

**Benefits and Application of Natural Landscaping
And
Five-year Implementation Plan**

[Note from staff: The precise date of preparation of this document is not known, but we think it was prepared by the then-Director of Urban Forest Management in 2004 or 2005]

Definition of Natural Landscaping

Landscaping is the physical modification of the natural environment to serve the needs of people by planting, altering the contours of the ground and building structures such as pedestrian ways, paths and picnic areas. *Natural Landscaping* is a relatively new term that incorporates a wide array of landscaping techniques that help retain natural landscape features and their beneficial effects.

On an aesthetical level, natural landscaping attempts to capture the essence of surrounding native plant communities and other natural features, such as hills and water ways in a designed landscape that places plants in arrangements and environments similar to those found in nature. In addition to achieving aesthetical objectives, natural landscaping can be used to mitigate the detrimental effects of land development and reduce property maintenance requirements. Natural landscaping can be used to protect and enhance existing natural resources in order to maximize the levels of social, economic and environmental benefits that can be provided by those resources.

Natural landscaping may utilize native plants exclusively or incorporate a small percent of exotic plants that can thrive in urbanized settings where native species cannot. While not maintenance free, natural landscaping techniques often require less time and money for ongoing maintenance than conventional landscapes. Natural landscaping may also incorporate man-made materials, devices or features that can help minimize maintenance requirements or assist the design to achieve specific outcomes.

Major Benefits, Goals, Treatments and Practices

The following 10 goals describe the environmental, economic and social benefits that are possible to achieve through the application of natural landscaping on Fairfax County properties. The Natural Landscaping Committee (NL Committee) recommends that retrofitted and new facilities be designed to achieve these goals. Following a discussion of each goal, examples are listed of associated treatments and practices.

1. Air Quality Improvement – Improvement of ambient air quality levels by planting or preserving tree canopy and reducing mowing levels. It should be noted that recent changes to United States Environmental Protection Agency (USEPA) policy relating to the Clean Air Act will allow tree cover to receive a modest amount of credits for voluntary stationary source emission reduction programs under Section 110 of the Clean Air Act, and as such tree-related measures will be allowed to receive explicit State Implementation Plan credits for voluntary stationary source emission reduction programs.¹ Specific details of the application of trees to air quality plans have not been defined by USEPA to date.

USEPA requires localities in non-compliance regions to verify the effectiveness of measures, and is likely that they will require any tree canopy involved with these measures to be placed in deed restricted easements and to have long-range management plans developed for them. As such, it may be possible to achieve multiple levels of regulatory compliance from the same areas; i.e., air quality and water quality conservation easements may be allowed to be co-located. In addition, reduction of mowing levels can have a significant impact on air quality. USEPA estimates that a gasoline powered lawn mower emits 11 times the air pollution of a new car for each hour of operation. Gasoline lawn and power equipment, on average, produce five percent of "smog" forming volatile organic compounds (VOC) in non-attainment areas.²

- *Develop tree-related measures for inclusion in Fairfax County's air quality management plans*
 - *Large-scale no-mow zones planted with seedlings/whips and small nursery stock trees*
 - *Increased canopy coverage and shade in parking lot area to reduce raw fuel emissions from parked vehicles*
 - *Tree preservation areas set in conservation easements on public lands*
 - *Limiting mowing operations in summer months when ozone levels are highest*
2. Energy Conservation - Reduction or elimination of fossil fuel levels needed to maintain landscaping or the utility energy used to heat or cool associated buildings. According to research conducted by the United States Department of Agriculture (USDA), Forest Service and others, trees properly placed around buildings can reduce air conditioning needs by 30 percent and can save 20 - 50 percent in energy used for heating. In addition, USDA estimates that the net cooling effect of a young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day. In addition to moderating the interior temperatures of buildings, trees cool the ambient air temperature through a process called "evapotranspiration." Research demonstrates that summer daytime air temperatures are 3°F to 6° F (2°C to 3°C) cooler in tree-shaded neighborhoods than in treeless areas³
- *No-mow zones*
 - *No-mow-zones planted with seedlings, alternative groundcovers, or woody-seed mix*
 - *Removal of turfgrass and replacement with mulch beds in interior parking lot islands and projections.*
 - *Planting native shade trees (nursery stock) 20 to 40 feet away from eastern and western sides of buildings to reduce passive solar gain through windows*
 - *Planting rows of evergreen trees and shrubs to intercept and reduce wintertime wind speeds to decrease heating costs*
3. Pesticide/Fertilizer Reduction - Reducing or eliminating fertilizer and/or pesticide applications. This goal may not have wide-spread application because regular

