▶ Build and plant in late spring
  - ▶ Capture runoff
  - ▶ Outline rain garden shape
  - ▶ Remove grass
  - ▶ Construct berm if necessary
  - ▶ Dig rain garden basin
  - ▶ Amend soil mixture
- 

# Berm

- ▶ Help retain water on steep slope
- ▶ Low mound, top level with uphill side
- ▶ Use excavated soil from rain garden
- ▶ Vegetated or compacted and mulched

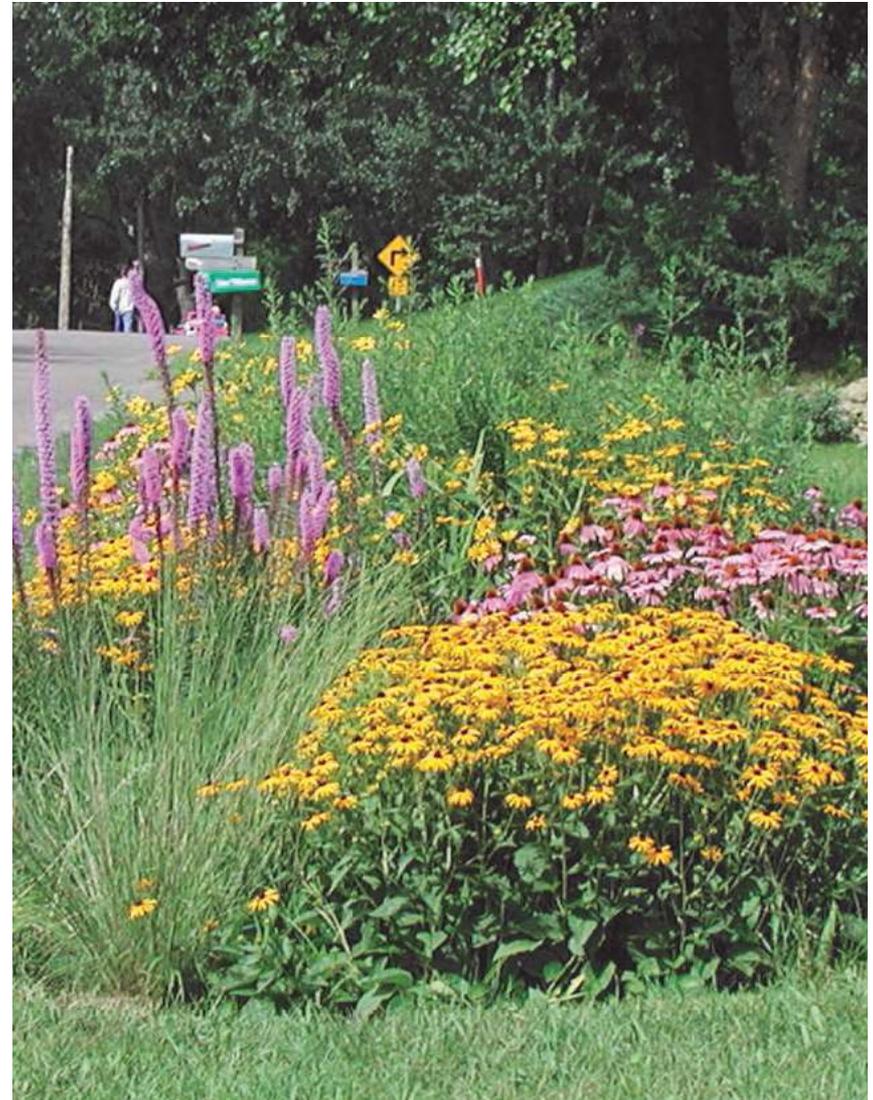


# Construction

- ▶ Safety with underground utilities
  - ▶ Build and plant in late spring
  - ▶ Capture runoff
  - ▶ Outline rain garden shape
  - ▶ Remove grass
  - ▶ Construct berm if necessary
  - ▶ Dig rain garden basin
  - ▶ Amend soil mixture
- 

