

Riparian Buffer and Upland Restoration With Woody Species



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Delaware Riverkeeper Network

What's a buffer good for?

Sediment Filtration

Chemical Filtration

Stormwater Infiltration

Bank Stabilization

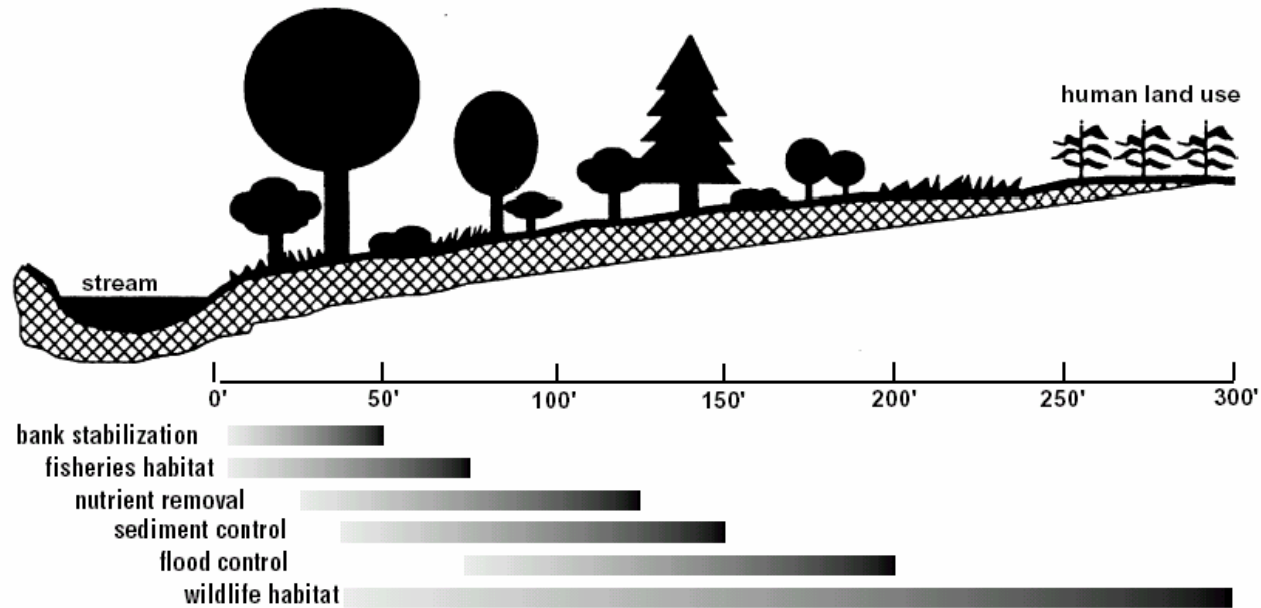
Terrestrial Habitat

Aquatic Habitat

Aesthetics



Wider *Is* Better...

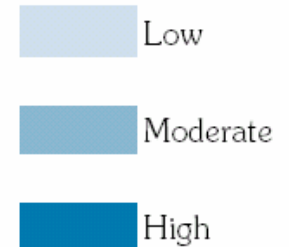


Courtesy of the Connecticut River Joint Commission

“What are those weeds good for?”

Effectiveness of Different Vegetation Types for Specific Buffer Benefits

BENEFITS	grass	shrubs	trees
stabilize streambank	Low	High	High
filter sediment and the nutrients, pesticides, & pathogens bound to it	High	Moderate	High
filter nutrients, pesticides, and microbes from surface water	Moderate	Low	Moderate
protect groundwater and drinking water supplies	Low	Moderate	High
improve aquatic habitat	Low	Moderate	High
improve wildlife habitat for field animals	High	Moderate	Low
improve wildlife habitat for forest animals	Low	Moderate	High
provide economically valued products	Moderate	Moderate	High
provide visual interest	Low	Moderate	High
protect against flooding	Low	Moderate	High



(adapted from Agroforestry Notes, AF Note 4 Jan 1997, USDA Forest Service/NRCS)