- application of fertilizer on County property is already limited due to budget and staff constraints; however, it may have significant application on formal lawns around governmental facilities under contract or in specialized turf areas, such as athletic fields and golf courses roughs and fairways.
- *Reduce the amount of turf by increasing areas of rough comprised of native plants and natural environments*
 - *Adoption of The Audubon Cooperative Sanctuary Program for Golf Courses which encourages golf courses to include wildlife habitat enhancement, establishment of Integrated Pest Management (IPM) Programs and protection of water resources.*
 - *Use of IPM on landscapes rather than annual blanket treatment*
 - *Replacement of plant species (usually exotics) that require predictably higher levels of pesticide and/or fertilizer application to thrive*
 - *Incorporation of “insectary” plants that provide habitat for parasitoid wasps that feed on pests of ornamental plants and garden crops. The wasps will parasitize caterpillars and grubs to feed their young, while the predatory and parasitoid flies attack many kinds of insects, including leafhoppers and caterpillars.*
4. Water Quality Improvement – Improving water quality by minimizing soil erosion or enhancing the nutrient uptake capacity of a landscape. This goal will be supported by existing riparian restoration projects, Low-Impact Development bio-retention practices, Best Management Practices and erosion and sedimentation control practices that utilize vegetation. Native vegetation in drainage ways enhances the infiltration of contaminated stormwater runoff. Root systems improve soil permeability and help the uptake of pollutants and nutrients. Vegetated buffers along stream banks and shorelines intercept surface runoff and subsurface water pollutants.
- *Re-establishing Riparian buffers with tree and wood plant species*
 - *Stream bank stabilization using bio-logs, fiber mats, emergent and submerged wetland plants, etc.*
 - *Rain Gardens*
 - *Use of “Bayscapes” landscaping schemes on properties adjacent to major waterways*
 - *Protection and management of riparian plant communities*
5. Stormwater Management – Managing stormwater runoff rates by increasing leaf surface area levels, establishing multiple canopy tiers and improving the perviousness of groundcover and soil layers.
- *Vegetation filter strips in parking lots*
 - *Green roofing products*
 - *Rain Barrels*
 - *Introduction of organic amendments to soils*
 - *Other Low Impact Development techniques related to landscaping*

6. Ecosystem Management - Protecting, managing, expanding, connecting, or restoring native plant communities, wildlife habitat and greenways. Natural landscaping protects and restores habitats for wildlife. The introduction of native plants species can increase the populations of birds, beneficial insects, and animals which are essential to the health of ecosystems.
 - *Control of invasive exotic species*
 - *Plant dominant/indicator species to help re-establish specific plant communities and wildlife habitat*
 - *Identify and map specific plant communities to assist in the selection of appropriate native plant materials in restoration projects*
7. Resource Reduction - Reducing current levels of fuel, materials, staff or budget needed to maintain or establish landscape and grounds. One example that can be used to contrast the cost of establishing natural landscaping with conventional turfgrass shows that conventional installation of sodded turf grasses may exceed \$12,000 per acre. Planting turfgrass seeds may cost in the range of \$4,000 to \$8,000 per acre. This contrasts with the installation costs of \$2,000 to \$4,000 per acre for seeding native grasses and herbaceous plants.⁴
 - *Mowing reduction with or without replanting*
 - *Sheriff Department work release landscaping program*
 - *Replacing high maintenance plants with low maintenance plants*
 - *Replacing shrubs and trees that obtain inappropriate dimensions for location with species that obtain appropriate dimensions at maturity*
8. Aesthetic Improvement – Improving or enhancing the aesthetic value of a property through the use of native and desirable plant species. Natural landscaping can provide a diversity of color and texture throughout the year which significantly contributes to the beauty of sites. The County’s 911 Memorial Garden is an excellent example of the beauty that native plants can lend on a year-round basis.
 - *Replacing turf with perennial wildflowers and native grasses*
 - *Use native plant species that have visually stimulating foliage, flowers, fruit, seeds and bark*
9. Public Education – Promoting the use of natural landscaping techniques and practices on private property by providing opportunities for public education. Natural landscaping puts people in touch with nature. County agencies, such as the Park Authority can and are already using natural landscaping as an educational tool.
 - *Development of educational materials such as brochures, web pages, videos and desktop exhibits that highlight the use of natural landscaping on County property and promote its use on private property*