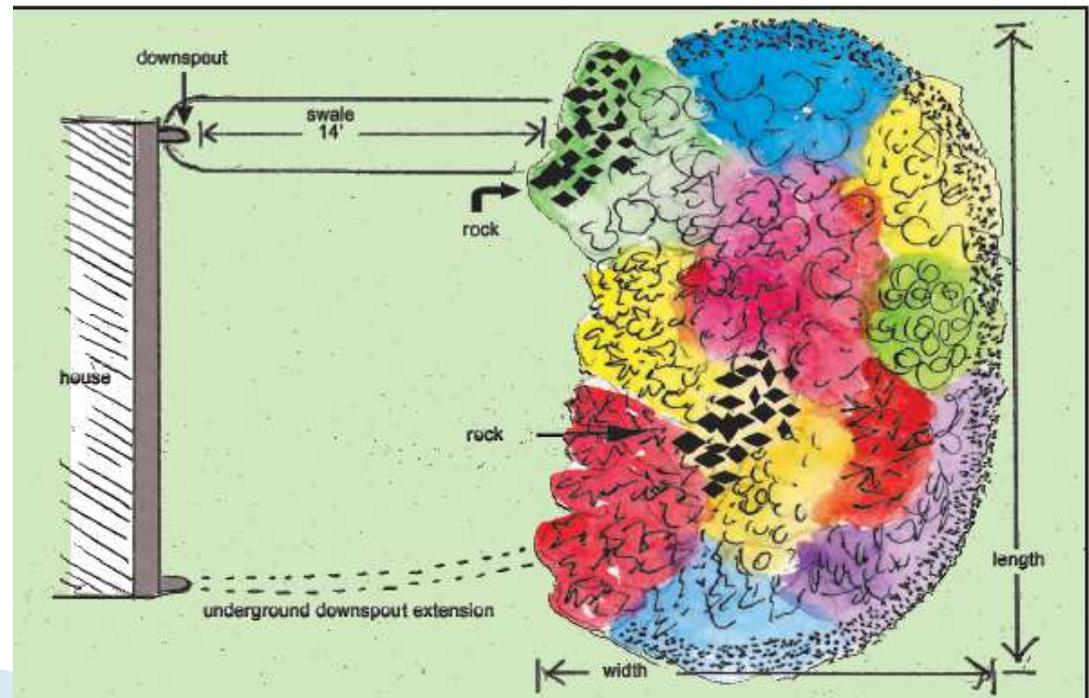
# Plant Selection

- ▶ Online Resources
- ▶ Cluster
- ▶ Well-established roots
- ▶ Bloom times
- ▶ Height, color, texture
- ▶ Sun, part sun, shade



# Sketch Design

- ▶ Sample designs available online
- ▶ Overlap mature plants
- ▶ Compliment colors and textures
- ▶ Consider height



# Planting

- ▶ Layout plants while still in pots
  - ▶ Plant from middle outward
  - ▶ Dig holes to appropriate sizes
  - ▶ Loosen roots before burying
  - ▶ Label clusters
- 
- ▶ Apply larger stones to reduce erosion
  - ▶ Top with mulch or gravel
- 

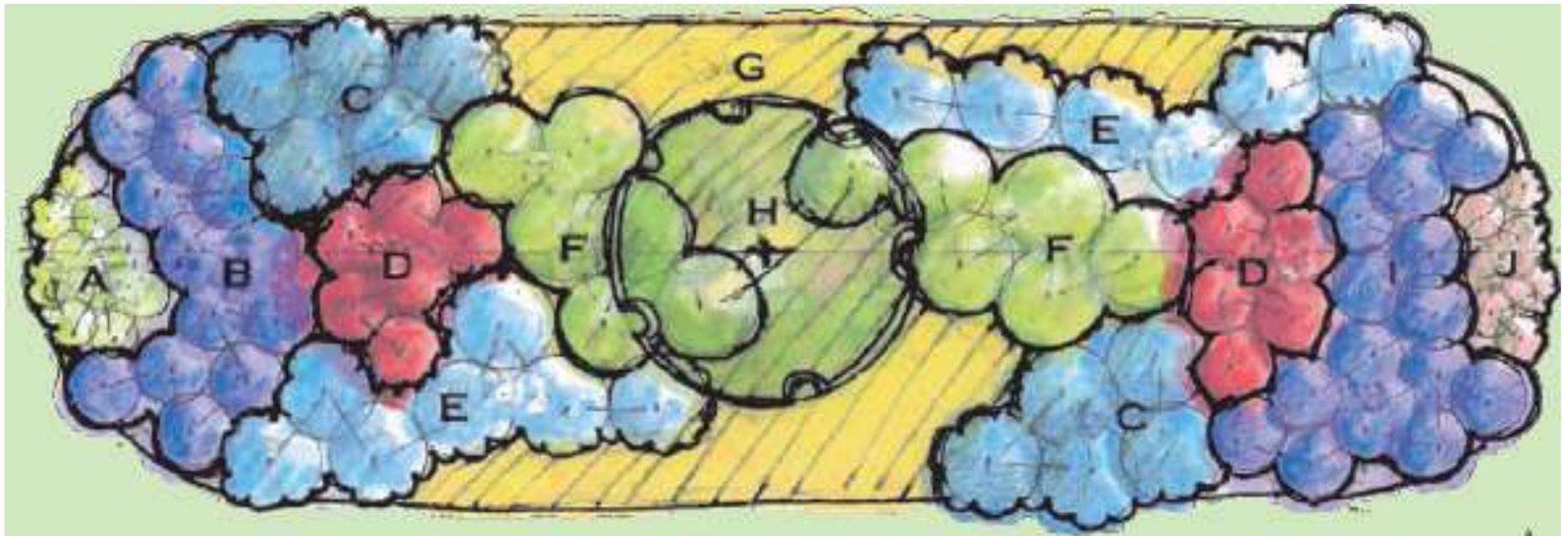
# Maintenance

- ▶ Maintenance is necessary until gardens become established
- ▶ Immediate watering
- ▶ Frequent watering
- ▶ Weeding
- ▶ Deadheading



*Lobelia cardinalis*

# Templates



*Note: The number of plants for each designated area is approximate.*

*Butterfly Swale*

Low Maintenance, 250 SF, Coastal Plain, Full Sun

Scale: 1/4"=1'



# Resources

- ▶ <http://www.aacounty.org/DPW/Highways/RainGarden.cfm> (ITEM 5 has resources for installation)
- ▶ <http://www.cwp.org/your-watershed-101/what-you-can-do.html>
- ▶ <http://www.dnr.state.wi.us/runoff/rg/>
- ▶ <http://www.nativeplantcenter.net/>