Courtesy of the Connecticut River Joint Commissions



Types of Stock

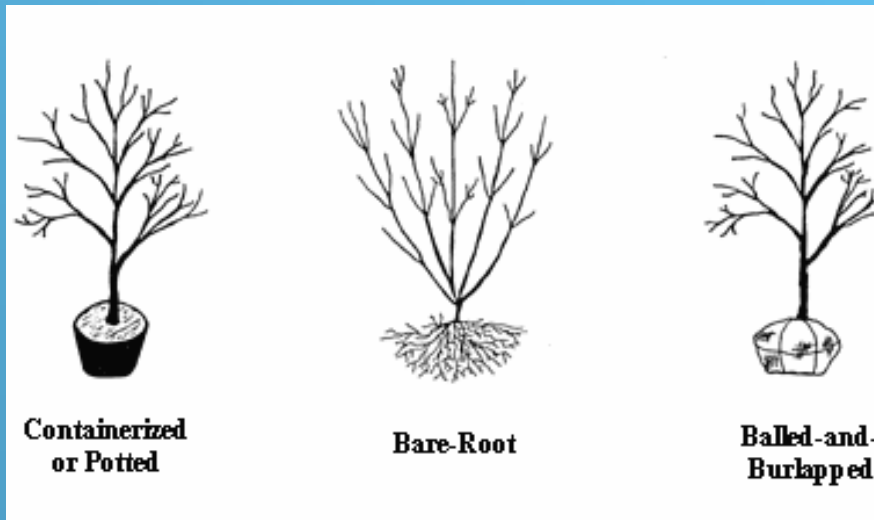
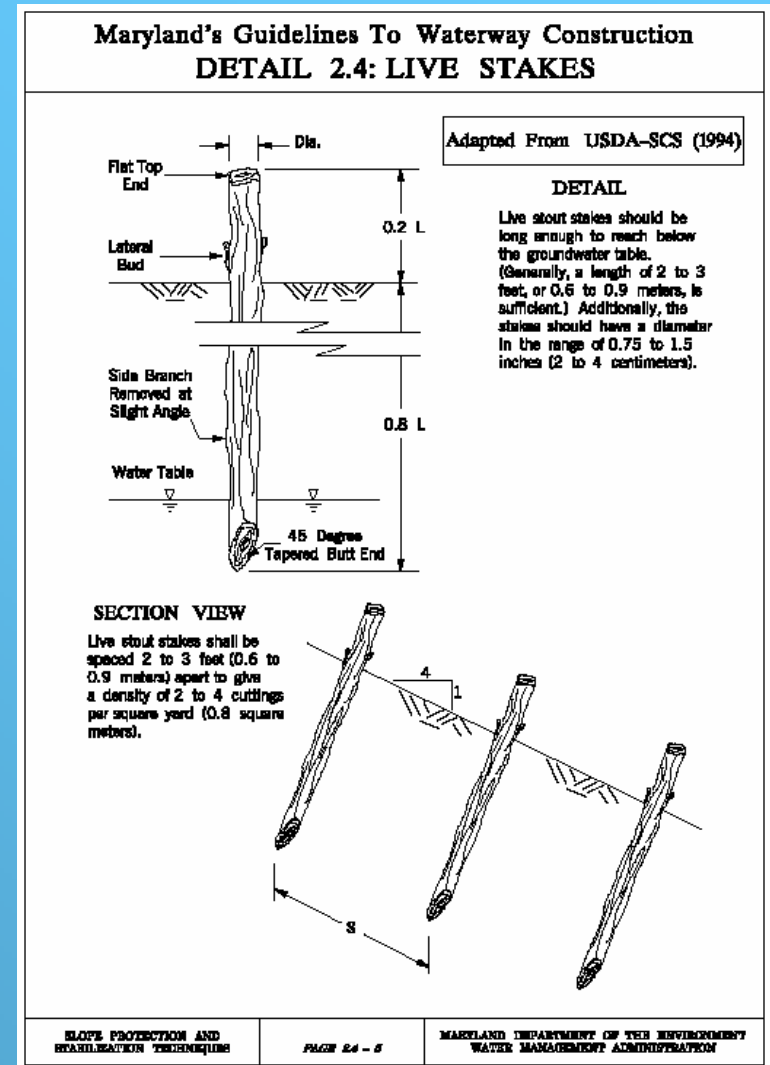


Image courtesy University of Nebraska Extension



Design Considerations

1. Define project goals: habitat, water quality, local plant community type

Cedar Creek Park Riparian Restoration Project City of Allentown Parks and Recreation Allentown, Lehigh County, Pennsylvania



Project Need

Cedar Creek Park encompasses the majority of the 1.1 miles (from SR1019 to Lake Muhlenberg Creek) designated as a Class A Trout fishery. This designation is given to sections of Pennsylvania documented to support wild-reproducing trout populations. This is the only section of Cedar Creek that carries the Class A designation.