- *Construct multi-function natural landscaping on high-visibility governmental sites that contain interpretive signage*
 - *Develop public service announcements for various media outlets*
 - *Promote natural landscaping at the County's Earth Day/Arbor Day Celebration*
 - *Promote existing programs such as the National Wildlife Federation's "Backyard Wildlife Habitat" program to construct exhibits at County facilities and school properties*
10. Community Engagement – Increasing neighborhood pride and environmental stewardship by assisting non-profit grass-root groups that are interested in assisting County staff with the maintenance of landscaping at libraries, schools and governmental centers.
- *Develop programs that encourage individual or groups interested in planting and maintaining natural landscape gardens or exhibits on County property*
 - *Incorporate natural landscape themes or projects into Revitalization Districts*
 - *Encourage gardening groups such as the Virginia Cooperative Extension Master Gardeners to attend Natural Landscaping workshops that are already held at the Park Authority's Green Spring Garden Park*
 - *Encourage local landscape businesses to participate in Natural Landscaping workshops to encourage the development of natural landscaping services for private landowners*

Evaluating Natural Landscaping on Existing County Properties and Facilities and Identifying Potential Projects

The following section approximates the number of existing County properties with potential to implement treatments and practices that support the 10 major goals of natural landscaping. The NL Committee used the 10 goals and associated treatments and practices in the evaluation of 153 governmental facilities and 850 properties managed by the Facilities Management Department, 209 school facilities managed by Fairfax County Public Schools and 101 facilities and 384 parks managed by the Fairfax County Park Authority. From the review of these properties and current programs and resources, the NL Committee identified 17 types of natural landscaping projects whose implementation over a five year period is feasible. The list provides associated goals, number and types of properties affected, along with associated fiscal impact and potential returns.

Cost Estimates

Costs are estimates of material and contractor expenses needed to implement natural landscaping treatments and practices on an on-site basis, and are based on the average size and condition of County properties and facilities. These estimates do not include County staff salaries/hours that might be needed to implement the projects. Global project costs were not provided because actual costs will vary significantly on a site-by-

site basis. Volunteer and community involvement could significantly reduce installation costs for several project types.

The NL Committee did not attempt to project cost savings for maintenance activities. Although the premise that natural landscaping requires considerably less resources and money to maintain than conventional landscaping appears to be legitimate, a literature search on the subject primarily provides anecdotal information; the few quantifiable examples are provided in the report.

The first nine projects will probably have minimal fiscal impact and could be funded through current agency funding levels as follows:

1. *Establish guidelines for retrofitting the landscapes of existing County facilities*

- Using the natural landscaping goals as a framework, the NL Committee will develop a formal set of guidelines to help agencies identify and prioritize potential natural landscaping projects in a consistent manner.
- Goals Supported: All goals are supported
- Estimated cost: Minimal or no cost
- Potential Returns: Will help identify and prioritize natural landscaping in a consistent manner
- Notes: In addition to the 10 major goals, the guidelines will need to incorporate additional criteria such as site specific environmental conditions, neighborhood issues and user agency concerns

2. *Develop Natural Landscaping Guidelines and Specifications for New Facilities*

- Goals Supported: All
- Estimated cost: Minimal or no cost
- Potential Returns: Will help ensure facilities have lower maintenance costs and are environmentally friendly
- Notes: Cost benefits from retrofitted natural landscaping take a significant amount of time to realize due to cost offsets associated with the removal and disposal of existing landscape materials and features. However, immediate operational and maintenance cost savings could be realized when a property is designed with a natural landscaping theme from the start and its features installed with the initial construction. Staff from the Capital Facilities Division, DPWES, Fairfax County Public Schools, Fairfax County Park Authority and the Department of Planning and Zoning should examine current specifications, policies and ordinances for opportunities to develop design criteria and specifications for new County facilities with natural landscaping as a focus

