Laurel Hill
Natural Resource Management Plan

Prepared for the

Fairfax County Park Authority

by

Lardner/Klein Landscape Architects, P.C.

in association with

Environmental Systems Analysis, Inc.

and

Wayfarer Environmental Technologies, LLC

July 2011

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Fairfax County Park Authority

Laurel Hill Natural Resource Management Plan

Approval Page

The Laurel Hill Natural Resource Management Plan is hereby approved, effective _____, 2011

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SECTION I: EXECUTIVE SUMMARY

Figure 1: View of former prison agricultural facilities across meadow and thicket/shrubland communities in Area H at Laurel Hill Park

Laurel Hill Park contains a wealth of ecological communities native to the Mid-Atlantic. In particular, the park presents an opportunity to restore and manage two landscapes that area increasingly rare in Northern Virginia: the treeless areas – areas that include meadows and thicket/shrublands – and the hardwood forests. These communities are the focus of this natural resource management plan.

Background

Formerly the site of the District of Columbia Correctional Facility in Lorton, Virginia, the land now designated a 1,200-acre park was transferred to Fairfax County in 2002. In accordance with terms set forth in a Memorandum of Agreement (MOA) established prior to the land transfer, the site has remained open space. The 2004 *Laurel Hill Park General Management Plan and Concept Development Plan* (GMP/CDP) proposes areas for active recreation, passive recreation and natural resources preservation.

During the active life of the prison, much of the site was devoted to agriculture; consequently, a large portion of the landscape is treeless, at various stages of succession ranging from pasture to thicket/shrubland. Former pastures, however, are now dominated by non-native invasive tall fescue. The meadow-thicket/shrubland mosaic that has grown from the former pastures creates a rare and valuable habitat that supports a diverse array of plant and animal species. Equally ecologically valuable, the remainder of the undisturbed portions of the site are largely intact, healthy, hardwood forest primarily located to the northeast of the main prison grounds. Given its size, this forest land is considered an interior forest, providing an intact ecosystem and habitat for wildlife that is not adapted to urban environments. Despite their two very different positions on the spectrum of succession, the treeless areas and the forest block each require proper management to maintain their ecological value in the landscape.

Laurel Hill Natural Resource Management Plan

The Laurel Hill Natural Resource Management Plan provides an assessment of the natural resource conditions and needs at Laurel Hill Park. Based on this assessment, the plan makes recommendations for the short- and long-term management of these resources, with an emphasis on the meadow-thicket/shrubland mosaic in the treeless areas and the forest block in the northeastern portion of the park. These recommendations are organized geographically according to management areas identified in the 2004 GMP/CDP and based on a system of land units and subunits defined in the *Fairfax County Comprehensive Plan*. Of the 18 management areas dedicated to public park space, seven are addressed in this plan. These include Management Areas A, G, H, I, J, K and L. Management Area A contains the large forest block in the northeastern portion of the park, while Areas H and L offer the most mature meadow-thicket/shrubland composition. Areas G, J, K and to a lesser extent I are also characterized by forested riparian buffers bordering significant treeless areas with the potential to develop an ecologically rich meadow-thicket/shrubland mosaic.

The plan begins with an overview of Laurel Hill Park, Section II, including its context within the D.C. metropolitan area, its context within the Pohick Creek and Mill Branch watersheds, the site's history and the current and proposed land uses. This is followed by Section III, a summary of site conditions and descriptions of the different ecological communities found on site during 2003 and 2009 natural resources inventories conducted by ESA, Inc. Section IV summarizes all of the reports and plans that have been written to date about Laurel Hill and outlines current management practices at the site. This section also includes a description of a pilot meadow restoration project that was conducted on two sites at the Laurel Hill Golf course and demonstrated how the meadow community can be restored across the park site. Finally, Section V contains management recommendations by management area, each section beginning with a profile of the management area, including current site conditions, current uses and activities and proposed uses. A management goal for each management area is further defined by objectives, and each objective is supported by action items offering concrete implementation steps.

Goals and Objectives

Promoting the stewardship of the site's natural resources while allowing for human activity, this plan establishes the following goal for the management of the park:

Provide a framework for the management and continuing stewardship of the natural resources, primarily related to treeless areas, in seven site areas (Management Areas) on Laurel Hill in an ecologically appropriate, sustainable and affordable manner, while recognizing that some sites have temporary uses and other uses are to remain in perpetuity, but that all sites are not static and will require active intervention to regain and retain their ecological integrity.

The goals and objectives for each management area support this overall goal and reinforce the management recommendations for the management area. The goals for each area are as follows.

