BMP 5.6.3: Re-Vegetate and Re-Forest Disturbed Areas, Using Native Species

Sites that require landscaping and re-vegetation should select and use vegetation (i.e., native species) that does not require significant chemical maintenance by fertilizers, herbicides, and pesticides.

Image: Rose Mallow, Bowman's Hill Wildflower Preserve, www.bhwp.org

Key Design Elements

- Preserve all existing high quality plant materials and soil mantle wherever possible
- Protect these areas during construction
- Develop Landscape Plan using native species
- Reduce landscape maintenance, especially grass mowing
- Reduce or eliminate chemical applications to the site, wherever possible
- Reduce or eliminate fertilizer and chemical-based pest control programs, wherever possible

Potential Applications

Residential: Yes
Commercial: Yes
Ultra Urban: Limited
Industrial: Yes
Retrofit: Yes
Highway/Road: Limited

Stormwater Functions

Volume Reduction: Low/Med.
Recharge: Low/Med
Peak Rate Control: Low/Med.
Water Quality: Very High

Water Quality Functions

TSS: 85%
TP: 85%
NO3: 50%

Description of BMP

Minimum Disturbance/Minimum Maintenance is comprised of two distinct steps, neither of which involves structural BMPs. The first step is to preserve existing vegetation on the development site as defined in BMP 5.6.1, so as to minimize the need for landscaping and re-vegetation. This BMP emphasizes the second step - the selection and use of vegetation that does not require significant chemical maintenance by fertilizers, herbicides and pesticides. Implicit in this BMP is the assumption that native species have the greatest tolerance and resistance to pests and require less fertilization and chemical application than non-native species. Landscape architects specializing in the local plant community usually are able to identify a variety of species that meet these criteria.

The production of biomass, such as grass clippings, is a significant pollutant source for water quality (if this biomass is not removed, over time this biomass decays and is converted to additional nutrient sources which add to the water quality problem). Native grasses and other herbaceous materials that do not require mowing are preferred. Because the selection of such materials begins at the concept design stage, where lawns are avoided or eliminated and landscaping species selected, this Non-Structural BMP can generally result in a site with reduced runoff volume and rate, as well as significant nonpoint source load reduction/prevention.

A native landscape may take several forms in Pennsylvania, ranging from re-establishment of woodlands to re-establishment of meadow. It should be noted that as this native landscape grows and matures, the positive stormwater benefits relating to volume control and peak rate control increase and these landscapes become much more effective in reducing runoff volumes than maintained landscapes such as lawns.

The elimination of traditional lawnscapes as a site design element can be an extremely difficult BMP to implement, given the extent to which the traditional lawn as an essential landscape design feature is embedded in current national culture.

Additional information relating to native species and their use in landscaping is available through PADCNR and its website: http://www.dcnr.state.pa.us/forestry/wildplant/native.aspx

Detailed Stormwater Functions

Volume Reduction Calculations and **Peak Rate Calculations** are not affected substantially by this BMP - at least in the short term. In the longer term, as species grow and mature, the runoff volume production of more mature native species can reasonably be expected to be lower than a conventionally maintained landscape (especially the conventionally mowed lawn). Native species are customarily strong growers with stronger and denser root and stem systems, thereby generating less runoff. If the objective is re-vegetation with woodland species, the longer-term effect is a significant reduction in runoff volumes, with increases in infiltration, evapotranspiration, and recharge, when contrasted with a conventional lawn planting. Peak rate reduction also is achieved. Similarly, meadow re-establishment is also more beneficial than a conventional lawn planting, although not so much as the woodland landscape. Again, these benefits are long term in nature and will not be forthcoming until the species have had an opportunity to grow and mature (one advantage of the meadow is that this maturation process requires considerably less time than a woodland area).

Water Quality Improvement
Minimizing Disturbance/Minimizing Maintenance through Use Native Species for Landscaping and Re-Vegetation can improve water quality preventively by minimizing application of fertilizers and pesticides/herbicides. Given the high rates of chemical application which have been documented at

newly created maintained areas for both residential and non-residential land uses, eliminating the opportunity for chemical application is important for water quality – perhaps the most effective management technique. Of special importance here is the reduction in fertilization and nitrate loadings. For example, Delaware's *Conservation Design for Stormwater Management* lists multiple studies, which document high fertilizer application rates, including both nitrogen and phosphorus, in newly created landscapes in residential and non-residential land developments. Expansive lawn areas in low density single-family residential subdivisions as well as large office parks – development which has and continues to proliferate in Pennsylvania municipalities - typically receives intensive chemical application, both fertilization and pest control, which can exceed application rates being applied to agricultural fields. Avoidance of this nonpoint pollutant source is an important water quality objective. See Chapter 8 for Water Quality Improvement methodologies.

Design Considerations

Native species is a broad term. Different types of native species landscapes may be created, from meadow to woodland areas, obviously requiring different approaches to planting. In terms of woodland areas, Delaware's *Conservation Design for Stormwater Management* states, "…a mixture of young trees and shrubs is recommended…. Tree seedlings from 12 to 18 inches in height can be used, with shrubs at 18 to 24 inches. Once a ground cover crop is established (to offset the need for mowing), trees and shrubs should be planted on 8-foot centers, with a total of approximately 430 trees per acre. Trees should be planted with tree shelters to avoid browse damage in areas with high deer populations, and to encourage more rapid growth." (p.3-50). As tree species grow larger, both shrubs and ground covers recede and yield to the more dominant tree species. The native tree species mix of small inexpensive saplings should be picked for variety and should reflect the local forest communities. Annual mowing to control invasives may be necessary, although the quick establishment of a strong-growing ground cover can be effective in providing invasive control. Native meadow planting mixes also are available. A variety of site design factors may influence the type of vegetative community, which is to be planned and implemented. In so many cases, the "natural" vegetation of Pennsylvania's communities is, of course, woodland.