3. ***Develop tree-related measures for inclusion in Fairfax County's air quality management plans***
 - Goals Supported: 1, 9 and 10
 - Estimated cost per site: Minimal or no material costs
 - Potential Returns: Credited Ozone and Particulate Matter offset reduction measures for local air quality management plans

4. ***Draft a Countywide Natural Landscaping Policy to communicate the purpose, goals and importance of natural landscaping features on County properties***
 - Goals Supported: 9 and 10
 - Estimated cost per site: Minimal or no material costs; may require training expenditures to educate staff on new methodologies
 - Potential Returns: Consistent application of natural landscaping treatment and practices; buy-in by County staff

5. ***Establish no-mow and minimal-mow (once per season) areas and reduce overall mowing by 5% - 10%***
 - Goals Supported: 1, 3, 4, 6, and 7
 - Could be implemented at 180 public school sites
 - Estimated cost per site: Minimal or no cost
 - Potential Returns: Cost savings from smaller contracted mowing areas; lower fuel costs

6. ***Develop educational materials such as brochures, web pages, videos and desktop exhibits that highlight the use of natural landscaping on County property and promote its use on private property***
 - Goals Supported: 1, 3, 4, 6, and 7
 - Could be implemented at 180 public school sites
 - Estimated cost per site: Minimal or no cost
 - Potential Returns: Cost savings from smaller contracted mowing areas; lower fuel costs

7. ***Establish Integrated Pest Management programs for grounds maintenance***
 - Goals Supported: 1, 3, 4, 7, and 9
 - Could be implemented at 209 public school sites
 - Estimated cost per site: Minimal or no material costs; may require training expenditures to educate staff on new methodologies
 - Potential Returns: Reduction in fertilizer and pesticide applications; water quality improvement

8. *Encourage gardening groups such as the Virginia Cooperative Extension Master Gardeners and others to promote natural landscaping by hosting workshops, seminars, and classes*

- Goals Supported: 9 and 10
- Estimated cost per site: Minimal or no material costs; may require training expenditures to educated staff on new methodologies
- Potential Returns: Dissemination of natural landscaping treatments and practices to private property owners

9. *Encourage local landscape businesses by hosting natural landscaping workshops, seminars and classes that encourage the development of natural landscaping services for private property owners*

- Goals Supported: 9 and 10
- Estimated cost per site: Minimal or no material costs
- Potential Returns: Increases to the level of natural landscaping services available to private property owners

Projects 10 through 14 may have fiscal impact beyond current agency funding levels. It is anticipated that these treatments and practices will require no more than \$5,000 per site to implement as follows:

10. *Establish no-mow-zones areas and allow to grow naturally or plant with seedlings, alternative groundcovers, or woody seed mix*

- Goals Supported: 1, 2, 3, 4, 5, 6, 7, 8 and 9
- Could be implemented at 75 parks
- Estimated range of cost per site: Minimal cost if allowed to regenerate naturally; \$500 - \$1,000 per 1,000 square feet if replanted with nursery stock trees; considerably less if seedlings and/or woody seed mixes are used
- Potential Returns: Cost savings from smaller contracted mowing areas; lower fuels costs; lower VOC emissions; potential for ozone mitigation for air quality plans
- Notes: Areas allowed to regenerate naturally will need to be carefully monitored to ensure that invasive plants do not become dominate, otherwise additional resources will need to be spent in order to remove the invasive plants

11. *Plant riparian buffers with native trees and shrubs*

- Goals Supported: 1, 4, 5, 6, 7, 8, 9 and 10
- Could be implemented at 50 stream valley parks and one public school site
- Estimated range of cost per site: \$500 - \$1,000 per 1,000 square feet when replanted with nursery stock trees; less with seedlings and woody seed mix
- Potential Returns: Improved water quality; cost savings from smaller contracted mowing areas; lower fuel costs; improved air quality
- Notes: These riparian restoration projects will supplement existing efforts by

the Park Authority, DPWES and the Virginia Department of Forestry

12. Installation of interpretive signs at existing natural landscaping projects on County property that help educate the public on the benefits and specific application of natural landscaping techniques and practices

