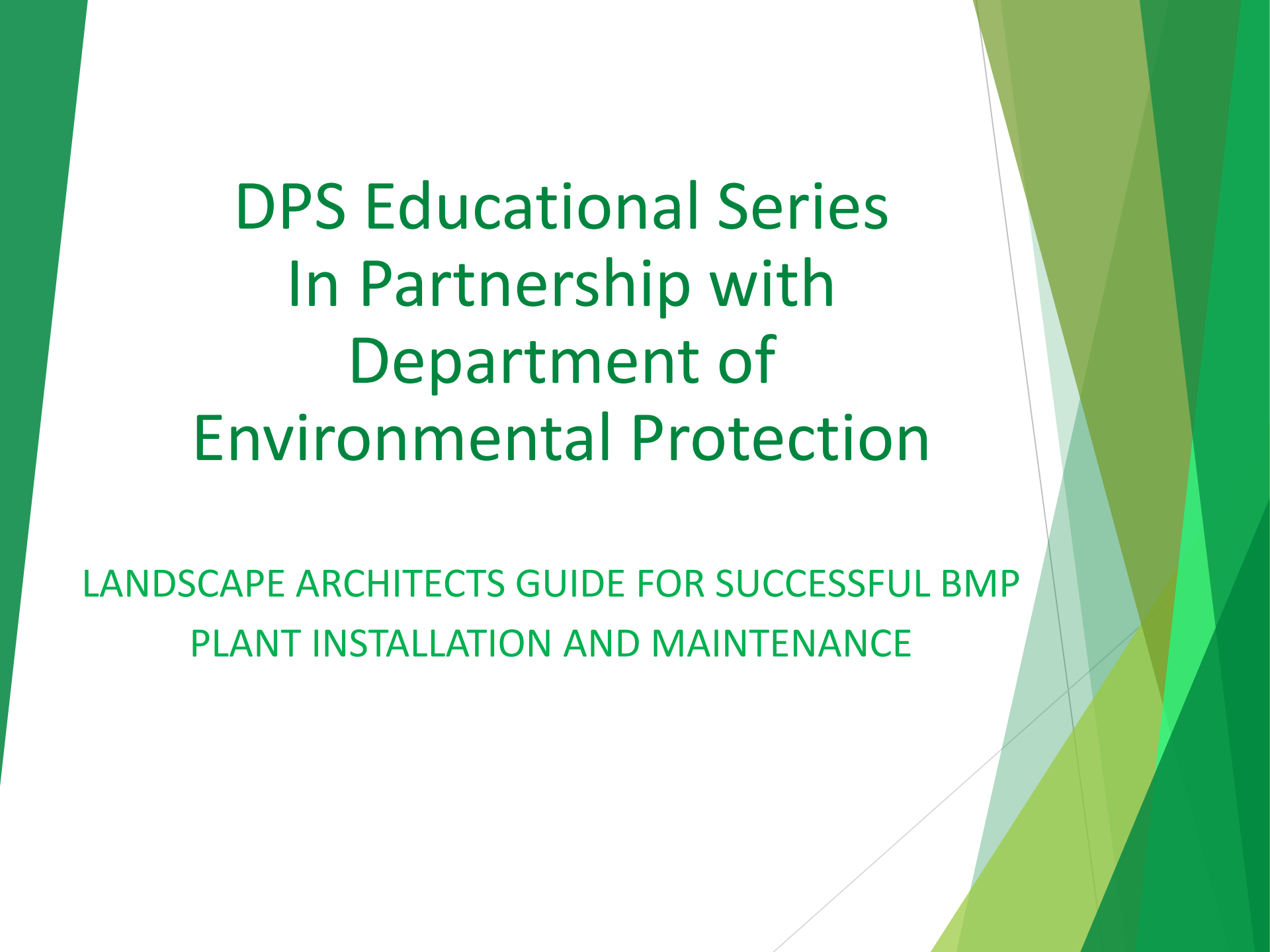




DPS Educational Series

DEP on Stormwater Management Landscaping Practices

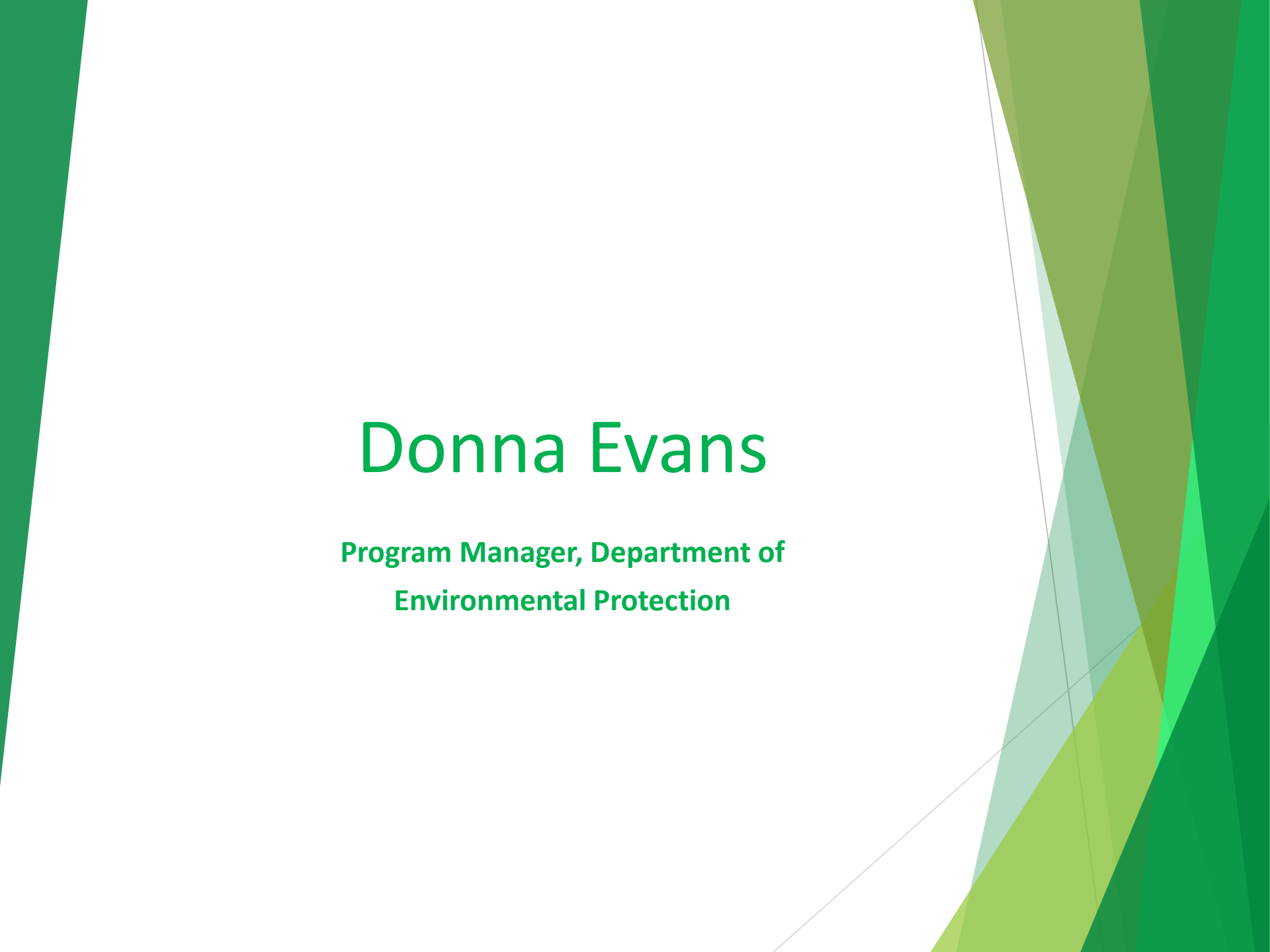
The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to deep forest green. These shapes are primarily located on the right side and bottom of the page, creating a modern, layered effect.