Area A: *Preserve and maintain Area A as a healthy interior forest with limited human access.*

Area G: *Actively manage and enhance the meadows to remain in perpetuity for ecological value, while managing the Central Green area as meadow as an interim use until the Green is developed.*

Area H: *Intensively manage and enhance the natural resources for wildlife habitat value – the large aggregate of meadow-thicket/shrubland mosaics, the riparian stream corridors and the large farm pond.*

Area I: *Improve the ecological health of the woodlands in the eastern portion of Area I while managing the meadow and thicket/shrublands on the western side of the area as interim uses until plans for active recreation are implemented.*

Area J: *Manage the existing meadows and thicket/shrublands as interim uses in a way that will facilitate the transition to native warm-season grass pasture land, the Resource Protection Area and its associated woodland in perpetuity and establish measures to protect Area J's natural resources from the shared use trail system (equestrian, pedestrian, bike), recognizing that the planned future use of portions of the site may eventually infringe on the interim use of the meadows and thicket/shrublands.*

Area K: *Manage the existing meadows and thicket/shrublands to facilitate the transition from fescue-ridden pasture land to native warm-season grasslands, using management methods that protect Area K's natural resources while encouraging human activity on shared-use trails and the equestrian facility.*

Area L: *Manage and protect the existing* rubus *shrubland community, reclaim fescue-dominated areas and protect the woodlands while allowing for human activity within the management area.*

Management Challenges

Although the management recommendations for each area contain specific language based on the current conditions in and proposed plans for that particular area, the ecological communities at Laurel Hill Park are not restricted by management area boundaries. Woodlands, meadows and thicket/shrublands extend from one management area to the next. Consequently, several of the management recommendations and the challenges they address overlap across management areas and may also be applicable to areas at Laurel Hill that do not fall within the seven areas discussed in detail in this report. This natural resource management plan emphasizes the need to engage in active forest management to improve the health of the large forest block in Management Area A. However, many of the threats affecting this forest block are also present in the riparian forests in the stream valleys within Areas H, I, J and K. Similarly, Management Areas H and L contain the most developed meadow-thicket/shrubland mosaic. Still this unique composition exists at earlier stages of development in Areas G, J, K and I. Although management of these areas will differ based on planned future uses and the need for interim strategies, they, too, face threats present in other areas of the park.

The primary threats most affecting the park include controlling and managing human access and land disturbance; non-native invasive plant species; excessive deer populations and stormwater management. Each of these is addressed with a series of management objectives and action items in Section V of this plan.

Human Access and Land Disturbance

Laurel Hill Park is a public resource set aside in the MOA and County Comprehensive Plan for the enjoyment and appreciation of the community. However, human activity, particularly active recreation, often occurs to the detriment of the natural environment. Laurel Hill Park has rare ecological communities worthy of restoration, preservation and protection. At the same time, it has the potential to offer much needed recreation opportunities in an increasingly populated area. Managing human activity amidst the valuable habitats will be a challenge and may require somewhat different approaches in the different management areas across the site.

Non-Native Invasive Plant Species (NNIs)

Non-native invasive plant species (NNIs) are present in each management area and need to be monitored and controlled across the park. Utility corridors and stream valleys are particularly vulnerable to the spread of NNIs, and once they are established, NNIs can spread quickly. Given there ability to crowd out native species, NNIs will need to be addresses early throughout the park.

Excessive Deer Populations

The deer population at Laurel Hill is well over the ecological carrying capacity of the site. Deer browsing can be detrimental to a community, but at this scale, it can be devastating. Feeding on young tree saplings, large populations of deer can wipe out an understory, severely impeding tree regeneration. In addition, deer browse can eliminate native groundcovers and shrub layers, destroying habitat for birds and other wildlife while creating an environment favorable to NNIs, which, in areas of over-browse, are able to establish themselves and thrive.

Stormwater Management

As development continues to occur around Laurel Hill Park, stormwater runoff becomes a greater problem for the site and its streams. Increased volumes and rates of runoff are responsible for the erosion of stream valleys and non-point source pollution is degrading water quality. Protecting the park's water resources will require partnering with the Fairfax County Department of Public Works and Environmental Services (DPWES) to promote stormwater best management practices and encouraging nearby homeowner associations to adopt these practices.

All of these challenges can be overcome with proper management efforts. This plan recommends action items that addresses each of these challenges, prioritizing them in implementation tables for each management area and in Appendix 6. Some of these, such as NNI eradication, should begin immediately, while others, like managing and controlling human access will entail longer-term, ongoing management efforts. This plan acknowledges that management strategies need to change as the ecological communities on the site progress and as planned land use programs are implemented. This plan seeks to provide recommendations and action items that are flexible and can evolve with the park.