- Goals Supported: 9 and 10
- Could be implemented at 50 park sites, 10 governmental facilities and five public school sites
- Estimated range of cost per site: \$100 to \$1,500 per site depending on nature and size of site and subject matter
- Potential Returns: Community education and adoption of natural landscape treatments and practices on private property

13. Schoolyard Habitat Gardens

- Goals Supported: 3, 6, 7, 8, and 9
- Could be implemented at 16 public school sites
- Estimated range of cost per site: \$500 - \$3,000 per garden
- Potential Returns: Student exposure to natural world; increased wildlife habitat

14. Plant shade trees for energy conservation, aesthetics, and air quality

- Goals Supported: 1, 2, 5, 6, 7, 8, 9 and 10
- Could be implemented at 50 parks, one public school site, and 10 governmental facilities
- Estimated range of cost per site: \$2,500 for a 10 tree planting project using 2.5 inch caliper nursery stock trees; less with seedlings and woody seed mix
- Potential Returns: Lower energy costs in governmental buildings; potential for ozone mitigation for air quality plans

Projects 15, 16 and 17 will have fiscal impact beyond current agency funding levels. It is anticipated that these treatments and practices will require more than \$5,000 per site to implement and may require outside contracts to design and install as follows:

15. Landscape improvements using native plants around schools and governmental buildings

- Goals Supported: 1, 3, 7, 8, 9, and 10
- Could be implemented at nine governmental facilities and five public school sites
- Estimated range of cost per site: \$1,000 to \$25,000 per site for landscape materials depending on size of facility
- Potential Returns: Cost savings from smaller contracted mowing areas; lower fuel costs; reduction in fertilizer and pesticide applications; community education and engagement; improved appearance of County facilities

16. Refurbish stormwater detention ponds using natural landscaping techniques

- Goals Supported: 4 and 5
- Could be implemented at 10 public school sites and five governmental facilities
- Estimated range of cost per site: \$5,000 - \$35,000 per site depending on size of detention facility and natural landscape technique
- Potential Returns: Groundwater infiltration; water quality improvement through uptake of nutrients

17. Remove invasive plants that threaten native plant communities and replace with appropriate species trees and shrubs

- Goals Supported: 1, 4, 5, 6, 8, 9 and 10
- Could be implemented at 10 parks
- Estimated range of cost per site: \$300 - \$1,300 per 1,000 square feet for manual invasive plant removal and replacement with nursery stock trees; less cost with seedlings and woody seed mix. Depending on total area and nature of invasive plants, these projects could exceed \$50,000 per site
- Potential Returns: Protection of ecological integrity and improved ability to deliver socio-economic and environmental benefits

Identifying, Funding and Tracking the Effectiveness of Natural Landscaping Projects

In addition to normal agency funding routes, the NL Committee could submit specific natural landscaping projects through the mechanisms established in the Environmental Improvement Program (EIP), which is administered by the Environmental Coordination Committee (ECC) and reviewed internally by the ECC's Action Group before being submitted as a budget item for the Board of Supervisor's consideration. As a start, the NL Committee will submit a limited number of natural landscaping projects for inclusion in the FY07 EIP through this mechanism.

The NL Committee recommends developing performance and cost tracking criteria to monitor the success of specific techniques, practices and projects. The performance and cost data could be used as a baseline to evaluate the level of cost-effectiveness and environmental benefits that are likely to be achieved by proposed projects.

Challenges That Must Be Addressed In Order To Fully Realize the Benefits of Natural Landscaping

The NL Committee recommends that the following actions be considered by the Board of Supervisors in order to ensure the aggressive and widespread use of natural landscaping.

Countywide Natural Landscaping Policy

A Countywide Natural Landscaping Policy will be needed to clearly communicate the purpose, goals and importance of natural landscaping features on County properties to both the public and staff. Official policy language would help ensure consistent application of natural landscaping treatment and practices, and acceptance by County staff. In addition to developing a stand alone policy, the NL Committee will be looking for opportunities to embed natural landscaping concepts and guidelines into existing County Code and policies, such as the Public Facilities Manual, the Zoning Ordinance, and the Comprehensive Master Plan Policy Plan. The relevant goals, concepts and principles of natural landscaping should also be embedded in future natural resource management plans such as urban forest management plans, watershed management plans and air quality plans.