DPS Educational Series In Partnership with Department of Environmental Protection

LANDSCAPE ARCHITECTS GUIDE FOR SUCCESSFUL BMP
PLANT INSTALLATION AND MAINTENANCE

Linda Kobylski

DPS Division Chief, Land Development

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Donna Evans

**Program Manager, Department of
Environmental Protection**

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Steve Ramirez

**Planning Specialist III, Department of
Environmental Protection**



DEPARTMENT OF
**ENVIRONMENTAL
PROTECTION**
MONTGOMERY COUNTY • MARYLAND



BMP PLANTING PLAN CONSIDERATIONS FOR REDUCING MAINTENANCE

Low maintenance is of critical importance to the life cycle costs of Green Infrastructure Stormwater Management Practices. The following are some important considerations to incorporate in the BMP plant selection decision making process and planting plan details for low-cost long-term maintenance while keeping attractive aesthetics in check.

1. Site conditions-Initial site visit to identify possible issues that influence plant selection (deer, salt load, line of site)
2. Plant selection-appropriate for site, BMP size and location, understanding plant growth habits and mature size
3. Plant schedule-plant container size and spacing for quick plant establishment
4. Add a maintenance schedule and initial watering details



WEED SEED CONTAMINATED MEDIA
IS A MAINTENANCE NIGHTMARE

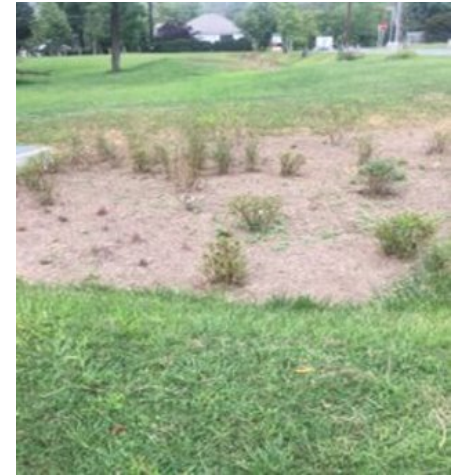
Contributing factors:

- No site visit prior to plant selection most plants eaten by deer
- Plant selection not appropriate for BMP size, slow growing evergreen shrub, low grade
- Seed mix over 50% , slow to germinate weeds out competed
- **No routine maintenance after plant installation for 2 years prior to permit closer**

1. Site conditions-Consider an Initial Site Visit

Check List:

- ✓ Deer Pressure
- ✓ Salt and Sediment load
- ✓ Water Velocity/inlet plants
- ✓ Soil Type and Draw Down Time
- ✓ Sun/Shade
- ✓ Location:
 - Adjacent to steep slopes
 - Adjacent to weedy vegetation, naturalized areas or middle of a parking lot
 - Line of site issues



Deer browse damage

These specific site characteristics need to be considered prior to plant selection for plant survivability and "right plant right place"

2. Plant Selection

- ✓ Plant attributes to consider
- ✓ BMP size and Location drives plant type "One size does not fit all"
- ✓ Plant arrangement suggestions

✓ Plant attributes to consider

- Dwarf growth habit for smaller BMP's and ground covers
- Spreader for side slope vs clump grower
- Deer resistance, salt tolerance-critical to do a site visit
- Excessive seasonal vegetation removal (access)
- Withstands high water velocity-critical to do a site visit
- Can handle very wet and very dry soil conditions- basin location
- Evergreen or basal winter foliage/grasses for winter interest (ex. Penstemon and Rudbeckia)
- Long flowering, flower time and color-four seasons of interest
- Structure (tree, shrub, upright, spreader)
- Texture (Fine or coarse foliage, grass or broad leaf)
- **Availability**