Currently, the riparian areas within the park are almost completely devoid of vegetation with the exception of numerous mature canopy trees. These few canopy trees do provide some shading of the stream and an annual supply of leaf litter to support the base level of the aquatic food web. However, these trees provide a mere fraction of the benefits naturalized riparian corridors provide. In addition, subsequent canopy tree plantings ready to replace these mature trees in the event of their decline.

The soils along this section along the stream are also continually saturated, resulting in little grass. In surrounding areas mowing difficult at best.

The proposed project will restore riparian buffer along approximately 900 linear feet of Cedar Creek within Allentown's Cedar Creek Park. The restoration of a riparian buffer will consist of scattered canopy tree plantings, occasional shrub clusters, and a variety of grasses, sedges, and wildflowers. All plantings will be native to Pennsylvania's Piedmont physiographic region.

Objectives

The restoration work outlined here will provide multiple benefits to the stream and surrounding lands by:

- Restoring 1.7 acres (72,333 square feet) of riparian buffer along Cedar Creek.
- Restoring a riparian buffer along 900 linear feet of Cedar Creek.
- Long-term enhancement of aquatic habitat through increased leaf litter supply and stream shading.
- Enhancing terrestrial habitat for species such as birds, small mammals, and amphibians.
- Beautifying the park area through planting of native wildflowers.

Project Description

The project lies within a central portion of Cedar Creek Park and is adjacent to the Allentown Rose Garden. The project area begins just upstream of the large concrete stormwater outfall along the creek and continues 900 feet downstream to the park access bridge located behind the park office.

This riparian buffer restoration will restore a naturalized riparian buffer to this section of Cedar Creek. The buffer described here ranges in width from 20 to 80 feet (~50 feet on average) with several small localized open areas along the creek to allow for streamside access. The goal in designing this buffer is to balance the multiple benefits to the stream and riparian area, while accounting for public access and aesthetics. Therefore, plant selection is guided by plant flowering, color, structure and wildlife value in addition to soil and hydrologic limitations.

Plantings within the buffer consist of mix of native wildflower, grass, and sedge species in order to encourage biodiversity, surface runoff filtration, habitat, and aesthetics. Approximately half of the buffer

Objectives

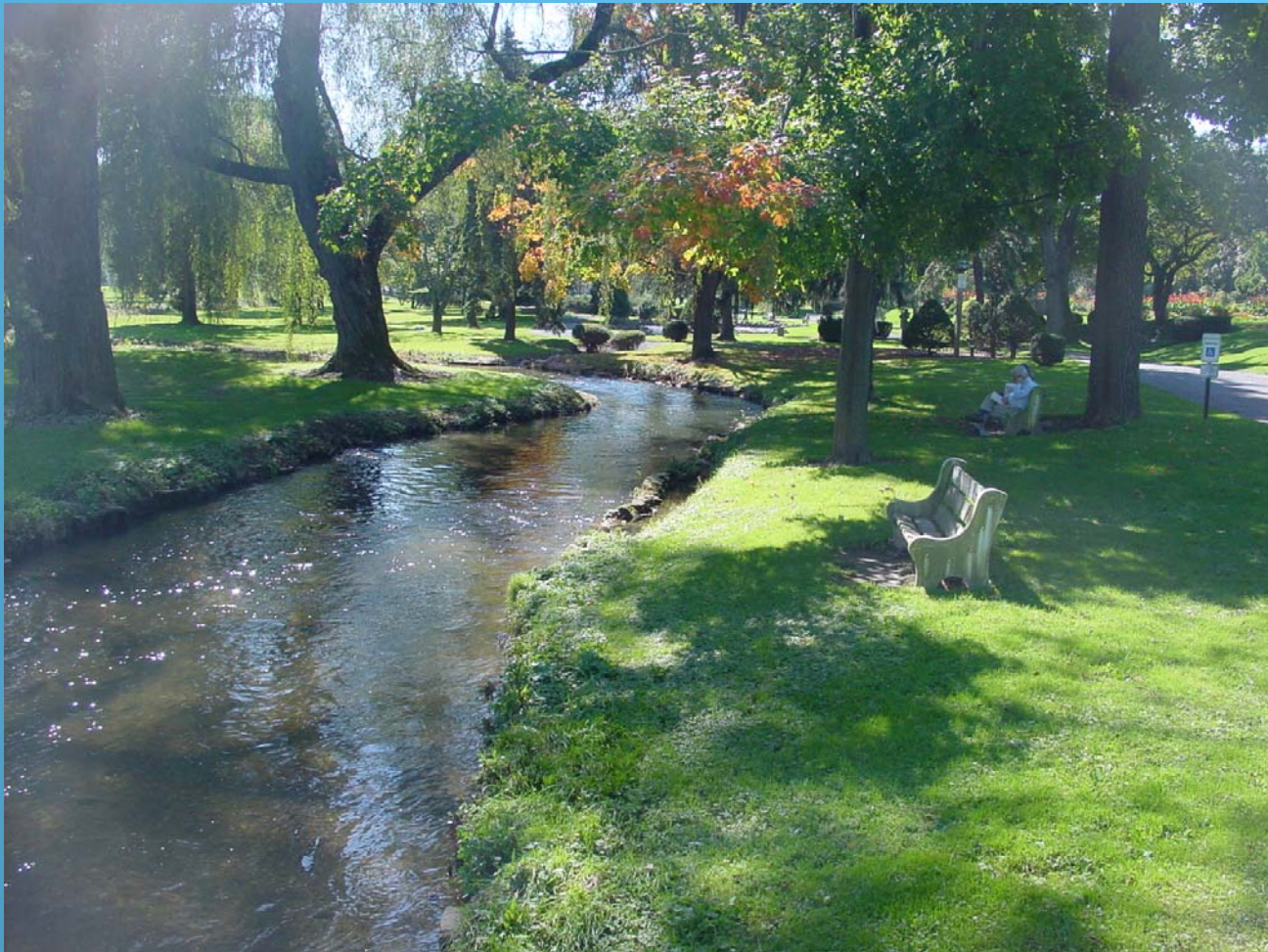
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Design Considerations