Public Education and Outreach

Although natural landscaping is a very effective way to minimize the detrimental effects of pesticides and fertilizers, as well as the noise pollution and emissions from lawn-mowing equipment, its wide spread acceptance by the public and County staff cannot be assumed. By far, the predominant groundcover used on private and public property today is turfgrass. Turfgrass is an inherent part of western culture. The suburban grass lawn is borrowed from the heavily grazed, short grass pastures and formal gardens of Europe, particularly England. Today, a weed-free finely manicured lawn is still highly esteemed and a dominant feature of most residential, institutional and commercial landscapes. Since the 1950s, a multi-billion dollar-a-year industry has developed in the United States to support the establishment, mowing, fertilization, and weeding of turfgrass; but in a manner that is not always kind to other natural resources such as water and air.

Since the manicured lawn is deeply imbedded in American culture and economy, in order to gain wide-spread acceptance and eventual emulation by the public, an effort to replace turfgrass and other mainstream forms of landscaping with alternative landscaping treatments on public property will need to be presaged with public outreach and education. The need to educate will become critical, especially when establishing no-mow zones in areas that are located in close proximity to residential and formal commercial uses where the majority of the public has an expectation to see grass that is mowed on a frequent basis.

Educating County Employees

Since County employees are part of the larger community and are subject to the same cultural influences, efforts to communicate the desirability and need for natural landscaping should be extended to public servants as well. The NL Committee anticipates that some forms of natural landscaping may encounter resistance from staff that may have strong opinions about landscape appearance based on more traditional viewpoints. Certainly, natural landscaping projects will need to be implemented in a

manner that harmonizes with the official use(s) of the facility and takes into account the concerns of on-site staff; however, unless the purpose and overall goals of the landscape are communicated, and staff in turn accepts their validity, the long-term viability and effectiveness of the landscape treatments will remain in question.

Encouraging the Local Green Industry

The NL Committee recommends that Fairfax County encourage local landscaping companies to develop and expand natural landscaping services to private property owners by pointing out additional opportunities for business development, especially in relation to natural landscape design and the propagation and installation of native plant materials. Encouraging the local Green Industry to expand their natural landscaping services will complement the County's public outreach efforts and will make it easier for the public to emulate the natural landscaping examples they observe on County properties

Along these lines, staff from Urban Forest Management, DPWES and the local Virginia Cooperative Extension Agent currently host workshops and conferences with local landscape companies to discuss landscaping design and installation issues. Natural landscaping information will be included in the next workshop which will be held in the winter months of 2005.

Need for Oversight and Continued Inter-Agency Cooperation

The NL Committee is currently operating on an ad-hoc basis. The NL Committee recommends that a more formal arrangement be made in order to ensure that an aggressive and unified approach toward implementing natural landscaping techniques and practices continues as dictated in the June 21, 2004 Board Matter.

The NL Committee recommends that the Board of Supervisors consider officially chartering an inter-agency group comprised of representatives from the same agencies already represented on the NL Committee, plus representatives from other natural resource management organizations such as the Virginia Cooperative Extension, Virginia Department of Forestry, the Northern Virginia Soil and Water Conservation District, and a local Green Industry representative and charge that group to:

- Implement a five-year natural landscaping plan in an aggressive but cooperative fashion
- Update the palette of natural landscaping techniques and practices as new information and research emerges
- Produce an annual progress report that evaluates the level of cost-effectiveness and benefits that specific natural landscaping practices, techniques and projects are likely to provide
- Submit natural landscaping projects to the ECC for possible inclusion into the annual Environmental Improvement Program
- Encourage the community to embrace and use natural landscaping treatments and

- practices on privately owned property and open space
- Ensure inter-agency cooperation, communication and sharing of resources to assist the implementation of natural landscaping projects

Sources:

- 1 Center for Urban Forest Research, Urban Forest Research Newsletter, January 2005, page 6
http://cufr.ucdavis.edu/products/cufr562_Newsletter_Jan05_Special_Edition.pdf
- 2 and 4 United States Environmental Protection Agency. *A Source Book on Natural Landscaping for Public Officials*. <http://www.epa.gov/glnpo/greenacres/>
- 3 United States Department of Energy, Landscaping for Energy Efficiency DOE/GO-10095-046, FS 220 April 1995
<http://www.eere.energy.gov/consumerinfo/pdfs/landscape.pdf>