Elklick Woodlands Natural Area Preserve

Natural Resources Management Plan

Prepared for the

Fairfax County Park Authority

by

Lardner/Klein Landscape Architects, P.C.

in association with

Environmental Systems Analysis, Inc.

June 2009

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Fairfax County Park Authority
Elklick Woodlands Natural Area Preserve
Natural Resource Management Plan

Approval Page

The Elklick Woodlands Natural Resource Management Plan is hereby approved, effective June 1, 2009

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Acknowledgements

Fairfax County Park Authority
Elklick Woodlands Natural Area Preserve
Natural Resource Management Plan

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Executive Summary

The Elklick Woodlands Natural Area Preserve is a 226-acre tract owned by the Fairfax County Park Authority and located in the western corner of the county at the heart of the Park Authority's Sully Woodlands Assemblage. The site is significant in that it supports one of the best remaining examples in Virginia of a globally rare natural community known as a northern hardpan basic oak-hickory forest. This forest type, characterized by white oak, pignut hickory, white ash and redbud, occurs on diabase soil underlain by dense plastic clay, commonly referred to as shrink-swell soil. Because it is a rare natural treasure, through the cooperative efforts of Fairfax County, the Virginia Department of Conservation and Recreation (DCR) and the Northern Virginia Conservation Trust (NVCT), the property was dedicated a Virginia Natural Area Preserve. In addition to its status as a state preserve, the site is also protected by a conservation easement held by NVCT.

The purpose of the Natural Resources Management Plan (NRMP) for Elklick Woodlands Natural Area Preserve is to identify specific actions to maintain and improve its environmental health. The Park Authority develops Natural Resources Management Plans to provide the tools needed to help agency staff, partners, stakeholders and residents identify, educate, protect, manage and monitor resources on park lands. Due to its significance as a Virginia Natural Area Preserve, a more detailed NRMP is required to meet the stewardship needs for this important part of Virginia's system of Natural Area Preserves.

The Park Authority, with the approval of this plan, establishes the following overall goal for the management of the Elklick Woodlands Natural Area Preserve:

> *The overall goal for management is to promote naturally regenerating communities capable of providing ecosystem services particularly of the globally rare natural community known as a northern harpdpan basic oak-hickory forest.*

In order to develop the objectives and actions presented in the plan, project team members compiled an initial set of management concerns during a site visit with Park Authority natural resource management staff and a follow-up meeting with additional Park Authority staff and agency stakeholders, including Virginia Department of Conservation and Recreation, Northern Virginia Conservation Trust, Dominion Resources, and Virginia Department of Transportation. Management concerns identified include

- Boundary Identification
- Perimeter "Edge" Management
- Hydrology
- Internal Trail System
- Invasive Species Management
- Access to the Site
- Use Limitations
- General Resources Needed
- Monitoring and Research Needs

In response to these concerns, the plan presents five Management Objectives, each of which is accompanied by related management challenges and issues along with strategies to address these challenges.

1. Adopt the necessary biological resource management techniques suited for an urbanizing region to maintain the ecological structure and function of the northern hardpan basic oak-hickory forest.
2. Work with the holders of the existing utility easement to develop and ensure consistent application of maintenance regimes that minimize adverse impacts to Elklick Woodlands
3. Allow for appropriate public access in a manner that serves to educate visitors while preserving the function and integrity of the globally rare plant community.
4. Incorporate appropriate facilities and infrastructure needed to achieve management objectives.
5. Maintain a land use buffer of compatible uses along the entire perimeter of Elklick Woodlands area.

Although the site is protected under Fairfax County Park Authority ownership and by an NVCT conservation easement, the northern hardpan basic oak-hickory forest at the Elklick Woodlands Natural Area Preserve faces numerous threats to its environmental health. Proper management efforts, however, can address these threats. This plan recommends prioritization, beginning with several early stewardship action steps, including performing a complete natural resources inventory, managing for invasive species, managing the deer population and marking boundaries. Additional strategies outlined in the plan can be implemented over a longer timeframe to insure the long-term health of this rare natural resource.

Introduction

Elklick Woodlands Natural Area Preserve is owned by the Fairfax County Park Authority (Park Authority) and was established through the cooperative efforts of the county, the Virginia Department of Conservation and Recreation (DCR), and the Northern Virginia Conservation Trust (NVCT). In addition to being dedicated as a Virginia Natural Area Preserve, the property is also protected with a conservation easement held by NVCT (Appendix 1). The site supports one of the best remaining examples of a globally rare natural community in Virginia known as the northern hardpan basic oak-hickory forest. This forest type, characterized by white oak, pignut hickory, white ash and redbud, occurs on diabase soil underlain by dense plastic clay, commonly referred to as shrink-swell soil. Under these conditions, water ponds easily during wet periods but evaporates quickly during dry spells. Such fluctuation in soil moisture results in stunted, open-canopy trees but encourages a wide variety of grasses and herbs to occupy the sunlit understory. With a natural range restricted to just a few counties in the northern Virginia and Maryland Piedmont, most examples of this forest-type have disappeared due to the rapid urban and suburban growth of the area, a long history of agriculture, and conversion of hardwood forests to silvicultural pine stands (http://www.dcr.virginia.gov/natural_heritage/natural_area_preserves/elklick.shtml, accessed 1/19/2009).

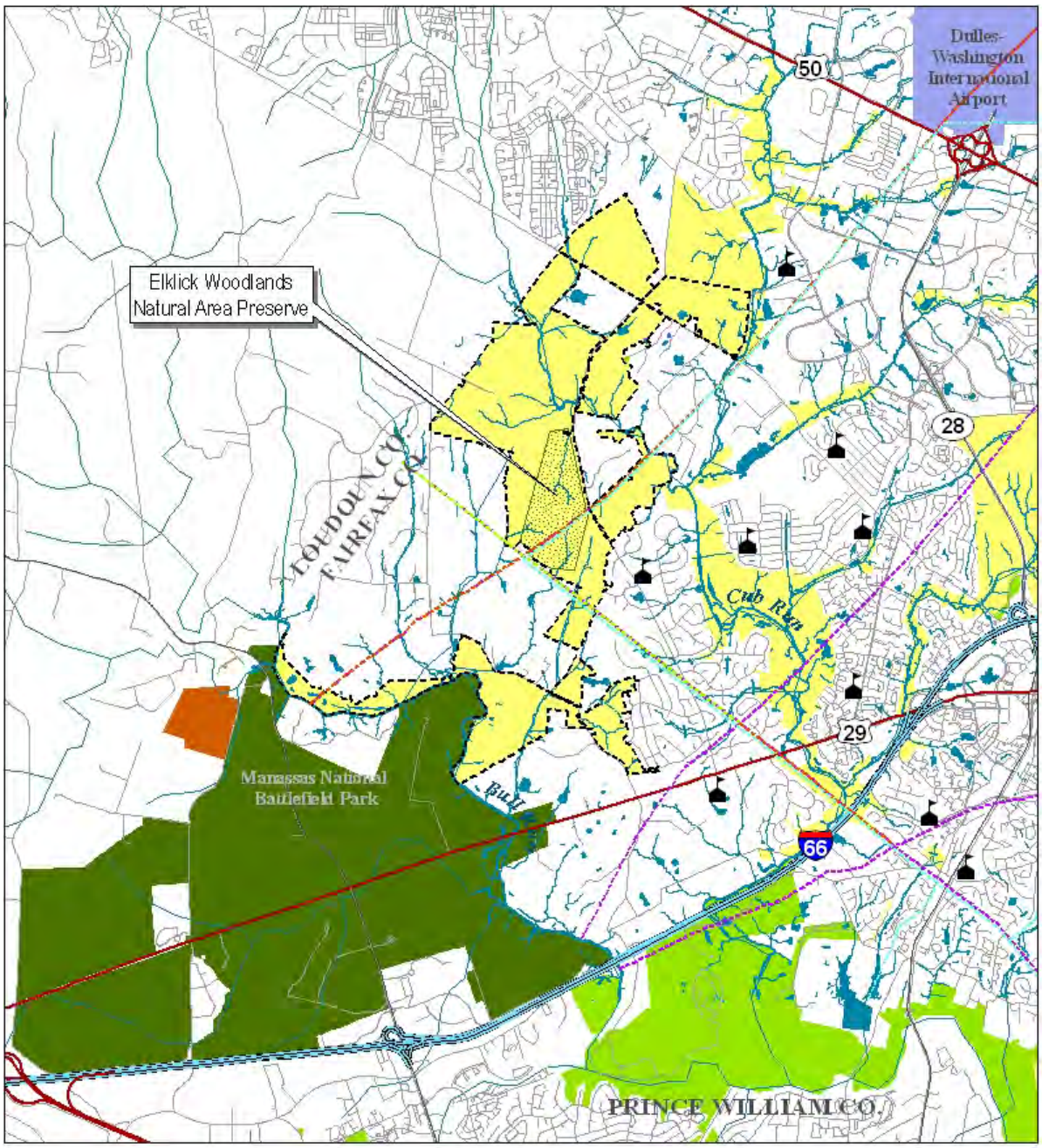
The purpose of the Natural Resource Management Plan (NRMP) for Elklick Woodlands Natural Area Preserve (referred to throughout the document as "Elklick Woodlands") is to identify specific actions to maintain and improve its environmental health. The Park Authority develops Natural Resource Management Plans to provide the tools needed to help agency staff, partners, stakeholders and residents identify, educate, protect, manage and monitor resources on parklands.

This NRMP sets forth the process to determine what natural features/resources are on a given site; determine their condition, threats and needs; identify specific actions to address those needs, identify funding and resource requirements to take action; and determine how to adapt and grow with the changing pressures. The NRMP for Elklick Woodlands Natural Area Preserve goes beyond this basic understanding of resources, their needs, and their threats and includes options for compatible human activities consistent with preserving the natural heritage resources and conservation efforts. This NRMP for Elklick Woodlands also meets the Virginia Natural Area Preserve Management Guidelines (Appendix 2).

Elklick Woodlands Natural Area Preserve is part of the Park Authority's Elklick Preserve which is part of the Sully Woodlands assemblage. A regional-scaled master plan (Sully Woodlands Regional Master Plan) was approved in 2006, encompassing over 4,000 acres of parkland in the Cub Run and Bull Run Watersheds. The regional-scaled plan developed a regional framework to assess development in the watersheds and guide the planning and development of the approximately 2,150 acres of recently acquired parkland and 2,250 acres of existing parkland.

From a regional perspective, Elklick Woodlands is at the heart of a greenway hub that includes other forested and natural area land owned by Fairfax County Park Authority and Manassas Battlefield National Park, as well as privately-owned forested and farmed land. These large natural areas promote genetic viability and biodiversity, performing ecological functions, such as nutrient cycling, pollination, serving as a food source, groundwater recharge, soil production and fertility, and providing habitat for species that have large ranges, need interior forest, or have low dispersal ability.

Privately held land that is forested or farmed and is adjacent to or connected at a landscape scale to Elklick Woodlands is a conservation interest to the health of Elklick Woodlands. Strategies for expanding preserved land around Elklick Woodlands are needed to help keep this natural community functioning and stable.



Regional Context Map
June 2009

Elklick Woodlands Natural Area Preserve

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LEGEND
- Sully Woodlands Assemblage
- Elklick Woodlands Natural Area Preserve
- FCPA Park Land
- Non-FCPA Public Park Land
- Manassas National Battlefield Park
- School
- Virginia Outdoors Federation Easement
- Washington-Dulles International Airport
- Columbia Gas Line
- Dominion Gas Line
- Virginia Power Transmission Line
- Other Gas Line

0 0.5 1 2 Miles

N

Figure 1: Location Map

Figure 2: Elklick Woodlands Natural Area Preserve, Photograph by Gary Fleming

Figure 3: Examples of Species Typically Found in the Northern Hardpan Basic Oak-Hickory Forest; Photographs by Gary Fleming

Natural Heritage Resources

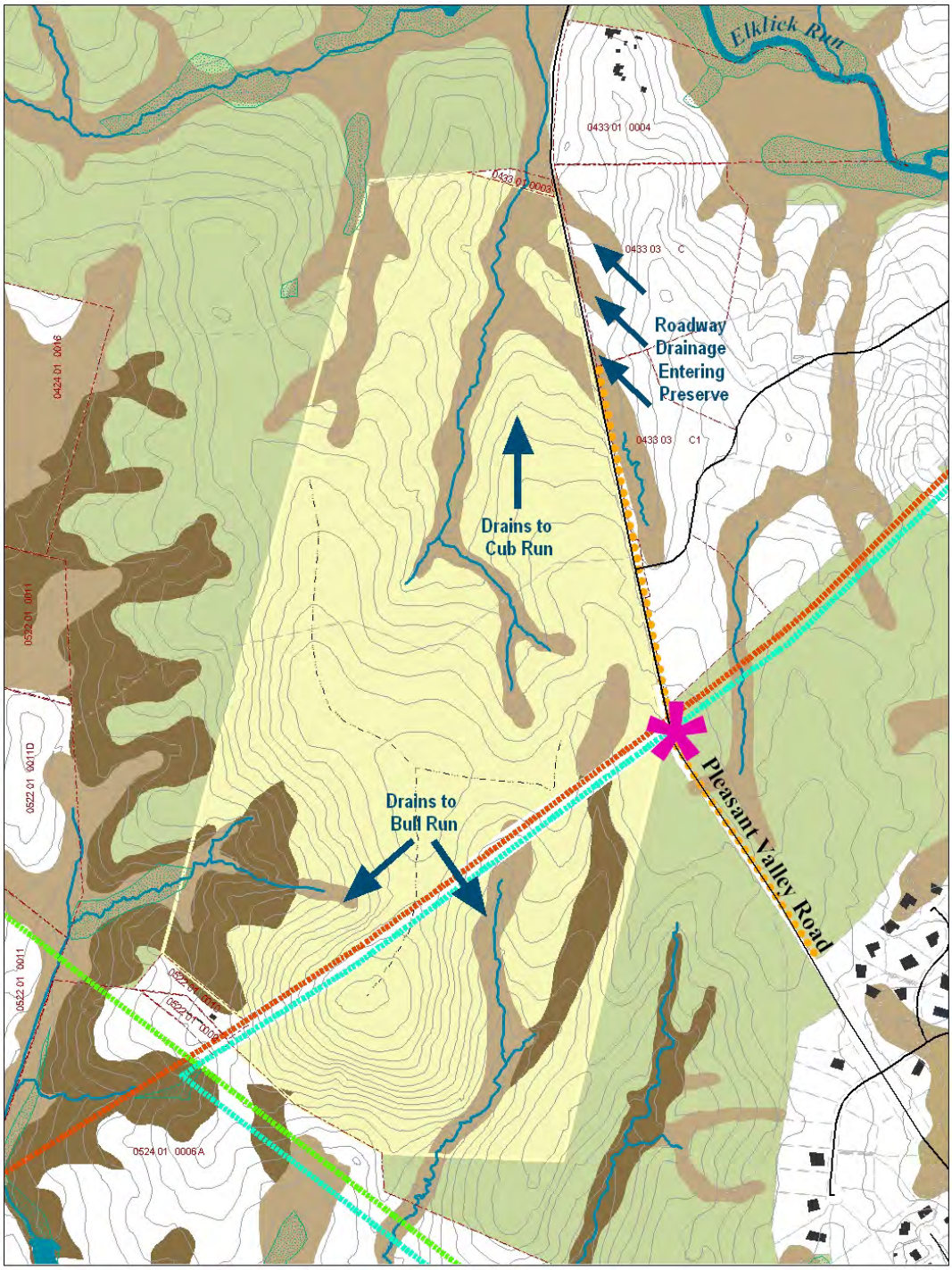
The 226-acre woodland park known as Elklick Woodlands is named for Elklick Run, which flows near the east boundary of the park. The woodlands are a prime example of an uncommon forest type called the northern hardpan basic oak-hickory forest.

The trees in this mature forest community of mixed hardwoods are often broad-crowned but stunted in height, at only 30 to 50 feet tall rather than a more typical 50 to 70 feet. The canopy closure of the overstory trees is fairly open allowing more light penetration to the forest floor than is typical. More light, in turn, allows for a savannah-type forest floor where grass communities can occur. This is quite atypical throughout the Virginia piedmont.

The Elklick woodlands consist of overstory trees dominated by oak (white, northern red, black, chestnut and post), hickory (pignut, mockernut, shagbark and red), white ash and, to a lesser extent, tulip poplar, eastern red cedar and Virginia pine, occurring especially on more disturbed or younger portions of the forested tract.

Typical understory trees and shrubs include redbud, ironwood, flowering dogwood and hawthorn. This forest has very high species richness, particularly in the groundcover layer. It is one of the most species-rich forests among all classified upland natural communities in Virginia. The indigenous herbaceous flora of the northern hardpan basic oak-hickory forest contains a great diversity of dry and dry-mesic species adapted to the magnesium-rich soils. The groundcover layer of the forest contains distinct and discrete monotypic aggregates of grass species including cliff muhly grass, bottlebrush grass, panic grass and poverty oat grass. Through the course of the growing season and especially during the spring, numerous species of ephemeral wildflowers and other flowering herbs have been documented.

The site soils are shallow with numerous rock outcroppings and are less acidic than is typical for Northern Virginia. They have a high red clay content that is texturally plastic in nature, and they have a high shrink-swell potential, which means that they can go from extremes of being very wet to droughty dry.



Site Map: Existing Conditions
June 2009

Elklick Woodlands Natural Area Preserve

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LEGEND
- Elklick Woodlands Natural Area Preserve
- Sully Woodlands Assemblage
- Contour Line
- Private Parcel
- Ridgeline
- Hydric Soils
- Areas with High Groundwater Tables
- Waterbodies and streams
- National Wetlands Inventory
- Existing Asphalt Trail
- Columbia Gas Line
- Dominion Gas Line
- Virginia Power Transmission Line
- Point of Entry to Preserve

GIS Data Sources: Fairfax County, VA; VA Dept. of Conservation & Recreation

0 250 500 1,000 1,500 Feet

Figure 4: Topography, Hydrology, and Soils

The shallow, difficult soils, closeness to bedrock, and numerous surface rock outcrops are primary reasons why these lands were rarely considered for timber harvesting and not suitable for agricultural clearing.

Rare, Threatened and Endangered Species

The combination of aforementioned factors makes for a rare forest community type that harbors a significant and fragile diversity of flora. It is quite rare to find such a broad range of wildflower forb and grass species, particularly with dozens of these species being considered uncommon, rare, threatened and/or endangered in Virginia. The primary significance of Elklick Woodlands, and the reason for its preservation and stewardship, is the entire plant community associated with the northern hardpan basic oak-hickory forest type. In addition to Elklick Woodlands itself, the northern hardpan basic oak-hickory forest type extends to a few nearby areas.

According to the Virginia Division of Natural Heritage, there is one global-ranked and two state-ranked rare plant species that are known to occur within a one-mile radius of Elklick Woodlands. These species are not listed in this document to protect them from collectors and inadvertent trampling. Additional species that are uncommon to Virginia or Fairfax County are also known to occur in the vicinity of Elklick Woodlands

Great care must be taken in managing the site and in provding access to ensure that the plant community continues to support the rare, threatened and endangered species that might be found there, as well as the health of the overall plant community.

Data Gaps and Research Needs

The natural resource management plan is based on existing and available data. An initial natural resource inventory and forest stand delineation was prepared by Environmental Systems Analysis, Inc. (2002) for the Park Authority to evaluate existing natural features and characterize existing forest cover on a parcel of land known as the Hunter-Hacor Assemblage. The report identified the now preserved portions of the Sully Woodlands complex in the southern half of the Hunter-Hacor Assemblage as providing the right conditions for rare natural communities such as the Basic Oak-Hickory Forest. The resulting dedication of the Elklick Woodlands Natural Area Preserve was facilitated by the efforts of the Virginia Department of Conservation and Recreation, the Northern Virginia Conservation Trust and the Fairfax County Park Authority. A conservation easement was placed on the property by the NVCT, and the Fairfax County Park Authority accepted the property and is responsible for its stewardship according to the stipulations of the conservation easement (Appendix 1) and the guidelines provided by the VDCR Natural Heritage Program (Appendix 2).

Research and monitoring needs for comprehensive and successful management of Elklick Woodlands will include tracking qualitative and quantitative changes in the existing plant community, forest structure and composition. Areas of particular interest for this site includes

- Inventorying the groundcover layer, especially ephemeral wildflowers and tree seedlings, to better understand what exists on site and how much damage deer have had on herbaceous vegetation and seedling recruitment
- Monitoring the size of invasive plant species populations and deer populations in order to develop and assess nuisance species control programs
- Conducting additional on-going surveys of birds (including Forest Interior Dwelling Species, or FIDS), Lepidoptera (butterflies and moths), small mammals, reptiles, amphibians and arthropods to help to better understand this preserve
- Though Virginia DCR collected data at Elklick Woodlands for natural community mapping, performing additional vegetation analysis is of interest
- Conducting natural resource assessments to more completely understand the preserve and this unique natural community which would include determining species composition and richness; tree height, width,

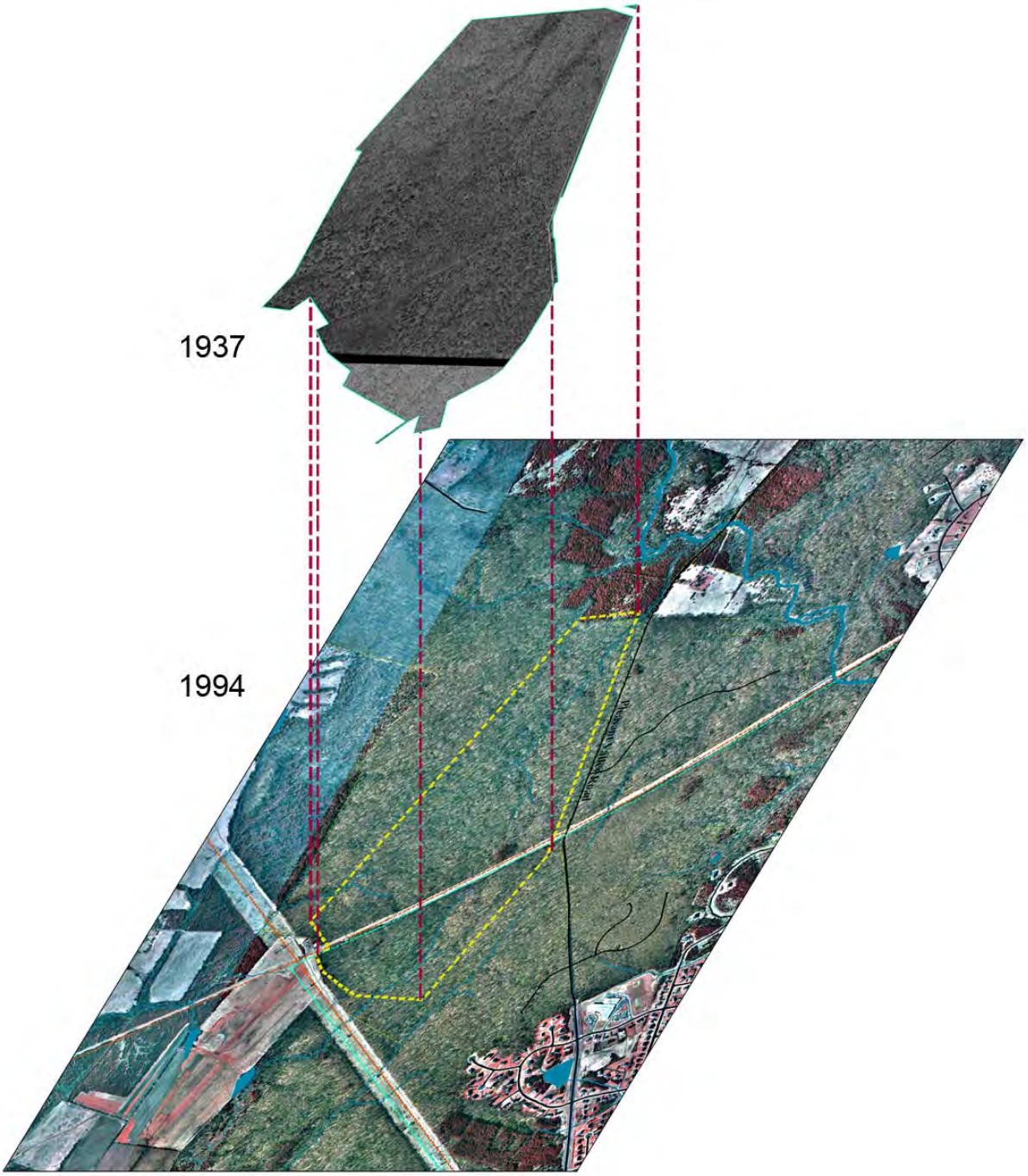


Figure 5: 1937 Aerial Photograph and 1994 Aerial Photograph

and age; light gap size and frequency; downed woody debris and snag size and frequency; structure and strata development; forest and wetland functions and values; and soil characteristics to better understand diabase soils and their influence on the natural community, such as pH, horizon development, textural analysis, chemical properties.

- Understanding the land use history of the site to help create a more complete picture of this preserve.

The natural resources management plan for the Elklick Woodlands identifies the types of changes that are likely to occur within and around its boundaries and establishes a set of actions and priorities to assist the Park Authority in their efforts to steward and maintain the integrity of its natural heritage resources. These additional research efforts will allow the Park Authority to proactively manage Elklick Woodlands, protecting and enhancing forest, wildlife and water resources as part of its stewardship responsibilities.

Management Concerns

An initial set of management concerns was identified by the project team (Park Authority Operations Division Area Manager and Park Authority Natural Resources Management and Protection Section Manager and Staff) including a site visit and a follow-up meeting with additional Park Authority staff and agency stakeholders, including Virginia Department of Conservation and Recreation, Northern Virginia Conservation Trust, Dominion Resources, and VDOT (by telephone and email). Environmental Systems Analysis, Inc. (ESA) staff that had initially inventoried the site in 2002 also identified concerns based on the perceived changes during the intervening seven years. These concerns are typical of Fairfax County and other urban counties and throughout the mid-Atlantic region. The following management concerns were identified:

Boundary Identification – Appropriate boundary identification is needed for the 226-acre Natural Area Preserve with signage focusing on the areas where encroachments are most likely to occur (near ATV users, for example) and with less frequent signage in other areas (e.g. boundary with adjacent parkland). Elklick Woodlands boundary is internal to Park Authority lands in the Elklick Preserve, which is part of the Sully Woodlands assemblage. Boundaries should be field-located, mapped and monumented. In addition, consideration should be given to marking all corners with permanent monumentation, followed by on-line witness posts (i.e. Carsonite markers) positioned as necessary and/or at regular distance intervals.

Boundary and other related access issues are discussed starting on page 32.

Perimeter "Edge" Management – The concept of perimeter management needs to include such issues as illegal vegetative dumping, property encroachment, and social trails (e.g. ATV, equestrian, pedestrian, mountain bike, dirt bike).

Perimeter management strategies are discussed throughout each management objective.

Hydrology – Elklick Woodlands has a series of originating headwaters with catchment areas confined to the parklands and not subject to land alteration clearing or land development. The soils in these areas appear as vulnerable/highly erodible. In addition, the originating headwaters within concave topography – primarily percolation bulbs, ephemeral and/or riverine intermittent splay channels – are subject to gully erosion.
…
Also contributing to the hydrology of Elklick Woodlands, a small amount of surface water flows from adjacent roadways into the site. (See Figure 4.)

Hydrology and water resource management strategies are discussed starting on page 25.

Invasive species management – There is an urgent need to address all species known to be problematic. Determinations must be made including how they get there and what the range of options is for management given varying degrees of intervention and budget.

Figure 6: Photograph Showing Effect of Deer Browse (Browse Line in Background) and Microstegium (Foreground)

Microstegium vimineum – Japanese stilt grass, more commonly referred to as *Microstegium*, is a highly invasive plant that readily invades disturbed shaded areas such as floodplains that are prone to natural scouring and other soil-disturbing situations including white-tailed deer traffic. Numerous aggregates of *Microstegium* were observed during our field review with the plant representing a major threat to the native understory grass communities for the preservation/conservation of which the park has been dedicated.

Emerald Ash Borer – Emerald ash borer (EAB), *Agrilus planipennis Fairmaire*, is an exotic beetle whose larvae (the immature stage) feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. EAB may become an issue as Fairfax County is a quarantine area. Ash Borer could significantly alter the composition and canopy of the natural area if infestation advances.

Other Non-Native Plant Invaders – additional species can degrade the natural habitat qualities of Elklick Woodlands and should be monitored. These include Japanese barberry (*Berberis thunbergii*), Oriental bittersweet (*Celastrus orbiculatus*), tree-of-heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), garlic mustard (*Alliaria petiolata*), Japanese honeysuckle (*Lonicera japonica*), and Canada bluegrass (*Poa compressa*).

Invasive plant species management strategies are discussed starting on page 13.

Access to the site – The existing informal parking access/gate at the ROW is outside the official preserve and therefore a small parking area is possible. On the east side of Pleasant Valley Road, however, parking would be a challenge due to buffer requirements for planting which could be in conflict with planting in the power easement.

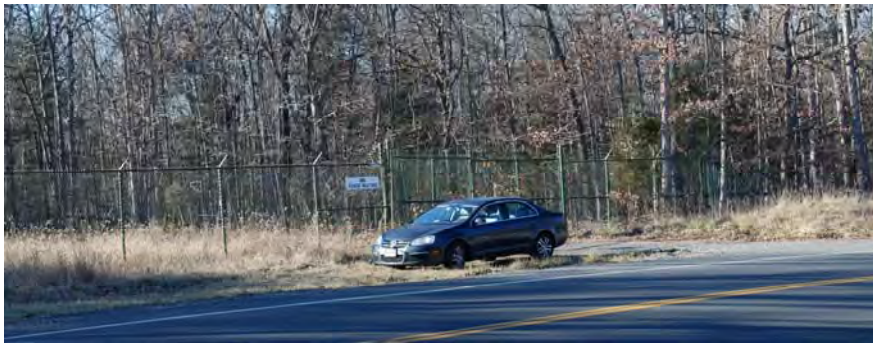


Figure 7: Photograph of Existing Access Point at Dominion Right-of-Way (room for one vehicle)

Internal trail system – Criteria are needed to determine the suitability of areas for low impact (natural surface) trails including protection of fragile or sensitive areas, soil conditions, and the ability to limit inappropriate use types (e.g. ATV, horse, mountain bike, etc.). The range of options may consider the preserve as a completely trail-less natural area or one with interpretive loops internal to the preserve. The system would then evolve from the criteria and may include small internal loops back to a primary external trail system at the perimeter, if feasible according to the criteria. The utility corridor offers the best opportunity to provide access to the site as a modest trail system. *Criteria are discussed starting on page 31.*

Use limitations – Criteria also need to address potential limitations on various types of use in general (e.g. ATV, horse, mountain bike, dogs, seasonal limitations, etc.). *Use limitations are discussed starting on page 28.*

General resource needs – Issues to be addressed include forest management (leave fallen timber in place), high incidence of ticks and likely tick-borne Lyme disease, opportunities to improve landscape linkages at a regional scale (to Bull Run corridor), and the role that this site plays for large forest interior habitat, old-growth characteristics, and probable likelihood for significant arthropods (insects, butterflies, spiders, crustaceans).

Figure 8: Photograph Showing Effect of ATV Use at Elklick Preserve

Research and monitoring needs – The management plan is assumed to be a framework within which decisions can be made with varying degrees of information and data. New sources of data may be required to further inform decision making and to assess changes in and/or success of management efforts over time, such as additional data on age composition, forest interior bird counts, etc.

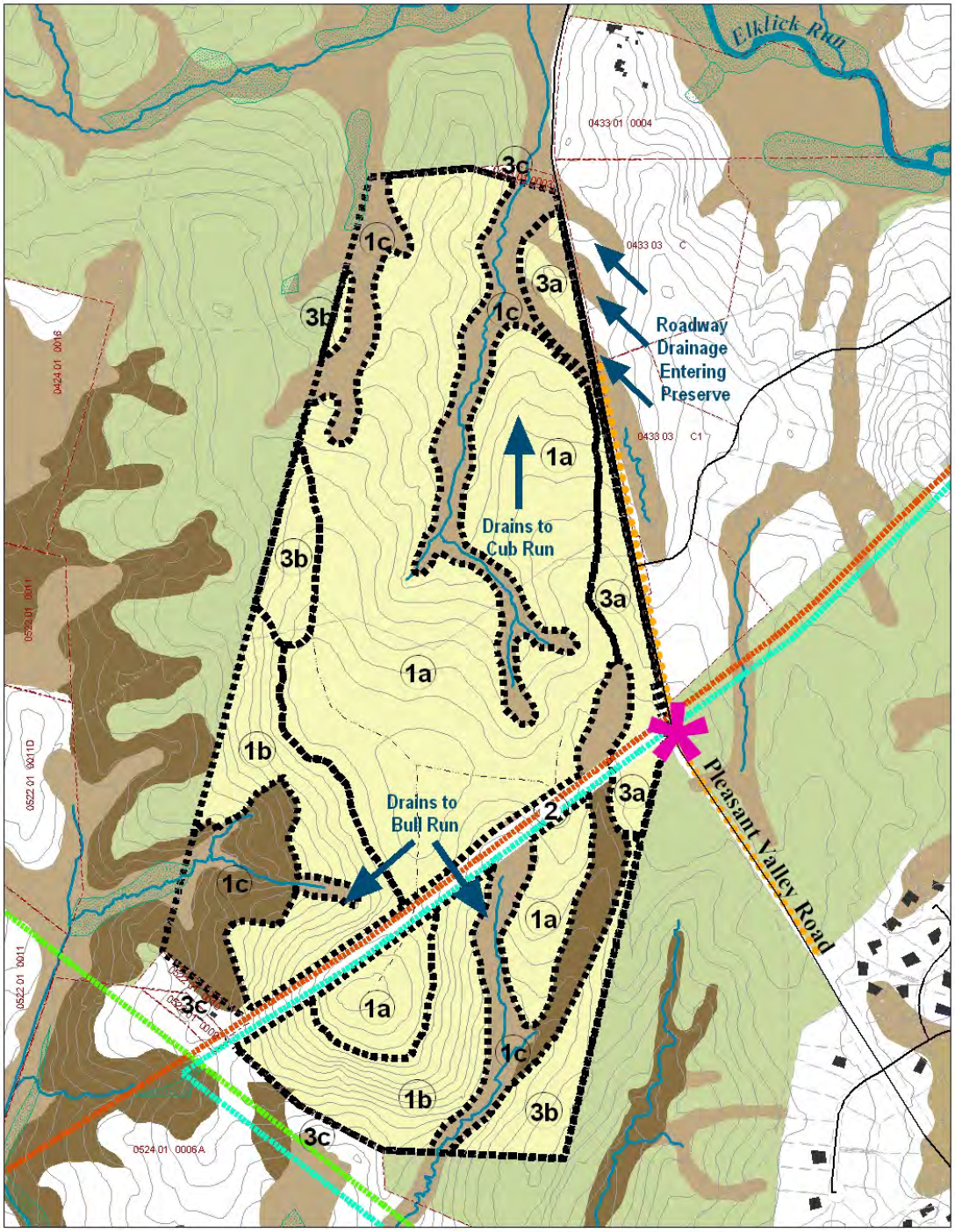
Land Conservation and Protection Needs

The site conditions noted above provide a basic structure and organization for addressing a range of issues facing Elklick Woodlands. There is also a need to address issues that might apply to the core area of Elklick Woodlands and the external influences associated with adjoining land use.

Management Units

Management Units have been identified within Elklick Woodlands to facilitate the discussion of management objectives and land protection measures as they apply to specific areas. These areas are referred to throughout the text. Management units include

1) Core Area of Elklick Woodlands
   a) Upland – includes the convex-shaped areas
   b) Transitional side slopes – steeper side slopes associated with the upland
   c) Lowland swales and watercourses – includes the concave-shaped landforms that are seasonally wet or intermittent watercourses forming first order tributaries
2) Utility Corridor – bisecting the upland and some lowland swales and watercourses (although technically this is not covered by the conservation easement)
3) Perimeter/Edge Areas
   a) Edge areas adjacent to Pleasant Valley Road
      - northern section where waters run from the road surface into Elklick Woodlands
      - central section where waters do not run from the road surface into Elklick Woodlands
      - entrance area at intersection of utility corridor
   b) Edge areas adjacent to Park Authority property
   c) Edge areas adjacent to private property



Site Map: Management Areas

June 2009

Elklick Woodlands Natural Area Preserve

Lardner/Klein Landscape Architects, P.C.
in association with Environmental Systems Analysis, Inc.