2. Consider site conditions: current/future land use, soil, light, hydrology, species benefits/limitations



Design Considerations

3. Define partner responsibilities: technical providers and facilitators



Design Considerations

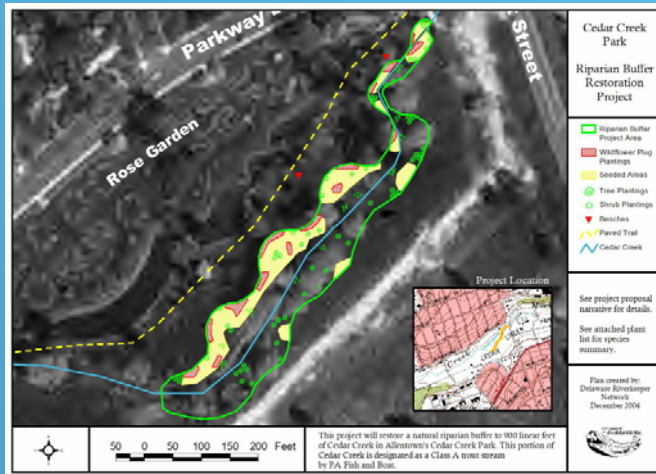
4. Estimate number of plants needed:

large trees and shrubs	10-12 feet apart
small trees and shrubs	3-6 feet apart
herbaceous plugs	18-24 inches apart
seeding	15-25 lbs./acre



Design Considerations

5. Draft proposal plan: site information, cost estimate, scope of work, partner responsibilities, project timeline.



Project Installation

Installation of this project is estimated to be completed within 2-3 days as follows:

Day 1: Site Preparation and Seeding

Existing turf grasses need to be removed prior to seeding for best establishment. This involves using a rototiller deck to till the upper 6-8 inches of soil. Alternatively, a backhoe may be used to scrape off the turf layer. Following site preparation, the native seed mix should be applied either by hand or through the use of a mechanical spreader. Seeded areas will be covered in a thin layer of straw mulch.

Day 2: Planting

With the site seeded, tree and shrub plantings will be installed in the layout shown in the attached plan. Depending on the number of volunteers available, herbaceous plugs may also be installed during Day 2.

Day 3: Additional Planting

Depending on the number of volunteers available, a second day of planting will most likely be necessary.

Project Budget Proposal

For: Cedar Creek Park - Allenstown, PA.