SECTION II: INTRODUCTION

Mark Burchick

Figure 2: Meadows and thicket/shrublands in Areas G and H at Laurel Hill Park

Project Intent

Laurel Hill Park, a 1,200-acre park located in Fairfax County, Virginia, contains a wealth of ecological communities native to the Mid-Atlantic. Amidst upland forests and forested stream valleys, pasture lands abandoned in the last twelve years have evolved and continue to evolve into meadow and old field communities. Characterized by few or no trees, the meadow and thicket/shrubland ecosystems in particular are significant due to the habitat they provide to numerous bird and animal species. However, they are disappearing rapidly in an increasingly urban Northern Virginia. Natural changes to these systems are occurring at a seemingly accelerated rate, including significant increases in coverage by non-native invasive plant species (NNIs), a decrease in diversity of native species and the encroachment of forest species in existing meadow and thicket/shrubland areas. This fact, coupled with the increased vulnerability of treeless areas to development pressure, makes the development and implementation of this natural resource management plan imperative.

The Laurel Hill Natural Resource Management Plan is an assessment of the natural resource conditions and needs at Laurel Hill Park. Based on these assessments, the plan identifies management priorities and establishes a set of goals and corresponding objectives that include recommendations for managing the ecological community types present and cultivating the communities that are desired. Following these management recommendations, the

Goal

Laurel Hill Park Natural Resource Areas

Provide a framework for the management and continuing stewardship of the natural resources, primarily related to treeless areas, in seven site areas (management areas) at Laurel Hill in an ecologically appropriate, sustainable and affordable manner, while recognizing that some sites have temporary uses and other uses are to remain in perpetuity, but that all sites are not static and will require active intervention to regain and retain their ecological integrity.*

Objectives

Resource Documentation

- *Obtain better assessment of current conditions of natural resources.*

Succession Intervention

- *Devise system for managing meadow and thicket habitats at Laurel Hill, fixing seral succession.*
- *Develop means and techniques to 'hold' landscapes, slowing change to existing pasture.*
- *Make use of appropriate tree and shrub suppression methods, including mechanical and chemical methods, burning and grazing.*

Education

- *Develop a demonstration meadow.*
- *Demonstrate the value of treeless areas, countering the demand to transform them for active recreation or other land uses.*
- *Articulate management options available to the County, making use of the Park Authority staff, contractors and volunteers.*
- *Train Park Authority staff and develop unit costs for treeless areas installation, rehabilitation, enhancement and maintenance.*

** Treeless areas are terrestrial communities, located on dry land – not wetlands – and are composed of habitats that have an open landscape character dominated by grasses, wildflowers (forbs), briars, shrubs and small trees.*

Treeless Area Technical Manual (Appendix 6) offers practical tools, such as time tables and labor estimates, to guide park staff in the implementation of the plan.

The Laurel Hill Natural Resource Management Plan focuses primarily on treeless ecological communities, addressing seven management areas within the park: G, H, I, J, K, L and portions of A. These management areas were defined in the 2004 *Laurel Hill Park General Management Plan and Concept Development Plan* (GMP/CDP) and provide the organizational framework for this plan. With the exception of Management Area A – a largely undisturbed forest block intended to remain as such – these areas are home to the park's abandoned pasture lands, meadows, and thicket/shrublands and offer a rare opportunity for the Park Authority to engage in treeless area restoration, preservation and management.

Management Areas

*The **management areas** used as the organizing unit of this plan were established in the 2004* Laurel Hill Park General Management Plan and Conceptual Development Plan *(GMP/CDP). The GMP/CDP identifies Management Areas A through AA; though only Areas A through M are within the bounds of Laurel Hill Park. The management areas are based on land use areas identified and defined in the* Fairfax County Comprehensive Plan*, termed **land units**. The* Comprehensive Plan *describes proposed uses for these land units. In establishing management areas, the GMP/CDP refined the boundaries of the Comprehensive Plan land units and further defined their proposed uses.*

This plan addresses Management Areas G, H, I, J, K, L and portions of A, which are the predominant natural resources areas (Figure 4). The plan includes management recommendations for Management Area A, the large forest block northeast of Silverbrook Road; however, the focus is on Areas G, H, I, J, K and L, the predominant meadow and thicket/shrubland communities in the park. Park parcels not addressed in this plan should be periodically assessed by the Park Authority and management strategies should be developed based on those listed in this plan for other management areas.

Site Overview

Location

Laurel Hill Park is located in southern Fairfax County, west of Interstate 95 and just north of the Occoquan River (Figures 3 and 5). This part of Fairfax County was long home to the County's waste facilities, water treatment plant and waste water treatment facility. Scattered single family housing development occurred, with strip retail commercial growth adjacent to the U.S. Route 1/Richmond Highway corridor and the interchange of Interstate 95 (I-95) and Lorton Road. Less than 15 miles from Washington, D.C., the park is easily accessible by I-95, Route 1/ Richmond Highway and Route 123. Given the park's proximity to the U.S. Capital, it is not surprising that development, primarily

Figure 3: Location map showing relationship of Laurel Hill Park to D.C. metropolitan area