GIS Data Sources: Fairfax County, VA; VA Dept. of Conservation & Recreation

0 250 500 1,000 1,500 Feet

LEGEND

- Elklick Woodlands Natural Area Preserve
- Sully Woodlands Assemblage
- Contour Line
- Management Area Boundary
- Private Parcel
- Ridgeline
- Hydric Soils
- Areas with High Groundwater Tables
- Waterbodies and streams
- National Wetlands Inventory
- Existing Asphalt Trail
- Columbia Gas Line
- Dominion Gas Line
- Virginia Power Transmission Line
- Point of Entry to Preserve

Management Areas

1) Core Area of the Preserve
   a) Upland – includes the convex-shaped areas
   b) Transitional side slopes – steeper side slopes associated with the upland
   c) Lowland swales and watercourses – includes the concave-shaped landforms that are seasonally wet or intermittent watercourses forming first order tributaries
2) Utility Corridor – bisecting the upland and some lowland swales and watercourses
3) Perimeter/Edge Areas
   a) Edge areas adjacent to Pleasant Valley Road
      - northern section where waters run from the road surface into the preserve
      - central section where waters do not run from the road surface into the preserve
      - entrance area at intersection of utility corridor
   b) Edge areas adjacent to FCPA property
   c) Edge areas adjacent to private property

Figure 9: Management Units

Statement of Overall Goal for Management:

The goal of the Natural Resource Management Plan is to define the necessary objectives and actions for the continuing stewardship of one of the best remaining examples of a globally rare natural community known as a northern hardpan basic oak-hickory forest. The overall goal for management is to promote naturally regenerating communities capable of providing ecosystem services.

Preserved forests may not provide timber for sale, but they do provide ecosystem services such as cycling nutrients as in carbon sequestration (which helps decrease carbon dioxide in the atmosphere and moderates global warming), moderating local and regional climate through shade and releasing water back into the atmosphere, providing habitat for wildlife, infiltrating groundwater (which can then be tapped for drinking water), slowing surface water runoff, protecting soil from eroding and producing topsoil. Five management objectives have been identified along with specific actions that are recommended to achieve each objective. Each management objective is organized to include the following:

- a statement about the potential changes that are likely to occur that might influence the Park Authority's ability to achieve that objective
- a list of specific strategies that are recommended for achieving each objective
- a brief description of any relationships to other strategies that need to be considered when making management decisions
- references to other similar types of management efforts being undertaken by others

Management Objective 1: Biological Resources

Adopt the necessary biological resource management techniques suited for an urbanizing region to maintain the ecological structure and function of the northern hardpan basic oak-hickory forest.

There are a number of threats to the integrity of the biological resources within Elklick Woodlands. The existing mature woodlands within Elklick Woodlands may be at a dynamic equilibrium state, but human-influenced pressures and disturbances are causing instability. Maintaining the ecological structure and function of the northern hardpan basic oak-hickory forest that is part of the Elklick Woodlands Preserve may require addressing any or all of the following concerns:

- Invasion by non-native vegetation
- Impacts due to deer population in excess of carrying capacity
- Attack by forest insects and disease
- Protection of rare, threatened and endangered species habitat
- Changes to hydrology
- Surface erosion
- Archaeological and historical resources conservation
- Access and incompatible and inappropriate uses
- Forest succession

The following describes the likely types of management issues that might arise for each of these categories and identifies the steps that could be taken should they arise in Elklick Woodlands.

Invasive Plant Species

This site is preserved because of the native plant population. Non-native invasive species threaten native plants; therefore controlling invasive plants is a primary management concern. Invasive plants can spread over large areas of the landscape and can impact all layers of the forest structure, including groundcover, understory, and canopy species. The spread of invasive plants reduces plant and wildlife diversity and abundance. Control of these plants is necessary to protect the native vegetation and wildlife in Elklick Woodlands.

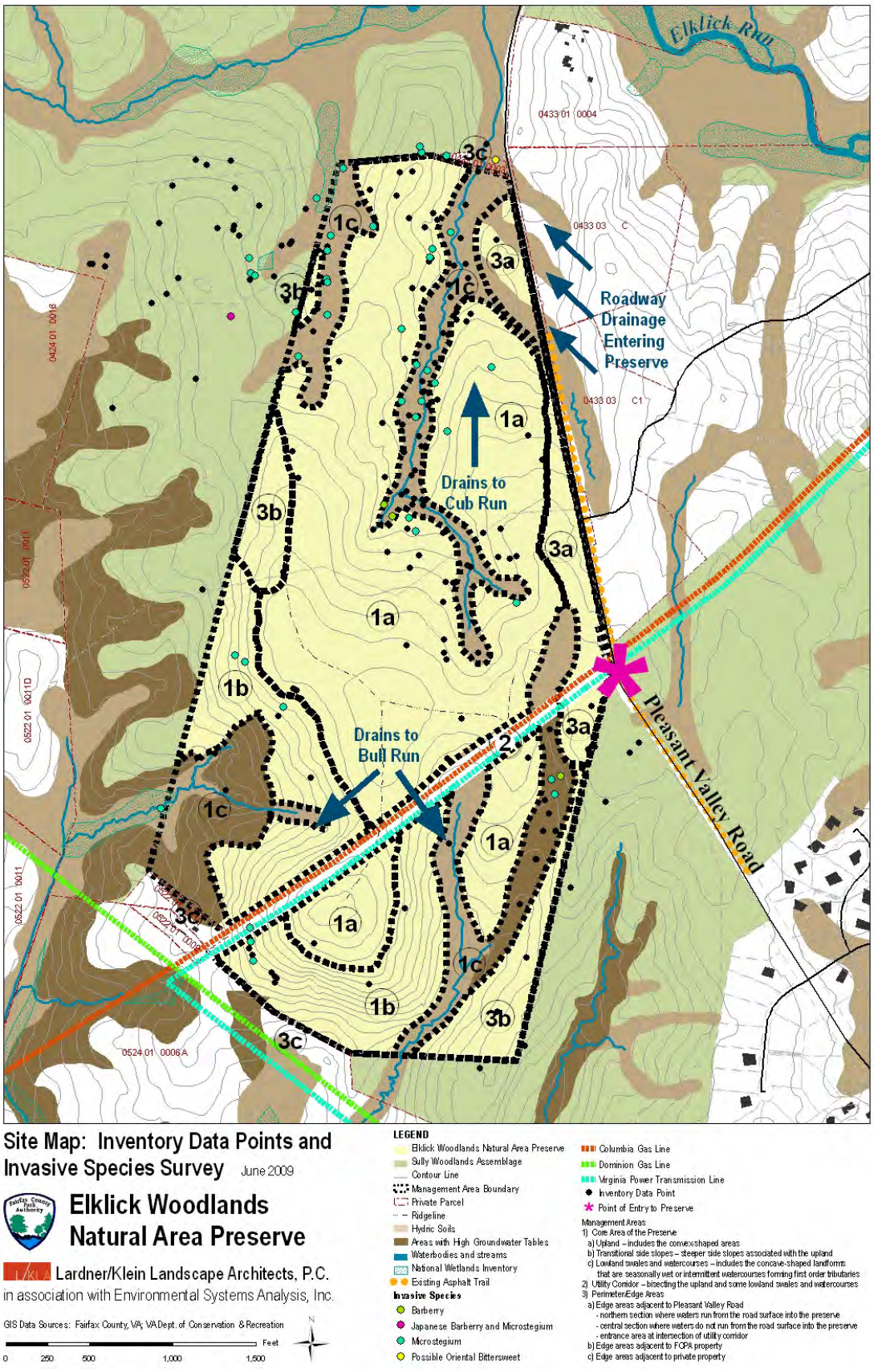


Figure 10: Existing Invasive Species Management Areas

An invasive species survey that included marking the locations of invasive species with GPS has already occurred at Elklick Woodlands (Figure 10). Japanese stilt grass (*Microstegium vimenium*) and Japanese barberry (*Berberis thunbergii*) are known to occur, and Oriental bittersweet (*Celastrus orbiculatus*) may occur on site. Most of the known non-native invasive plant populations are within Management Unit 1c.

Other invasive species that may threaten the native flora in the future include tree-of-heaven (*Ailanthus altissima)*, multiflora rose (*Rosa multiflora*), garlic mustard (*Alliaria petiolata*), Japanese honeysuckle (*Lonicera japonica),* and Canada bluegrass *(Poa compressa)*. Descriptions of these species and specific management techniques are summarized in Appendix 3.

Management Strategies for Invasive Species

An invasive species management program should be developed for Elklick Woodlands. The program should be consistent with policy of the Park Authority. This program should include the following steps:

1) determine what threshold of an invasive species or environmental condition the Park Authority will tolerate before acting;
2) identify and monitor the spread of invasive plants annually;
3) identify and implement prevention measures; and,
4) evaluate the proper control method both for effectiveness and risk prior to taking any action.

DCR's invasive species management report entitled "Managing Invasive Alien Plants In Natural Areas, Parks, And Small Woodlands" states,

> *Such a plan includes: site goals or management objectives, a list of the invasive plant species identified as interfering with goals or objectives, species life history information, the observed or potential impacts on the site, an assessment of control options, a monitoring plan to measure the effects of management actions, and a detailed budget of projected costs. A written plan is a record of the information used to make management decisions and will guide actions throughout the implementation of the control program. Additional factors to consider while planning management actions are: disruption of natural processes, hazards to human health, effects on non-target organisms, and overall damage to the environment.*

Microstegium was controlled in 2008 and will be controlled in 2009 with pre-emergent treatment of Plateau, 4 oz/acre, in the spring and adult (pre-seed) treatment with Accord, 1.5%, in the summer. *MIcrostegium* seeds remain viable in the soil for up to five years. Therefore, post-emergent treatment should be continued annually through 2012 or preferably, until the population is eradicated. In addition, annual monitoring that includes marking the boundaries of the populations with GPS should be conducted in early summer.

Berberis thunbergii was removed manually. Success of this removal should be evaluated and continued, if deemed necessary and useful.

Generally herbicide treatment is the most effective means of reducing invasive plant species populations. Herbicides can cause harm in ecosystems and must be used prudently. A forest pest control certification is required to apply herbicide in forests. The sighting of *Celastrus scandens* should be confirmed and controlled if found.

In some circumstances, controlled burns can be used to control Japanese honeysuckle, Multiflora rose and Canada bluegrass. However, controlled burns often need permits and there are site and weather restrictions in order to make this technique safer. Manual removal can control small populations of Japanese stilt grass, Japanese barberry, and garlic mustard. Annual mowing or cutting prior to the plant producing seed can control invasive plant populations, though generally this method is not as effective as herbicidal treatment. Often, cutting or burning is combined with herbicidal treatments.

Trails are one known vector of invasive species dispersal because most invasive species thrive on disturbed soils. Therefore, trail alignment should avoid passing through existing invasive species populations and particularly sensitive areas where invasive species could spread off the trail and compete with native species. Japanese stilt grass is known to spread along deer trails. Decreasing the deer population in the surrounding area will help reduce the threat of invasive species out-competing the native plants that are part of this rare natural community.
A few well-trained and very reliable volunteers can be used to monitor the site for invasive species and for manual plant removal. However, the general public cannot be expected to conduct a thorough and accurate survey, nor do they generally do a complete job in removing invasive plants.

Though complete eradication of invasive species is best, it may be difficult and costly to achieve. Therefore, tolerance levels for each invasive species should be established. The following tolerance levels are suggested:

- Less than 1% groundcover of *Microstegium vimineum*
- Less than 5% cover by all non-native species within each strata (groundcover, vine, shrub, understory, canopy) throughout Elklick Woodlands

Manual and very targeted removal techniques, such as using a backpack sprayer or basal application of herbicide, should be used before a tanker truck or wholesale mowing to control invasive species in order to decrease the management activity's negative impact on native plants.

Educating the public on how certain invasive plant species are a threat to Elklick's rare natural community should be part of any invasive species management program. Education can include signs along trails or at the parking area; addressing the threat invasive species pose during interpretive programs at the preserve; and hosting supervised invasive species eradication parties at the preserve.

Forest Insect and Disease Concerns

Forest insect pests can run the gamut from leaf and flower consumers, borers of bark, twigs and shoots, piercing and sucking pests and gall makers. Tree and shrub diseases are even more involved and can cause individual or stand decline or mortality through mildew, mold, spot, blight, scab, canker, anthracnose, knot, patch, rust, root rot, decay and wilt type disease. Damage and decline can also be caused by unknown factors, salt spray, air pollution, pesticides, nutrient deficiencies, girdling, browse, drought, heat, freezing, excess water, hail, sheet ice, wind sheer, microburst, tornados, lightening and vandalism.

Significant insect and disease problems of the past have included American chestnut blight, Dutch elm disease and gypsy moth defoliation. Current low level disease concerns include dogwood and sycamore anthracnose. Some pest issues are fairly innocuous and seasonal such as locust leaf miners that annually skeletonize black locust leaves and fireblight of trees in the apple, cherry and pear families.

The Elklick woodlands consist of overstory trees dominated by oak (white, northern red, black, chestnut and post), hickory (pignut, mockernut, shagbark and red), white ash and, to a lesser extent, tulip poplar, eastern red cedar and Virginia pine, especially occurring on more disturbed or younger portions of the forested tract.

Typical understory trees and shrubs include redbud, ironwood, flowering dogwood and hawthorn. The groundcover layer of the forest contains distinct and discrete monotypic aggregates of grass species including cliff muhly grass, bottlebrush grass, panicgrass and poverty oatgrass. Through the course of the growing season and especially during the spring, numerous species of ephemeral wildflowers and other flowering herbs have been documented.

Fortunately and at present the "*northern hardpan basic oak-hickory forest"* assemblage is known to be fairly resistant to various insect and pest considerations. The most recent threat was from the initial, high mortality waves of gypsy moth defoliation and understory dieback of flowering dogwood through dogwood anthracnose.

The most important looming threat may be the recent documentation of the emerald ash borer found in Newington, the town of Herndon and the Bailey's Crossroads area. White Ash is predominantly found within Management Units 1a, 1b, and 3.

As of December 2008, Fairfax County is now quarantined for emerald ash borer and the USDA Science Advisory Council has recommended that no eradication action be taken in Fairfax County due to the extent of the infestation and the fact that similar eradication attempts in other US States have failed. Since the borer infests both the bottomland green ash and upland white ash and is almost always fatal without intensive preventative treatment, the Fairfax County Urban Forest Management Division is asking that all ash species (*Fraxinus* spp.) no longer be used as planting stock.

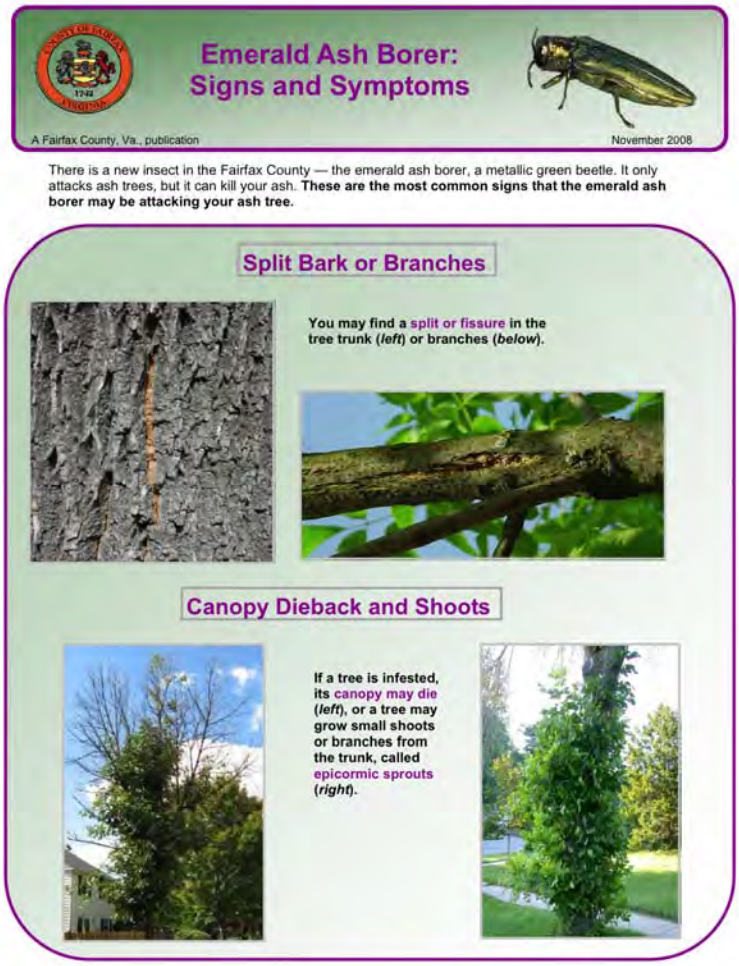


Figure 11: Emerald Ash Borer Signs and Symptoms Brochure

White ash is an important component of the forest at Elklick Woodlands (see DCR's Woody Compositional Summary for the Hunter-Hacor Assemblage Oak-Hickory Forest). Losing the ash trees at Elklick could create unnaturally large or frequent light gaps.

Management Strategies for Forest Insects and Disease

For the purpose of natural resource management operations, it is important to monitor the 226-acre preserve woodlands and other nearby Park Authority parklands for indicators of forest decline or mortality. If any concerns are noted, it is then important to perform the necessary research to determine the insect pest or disease agents that are causing defoliation, dieback and/or death.

In extreme situations stands of dying trees may become vectors to advance multiple disease and insect agents, which then further exacerbate the threat. Management actions should be based on coordinating advice with one or multiple agencies that may include the Fairfax County Department of Public Works and Environmental Services, Fairfax County Urban Forest Management Division, the Virginia Cooperative Extension and upwards to USDA, Animal and Plant Health Inspection Service (APHIS). These multiple agencies track pest and disease threats and provide the resources and recommendations necessary to address observed issues. Defoliation or dieback of approximately 15% should prompt action to identify the cause and develop an Integrated Pest Management (IPM) program.

Based on interagency protocols the Park Authority may be asked to participate in various management actions, typically based in the concept of Integrated Pest Management. IPM utilizes any/all available methods of regulating populations of destructive pests and diseases (i.e. physical, mechanical, and biological). Biological control with parasites, predators, traps, attractants, cultural practices, resistant plants and other non-mechanical strategies may receive major attention. With an IPM approach, the accurate identification of pest problems is consequential in the diagnostic and decision-making process. IPM services that include pest detection, population monitoring and plant protection rather than merely offering spray services would likely become the preferred management strategy/approach.

When substantial defoliation or dieback occurs, unnaturally large or frequent light gaps will most likely occur. These light gaps will need to be monitored for invasive plant species. The high light levels may alter the forest composition, and supplemental planting of endemic plant species may be warranted to maintain the northern hardpan basic oak-hickory forest species composition.

The Park Authority should make Fairfax County's Urban Forest Management Division aware of the significance of Elklick Woodlands and that it has a rare natural plant community that also contains White Ash. The Park Authority should indicate their interest in closely monitoring the EAB research and should any specific actions be warranted, that they be notified immediately by the Urban Forest Management Division.

Deer

Deer evolved under intense predation. The high reproductive capability of present-day herds likely reflects intense predation and hunting in the past. As a consequence, it would seem inaccurate to describe a deer herd in today's environment, with few if any predators and no hunters, as "natural." In fact, active management in the form of population control seems to be a more natural option than the "hands off" approach (MD DNR 2009).

Deer within Elklick Woodlands and the surrounding area are in gross excess of their biological carrying capacity. Currently deer population densities in Elklick Woodlands and the surrounding areas are estimated at 130 deer per square mile.[1] To ensure tree regeneration and desired tree species composition, a density not exceeding 18 deer per square mile is required (Tilghman 1989). The optimal herd density is between 8 and 11 deer per square mile.

Typically, deer use parklands as "safe harbor" and bed down during the day. They then leave the parks at night to feed in the lush residential communities. Additionally, NPS Manassas National Battlefield and Cub Run have woodland movement corridors that tie into Sully Woodlands. Deer establish territory and tend not to leave it. A breeding pair can produce 35 deer in 7 years and live up to 11 years in the wild. A territory population can double in size annually. Earl Hodnett, former Fairfax County Wildlife Biologist, has "ancillary" information that Bull Run Park (Northern Virginia Regional Park Authority) to the south of Elklick Woodlands had a low of 34 deer per square mile and a high of 400 per square mile in 1998, with the park being a high population hot-spot. He has a 1960 photo of dense understory and current photo at same location devoid of vegetation within the browse line.

Deer browse is having an adverse effect on hardwood regeneration and the diversity of groundcover grass, sedge, rush and forbs. The site has a well-defined deer browse line indicating deer have browsed on most vegetation they can reach. Overtime, selective feeding habits and little regeneration can decrease plant

[1] Based on recent culling data and area herd density and oral interviews by Mark Burchick, Environmental Systems Analysis with: Charles Smith, FCPA Resource Manager; Earl Hodnett, former Fairfax County Wildlife Biologist; Scott Bates, NPS/CUE Wildlife Biologist (Manassas); Dr. Jorje Arias, Fairfax Health Department; Emily Yance-Houser, Fairfax Police, Operation Support on February 5, 2009.

diversity. Because there is an unusual assemblage of groundcover plant species in this natural community, the Elklick Woodlands is particularly vulnerable to deer browse.

Deer trails also provide a vector for the establishment and spread of invasive species like Japanese stilt grass (*Microstegium vimineum*) and wavyleaf basketgrass (*Oplismenus hirtellus ssp. undulatifolius*). These plants out compete and will crowd out native gasses, sedges, and forbs.

As deer populations increase so do deer and human parasites like ticks and chiggers. Tick and chigger levels are very high at Elklick Woodlands. Ticks in particular are a detriment to human health, they can harbor Lyme disease, a debilitating infection that is often hard to diagnose. The number of diagnosed Lyme cases reported by the CDC in Virginia jumped from 357 cases in 2006 to 959 cases in 2007.

Management Strategies for Deer

Deer need to be managed on a landscape scale. In addition to Elklick Woodlands, this would include management on nearby Manassas Battlefield National Park, Sully Woodlands, and adjacent privately owned properties. To ensure tree regeneration and desired species composition, a density not exceeding 18 deer per square mile is recommended.

Deer population density should still be monitored annually in order to evaluate deer control programs. The number of deer sightings should be recorded at points along a series of transects. The deer surveyed at each point can be used to calculate the overall estimated deer population at Elklick Woodlands. One technique for monitoring deer population is to use the software *Distance 5.0* (http://www.ruwpa.st-and.ac.uk/distance/) to assist in accurately calculating deer densities. The software utilizes field sampling techniques described in *Introduction to Distance Sampling: Estimating Abundance of Biological Populations b*y Stephen T. Buckland, D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, Len Thomas, Oxford University Press, 2001, ISBN 0198509278, 9780198509271. Scott Bates, Wildlife Biologist for NPS Manassas National Battlefield, has been using these sampling protocols at Manassas since 2003. The recently completed 2008 study determined the deer density is 163 deer per square mile at Manassas. Mr. Bates can introduce a Park Authority, or contractor, wildlife biologist to these sampling protocols.

The Fairfax County Wildlife Biologist conducted managed hunts in Sully Woodlands. The hunts are a lottery, using hunters and police. Buckshot, not slugs, were allowed. The hunts took 107 deer in 2006, 133 deer in 2007 and 160 deer in 2008 for a total of 400 deer over the course of the last three years.

Non-Lethal Deer Management

There are multiple lethal and non-lethal deer control strategies, though non-lethal strategies are not effective in free-ranging deer populations in large landscapes. Non-lethal means of managing deer include deer relocation, supplemental feeding, fencing, repellants, and fertility control. Relocating deer is expensive, requires a release site that can absorb large numbers of relocated deer and survival rates of relocated deer are low. Supplemental feeding could be provided to reduce damage to the unusual groundcover plants at Elklick Woodlands. However, increasing food sources will increase survivability and production, thus compounding problems that already exist. Providing alternative food sources may provide temporary relief from browsing on plants needing protection, but will not provide a long-term solution. Repellents have been used to decrease deer browsing, but they do not eliminate browsing pressure, need to be re-applied often after rain, and need to be changed every few years. An effective deer fence may be an eight foot-tall-barrier or a smaller, electric system. Barrier fences are more costly than electric ones. However, electric fences are inappropriate where high human contact is likely. Regular inspection and maintenance of fences increase their effectiveness. Although these types of non-lethal management techniques can decrease deer damage, they do not decrease the number of deer present.

Fertility control may be applicable only to localized herds with less than 100 females (Rudolph et al. 2000). Only females are treated in fertility control program because of the polygamous breeding behavior of deer. Only a few untreated, fertile males in an urban deer population would be capable of breeding most of the females in that area. Fertility control options include surgical sterilization, oral contraception, subcutaneous hormone implants, Immunocontraception, and contragestation. An overview of these fertility control techniques can be read in Warren (2000). Surgical sterilization, a permanent solution, requires capture of individual deer and application of field surgery, usually by a licensed veterinarian. Both of these requirements increase the cost of this method of fertility control and create concerns over animal stress. Orally administered, synthetic steroids can inhibit ovulation in female deer, but in practice these are not feasible because they require daily oral exposure. Subcutaneous hormone implants have prevented pregnancy in female deer for about 2 years. Synthetic steroid hormones are orally effective, and therefore, have the potential for secondary, nontarget organism effects.

Immunocontraception involves injecting an animal with a vaccine to stimulate its immune system to produce antibodies against a protein (i.e., antigen) involved in reproduction. Immunocontraceptive vaccines can be delivered remotely via syringe-darts; however, multiple booster injections are required. This requirement limits the practicality of using this contraceptive vaccine in free-ranging deer populations. Immunocontraceptives have a number of disadvantages. Currently, there is no commercial source for the vaccine, zona pellucida. Research is needed to determine whether prolonging the breeding season by immunocontraception will increase deer-vehicle collisions. In field application studies, immunocontraception was time-consuming and costly (ranging from $802-$1,100/treated female in the 1990s). There has also been some questions as to whether this suppression leads to deer population decline.

Research on contragestation in white-tailed deer has focused on prostaglandin. When administered during gestation, prostaglandin causes a reduction in blood progesterone concentrations, which induces an abortion. Disadvantages associated with the use of contragestation in deer are that females must be retreated annually, because they become pregnant the following year. In addition, abortion of fawn-like fetuses may be unacceptable in some communities.

Lethal Control Techniques

Lethal control techniques include euthanasia, regulated hunting, and hiring sharpshooters. Because deer establish territories and tend not to leave them, and due to recruitment rates, culling operations can have benefits for up to five-years. Trapping and euthanasia involves capturing deer with box traps, Clover traps, drop nets, or rocket nets and then euthanizing them. This method has proven inefficient and expensive.

Regulated hunting has been proven to be an effective deer population management tool that is cost efficient. The harvest of female deer is critical to population control. Removing a sufficient number of does ensures that the next year's reproduction will be of appropriate magnitude and that the deer population eventually will decline to more ecologically sound numbers. Managed hunts should occur twice during the hunting season and should focus on antlerless deer.

The professional sharpshooters and bow hunters program usually operates from October through March, when it is easiest to bait deer, and works during traditional dawn/dusk peak movement periods or through the night. Operations that cull a minimum of 100 deer typically take from two to ten days with adjacent landowners having no overt indication that the operations are being performed. All animals are removed in covered pick-up trucks and delivered to a meat processing facility.

A private contractor acquires the necessary federal and state crop damage, depredation and discharge permits, develops site-specific culling plans, engages in public meetings as necessary, posts signage, establishes pre-

selected harvest sites with adequate downrange backdrops, pre-baits for days or weeks, and then performs culling operations and carcass removal.

The following options are appropriate for controlling the deer populations at Elklick Woodlands:

1. professional sharpshooters, using suppressed firearms with night-vision optics
2. professional bow hunters, hunting assigned areas on the same day and over bait
3. expanded managed hunting that focuses on does

Based on our review of literature and participation in regional deer management programs, culling operations are found to be the most beneficial option of establishing a deer population that will allow for a sustained and diverse plant community. When the target population density of 18 deer per square mile is reached culling operations can end, but population density should still be monitored annually using Distance 5.0 Wildlife Population Survey Software and Protocols. It should be noted that professional sharpshooting is costly, and obtaining permission to shoot over bait in Virginia, while now allowed again for localities, needs to be clarified for contractors. However, it is possibly the most effective technique to control deer populations.

Fisheries

The streams within Elklick Woodlands are ephemeral (flow only in response to precipitation) or intermittent (flow in response to precipitation and when the groundwater table is high) and therefore, do not support fish. Elklick Woodlands was not purchased or managed for the objective of providing fishing, hunting, or trapping opportunities for the general public. No taking of any living resource is permitted from Elklick Woodlands without a preserve-specific permit.

Rare, Threatened or Endangered Species (RTEs)

…

Management Strategies for Rare, Threatened and Endangered Species

Managing and protecting these rare plants' habitats are the best ways to conserve these plant populations. By protecting the plants' habitat and managing the ecosystem for the habitat's long-term ecological health and function, the rare species can withstand natural fluctuations in population location and size.

Populations should be visited on a frequent basis to assess population size and vigor, reproductive success, habitat quality, and threats. Monitoring the known woodland populations of RTEs should occur annually, but no less than every five years. Monitoring less than annually will make it difficult to do any trend analysis on the size of the population, but will at least confirm that the population still exists. If invasive species spread near the known RTE populations, then more frequent monitoring is recommended. The RTEs that occur within the utility right-of-way should be monitored more frequently because of the active management of the utility corridor.

Managers of utility rights-of-way at Dominion, Charles Hardy (804-771-3708) and Aaron Jonas (804-257-7683) should be educated as to where the known populations exist, how to identify them, why they are worth preserving, and what utility management activities should and should not be conducted near these RTE populations. (See Management Objective #2, page 25.) Mowing is compatible with these RTEs. Spraying herbicide on invasive species can and should be conducted, but the pesticide applicator should be able to identify the rare plants in order to avoid them and should not spray on windy days in order to avoid inadvertent herbicidal drift.

Water Resources

Elklick Woodlands is located at the watershed divide between Cub and Bull Runs. Elklick Woodlands includes headwater channels for Elklick Run and Bull Run that are ephemeral (flows in response to storm events) and intermittent (flows during storm events and when the groundwater table is high). The entire area drains into the Occoquan Reservoir watershed, which is a primary source of drinking water for the population of Northern Virginia. A secondary goal of the Elklick Woodlands Natural Area Preserve is to protect the water quality of the Occoquan Reservoir. (Refer to Figure 9, Management Unit 1c indicating surface hydrology .)

Elklick Woodlands has a series of originating headwaters with catchments areas occurring exclusively within Park Authority landholdings and not subject to recent or future land alteration clearing or land development. These soils appear as vulnerable/highly erodible and are a conduit for the spread of invasive plants that like disturbed soils. Jackland and Haymarket soils, 7 to 15 percent slopes, which are found within Elklick Woodlands, have a severe erosion hazard rating. A severe rating indicates that significant erosion is expected when roads or trails are built on this soil. Roads or trails will require frequent maintenance, and costly erosion-control measures may be needed when built on this soil type. Gully erosion of originating headwaters that are primarily percolation bulbs, ephemeral and/or riverine intermittent channels will need to be monitored. The existing conditions are splay channels without defined bed and bank.
…
. Excessive scour may eliminate its habitat. Action will be necessary if the channels develop defined bed and bank or headcuts. The channels then will be downcutting and no longer stable.

In addition, a smaller portion of surface water flows from Pleasant Valley Road and the utility corridor into the site. Impervious surfaces do not allow precipitation to percolate into the soil and recharge the groundwater; instead the water runs-off impervious land quicker and in larger volumes than off forested land. There is an increase in the volume and rate at which sediment and water are delivered to streams. This causes an increase in the erosive forces on stream banks and beds that dislodge and transport particles and, over time, damage the natural form of streams.

Management Strategies for Water Resources

Some of the channels are scoured due to run-off from Pleasant Valley Road and the gravel road along the utility corridor. Run-off from Pleasant Valley Road and the utility easement should be treated prior to entering the site. Specifically, water quality treatment for sediment and nutrients and a velocity check are needed. Intermittent check dams within grass-lined swales along Pleasant Valley Road and the utility corridor could provide the needed water quality and velocity reduction prior to entering Elklick Woodlands' waterways. Similarly, if splay channels develop defined bed and banks, intermittent check dams within the channels can help stop downcutting and erosion.

Related Strategies

Stormwater management to control run-off volumes and rates from the utility corridor and Pleasant Valley Road will help to re-create natural hydrology. (See page 40 and Appendix 8.)

Wetlands and vernal pools may be present on site. Trails should avoid impacting these resources. (See Figure 3 for locations of hydric soils and page 31 for a discussion of the need to inventory these areas for rare plants.)

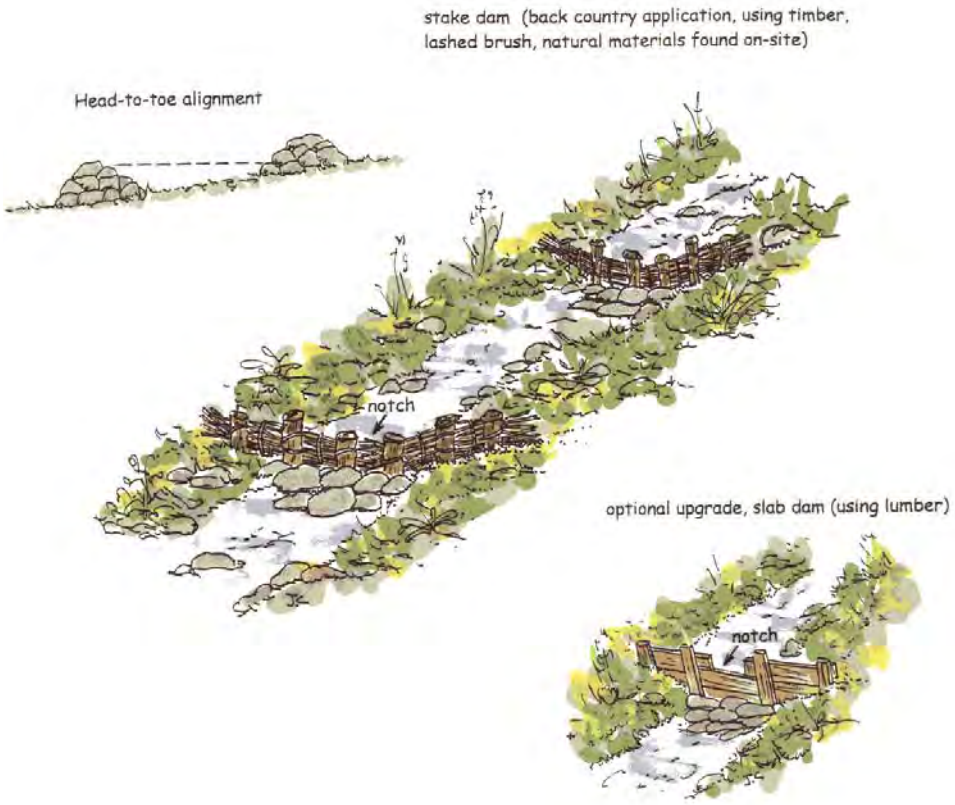


Figure 12. Intermittent Check Dam

Disturbances and Succession

Disturbances and natural succession of the plant communities associated with the northern hardpan basic oak-hickory forest type may require some management intervention depending upon the severity and cause of the disturbance. The plant community appears to be mature woodland, and small-scale perturbations may not require active management. The diabase soils influence the structure and composition of this forest and therefore the species composition and forest structure are not expected to change without outside perturbations. Forest fires or prescribed burns do not appear to be necessary to maintain the species composition or forest structure, though fire may be used as a control mechanism for invasive species.

Management Strategies for Disturbances and Succession

Only large-scale perturbations, such as large area treefall from microbursts or hurricanes that threaten the existence of the endemic natural community will be managed with regards to succession. Small-scale perturbation, from which the forest is expected to rebound with little change in species composition and richness

and community structure, will not be actively managed. However, any disturbance that leads to invasive species spreading will require invasive species control techniques. Similarly, forest insects or diseases that cause substantial damage or death may require silvicultural or other control techniques. Planting or seeding native species may be considered if deemed necessary by the Natural Resources staff of the Park Authority. Criteria used to determine whether supplemental planting or seeding is necessary may include substantial soil disturbance, invasion by non-native species, and large gaps in the canopy (4 or more canopy trees). Dead or dying trees may be removed if they are adjacent to a trail or otherwise threaten human lives, or are determined that they will promote the spread of disease or detrimental insects such as Emerald Ash Borer.