IMPORTANCE OF UNDERSTANDING PLANT GROWTH HABITS

Panicum will eventually take over inkberry



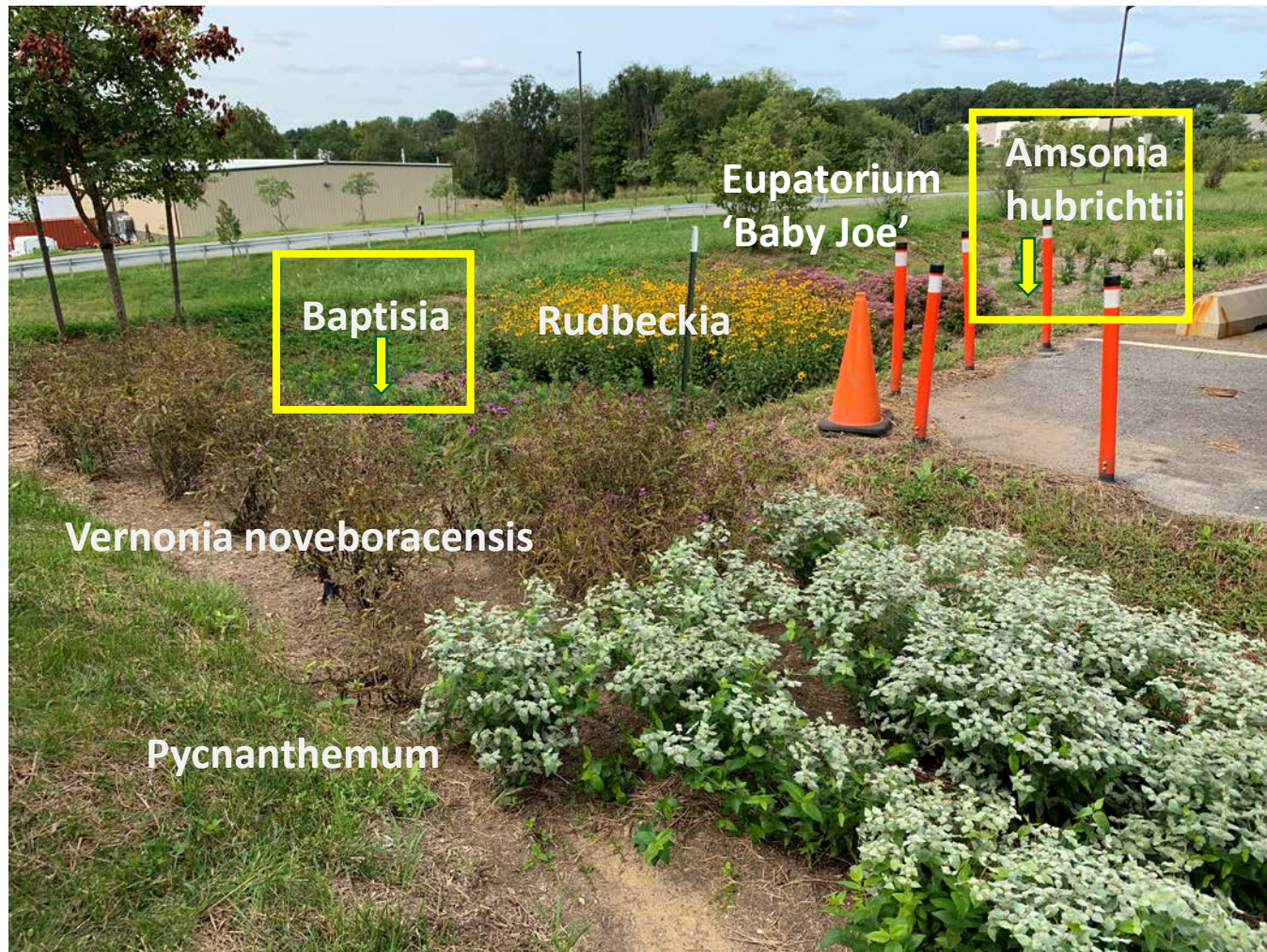
Panicum can grow very dense and tall depending on the variety so careful consideration should be given not to intermix with other plants/shrubs, clearly defined separate planting areas

Panicum is taking over winterberry





Some plants establish quicker than others

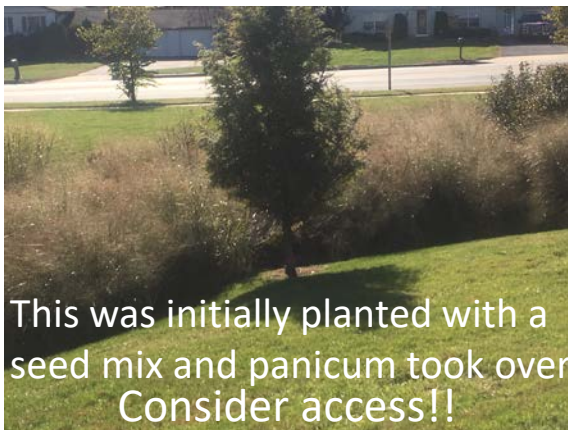




EXCESSIVE VEGETATION REMOVAL IS EXPENSIVE



- 8900 sq ft excessive vegetation removal
- **\$ 21,370.00** yearly maintenance cost
- Approx. 95% herbaceous **Panicum**



This was initially planted with a seed mix and panicum took over
Consider access!!



- 8500 sq ft more balanced plant approach
- **\$ 10,055.00** yearly maintenance cost
- Approx. 25% herbaceous, 10% trees, 65% shrubs



EXCESSIVE VEGETATION REMOVAL LEAVES A LOT OF OPEN SPACE

Once vegetation is cut back lots of open space for weeds to grow, this leads to weed seed contamination of the soil. When you pull a weed it brings new weed seeds to the surface.





A ground cover layer is very important

Incorporating a ground cover layer under trees, between shrubs or perennial groupings to cover mulch area and fill voids quickly will reduce weed pressure from the beginning and can create a lighter/less bulky feel to the planting.



Packera aurea under *Magnolia virginiana*

✓ “One size does not fit all”

BMP size and location will drive what plant type is appropriate to consider.

- Small BMP (100- 150 sq ft) Residential, “green streets” = smaller growing plants (dwarf cultivars), shrub (maybe), perennial/grass and **ground cover layer between shrubs**.
- Medium sized BMP (15 x 20 = 300 Sq ft) Schools parking lots, shopping centers = Small growing trees/shrubs and perennial/grass and a **ground cover layer under trees and between shrubs**- or just trees with a ground cover layer, low maintenance and looks nice.
- Large BMP (30 x 20 = 600 sq ft) Recreation Centers, Police Stations = Larger growing trees/shrubs, perennial/grass layer and **ground cover layer under trees and shrubs**.
- Very large BMP in open field space (over 800 sq ft) larger growing perennials, quick coverage, no shrubs or trees so can be mowed down easy once in late spring. Possibly a **ground cover layer between perennials “groupings”** for a less bulky look.