Item	Estimated Cost per sq. ft.	Quantity	Total Cost
Grass - Tallgrass Prairie (priced at avg. cost of a 6-8" contaminated area)	\$ 35.00	12	\$ 420.00
Compost Tea (priced at avg. cost of a 6-8" contaminated area)	\$ 12.00	45	\$ 540.00
Compost Shrub (priced at avg. cost of a 3-4" contaminated shrub)	\$ 7.00	51	\$ 357.00
Herbaceous Plug (priced at avg. cost of a 2" plug)	\$ 0.85	914	\$ 776.48
Native Willow Seed Mix (priced at avg. cost per pound, including cover crop, seeded at 30 lbs. per acre)	\$ 55.00	14	\$ 770.00
Straw Mulch (priced at an avg. cost of \$4 per bale)	\$ 4.00	34	\$ 134.37
Delivery			\$ 299.13
Other materials at a 10% off of total materials			
Estimated Project Total =			\$ 3,290.41

Trees and Shrub Estimate			
Large Trees	12		
Medium Trees	40		
Shrubs	51		

Willow and Willow Seed Estimate			
Willow seed mix	20,100 sq. ft.		
Seeding rate =	30 lbs. per acre		
Approx. lbs. of seed needed =	14 lbs.		

Herbaceous Plug Estimate			
Herbaceous plugs (contaminated areas) =	3,054 sq. ft.		
Plugs at 24" x 24" =	4 sq. ft.		
Approx. # of plugs needed =	914 plugs		

Straw Mulch Estimate			
Willow seed mix	20,100 sq. ft.		
Mulching rate =	1000 sq. ft. per bale		
Approx. # of bales needed =	34 bales		