Native species plantings can achieve variation in landscape across a variety of characteristics, such as texture, color, and habitat potential. Properly selected mixes of flowering meadow species can provide seasonal color; native grasses offer seasonal variation in texture. Seed production provides a food source and reinforces habitat. In all cases, selection of native species should strive to achieve species variety and balance, avoiding creation of single-species or limited species "monocultures" which pose multiple problems. In sum, many different aspects of native species planting reinforce the value of native landscaping, typically increasing in their functional value as species grow and mature over time.

Maintenance Issues

Although many conventional landscape management requirements are made unnecessary with this BMP, Using Native Species for Landscaping and Re-Vegetation can be expected to require some level of management – especially in the short term immediately following installation. Woodland areas planted with a proper cover crop can be expected to require annual mowing in order to control invasives. Application of a carefully selected herbicide around the protective tree shelters/tubes may be necessary, reinforced by selective cutting/manual removal, if necessary. This initial maintenance routine is necessary for the first 2 to 3 years of growth and may be necessary for up to 5 years until tree growth and tree canopy begins to form, naturally inhibiting weed growth. Once shading is adequate, growth of invasives and other weeds will be naturally prevented, and the woodland becomes self-maintaining. Review of the new woodland should be undertaken intermittently to determine if replacement trees should be provided (some modest rate of planting failure is typical). Meadow

management is somewhat more straightforward; a seasonal mowing may be required, although care must be taken to make sure that any management is coordinated with essential reseeding and other important aspects of meadow re-establishment.

Construction Issues

During the initial conceptual design phase of a project, the design engineer should develop a Minimum Disturbance/Minimum Maintenance concept plan that includes the following:

- Areas of Existing Vegetation Being Preserved
- Areas to Be Re-Vegetated/Landscaped by Type (i.e., Native Species Woodland, Meadow, etc. plus Non-Native Conventional Areas)
- A landscape maintenance plan that avoids/minimizes mowing and other maintenance, except for limited areas of high visibility, special needs, etc.; specific landscape areas not to receive fertilization and other chemical applications should be identified in plan documentation

This information needs to appear on the plan drawings and receive municipal review and approval. Existing Vegetation Being Preserved must be flagged or fenced in the field. In terms of specific construction sequencing, all plantings including native species should be installed during the final construction phase of the project. Because native species plantings are likely to have a less "finished" appearance than conventionally landscaped areas, additional field identification for these areas through flagging or fencing similar to Existing Vegetation Being Preserved should be considered.

Cost Issues

BMP 5.6.3 cost implications are minimal during construction. Seeding for installation of a conventional lawn is likely to be less expensive than planting of a "cover" of native species, although when contrasted with a non-lawn landscape, "natives" often are not more costly than other non-native landscape species. In terms of woodland creation, somewhat dated (1997) costs have been provided by the *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*:

$860/acre trees with installation
$1,600/acre tree shelters/tubes and stakes
$300/acre for four waterings on average

Current values may be considerably higher, well over $3,000/acre for installation costs. Costs for meadow re-establishment are lower than those for woodland, in part due to the elimination of the need for shelters/tubes. Again, such costs can be expected to be greater than installation of conventional lawn (seeding and mulching), although the installation cost differences diminish when conventional lawn seeding is redefined in terms of conventional planting beds.

Cost differentials grow greater when longer term operating and maintenance costs are taken into consideration. If lawn mowing can be eliminated, or even reduced significantly to a once per year requirement, substantial maintenance cost savings result, often in excess of $1,500 per acre per year. If chemical application (fertilization, pesticides, etc.) can be eliminated, substantial additional savings result with use of native species. These reductions in annual maintenance costs resulting from a native landscape re-establishment very quickly outweigh any increased installation costs that are required at project initiation. Unfortunately, because developers pay for the installation costs and longer term

reduced maintenance costs are enjoyed by future owners, there is reluctance to embrace native landscaping concepts.

Stormwater Management Calculations

See Chapter 8 for calculations.

References

Bowman's Hill Wildflower Preserve, Washington Crossing Historic Park, PO Box 685, New Hope, PA 18938-0685, Tel (215) 862-2924, Fax (215) 862-1846, Native plant reserve, plant sales, native seed, educational programs, www.bhwp.org

Morris Arboretum of the University of Pennsylvania; 9414 Meadowbrook Avenue, Philadelphia, PA 19118, Tel (215) 247-5777, www.upenn.edu/morris, PA Flora Project Website: Arboretum and gardens (some natives), educational programs, PA Flora Project, www.upenn.edu/paflora

Pennsylvania Department of Conservation and Natural Resources; Bureau of Forestry; PO Box 8552, Harrisburg, PA 17105-8552, Tel (717)787-3444, Fax (717)783-5109, Invasive plant brochure; list of native plant and seed suppliers in PA; list of rare, endangered, threatened species.

Pennsylvania Native Plant Society, 1001 East College Avenue, State College, PA 16801 www.pawildflower.org

Western Pennsylvania Conservancy; 209 Fourth Avenue, Pittsburgh, PA 15222, Tel (412) 288-2777, Fax (412) 281-1792, www.paconserve.org

5.7 Reduce Impervious Cover