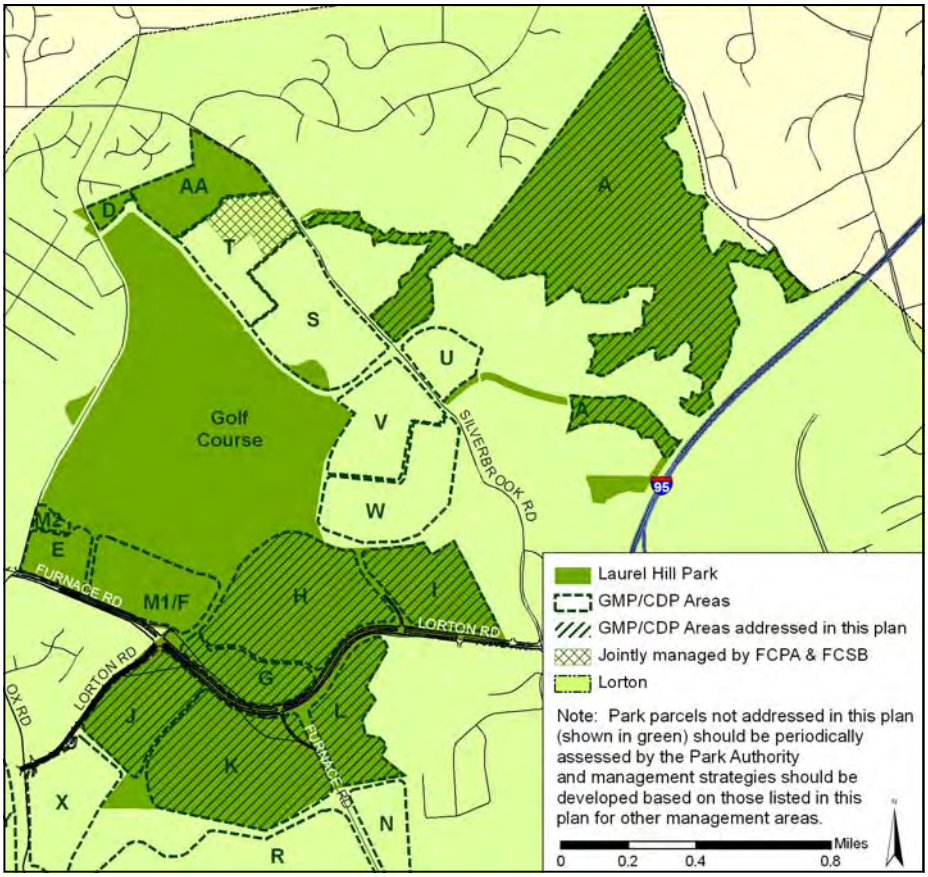

Figure 4: Close-up of location map showing Laurel Hill Park. Management Areas A, G, H, I, J, K and L are shown with dark green hatching.

composed of residential neighborhoods, has surrounded it to the west, northwest, north and northeast. Today, the park sits in the fastest growing sector of Fairfax County.

Size

Laurel Hill Park is approximately 1,200 acres. This includes a 275-acre golf course and a roughly 300-acre forest block that is a dedicated natural resource area. The remaining acreage is planned for a variety of uses including active and passive recreation and natural resource protection.

Land Transfer

Now a part of the Fairfax County Park Authority park system, Laurel Hill Park was formerly part of the D.C. Correctional Facility at Lorton. The site originated through the dissolution of the Lorton Prison complex by two Congressional Acts: The National Capitalization Revitalization and Self-Government Improvement Act of 1997, which directed the initial disposal of segments of the prison facilities, followed by the District of Columbia Management Reform Act of 1997, which mandated the termination of penal activities and the closing of the complex. Through a third Congressional Act, the 1998 Lorton Technical Corrections Act, the General Services Administration acquired the Lorton Prison property from the District of Columbia, and on July 15, 2002, Fairfax County received title to the former D.C. Department of Corrections facility at Lorton. (Fairfax County 2010, 24)

The Technical Corrections Act mandated a transfer of 2,324 acres to the County and stipulated the development of a Reuse Plan that would maximize open space, parkland and recreational uses. In February 1999, the Fairfax County Board of Supervisors convened a Citizen Advisory Committee (CAC) to develop a reuse plan. Revisiting a 1995 land use plan for the property that had been created in anticipation of the land transfer, the CAC reallocated significant portions of the property for parkland, designating approximately 1,200 acres for the Fairfax County Park Authority and 400 acres for the Northern Virginia Regional Park Authority. The plan was adopted in July 1999 and was incorporated into the revised County Comprehensive Plan. (ibid., 24)

The remaining acreage that composed the former D.C. Correctional Facility includes sites for three public schools, an age-restricted housing community development, the Occoquan Workhouse – now an arts facility, the Reformatory and Penitentiary of the former prison, the I-95 Resource Recovery Facility and Landfill, the Vulcan Quarry and the Occoquan Regional Park, owned by the Northern Virginia Regional Park Authority. Formerly referred to as Lorton Prison, or the Lorton Reformatory, the site – including the 1,200 acres transfer to the Fairfax County Park Authority

– is now called Laurel Hill in reference to the eighteenth century farmhouse that served as the home of Revolutionary War patriot William Lindsay and later, the residence of the Superintendent of the Reformatory.