Soil Erosion

The Virginia Department of Conservation and Recreation "Guidelines for Natural Area Preserve Management Plans" includes the following policy statement guiding erosion control and conservation plantings:

> *Control of erosion in natural area preserves that result from human disturbance may be accomplished through conservation plantings or by other means in order to meet natural heritage resource stewardship goals, to protect water quality, and to abate man-induced soil loss arising from previous land surface alterations. Species native to Virginia (and if possible, native to the specific region) will be used for conservation plantings to achieve soil stabilization. Planting non-native and/or invasive alien species is inappropriate on natural area preserves as well as in other natural settings, and such plantings are now widely discouraged for most natural resource conservation projects. In addition, erosion problems on adjacent or nearby lands that impinge on preserve stewardship issues may be addressed in cooperation with DCR's Division of Soil and Water Conservation and the landowner. Erosion mitigation plans will be developed as needed in cooperation with appropriate agencies, parties, and stakeholders.*

Management Strategies for Soil Erosion

The primary need for erosion and sediment control would be associated with the parking facility and trails, all planned for areas outside Elklick Woodlands. If a footpath is constructed inside Elklick Woodlands, that footpath should be planned to minimize land disturbance activities and therefore the need for erosion and sediment control and related conservation planting. Erosion control may also be needed in Management Unit 3b due to runoff from Pleasant Valley Road.

Archeological and Historical Resources

There is a high probability of the presence of significant archeological and historical sites within Elklick Woodlands, though no formal inventory has been conducted. Evaluating Elklick Woodlands for cultural, historical and archeological resources should be a priority, particularly before any formal trail alignment is established. Significant prehistoric and historical archeological sites occur throughout the Sully Woodlands assemblage. According to the Park Authority, "prehistoric sites date back to the Paleo-Indian Period (10,000-8,000 BC) through the Late Woodlands Period (1000-1600 AD). The earliest inhabitants were hunters and gatherers, who migrated in search of resources. In the Woodland Period, with the introduction of horticulture, there were more permanent settlements, the introduction of pottery and the development of more complex political systems" (Park Authority 2004).

Incompatible and Inappropriate Uses

In order to protect occurrences of rare species and specimens, the collection and removal of plant material, animals, minerals (rocks), or artifacts is prohibited. For legitimate research and education purposes, collection of specimens may be approved by Virginia's Department of Natural Heritage (VDNH) and the Park Authority Natural Resource Management staff following submission and review of an application for a natural area preserve Research and Collection permit. Park Authority staff should coordinate all requests with VDNH.

The following uses are considered to be incompatible with the stewardship needs of the Elklick Woodlands Natural Area Preserve and should be prohibited and monitored throughout Elklick Woodlands:

- Camping
- Bicycles
- Horseback riding
- Off-road vehicles
- Unleashed pets
- Forest Harvesting
- Livestock Grazing and Crop Production

Management Strategies for Monitoring Incompatible and Inappropriate Uses

There will be three primary means from which to minimize impacts associated with incompatible and inappropriate uses:

1) Boundary signage and demarcation –signs are already in place at the existing access point at the utility line right-of-way at Pleasant Valley Road. Additional signage is recommended under Management Objectives 3 and 4 in relation to future trail development in areas adjoining Elklick Woodlands, and in any place where evidence of unauthorized access or incompatible uses have been observed, primarily within Management Units 3a and 3b.

2) Fencing – Some fencing is already in place along Pleasant Valley Road. Additional fencing requirements are discussed under Management Objectives 3 and 4 in relation to future trail development in areas adjoining Elklick Woodlands. Fencing may need to be extended along Pleasant Valley Road in cases where unauthorized and inappropriate uses have been observed.

3) Public Information and Education – Access information, rules governing the use of Elklick Woodlands, and contacts for getting more information about visiting Elklick Woodlands are located at the current access point (currently at the utility line right-of-way along Pleasant Valley Road). Information about Elklick Woodlands should be placed on the Fairfax County Park Authority Web site. However, the current structure of the web site does not have a category for "natural area" on their home page drop down menu. Some care needs to be taken to identify this as a Virginia Natural Area Preserve and that special access conditions apply. This could be accomplished with a separate drop down menu.

A minor change in the policy may be useful so that the Virginia Natural Areas Preserve System is referenced

Currently Fairfax County Park Authority provides the following information with regard to uses of its existing Natural Areas:

Organized Activities in Natural Areas on Parkland
Restricted Activities in Natural Areas - Regardless of the size of the group, all organized activities on park land in natural areas which may or will cause people to go off of authorized trails require special written permission by the Park Authority through a Park Use Permit. Authorized trails are those trails maintained by the Park Authority or by another organization under special agreement with the Park Authority. Note: Permission will not be granted if the activity conflicts with park management goals/guidelines.

Activities requiring special permission in natural areas include but are not limited to:
-orienteering
-geocaching, letterboxing or similar activities
-search and rescue training
-adventure training
-laser tag
-programs or classes
-athletic events or physical training
-research or nature study
-parties or weddings
-night-time activities (whether on trail or off trail)
-any group of 25 or more people using a trail

Reasons for restricting activities in natural areas - The Fairfax County Park Authority is required through its policies and mission to protect and preserve natural and cultural resources on park land. Activities which cause people to go off authorized trails in natural areas often disturb soils and cause erosion, can damage archeological sites, damage plants, disrupt wildlife and can introduce invasive species on clothing and equipment. By limiting off-trail activity we can help preserve our natural and cultural resources for future generations. The bench mark for review will be whether the activity will or will not impact any sensitive resources and will or will not have any lasting impact.

Activities prohibited on park land
It should be noted that there are activities that are prohibited on park land and will not be approved under the special permit process. Most prohibited activities are legal violations that could result in fines and other penalties. Such activities include but are not limited to:
-hunting or trapping
-gathering of wild foods or plants
-metal detecting
-gold panning
-cutting firewood
-paint ball (note that paint ball guns, pellet and BB guns are prohibited on park land by county ordinance)
-archery
-disturbance of vegetation or animals
-removal of vegetation, animals or natural materials
-digging of any kind
-release or planting of any organism (animals, plants, etc.) in a park
For more information, you may also view the Park Authority

as having additional regulations. (See list of prohibited uses noted above.) None of the uses requiring special permits are appropriate for the Elklick Woodlands Natural Area Preserve. Rather than listing this as a "park" on the Park Authority website, it may be helpful to simply provide a link the Virginia Natural Areas Preserve website with its own site description. This will help the Area Manager enforce the rules and inform residents that the site is part of the Virginia statewide system of natural area preserves, rather than a Fairfax County natural area.

Additional interpretive programming could take place in the greater Sully Woodlands complex, and that interpretation could be off site in the area to the north and west of Elklick Woodlands that has a similar plant community but was not identified as part of the natural area Preserve. This interpretation could also include information about the special qualities and characteristics of the plant community and efforts that have taken place and that are underway to preserve the plant community.

Management Objective 2: Utility Corridor

Work with the holders of the existing utility easement to develop and ensure consistent application of maintenance regimes that minimize adverse impacts to Elklick Woodlands.

Potential Changes to the Utility Corridors

The access road crosses two areas where wet conditions persist thereby resulting in ruts and erosion. There is interest in using the utility corridors for trails as shown in the Countywide Trails Plan. A concurrent Park Authority trail planning effort is underway in the Sully District.

Figure 13: Photograph Illustrating Existing Maintenance Regime for Utility Corridor

Mowing will be the constant with regard to vegetation management in the corridor, with more frequent cycles for the gas transmission line than the electric. (See Appendix 5 for existing maintenance standards.) The mowing frequencies as currently practiced appear to work to minimize the spread of invasive species, as well as diversify the habitat for Elklick Woodlands.

Management Strategies for the Utility Corridors

The following strategies are recommended in order to maintain this easement corridor as a high-quality meadow managed for the benefit of native species while minimizing the presence of invasive species (especially those that could invade into the surrounding woods of the Natural Area Preserve). Strategies to achieve this objective include

1. Establish open line of communication with Dominion land managers to establish areas of common interest and to coordinate, plan and monitor land management practices on the right-of-ways to benefit both Elklick Woodlands and the right-of-way.
2. Determining the feasibility of adjusting management practices to increase diversity within the larger area of Elklick Woodlands and surroundings. Discussions should include
   - adoption of edge effect management prescriptions to diversify meadow habitat
   - adoption of low-deer food quality management prescriptions
   - adoption of wetland management prescriptions

- discussion of application of selective herbicides using integrated vegetation management to promote habitat diversity
- joint use of the access road for public access to Elklick Woodlands and for parking

3. Following up with regular meetings to coordinate management prescriptions (annually at a minimum, perhaps in late fall, in advance of hunting season)
   - coordinate data on presence of invasive species and management prescriptions
   - coordinate dates and times for managed deer hunts
   - coordinate implementation of habitat improvement projects and research needs
   - coordinate access issues (unauthorized and authorized)

Currently, the utility easement includes a narrow gravel access road and accommodates a high-voltage electric transmission line and a natural gas transmission line. There are two substations located at the western end of the utility easements.

Overall, there is a quality meadow dominated by native warm season grasses that may or may not have been planted. The meadows harbor a good diversity of plants with at least one known state rare species. Little is known about the plants and wildlife in the easement, and future efforts should be directed to asses and manage the health of those native organisms and the communities that support them as well as improve the transition between the meadow and forest.

There is currently no special management plan in place to address issues associated with the Elklick Woodlands. The maintenance prescriptions were filed as part of their federal license to construct and operate the electric and gas transmission lines. (See Appendix 5).

Management Strategies for Habitat Diversity

Managing large-scale utility transmission corridors for habitat diversity provides a valuable contrast to the wildlife habitat of surrounding forests (old-field meadows and thickets create an early successional habitat).

According to the US Fish and Wildlife Service (USFWS), the resulting meadow habitat has value for ungulate and other grazing species, some small mammals, and small mammal predators. Meadow habitat has value for grassland breeding birds in a large enough block (i.e. greater than ten hectares and not overly linear in shape).

However, the hard edge effect of the abrupt transition from mowed meadow habitat to forest canopy is sometimes associated with reduced wildlife diversity and could increase habitat fragmentation impacts. Invasive and exotic species can establish easily in meadows and various saplings can easily establish as well, potentially interfering with power lines and pipelines (although neither has happened to date with the current frequency of mowing).

Soft or “feathered” edges can be used to provide a transition from forested habitat to the meadow area and may lessen the impact of fragmentation. This is sometimes referred to as the “U effect”, with a medium height feathered edge transitioning to the grasses associated with the clear area required for the utility lines. Figure 14 illustrates how this could be accomplished within the utility right-of-way. Note that the existing trees would be preserved.

Amy Meehan and Carola Haas, in their article *Use of a Powerline Corridor by Breeding and Wintering Birds in Giles County Virginia*, stated that although they had found few birds nesting in the powerline corridor they studied, they did observe “much more bird use in the areas that had once been skid trails for construction and had now grown over to shrub cover,” indicating that “the creation of a stable shrubland within the right-of-way would provide food and nesting cover for songbirds, and make the right-of-way a higher quality habitat for shrubland birds.”

Richard Yahner, Professor of Wildlife Conservation at Penn State University has conducted multiple studies since 1987on a State Wildlife area with a utility transmission line including two bird nesting studies, a small mammal study, an amphibian study, and a butterfly study that have demonstrated the habitat diversity benefits of managing utility line corridors as early successional habitat.

Yahner's preferred method for management involves establishing a wire-border zone where the land under the power line plus ten feet of width beyond - where anything above the waist is kept out of the wire zone (current practice on the transmission line through Elklick Woodlands). In the border zones, low growing shrubs or small trees can be used to provide the benefits of a more diverse edge habitat.

According to Yahner, the preferred method of management is a combination of mowing and selective herbicide use on woody vegetation. Mowing should be done rarely and never during the spring breeding season – from March to July – when nesting wildlife and their young could be harmed. Herbicide use should be restricted to one of the seven types (typically Garlon for woody-stemmed plants) approved by the Environmental Protection Agency for rights-of way.

In the two areas where the utility line crosses low lying wet areas with hydric soils, consideration should be given to re-establishing the wetland plant community associated with these soils.

Related Strategies

Trails:

The Sully Woodlands General Management Plan provides additional direction regarding the management of adjacent parklands and planned trails in the vicinity of Elklick Woodlands, including a desire to utilize the right-of-way through Elklick Woodlands for a connecting linkage. (See Objectives 3 and 4 for discussion.)

Should modifications to the facilities within the right-of-way be necessary, design and construction techniques that minimize impacts to Elklick Woodlands should be followed. (See Management Objective 1.)

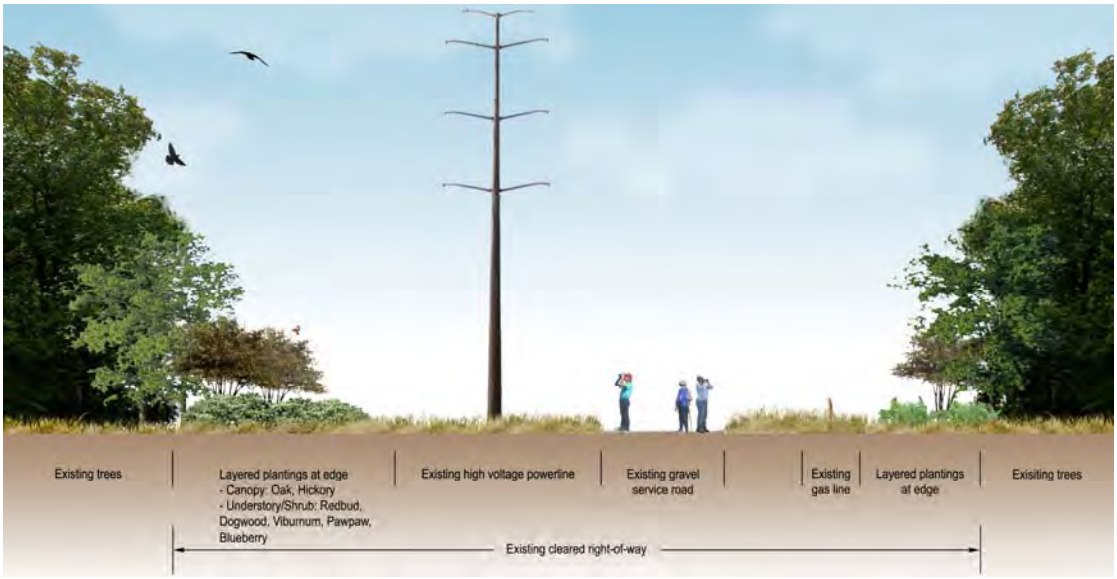


Figure 14: Cross-section Illustrating an Approach to Managing "Feathered Edges" to create a U-Effect"

Management Objective 3: Public Access

Allow for appropriate public access in a manner that serves to educate visitors while preserving the function and integrity of the globally rare plant community.

Managing access is about balancing the desire for public access and the need for resource protection. In general, the approach to managing access should be as follows:

- Determine appropriate carrying capacity for visitation based on research identifying locations of plant communities and their ability to withstand disturbance. Capacity assessments should include assumptions about management (e.g. can the site be opened on specific days only, etc.)
- Work with trail planners to determine appropriate locations for the generalized trail corridor to the west of the site and along Pleasant Valley Road to the east.
- Once the planned trails are completed to the east and/or west, determine how to best manage access into Elklick Woodlands (See Management Objective 4), including working with utility companies to determine the feasibility of using the corridor that bisects Elklick Woodlands. (See Management Objectives 2 and 4.)
- Mark trails as per Management Objective 4 and establish a monitoring protocol.
- Phase interpretation to be timed with the provision of parking and access as a means of managing access (providing information about Elklick Woodlands to the public only as facilities are developed to accommodate the resulting increase in use).

The Virginia Department of Conservation and Recreation "Guidelines for Natural Area Preserve Management Plans" include the following policy statement guiding public access:

> *Natural area preserves are acquired and managed primarily to perpetuate the long-term quality, condition, and viability of natural heritage resources contained or supported within their boundaries. Some natural area preserves can be managed to meet this objective while at the same time accommodating some level of public use. Compatible and appropriate types of uses for each preserve are identified through the management planning process. Visitor use is monitored by natural area stewards and data is used for refining public use and visitor access objectives. Some preserves contain extremely fragile habitats and species that are damaged by even low levels of visitation. Other preserves are more resilient and may be capable of sustaining higher levels of public use. Some preserves may be closed seasonally but open for visitor use at specific times of year. At others, visitation may be restricted to specific areas – such as along a designated trail or boardwalk.*
>
> *Public use of natural area preserves can conflict with the primary natural heritage resource management and protection objective mandated by the Virginia Natural Area Preserves Act. The term "public use" as used here includes such activities as hiking, camping, biking, fishing, hunting, swimming, research, and education. It is a plain fact that human visitors often harm or threaten population viability of rare plants and animals, as well as their often-fragile habitats.*
>
> *The degree of damage depends on the frequency, intensity, and location of visitor activity. Some level of public use may be considered as appropriate if the characteristics of visitation and use are compatible with the resource protection priority and if such use does not threaten or degrade occurrences of natural heritage resources. Additionally, with the scarcity of funds to support natural areas management, costs to monitor and manage public use cannot be excessive.*

Allowable uses within the framework of the Natural Area Preserve System include
- Birding and Wildlife Watching
- Wildflower and Native Plant Observation
- Photography
- Hiking
- Ecological Research and Education

Types of Access Issues Likely to Arise

Within the framework of allowable uses noted above, access to Elklick Woodlands is currently limited by available parking and lack of trails both connecting to Elklick Woodlands and providing access into Elklick Woodlands.

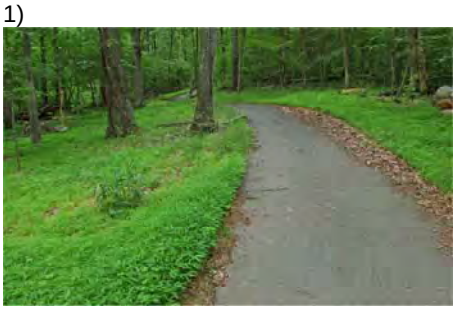
As word spreads about Elklick Woodlands, there will be increased interest in visiting Elklick Woodlands including individuals in small groups, as well as larger groups such as schools. Interpretation and programming will be coordinated with the natural resource management team in order to determine the right timing and pace to begin interpreting the resources.

As population growth continues in the vicinity of Elklick Woodlands, there will be more unauthorized access. Conservation easements, as discussed under Management Objective #1, will help reduce the pressure.

As trails are developed there will be more pressure for access. Major north-south trails along Pleasant Valley Road and within the utility corridors that parallel Elklick Woodlands are undergoing planning phases right now. A coordinated planning effort is highly recommended to balance the needs of trail users with the new management obligations that would result from increased access and the limited resources and staff to address the obligations.

The provision of parking on the site is dependent upon whether or not Elklick Woodlands can accommodate additional visitors without adversely affecting the integrity of the natural plant communities for which the site is being protected.

1)



2)

3)

Figure 15: Excerpt from slide presentation by Gary Fleming on Microstegium invasion along Elklick Run Trail
1. Microstegium in flower
2. Within the first growing season, all areas of equipment-disturbed soil in the trail corridor were completely covered with a continuous colony of stilt-grass.
3. Once established along the trail, stilt-grass "jumped" into the adjacent, intact forest in small areas of soil disturbance (e.g., around tip-up mounds or where foraging animals have churned up the topsoil).

The Fairfax County Countywide Trails Plan (as adopted by the Fairfax County Board of Supervisors on 6/17/2002) identifies a number of planned trails that should be considered in the Natural Resource Management Plan. These trails are also included in the Sully Woodlands Regional Master Plan. Planned regional trails along I-66 and Bull Run provide nearby regional access. These regional trails then connect to a planned Major Paved Trail along Old Post Office Road to the west of Elklick Woodlands. A planned Major Paved Trail along Pleasant Valley Road to the east of the site connects to nearby schools and neighborhoods. A Stream Valley Trail (major paved trail) is partially constructed along Elklick Run to the north of the site. A natural surface or stone dust trail is planned along the Columbia Gas/Virginia Power utility corridor that forms the southwestern boundary of Elklick Woodlands. A natural surface or stone dust trail is also planned for the utility corridor that bisects the site. (See Management Objective 2, above.)

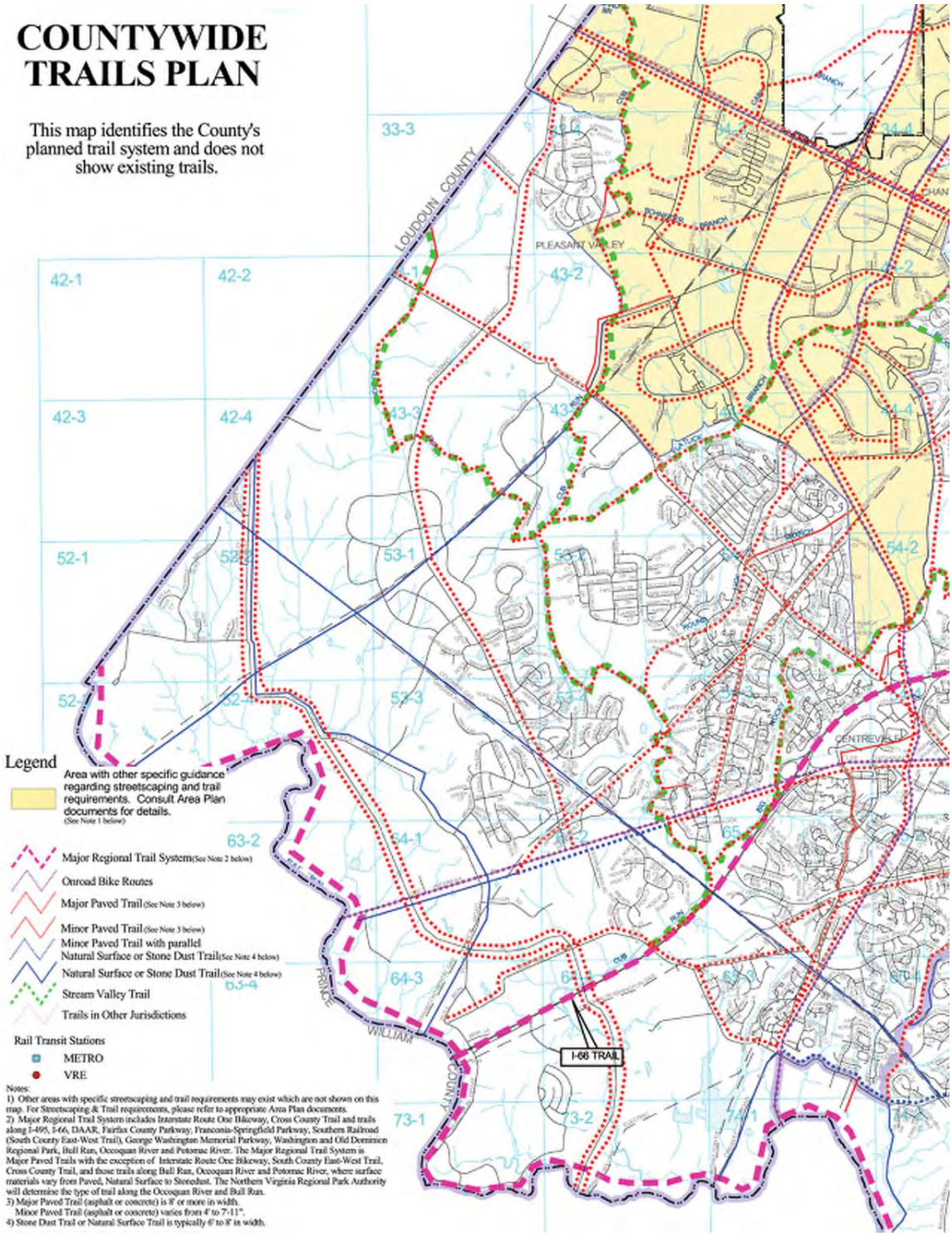


Figure 16: Excerpt from the Fairfax County Countywide Trails Plan for vicinity of Elklick Run

Management Strategies for Public Access

The purpose of Elklick Woodlands is to perpetuate the long-term quality, condition, and viability of natural heritage resources contained or supported within their boundaries. Given the globally rare nature of the occurrence of these resources and the range of choices that are available to provide north-south connectivity as part of the Countywide Trails Plan, the preservation needs of this Statewide Natural Heritage Preserve must take precedence over the Countywide trails goal of north-south connectivity. At the same time, if access can be provided in a manner that will not impair the resource, then that access should be accommodated.

The recommended approach for managing access within and adjacent to Elklick Woodlands is adapted from that used by the National Park Service whose mission is to both conserve and protect the resources while at the same time allowing visitors to enjoy them in a way that will leave them unimpaired for the enjoyment of future generations. In some situations, it may be possible to provide access while protecting the resource through the use of design exceptions to Park Authority standards or policies (for example a reducing the minimum trail width from three-feet to two-feet).

NPS uses an approach based on the "Visitor Experience and Resource Protection (VERP) Framework." The VERP Framework stresses the concept of "visitor carrying capacity" defined as "the type and level of visitor use that can be accommodated while sustaining acceptable resource and social conditions that complement the purpose of a park" (VERP Handbook, p 8). When applied to natural areas with globally significant natural heritage resources, carrying capacity must be viewed in terms of the *limits of acceptable change* (LAC). As soon as the public is introduced to the natural environment, "some decline or change in resource condition and the quality of visitor experience is inevitable" (VERP Handbook, page 5). Therefore, assuming that change will occur, we must determine how much and what type is acceptable.

Public access is inevitable for a natural area preserve in the middle of suburban Northern Virginia. Building upon the statement of purpose for Elklick Woodlands, the following steps will need to be taken to establish the limits of acceptable change associated with the likely types of access that are going to occur.

The limits of acceptable change (LAC) must be based on an analysis of the resources for which Elklick Woodlands has been established. Portions of this analysis have been done as part of this management plan including an evaluation of soils, slopes, and hydrology that comprise the rare plant community. (See page 4.) Core areas of Elklick Woodlands have been identified (Figure 9, page 10, Management Areas 1a,1b, and 1c) along with associated concave shaped topography that is the beginning point of the concentration of runoff. The powerline corridor and the areas influenced by the adjacent land use conditions have been identified also (Management Area 2). Perimeter/Edge Areas are shown as well (Management Areas 3a, 3b, and 3c). Each of these three areas may have a different LAC.

The core area of Elklick Woodlands has the lowest threshold, or limit of acceptable change. Currently, not enough information is known about the ephemeral nature of the spring wildflowers to know whether any change is acceptable. This research need has been identified and will be accomplished within the first five years of the plan's implementation. Once ephemeral spring wildflowers have been identified, the thresholds can be established.

Figure 17 – Trail width should be limited to less than 2' similar to Rock Creek Park (photograph courtesy of the National Park Service)

Once the core area is delineated and a limit of acceptable change is identified, the utility corridor and

edge areas can be assessed to determine the LAC (including any potential influences that a trail may have on the core area and its LAC).

The determination of Elklick Woodlands' "carrying capacity" should include discussion of the following issues:

- The soils in Elklick Woodlands generally have a fairly high clay content. The soils' high clay content and parent materials are the two factors that enable it to support a rare plant community. Of concern is the fact that soils with high clay content are prone to compaction when wet. The effects of this are visible in some of the ATV tracks that near Pleasant Valley Road.
- Invasive species can use trails as conduits into less disturbed natural areas. Trails are one vector for the spread of invasive species. In the Elklick Run area, a Japanese Stiltgrass invasion followed the construction of a recent trail. (See Figure 15.)
- The experience of being in Elklick Woodlands should be one that is sympathetic to the natural resource appreciation uses that are allowed – more of a primitive trail experience, one that does not disturb, but rather supports interior forest species. Primitive type trail experiences can be achieved when there is a minimum of 100 acres of land per mile of trail. Each mile of trail can accommodate between one and five two-person groups per day, turning over twice. This indicates that the maximum size of the parking area would accommodate five cars[2].

Criteria

The following criteria should be utilized to determine whether or not access can be accommodated and under what condition:

- Trails should be prohibited within the core area of Elklick Woodlands (areas identified as 1a, 1b, and 1c, on the management units map) until such time as the soils and associated flora can be more fully inventoried and documented (including soils, flora/communities and RTEs).
- Cultural resource inventories must also be completed.
- Limits of Acceptable Change and Visitor Carrying Capacities must be identified for each community and management unit.
- Trails within the utility corridor and perimeter areas (including adjoining Park Authority property and potentially along utility line easements) should avoid the following conditions:
  - wet soils (high water table)
  - highly erodible soils
  - steeply sloped land that requires extensive grading to accommodate a trail (the trail should lay "lightly on the land" and require very minimal amounts of grading to construct, if any)
  - wooded areas requiring tree removal to accommodate a trail
- Should the concave depressions of the Elklick Run and Bull Run tributaries need to be crossed with a trail, the crossing should take place at the narrowest point. Boardwalk construction should be considered using the least intrusive form of construction. (See Appendix 6 for typical types of details.)
- Trails should avoid areas where *Microstegium* or future non-native invasive species establish to avoid further spread of the species. Effective control of non-native invasive species must be demonstrated.
- Any trail and associated parking area or public access facility for any portion of Elklick Woodlands should include, as part of the project, dedicated funding for annual mapping and controlling of non-native invasive species and for monitoring visitor use and its associated impacts.

[2] Based on a review of literature describing experiential carrying capacity for primitive trail experiences (Manning and Lawson, *Carrying Capacity as "Informed Judgment": The Values of Science And the Science of Values*, University of Vermont School of Natural Resources) and applications (e.g. www.dep.state.fl.us/parks/planning/forms/CarryingCapacityGuidelines.pdf)

Restriction of Access

Currently, unauthorized access has been managed by constructing a rail fence along Pleasant Valley Road in the vicinity of utility line crossing, coupled with a woven-wire mesh fence at the access road that follows the utility lines.

ATV users have been observed going around the fence and the Area Manager has used one-on-one contact with suspected ATV users in the adjoining neighborhood to further discourage such use. More fencing may be needed. Appendix 6 illustrates fencing details that could be used to further restrict access along Pleasant Valley Road.

Additional proactive contact with adjacent homeowners (either through their association) or through a special meeting may be beneficial to discuss the statewide significance of Elklick Woodlands and to explain the wide range of influences that could negatively impact the rare plant communities.

If trails are constructed to the west, a similar type of fencing will be needed to restrict access into Elklick Woodlands and that should be considered as part of any future trail construction budget associated with the north-south trails running on both sides of Elklick Woodlands.

Related Strategies

Additional facilities may be needed to open access to Elklick Woodlands in the future. The types of facilities are discussed under Management Objective 4 and in Appendix 6.

Managed hunts are currently utilized to constrain the deer population. Further access to Elklick Woodlands may be required for these hunts in the future. This is discussed further under Management Objective 1.

Interpretation should take place off-site (within the Sully Woodlands complex) and should communicate the purpose of Elklick Woodlands, the fragility of the resources found here and where other similar community types can be found (the rarity). (See Management Objective 4.)

Future access may be needed to accommodate research opportunities and potential partnerships in Elklick Woodlands. This is discussed further under Management Objective 1.

Management Objective 4: Facilities

Incorporate appropriate facilities and infrastructure needed to achieve management objectives.

Existing Facilities

A fence has been constructed to prohibit unauthorized vehicular access along the utility right-of-way at Pleasant Valley Road. A rail fence has been constructed extending on both sides of the utility easement to discourage ATV use. Rutted wheel tracks have developed near the entry area to Elklick Woodlands from unauthorized ATV use.

Types of Facilities Needed

Based on the identification of management objectives noted above, the following types of facilities will be needed to achieve those management objectives:

- Fencing – is needed in the short term to further prohibit unauthorized ATV access from the subdivisions adjoining Pleasant Valley Road. Fencing could be similar in style to the rail fencing found there now. If needed, a third rail could be added to the fencing to make it more difficult to breach.
- Parking – upon completion of the carrying capacity study noted under Objective 3, parking should be expanded if it is found that access to Elklick Woodlands can be accommodated without destroying the integrity of the plant communities that are found there. In order to preserve the primitive trail experience and to maintain the quality of the wildlife and plant observation activities permitted in Elklick Woodlands, parking should be limited to a maximum of five spaces and located, if feasible, at the existing entrance to the right-of-way access drive. (See discussion under Management Objective 4.)
- Trails – upon completion of the carrying capacity study, and if feasible according to the results of that study, foot trails should be marked in the perimeter areas surrounding Elklick Woodlands. Also, in agreement with the utility easement holders, internal access linking the two sides of Elklick Woodlands should be provided along the utility easement.
- Boundary Marking and Signage – signs indicating use restrictions and boundary markers are desirable for the entire boundary. Once a decision is made about trails, then trail markers and interpretive panels would be appropriate along with a small kiosk to be located at the parking area.

1) trailhead kiosk

2)interpretive panel

3) trail guide sign

4) rules sign and fencing

Figure 18: Family of Sign Types

Management Strategies for Needed Facilities

Trails and parking should be built in the following order:

1. Signage – additional use limitation signs and boundary marking signs should be installed prior to any trail and parking construction

2. After development of a Conceptual Development Plan and undergoing Fairfax County's 2232 Review Process, construction of the parking area and provision of access along the existing utility drive, coupled with appropriate access control for prohibited use types (ATV, horses, mountain bikes, etc.) using a turnstile. (See Appendix 6 and Figure 19.)
3. Completion of the north-south trails along the utility corridor and Pleasant Valley Road. This should be accompanied by the construction of a trailhead area at the western end of the utility corridor, leading in to Elklick Woodlands trail across the utility corridor with appropriate access control as per above. The trailhead areas should include interpretive materials about how to visit Elklick Woodlands, what to look for and be careful of and the importance of staying on the trail.
4. Marking of footpaths around the perimeter of Elklick Woodlands. Footpaths should be restricted to areas suitable and capable of handling human foot traffic as noted above and located in places that do not require grading or crossing of wet areas. (See Appendix 6.)
5. Trail use should be monitored to determine how well visitors are staying on marked trails (periodic review of the condition of the trails and the land around them). Trails should be closed at signs of over use (compaction, widening, tromping of vegetation, etc.) based upon LAC standards. (See pages 30-31.)

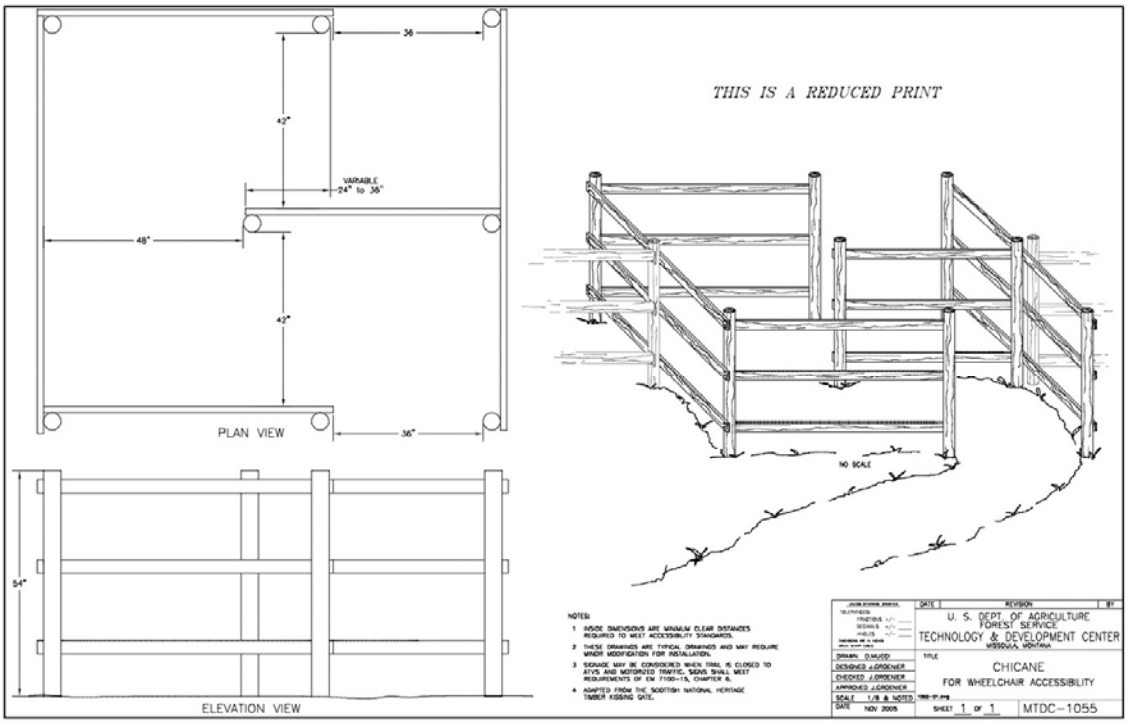


Figure 2—Accessible chicane drawing (MTDC–1055) as modified from a Scottish Natural Heritage design.