MATCHING MATURE PLANT SIZE AND BMP SIZE MATTERS

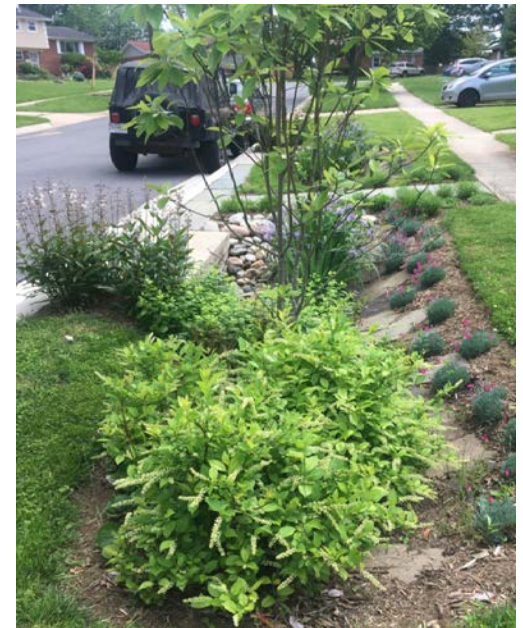
Critical to achieve an attractive plant combination that maintains attractive appearance over time.



Newly installed



Grown in over a few seasons



No room for weeds but not overgrown. Used plants with controlled growth habits, 4 seasons of interest and a ground cover layer for small BMP footprints



MATCHING MATURE PLANT SIZE AND BMP SIZE MATTERS

Critical to achieve an attractive plant combination that maintains attractive appearance over time.



Larger BMP footprint using herbaceous plants maturing 2-3' tall, fast establishing, string trim down once in spring, without excess vegetation removal



Possibly using large shrubs, larger footprint for covering larger areas

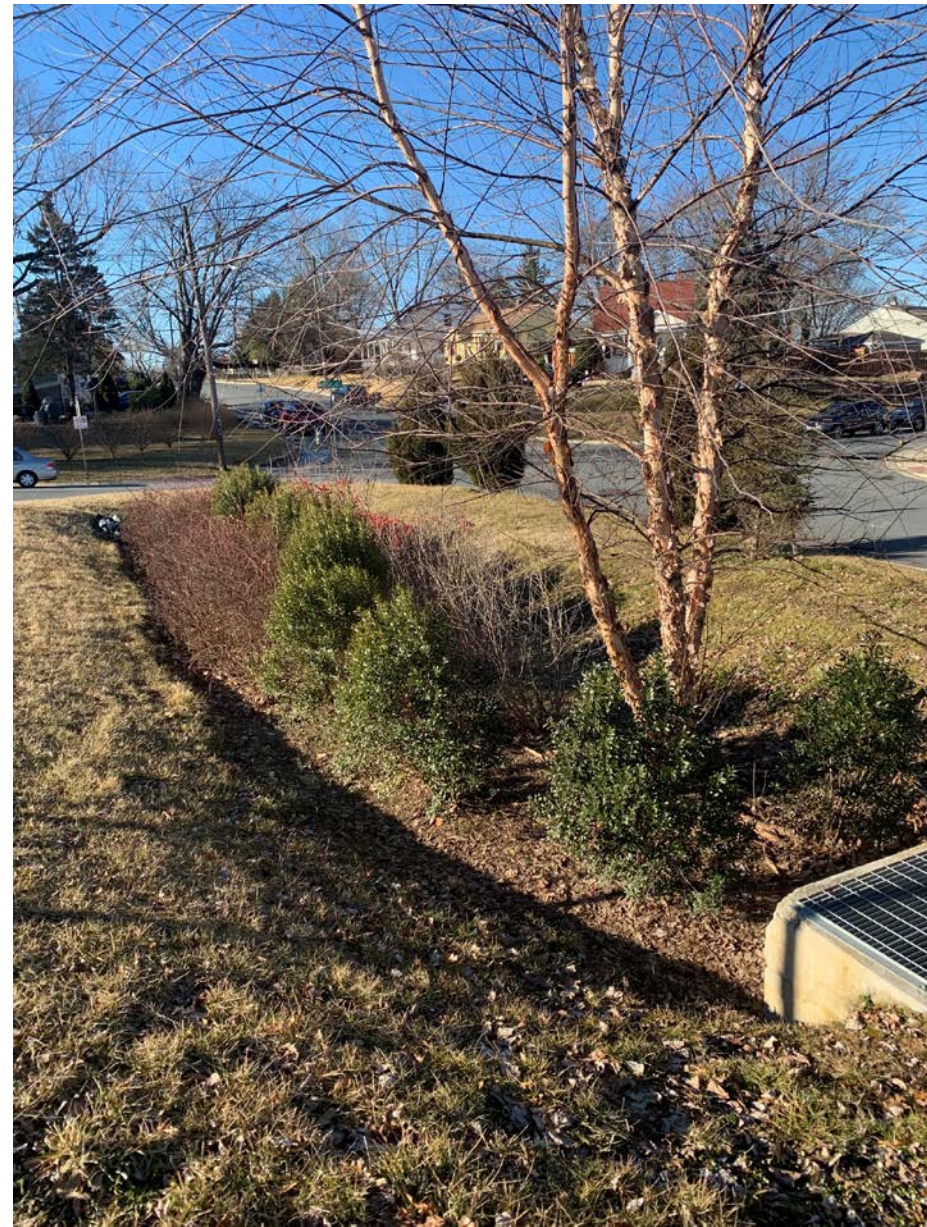


Button Bush *Cephalanthus occidentalis*



Viburnum dentatum 'Blue Muffin'

Use 5 gallon if possible and a ground cover layer to keep weeds from invading open mulch space as plant matures or combining these shrubs as a backdrop and perennial layer in front.

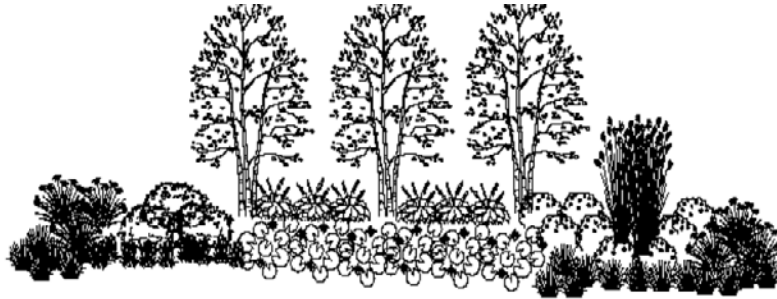


Start with larger containers, tight spacing maybe a ground cover layer

✓ Plant arrangement suggestions

EXAMPLES:

Layered look, formal, organized



Upright vertical trees, broad leaf perennials next to thin grassy plants adds textural interest

Minimalist look/commercial look



Fewer plant varieties with texture change

Meadow look



Repeating groupings (no shrubs) intermingle shorter growing species for a less bulky look

Artsy look



Dry stream bed/boulders



DESIGNING FOR THE AUDIENCE (and reduced maintenance)

More landscaped appeal in a highly visible public setting

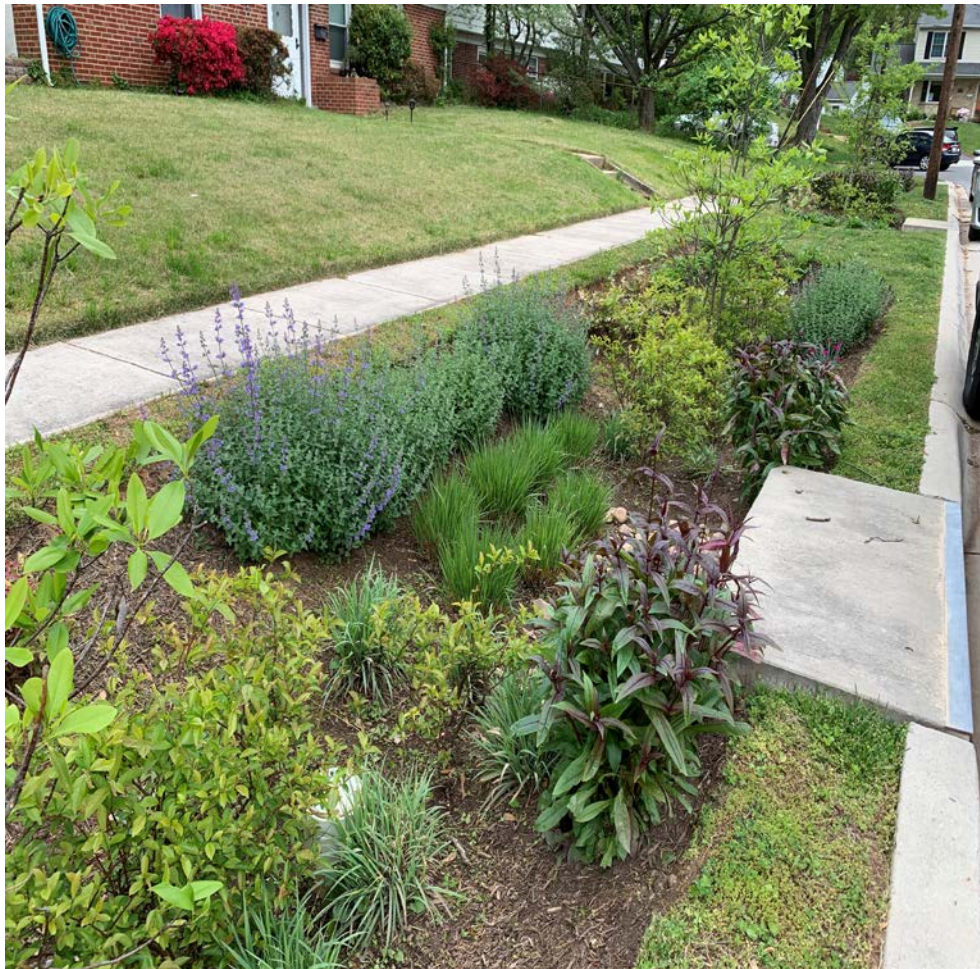
Before replanting 95 %
Panicum 5% Iris versicolor



After installation: Used a more balanced planting plan approach. Tree layer, shrub layer, perennial and grass layer and ground cover layer.



DESIGNING FOR THE AUDIENCE (and reduced maintenance)



More residential curb appeal for “green street” BMP’s located in front of peoples houses

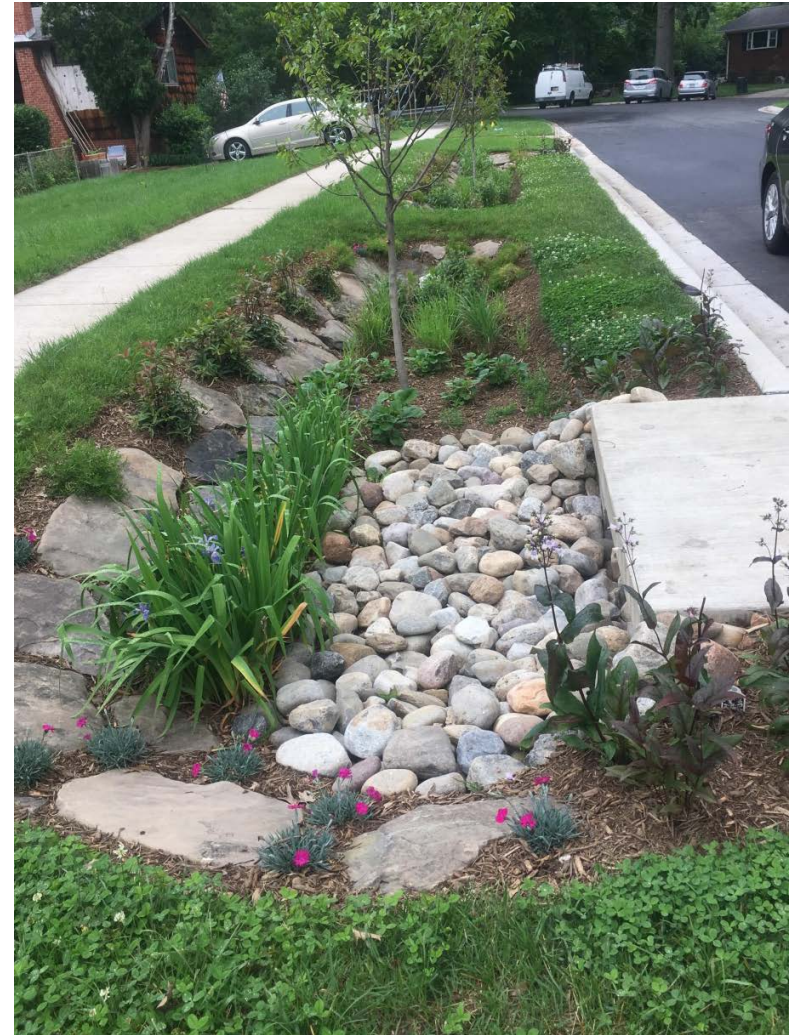


DESIGNING FOR 4 SEASONS OF INTEREST

Spring before retrofit



Spring After Retrofit 2018



Winter After Retrofit 2018



Expand plantings to soften the look or plant the area around the facility to make it “part of a garden”



DESIGNING FOR THE SETTING- MEADOW LOOK



3. Plant schedule considerations

Initial plant/container size and spacing to achieve proper ground coverage quickly

EXAMPLE:

Qts spaced 2-3' O.C., 5 gallon 7' O.C. takes a long time to establish. Lots of mulch space for weed invasion, lots of labor to keep weed free for several seasons.

41	IS	<i>Ilex</i>	<i>verticillata</i>	'Jim Dandy'	Winterberry	5 Gal.	3' O.C.
160	IS	<i>Ilex</i>	<i>verticillata</i>	'Red Sprite'	Red Sprite Winterberry	5 Gal.	3' O.C.
198	JB	<i>Juniperus</i>	<i>horizontalis</i>	'Bar Harbor'	Bar Harbor Juniper	5 Gal.	3' O.C.
482	LH	<i>Lavandula</i>	<i>angustifolia</i>	'Twickel Purple'	English Lavender	5 Gal.	3' O.C.
79	LB	<i>Lindera</i>	<i>benzoin</i>		Spicebush	5 Gal.	7' O.C.
70	MP	<i>Myrica</i>	<i>pensylvanica</i>		Northern Bayberry	5 Gal.	4' O.C.
93	ST	<i>Spiraea</i>	<i>tomentosa</i>		Steeplebush	5 Gal.	3' O.C.
42	VC	<i>Vaccinium</i>	<i>corymbosum</i>		Highbush Blueberry	5 Gal.	3' O.C.
36	VO	<i>Vaccinium</i>	<i>oxycoccos</i>		Small cranberry	5 Gal.	3' O.C.
69	VD	<i>Viburnum</i>	<i>dentatum</i>		Arrowwood	5 Gal.	7' O.C.
42	VL	<i>Viburnum</i>	<i>lentago</i>		Nannyberry	5 Gal.	7' O.C.

PERENNIALS AND GRASSES

QUAN	SYM	GENUS	SPECIES	CULTIVAR	COMMON NAME	SIZE	NOTES
265	AV	<i>Andropogon</i>	<i>virginicus</i>		Broomsedge	1 Qt.	3' O.C.
543	AN	<i>Aster</i>	<i>nemorals</i>		Bog Aster	1 Qt.	18' O.C.
781	EC	<i>Echinacea</i>	<i>purpurea</i>		Purple Coneflower	1 Qt.	18' O.C.
837	ES	<i>Eragrostis</i>	<i>spectabilis</i>		Purple Lovegrass	1 Qt.	18' O.C.
181	EP	<i>Eupatorium</i>	<i>purpurea</i>		Joe Pye Weed	1 Qt.	3' O.C.
2093	IR	<i>Iris</i>	<i>versicolor</i>		Blue Flag	1 Qt.	12' O.C.
2377	LM	<i>Liriope</i>	<i>muscaris</i>	'Big Blue'		1 Qt.	12' O.C.
1980	LC	<i>Lobelia</i>	<i>cardinalis</i>		Cardinal Flower	1 Qt.	12' O.C.
1366	MD	<i>Monarda</i>	<i>didyma</i>		Beebalm	1 Qt.	12' O.C.
189	PV	<i>Panicum</i>	<i>virgatum</i>		Switchgrass	1 Qt.	3' O.C.
560	RL	<i>Rudbeckia</i>	<i>laciniata</i>		Tall Coneflower	1 Qt.	2' O.C.
435	SP	<i>Scirpus</i>	<i>pungens</i>		Three Square Bulrush	1 Qt.	2' O.C.
633	VN	<i>Vernonia</i>	<i>novboracensis</i>		New York Ironweed	1 Qt.	18' O.C.

3. Plant schedule considerations

Some plants are not reliable to come back over time

Small containers spaced too far apart for quick establishment

PLANT SCHEDULE ✓						
Quantity	Key	Botanical name	Common name	Size	Root	Comments
GRASSES AND HERBACEOUS PLANTINGS						
93	IV	Iris versicolor	Blue Flag	1 QT	Quart	2' on center
92	LC	Lobelia cardinalis	Cardinal Flower	1 QT	Quart	2' on center
405	MC	Muhlenbergia capillaris	Muhly Grass	1 QT	Quart	2' on center
2,197	PV	Panicum virgatum 'Heavy Metal'	Heavy Metal Switchgrass	1 QT	Quart	2' on center
899 SY SHREDDED HARDWOOD BARK MULCH						

3. Plant schedule considerations

- Seed mix between shrubs non-existent - Is it under 3" of mulch? Did it wash away? Was it installed? Was it pulled out by maintenance looked like a weed? Would not recommend using seed.
- Poor plant grade installed will take a long time to establish to do it job, weak may not survive, use "retail or heavy" grade
- Too much open space between plants = weed invasion



3. Plant schedule considerations

Using “high or retail ready” grade (not restoration grade) plant material assures quick establishment and cover.



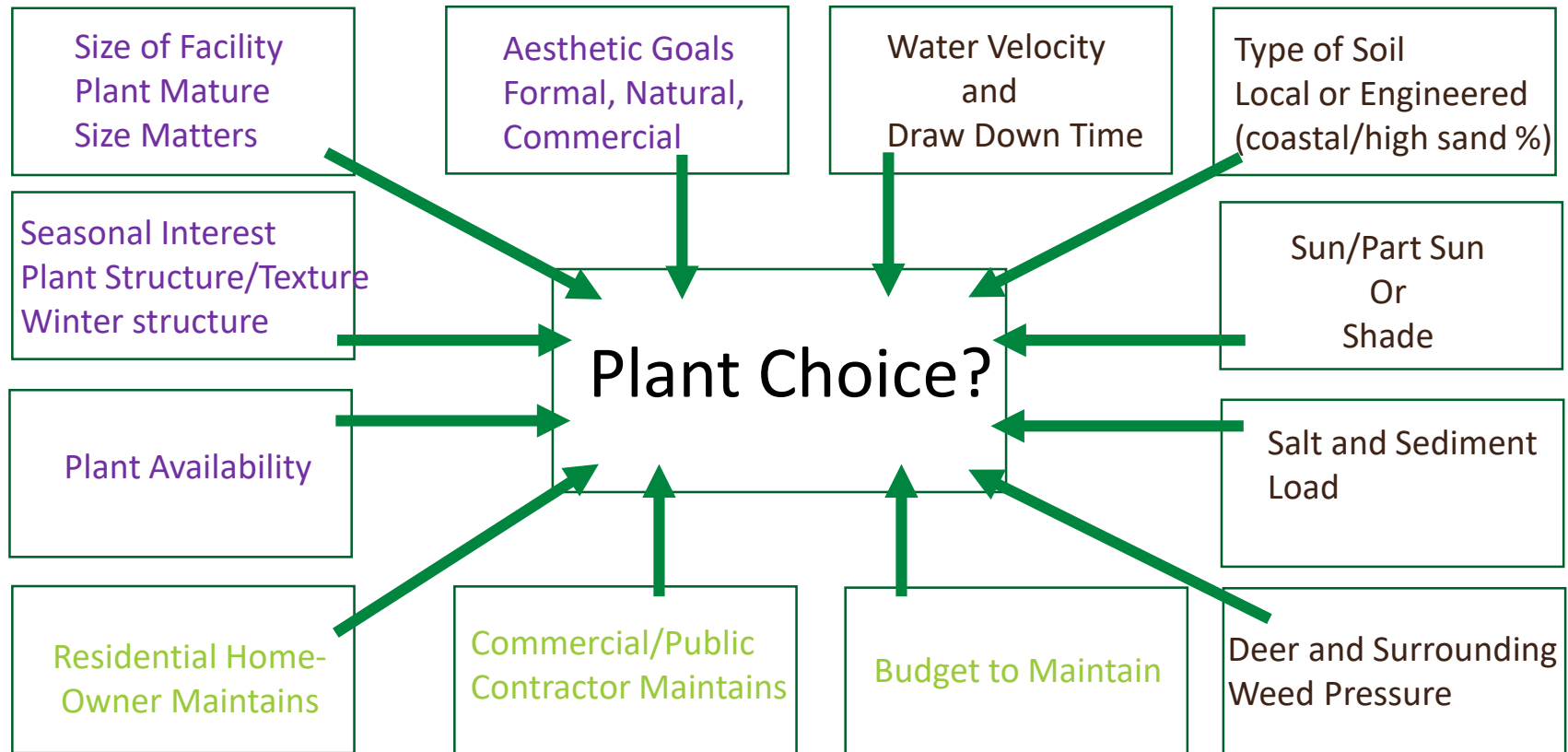
RESTORATION GRADE
VS
HEAVY OR RETAIL GRADE
PLANT MATERIAL

(River Birch multi stem 7')



Maintenance costs are reduced when plant material is more established on initial installation so it will fill in quickly to reduce weed pressure from the start.

MANY CONSIDERATIONS IN BMP PLANT SELECTION NEED TO BE THOUGHT THROUGH



Design Considerations

Maintenance Considerations

Plant Cultural Considerations



GENERAL BMP PLANT SCHEDULE GUIDANCE to REDUCE LONG TERM MAINTENANCE

Use dwarf cultivars whenever possible for controlled growth in smaller facilities.

Plants for LID should not be restoration grade, use "Heavy or Retail Ready grade" for quick establishment.

Plant in mass groupings using fewer varieties for easier recognition by maintenance staff.

Use a ground cover layer to reduce bare mulch exposure to reduce weed growth on new installations. Mature plantings (2-3 seasons) should achieve no bare earth or mulch. Trees and shrubs and taller perennials should be underplanted with a groundcover to help ensure a completely vegetated condition.

Do not use plugs or seed, slow to establish (weed invasion) and not reliable to survive, in some low flow situations plugs may work as a ground cover layer.

Woody plant material maturing up to 3' should be a minimum of 2-gallon container size and be spaced 18"-24" on center (Shrubs), consider adding a ground cover layer.

Woody plant material maturing 4' or more should be a minimum of 3-gallon size, be spaced 3'-4' on center depending on mature size (Shrubs)-use a ground cover layer.

Trees 1 1/2" cal. Minimum, use under plantings and/or a ground cover layer.

Herbaceous plant material should be a minimum of 1-gallon size and spaced 15-18-24" on center on average, adjust depending on mature size.

Ground cover layer appropriate to use quarts spaced 8-12" on center or possibly plugs 6-8" on center.

New plantings should be mulched with a 3" layer of double shredded undyed hardwood bark mulch

Hand watering should be required for six weeks after installation: 3 times a week for 2 weeks, 2 times a week for 2 weeks and once a week for 2 weeks, after on an as needed basis dependent on weather (drought or rain).

4. ADD A MAINTENANCE SCHEDULE AND INITIAL WATERING DETAILS



Contributing factors:

- No routine maintenance from initial plant installation for several years
- Not mowing adjacent areas before weeds bloom

Resulting in weed seed contaminated media

4. Suggested Maintenance Detail Items :

- Schedule for BMP's to be maintained after plant installation and regularly during plant establishment phase/warranty period to ensure a weed free soil environment and plant survivability.
- Adjacent green open space and side slopes mowed regularly before weeds/flower go to seed infecting the BMP
- Direct mowed cuttings away from the BMP
- Details Inlet protection until construction is finished
- Details what phase of construction for the plants to be installed
- Details what season to prune back plants
- Initial watering schedule outlined (see example next slide)



Example

Watering Instructions

Water plants for 6 weeks following installation, unless more than a ½ inch of rain falls in any week for which watering is scheduled. During the 6-week period following installation, please follow this schedule:

- 3 times a week for the first 2 weeks
- 2 times a week for the next 2 weeks
- 1 time a week for the last 2 weeks

adjust schedule accordingly due to rain fall

Watering Notes: All watering should use a hose with nozzle end breaker or a sprinkler. Be mindful that sprinklers do not water evenly and will need to be monitored for the flow patterns. Areas that are getting missed will need subsequent hand watering or sprinklers adjusted to get full watering coverage. Water must be applied in sufficient quantities to maintain moist soil to a depth of at least 4 inches. Water must be applied at low water pressure directly to the root zone of each plant, allowing water to be absorbed into the planting pit soil until saturated, but without runoff.

If planting late in the season (November) the watering schedule may be shortened. Due to the late install please water once the weather warms up for one month. In severe dry days beyond the schedule outlined above, please monitor plantings for wilting and water as needed especially the first year.

(Co Authored by Donna Evans and Darlene Robbins)

PLANTS TO CONSIDER



WATER VOLUME=INLET PLANT SUGGESTIONS

All deer resistant

Iris versicolor



Packera aurea



Juncus effusus



Panicum varieties

Chasmanthium latifolium
Naturalizes well in larger
gardens
or keep under control



DEER RESISTANT PLANT SUGGESTIONS

Amsonia hubrichtii



Carex spp.



Rudbeckia fulgida *Vernonia noveboracensis*



Solidago spp.



Panicum spp.



Schizachyrium scop.
'Standing Ovation'



Asclepias
tuberosa



Iris versicolor



* Straight native species and other cultivars also deer resistant

SIDE SLOPE PLANTS SUGGESTIONS

Juniperus c. 'Blue Pacific'



Penstemon
'Husker Red'



Leucothoe 'Scarletta'



Juniperus 'Grey Owl'



Phlox subulata



Asclepias tuberosa



GROUND COVER -EVERGREEN/SEMI EVERGREEN SUGGESTIONS

Carex 'Bunny Blue'



Carex rosea



Carex amphiloba
(shade)



Phlox subulata
(side slope)



Deschampsia
cespitos 'Goldtau'



Erigeron pulchellus
'Lynnhaven Carpet'



Packera aurea
(some drought
intolerance in full sun)



Carex texensis



DWARF/CLUMP GROWING CULTIVARS TO CONSIDER

Penstemon
'Husker Red'



Solidago
'Golden Fleece'
'Little Lemon'
Ground cover?



Echinacea
'Kim's Knee High'



Cephalanthus
'Sugar Shack'
(shrub)



Basal
winter
foliage



Physostegia
'Miss Manners'
(white flower)
'Pink Manners' (pink)



Itea 'Little Henry'
(shrub)



Panicum
'Cape Breeze'



Liatris
microcephala

Rudbeckia 'Little Gold Star'



Clump grower

Basal winter foliage

MEADOW PLANTINGS TRIM DOWN ONCE IN SPRING

1 gallon plant material 18-24" apart in repeating groupings interplanted with qts of ground cover



Separating larger growing plant groupings with shorter ones helps to add interest and appeal to a mass planting instead of all one height could create a “lighter look” to the planting.

WINTER INTEREST/EVERGREENS TO CONSIDER

Leucothoe 'Scarletta'
side slope a little picky



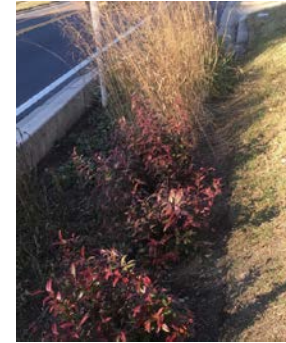
Ilex Glabra
'Shamrock'



Juniperus c. 'Blue
Pacific'
side slope



Grasses



Juniperus 'Grey Owl'
side slope



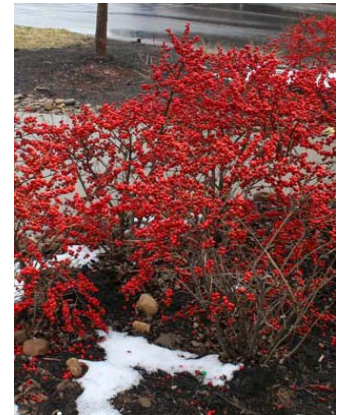
Packera aurea



Phlox subulate
side slope



Ilex v. 'Sprite'
Need 'Jim Dandy'
to Pollinate



LARGER SHRUBS TO CONSIDER

Button Bush *Cephalanthus occidentalis*



There is a dwarf cultivar
'Sugar Shack'



Red Twig Dogwood *Cornus sericea*
Not deer resistant

Viburnum dentatum 'Blue Muffin'





DEPARTMENT OF ENVIRONMENTAL PROTECTION

MONTGOMERY COUNTY • MARYLAND

Working together for a cleaner, greener, economically vibrant community



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The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the left and right sides of the slide, framing the central text. The central area is a plain white background.

QUESTIONS?

Need Help?

➤ Please contact any of the staff below for additional questions on this topic:

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