Natural Context

Despite its highly developed surroundings in the D.C. metropolitan area, Laurel Hill Park is situated in a rich hydrologic and physiographic context that supports the valuable natural habitats on-site today (Figure 5). The area lies within the Pohick Creek and Mill Branch watersheds, which feed into the Chesapeake Bay (Figure 7). Three named tributaries flow through the site: Giles Run flows from northwest to southeast from Route 636 through the Laurel Hill golf course to Lorton Road and eventually enters the Occoquan River; South Run, in the northern forested block of Laurel Hill, flows north to south before converging with Pohick Creek, which borders the site to the east; and Rocky Branch, which flows from west to east in the northern portion of the site drains into South Run upstream of its convergence with Pohick Creek. In addition to these named streams, several smaller, unnamed tributaries flow through the site, some of which are directed into culverts that run underneath the former prison complexes.

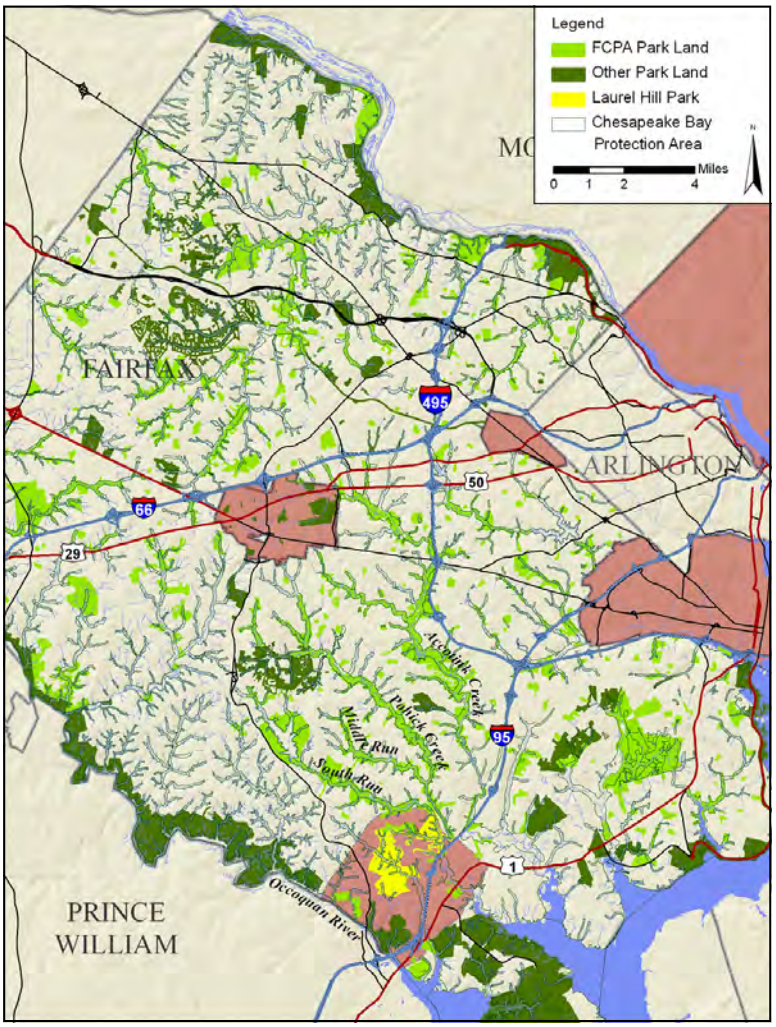

Figure 5: Laurel Hill Park within the context of surrounding park lands, hydrologic features and Chesapeake Bay Protection Areas

These streams and creeks connect Laurel Hill Park to an extensive regional network of natural resources and protected open space. South of Laurel Hill, along the northern bank of the Occoquan River, a series of protected parcels, owned by state and federal government agencies and the Fairfax County and Northern Virginia Regional Park Authorities, create a riparian corridor extending from the western portion of the County downstream to Mason Neck. Branching out from Laurel Hill to the north, Fairfax County Park Authority park lands create protected riparian greenways along South Run, Pohick Creek and Accotink Creek. The greenways along Pohick and Accotink Creeks extend north into the heart of Fairfax County, up to the City of Fairfax. As shown by the map above, Laurel Hill Park is not an island of rich natural resources but rather is an important link in a regional network of critical ecological communities.

Soils and Geology: Edge Between Coastal Plain and Piedmont

Laurel Hill Park sits on the boundary between two physiographic provinces of Virginia: the Coastal Plain Province and the Piedmont Province (Figure 6). Divided by the Fall Line, evidence of each province is visible on Laurel Hill in its stream patterns, geology and soils. Soil type affects drainage and influences what plant materials thrive. Soils found in the Coastal Plain are referred to as unconsolidated and are comprised of sands, silts, clay and gravels that

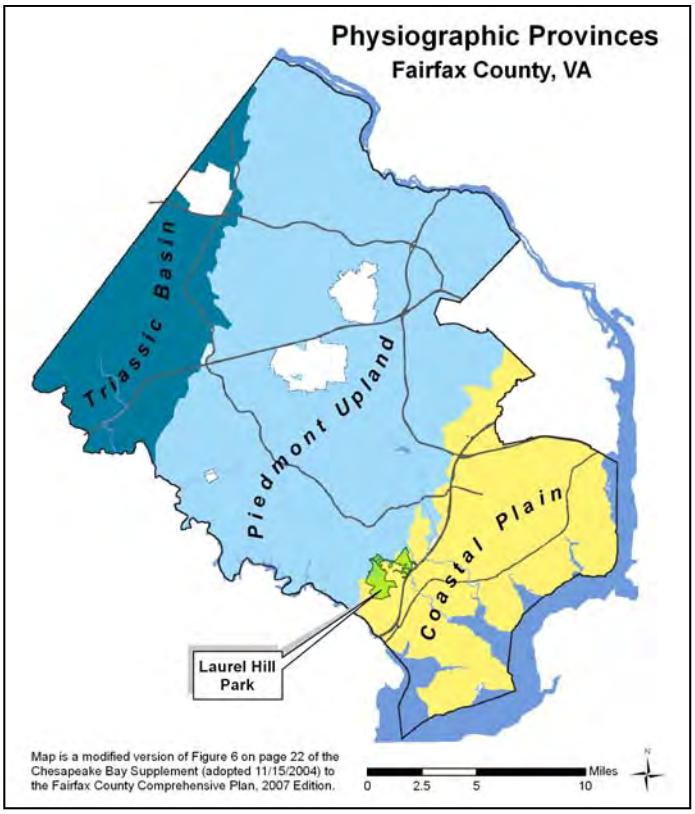

Figure 6: Laurel Hill Park's location on the Fall Line

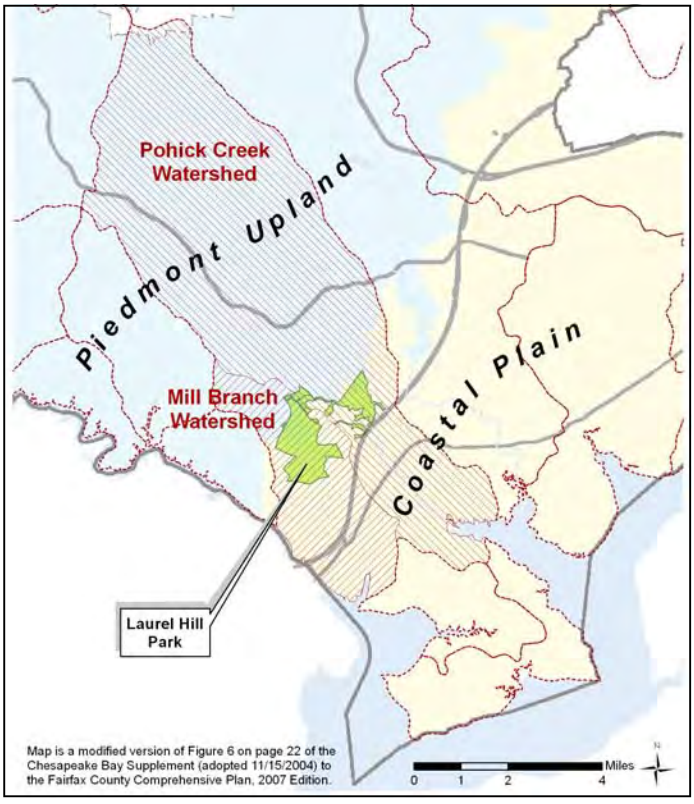

Figure 7: Laurel Hill Park's location within two watersheds: Mill Branch and Pohick Creek.

were stripped from the Appalachian Mountains and carried eastward by rivers over 35 million years ago. Later geologic activity caused sands, silts and clay to be deposited during incursions of the sea under conditions similar to those that exist in the Chesapeake Bay today. Many of the Coastal Plain soils are poorly drained and include a particular lens of clay referred to as marine clay or blue clay that is notoriously unstable and has a high shrink to swell rate. Poor drainage leads to shallow seasonal high water tables. High water tables may adversely affect plant growth and viability. Stream valleys, without the damage created by uncontrolled stormwater runoff, are more gently sloped in the Coastal Plain, while those in the Piedmont region are more V-shaped with steep slopes.

Forming the foothills of the Blue Ridge Mountains, the Piedmont Province is shaped by gently rolling topography, deeply weathered bedrock and a relative lack of solid outcrop except along stream valleys where erosion has removed the characteristic blanket of saprolite. Uplands are dominated by ancient igneous and metamorphic rocks and the lowlands have soils overlying shallow sedimentary rocks and igneous intrusion. Drainage patterns are well-dissected and are framed with wide and rolling hilltops except in the lower tributaries of large streams where narrow ridge tops occur with v-shaped valleys. However, with the increasing amount of unmanaged stormwater runoff due to the increase in adjacent development, all stream valleys are at risk of downcut and channel widening.

Regardless of the underlying geology and soil types, the soils on Laurel Hill have been farmed for many years. Depleted topsoil and depauperate and exhausted soils are more common than not on the site. Other soils, having been farmed with mechanical equipment for many years, may exhibit a plow pan that may impede plant growth. Exhausted soils are often low in major and minor nutrient fertility, lack elements such as nitrogen, phosphorus and potash necessary for plant function. Soil acidity may also be adversely affected, tying up major and minor plant nutrients if pH levels are out of balance.

Site History

Past Land Use

PRISON/REFORMATORY

Rich in natural resources, the Laurel Hill site has an equally rich cultural history. Laurel Hill is the site of the former 2,550-acre District of Columbia Correctional Facility. The prison facility was established in 1910 with the purchase of an initial 1,155-acre tract north of the Occoquan River after President Theodore Roosevelt initiated an investigation into the deplorable conditions in the District of Columbia's jail and workhouse in Washington. At the time, the new prison in Lorton was progressive, with classically inspired, symmetrical dormitories, no walls or watch towers surrounding the site and an open-air design intended to provide access to nature, light and clean air. This gave the facility a more campus-like feel. (www.fairfaxcounty.gov/dpz/laurelhill/history/prison.pdf)

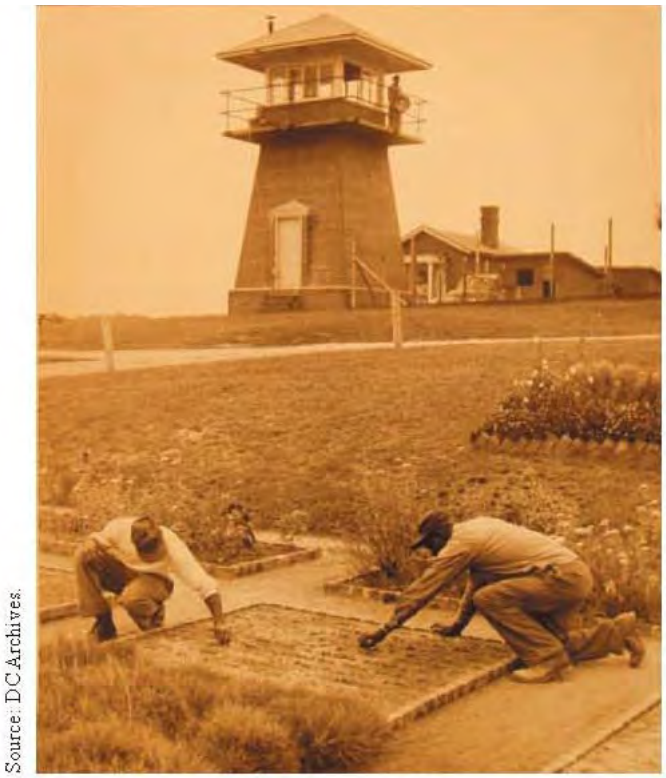

Figure 8: A 1951 view of work being done on the Reformatory planting beds courtesy of the D.C. Workhouse and Reformatory National Register District nomination application.

AGRICULTURE LANDS

The prison was not only progressive in architectural style, but in its operating philosophy as well. The Workhouse (Occoquan Facility) was an agricultural work camp. Intended to be self-sufficient, the prison's agricultural complex included cultivated fields, pasture land, a poultry farm, hog ranch, slaughterhouse, dairy, blacksmith shop, sawmill, and feed, hay and storage barns.

From the early days of the facility, agriculture dominated the landscape. Documentation from 1937 indicates that an orchard extended from the intersection of Furnace and Lorton Roads eastward to the property line of the prison. Plowed fields existed to the north and west of the orchards, extending to the northwest of the Penitentiary (Maximum Facility) and up to the northern property boundary near the intersection of Hooes and Silverbrook Roads. Additional fields extended to the east of the Penitentiary across Silverbrook Road. By 1953, the orchard had decreased in size, but the area between the Occoquan Workhouse and the Reformatory and much of the property between Furnace and Silverbrook Roads was being used for agriculture. Over the next twenty years, the entirety of the property north of Furnace Road and south of Silverbrook Road was under cultivation, though the orchards near the Lorton/Furnace intersection were converted to pasture land to support the dairy (c. 1962). By the time the prison closed in 1998, the dairy – and the cultivation of corn and hay to support the dairy – was the only agricultural activity still being carried out. All other agricultural activities had already ceased operation, and the associated buildings – the poultry incubator house, livestock barns, feed barns, corn crib, creamery, smokehouse and slaughterhouse – stood empty. The dairy ceased operations in 1998. (www.fairfaxcounty.gov/dpz/laurelhill/history/prison.pdf)

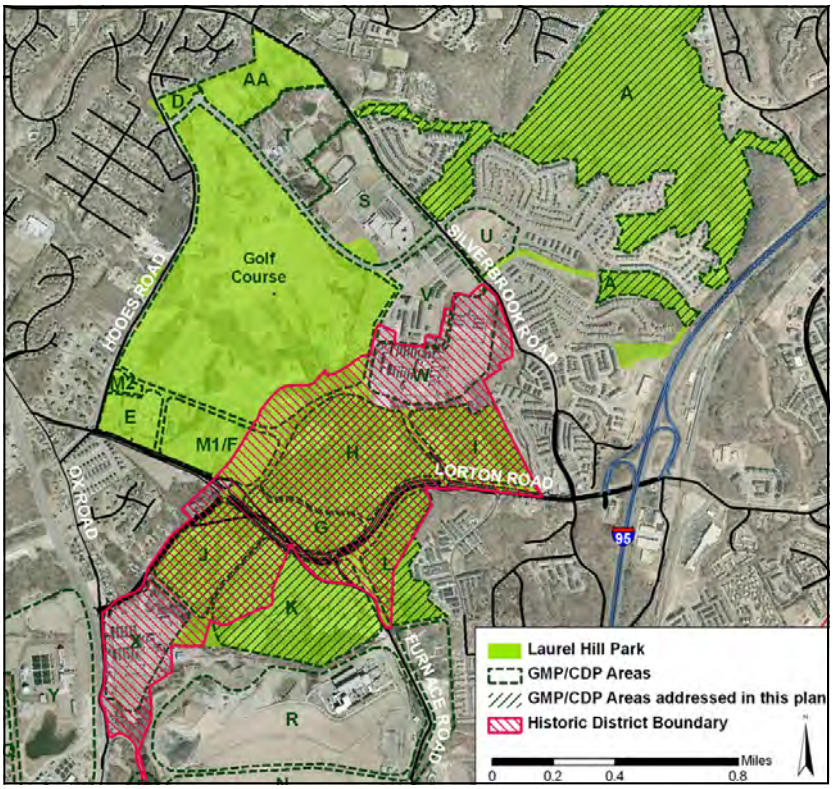

Figure 9: D.C. Workhouse and Reformatory National Register District boundary, shown in red

Status as a Historic District

The D.C. Workhouse and Reformatory National Register District is a 511-acre area that overlaps a substantial portion of the Laurel Hill Park site. The District extends from Ox Road east to Silverbrook Road. The northern boundary follows Lorton Road from Ox Road and then Farm Road up to the former Lorton Reformatory, while in the south, the boundary skirts the southern most portion of the Workhouse area, then follows Dairy Road to Furnace Road and on to Lorton Road. Within these bounds are 194 contributing and 64 non-contributing buildings, structures, sites and objects. Shown in Figure 9 in red hatching, the National Register District includes Management Areas G, H, I and J in their entirety as well as portions of K and L.

In July 2002, when the Laurel Hill property was transferred from the federal government to Fairfax County, the associated corrected quitclaim deed included a unique memorandum of agreement (MOA) governing the portion of the Laurel Hill site within the National Register District. The MOA provides stipulations and review requirements for any 'undertaking' within the National Register Eligible Historic District. Included is the requirement that any proposed activities within the District be reviewed by Fairfax County's Architectural Review Board (ARB) just as is currently the case with all projects conducted in locally designated Fairfax County Historic Overlay Districts. According to the Fairfax County Zoning Ordinance, all applications for rezoning, special exceptions, special permits, variances, sign permits, or other construction permits, site plans, subdivision plats and grading plans for properties within Historic Overlay Districts must be submitted to the ARB for review. Upon review, the Board makes recommendations which are then forwarded to the appropriate county agency for their review and implementation. In addition, plans to change the exterior appearance of any building, structure, or site located within a Historic Overlay District – including demolition, rehabilitation, or the construction of additions or new structures – require ARB approval before a sign permit may be issued by the Zoning Administrator or a building permit issued by the Department of Public Works and Environmental Services (DPWES).

With the exception of Management Area A, all areas addressed in this plan are located at least partially, if not entirely, within the D.C. Workhouse and Reformatory National Register District. