

Summary Fact Sheet

Category: 6.0 Vegetative Systems

Practice: 6.1 Bayscaping and Environmentally Sensitive Landscaping

General Description: Revegetating or landscaping a site using trees, shrubs, grasses, or other groundcover provides an opportunity to reintroduce native vegetation, which may be more disease-resistant and require less maintenance than non-native species. Benefits of bayscaping and environmentally sensitive landscaping include:

- erosion control/soil stabilization
- runoff volume reduction
- water quality treatment (especially for sediment and nutrients)
- habitat creation
- aesthetic enhancements
- creation of, or addition to, local greenways and wildlife corridors
- reduction of water demands for landscaping

Long-term revegetation should only occur at sites at which future disturbance is not expected to occur.

Water Quantity Controls

Planting trees, shrubs, grasses, or groundcover in a portion of the drainage area will reduce the runoff volume and peak discharge rate for the drainage area by lowering its runoff potential. The runoff potential can be expressed using the “C” value in the Rational Formula, as discussed in section 6-0803 of the PFM. It can also be expressed using the curve number (CN) in SCS methods, as discussed in PFM section 6-0802. Depending on the infiltration capacity of the soil, runoff (e.g. from disconnected downspouts) can be routed to a vegetated area to reduce runoff volume and pollutant loadings.

Individual plantings scattered across the drainage area will not appreciably affect hydrologic calculations or reduce the runoff volume or peak discharge rate. Vegetation should be planted contiguously in order to influence the composite “C” or CN for the drainage area. Also, the long-term maintenance and landscaping of the planted area will determine its runoff potential. An area replanted and allowed to grow into a mature stand of trees with little or no clearing of undergrowth can be designated as “Woods” or “Forest.” However, if grass and groundcover are planted, or the understory of a wooded area is kept clear, the planted area should be considered “Open Space,” “Park,” or “Meadow” for the purposes of hydrologic computations.

Volume reductions will also result from rainfall interception by leaves and increased evapotranspiration (ET), but quantifying these reductions will require more rigorous and intensive analysis. Interception and ET will have a greater effect on runoff volume reduction for small, frequently occurring, low intensity storm events.

In addition to plant selection and landscape design, soil preparation is also a critical factor determining runoff retention. Soil conditions most favorable to plant growth generally also provide the greatest runoff volume reduction. Soils must be loose enough to allow water to percolate and roots to penetrate. Soil amendments can be used to increase permeability (see fact sheet 5.1).

Water Quality Controls

Water quality benefits are gained from planting vegetation because of the reduction in runoff potential as described above. The pollutant mass loading is the product of pollutant concentration and runoff volume. The reduction in pollutant mass is dependent upon the reduction in runoff volume achieved by planting vegetation.

Phosphorous loading calculations are a function of the weighted runoff coefficient “C” in the Occoquan Method, as described in the *Northern Virginia BMP Handbook*. Calculated phosphorous loads are decreased by planting vegetation because of the reduction in “C” that is achieved.

Location: The required maintenance level for the site will guide the plant selection. Consider whether the site requires frequent mowing or fertilization, has high foot traffic, or has high aesthetic requirements. If so, the site should be considered high maintenance and perennials may be more appropriate. Low maintenance sites should use grass/legume mixtures. In general, seed mixtures should be chosen based on average soil moisture and sun exposure.

Design Construction and Materials: Revegetate a site within 30 days after creating the final grade unless temporary stabilization is used. Basic materials include seeds, tree and shrub stock (bare root, container, cuttings or seedlings), and netting or mulch. Plants include trees, shrubs, and groundcovers such as native grasses, legumes (nitrogen fixing plants), and forbs (e.g. wildflowers). Native groundcovers are a desirable alternative to standard turf.

Interseeding (seeding among existing plant growth, especially grasses) is a sound initial approach to plant establishment. Interseeding should be performed in the fall or early spring. Clearing and grubbing may not be necessary unless a site is densely populated with exotic or invasive species. Incorporate seeds into the soil through raking, harrowing, disking, or drilling.

If tree stock is to be used, the site characteristics and time frame for revegetation will influence stock selection. Container stock are appropriate for sites exposed to a high amount of stress (e.g. foot and animal traffic). Container stock also typically becomes established more quickly than less expensive types of stock. If stress and rapid establishment are not concerns, cuttings, bare roots, or other, less expensive stock may be the most economical choice, as long as enough are planted to ensure survival across the site. The time of year chosen for planting stock depends on the type of stock and nursery availability.

Take care not to compact the soil in areas to be revegetated. Surface roughening may improve seed establishment and moisture retention. Soil amendments can also be used to increase permeability, and should be applied to areas to be revegetated as far in advance as possible.

Use mulch to increase water retention, decrease erosion and improve soil stability, and insulate seeds and stock from temperature extremes. Mulching or the use of matting is especially critical on steep slopes.

If an area is being planted for the specific purpose of providing a water quality management area, clearly post signs indicating so.

Basic costs for planting vegetation are:

Item	Unit	Estimated unit cost (2005 dollars)
Tree seedling (depends on maturity)	Ea.	\$6 - \$25
Tree seeds	M.S.F.	\$30 - \$50
Shrub seedling (depends on maturity)	Ea.	\$6 - \$20
Grass seed	M.S.F.	\$15 - \$20
Mulch	S.Y.	\$4 - \$7

Cost: The cost to landscape ½ acre using trees, shrubs, grasses, and groundcover is comprised of both the installation cost and annualized costs. For consistency with other BMP cost estimates, cost calculations assume complete replanting after 25 years.

Item	Required Cost per Year (2005 Dollars)													
	0	1	2	3	4	5	6	7	8	9	10	...	25	
Installation ¹	5,000													
Weeding ²		200	200	200	200	200	200	200	200	200	200			
Replace Vegetation		200	200	200	200	200	200	200	200	200	200			
Replant Site														5,000
Total Cost	5,000	400	400	400	400	400	400	400	400	400	400			5,000
Annualized Cost	\$575 / year (includes replanting in year 25)													

¹Developer Cost. Not included in annualized cost.

²Includes invasive plant removal.

Maintenance: Watering of vegetation may be necessary during dry periods and occasional replanting may be necessary. Reseed or replant any areas where vegetation did not become established. “Established” means that the soil cover has been maintained for at least one year since replanting.

Maintenance requirements for native vegetation are relatively low because native plants are already adapted to regional stressors such as climate and endemic diseases. Little or no reseeding should be necessary.

Protection from exotic/invaser species is a critical concern. Management strategies for dealing with exotics depend on their growth cycle (e.g. annual vs. perennial), available labor and resources to remove exotics, and the degree to which exotics are already established. Exotics may compete with native plants used to revegetate a site and hinder natural succession.

The long-term objectives for the site (e.g. habitat and land use), in addition to surrounding land uses, will guide the maintenance regime. Sites at which it is desirable to maintain grasses, forbs, or legumes should be mowed. If the site is not mowed, shrubs and trees will replace the groundcover through natural succession, as long as exotics are kept under control. Shrubs and trees may face competition from native groundcover, however, slowing their establishment.

Performance and Inspection: A healthy plant cover will stabilize the soil and reduce runoff volumes. Inspect the site for signs of disease, invasive species establishment, and erosion. Perform this inspection annually in late spring. Replace plants and stabilize soil as necessary.



**Native vegetation in bioretention cell
at Alexandria Central Library**

Source: *Friends of the Rappahannock*
PERMISSION PENDING

Potential LEED Credits:

- Primary: Water Efficiency – Credit 1 “Water Efficient Landscaping” (1-2 Points)
Sustainable Sites – Credit 6 “Stormwater Management” (1-2 Points)
Sustainable Sites – Credit 7 “Landscape & Exterior Design to Reduce Heat Islands”
(1-2 Points)
- Other: Innovation & Design Process (1-4 Points)

Links to Additional Information:

- Fairfax County Department of Public Works and Environmental Services. 2001. “Hydrologic design.” *Public Facilities Manual*, 6-0800. Available at <http://www.co.fairfax.va.us/dpwes/publications/pfm/6-0800.htm>
- Fairfax County Department of Public Works and Environmental Services. 2001. “Stormwater runoff quality control criteria.” *Public Facilities Manual*, 6-0400. Available at <http://www.co.fairfax.va.us/dpwes/publications/pfm/6-0400.htm>
- Fairfax County Department of Public Works and Environmental Services. 2001, amended effective April 15, 2002. “Vegetation preservation and planting.” *Public Facilities Manual*, 12-0000. Available at <http://www.co.fairfax.va.us/dpwes/publications/pfm/12.htm>
- Natural Resources Conservation Service. “Critical area planting.” *Urban BMP's - Water Runoff Management*. Available at <ftp://ftp-fc.sc.egov.usda.gov/WSI/UrbanBMPs/water/erosion/critareaplant.pdf>
- Natural Resources Conservation Service. “Native revegetation - grasses, legumes, and forbs.” *Urban BMP's - Water Runoff Management*. Available at ftp://ftp-fc.sc.egov.usda.gov/WSI/UrbanBMPs/water/erosion/natrevege_grasses.pdf

Natural Resources Conservation Service. "Native revegetation - trees and shrubs." *Urban BMP's - Water Runoff Management*. Available at ftp://ftp-fc.sc.egov.usda.gov/WSI/UrbanBMPs/water/erosion/natrevege_trees.pdf

Northern Virginia Planning District Commission. 1992. *Northern Virginia BMP Handbook: A Guide to Planning and Designing Best Management Practices in Northern Virginia*. Available at <http://www.novaregion.org/pdf/NVBMP-Handbook.pdf>

Virginia Department of Conservation and Recreation. 1999. "Landscaping." *Virginia Stormwater Management Handbook*, 3-05. Available at http://www.dcr.virginia.gov/sw/docs/swm/Chapter_3-05.pdf