Figure 19 – Example of Chicane-Type Stile (Adapted by USFS from Sottish Natural Heritage design)

Management Objective 5: Adjacent Land Use

Maintain a land use buffer of compatible uses along the entire perimeter of Elklick Woodlands area.

The primary challenges from adjacent land use include the expansion of Pleasant Valley Road from two- to four-lanes, potential development of estate lots on adjacent properties in the RC zone to the west, and potential future modifications to the gas and electric utility corridors and substations. There are five specific actions that should be taken to better manage the effects of external influences on Elklick Woodlands:

1) Manage adjacent Park Authority land consistent with Management Objectives 1-4.
2) Work with adjacent owners and conservation groups to preserve lands in their undeveloped state in perpetuity
3) Monitor future changes in the transportation network and advocate for transportation solutions that reduce the pressure to widen Pleasant Valley Road.
4) Work with VDOT and Fairfax County stormwater management staff to protect Elklick Woodlands from hydrologic impact.
5) Work with VDOT to provide training for maintenance personnel to be proactive in their efforts to eliminate new vectors for invasive species associated with roadside maintenance activities.

Potential Changes in Adjacent Land Use

Use of the lands in the vicinity of Elklick Woodlands is guided by the Fairfax County Comprehensive Plan and is regulated by the Zoning Ordinance. Much of the land in the vicinity of Elklick Woodlands has already been conserved through public land acquisition as part of the as part of the Elklick Preserve at the Sully Woodlands assemblage. Several large privately-owned vacant or underutilized parcels still remain in the vicinity of the park and are planned for very low density residential uses. (See Figure 20.) These areas could, under existing zoning, develop at a density of one dwelling unit per five acres of land. However, it is possible that limitations of soil capabilities to accommodate on-site sewage disposal systems could inhibit attainment of the maximum development density allowed in this area.

According to the Bull Run Sector Plan:

> *The land on the southwest perimeter of the County, adjacent to Loudoun County and Prince William County, lying generally along Bull Run and the public parkland associated with Bull Run has remained for the most part open and undeveloped and has a rural character. It is planned for residential development at .1-.2 dwelling unit per acre and public parkland. This is in conformance with the findings of the Occoquan Basin Study. The present very low-density development which characterizes this area should remain intact to protect its natural wildlife and water quality.*

Management Strategies for Adjacent and Related Land Use

The remaining parcels of private land can be further conserved in perpetuity through cooperative efforts between not for profits, state and local governments and private landowners, should the owners wish to take advantage of existing programs for private land conservation through the Commonwealth of Virginia.

Conservation Easements

In Virginia, land conservation easements can be either donated or sometimes sold to qualified private or public organizations. The Northern Virginia Conservation Trust, a key participant in the original conservation effort to preserve Elklick Woodlands, is one such qualified organization. The NVCT and Fairfax County have established a public/private partnership to facilitate donations of conservation easements. Other state agencies also accept easements, including the Department of Conservation and Recreation (VDCR), Virginia Outdoor Foundation, (VOF), Virginia Department of Forestry (VDOF), Virginia Department of Game and Inland Fisheries, and the

Figure 20:

Virginia Department of Historic Resources. Soil and water conservation districts can hold easements in Virginia as well as local governments.

The following programs provide funding, technical assistance or financial incentives for conservation easement purchase. (See Appendix 7 for a complete description of these programs.)

- Department of Conservation and Recreation's Office of Land Conservation (VDCR)
- Virginia Land Conservation Foundation
- Virginia Conservation Lands Needs Assessment (VCLNA)
- Department of Taxation's Land Preservation Tax Credit
- Green Infrastructure (as recommended in the Virginia Outdoors Plan)

There are a number of steps that not-for-profits and/or the County can take to facilitate these types of private conservation actions:

1) Establishment of Conservation Priority for Elklick Woodlands' related lands – these adjacent private lands should be identified as a conservation priority by the Fairfax County Land Preservation Fund and other non-profit conservation organizations. The purpose of establishing these areas as conservation priorities is to document the public benefit and to increase the competitiveness of any future efforts for obtaining funding from public and not-for-profit organizations.

2) Once identified as a priority, there are a number of tools that could be used to work cooperatively with the property owners to maintain the lands as open space, either permanently, or for a defined period of time. (See Appendix 7 for more complete descriptions of these tools.)

…

Conservation Design

As part of any outreach to adjoining property owners, efforts should be made to educate landowners about conservation design practices that could be implemented on a voluntary basis. Should any of the owners wish to develop their parcels to the allowable zoning (RC), group lots in such a manner to minimize potential impacts to Elklick Woodlands through tree preservation, reduction in permeable surfaces and other buffering measures.

Potential Changes in the Transportation Network

The Fairfax County Comprehensive Plan lists a number of transportation projects that, although not currently listed in the six-year plan, should be monitored in the event that the projects are implemented, to ensure that potential impacts to Elklick Woodlands are avoided (see Figure 21).

Tri-County Parkway: On November 17, 2005, the CTB approved the West Two Alternative for the Tri-County Parkway which lies outside the Cub Run and Bull Run watersheds. It is composed of segments D and C, west of the Manassas National Battlefield. (See http://www.virginiadot.org/projects/resources/TCPMap022205.pdf.) The alignment starts at US 50, John S. Mosby Highway, and extends southerly, ending at the 234/I-66 interchange, near the western boundary of the Manassas National Battlefield Park.

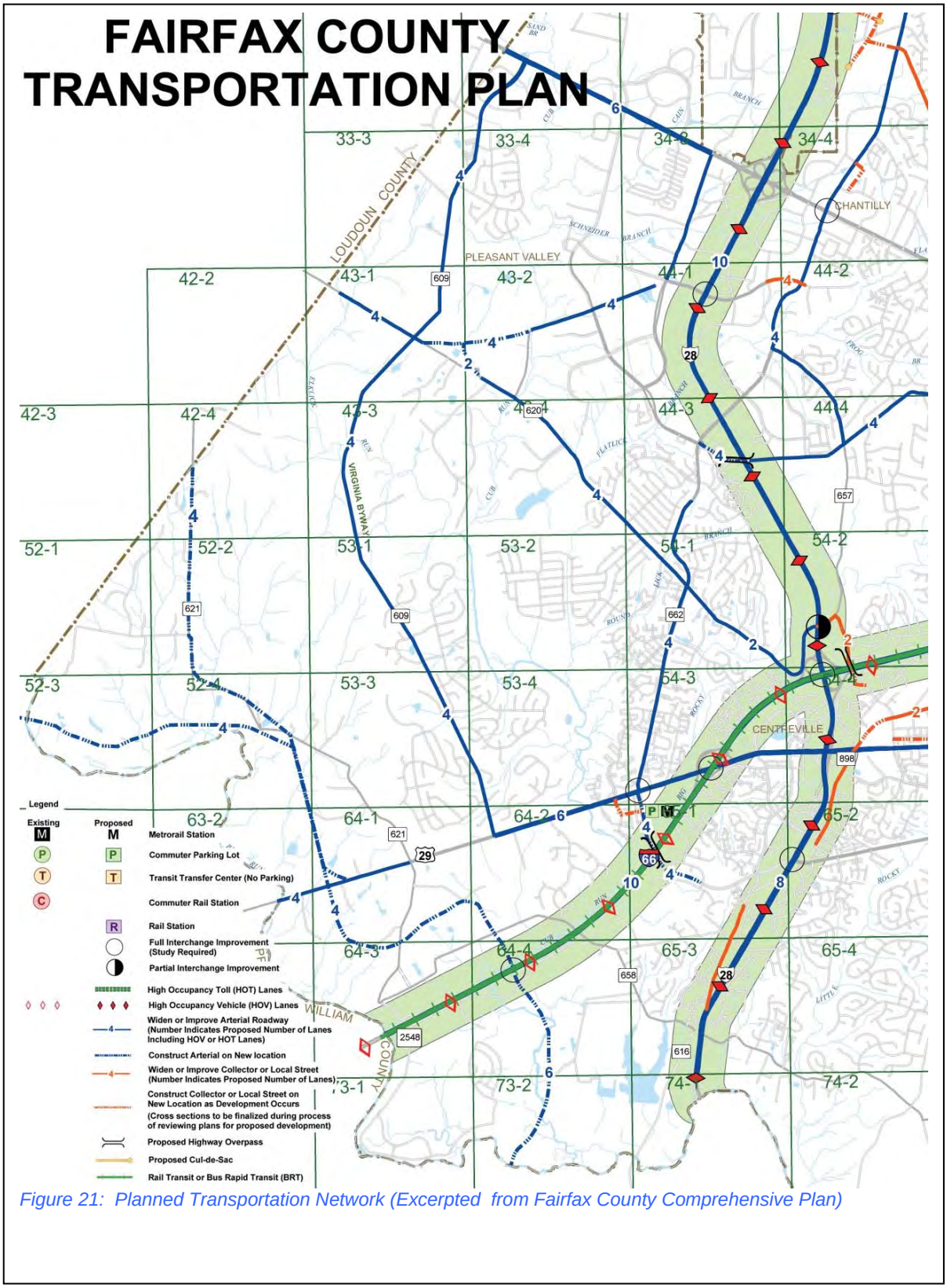


Figure 21: Planned Transportation Network (Excerpted from Fairfax County Comprehensive Plan)

Battlefield Bypass: A bypass around the northern part of the Manassas National Battlefield Park is still identified in the Fairfax County Comprehensive Plan. The Commonwealth Transportation Board's West Two Alternative does not include the Battlefield Bypass.

Pleasant Valley Road: The Comprehensive Plan indicates that Pleasant Valley Road is planned to be widened from two to four lanes. However, this project is not identified in the six-year plan and under current economic conditions and stated regional priorities, is not likely to be expanded in the foreseeable future.

Management Strategies for Monitoring Changes to the Transportation Network

All of these transportation projects, including the widening of Pleasant Valley Road, should be monitored to ensure that the interests of Elklick Woodlands are considered and negative impacts avoided. Should any of these projects move forward, VDOT will be required to consult with Virginia DCR, triggering the inclusion of Elklick Woodlands Natural Area Preserve in any future studies.

In addition to its status as a Virginia Natural Area Preserve, Elklick Woodlands and the surrounding open space are located within an area of the Occoquan Watershed that was rezoned by the Fairfax County Board of Supervisors in 1982 to the "Residential Conservation" zoning district in order to support protection of the water quality of the Occoquan Reservoir, which is one of Fairfax County's primary sources of drinking water. Therefore, best management practices should be used for all land modification activities associated with Pleasant Valley Road (and any future modifications to the Dominion Pleasant Valley M&R Station) to meet water quality objectives.

Should Pleasant Valley Road be widened in the future, the following considerations should be incorporated into the design and environmental review process:

Design Considerations

- Additional lanes should be constructed on the east side of Pleasant Valley Road away from Elklick Woodlands.
- Lane and shoulder widths should be minimized to the extent practical to reduce the overall impact of the cross section. Design exceptions should be requested to reduce the lane widths to 10' and paved shoulder to 2' to preserve tree canopy through Elklick Woodlands and minimize right-of-way requirements .
- A planted median should be considered by comparing the impact to adjoining trees on the east side and additional cost to the benefits of breaking up expansive pavement area (with its high rates of stormwater runoff and reflected heat).
- If a median is selected, stormwater can be managed within the median to reduce cross-sectional impact and facilitate the use of low-impact development practices.
- Additional reinforced turf shoulder can be utilized if a recovery area is needed. (See below regarding stormwater runoff.)
- No temporary construction easements should be granted on Elklick Woodlands.

Roadway Related Stormwater Management Practices in Relation to Elklick Woodlands

If, at some point in the future, Pleasant Valley Road is widened, great care will be required to ensure that Elklick Woodlands does not become the de facto storage area for excess stormwater runoff from the roadway. The following design considerations should be applied with respect to water quality concerns along an expanded roadway:

- Use best management practices/low impact development techniques to minimize the impact of stormwater runoff – stormwater runoff should be directed away from Elklick Woodlands to the east side or to a median as noted above.
- Minimize Impervious Surfaces: The intent of this goal is to reduce the volume of runoff.
- Prevent Downstream Erosion: Stormwater drainage systems should be designed to avoid causing or contributing to downstream erosion.
- Stabilize Disturbed Soil Areas: Disturbed soil areas should be appropriately stabilized.
- Maximize Vegetated Surfaces Consistent with Existing Policies: Vegetated surfaces prevent erosion, promote infiltration (which reduces runoff), and remove pollutants from stormwater. See the following section on design for sustainable, low maintenance roadsides.
- Preserve the naturally vegetated areas and soil types that slow runoff, filter out pollutants, and facilitate infiltration.
- Direct runoff into or across vegetated areas to help filter runoff and encourage groundwater recharge.
- Provide small-scale distributed features and devices that help meet regulatory and resource objectives.
- Treat pollutant loads where they are generated, and, when possible, prevent their generation.

See Appendix 8 for more detailed information regarding potential stormwater management tools.

Roadside Vegetation Management

According to the Federal Highway Administration: "A determination of the likelihood of introducing or spreading invasive species and a description of the measures being taken to minimize their potential harm should be part of any process conducted to fulfill agency responsibilities under NEPA. Consideration of invasive species should occur during all phases of the environmental process to fulfill the requirements of NEPA. For example, at the very beginning of the project, discussions with stakeholders should identify the potential effects from invasive species and include possible prevention and control measures."

Any road construction activities on Pleasant Valley Road should include the following:

- Mandatory training session for contractors regarding the identification of invasive species, how invasive species spread along roadways, and how to avoid the inadvertent spreading of invasive species during construction.
- Measures for inspecting and cleaning construction equipment.
- Ensuring the use of invasive-free mulches, topsoils, and seed mixes.
- Developing eradication strategies to be deployed should an invasion occur.

A critical part of FHWA guidance on implementing Executive Order 13112 on invasive species is to develop innovative methods to minimize soil disturbance during vegetation management activities so as to reduce the opportunities for the introduction of invasive species. When planning for and designing the widening of Pleasant Valley Road, efforts should be made to minimize the amount of grading on the west side of the road, on which Elklick Woodlands is located. In addition to the design interventions noted above, several construction management activities should be included:

- Use rigid fencing during construction to limit access to Elklick Woodlands; and
- Train construction personnel to identify invasive species in the roadside area and train them to respond appropriately should they encounter an invasive species (for example, prior to grading, remove plants that have gone to seed and place them in sealed plastic bags to prevent seed dispersal).

Related Strategies

Natural Resources

Invasive species strategies are found starting on page 11. Water resource and stormwater management strategies relating directly to runoff and scour affecting Elklick Woodlands today are found starting on page 19.

Trails
Criteria for determining appropriate locations for trails and access to Elklick Woodlands (starting on page 27).

Conservation Easements
If conservation easements are used as a tool to preserve private lands for conservation use in perpetuity, easements should be written to allow for trail use (See Management Objectives 3 and 4.) and for managed hunts. (See Management Objective 1.)

Additional Resources

AASHTO Center for Environmental Excellence (http://environment.transportation.org/)
Green Highways Partnership Initiative (http://www.greenhighways.org/index.cfm)

Phasing and Implementation Recommendations

There are a number of early stewardship action steps that that should be established as high priority items for preserving Elklick Woodlands. Some of these items can be accomplished with current Park Authority Resources, while others may require additional resources or alternative means for implementation (such as grant funding, partnership programs or volunteer efforts). Finally a table is included to describe the full set of actions that are needed to achieve the plan's management goal and objectives.

The implications of the different levels of funding are summarized below:

Existing Resources: This current level of funding would continue a minimum level of a managed deer hunt; minimal maintenance of *Microstegium*; extending the signage along Pleasant Valley Road; Inventory of spring ephemerals; three site visits per year by NRMP staff for inventory and monitoring work; one meeting per year with VDOT and Dominion regarding invasive species management and other issues; participation in Sully District trail planning efforts; and, documenting conservation priorities as part of County Land Preservation activities.

Key outcomes from this level of funding would maintain the status quo. Access to Elklick Woodlands would remain limited to guided tours.

Additional Funding Level Priorities (partial): Additional funds at a partial funding level would be utilized for a bio-blitz inventory of the site; an integrated pest management plan; additional resources for outside contractors to remove and monitor invasive species; monitor RTE populations in the Preserve and the utility corridor; and, inventory archaeological, historic and cultural resources and prepare a land use history report for the property.

Key outcomes of this level of funding would be that the Park Authority would have enough information to determine whether or not public access could be accommodated and how best to accommodate it on what time frame. Invasive species could be more effectively monitored and managed reducing the risk of their spread. Proactive measures could be taken to better manage the threats associated with insects and other pests.

Full Funding: would support the installation of best management practices for roadway runoff entering the Preserve; additional managed hunts, sharpshooting, and monitoring necessary to reduce the deer herd to levels that would minimize impact to the Preserve; additional monitoring of the site needed to qualitatively assess the health of the ecosystem; and develop a training program to work with utility and transportation employees to reduce the spread of invasive species.

Full funding levels would result in the effective management of both internal and external threats to Elklick Woodlands including and especially deer browse and invasive species. Full funding levels would also be needed to address any future trail access and trail needs including design, construction, maintenance, and monitoring of all facilities needed to provide, monitor and manage access consistent with design criteria identified on pages 30-31.

Summary of staff, contracting and resources by level of funding:

	NRMP Staff hours	POD Staff hours	Contractor dollars	Volunteer hours
Current Resources and Funding	200	80	$15,000-$60,000	40
Additional Resources (Partial Funding	250		$40,000-$115,000	
Additional Resources (Full Funding)	600	160	$570,000-$630,000	120
TOTAL with Full Funding	1050	240	$625,000-$805,000	160

Priorities Under Current Resources and Funding

Currently Park Authority has funds to support the following:

- 100-200 hours total for NRMP for office and field time.
- limited POD staff time involvement (mow, build fence etc. not trail building or inventory, or deer management)

ACTIONS	NRMP Staff	POD staff	Contractor	Volunteer
• Coordinate a managed hunt for all of Sully Woodlands for Fall 2009 – staff time	40 hours	16 hours	Plus current budget for hunts (now spread across entire area – not just Elklick)	
• Hire contractor to monitor and spray *Microstegium* (and other invasives if there's enough money) for the summer - Continue with pre-emergent and post-emergent for this year	24 hours		$3,000-10,000	????
• Signage – additional use limitation signs and boundary marking signs should be installed prior to any trail and parking construction, monitoring and repair of existing fencing, consulting with neighbors.		Allow 40 hours	Sign cost – allow $200/sign and post $2,000 for 10 signs	
• Hire contractors to inventory wildflowers and seedlings Spring 2009 and compare to other northern hardpan basic-oak hickory forest stands– supplement with volunteer hours	24 hours		$10,000-$50,000	40 hours
• Visit site to qualitatively assess health of ecosystem and look for illegal entry or dumping – o tree health (look for signs of death or disease, especially monitor ash trees for signs of Emerald Ash Borer) o stream health (erosion, siltation, headcuts, *Isoetes*) o deer browse o spread of invasive species o dumping of yard or other waste o Illegal trails o Additional actions may be necessary depending on what is found (e.g. trash removal) o	Allow 40 hours: Assume 2 site visits per year plus reporting time	Allow 24 hours (3 days) per year trash removal until trash removed		Trash removal could be done by volunteers
• Meet with Dominion Power utility managers, Charles Hardy (804-771-3708) and Aaron Jonas (804-257-7683), to educate them on RTEs within the utility corridor: where the known RTE populations exist, how to identify them, why they are worth preserving, and what utility management activities should and should not be conducted near these RTE populations. –	Allow 16 hours Assume 1 meeting annually plus preparation time			
• Meet annually with VDOT maintenance personnel to inspect roadway for invasive species, drainage, and planned maintenance for the road and right-of-way	Allow 16 hours - Assume 1 meeting plus preparation time			
• Participate actively in ongoing trail planning for the Sully District and provide advice to park planning and development	Allow 20 hours - Assume 2 meetings plus			

ACTIONS	NRMP Staff	POD staff	Contractor	Volunteer
regarding development of adjacent trail corridors and requirements for protecting Elklick Woodlands	review time			
• Work with the County Park Foundation and non-profit organizations to identify Elklick Woodlands and related nearby open spaces as a high priority for conservation action based on its status as a Virginia Natural Heritage Area Preserve and its potential threats from future growth and development.	Allow 20 hours for coordination with Park Foundation and non-profit organizations -			

Priorities For Additional Resources and Funding

Assume $50,000 per year in addition to the staff time from NRMP POD identified above.

ACTIONS	NRMP Staff	POD staff	Contractor	Volunteer
• Coordinate inventories of wildlife or BioBlitz by others (possibly DCR of DOF staff). Hire grad student to conduct/coordinate some of these surveys o other animals: Lepidoptera, amphibians, small mammals, birds o wetlands and vernal pools o forest assessments to better understand this natural community: species composition and richness; tree height, width, and age; light gap size and frequency; downed woody debris and snag size and frequency; structure and strata development o soil characteristics to better understand diabase soils and their influence on the natural community: pH, horizon development, textural analysis, chemical properties	50+ hours by staff		$10,000-50,000	
• Hire contractor to write Integrated Pest Management Program for invasive species and forest insects and diseases	40 hours		$15,000-25,000	
• Hire contractor to monitor and control all invasive plant species through 2013	60 hours		Current annual cost plus escalation	
• Monitor known woodland populations of RTEs at least once every five years –	20 hours			
• Monitor known powerline populations of RTEs once a year –	40 hours			
• Hire contractor to inventory cultural, archeological and historical resources and describe the land use history	40 hours		$25,000-$40,000	

Full Funding to Implement the Plan

Full funding includes everything necessary to fully implement the plan including funding for contract support, equipment and staff needs. This could include up to a full time Natural Resource Manager for the site with the remaining time being utilized for the following activities for some of the contracted activities such as inventory, working on the trail carrying capacity studies, leading tours of the site, working on boundary and related land issues, and working with the Urban Forest Division on integrated pest management planning including addressing issues related to Emerald Ash Borer. Full funding includes all of the action items listed above plus:

ACTIONS	NRMP Staff	POD staff	Contract	Volunteer
• Work with VDOT, Dominion Power, and County Stormwater Management staff to treat run-off from Pleasant Valley Road and the utility easement prior to entering the preserve. – o Possibly cost-share design/build of grass swales with velocity checks	Allow 40 hours for first year – hours would diminish with success of program to require only monitoring		Design and Construction costs: $15-45/lf for enhanced grass swales $1-2/lf O&M annually - assume 2000 lf $30,000-$90,000 plus maintenance	
• Coordinate 2 managed hunts for all of Sully Woodlands per year continued annually	Allow 80 hours per year – hours would diminish with success of program		At current cost spread across entire area	
• Train Park Authority staff to learn *Distance 5.0*, coordinate with Manassas Battlefield National Park, and monitor deer densities and evaluate deer control program annually	Allow 40 hours per year – hours would diminish with success of program			
• Visit site to qualitatively assess health of ecosystem and look for illegal entry or dumping o tree health (look for signs of death or disease, especially monitor ash trees for signs of Emerald Ash Borer) o stream health (erosion, siltation, headcuts, *Isoetes*) o deer browse o spread of invasive species o dumping of yard or other waste o Illegal trails o Additional actions may be necessary depending on what is found	allow 120 hours for 6 visits per year			Training of volunteers could be accomplished by accompanying staff on first year, providing a checklist, camera, base map or GPS, etc. for outgoing years.
• Hire sharpshooters or bow hunters to cull deer. More deer will be eliminated in a short amount of time and can replace the managed hunts for a particular year.	allow 40 hours per year– hours would diminish with success of program		$25,000/hunt	
• Monitor future changes in land use and transportation related to Elklick (annual review with land use /transportation planners at County to identify new development and transportation projects in vicinity) – follow up actions may be needed.	allow 80 hours per year			
• Develop training program on invasive species management in road and utility corridors for use in training of maintenance	allow 40 hours per year for participation		Development of training course would require	Could be Countywide and VDOT NOVA

ACTIONS	NRMP Staff	POD staff	Contract	Volunteer
personnel to be proactive in their efforts to eliminate new vectors for invasive species associated with roadside maintenance activities	training others		outside funds - $20,000 estimated per course	Districtwide (also Dominion) – could be done jointly with non-governmental organization
• Conduct trail carrying capacity studies to determine limits and carrying capacity, and monitoring use thereafter.	Allow 120		$20,000 estimated	
LONG TERM: (contingent on further study)	NRMP Staff	POD staff	Contract	Volunteer
• Design and construction of Pleasant Valley Road trailhead and a second trail head, contingent on construction of a north-south trail, a trailhead area at the western end of the utility corridor, leading in to Elklick Woodlands trail across the utility corridor with appropriate access control	Allow 120 hours per year for coordination		Development of design and construction documents, construction Cost TBD – allow $400,000 for design, negotiation with right-of-way, permitting, construction and initial maintenance period	
• Marking of footpaths around the perimeter of Elklick Woodlands	Allow 80 hours per year for coordination	Allow 40 hours to Install trail markers and use signs	Allow $5/lf of trail for a well constructed mulched trail surface plus signs and controls – assume 1-mile trail plus design costs (allow $75,000)	
• Trail use should be monitored to determine how well visitors are staying on marked trails. Trails should be closed at signs of over use (compaction, widening, tromping of vegetation, etc.		Allow 120 hours per year for monitoring use, general maintenance and upkeep		Supplement with 120 hours of volunteers (litter pickup, monitoring for invasive species and removal of any invasive species

Priorities

The highest priority items, regardless of funding sources include:

Inventory

Prior to planning trails or interpretive programs within Elklick Woodlands, the Park Authority should better understand what exists in Elklick Woodlands. To help save the Park Authority money, consider partnering with universities or other research institutions to conduct inventories or a BioBlitz. The following is a list of inventories ranked from high priority to low priority:

- groundcover plants, especially ephemeral wildflowers and tree seedlings, to better understand what exists on site and how much damage the deer have had on herbaceous vegetation and seedling recruitment
- invasive plant species to monitor the success of the invasive species control program
- deer populations to monitor the success of the deer control program
- archeological and historical resources
- other animals: Lepidoptera, amphibians, small mammals, birds
- wetlands and vernal pools

- forest assessments to better understand this natural community: species composition and richness; tree height, width, and age; light gap size and frequency; downed woody debris and snag size and frequency; structure and strata development
- soil characteristics to better understand diabase soils and their influence on the natural community: pH, horizon development, textural analysis, and chemical properties

Invasive Species Management Plan and Activities

Park Authority staff or a natural resources contractor should write an invasive species management plan for Elklick Woodlands. The Park Authority should oversee the work of a contractor hired to monitor and control invasive plant populations.

The Park Authority should hire a contractor to monitor and control invasive plants within Elklick Woodlands annually. Japanese stilt grass is an existing threat to the natural community at Elklick Woodlands. Eradicating the existing population will most likely take five years or more of annual herbicidal treatment because of the existing seed bank. Additionally, seed will most likely continue to be introduced into the site from off-site run-off and deer trails. Because a licensed pesticide applicator is necessary to control the plant population and evaluate how well the herbicidal treatment worked, this same contractor can also monitor the entire site for other invasive plants during the Japanese stilt grass site visits. Using a backpack sprayer, herbicidal treatment should occur during the growing season prior to Japanese stilt grass going to seed, which is typically in late summer or early fall.

Deer Management

Implementation of the deer management recommendations is a high priority (see page 22)

Boundary Marking

Additional boundary markers should be placed along Pleasant Valley Road.

Citations

Bergmann, Carole and Jil Swearingen. Oriental Bittersweet. National Park Service. Internet. October 7, 1999. http://www.nps.gov/plants/alein/fact/ceor1.htm.

Dreyer, Glen. 1994. *Celastrus orbiculatus*: Element Stewardship Abstract. The Nature Conservancy, Galt.

Hutchison, Max. 1992.Vegetation Management Guideline: Round-leaved bittersweet (*Celastrus orbiculatus* Thunberg) Illinois Department of Conservation. Internet. March 12, 2001. http://www.inhs.uiuc.edu/edu/VMG/rlbitter.html.

Virginia Native Plant Society. 1995. Invasive Alien Plant Species of Virginia: Oriental Bittersweet (*Celastrus orbiculatus* Thunberg). Department of Conservation and Recreation, Richmond

Environmental Laboratory. 1987. "Corps of Engineers Wetland Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterway Experiment Station, Vicksburg, Miss.

Fairfax County Department of Planning and Zoning, Comprehensive Plan for Fairfax County, Virginia, 2007 edition, http://www.fairfaxcounty.gov/dpz/comprehensiveplan/ [accessed on January 30, 2009]

Fairfax County Park Authority. January 14, 2004. Natural Resources Management Plan 2004-2008.

Fairfax County Park Authority, Sully Woodlands General Management Plan, September 2006.

Global Invasive Species Database (http://www.issg.org/database) Accessed February 4, 2009.

Hanson, Keith E. 1988. *Managing Transmission Lines for Wildlife Enhancement*. Journal of Arboriculture 14(12): December 1988. Pages 302-303

Heffernan, K.E. 1998. Managing Invasive Aliem Plants in Natural Areas, Parks, and Small Woodlands. Natural Heritage Technical Report 98-25. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Richmond, Virginia.

International Finance Corporation, World Bank Group. 2007. *Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution*. April 30, 2007

Manning,, Robert E. and Steven R. Lawson, School of Natural Resources, University of Vermont: Carrying Capacity as "Informed Judgement": The Values of Science And the Science of Values (undated).

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 28, 2009).

Swearingen, J., K. Reshetiloff, B. Slattery, and S. Zwicker. 2002. Plant Invaders of Mid-Atlantic Natural Areas. National Park Service and U.S. Fish & Wildlife Service, 82 pp. (http://www.invasive.org/eastern/midatlantic/mivi.html) Accessed February 5, 2009.

Townsend, John F. 2007. Natural Heritage Resources of Virginia: Rare Plants. Natural Heritage Technical Report 07-13. Virginia Department of Conservation and Recreation, Division of Natural Heritage,

Richmond, Virginia. Unpublished report. May 2007. 56 pages plus appendices. http://www.dcr.virginia.gov/natural_heritage/documents/plantlist07.pdf

U.S. Department of the Interior • National Park Service: The Visitor Experience and Resource Protection (VERP) Framework A Handbook for Planners and Managers, September 1997

US. Fish and Wildlife Service National Conservation Training Center. November 2004. *Managing Utility Rights-of-Way for Wildlife Habitat, A Self Study Guide*. NCTC Course Number TEC7179. Pages 9-13.)

Virginia Department of Conservation and Recreation, Division of Natural Heritage: Natural Area Preserve Management Guidelines, December 2000

Virginia Tech Weed Identification Guide. *Symphoricarpos orbiculatus* (http://www.ppws.vt.edu/scott/weed_id/supor.htm) Accessed February 5, 2009.

Willyard, Cassandrai J. and Susam M. Takalsky and Patricia A. Mullins. 2004. *Ecological Effects of Fragmentation Related to Transmission Line Rights-of-Way: A Review of the State of the Science*. State of Wisconsin, Department of Administration, Division of Energy's Environmental Research Program. Final Report June 2004

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Deed of Conservation Easement

THIS DEED OF CONSERVATION EASEMENT ("Conservation Easement") is made this 17 day of December, 2003 between the Fairfax County Park Authority, (the "Grantor") and the Northern Virginia Conservation Trust, formerly known as the Fairfax Land Preservation Trust (the "Grantee"), having its principal office at Packard Center, 4022 Hummer Road, Annandale, Virginia 22003.

WITNESSETH

A. WHEREAS, the Grantor is the sole owner in fee simple of 226.3590 acres, more or less, of certain real property (the "Property") in Fairfax County, Virginia, more particularly described in Exhibit A attached hereto and incorporated herein by this reference;

B. WHEREAS, the Grantee, whose primary purpose is protecting the natural and historic resources of Northern Virginia, is a non-profit corporation incorporated under the laws of the Commonwealth of Virginia as a tax exempt public charitable organization under section 501(c)(3) of the Internal Revenue Code of 1986, as amended, qualified under section 170(h) of the Internal Revenue Code of 1986, as amended, to receive qualified conservation contributions;

C. WHEREAS, the Property possesses natural, ecological, and open space values (collectively, "conservation values") of great importance to the Grantor, the people of Fairfax County, and the people of the Commonwealth of Virginia;

D. WHEREAS, in particular, the Property contains Natural Heritage Resources, defined in the Virginia Natural Area Preserves Act (Va. Code Ann. § 10.1-209) as "the habitat of rare, threatened or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest benefiting the welfare of the citizens of the Commonwealth," including significant rare natural communities known as the Piedmont/Mountain Basic Woodland and the Basic Oak-Hickory Forest;

E. WHEREAS, the specific conservation values of the Property are further documented in an inventory of relevant features of the Property, Baseline Documentation No. 0036, on file at the offices of the Grantee and incorporated herein by reference, and the parties agree that the Baseline Documentation provides an accurate representation of the Property at the time of this grant and is intended to serve as an objective, though nonexclusive, information baseline for monitoring compliance with the terms of this grant;

F. WHEREAS, the Virginia Conservation Easement Act (Va. Code Ann. §§10.1-1009 - 10.1-1016) authorizes charitable corporations such as the Grantee to accept and enforce conservation easements in gross to retain or protect natural or open-

Tax map # 042-4-/02/ 11A
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TESTE: JOHN T. FREY
Grantee: NORTHERN VIRGINI
Instrument: 200305630.001
# of Pages: 12

space values of real property, assuring its availability for agricultural, forest, recreational, or open space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, or archeological aspects of real property;

G. WHEREAS, this Deed of Conservation Easement satisfies a condition of a Virginia Land Conservation Foundation matching grant made in 2001 to the Northern Virginia Conservation Trust for the purchase of the Property for its protection as a state natural area preserve pursuant to § 10.1-1017 through § 10.1-1026 of the Code of Virginia.

H. WHEREAS, the Property has been dedicated as a state natural area preserve through a Deed of Natural Area Preserve Dedication to the Virginia Department of Conservation and Recreation pursuant to the Virginia Natural Area Preserves Act (Acts 1989, C. 553; Va. Code Ann. §§10.1-209 et seq.), which has been recorded in the land records of Fairfax County, Virginia, in Deed Book _____ at Page _____, and which provides for the preservation of any area of land, water, or both land and water, that retains its natural character or which is important in preserving rare or vanishing flora, fauna, native ecological systems, geological, natural, historical, scenic or similar features of scientific or educational value benefiting the citizens of the Commonwealth;

I. WHEREAS, the preservation of the Property furthers the goals of the Fairfax County Comprehensive Plan, which states that Fairfax County should "support the conservation of appropriate land areas in a natural state to preserve, protect, and enhance stream valleys, meadows, woodlands, wetlands, farmland, and plant and animal life" and that "[s]mall areas of open space should also be preserved in already congested and developed areas for passive neighborhood use, visual relief, scenic value, and screening and buffering purposes;"

J. WHEREAS, the Grantor and Grantee have the common purpose of conserving the above-described conservation values of the Property in perpetuity;

K. WHEREAS, the Grantor intends that the conservation values of the Property be preserved and maintained by permitting only those uses on the Property that do not significantly impair or interfere with them;

L. WHEREAS, the Grantor further intends, as owner of the Property, to convey to the Grantee the right to preserve and protect the conservation values of the Property in perpetuity by granting this Conservation Easement that will restrict use of the property by the Grantor (and any future owner of the Property) because of the imposition of the terms, conditions, and restrictions hereinafter expressed and the Grantee intends to accept such conveyance;

NOW THEREFORE, in recognition of the above and in consideration of ten dollars ($10.00) and other valuable consideration, and in consideration of the mutual covenants, terms, conditions, and restrictions contained herein, and pursuant to the laws

of the Commonwealth of Virginia and in particular the Virginia Conservation Easement Act, Grantor and the Grantee agree as follows:

1. Purpose. It is the purpose of this Conservation Easement to preserve and protect the conservation values of the Property in perpetuity, and to prevent any use of the Property that will significantly impair or interfere with the conservation values of the Property.

2. Definitions. Whenever used herein, the term "Grantor" shall include the Grantor and all personal representatives, heirs, successors and assigns, and the term "Grantee" shall include the Grantee, its successors and assigns.

3. Grant. Grantor hereby voluntarily grants and conveys to the Grantee a Conservation Easement in gross over the Property, forever and in perpetuity, of the nature and character and to the extent hereinafter set forth.

4. Prohibited Uses. Any activity or use of the Property inconsistent with the above-stated purpose of this Conservation Easement is prohibited. Furthermore, no uses or activities shall be permitted which are more intensive or less restrictive than the uses and activities prescribed by the conditions of the Deed of Natural Area Preserve Dedication granted to the Commonwealth of Virginia, Department of Conservation and Recreation for the Property. Without limiting the generality of the foregoing, the following restrictions expressly apply to the Property:

4.1 No permanent or temporary structures or other improvements shall hereafter be placed or maintained on the Property (including, without limitation, any building, tennis or other recreational court, soccer or ball field, landing strip, mobile home, swimming pool, tot lot, dog park, shooting area or range, camping accommodation, antenna, utility pole, tower, conduit, line, or sodium vapor light), except as specifically provided for below, with prior notice and approval pursuant to Section 18, and except as may be permitted pursuant to easements and agreements existing as of the date of this Conservation Easement.

The following permitted structures and improvements must be located and constructed so as to minimize their potential negative impacts on the Property's conservation values:

4.1.1 Natural, permeable surface footpaths to facilitate passive recreation by the public;

4.1.2 Fences and gates for the purpose of protecting or enhancing the Property's conservation values or to facilitate resource management, research, education, and site security;

4.1.3 Signs and informational kiosks to provide notice necessary for the protection of the Property, directions, and information about the Property's history, natural values, protection, and permitted recreational uses, and as deemed necessary by the Grantee for appropriate management.

4.1.4 Structures for the purpose of habitat restoration, protection, or enhancement.

4.2 There shall be no cutting, destruction or removal of trees or other plants, except, with prior notice to the Grantee pursuant to Section 18, as necessary for disease control, habitat restoration and management, visitor safety, or as otherwise prescribed in a management plan approved by the Virginia Department of Conservation and Recreation or successor state conservation agency.

4.3 There shall be no horseback riding, operation of mountain or other bicycles, operation of mechanized vehicles, or other activity likely to result in the introduction of non-native species or in significant compaction of the Property's soils or destruction of vegetation, except that the Grantor may operate vehicles as necessary for maintenance of the Property.

4.4 There shall be no mining, excavating, dredging, or removing from the Property of soil, loam, peat, gravel, sand, hydrocarbons, rock, or other mineral resource or natural deposit and no changing of the topography through the movement or placement of soil or other substance or material such as land fill or dredging spoils, except for: (1) disturbance of soil to conduct activities on the Property otherwise permitted by this Conservation Easement; (2) placement of soil, rock, or other earth materials, vegetative matter, and compost reasonably necessary for the purpose of combating erosion or flooding or to enhance habitat values; and (3) disturbance of soil by or under the supervision of a professionally qualified archaeologist for the purpose of excavating archaeologically significant deposits, sites or features, provided that plans for such archaeological activity have been submitted to and approved by the Grantee prior to any ground-disturbing activities, in accordance with Section 18.

4.5 There shall be no activities conducted on the Property or adjacent property if owned by Grantor which would cause erosion or siltation on the Property.

4.6 There shall be no activities conducted on the Property or on adjacent property if owned by Grantor which could reasonably be expected to cause pollution, alteration, depletion or extraction of surface water, natural water courses, lakes, ponds, wetlands, or any other water bodies on the Property.

4.7 There shall be no storage or dumping of ashes, trash, garbage, solid or liquid waste, or other unsightly or offensive material, hazardous or toxic substance, material or waste, nor any placement or use of underground storage tanks in, on, or under the Property.

4.8 The use of chemical fertilizers, herbicides, pesticides, fungicides, and natural controls is permitted only if such use is in compliance with all applicable federal, state, and local statutes and regulations and only to the extent such use does not have a demonstrable detrimental effect on the conservation values of the Property.

4.9 The Property shall not be subdivided in any manner, in law or in fact.

4.10 There shall be no residential, agricultural, commercial or industrial use of the Property.

5. Grantor's Reserved Rights. The Grantor hereby reserves the following rights, which are permitted only if such uses and activities do not materially impair the purpose of this Conservation Easement:

5.1 The right to undertake any activity or use of the Property not prohibited by this Conservation Easement.

5.2 The right to sell, give, mortgage, lease, or otherwise convey the Property, in accordance with section 12.

6. Grantor's Retained Duties. The Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep and maintenance of the Property.

7. Monitoring. The Grantee shall have the right to enter upon the Property at any time to monitor Grantor's compliance with and otherwise enforce the terms of this Conservation Easement.

8. Enforcement. Upon any breach or threatened potential breach of this Conservation Easement by Grantor, Grantee may, after reasonable notice to Grantor, take such action as the Grantee determines to be necessary or appropriate to enforce the covenants and restrictions set forth in this Conservation Easement.

8.1 The Grantee shall be entitled to pursue any cause of action which may be available to the Grantee at law or in equity to prevent or correct any breach of such covenants and restrictions, including obtaining injunctive relief to prevent or rectify any breach of this Conservation Easement.

8.2 The Grantee shall be entitled to recover damages for violation of the terms of this Conservation Easement, including damages for the loss of those conservation values that are protected by this Conservation Easement.

9. Effect of Failure to Enforce. Any forbearance by the Grantee to exercise its rights under this Conservation Easement in the event of any breach of any term of this Conservation Easement by Grantor shall not be deemed or construed to be a waiver by Grantee of such term or of any subsequent breach of the same or any other term of this Conservation Easement or any of the Grantee's rights under this Conservation Easement.

10. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle the Grantee to bring any action against the Grantor for any injury to or change in the Property resulting from causes beyond Grantor's control, including without limitation, fire, flood, storm, and earth movement, or from any prudent action taken by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes.

11. Control. Nothing in this Easement shall be construed as giving rise, in the absence of a judicial decree, to any right or ability in the Grantee to exercise physical or managerial control over the day-to-day operations of the Property, or any of Grantor's activities on the Property, or otherwise to become an operator with respect to the Property within the meaning of The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, and any similar statute of the Commonwealth of Virginia.

12. Subsequent Transfers. Grantor agrees to incorporate in whole or by reference the terms of this Conservation Easement in any deed or other legal instrument by which it divests itself of any interest in the Property, including, without limitation, a leasehold interest. Moreover, in any deed conveying any interest in the Property, this Conservation Easement shall be referenced by Deed Book and Page Number in the deed of conveyance. Grantor further agrees to give written notice to the Grantee of the transfer of any interest at least sixty (60) days prior to the date of such transfer. The failure of the Grantor to perform any act required by this paragraph shall not impair the validity of this Conservation Easement or limit its enforceability in any way.

13. Successors and Assigns. This Conservation Easement shall be binding upon the Grantor, including all successors and assigns, future owners of the Property or of any interest in the Property, and their personal representatives and heirs, and shall constitute a servitude upon and touching the Property and shall continue as a servitude running in perpetuity with the Property.

14. Termination of the Grantee. Whenever the Grantee shall cease to exist, this Conservation Easement and any right of enforcement shall vest in the Virginia Outdoors Foundation. If the Virginia Outdoors Foundation, or the successors or assigns thereof, should cease to exist, or should not qualify as a "qualified organization" under Section 170(h) of the Internal Revenue Code (or any successor provision then applicable) or should otherwise cease to be eligible to receive this Conservation Easement, then this Conservation Easement and any right of enforcement shall vest in the Commonwealth of Virginia.

15. Modification. Grantor and Grantee may jointly amend this Conservation Easement provided that no amendment shall be allowed that will affect the status of Grantee under §501(c)(3) and §170(h) of the Internal Revenue Code or §§ 10.1-1009 et seq. and §§10.1-1700 et seq. of the Code of Virginia (or any successor provisions then applicable). Any amendment of this Conservation Easement must be consistent with the purpose of this Conservation Easement, shall not affect its perpetual duration, and shall not permit any uses or activities which are more intensive or less restrictive than the uses and activities prescribed by the conditions of the Deed of Conservation Easement granted to the Commonwealth of Virginia, Department of Conservation and Recreation for the Property. Any such amendment shall not be effective unless and until recorded in the land records of Fairfax County, Virginia.

16. Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Conservation Easement shall be liberally construed in favor of the grant to effect the purpose of this Conservation Easement and the policy and purpose of

the Virginia Conservation Easement Act. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purpose of the Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

17. Severability. If any provision of this Conservation Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Conservation Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

18. Notice and Requests for Approval. In any case where the terms of this Conservation Easement require notice to or approval of the Grantee, such notice or request for approval shall be in writing. Notice of an activity and requests for approval must describe the activity in question in sufficient detail to permit the Grantee to make an informed judgment as to its consistency with the purpose of this Conservation Easement. The Grantee shall have forty-five (45) days from the receipt of requests for approval (or such longer period as the parties may agree to in writing) within which to review such request and grant or deny approval. If the Grantee fails to respond within forty-five (45) days, Grantor will further contact the Grantee to confirm that the Grantee received the first request, and if after ten (10) days the Grantee has not responded, the proposed activity shall be deemed approved. Written requests by Grantor and any subsequent response by the Grantee shall be deemed given when received, or three (3) days after mailing by certified mail, or by FedEx or a similar public or private courier service which provides receipt of delivery, properly addressed as follows: (a) if to Grantee, at Northern Virginia Conservation Trust, Packard Center, 4022 Hummer Road, Annandale, VA 22003; (b) if to Grantor, to Director, Fairfax County Park Authority, 12055 Government Center Parkway, Suite 927, Fairfax, Virginia 22035. Any party can change the address to which notices are to be sent to him or her by giving notice pursuant to this paragraph.

19. Condemnation. If the Conservation Easement is taken or condemned, in whole or in part, by exercise of eminent domain, the Grantee shall be entitled to compensation in accordance with applicable law.

IN WITNESS WHEREOF Grantor and the Grantee have executed this Conservation Easement as of the date and year first above written, the grant of which shall be effective the date of recordation in the Office of the Clerk of the Circuit Court, Registry of Deeds of Fairfax County, Virginia.

[SIGNATURES APPEAR ON FOLLOWING PAGES]

GRANTOR:

FAIRFAX COUNTY PARK AUTHORITY

By: _____
Michael A. Kane, Director, Fairfax County Park Authority

COMMONWEALTH OF VIRGINIA,
COUNTY OF FAIRFAX, TO WIT:

I, BARBARA J. Gosa a Notary Public for the Commonwealth aforesaid, hereby certify that Michael A. Kane personally appeared before me this day and acknowledged the foregoing instrument.

WITNESS my hand and official seal this 17th day of December, 2003.

_____
Notary Public

My commission expires: 11/30/2005 (SEAL)

GRANTEE:

NORTHERN VIRGINIA CONSERVATION TRUST,
Formerly known as the Fairfax Land Preservation Trust

By: Jean R. Packard
Jean R. Packard, Board Chair, Northern Virginia Conservation Trust

COMMONWEALTH OF VIRGINIA,
COUNTY OF FAIRFAX, TO WIT:

I, ELEANOR W GLASS, a Notary Public for the Commonwealth aforesaid, hereby certify that Jean R. Packard, Board Chair of the Northern Virginia Conservation Trust, personally appeared before me this day and acknowledged the foregoing instrument.

WITNESS my hand and official seal this 17th day of December, 2003.

Eleanor W Glass
Notary Public

My commission expires: 12-31-2007 (SEAL)

Exhibit A

Preserve/Easement

Beginning at a point common with the property of Ingersoll, Trustee and the subject property of Fairfax County Park Authority as recorded in Deed Book 11930, at Page 244 in the Land Records of Fairfax County, Virginia,

Thence running with the property of Ingersoll, Trustee, the following two (2) courses and distances:

N 61° 29' 45" W 743.39 feet to a point;

N 43° 05' 40" W 312.52 feet to a point;

Thence departing Ingersoll, Trustee and running with the easterly line of Cove Point LNG, LC common with the subject property the following two (2) courses and distances:

N 56° 15' 52" E 123.43 feet to a point;

N 57° 05' 52" E 46.82 feet to a point;

Thence running with the northerly line of Cove Point LNG, LC common with the subject property the follow course and distance:

N 52° 03' 13" W 620.46 feet to a point;

Thence running through the property of Fairfax County Park Authority as recorded in Deed Book 11930, at Page 244 and in Deed Book 11828, at Page 593 in the Land Records of Fairfax County, Virginia the following five (5) courses and distances:

N 14° 55' 52" E 4,517.43 feet to a point;

N 82° 47' 44" E 766.84 feet to a point;

S 12° 33' 02" E 3,593.76 feet to a point;

S 13° 50' 07" W 2,142.18 feet to a point; and

N 86° 00' 26" 981.65 feet to the point of the beginning and containing 226.3590 acres, more or less.

Less and except the areas described in the following court orders recorded in the Land Records of Fairfax County, Virginia:

a. Columbia LNG Corporation as recorded in Deed Book 4758 at Page 177;

b. Virginia Electric and Power Company as recorded in Deed Book 1065 at Page 1, and

Less and except the areas described in the following easements recorded in the Land Records of Fairfax County, Virginia:

a. Rights-of-Way granted to Virginia Electric and Power Company as recorded in Deed Book 1862 at Page 412, Deed Book 2189 ant Page 360, and Deed Book 3131 at Page 381;

b. Right-of-Way granted to the Chesapeake and Potomac Telephone Company as recorded in Deed Book 5543 at Page 1535;

c. Right-of-Way granted to Prince William Electric Cooperative as recorded in Deed Book 5537 at Page 281;

d. Rights-of-Way granted to Columbia LNG Corporation as recorded in Deed Book 4761 at Page 202 and Deed Book 5429 at Page 32;

e. Right-of-Way granted to Atlantic Seaboard Company as recorded in Deed Book 3005 at Page 538;

f. Right-of-Way granted to Virginia Gas Corporation as recorded in Deed Book W-10 at Page 386; and

g. Ingress/Egress Easement granted to Board of Supervisors of Fairfax County as recorded in Deed Book 11748 at Page 1447.

COMMONWEALTH of VIRGINIA

Natural Area Preserve Management Guidelines

Virginia Department of Conservation and Recreation
Division of Natural Heritage
December 2000

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

Commonwealth of Virginia

Natural Area Preserve Management Guidelines

Department of Conservation and Recreation
Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219
www.dcr.state.va.us/dnh

(804) 786-7951

These guidelines were approved by the
Director of the Department of Conservation and Recreation
on December 8, 2000
and by the
Board of Conservation and Recreation
on December 12, 2000

Contents

Virginia Department of Conservation and Recreation
Division of Natural Heritage

Natural Area Preserve Management Guidelines

Overview

Natural area preserves in Virginia are managed for the objective of providing suitable habitat conditions for the continued existence of rare or declining species of plants and animals, and also to maintain rare and exemplary natural community types. Active management actions are often required to meet objectives, as is the case in many better known fields of natural resources management. For example, actions are taken in order to: (1) protect fragile and rare habitats from the potentially destructive impacts of human visitation while still allowing compatible and appropriate types of public use; (2) reinstate the natural process of fire through the use of prescribed burning to create and maintain habitat conditions required by fire-adapted and fire-dependant species and communities; (3) restore altered water flows and soil moisture regimes by blocking ditches or removing fill; (4) control invasive plants that rapidly usurp resources and occupy habitats of rare species while obliterating natural communities.

These management guidelines are intended to explain the general rationale for managing rare species and natural communities, to clarify the reasons for restricting public use and visitation, and to state principles and ideas that guide management of natural areas with the goal that they will perpetually sustain their valuable and vulnerable resources.

Introduction

The Virginia Natural Area Preserve System was established by law in 1989 to protect and conserve *natural heritage resources* (habitats of rare plants and animals; exemplary natural communities; other rare natural features) throughout the state. This system of protected lands is administered by the Virginia Department of Conservation and Recreation (DCR) and managed by the Division of Natural Heritage (DNH). Natural Area Preserve Dedication, in accordance with the Code of Virginia sections 10.1-209 - 217 (Virginia Natural Area Preserves Act), offers strong levels of protection by placing privately and publicly held natural areas into a legally established statewide preserve system with statutory protection against most forms of condemnation and conversion to other land uses.

These guidelines were developed by DCR–DNH to provide management direction for dedicated natural area preserves in Virginia. Natural area preserves may constitute a portion of larger conservation areas such as state parks, municipal watersheds, county forests, and privately-owned open spaces. Such lands usually have recreation and/or commodity and income production as primary management objectives; thus, they nearly always have a broader set of compatible uses than is appropriate for natural area preserves.

Natural areas often support fragile habitats that are easily disturbed and sometimes destroyed by the presence of people. In a world dominated by humans, most natural areas have been modified

to varying degrees by past and on-going land-use activities, and by introductions of non-indigenous species of plants and animals. The result, in some cases, has been the suppression or elimination of natural processes such as fire and flooding. These agents of disturbance are required to maintain successional stages that provide habitat for certain species or that result in the formation of distinct communities. Often, the introduction of exotic and invasive plants and animals poses a threat to native species and natural community integrity. For these reasons, a "hands-off" approach will usually not meet the objectives of natural areas stewardship. Natural area stewards must identify which processes are involved in maintaining communities and the habitats of rare species in order to develop successful management strategies and prescriptions.

The primary and over-riding objective of natural areas stewardship is to provide for the continued presence of natural heritage resources. Attaining this objective may require management actions that result in perpetuation of a particular successional vegetative stage (habitat condition) required by a rare species or characterizing a natural community. Actions are taken that maintain, restore, or mimic natural processes and result in a particular desired vegetative structural and compositional condition. Thus, natural area stewards may work to prevent an unnatural, harmful disturbance (such as invasion by a non-native plant like kudzu) and allow or promote a natural, appropriate disturbance (such as fire) to maintain a rare grassland or prairie community in the Shenandoah Valley. By taking such actions, the natural processes and conditions that allowed the rare species or community to occur at the site are restored, to the extent possible.

Natural Area Preserve (NAP) Management Plans are written for all dedicated natural area preserves in Virginia. Plans are comprehensive and contain specific site and resource information plus management objectives and action recommendations that guide preserve stewardship and allow for management continuity over time. With assistance from various sources and organizations, DCR–DNH staff lead the assembly of information and development of management strategies aimed at enhancing, maintaining, and/or restoring the natural heritage resources for which the site was protected.

Public Use

Natural area preserves are acquired and managed primarily to perpetuate the long-term quality, condition, and viability of natural heritage resources contained or supported within their boundaries. Some natural area preserves can be managed to meet this objective while at the same time accommodating some level of public use. Compatible and appropriate types of uses for each preserve are identified through the management planning process. Visitor use is monitored by natural area stewards and data is used for refining public use and visitor access objectives. Some preserves contain extremely fragile habitats and species that are damaged by even low levels of visitation. Other preserves are more resilient and may be capable of sustaining higher levels of public use. Some preserves may be closed seasonally but open for visitor use at specific times of year. At others, visitation may be restricted to specific areas – such as along a designated trail or boardwalk.

Public use of natural area preserves can conflict with the primary natural heritage resource management and protection objective mandated by the Virginia Natural Area Preserves Act. The term "public use" as used here includes such activities as hiking, camping, biking, fishing, hunting, swimming, research, and education. It is a plain fact that human visitors often harm or threaten population viability of rare plants and animals, as well as their often-fragile habitats. The degree of damage depends on the frequency, intensity, and location of visitor activity. Some level of public use may be considered as appropriate if the characteristics of visitation and use are compatible with the resource protection priority and if such use does not threaten or degrade occurrences of natural heritage resources. Additionally, with the scarcity of funds to support natural areas management, costs to monitor and manage public use cannot be excessive.

Guidelines relating to specific types of public uses in the context of natural areas management follow. These are organized into three use categories, based on their appropriateness under normal circumstances and management situations.

Category 1: Normally Appropriate Uses

Birding, wildlife-watching, wildflower and native plant observation, photography. These non-consumptive uses by the public are often compatible with natural areas management. Populations of plants and animals are simply being observed, often at a distance, with no collection, disturbance, or resultant change in population condition. At some sites, trails or observation platforms may be beneficial for managing impacts of large groups or increased numbers of visitors participating in these activities. Particularly on fragile sites such as mountaintop balds, rock outcrops, and wetlands, repeated foot travel can damage local habitats and trample rare plants. Visitation may, in some cases, need to be limited to specific seasons. Such is the case with preserves supporting populations of colonial beach nesting birds, so that nesting success is not decreased as a result of the presence of humans.

Hiking. Trails and vestiges of old roads nearly always exist as a result of land use prior to the establishment of a natural area preserve. Such trails may or may not be appropriate for public use by hikers, depending on factors such as proximity to occurrences of natural heritage resources, active erosion, wetland crossings, and other terrain features. New trails, if they are to be constructed, should be carefully located and maintained. All proposals for new trails in a natural area preserve, whether for recreation, research, or education, will be reviewed by the Natural Area Preserve Public Access Oversight Committee, co-chaired by the DCR–DNH Division Director and Stewardship Manager.

A map of existing and proposed trails will be included in the preserve Management Plan section on public access. This section will describe the purpose and physical characteristics of preserve trails. On most DCR-owned preserves, trail maintenance and use monitoring is the responsibility of the regional DNH Natural Area Operations Steward. Trail use monitoring assesses the number of trail users, the specific aspects of trail maintenance, and the extent to which users stay on designated trail routes. Careful attention is given to monitoring whether occurrences of natural heritage resources are being degraded by visitors using trails. It is notable that adverse effects from trail use are difficult to detect before damage has occurred and that once public use

patterns are established, they are not easy to change. As needed, DNH staff will consult with Division of Planning and Recreation Resources and Division of State Parks staff to develop strategies to protect sensitive resources. Actions for reducing access to sensitive areas will include blocking roads and trails with gates and rocks, and installing interpretive signs explaining the purpose for access restrictions in natural area preserves.

Research. Numerous possibilities for research exist on natural area preserves. Baseline inventory work is often needed, such as floral, faunal, and community surveys. Research that increases knowledge about local microclimates, soils, geology, and hydrology of the area greatly benefits and informs preserve management decisions. To the extent possible, DNH will support scientific studies that show promise to fill knowledge gaps in natural area preserve and natural heritage resource management. Proposals for research funding support on natural area preserves will be reviewed on an individual basis. Studies to be conducted on preserves will require prior submission of a Research and Collecting permit application, review and approval by DNH staff, and issuance of a written permit. Research methods will be used that minimize adverse effects on natural heritage resources and physical features at the preserve. At project conclusion, researchers will be required to remove evidence of their work such as residue from destructive sampling techniques (clipped plots), temporary shelters for instrumentation, plastic flagging, and visual plot locators such as stakes, wire flags, or sampling station monuments

Teaching and interpretation. The use of natural area preserves for educational programs is highly appropriate. Natural areas present an opportunity to observe many rare forms of life as well as the natural processes that maintain them. Preserves are also ideal locations for introducing students to the concept and value of biodiversity and for educating people of all ages of the need for broad and comprehensive approaches to natural resource management. As with other public uses of natural areas, teaching and interpretation activities must be managed to prevent adverse impacts on natural heritage resources. DNH staff and/or responsible volunteer instructors should accompany all group field trips to natural area preserves.

Category 2: Conditionally Appropriate Uses

Fishing, picnicking, canoeing. Whether or not these activities constitute appropriate public uses depends on (1) the site-specific characteristics of a particular natural area and (2) the observed consequences of such uses. For example, circumstances may allow low numbers of fishermen to use a beach that supports rare beach nesting birds and animals. At some preserves, however, there is clear justification for prohibiting these uses because they are known or expected to cause negative impacts to rare species. In all cases, where allowed, the effects of such uses will be monitored. If negative impacts to natural heritage resources are observed, the causative public use(s) will be discontinued.

Swimming. Swimming is not an authorized activity on DCR-owned natural area preserves, due primarily to the issue of public safety. With no lifeguards or patrols in place on public beaches or waterways, responsible landowning public agencies cannot officially sanction swimming. Rather, in nearly all cases, they must prohibit or actively discourage it. On privately-owned natural area preserves, decisions to allow swimming or to prohibit it are the responsibility of the

landowner. In cases where beach uses such as sunbathing and beach-walking result in direct damage to fragile beach and dune habitats that support rare species, such impacts will be documented and the specific causative use(s) discontinued.

Hunting. As with fishing, hunting is not necessarily incompatible with natural area preserve management. Hunting may be both compatible and necessary for the purpose of controlling populations of animals that need to be limited such as white-tailed deer, nutria, snow geese, or resident Canada geese. However, hunting is an activity that can and often does result in conflicts between user groups. For example, public use by birders and wildlife watchers who visit a preserve to view migratory waterfowl is not compatible with concurrent waterfowl hunting. Likewise, use of a preserve by nature photographers or educators would not be a compatible use during periods when hunting activities to achieve control of the local deer population were taking place. In most instances, hunting on natural area preserves will be limited temporally and conducted specifically to meet the management objective of controlling animal populations that, if left unchecked, present a threat to natural heritage resources on site.

Category 3: Incompatible and Inappropriate Uses

Camping. Camping activities inevitably result in repeated localized intensive use and long-term degraded site effects. Even low-intensity camping styles cause some adverse impacts. And while "no trace" camping practices have much to recommend them, DCR–DNH does not have the capacity to monitor campers and ensure that they follow such practices. Additionally, if "no-trace" or other camping styles were allowed on state-owned preserves, increasing numbers of people would request camping access and many would not abide by "no trace" practices. Thus, permitting camping would lead to gradual habitat degradation and negative impacts on rare species. For these reasons, camping is considered incompatible with the objectives of the Virginia Natural Area Preserve System and is prohibited.

Bicycles. Except for accessing established parking areas and public access points designed for automobiles, use of bicycles in natural area preserves is prohibited. Mountain biking has become a popular outdoor activity that exerts increasing pressure on sensitive natural areas. If bicycle use has occurred in a preserve or if ready access exists, management actions will be taken to inform riders that biking is not permitted. If feasible or needed, access will be blocked with signs and/or barricades placed in strategic locations. Adverse effects from mountain bikes may be difficult to detect before damage has occurred. Given that bicycle riding patterns are difficult to change once established, it is imperative to quickly develop strategies to protect natural heritage resources from this incompatible use once such use is detected.

Horseback riding. This use is inappropriate for natural area preserves due to the well-documented negative impacts to soils and vegetation of concentrated and frequent passage of horses. Additionally, the introduction of invasive weeds from both manure and hoof-borne vectors is a documented negative aspect of horseback riding in areas managed for natural heritage resources. While infrequent use may cause minimal impacts, increased levels of use are inevitable on public lands. Thus, as with bicycles, horseback riding is nearly always an inappropriate and incompatible use on lands managed as natural area preserves.

Rock climbing and caving. Rock outcrops, cliffs, and caves are among the most fragile of habitats and support some of the rarest occurrences of natural heritage resources in the state. The repeated presence of humans at these places often leads to habitat degradation and, if prolonged or chronic, is well-known to cause damage or extirpation of rare species of plants and animals. For this reason, access to most cliffs, rocky peaks, and caves on natural area preserves will be restricted to designated trails or observation points *only*, or to visitation during an organized field trip, or following issuance of a written Research and Collection or Special Use permit from DCR–DNH.

Off-road vehicles. Motorized all-terrain-vehicles including SUVs, "four-wheelers," and dirt bikes are prohibited within natural area preserves. These uses degrade trails and cause severe erosion requiring expensive repairs. Noise pollution from vehicle engines reduces the quality of the outdoor experience for other authorized user groups and constitutes harassment to wildlife. The use of such motorized vehicles is perhaps the most incompatible of all public use categories in natural area preserves.

Unleashed pets. Visitors are not prohibited from bringing pets with them when visiting natural area preserves. However, by regulation, pets must at all times remain under leash restraint while on DCR-owned lands. Unleashed dogs pose a particular threat to natural heritage resources and to various species of wildlife. Free-roaming dogs are known to cause nest abandonment in shore nesting bird colonies and to harm or destroy ground nesting bird eggs and young. Digging activity by dogs also causes habitat degradation on beaches protected for rare animals such as northeastern beach tiger beetles. For these reasons, all dogs or other domestic animals accompanying human visitors to natural areas preserves must be kept on leash at all times.

Collection of plants, animals, minerals, or artifacts. In order to protect occurrences of rare species, the collection and removal of plant material, animals, minerals (rocks), or artifacts is prohibited. The one exception to this guideline is the non-commercial, incidental gathering of common species (e.g., blackberries, blueberries, strawberries) for personal consumption. However, some rare species that produce an edible berry are native to Virginia and should not be picked. In such instances and locations, signs will be posted to inform the public in order to prevent negative effects to rare species from incidental collection. For legitimate research and education purposes, collection of specimens may be approved by DNH following submission and review of an application for a natural area preserve Research and Collection permit.

Site Operations Management

Roads

Many preserves have existing roads from previous land uses. Building new roads is nearly always inappropriate in natural area preserves and seldom is there sufficient justification to do so. Even roads outside of the preserve, especially along boundaries, may adversely affect resources within the preserve due to impacts such as introduction of invasive species, noise pollution, and alteration of local hydrology. Existing interior roads, skid trails, or historic traces will be mapped and described in Natural Area Preserve (NAP) Management Plans. Roads within preserves will be considered for closure or obliteration if they have no specific utility or function

for preserve stewardship, or if such closure would reduce negative impacts to natural heritage resources or cause a decrease in vandalism to preserve facilities and infrastructure. Road maintenance schedules and costs will be included in NAP Management Plans.

Rights-of-way
Utility corridors such as powerline rights-of-way can and do exist in natural area preserves. Siting of new corridors within preserve boundaries is highly inappropriate and should be prevented by preserve Deed of Dedication language. Rights-of-way agreements or easements particular to a preserve will be appended to the NAP Management Plan, along with a list of contacts regarding agreements and corridor maintenance. All non-DCR entities (rights-of-way maintenance contractors, utilities, municipalities, etc.) should be informed of the sensitivity and importance of natural heritage resources in the preserve. Frequency and methods for rights-of-way maintenance will be used that have the fewest negative effects on natural heritage resources. Such coordination will decrease adverse impacts to rare species and increase DCR inclusion in planning for expansion or improvement to utility corridors near or within natural area preserves.

Access Points
Public access facilities and points of entry to preserves will be designed so as to meet the primary objective of protecting natural heritage resources. Access designs will first and foremost function to restrict or direct visitor activity in ways that protect fragile habitats. Determining and mapping the location of sensitive areas within the preserve is essential so that threats can be abated and vulnerable resources protected. All proposed and existing structures and signs at preserve entrances will be described in NAP Management Plans. Additional needs for improved parking, interpretive signs, and trails will be discussed and approved by the NAP Public Access Oversight Committee prior to project implementation.

Facilities and Infrastructure
Guard rails, signs, fences, gates, trail steps, and other devices or measures may be installed as necessary for site security and visitor safety. Such infrastructure should be described and justified in each NAP Management Plan. Potentially dangerous conditions such as dead trees, branches, abandoned wells or pits, and similar hazards on trails or in authorized public use areas may be removed, cleared, filled in, or otherwise remedied. When in accordance with the NAP Management Plan, evidence of past human use such as fences, fence rows, culverts, trash dumps, and abandoned vehicles or structures (having no historic or scientific value) may be removed from the preserve.

Biological Resource Management

Prescribed Burning
Prescribed burns will be conducted to restore, enhance, and maintain fire-adapted natural communities, control invasive species, and accomplish various other objectives as identified in NAP Management Plans and in accordance with guidance from DNH fire managers and fire ecologists. DNH stewardship staff with training and experience in fire management that hold Virginia Prescribed Burn Manager Certification will, in conjunction with reviews and approval by other fire managers, prepare a written burn plan for each prescribed burn project. All required

permits and approvals shall be obtained for each project. Burning shall not be attempted under conditions more hazardous than those specified in the prescribed burn plan. The use of equipment and motorized vehicles, size and roles of the burn crew, identity of the fire leader, time of year for the burn, frequency of burning, amount of area to be burned, and other detailed information pertinent for conducting a burn shall be specified in prescribed burn plans.

Prescribed burn plans shall be reviewed and approved by a DCR Fire Manager. The implementation of prescribed burn plans will require the concurrence of the Director of the Department of Conservation and Recreation, or his/her designee, and the Director of the Division of Natural Heritage. Stewardship objectives of prescribed burning shall be stated in NAP Management Plans. As appropriate and needed, monitoring of animal, plant, or community responses will be accomplished in order to determine efficacy of burn projects. Copies of unit burn prescriptions and monitoring reports will be completed and archived in the DNH NAP management files.

Restoration of Natural Hydrology

Hydrologic conditions altered by human activities such as drainage or fill placement may be restored, as appropriate, to create soil moisture regimes necessary for the benefit and enhancement of rare species and natural community occurrences. Stewardship actions that affect hydrology will be conducted for the purpose of meeting habitat maintenance and restoration objectives for which the preserve was established. Specific actions will be described in NAP Management Plans and be in accordance with local, state, and federal laws and regulations.

Erosion Control and Conservation Plantings

Control of erosion in natural area preserves that result from human disturbance may be accomplished through conservation plantings or by other means in order to meet natural heritage resource stewardship goals, to protect water quality, and to abate man-induced soil loss arising from previous land surface alterations. Species native to Virginia (and if possible, native to the specific region) will be used for conservation plantings to achieve soil stabilization. Planting non-native and/or invasive alien species is inappropriate on natural area preserves as well as in other natural settings, and such plantings are now widely discouraged for most natural resource conservation projects. In addition, erosion problems on adjacent or nearby lands that impinge on preserve stewardship issues may be addressed in cooperation with DCR's Division of Soil and Water Conservation and the landowner. Erosion mitigation plans will be developed as needed in cooperation with appropriate agencies, parties, and stakeholders

Invasive Species Control

Measures to control invasive plants and animals will be taken using accepted methods consistent with objectives stated in NAP Management Plans. The term "control of invasive species" may in some cases include the control of plant succession, even if targeted plants are native to Virginia. Actions recommended for the control of any plant or animal species, noxious or otherwise, will be described in NAP Management Plans.

Insect and Disease Control
Insect or disease control programs will be undertaken only if the infestation or outbreak (1) threatens adjacent natural areas, (2) will drastically alter natural ecological processes within the natural area preserve or cause adverse economic impacts on adjacent property, or (3) constitutes a public health emergency provided that such control programs are approved by the managing agency or are provided for by law.

Pesticide Use
The use of certain pesticides is one means by which natural area preserve stewards may accomplish specific management objectives. NAP Management Plans describe those situations under which pest management, such as invasive plant control programs, will be undertaken. Pesticide use in the context of natural area stewardship is mostly limited to herbicide applications for controlling (1) invasions of exotic vegetation that threaten on-site occurrence of rare species or natural communities or (2) weedy growth in public access facilities such as parking areas. Other use of pesticides should be made only with project review and approval by DNH staff or by consent of the managing entity or agency.

Forest Harvesting and Silviculture
The objectives of management for natural area preserves focus on (1) minimizing soil disturbance to retard or prevent invasive plant introductions, (2) retention and restoration of natural hydrological regimes and nutrient cycles, and (3) taking other actions to alter or maintain habitat conditions that favor the expansion of populations of rare species of plants and animals. Objectives of natural area preserve management do not include production of a continuous supply of forest products or income streams. Many silvicultural practices such as chemical and/or mechanical site preparation, fertilization, drainage, and plantation establishment are, in most instances, not compatible with protection and stewardship goals on natural areas as they can conflict with the goal of maintaining and enhancing natural plant communities and rare species habitats.

Nevertheless, actions such as cutting, deadening, or removing trees are not necessarily incompatible with natural areas management. Some silvicultural activities may be appropriate tools for natural area preserve management, but only when the objective is improvement or creation of habitat conditions for a targeted rare species or natural community. For example, thinning and burning a pine stand in order to favor shade-intolerant endangered plants such as smooth coneflower, or removing loblolly pine in order to restore a longleaf pine savanna may be high priorities requiring specialized forest harvesting plans for some natural area management programs. Such thinning and overstory removals may even, in some cases, best be accomplished through the process of conducting a timber sale.

When alterations to existing structure and composition of forest vegetation are appropriate and necessary to benefit natural heritage resources, natural area preserve stewards may make use of practices or treatments that closely resemble those of silviculture. Management plans for natural area preserves should clearly designate what vegetation management practices are to be used and for what objectives.

Traditional Wildlife and Fisheries Management
Natural area preserves are not purchased or managed for the objective of providing fishing, hunting, or trapping opportunities for the general public. It is therefore inappropriate to take management actions on preserves with the specific intent of improving consumptive recreation opportunities. However, certain types of hunting, fishing, or trapping activities may, at times, be considered compatible with preserve stewardship goals. For example, hunting may occur on some preserves under circumstances such as retained rights, conditions of transfer, traditional use, or to meet population reduction objectives. Hunting, fishing, and trapping activities for the purpose of protecting or enhancing natural heritage resources will be described in site-specific NAP Management Plans.

Rare Species Recovery
A primary objective of natural areas management is to conduct activities which provide or enhance habitats for plants and animals that have not benefited from common, traditional, or commercial land management regimes. Management of endangered, threatened, and special concern species of both plants and animals, plus non-listed species which may be of management concern on a particular natural area preserve, will receive close attention from natural area managers. Habitat manipulations and protective measures favoring a particular species will be undertaken as specified in NAP Management Plans. Monitoring of the target species will be undertaken in order to assess effectiveness of recovery or management actions.

Reintroduction as a means for rare species recovery will be considered only as a last resort and only when it is clear that reinstating natural processes and/or threat and stress mitigation will not result in population recovery. Intentional introductions of plant material of any type or kind of propagule (plant, cutting, seed, shoot, rhizome, rootstock, bulb, corm, etc.) or of any animal will be made only with review and approval, on a species by species and site by site basis, by a DNH oversight committee consisting of the Division Director, Stewardship Manager, and Chief Biologist.

Livestock Grazing and Crop Production
In nearly all cases, domestic livestock grazing is incompatible with the objectives of natural area preserve management. Concentrated grazing by cattle, horses, sheep, or other stock cannot be rationally argued to mimic a natural process; e.g., to simulate the effects once produced by native grazing animals such as bison or elk. Negative grazing effects commonly include degradation of stream banks and reduction of downstream water quality. Eliminating grazing and allowing or facilitating reestablishment of stream bank vegetation is one sound method of riparian buffer restoration.

However, certain exceptions are noteworthy of mention. Some natural area managers have experimented and seen positive results with grazing of goats in mountain bald communities for the control of invading woody species. Specialized circumstances may exist, such as retained rights or conditions of sale where grazing is continued for a specified time period. In such cases, detailed records will be kept on stock density, timing, and duration of grazing. A monitoring program will be designed and exclosures may be established to evaluate the effects of grazing. Management options for reducing negative grazing impacts to natural heritage resources should

be developed under the guidance of the NAP Management Plan. These options may include shifting the season of grazing, providing resting periods, changing stocking levels, appropriately locating water, shelter, and mineral supplements, and rehabilitating soil.

As with grazing of stock, crop production for agricultural production purposes is not compatible with natural area preserve management. Except in the case of retained rights or short-term leases in specialized instances, the use of natural areas for producing crops of any kind, including forages, grains, leaf, vegetables, or fruits is not consistent with the purpose and objectives for establishing and managing natural area preserves.

Archeological and Historic Resources

Archeological and historic resources on natural area preserves will be protected. Inventories for archeological and historic resources will be conducted and recommendations for conservation will be included in NAP Management Plans. Resources may be considered for interpretive and/or research value as identified and prescribed in the Plan. The collection of artifacts will be discouraged and only permitted for justified research studies approved by the Department of Historic Resources and the Department of Conservation and Recreation.

Eligible historic structures will be surveyed and nominated for placement on the Virginia Landmarks Register. Archeological research may vary, from recordation surveys where no collection or excavation is performed, to intensive excavations usually focused in a confined area. Consequently, compatibility of archaeological research and natural area preserve stewardship may vary and each proposed action should be assessed on an individual basis.

Certain resources are protected by established statutes, regulations, and guidelines. Activities which would in some way affect significant historic resources may require review and/or permitting by the Department of Historic Resources. Pertinent statutes to consider include the Virginia Antiquities Act, Virginia Cave Protection Act, Appropriations Act, and the National Historic Preservation Act.

Minerals

Mineral exploration and extraction are incompatible and inappropriate uses on natural area preserves, and are prohibited in all cases. Soil disturbance, especially at the scale necessary to remove mineral resources, is clearly at odds to the purposes and objectives of natural area preserve establishment and stewardship. Simply stated, dedicated natural area preserves will have no mineral exploration or exploitation. Collection of any surface mineral specimens for research or educational purposes requires the prior issuance of a Research and Collection permit by the Department of Conservation and Recreation.

Modifications

Modifications to these Natural Area Preserve Management Guidelines shall require the approval of the Director of the Department of Conservation and Recreation, or his/her designee.

Appendix 3: Invasive Plant Species Expected to Occur at Elklick Woodlands NAP

Japanese stilt-grass, *Microstegium vimineum*, is a shade tolerant C4 grass and gets a toe-hold in mesic and wet forests on disturbed soils. It outcompetes and ultimately overwhelms other plants, creating a carpet of grass. After several years of growth, a layer of decomposing stems and leaves remains that inhibits the germination of other plant seedlings. The seeds remain viable for three to five years. Because it is shallow-rooted, stilt grass may be removed manually or mowed prior to seed production, though early season mowing can allow the plant to regrow and still grow to seed. For extensive infestations, foliar spray herbicides along with pre-emergent applications may be more practical and effective.

Japanese barberry, *Berberis thunbergii*, is a shrub native to Japan. It forms dense stands in a variety of habitats, including closed canopy forests and open woodlands. *Berberis thunbergii* is highly shade-tolerant and displaces a variety of native herb and shrub species in areas where it becomes well established. Manual hand-pulling is a favored method of control as the species is easily unearthed. Chemical and mechanical methods are also often employed, depending on site conditions.

Oriental bittersweet, *Celastrus orbiculatus,* is a climbing, deciduous, woody vine with alternate, glossy, round, toothed leaves. Asiatic bittersweet primarily occurs near areas of disturbance, including trails, roads, forest edges, and abandoned fields; however, established forests are also susceptible to invasion where there is a canopy opening due to either natural or human disturbances. Meadows, young forests, and beaches are extremely vulnerable. Asiatic bittersweet seedlings are shade tolerant and readily spread in forested areas. Rapid vine growth spreads vertically and horizontally. This growth shades out and kills native trees and shrubs by preventing photosynthesis. Asiatic bittersweet vines are capable of climbing trees up to sixty feet in height and reaching four inches in diameter. Vines may also deform, strangle, pull down, and girdle the trunks of larger species. Asiatic bittersweet can be managed by using a combination of cutting, mowing, and herbicide application. These combined treatments should occur after the last killing frost and before spring ephemerals emerge. Herbicide should be applied immediately to the cut stumps and vines or vigorous regrowth will occur. A second treatment of herbicide should be applied to new foliage and stems late in the growing season to ensure root kill.

Tree-of-heaven, *Ailanthus altissima*, is a very aggressive shade-intolerant tree, a prolific seed producer (up to 350,000 seeds in a year), grows rapidly, and can overrun native vegetation. It also produces toxins that prevent the establishment of other plant species. The root system is aggressive enough to cause damage to sewers and foundations. It grows well in mesic and dry soils and doesn't tolerate flooding. Herbicidal methods of control for Tree of Heaven include leaf, bark and cut stem applications.

Multiflora rose, *Rosa mulitflora*, is a perennial shrub that forms dense, impenetrable thickets. It is shade-intolerant and therefore is more of a threat to forest edge and gaps within the interior forest. Its characteristic dense growth of foliage and stems inhibits growth of competing native plants, though it is not a long-term threat to interior forest because it will be shaded out. It reproduces by seed and by forming new plants that root from the tips of arching canes that contact the ground. Many species of birds and mammals feed on the hips of *Rosa multiflora*; dispersing the seeds widely. *Rosa multiflora* can colonize gaps in late-successional forests, even though these forests are thought to be relatively resistant to invasion by non-native species. Strategies to manage and control *Rosa multiflora* include prescribed burns, periodic mowing or cutting, foliar or basal bark application or herbicides, or introduction of rose rosette disease or the rose seed chalcid (*Megastigmus aculeatus*), a Japanese wasp that has become established in the eastern United States.

Garlic mustard, *Alliaria petiolata*, is a shade-tolerant herb that smells like garlic when crushed. It prefers moist, basic or circumneutral soils. It is one of the few invasive plants that can invade and dominate the understory of forested areas. It can form dense stands because it has no natural predators, and it thrives in disturbed areas. In outcompetes native plants for light, nutrients, moisture and soil. Invasion is more likely in floodplain forests, forest edges, stream banks, and other disturbed areas, such as trail edges and road sides. It can be controlled through hand-pulling,

cutting before it flowers, or with foliar spray of herbicide. "The presence of garlic mustard interferes with oviposition of the rare native butterflies *Pieris napi oleraceae* and West Virginia white butterfly (please see *Pieris virginiensis* for more details on its conservation status). The native hosts of *P. napi oleraceae* and *P. virginiensis* are toothworts *Cardamine concatenata [Dentaria laciniata]* and *Cardamine [Dentaria] diphylla*. Eggs laid by females hatch but larvae are unable to complete development on garlic mustard (NatureServe. 2007)." Though it is unknown at this time whether these butterflies use this preserve, *Cardamine concatenata*, does grow in the preserve.

Japanese honeysuckle, *Lonicera japonica*, is a common, shade-tolerant vine that can live in forest interior waiting for a light gap. It needs full to partial sunlight to grow successfully. It competes with native plants for light and nutrients and prevents the understory and small trees from developing, causing a reduction in forest diversity. It spreads rapidly via above-ground runners that root at nodes and its seeds may be eaten by birds and then dispersed. The most effective eradication technique is a combination of both herbicide application and burning.

Canada bluegrass, *Poa compressa*, is a cool-season grass that is naturalized from Europe. It is found in meadows, fields, and semi-open woods and can form extensive sods in dry, sterile soils. Because bluegrass grows early in the season (when most other species are still dormant), it can spread very quickly. It can out-compete native grasses and forbs, and will dominate shaded areas. Because it may be present in the adjacent powerline and is not present within the woodlands itself at this time, monitoring for this grass in the woodlands only is sufficient. Eliminating this grass from the adjacent powerline, if it is present, may not be necessary at this time because it has not invaded the woodlands.

A controlled fire can dramatically reduce bluegrass. The herbicide glyphosate has proven effective, but because it grows intermixed with native species, spot application can be difficult. Mowing and defoliation are not effective control strategies.

Appendix 4: Emerald Ash Borer Information (www.emeraldashborer.info)

emerald ash borer

www.emeraldashborer.info

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- Home
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Leader-Telegram Online
April 26, 2009

MAPS & STATE INFO

Welcome | What's New for May | What's Being Done | What to Know | Contact Info

This Web site is part of a multinational effort in Michigan, Illinois, Indiana, Maryland, Missouri, Ohio, Pennsylvania, Virginia, West Virginia, Wisconsin, and Canada to bring you the latest information about emerald ash borer.

Emerald Ash Borer

Emerald ash borer (EAB), *Agrilus planipennis* Fairmaire, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The adult beetles nibble on ash foliage but cause little damage. The larvae (the immature stage) feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. Emerald ash borer is also established in Windsor, Ontario, was found in Ohio in 2003, northern Indiana in 2004, northern Illinois and Maryland in 2006, western Pennsylvania and West Virginia in 2007, and Wisconsin, Missouri and Virginia in summer 2008. Since its discovery, EAB has:

Select a state to learn more about EAB.

- Killed tens of millions of ash trees in southeastern Michigan alone, with tens of millions more lost in Ohio, Illinois, Indiana, Pennsylvania, West Virginia, Missouri, Wisconsin, Virginia, Ontario, and Quebec.
- Caused regulatory agencies and the USDA to enforce quarantines (**Michigan**, **Illinois**, **Indiana**, **Maryland**, **Missouri**, **Ohio**, **Ontario**, **Pennsylvania**, **Quebec**, **Virginia**, **West Virginia**, and **Wisconsin**) and fines to prevent potentially infested ash trees, logs or hardwood firewood from moving out of areas where EAB occurs.
- Cost municipalities, property owners, nursery operators and forest products industries tens of millions of dollars.

BIG TROUBLE FOR ASH TREES IN MINNESOTA

"When it hits Minnesota, we're going to have a huge problem."
Jacob Ryg - City Forester, Rochester, MN

Read the article to see what you can do.

What's Being Done:
A concerted effort to stop EAB has been launched by state and federal officials.

- **Research** is being conducted at universities, as well, to understand the **beetle's life cycle** and find ways to detect new infestations, control EAB adults and larvae, and contain the infestation.
- Quarantines are in place to prevent infested ash firewood, logs or nursery trees from being transported and starting new infestations.

This Web site provides information from Michigan State University, Purdue University, the Ohio State University, the Michigan and Ohio departments of Agriculture; the Michigan, Indiana and Ohio departments of Natural Resources; the USDA Forest Service; the USDA Animal and Plant Health Inspection Service (APHIS); and the Canadian Food Inspection Agency. Our goal is to help you find answers to your questions about EAB. We also provide links to other EAB-related Web sites. Please check this site often because information changes frequently.

What to know about EAB:

- It attacks only **ash trees (*Fraxinus* spp.)**.
- **Adult Beetles** are metallic green and about 1/2-inch long.
- Adults leave a **D-shaped exit hole in the bark** when they emerge in spring.
- Woodpeckers like **EAB larvae**; heavy woodpecker damage on ash trees may be a sign of infestation.
- **Firewood** cannot be moved in many areas of Michigan, Ohio, Illinois, Indiana, Pennsylvania, West Virginia, Maryland, Ontario and Quebec because of the EAB quarantine (**Michigan, Illinois, Indiana, Maryland, Missouri, Ohio, Ontario, Pennsylvania, Virginia, West Virginia**, and **Wisconsin**)
- It probably came from **Asia** in wood packing material.

If you suspect you may have EAB in your ash trees, call these numbers:

- Michigan — 1-866-325-0023
- Illinois — Contact your county Extension office. The Illinois Department of Agriculture also will offer a toll-free hotline at 1-800-641-3934 for extension-confirmed infestations
- Indiana — 1-866-NO-EXOTIC
- Iowa — 1-515-294-5963
- Kentucky — 1-859-257-5838
- Maryland — University of Maryland Home and Garden Information Center — 1-800-342-2507 or the Maryland Department of Agriculture — 1-410-841-5920
- Minnesota — 1-888-545-6684 (Arrest-the-Pest Hotline)
- Missouri — 1-866-716-9974

- Ohio — 1-888-OHIO-EAB
- Pennsylvania — 1-866-253-7189
- Virginia — The Forest Pest Branch of Fairfax County at 703-324-5304, the Arlington Office of Virginia Cooperative Extension at 703-228-6423 or 703-228-6400, or the Virginia Department of Agriculture and Consumer Services at 804-786-3515
- West Virginia — 1-304-254-2941
- Wisconsin — 1-800-462-2803
- USDA APHIS — 1-866-322-4512
- Canada — 1-866-463-6017

Scientists are studying methods of controlling EAB. The latest information on **insecticide evaluations** can help homeowners, arborists and landscapers decide if and how they can treat trees for EAB in certain areas in southeastern Michigan.

IMPORTANT NOTE: Using insecticides to control EAB on ash trees is an option in Michigan and the EAB quarantined counties in Ohio, Indiana and Illinois. If your tree is located within an area designated for eradication or suppression activities, it may be removed by regulatory agencies even if it has been treated. In those cases where government-ordered tree removals occur within the contiguous EAB quarantine counties, consideration will be given to ash trees treated by certified applicators utilizing methods and materials recommended by Michigan State University. If your ash trees are located outside of this area in Michigan, Indiana, Illinois or Ohio, using insecticides may not be recommended. If you are not sure about the regulatory status of your area or whether you should consider insecticides, please contact your county Extension office.

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

01/17/2003 VERSION

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

TABLE OF CONTENTS

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN (PLAN)

I. APPLICABILITY

A. The intent of this Plan is to assist applicants by identifying baseline mitigation measures for minimizing erosion and enhancing revegetation. The project sponsors should specify in their applications for a FERC Certificate (Certificate) any individual measures in this Plan they consider unnecessary, technically infeasible, or unsuitable due to local conditions and to fully describe any alternative measures they would use. Applicants should also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is certificated, further changes can be approved. Any such changes from the measures in this Plan (or the applicant's approved plan) will be approved by the Director of the Office of Energy Projects (Director), upon the applicant's written request, if the Director agrees that an alternative measure:

1. provides equal or better environmental protection;

2. is necessary because a portion of this Plan is infeasible or unworkable based on project-specific conditions; or

3. is specifically required in writing by another Federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Any requirements in this Plan to file material with the Secretary of the FERC (Secretary) do not apply to projects undertaken under the provisions of the blanket certificate program. This exemption does not apply to a request for alternative measures.

Project-related impacts on wetland and waterbody systems are addressed in the staff's Wetland and Waterbody Construction and Mitigation Procedures (Procedures).

II. SUPERVISION AND INSPECTION

A. ENVIRONMENTAL INSPECTION

1. At least one Environmental Inspector is required for each construction spread during construction and restoration (as defined by section V). The number and experience of Environmental Inspectors assigned to each construction spread should be appropriate for the length of the construction spread and the number/significance of resources affected.

2. Environmental Inspectors shall have peer status with all other activity inspectors.

3. Environmental Inspectors shall have the authority to stop activities that violate the environmental conditions of the Certificate, state and Federal environmental permit conditions, or landowner requirements; and to order appropriate corrective action.

B. RESPONSIBILITIES OF ENVIRONMENTAL INSPECTORS

At a minimum, the Environmental Inspector(s) shall be responsible for:

1. Ensuring compliance with the requirements of this Plan, the Procedures, the environmental conditions of the Certificate authorization, the mitigation measures proposed by the applicant (as approved and/or modified by the Certificate), other environmental permits and approvals, and environmental requirements in landowner easement agreements;

2. Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;

3. Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;

4. Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;

5. Identifying erosion/sediment control and soil stabilization needs in all areas;

6. Ensuring that the location of dewatering structures and slope breakers will not direct water into known cultural resources sites or locations of sensitive species;

7. Verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity shall be stopped and the design of the discharge shall be changed to prevent reoccurrence;

8. Ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;

9. Advising the Chief Construction Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;

10. Ensuring restoration of contours and topsoil;

11. Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

12. Determining the need for and ensuring that erosion controls are properly installed, as necessary to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;

13. Inspecting and ensuring the maintenance of temporary erosion control measures at least:

    a. on a daily basis in areas of active construction or equipment operation;

    b. on a weekly basis in areas with no construction or equipment operation; and

    c. within 24 hours of each 0.5 inch of rainfall;

14. Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;

15. Keeping records of compliance with the environmental conditions of the FERC certificate, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other Federal or state environmental permits during active construction and restoration; and

16. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

III. PRECONSTRUCTION PLANNING

The project sponsor shall do the following before construction:

A. CONSTRUCTION WORK AREAS

1. Identify all construction work areas (e.g., construction right-of-way, extra work space areas, pipe storage and contractor yards, borrow and disposal areas, access roads, etc.) that would be needed for safe construction. The project sponsor must ensure that appropriate cultural resources and biological surveys have been conducted.

2. Project sponsors are encouraged to consider expanding any required cultural resources and endangered species surveys in anticipation of the need for activities outside of certificated work areas.

B. DRAIN TILE AND IRRIGATION SYSTEMS

1. Attempt to locate existing drain tiles and irrigation systems.

2. Contact landowners and local soil conservation authorities to determine the locations of future drain tiles that are likely to be installed within 3 years of the authorized construction.

3. Develop procedures for constructing through drain-tiled areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.

4. Engage qualified drain tile specialists, as needed to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialists from the project area, if available.

C. GRAZING DEFERMENT

Develop grazing deferment plans with willing landowners, grazing permittees, and land management agencies to minimize grazing disturbance of revegetation efforts.

D. ROAD CROSSINGS AND ACCESS POINTS

Plan for safe and accessible conditions at all roadway crossings and access points during construction and restoration.

E. DISPOSAL PLANNING

Determine methods and locations for the disposal of construction debris (e.g., timber, slash, mats, garbage, drilling fluids, excess rock, etc). Off-site disposal in other than commercially operated disposal locations is subject to compliance with all applicable survey, landowner permission, and mitigation requirements.

F. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and Federal agencies as outlined in this Plan and in the Certificate.

1. Obtain written recommendations from the local soil conservation authorities or land management agencies regarding permanent erosion control and revegetation specifications.

2. Develop specific procedures in coordination with the appropriate agency to prevent the introduction or spread of noxious weeds and soil pests resulting from construction and restoration activities.

G. STORMWATER POLLUTION PREVENTION PLAN

Make available on each construction spread the Stormwater Pollution Prevention Plan prepared for compliance with the U.S. Environmental Protection Agency's National Stormwater Program General Permit requirements.

IV. INSTALLATION

A. APPROVED AREAS OF DISTURBANCE

1. Project-related ground disturbance shall be limited to the construction right-of-way, extra work space areas, pipe storage yards, borrow and disposal areas, access roads, and other areas approved in the Certificate. Any project-related ground disturbing activities outside these Certificated areas, except those needed to comply with the Plan and Procedures (e.g., slope breakers, energy-dissipating devices, dewatering structures, drain tile system repairs) will require prior Director approval. All construction or restoration activities outside of the Certificated areas are subject to all applicable survey and mitigation requirements.

2. The construction right-of-way width for a project shall not exceed 75 feet or that described in the FERC application unless otherwise modified by a Certificate condition. However, in limited, non-wetland areas, this construction right-of-way width may be expanded by up to 25 feet without Director approval to accommodate full construction right-of-way topsoil segregation and to ensure safe construction where topographic conditions (such as side-slopes) or soil limitations require it. Twenty-five feet of extra construction right-of-way width may also be used in limited, non-wetland or non-forested areas for truck turn-arounds where no reasonable alternative access exists.

   Project use of these additional limited areas is subject to landowner approval and compliance with all applicable survey and mitigation requirements. When such additional areas are used, each one should be identified and the need explained in the weekly or biweekly construction reports to the FERC, if required. The following material should be included in the reports:

   a. the location of each additional area by station number and reference to a previously filed alignment sheet, or updated alignment sheets showing the additional areas;

   b. identification of where the Commission's records contain evidence that the additional areas were previously surveyed; and

c. a statement that landowner approval has been obtained and is available in project files.

Prior written approval of the Director is required when the Certificated construction right-of-way width would be expanded by more than 25 feet.

B. TOPSOIL SEGREGATION

1. Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) in:

   a. actively cultivated or rotated croplands and pastures;

   b. residential areas;

   c. hayfields; and

   d. other areas at the landowner's or land managing agency’s request.

2. In residential areas importation of topsoil is an acceptable alternative to topsoil segregation.

3. In deep soils (more than 12 inches of topsoil), segregate at least 12 inches of topsoil. In soils with less than 12 inches of topsoil make every effort to segregate the entire topsoil layer.

4. Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities.

5. Segregated topsoil may not be used for padding the pipe.

C. DRAIN TILES

1. Mark locations of drain tiles damaged during construction.

2. Probe all drainage tile systems within the area of disturbance to check for damage.

3. Repair damaged drain tiles to their original or better condition. Do not use filter-covered drain tiles unless the local soil conservation authorities and the landowner agree. Use qualified specialists for testing and repairs.

4. For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).

D. IRRIGATION

Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties.

E. ROAD CROSSINGS AND ACCESS POINTS

1. Maintain safe and accessible conditions at all road crossings and access points during construction.

2. If crushed stone access pads are used in residential or active agricultural areas, place the stone on synthetic fabric to facilitate removal.

F. TEMPORARY EROSION CONTROL

Install temporary erosion controls immediately after initial disturbance of the soil. Temporary erosion controls must be properly maintained throughout construction (on a daily basis) and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration is complete.

1. Temporary Slope Breakers

a. Temporary slope breakers are intended to reduce runoff velocity and divert water off the construction right-of-way. Temporary slope breakers may be constructed of materials such as soil, silt fence, staked hay or straw bales, or sand bags.

b. Install temporary slope breakers on all disturbed areas, as necessary to avoid excessive erosion. Temporary slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings at the following spacing (closer spacing should be used if necessary):

Slope (%)	Spacing (feet)
5 - 15	300
>15 - 30	200
>30	100

c. Direct the outfall of each temporary slope breaker to a stable, well vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way.

d. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

2. Sediment Barriers

a. Sediment barriers are intended to stop the flow of sediments and to prevent the deposition of sediments into sensitive resources. They may be constructed of materials such as silt fence, staked hay or straw bales, compacted earth (e.g., driveable berms across travelways), sand bags, or other appropriate materials.

b. At a minimum, install and maintain temporary sediment barriers across the entire construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody, wetland, or road crossing until revegetation is successful as defined in this Plan. Leave adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.

c. Where wetlands or waterbodies are adjacent to and downslope of construction work areas, install sediment barriers along the edge of these areas, as necessary to prevent sediment flow into the wetland or waterbody.

3. Mulch

a. Apply mulch on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw or its equivalent, unless the local soil conservation authority, landowner, or land managing agency approves otherwise in writing.

b. Mulch can consist of weed-free straw or hay, wood fiber hydromulch, erosion control fabric, or some functional equivalent.

c. Mulch <u>before</u> seeding if:

(1) final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas), as required in section V.A.1; or

(2) construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.

d. If mulching <u>before</u> seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.

e. If wood chips are used as mulch, do not use more than 1 ton/acre and add the equivalent of 11 lbs/acre available nitrogen (at least 50 percent of which is slow release).

f. Ensure that mulch is adequately anchored to minimize loss due to wind and water.

g. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies.

h. Install erosion control fabric on waterbody banks at the time of final bank recontouring. Anchor the erosion control fabric with staples or other appropriate devices.

V. RESTORATION

A. CLEANUP

1. Commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup.

   The project sponsor should file with the Secretary for the review and written approval of the Director, a winterization plan if construction will continue into the winter season when conditions could delay successful decompaction, topsoil replacement, or seeding until the following spring.

2. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed (as specified in section IV.F.) and inspected and maintained (as specified in sections II.B.12 through 14). When access is no longer required, the travel lane must be removed and the right-of-way restored.

3. Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench should be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner or land managing agency.

4. Remove excess rock from at least the top 12 inches of soil in all actively cultivated or rotated cropland and pastures, hayfields, and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. The landowner may approve other provisions in writing.

5. Grade the construction right-of-way to restore pre-construction contours and leave the soil in the proper condition for planting.

6. Remove construction debris from all construction work areas unless the landowner or land managing agency approves otherwise.

7. Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.

B. PERMANENT EROSION CONTROL DEVICES

1. Trench Breakers

a. Trench breakers are intended to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as sand bags or polyurethane foam. Do not use topsoil in trench breakers.

b. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at the same spacing as and upslope of permanent slope breakers.

c. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required.

d. At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland.

2. Permanent Slope Breakers

a. Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction right-of-way, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, sand bags, or some functional equivalent.

b. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, using spacing recommendations obtained from the local soil conservation authority or land managing agency.

In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way:

Slope (%)	Spacing (feet)
5 - 15	300
>15 - 30	200
>30	100

c. Construct slope breakers to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy-dissipating devices at the end of the breaker.

d. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction right-of-way, they are subject to compliance with all applicable survey requirements.

C. SOIL COMPACTION MITIGATION

1. Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests.

2. Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

   Alternatively, make arrangements with the landowner to plant and plow under a "green manure" crop, such as alfalfa, to decrease soil bulk density and improve soil structure. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

3. Perform appropriate soil compaction mitigation in severely compacted residential areas.

D. REVEGETATION

1. General

   a. The project sponsor is responsible for ensuring successful revegetation of soils disturbed by project-related activities, except as noted in section V.D.1.b.

   b. Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

2. Soil Additives

   Fertilize and add soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land management agencies, or landowner. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as possible after application.

3. Seeding Requirements

   a. Prepare a seedbed in disturbed areas to a depth of 3 to 4 inches using appropriate equipment to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed.

b. Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or as requested by the landowner or land management agency. Seeding is not required in actively cultivated croplands unless requested by the landowner.

c. Perform seeding of permanent vegetation within the recommended seeding dates. If seeding cannot be done within those dates, use appropriate temporary erosion control measures discussed in section IV.F. and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Lawns may be seeded on a schedule established with the landowner.

d. In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting, subject to the specifications in section V.D.3.a-c.

e. Base seeding rates on Pure Live Seed. Use seed within 12 months of seed testing.

f. Treat legume seed with an inoculant specific to the species using the manufacturer’s recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydro).

g. In the absence of written recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary, a seed drill equipped with a cultipacker is preferred for seed application.

   Broadcast or hydroseeding can be used in lieu of drilling at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker or imprinter after seeding. In rocky soils or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the Environmental Inspector.

VI. OFF-ROAD VEHICLE CONTROL

To each owner or manager of forested lands offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include:

A. Signs;

B. Fences with locking gates;

C. Slash and timber barriers, pipe barriers, or a line of boulders across the right-of-way; and

D. Conifers or other appropriate trees or shrubs across the right-of-way.

VII. POST-CONSTRUCTION ACTIVITIES

A. MONITORING AND MAINTENANCE

1. Conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation.

2. Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.

   Continue revegetation efforts until revegetation is successful.

3. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is successful.

4. Restoration shall be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored.

5. Routine vegetation maintenance clearing shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in a herbaceous state. In no case shall routine vegetation maintenance clearing occur between April 15 and August 1 of any year.

6. Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

B. REPORTING

1. The project sponsor shall maintain records that identify by milepost:

   a. method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;

   b. acreage treated;

   c. dates of backfilling and seeding;

   d. names of landowners requesting special seeding treatment and a description of the follow-up actions; and

   e. any problem areas and how they were addressed.

2. The project sponsor shall file with the Secretary quarterly activity reports documenting problems, including those identified by the landowner, and corrective actions taken for at least 2 years following construction.

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UNITED STATES OF AMERICA 105 FERC ¶ 61, 234
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Pat Wood, III, Chairman;
William L. Massey, and Nora Mead Brownell.

Dominion Cove Point LNG, LP Docket No. CP03-74-000

ORDER ISSUING CERTIFICATE

(Issued November 18, 2003)

1. On March 28, 2003, Dominion Cove Point LNG, LP (Dominion Cove Point)[1] filed an application to construct two new compressor stations in Loudoun and Fairfax Counties, Virginia, referred to as the Cove Point East Project, in order to provide 445,000 Dth/d of additional firm transportation service from west to east on Dominion Cove Point's pipeline system.

2. On February 27, 2003, the Commission approved an uncontested settlement in which Dominion Cove Point agreed to file an application, on or before March 31, 2003, for certificate authorization to operate facilities necessary to create additional firm transportation capacity from west to east on Dominion Cove Point's pipeline system.[2]

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[1] Dominion Cove Point LNG, LP is a wholly-owned partnership composed of Dominion Gas Projects Company, LLC and Dominion Cove Point LNG Company, LLC, which are wholly-owned subsidiaries of Dominion Cove Point, Inc., a wholly-owned subsidiary of Consolidated Natural Gas Company, which is wholly-owned by Dominion Resources, Inc. On September 5, 2002, Consolidated Natural Gas Company acquired Cove Point LNG Limited Partnership, owner of the LNG terminal and pipeline facilities. On December 17, 2002, Cove Point LNG Limited Partnership became Dominion Cove Point LNG, LP.

[2] Cove Point LNG Limited Partnership, 102 FERC ¶ 61,227 (2003). The Commission approved two uncontested settlement agreements that resolved certain remaining issues related to the reactivation of the LNG import terminal, as authorized by the Commission in: 97 FERC ¶ 61,043 (2001); Order Granting and Denying Rehearing in Part and Granting and Denying Clarification, 97 FERC ¶ 61,276 (2001); Order Denying Rehearing and Granting and Denying Clarification, 98 FERC ¶ 61,270 (2002).

This is the resulting application. As discussed below, two shippers have entered into precedent agreements at incremental rates for the entire capacity and no adverse effects have been identified. Accordingly, we find Dominion Cove Point's proposal is required by the public convenience and necessity and grant the requested authorization.

Dominion Cove Point's Proposal

3. Dominion Cove Point held open seasons for the Cove Point East Project between June 3 and June 17, 2002 and between July 15 and July 22, 2002. Dominion Cove Point subsequently executed a binding precedent agreement with Washington Gas Light Company (Washington Gas) for 350,000 Dth/d of firm transportation service for a 20-year term commencing on an anticipated date of December 15, 2003. Dominion Cove Point held a further open season between February 14 and February 21, 2003, which resulted in the execution of a binding precedent agreement with Virginia Power Service Energy Corp. Inc. (Virginia Power), for 95,000 Dth/d of firm transportation service for a 20-year term commencing on a date no earlier than June 1, 2004.

4. Pursuant to the agreements, the project shippers will receive gas volumes at existing interconnections with the systems of Dominion Transmission, Inc. (Dominion Transmission), Columbia Gas Transmission Corporation (Columbia Gas), both in Loudoun County, Virginia, and with Transcontinental Gas Pipe Line Corporation (Transco), in Fairfax County, Virginia, for transportation and delivery at existing delivery points along Dominion Cove Point's 87-mile pipeline system which extends eastward from the receipt points in Virginia to Dominion Cove Point's LNG terminal in Maryland. Washington Gas will use its subscribed capacity to serve customers on its distribution system in Virginia and Maryland, and Virginia Power will use its subscribed capacity to deliver fuel to its Possum Point power plant, via Virginia Power's existing Possum Point Lateral, near Dumfries, Virginia.

5. In order to provide the subscribed 445,000 Dth/d of firm service, Dominion Cove Point proposes to construct, operate, and maintain two new compressor stations totaling 19,340 hp of compression.[3] The proposed Loudoun Station, in Loudoun County, Virginia, consists of two 4,735 hp gas-fired compressor units and one 2,370 hp gas-fired compressor unit. The proposed Pleasant Valley Station consists of one 4,750 hp electric-driven compressor unit and one 2,750 hp electric-driven compressor unit. The estimated cost of the proposed facilities is approximately $43.5 million.

[3] Dominion Cove Point will also construct certain appurtenant facilities pursuant to Section 2.55 of the Commission's regulations.

6. Dominion Cove Point proposes to charge an incremental rate, under its existing Rate Schedule FTS, that includes an electric reservation surcharge to recover the costs for electric power to drive compression at the Pleasant Valley Station. Therefore, Dominion Cove Point also proposes tariff language to establish an electric power tracker applicable to shippers on the Cove Point East Project.

7. Dominion Cove Point states that the proposal responds to market demand, and will provide greater transportation options for shippers and enhanced access to a wider variety of supplies. Dominion Cove Point also states that there will be no rate impact on existing customers or degradation of their services, no adverse effect on existing pipelines or their customers, and no or minimal adverse effects on landowners.

Notice and Interventions

8. Notice of Dominion Cove Point's proposed Cove Point East Project was published in the Federal Register on April 14, 2003.[4] Washington Gas Light Company (Washington Gas), BP Energy Company, Shell NA LNG, Inc., Statoil North America Inc., and Public Service Company of North Carolina, Inc. filed timely motions to intervene.[5] Columbia Gas filed a motion to intervene out-of-time. Columbia Gas, in its late motion, has demonstrated an interest in this proceeding and has shown good cause for seeking to intervene out-of-time. Further, granting the late motion will not delay, disrupt, or otherwise prejudice this proceeding. Thus, we will grant the late motion to intervene. There were no protests.

9. Washington Gas filed comments in support of the project stating that Dominion Cove Point's pipeline is located in Washington Gas' franchised service area and that delivery points along that pipeline provide the sole source of supply for Washington Gas' customers in Calvert and St. Mary's Counties, Maryland. Washington Gas states that the construction and operation of the proposed new compressor stations to create firm transportation capacity from west to east after the reactivation by Dominion Cove Point of its LNG terminal has been a critical component of Washington Gas' support for such reactivation.[6] Further, Washington Gas states that the proposed new compression will

[4] 68 FR 17929 (2003).

[5] Timely unopposed motions to intervene are granted by operation of Rule 214.18 of the Commission's Rules of Practice and Procedure. 18 CFR § 385.214 (2003).

[6] On August 18, 2003, the Director of the Commission's Office of Energy Projects authorized the commencement of commercial LNG operations.

provide project subscribers with needed system reliability and operational flexibility, and will permit Washington Gas to meet the growing firm delivery requirements of its distribution system.

Discussion

10. Dominion Cove Point's proposal to construct the Cove Point East Project facilities, to be used to transport gas in interstate commerce, is subject to the Commission's jurisdiction and the requirements of Subsections (c) and (e) of Section 7 of the NGA.

Public Convenience and Necessity

11. On September 15, 1999, the Commission issued a Policy Statement to provide guidance as to how we will evaluate proposals for certificating new construction.[7] The Policy Statement established criteria for determining whether there is a need for a proposed project and whether the proposed project will serve the public interest. The Policy Statement explains that in deciding whether to authorize the construction of major new pipeline facilities, the Commission balances the public benefits against the potential adverse consequences. Our goal is to give appropriate consideration to the enhancement of competitive transportation alternatives, the possibility of overbuilding, subsidization by existing customers, the applicant's responsibility for unsubscribed capacity, the avoidance of unnecessary disruptions of the environment, and the unneeded exercise of eminent domain in evaluating new pipeline construction.

12. Under this policy, the threshold requirement for pipelines proposing new projects is that the pipeline must be prepared to financially support the project without relying on subsidization from the existing customers. The next step is to determine whether the applicant has made efforts to eliminate or minimize any adverse effects the project might have on the applicant's existing customers.

13. The Commission also considers potential impacts of the proposed project on other pipelines in the market and those existing pipelines' captive customers, or landowners and communities affected by the route of the new pipeline. If residual adverse effects on these interest groups are identified after efforts have been made to minimize them, the Commission will evaluate the project by balancing the evidence of public benefits to be

[7] Certification of New Interstate Natural Gas Pipeline Facilities (Policy Statement), 88 FERC ¶ 61,227 (1999); order clarifying statement of policy, 90 FERC ¶ 61,128 (2000); order further clarifying statement of policy, 92 FERC ¶ 61,094 (2000).

achieved against the residual adverse effects. This is essentially an economic test. Only when the benefits outweigh the adverse effects on economic interests will the Commission then proceed to complete the environmental analysis where other interests are considered.

Subsidization

14. The Commission's Policy Statement directs that the threshold requirement for pipelines proposing new projects is that the pipeline must be prepared to financially support the project without relying on subsidization from existing customers. Dominion Cove Point proposes an incremental recourse rate for services on the proposed facilities, thus, insulating existing customers from contributing to the project's costs. Therefore, Dominion Cove Point's proposal satisfies the Policy Statement's threshold requirement.

Effect on Other Constituent Groups

15. The Commission finds that Dominion Cove Point's proposed facilities should have no adverse impact on existing pipelines or on those pipelines' captive customers. Dominion Cove Point's proposal responds to market demand for additional firm transportation capacity from west to east on the Dominion Cove Point pipeline which should not replace any existing service provided by another pipeline. Indeed, the proposal will increase transportation options available to shippers on Columbia Gas, Transco, and Dominion Transmission, because the proposal will provide incremental capacity to receive gas from those pipelines. The Commission received no adverse comments from existing pipelines.

16. Likewise there are no expected adverse economic impacts on landowners as no condemnation is anticipated. The Loudoun Station will be located on property owned by Dominion Cove Point, and the Pleasant Valley Station and access road will be located on property owned by Dominion Cove Point and on property for which Dominion Cove Point has an option to purchase. In addition, the suction and discharge pipelines connecting the Pleasant Valley Station will be constructed within the Dominion Cove Point and Virginia Power existing pipeline/electric transmission right-of-way. The Commission received no adverse comments from landowners.

Project Need and Certificate Policy Statement Conclusion

17. The Cove Point East Project application was filed as a requirement of an uncontested settlement between Dominion Cove Point and its customers. The project facilities were designed to meet the firm transmission requirements of the subscribing shippers, thus the proposed incremental capacity is fully subscribed. In addition, the

project will provide project shippers reliability and operational flexibility, and will provide increased transportation options to shippers on the three interconnecting, interstate pipelines.

18. The Commission finds that Dominion Cove Point's proposal will provide substantial benefits, can proceed without subsidies, and will not adversely affect or degrade service to Dominion Cove Point's existing shippers. We find that the benefits of the project outweigh any potential adverse impacts. Therefore, the proposal is consistent with the Policy Statement and Section 7(c) of the NGA. Accordingly, balancing the factors set forth in the Policy Statement, we conclude that Dominion Cove Point's proposed project is required by the public convenience and necessity.

Rates

Incremental Rates

19. Dominion Cove Point proposes an initial incremental reservation rate of $1.9704 per Dth plus an electric reservation surcharge of $0.3016 per Dth and fuel retention of 0.30 %.[8] Dominion Cove Point states that the service is priced incrementally because the rates required to recover these incremental costs exceed Dominion Cove Point's existing system rates for firm transportation under Rate Schedule FTS, and that charging rolled-in system rates would result in existing customers subsidizing the incremental transportation service.[9]

20. Dominion Cove Point states that it has based its proposed rates on an annualized cost of service of $10,521,994. Dominion Cove Point proposes to use its current system depreciation rate of 5.0% and a pre-tax return on equity of 13.0%, with a cost of debt of 8.5%, with a capital structure of 40% debt and 60% equity.[10] Dominion Cove Point also states that the rates are based on demand determinates of 445,000 Dth/day.

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[8] The electric power costs will be updated annually through a surcharge adjustment in the proposed electric power tracker. Fuel retention will be updated annually by use of Dominion Cove Point's existing Fuel tracker.

[9] The currently effective maximum reservation rate for Rate Schedule FTS service is $0.6759 per Dth.

[10] See Response to Data Request No. 5 filed July 7, 2003.

21. All of the costs of the proposed Cove Point East Project will be recovered only from the shippers who subscribe to this incremental service. The project will not rely upon any subsidization from existing customers. Accordingly, we will approve the proposed initial incremental rates. Dominion Cove Point is directed to file compliance tariff sheets for the initial incremental rates 60 days prior to the in-service date.

Tariff Proposal

22. Dominion Cove Point proposes a new Section 27 to its General Terms and Conditions. The new tariff language establishes an electric power tracker to collect electric power costs used at the electric powered compressor station located at Pleasant Valley, Virginia.

23. In summary, Dominion Cove Point will maintain on a monthly basis, in a sub-account of Account No. 186, the difference between the actual power costs and the actual recovery of power costs. At least 30 days prior to each April 1, Dominion Cove Point will file with the Commission to reflect net changes in the electric power rates. Interest will be computed on a monthly basis on the balance of the account based on the method prescribed in Section 154.501(d)(1) of the Commission's Regulations.

24. The electric power cost tracking mechanism will insure that the existing customers will be insulated from the electric power costs incurred in this project. Accordingly, we will pre-approve Dominion Cove Point's proposed electric cost tracker tariff provisions. Dominion Cove Point is directed to file its actual electric power cost tracker tariff sheets 60 days prior to the in-service date.

Engineering

25. Commission staff has analyzed Dominion Cove Point's flow diagrams, flow models and engineering data supplied in the instant proceeding. Based upon that analysis, we conclude that the proposed facility modifications are properly designed to accommodate an additional 445,000 Dth per day of incremental firm transportation service flowing from west to east on the Dominion Cove Point pipeline. The analysis shows that the compression facilities at both the Loudoun and Pleasant Valley facilities will enable Dominion Cove Point to meet it's firm obligation even when the LTD-1 shippers' gas is flowing from the LNG facility.[11] This additional compression will also allow Dominion Cove Point shippers increased supply flexibility from the three

[11] Dominion Cove Point provides firm LNG service under its Rate Schedule LTD-1.

interconnecting interstate pipeline companies, Dominion Transmission, Columbia Gas and Transco, that would not have existed after the reactivation of the LNG terminal due to the high operating pressure.

Environmental

26. On May 21, 2003, we issued a Notice of Intent to Prepare an Environmental Assessment for the Proposed Cove Point East Project and Request for Comments on Environmental Issues (NOI). We received two responses to the NOI, from the Virginia Department of Conservation and Recreation and the Fairfax County Department of Planning and Zoning (Fairfax County).

27. Our staff prepared an environmental assessment (EA) for Dominion Cove Point's proposal. The EA addresses geology, soils, water resources and wetlands, vegetation and wildlife, endangered and threatened species, land use, cultural resources, air and noise safety, reliability and safety, and alternatives. In addition, the EA addresses all substantive comments received in response to the NOI.

28. The EA was mailed to all affected landowners, Federal, state, and local agencies. We received two comments on the EA, from Fairfax County and the Virginia Department of Environmental Quality (VDEQ).

29. In its comment letter on the EA, VDEQ requested that a copy of the cultural resources survey report, the Virginia State Historic Preservation Office's May 7, 2003 letter, and any Memorandum of Agreement (MOA) be sent to the Loudoun County Planning Department (LCPD). We have requested that Dominion Cove Point provide the report and the letter to the LCPD. An MOA has not been necessary for the project as no historic properties requiring data recovery have been identified to date. However, if as a result of completion of cultural resources survey work, historic properties are identified and require data recovery, the Commission will provide the LCPD with any MOA.

30. The VDEQ seeks assurance that Dominion Cove Point's project will be in compliance with storm water permitting requirements. In this regard, the VDEQ lists several recommendations and best-management practices it encourages the applicant to adopt to minimize impacts on wetlands and waterways. The VDEQ also advocates the implementation of pollution prevention principles, including reduction of solid wastes at the source, re-use of materials, and recycling of waste materials.

31. Fairfax County is concerned that the Pleasant Valley site is located within the Reservation Conservation District of the Occoquan Watershed, a specially-designated water source. Therefore, it recommended that construction at the Pleasant Valley site use

best management practices to meet water quality objectives. Fairfax County also recommends at least half of the project site be retained as (and/or be restored to) perpetually undisturbed open space in light of the water quality sensitivity of the area.

32. As stated in the EA, the applicant has committed to construct its project in accordance with the Commission staff's Wetland and Waterbody Construction and Mitigation Procedures (Procedures) and the Upland Erosion Control, Revegetation and Maintenance Plan (Plan). Our staff has determined that proper implementation of the Plan and Procedures would adequately minimize construction-related impacts on soil, waterbodies, and wetlands in general. The Dominion Cove Point is required to obtain a Virginia Water Protection Permit and a Virginia Pollutant Discharge Elimination System Permit for storm water activities. VDEQ may attach additional (perhaps more site specific) mitigation to these permits.

33. Given that impacts on waterbodies or wetlands would be temporary, and no waterbodies or wetlands would be permanently altered, we do not believe the construction and operation of this project would adversely affect the Residential Conversation District of the Occoquan River Watershed.

34. VDEQ's comment letter informs us that the Pleasant Valley site is located within the designated coastal zone watershed. Therefore, Dominion Cove Point's proposed actions must be found consistent with the Virginia Coastal Resources Management Program.

35. Accordingly, we will require that Dominion Cove Point obtain and file a Coastal Zone Management Act Consistency Determination from the VDEQ before construction is authorized by the Director of the Office of Energy Projects.

36. VDEQ is concerned that the compressor station facilities may have substantial adverse visual and noise impacts on adjacent county park property, and that the project could compromise the passive recreational value of this portion of the park. VDEQ contends that the facility should be situated so it would not be visible from any area on the park property. However, Fairfax County states in its comments that the master planning process for this parkland has not been completed.

37. We acknowledge that the new compressor station would be built on about 30 acres of land adjacent to park property. However, we note that an existing access road (that leads from Pleasant Valley Road to the meter station facility), a 200-foot-wide electric transmission line and pipeline right-of-way corridor already exists at this site. All these facilities are visible from parkland property. Dominion Cove Point commits to limit the clearing of vegetation (previously disturbed woodland forest) that is necessary to

construct and operate the compressor station. Dominion Cove Point would leave a forested buffer intact around its site, which would mitigate for noise and visual impacts. We believe that locating Dominion Cove Point's facilities on land that is adjacent to existing energy facilities is appropriate.

38. VDEQ commented that the expected noise from a compressor station must not exceed the levels identified in its county noise ordinances. In the EA, our staff's analysis of Dominion Cove Point's projected noise levels indicates that the noise attributed to Dominion Cove Point's facilities would comply with both Federal regulations and county noise ordinances. However, to ensure Dominion Cove Point would meet these regulations and noise ordinances, the EA includes a condition that Dominion Cove Point file noise surveys showing they met these standards with the Secretary after placing the proposed compressor stations in service. If for some reason the operational noise levels exceed the regulations and noise ordinances, the applicant must file a report detailing what additional noise controls will be installed to meet the appropriate noise level.

39. Commenters from Fairfax County also expressed safety concerns. The U.S. Department of Transportation (DOT) is solely responsible for establishing criteria and requirements for the safety of natural gas pipeline facilities. DOT sets standards for the design, construction, inspection, and operation of natural gas pipelines in accordance with the Natural Gas Pipeline Safety Act of 1968. DOT's safety standards specify material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion. Any applicant for a certificate from the Commission is required to verify that the proposed facilities would meet DOT safety standards. As stated in the EA (page 18), Dominion Cove Point's project would be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in Title 49 Code of Federal Regulations (CFR) Part 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas pipeline accidents and failures. Under Title 49 CFR 192.615, Dominion Cove Point is required to establish and maintain adequate means of communication with appropriate fire, police, and other public officials.

40. Finally, Fairfax County does not find the EA to be acceptable and recommends that no further action on the proposal be taken until the EA has been amended to adequately address issues such as noise and visual impact. In addition, Fairfax County finds that additional sites should be evaluated. In the alternative, Fairfax County asks that an Environmental Impact Statement (EIS) be prepared for this project.

41. We disagree that an EIS is necessary for this project and that further alternative site evaluations are necessary. The EA prepared for Dominion Cove Point's project complies with the National Environmental Policy Act and the Council of Environmental

Quality's regulations. Further, all the issues identified during the scoping process are addressed in the EA and this order. Therefore, the EA supports our finding that the proposed action will not significantly affect the quality of the human environment.

42. Based on the discussion in the EA, we conclude that if constructed in accordance with Dominion Cove Point's application and supplement filed March 28, 2003, approval of this proposal would not constitute a major Federal action significantly affecting the quality of the human environment.

43. Any state or local permits issued with respect to the Cove Point East Project facilities must be consistent with the conditions of this certificate. The Commission encourages cooperation between interstate pipelines and local authorities. However, this does not mean that state and local agencies, through application of state or local laws, may prohibit or unreasonably delay the construction or operation of facilities approved by this Commission.[12] Dominion Cove Point shall notify the Commission's environmental staff by telephone and/or facsimile of any environmental noncompliance identified by other federal, state, or local agencies on the same day that such agency notifies Dominion Cove Point. Dominion Cove Point shall file written confirmation of such notification with the Secretary of the Commission within 24 hours.

Conclusion

44. At a hearing held on November 13, 2003, the Commission on its own motion received and made a part of the record in this proceeding all evidence, including the application, as amended and supplemented, and exhibits thereto, submitted in support of the authorization sought herein, and upon consideration of the record,

The Commission orders:

(A) A certificate of public convenience and necessity is issued to Dominion Cove Point pursuant to Section 7(c) of the NGA and Part 157 of the Commission's regulations to construct and operate facilities as described and conditioned herein, and as more fully described in the application.

[12] See, e.g., Schneidewind v. ANR Pipeline Co., 485 U.S. 293 (1988); National Fuel Gas Supply v. Public Service Commission, 894 F.2d 571 (2d Cir. 1989); and Iroquois Gas Transmission System, L.P., et al., 52 FERC ¶ 61,091 (1990) and 59 FERC ¶ 61,094 (1992).

(B) Dominion Cove Point's proposed initial incremental rates and its proposed electric cost tracker are approved.

(C) The certificate authority in Ordering Paragraph (A) shall be conditioned on the following:

(1) Dominion Cove Point's completion of the proposed facilities and making them available for service within one year of the issuance of this order pursuant to paragraph (b) of Section 157.20 of the Commission's regulations;

(2) Dominion Cove Point's compliance with all applicable Commission regulations under the NGA, including paragraphs (a), (c), (e), and (f) of Section 157.20 of the Commission's regulations;

(3) Dominion Cove Point's execution of contracts for the quantity and terms of service represented in the precedent agreements prior to commencing construction;

(4) Dominion Cove Point's filing actual tariff sheets implementing the project's initial incremental rates and electric power cost tracker tariff provision 60 days prior to the project's in-service date; and

(5) Dominion Cove Point's compliance with the environmental conditions listed in the appendix to this order.

(D) Dominion Cove Point shall notify the Commission's environmental staff by telephone and/or facsimile of any environmental noncompliance identified by other federal, state, or local agencies on the same day that such agency notifies Dominion Cove Point. Dominion Cove Point shall file written confirmation of such notification with the Secretary of the Commission within 24 hours.

(E) Columbia Gas' late motion to intervene is granted.

By the Commission.

(S E A L)

Linda Mitry,
Acting Secretary.

Appendix

Dominion Cove Point LNG, LP, Docket No. CP03-74-000
Environmental Conditions

As recommended in the EA, this authorization includes the following condition(s):

1. Dominion Cove Point shall follow the construction procedures and mitigation measures described in its application and as identified in the EA, unless modified by this Order. Dominion Cove Point must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary of the Commission (Secretary);
    b. justify each modification relative to site-specific conditions;
    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
    d. receive approval in writing from the Director of OEP before using that modification.

2. The Director of OEP has delegation authority to take whatever steps are necessary to insure the protection of all environmental resources during construction and operation of the project. This authority shall allow:

    a. the modification of conditions of this Order; and
    b. the design and implementation of any additional measures deemed necessary (including stop work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from project construction and operation.

3. Dominion Cove Point shall defer construction and use of facilities and staging, storage, and temporary work areas and new or to-be-improved access roads at the Pleasant Valley Station **until**:

    a. Dominion Cove Point files with the Secretary a cultural resource report for the remaining portion of the Pleasant Valley Station site, the Virginia SHPO comments on the report, any required treatment plan, and the SHPO's comments on any treatment plan; and
    b. the Director of OEP reviews and approves the report and any plan and notifies Dominion Cove Point in writing that it may proceed.

4. All material filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."**

5. Dominion Cove Point shall make all reasonable efforts to assure its predicted noise levels from the Loudoun and Pleasant Valley Compressor Stations are not exceeded at nearby NSAs and file noise surveys showing this with the Secretary **no later than 60 days** after placing the Loudoun and Pleasant Valley Compressor Stations in service. However, if the noise attributable to the operation of the Loudoun and Pleasant Valley Compressor Stations at full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, Dominion Cove Point shall file a report on what changes are needed and shall install additional noise controls to meet the level **within 1 year** of the in-service date. Dominion Cove Point shall confirm compliance with this requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

6. Before construction, Dominion Cove Point shall file with the Secretary a copy of the Virginia Coastal Zone Management Act Consistency Determination.

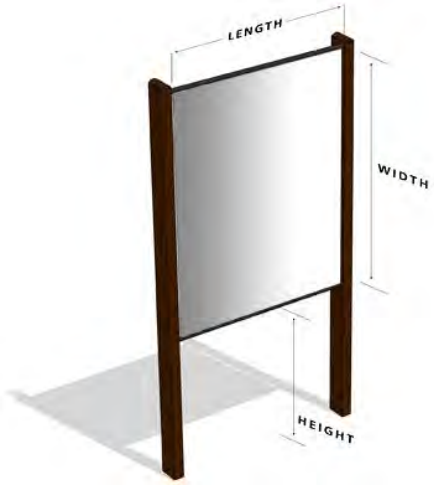
Appendix 6: Guidelines for Facilities (trails, boardwalks, signs, fencing, gates, interpretive panels, and kiosks)

Signage

The National Park Service's Harper's Ferry Center offers a series of signs and interpretive panels used throughout the national park system. Given their straightforward design and durable steel construction, these signs are appropriate for use at the Elklick Woodlands Natural Area Preserve. This plan recommends using these signs and panels as an example for any signage placed in the Preserve. Information about these signs is summarized below. Unless otherwise noted, the images in this section of Appendix 6 are from the Harper's Ferry Center website. Additional images and more detailed information can be found at the Harper's Ferry Center website at http://www.nps.gov/hfc/index.htm.

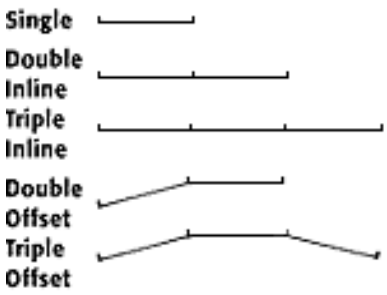
Entry Kiosk

An entry kiosk in the parking area off of Pleasant Valley Road provides an opportunity to welcome visitors and inform them of the rules of the Preserve. The NPS's upright exhibit is ideal for this purpose. These signs are highly visible due to their upright design, thereby insuring that visitors do not miss important practical information, including orientation, safety information, permitted and prohibited activities within the Preserve, etc.



Panel Sizes:	24" x 36", 24" x 48" or 36" x 48" (L X W)
Height:	30" (for a 48" wide panel)
	36" (for a 36" wide panel)
Material:	galvanized steel, weathering steel, painted aluminum (NPS Brown/NPS Medium Gray)

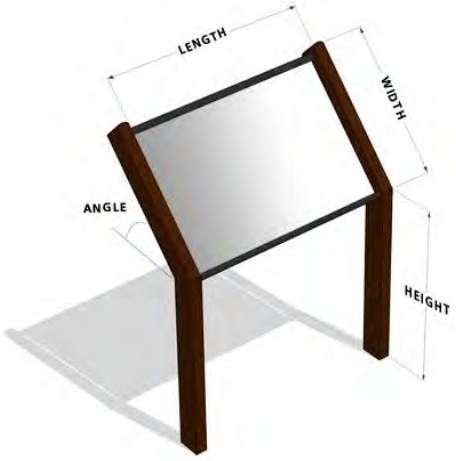
The exhibits can be displayed as single panels or in clusters if more space is needed.



Double panels are used at Historic St. Mary's City in St. Mary's County, Maryland. (*Photo courtesy of L/KLA*)

Interpretive Panels

At various locations within the Preserve, low-profile interpretive panels provide an unobstrusive means of conveying information without blocking the visitor's view of the natural resources at Elklick.

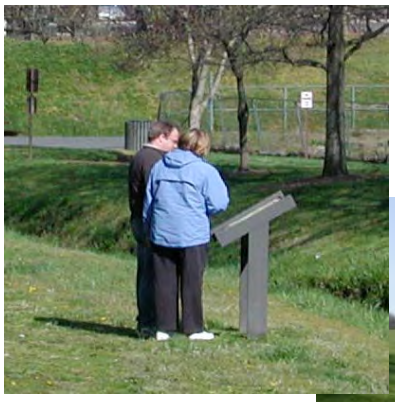


Cantilevered Base

Panel Sizes:	18" x 18", 24" x 18", 24" x 24" 36" x 18", 36" x 24", 42" x 18", 42" x 24" and 48" x 24" (L X W)
Height:	32"
Materials:	galvanized steel, weathering steel, painted aluminum (NPS Brown/ NPS Medium Gray)

T-Style Base

Panel Size:	available in all sizes
Panel Angle:	30 degrees
Height:	32"
Materials:	galvanized steel, weathering steel, painted aluminum (NPS Brown/NPS Medium Gray)



T-Style Bases are used along the W&OD Trail (above) and at Morven Park in Leesburg, VA (right). (*Photos courtesy of L/KLA*)

Temporary/Interchangeable Signs

At various times during the year, it may be necessary to post seasonal information in the parking area or at other access points at Elklick. The County may need to announce Preserve closures during hunting season or culling operations. Likewise, the Preserve may be closed to visitors in order to perform habitat preservation actions, or certain areas may be restricted so as not to interfere with breeding or other species-specific behaviors.

The National Park Services Changeable Display allows Preserve managers to post temporary notices easily. A 12-inch x 12-inch unit holds a standard landscaped letter-size sheet. Like the brochure dispenser, sheets are added from the bottom and protected from weather.

Currently at Elklick, some signs are affixed to tree trunks. This makes it difficult to update information seasonally, and signs, which are subject to fading and weathering from exposure, are hard to read.
(Photo courtesy of L/KLA)

Trail Markers

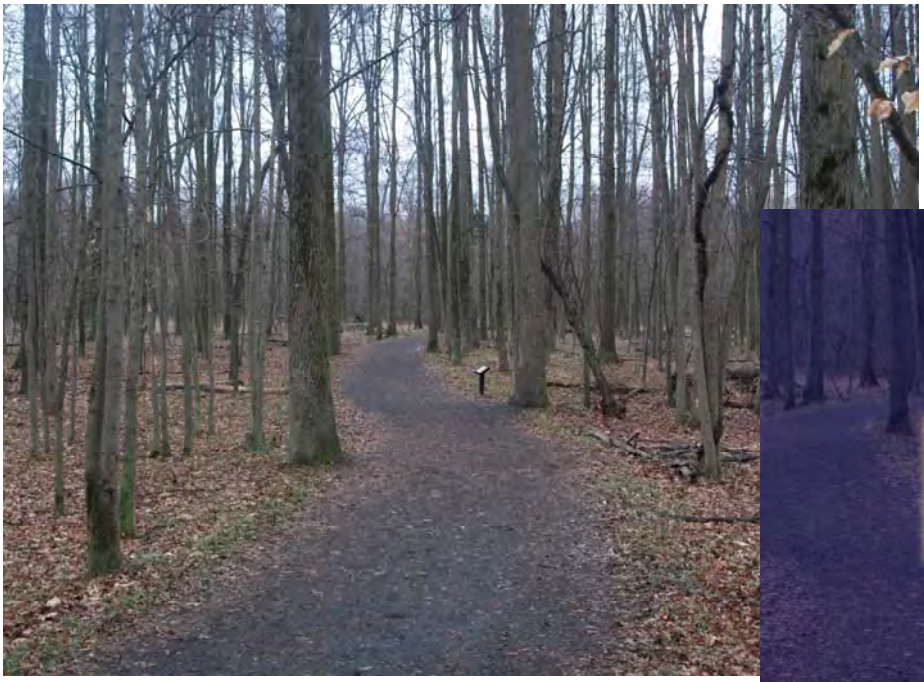
Management Objective 3 outlines strategies for managing public access in ways that respects the natural resources within the Elklick Woodlands. The plan recommends working with trail planners to determine appropriate locations for a generalized trail corridor to the west of the site and along Pleasant Valley Road to the east. If feasible given the carrying capacity of the site, the plan also recommends establishing footpaths in the perimeter areas of the Woodlands to provide controlled access into the site.

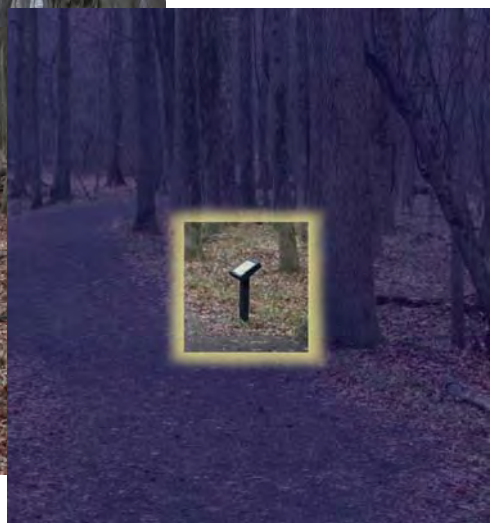
Given the vulnerability of the natural resources in the site, it will be important to keep visitors from straying off any trails or footpaths that are developed. This will require that trails and paths be clearly marked. Various marking techniques have been implemented in national, state and county parks, including signs, blazes on tree trunks, colored tape tied around trees, etc. For the Elklick Woodlands, this plan recommends markers like those used at Huntley Meadows Park in eastern Fairfax County (below, left).

original height

modified height

These markers can be lowered to a height of approximately 10” (immediately left) so that they are still visible to visitors following a trail or path without being so obtrusive that they distract from the views within the Woodlands. *(Photos courtesy of L/KLA)*





Boundary Marking

Among the early action steps for the Elklick Woodlands is to define the Preserve's boundaries. This can be most easily accomplished using simple, clear, visible yet unobstrusive signage.

Signs should be mounted on wooden posts with a dark stain. The back sides of all signs should be painted a matching brown, so as to blend in with the surroundings.

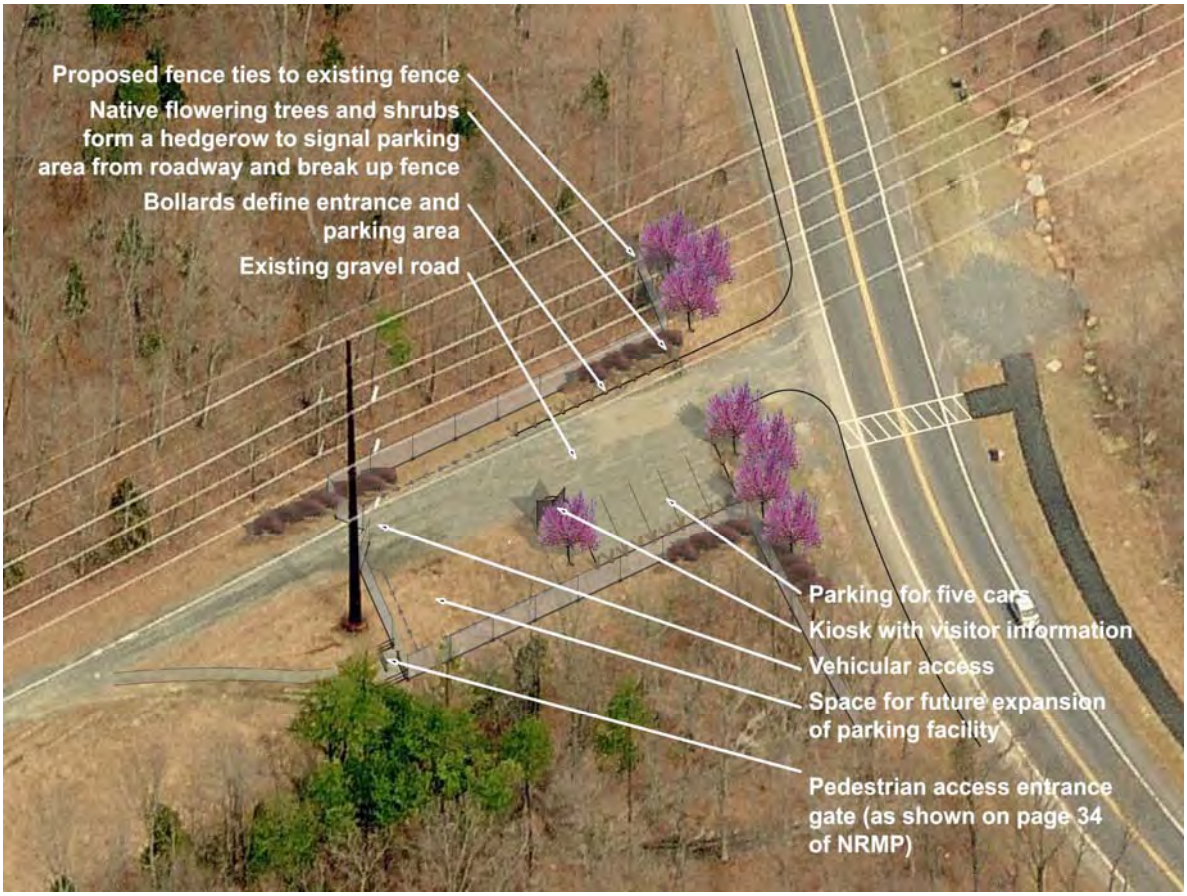
Flexible fiberglass markers are a suitable alternative for boundary marking (similar to signs in use on the Cross-County Trail). Refer to the Park Authority design standards for details.

The photo top right shows an existing sign
Above, left and right, the same sign is shown on a wooden post with a painted back. *(Photos courtesy of L/KLA)*

Parking

Currently, there is room for one car to park outside the fence at Elklick at the intersection of the utility corridor and Pleasant Valley Road. In order to accommodate the inevitable increase in visitation, it will be necessary to provide a larger, more clearly defined parking facility. Initially, this need be only a small area, with space for five cars. However, there should be room for expansion, should visitation to Elklick demand it.

The image below shows a proposed parking area at the intersection of the utility corridor and Pleasant Valley Road. Using the existing gravel road as point of entry, the design calls for a realignment of the existing fence around a parking area that can accommodate five cars with room to add five more. A gate near the northwestern corner of the parking area allows authorized vehicles to enter the Preserve on the existing gravel road, while a Chicane-type stile at the southwestern corner is open to pedestrians. A kiosk alongside the proposed parking spaces provides a place to display the rules of the Preserve, site maps, and other visitor information. Native flowering trees, such as redbuds, and shrubs soften the appearance of the fence, while signaling to drivers the approach to the parking area. Finally, a crosswalk connects the parking area to the trail on the opposite side of Pleasant Valley Road.

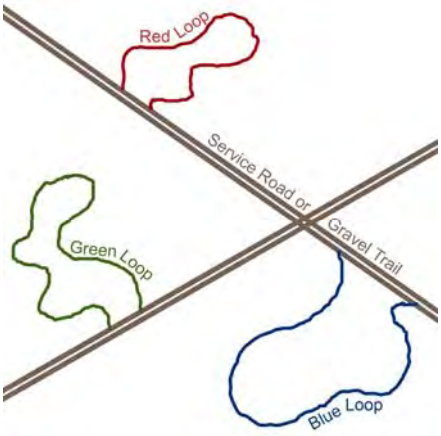


Trails

Given the location of the Preserve in the middle of suburban northern Virginia, people will inevitably seek access to the site. The key is to allow access in a way that does not threaten the natural communities within the site. A limited trail system will allow visitors into the site to enjoy its natural resources, and at the same time, discourage visitors from wandering into areas that may be particularly sensitive to human traffic.

Trail Siting

A system of looped trails will allow visitors to explore the site without the site becoming a major thoroughfare. As shown in the diagram to the right, loops can depart from and return to already established gravel trails, service roads or transmission line corridors. The loops should be dirt trails – no bark mulch or stone dust – and have a maximum width of two feet to minimize the impact to the site and regulate the number of people using them at one time.



Trail Criteria

In addition, the following criteria should apply to the development of trails at Elklick:

- Trails should be prohibited within the core area of Elklick Woodlands (areas identified as 1a, 1b, and 1c, on the management units map) until such time as the soils and associated flora can be more fully inventoried and documented (including soils, flora/communities and RTEs).
- Cultural resource inventories must also be completed.
- Limits of Acceptable Change and Visitor Carrying Capacities must be identified for each community and management unit.
- Trails within the utility corridor and perimeter areas (including adjoining Park Authority property and potentially along utility line easements) should avoid the following conditions:

- wet soils (high water table)
- highly erodible soils
- steeply sloped land that requires extensive grading to accommodate a trail (the trail should lay "lightly on the land" and require very minimal amounts of grading to construct, if any)
- wooded areas requiring tree removal to accommodate a trail

- Should the concave depressions of the Elklick Run and Bull Run tributaries need to be crossed with a trail, the crossing should take place at the narrowest point. Boardwalk construction should be considered using the least intrusive form of construction. (See Appendix 6 for typical types of details.)
- Trails should avoid areas where *Microstegium* or future non-native invasive species establish to avoid further spread of the species. Effective control of non-native invasive species must be demonstrated.
- Any trail and associated parking area or public access facility for any portion of Elklick Woodlands should include, as part of the project, dedicated funding for annual mapping and controlling of non-native invasive species and for monitoring visitor use and its associated impacts.

Bridges and Boardwalks

Located at the watershed divide between Cub and Bull Runs, Elklick Woodlands includes a series of originating headwaters and wetland areas. Given the site's prominent hydrography, trails will likely cross waterways or wetlands. In the event that a trail crosses wetlands or a small stream, the appropriate structure will be necessary.

Minor stream crossings at Elklick can be simple footbridges with or without handrails, as shown in the photo to the left from the United States Forest Services, *Trail Construction and Maintenance Notebook, 2007 Edition*, page 97.

Wetland areas in the Elklick Woodlands can be traversed using a similar structure: a wooden walkway called a puncheon. Also illustrated in the United States Forest Service's *Trail Construction and Maintenance Notebook, 2007 Edition*, the puncheon should be made from timber found on site, and can be slightly elevated (surface puncheon) or flush with the wetland surface (subsurface puncheon). Refer to the USFS notebook for further information at http://www.fhwa.dot.gov/environment/fspubs/07232806/index.htm.

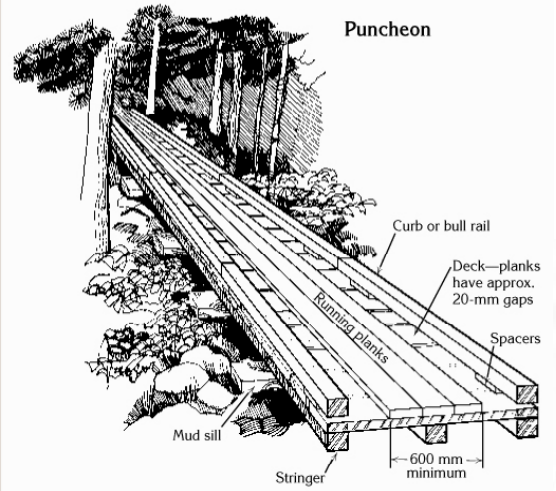


Figure 46—Puncheon.

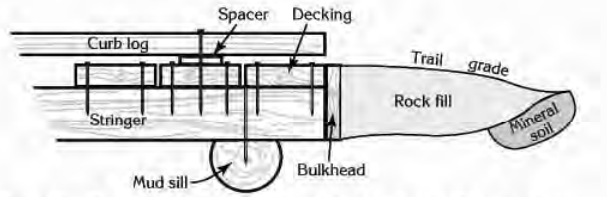


Figure 51—Place a bulkhead or backing plate at each end of the puncheon. Approaches should have a rising grade so water will not run onto the structure.

(*Trail Construction and Maintenance Notebook, 2007 Edition,* pages 82 [above left] and 86 [above right])

Surface Water

Critical to trail design is the removal of surface water. Surface water must be diverted off the trail to prevent erosion of the trail surface and the subsequent failure of the trail support structure.

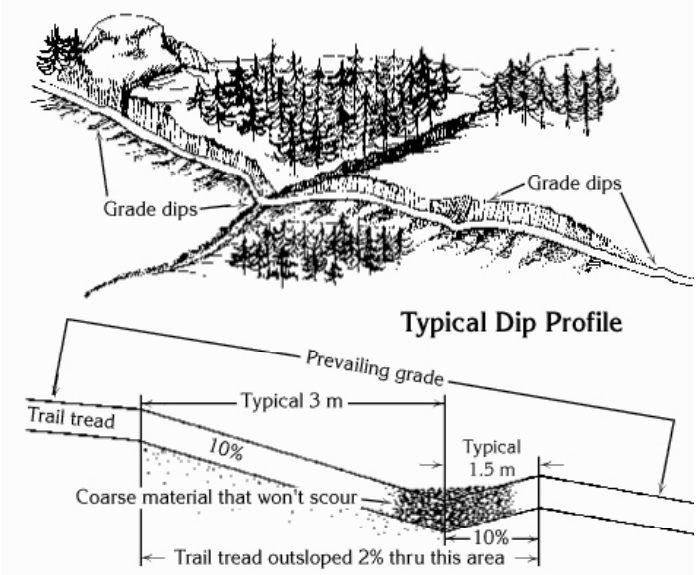


Figure 18—Grade dips are much more effective than waterbars and require less maintenance. Along with outsloping, they are the drainage structure of choice.

The Forest Service recommends using grade reversals to divert water off the trail. Also called grade dips, terrain dips, Coweeta dips and swales, grade reversals "use a reversal in grade to force water off the trail without the need for any other structure" (*Trail Construction and Maintenance Notebook, 2004 Edition*, page 40).

According to the Forest Service, grade reversals "should be placed frequently enough to prevent water from building enough volume and velocity to carry off your tread surface. Grade dips are pointless at the very top of grades unless they intercept significant amounts of slope drainage. Usually midslope is the best location. Grade dips also should not introduce sediment-laden water into live streams.

While grade reversals are the preferred method for directing water off of trails, waterbars are another possibility. However, waterbars should be used with caution because they "commonly fail when sediment fills the drain. Water tops the waterbar and continues down the tread. The waterbar becomes useless. You can build a good rolling grade dip quicker than you can install a waterbar, and a rolling grade dip works better" (*Trail Construction and Maintenance Notebook, 2007 Edition*, page 37). If waterbars are used at Elklick, they should be constructed as shown below, using timber from the Elklick site.

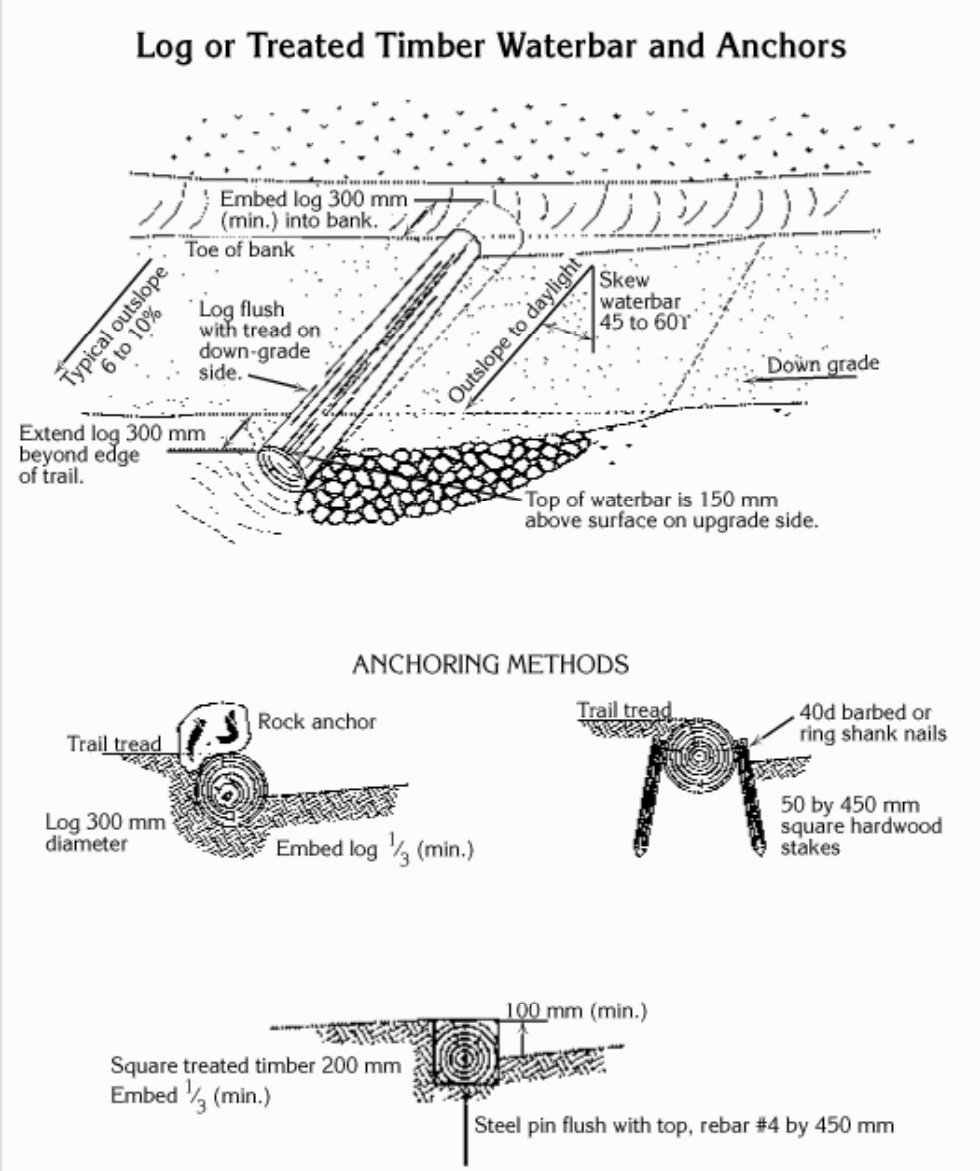


Figure 22—Logs used for waterbars need to be peeled (or treated with preservative), extended at least 300 mm (12 in) into the bank, staked or anchored, and mostly buried.

Trail Construction and Maintenance Notebook, 2004 Edition, page 47.

Appendix 7: List of Virginia Programs for Open Space and Natural Resource Conservation

Virginia Programs

In Virginia, land conservation easements can either be donated or sometimes sold to qualified private or public organizations. Most of the easements are donated to the Virginia Outdoors Foundation, a state agency. Other state agencies also accept easements, including the Department of Conservation and Recreation (VDCR), Department of Forestry (VDOF), Virginia Department of Game and Inland Fisheries, and the Virginia Department of Historic Resources. Soil and water conservation districts can hold easements in Virginia as well as local governments.

The following programs have potential for applicability for conserving open space on private lands adjoining Elklick Preserve:

Department of Conservation and Recreation's Office of Land Conservation (VDCR)

The VDCR maintains a statewide "conservation lands" database that includes public and certain private lands with the potential to serve various conservation, recreation and open-space roles. It also produces a directory of Virginia's land conservation trusts and organizations and a brochure that details state agencies' programs suited to help citizens conserve their land. More information is available at http://www.dcr.virginia.gov/land_conservation/index.shtml.

The Virginia Outdoors Plan, published by the VDCR, offers extensive discussions of land trusts activities in the Northern Virginia Region. The plan recommends working closely with existing groups to link together opportunities for funding with ongoing activities of existing land trusts.

Virginia Land Conservation Foundation

The Virginia Land Conservation Foundation provides state funding to conserve certain categories of special land, such as open spaces and parks, natural areas, historic areas, farmland, and forests. More information is available at http://www.dcr.virginia.gov/virginia_land_conservation_foundation/. About 3 million dollars were allocated for fiscal year 2009.

Virginia Conservation Lands Needs Assessment (VCLNA)

The VCLNA can help guide effective conservation by providing technical assistance in the form of tools that help both government and private organizations identify resource protection areas and that, at the local level, help planners manage growth in a balanced way. More information is available at www.dcr.virginia.gov/natural_heritage/vclna.shtml.

Department of Taxation's Land Preservation Tax Credit

This tax credit "allows individuals and corporations to take a credit for conveying land located in Virginia for such purposes as historical or conservation preservation, agricultural use, forest use, open space, and natural resource conservation." There is a statewide cap on land preservation tax credits set in 2006 legislation at 100 million dollars to be increased annually at an amount equivalent to the consumer price index. More information is available at http://www.tax.virginia.gov/site.cfm?alias=taxcredit2#preservationAfter.

VDACS Office of Farmland Preservation

Virginia's Office of Farmland Preservation "works with other governmental and private organizations to help establish local purchase of development rights (PDR) programs by creating model policies and practices, establishing criteria to certify programs as eligible to receive funds from public sources, and determining methods and sources of funding for localities to purchase agricultural conservation easements.

Green Infrastructure

The Virginia Outdoors Plan recommends that green infrastructure planning be coordinated between state agencies and that agencies work in concert with green infrastructure planning such as is taking place with this planning effort for the JTHG region. The Virginia Outdoors Plan defines green infrastructure as *"land planning that balances the benefits of open space with development. Green infrastructure planning emphasizes the importance of connections between blocks of open space, between developed and undeveloped areas and between society and the landscape."* Partnerships with state resource agencies is one way to extend resources and the knowledge base to implement green infrastructure initiatives

Land Use Taxation

Virginia has a unique program that allows qualified natural areas (in addition to other types of open space) also to receive reduced assessments for property tax purposes, reductions in federal estate taxes, and a charitable donation for tax benefit. For example, a property owner that does not meet the criteria for farm, forest, or horticultural use may qualify for open space use (such as land used as a riparian buffer).

Cost-Share Assistance – Environmental Quality Incentive Program (EQIP)

In Virginia, EQIP was established to provide a single voluntary conservation program for farmers and landowners to address significant natural resource needsand objectives. EQIP offers five to 10-year contracts to landowners and farmers to provide cost-share assistance and/or incentive payments to implement conservation practices and address the priority concerns statewide or in the priority area. Eligible land includes cropland, pasture, and other agricultural land in priority areas or land that has an environmental need that matches one of the statewide concerns.

Landowner Incentive Program

The Landowner Incentive Program (LIP), funded by the U.S. Fish and Wildlife Service, is a competitive grant program that establishes partnerships between federal and state government and private landowners. In Virginia, LIP provides 75% cost share to landowners willing to install and maintain stream restoration and riparian buffer projects on their property for at least ten years.

Virginia Clean Water Revolving Loan Fund -- Land

Conservation Loan Program The State Water Control Board authorizes low interest loans from the Fund for land acquisition when the Board is satisfied that the acquisition would protect or improve water quality and prevent pollution of state waters. For more information go to www.deq.state.va.us/cap/lcguide.html

Conservation Reserve Enhancement Program (CREP)

CREP offers a program to conserve riparian buffers within agricultural areas. According to the VDCR website, CREP "aims to improve Virginia's water quality and wildlife habitat by offering financial incentives, cost-share and rental payments to farmers who voluntarily restore riparian buffers, filter strips and wetlands through the installation of approved conservation practices." The CREP conservation easement program is "a legal document made between a landowner and DCR, which pays the landowner $1,000 an acre for the

easement. The easement limits some rights but allows the landowner to own and use the property and sell it or pass it on to heirs while protecting it. The CREP easement is legally recorded and bound to the deed of the property permanently." As part of the easement, the landowner agrees to keep the land as a restored riparian buffer or wetland after the CREP 10 to 15-year rental contract expires. (See www.dcr.virginia.gov/soil_&_water/ crep.shtml.)

Water Quality Improvement Fund

WQIF provides water quality improvement grants to local governments, soil and water conservation districts and individuals for point and nonpoint source pollution prevention, reduction and control programs (Section 10.1- 2128.B. of the Code of Virginia). For example, in 2007, the Culpeper SWCD received $73,600 for natural stream channel restoration in the Upper Rappahannock River Basin

Forest Land Enhancement Program

Landowners who are implementing an approved Forest Stewardship Plan are eligible for certain cost-sharing assistance to preserve and protect their valuable resources. Information is available at http://www.dof.virginia.gov/mgt/cip-fact-flep.shtml.

Incentives in the form of cost sharing are offered to participants who agree to adopt and carry out a Forest Stewardship Plan based on realistic management objectives that match the landowner's interests and goals with the capability of his/her land. The practices that are recommended in the plan and have received cost share assistance must be maintained for a minimum of ten years. The maximum amount a landowner may receive in a year is $10,000. The eleven broad practices are

- FLEP 1 Forest Stewardship Plans
- FLEP 2 Afforestation/Reforestation
- FLEP 3 Forest Stand Improvement
- FLEP 4 Agroforestry
- FLEP 5 Water Quality Improvement & Watershed Restoration
- FLEP 6 Fish & Wildlife Habitat
- FLEP 7 Forest Health Protection
- FLEP 8 Invasive Species Control
- FLEP 9 Fire & Catastrophic Risk Reduction
- FLEP 10 Fire & Catastrophic Event Rehabilitation
- FLEP 11 Special Practices

Forest Legacy Program

Led in Virginia by the Virginia Department of Forestry (VDOF), the Forest Legacy Program will be an important tool for preserving Virginia's forests through future years of continued growth. Forest Legacy is distinct from other conservation programs in that it focuses specifically on environmentally important working forest lands and requires a Stewardship Plan or a Multi-Resource Management Plan (MRMP) meeting the requirements of the Forest Stewardship Program for each tract accepted into the program. Funded under the Cooperative Forestry Assistance Act of 1978 (Amended), 1990 Farm Bill and the 1996 Farm Bill, Forest Legacy funds may be used by Virginians to purchase conservation easements or fee simple land ownership. For more information go to http:// www.dof.virginia.gov/info/index-finance-assist.shtml.

Riparian Buffer Tax Credit

In Virginia, wooded buffer zones along streams, rivers, and the Chesapeake Bay can be classified as riparian forests. Landowners can receive a tax credit for preserving this type of land. The amount of the credit is equal to 25 percent of the value of the timber retained as a buffer up to $17,500. The buffer must be at least 35 feet wide and no more than 300 feet and remain intact for 15 years. The applicant must have a Stewardship Plan for the tract to qualify. A separate application must be completed for each tract. For more information go to http://www.dof.virginia.gov/rfb/rbtcindex.shtml.

Appendix 8: Stormwater Management Toolbox for Surface Drainage near Elklick Woodlands Preserve

The following guidelines are to be used when runoff increases in both rate and volume as a result of modifications to the adjacent roadways and development where that water is likely to runoff into Elklick Woodlands.

As roadway modifications and development reduce the amount of pervious surface in the Elklick Woodlands vicinity, the stormwater management goal will be to maintain equal pre- and post-development runoff rates and volumes through infiltration. In addition, stormwater management systems need to address water quality, removing non-point source pollution before runoff enters the watershed. By providing opportunities for infiltration, the volume of runoff will decrease, as will its rate of flow, and water will be cleansed as it replenishes groundwater supplies. This appendix outlines "green infrastructure" techniques to promote infiltration and mitigate the impacts of pollution and increased runoff rates and volumes.

A key component of successful stormwater management is synergy among team members. Civil and hydraulic engineers, environmental planners and designers, and landscape architects should contribute to this multi-disciplined approach. Communication and cooperation between all parties will lead to an effective stormwater management system, both technically and aesthetically.

In addition to open communication among team members, the following strategies can be used to address post-development runoff conditions. Some of these are more complex than others. The management system developed should begin with the simplest technology and gradually progress to more complex management strategies as necessary.

- Utilize natural hydrologic processes
  - Use soils and vegetation to promote infiltration and evapotranspiration, thereby replenishing the hydrologic cycle

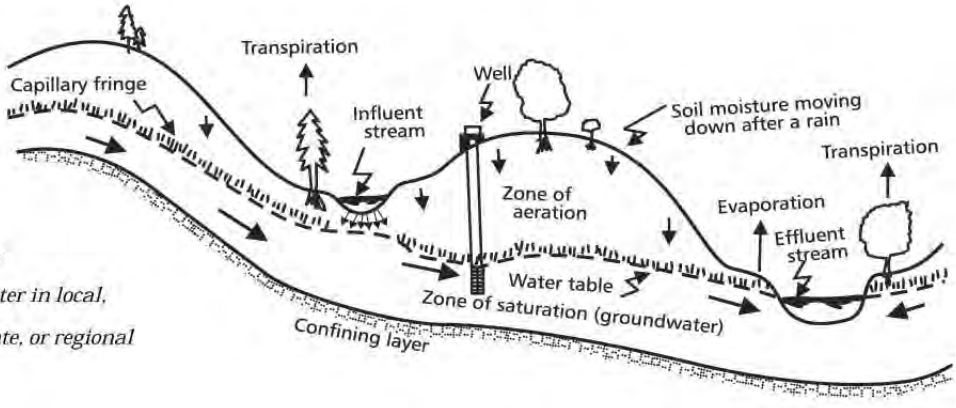


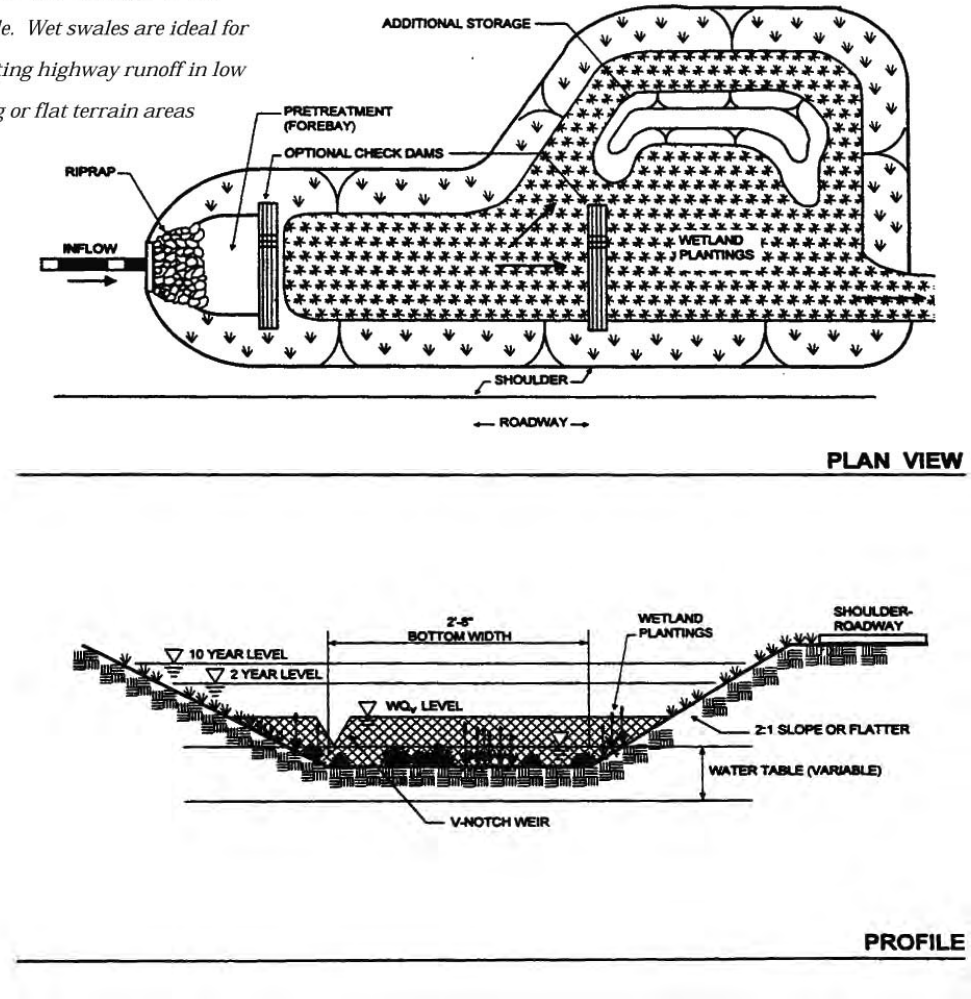
Figure 3-5. Groundwater in local, intermediate, or regional setting

Low-Impact Development Design Strategies: An Integrated Design Approach. Prince George's County, Maryland, Department of Environmental Resources, Programs and Planning Division, June 1999, page 3-8.

- Promote infiltration
  - Vegetated swales

    Swales are shallow, open channels, intended primarily as a means of conveyance. However, vegetated swales, while storing and moving runoff, also slow water velocity and provide a large surface area for pollutant removal and infiltration. Along a roadway, surface flow from the travel lanes flows into swale either in median (if divided) or adjacent if not a divided highway.

Figure 4-8. Example of wet swale. Wet swales are ideal for treating highway runoff in low lying or flat terrain areas



Low-Impact Development Design Strategies: An Integrated Design Approach. Prince George's County, Maryland, Department of Environmental Resources, Programs and Planning Division, June 1999, page 4-17.

- Filter strips

Filter strips differ from swales in shape but perform the same functions. Filter strips are mildly sloping vegetated areas adjacent to impervious surfaces, such as roads and parking lots. Like swales, they slow runoff and provide the surface area needed for infiltration and pollutant. Swales and filter strips are also similar in that they are usually used as the first feature in a multi-step stormwater treatment system. They are frequently used in conjunction with another stormwater treatment method, such as detention or infiltration basins, located at the end of the swale or base of the filter strip.

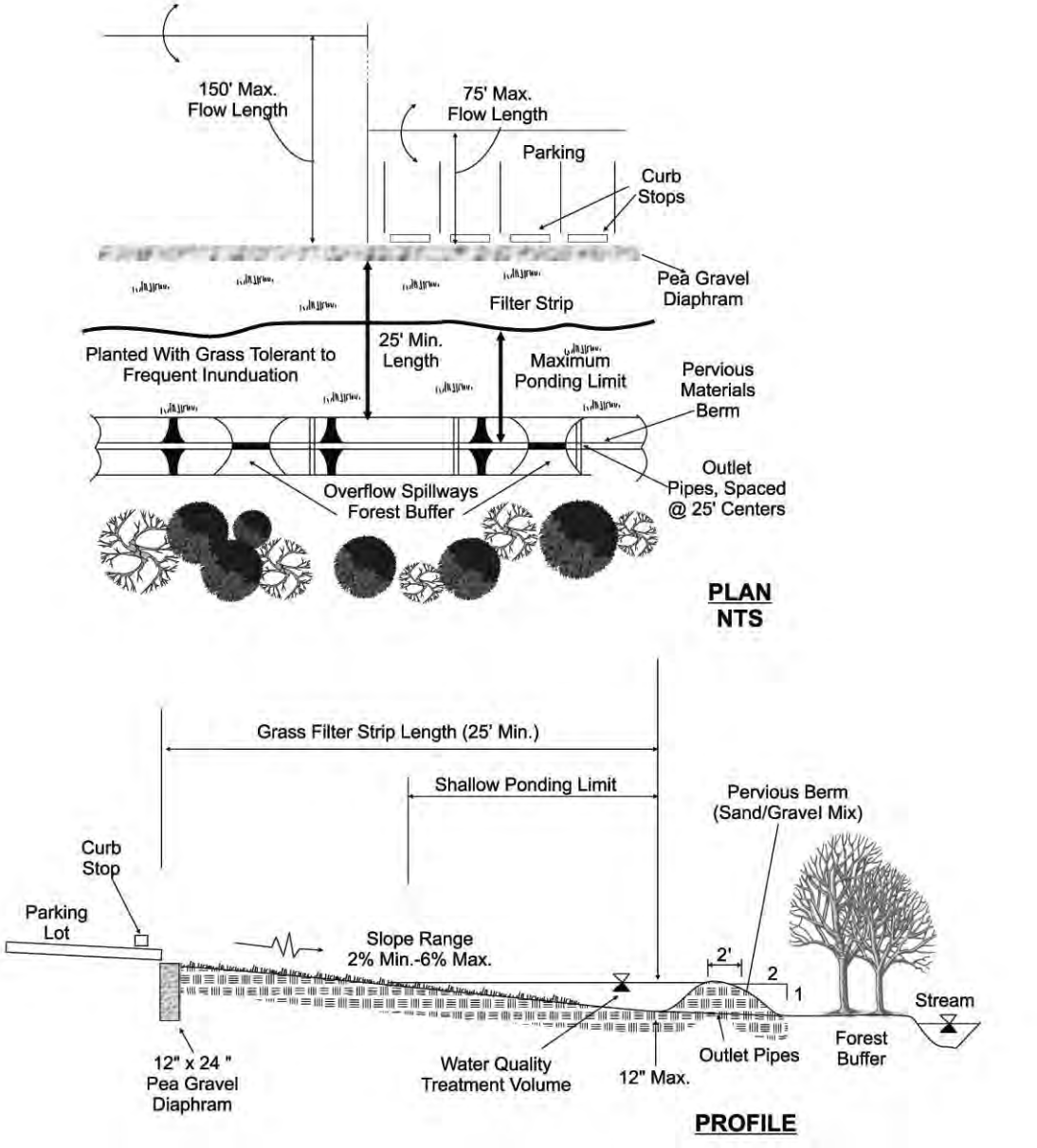


Figure 4-5. Typical filter strip (CRC, 1996).

Low-Impact Development Design Strategies: An Integrated Design Approach. Prince George's County, Maryland, Department of Environmental Resources, Programs and Planning Division, June 1999, page 4-13.

- Infiltration basins

While swales and filter strips are primarily methods of conveyance with a secondary infiltration function, infiltration basins returns water directly to the soil. Infiltration cleanses runoff, enables groundwater recharge and stabilizes stream base flows. Near the Elklick Woodlands, the right-of-way may not be large enough for an infiltration basin; instead a more linear, trench-like construction may be necessary. These basins or trenches can be gentle, vegetated depressions that capture at least the first flush from every storm.

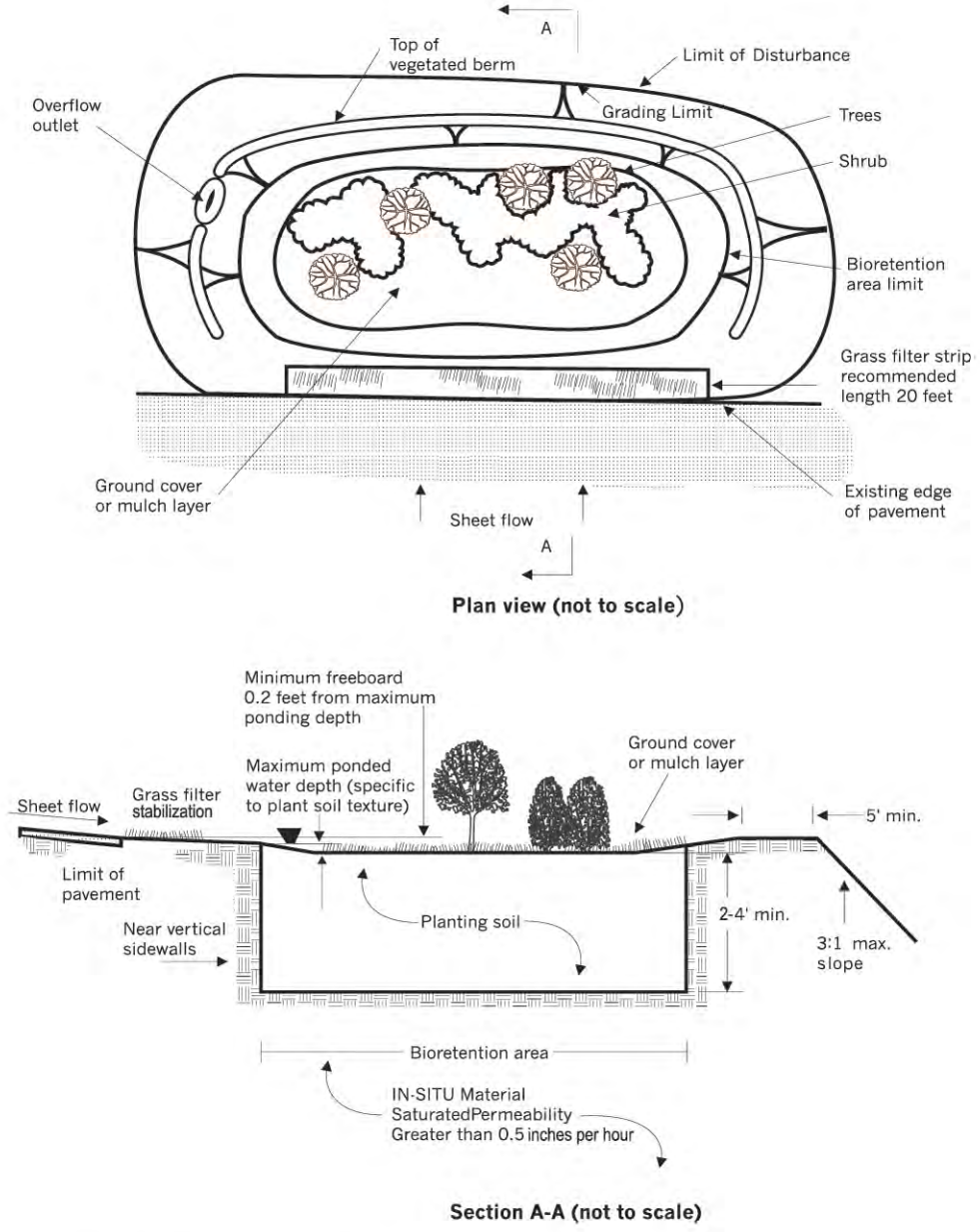


Figure 4-3. Typical bioretention facility

Low-Impact Development Design Strategies: An Integrated Design Approach. Prince George's County, Maryland, Department of Environmental Resources, Programs and Planning Division, June 1999, page 4-10.

- Porous Paving

Porous pavements are permeable paving materials that utilize a subsurface stone reservoir to termporarily store runoff as it infiltrates into the subsoil. Porous pavement is available in three forms: porous asphalt pavement, porous concrete pavement and modular porous blocks, typically of concrete, but more recently made of plastic. All of these are capable of supporting heavy vehicular loads, while at the same time, allowing runoff to infiltrate into the soil rather that directing the runoff into piped stormwater systems.

- Recycle/reuse runoff whenever possible through water harvesting
  - Water harvesting is the capture of water for human use. Direct precipitation and runoff from a catchment area are collected in a permanent pool. Depending on the source of the runoff, it may need to be directed over a biofilter strip or vegetated swale in order to improve water quality before it reaches the permanent pool. This water can then be used for irrigation or other non-potable uses.

- Preserve existing vegetation
  - Reduce lane and shoulder widths
  - Along divided highways, vary the profile of each opposing lanes of traffic
  - Minimize cut and fill to accommodate roadway

- Stockpile topsoil and use it in revegetation
  - When possible, stockpile and reuse native soils
    Topsoil is the "uppermost layer of soil capable of growing and supporting vegetation." On roadway projects this is often the first earth to be removed in cut and the first to be transported and placed in fill. Consequently, it is placed at depths in accessible to the developing root systems of new plants. Ideally, topsoil should be stockpiled and then placed atop fill. The following guidelines provide for topsoil rich in nutrients and organic matter:
    - To the extent possible, aboveground vegetation, including litter, should be mixed or otherwise incorporated into the topsoil prior to excavation. Topsoil should be excavated from the existing roadway should to a depth of 6 inches.
    - When stockpiling topsoil, mound soil no higher than 1.3 m (4 feet) high for less than 1 year and preferably less than 6 months. Cover to prevent soil erosion and contamination by weeds.
    - Stockpiling will result in the disruption and loss of beneficial soil microorganisms, and if stockpiled over a length of time (six months +/-) may result in a total of partial loss of soil microorganisms
    - If topsoil is stockpiled prior to placement, the top one foot of the stockpile material should be mixed with the remainder of the stockpile to ensure that living organisms are distributed throughout the topsoil material at the time of final placement.
    - Following construction, stockpiled topsoil should be uniformly redistributed (placement) to a depth of 150 mm (six-inches). Placed topsoil should be cat tracked vertically to the slope to compact the topsoil and to create horizontal pockets (safe sites) to hold seed and water.

    For additional information on topsoil preservation, refer to AASHTO's Center for Environmental Excellence at http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/4_11.aspx.

- Prevent erosion and sedimentation
  - Apply compost blankets

    A compost blanket is a layer of loosely applied compost or composted material that is placed on the soil in disturbed areas to control erosion and retain sediment resulting from sheet-flow runoff. It can be used in place of traditional sediment and erosion control tools such as mulch, netting, or chemical stabilization. When properly applied, the erosion control compost forms a blanket that completely covers the ground surface. This blanket prevents torm water erosion by (1) presenting a more permeable surface to the oncoming sheet flow, thus facilitating infiltration; (2) filling in small rills and voids to limit channelized flow; and (3) promoting establishment of vegetation on the surface. Composts used in compost blankets are made from a variety of feedstocks, including municipal yard trimmings, food residuals, separated municipal solid waste, biosolids, and manure. (U.S. Environmental Protection Agency, http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_ results&view=specific&bmp=118)

    Application of a 2 inch-thick blanket to a 1:1 rock slope using a pneumatic blower (Austin, Texas, 2002). Source: McCoy, Texas Commision on Environmental Quality (TCEQ), 2005.

  - Utilize brush layering on slopes

    Brush layering is another method of preventing erosion on slopes that have been disturbed. In this case, cuttings of live woody plant material are planted into the slope face, in trenches that have been excavated parallel to the slope's contours. Planted close together with the trench, the woddy cuttings create rows across the slope face that act as a fence, catching debris moving down the slope.

    When selecting plant material for brush layering, cuttings from within the native ecotype should be used. These should be planted in late fall before the rainy season.

  - Install check dams

    Check dams or weirs can be used in stormwater management to regulate water flow through a series of BMPs. Runoff may be detained in a sedimentation basin to allow solids to settle out before it flows over the dam to a secondary detention area or infiltration basin. Using check dams to create a multi-level stormwater treatment facility can be significantly more effective than using a single BMP in isolation.

    During construction, constriction treatment check dams, such as fiber rolls, may be used to control erosion in disturbed areas. These can be left in place after construction to serve as part of the stormwater treatment sequence.

- Vegetation management
  - Protect existing vegetation along the roadway. In order to protect trees and shrubs on the Elklick Woodlands property, this may require directing roadway modifications to the opposite side of the road