Design Considerations

6. Review/Finalize the plan: gather final input, solidify partner roles and responsibilities.



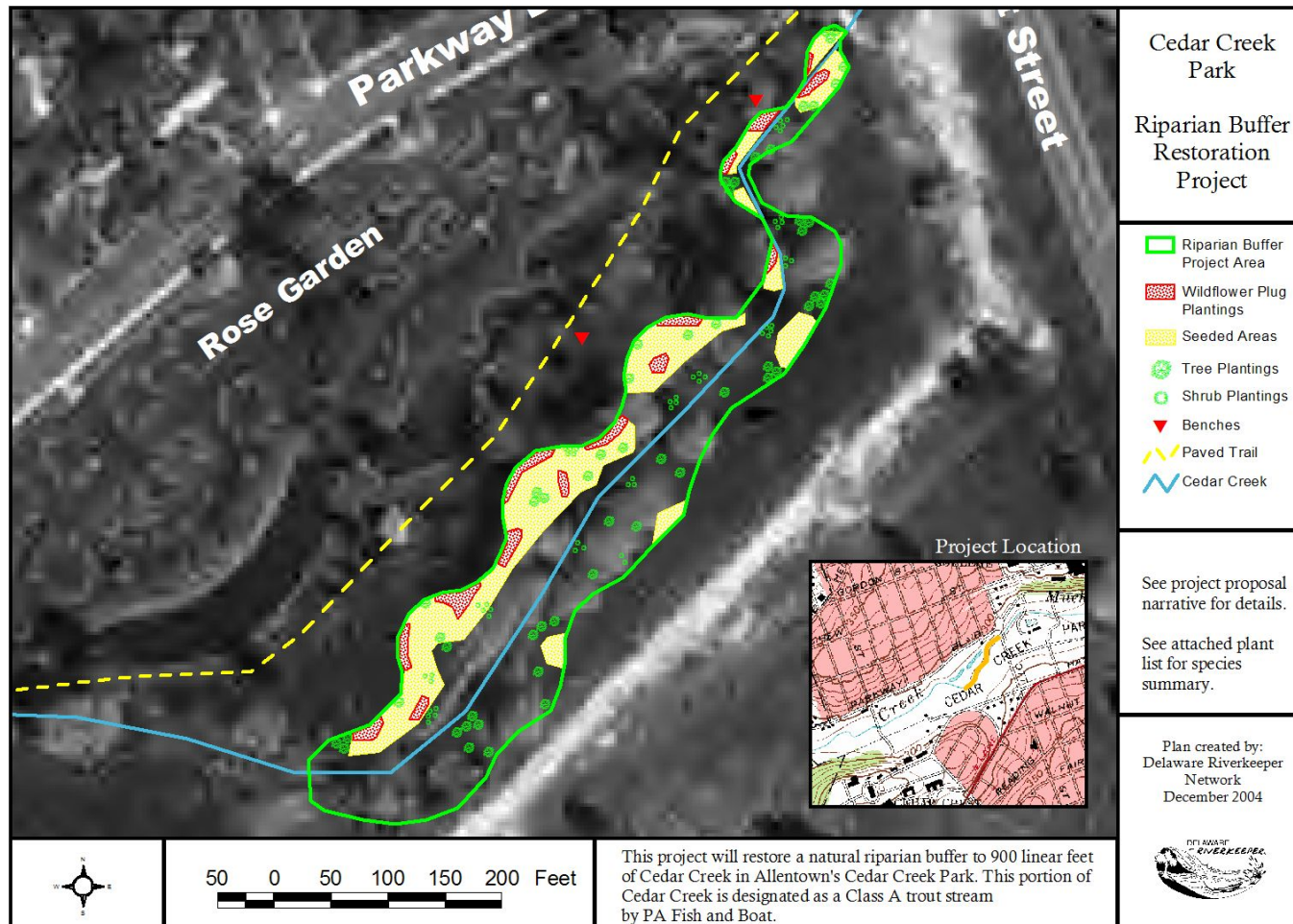
Plant Selection

Site conditions: shade tolerance, pH, water tolerance, soil type



Plant Selection

Cost/Benefit: size vs. number of plants



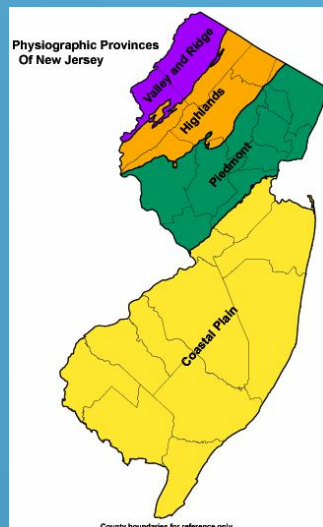
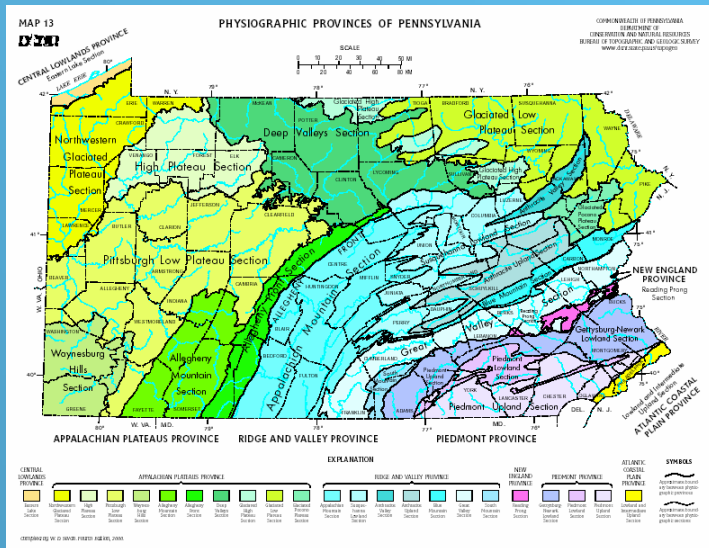
Plant Selection

Project objectives: filtration, stabilization, habitat...



Plant Selection

Nativity: choose species native to your region and habitat type



Plant Selection

Genetics: diversity of stock and species



Image courtesy of Pinelands Nursery

Plant Selection

Physical Composition: Local plant community, mix of habitat layers vs. trees only,



Native Plant Nurseries

Genetic diversity: Local sources

Demand Quality: Defects, disease, mislabeling

Aim for Natives not Cultivars:

Example: “Heritage” river birch

Betula nigra x Heritage

Know Your Nursery:

Knowledgeable/helpful staff, visit, professional affiliations

Support the Native Plant Industry



Native Plant Nurseries

Pinelands Nursery, Inc.– Columbus, NJ

Container Trees and Shrubs, Herbaceous Plugs

P=800.667.2729 F=609.298.8939 www.pinelandsnursery.com

Octoraro Native Plant Nursery – Kirkwood, PA

Container Trees and Shrubs, Bioengineering Materials

P=717.529.3160 F=717.529.4099 www.octoraro.com

New Moon Nursery – Kirkwood, PA

Grass and Wildflower Container Plants and Plugs

P=717.529.3870 F=717.529.5657 www.newmoonnnursery.com

Ernst Conservation Seed – Meadville, PA

Native Grass and Wildflower Seed Mixes, Bioengineering Plants

P=800.873.3321 F=814.336.5191 www.ernstseed.com



Planting Specifications

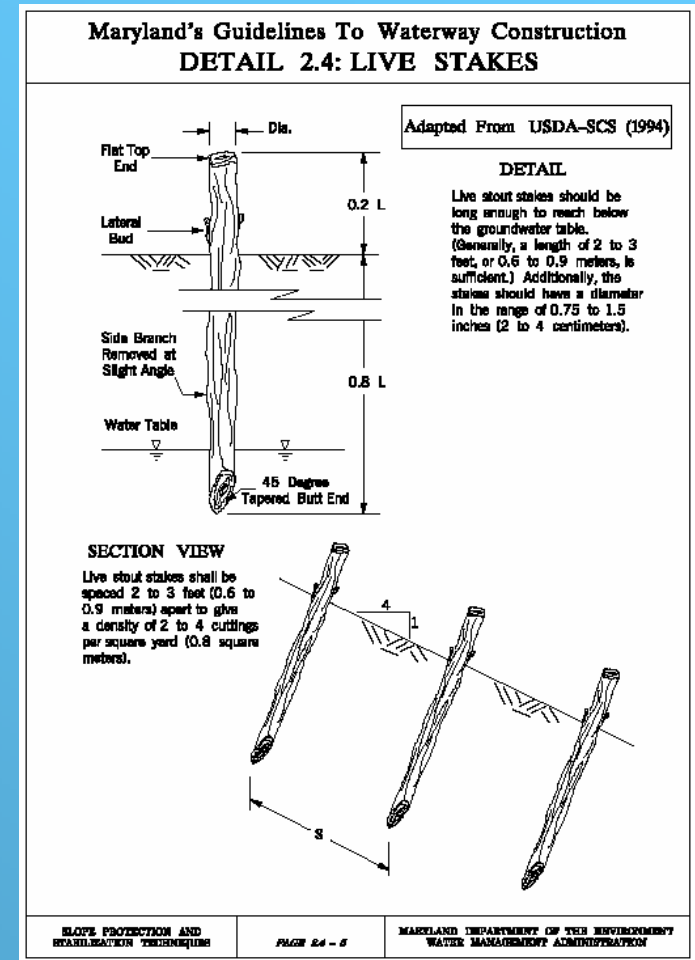
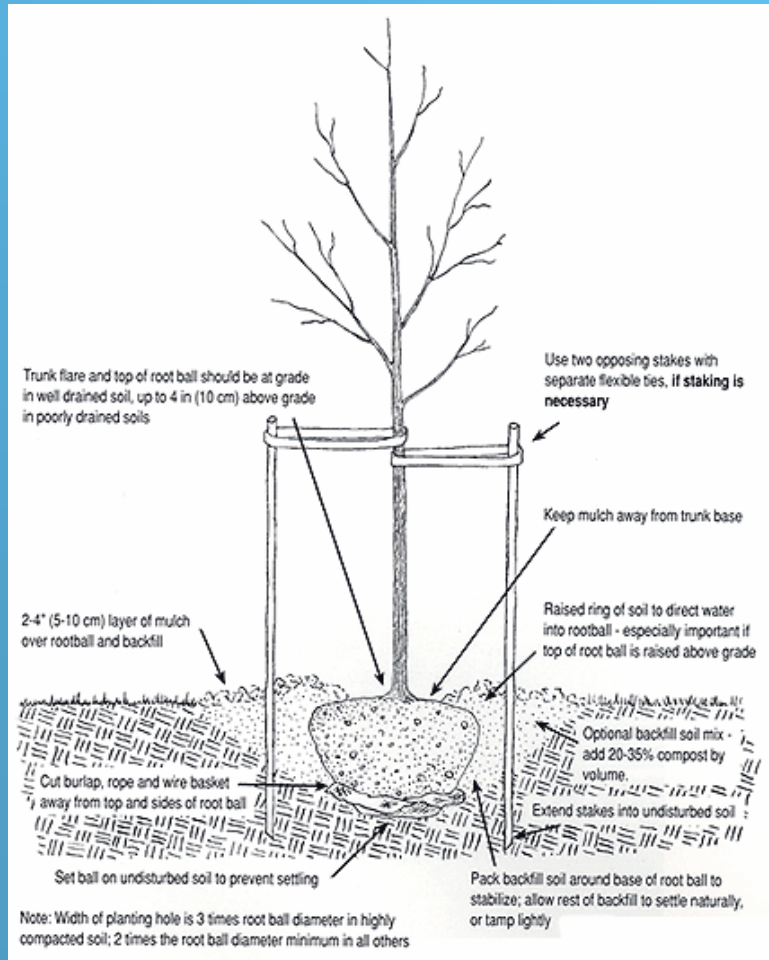


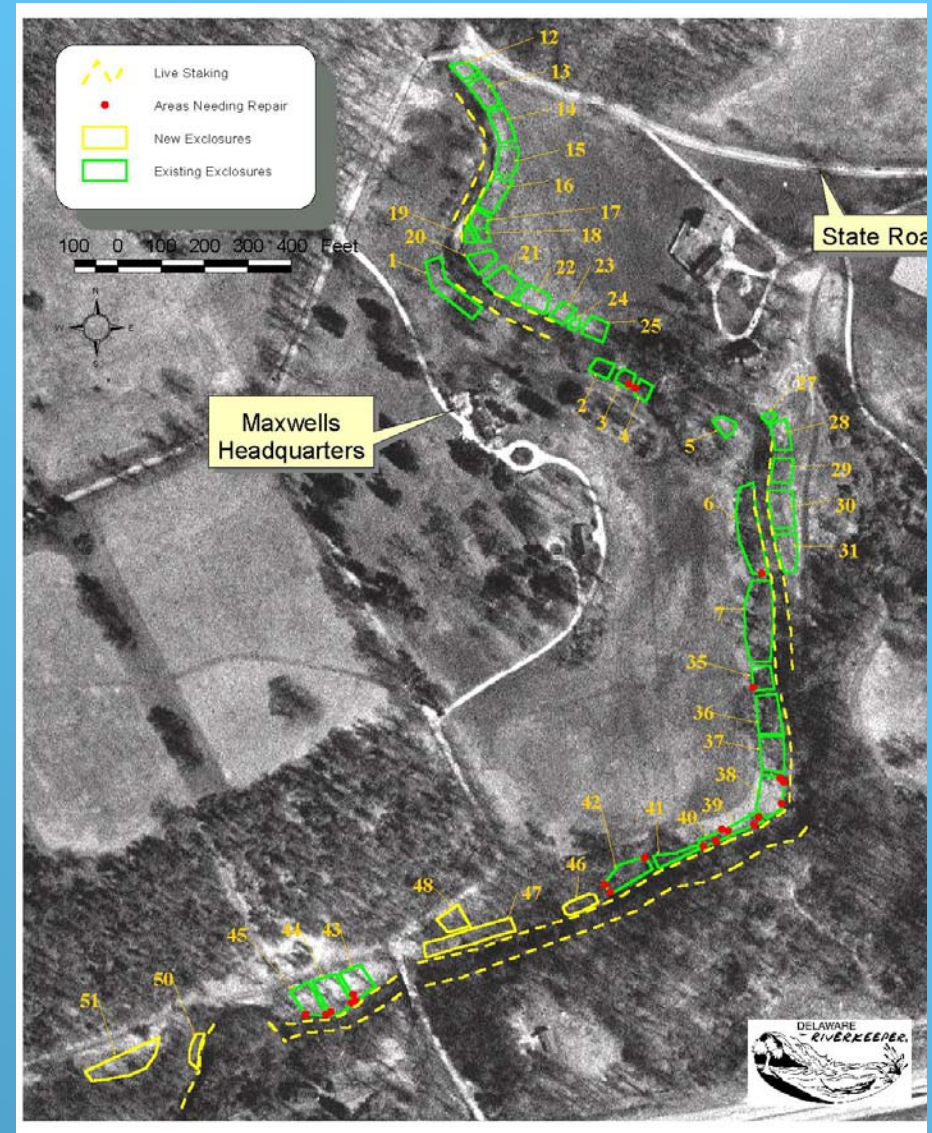
Image courtesy International Society of Arboriculture



Keys to a Successful Restoration

1. Know What You're Getting Into

Soils, Historic Value, Utilities, Toxicity



Keys to a Successful Restoration

2. Good Planting will “Jumpstart” Natural Succession



Keys to a Successful Restoration

3. Integrate Partners in Planning and Design



Keys to a Successful Restoration

5. Long-term Monitoring/Maintenance



Tools and Resources

- Buffer Restoration Handbook
 - *Alliance for the Chesapeake Bay*
 - <http://www.chesapeakebay.net/pubs/subcommittee/nsc/forest/handbook.htm>
- *PA Common Invasive Plants of Riparian Areas*
 - *Alliance for the Chesapeake Bay*
 - <http://www.acb-online.org/pubs.cfm>
- Restoration Primer
 - *Society for Ecological Restoration*
 - http://www.ser.org/content/ecological_restoration_primer.asp
- Adopt-A-Buffer Manual – Monitoring and Maintaining Projects
 - *Delaware Riverkeeper Network*
 - http://www.delawareriverkeeper.org/monitoring/adopt_a_buffer.htm

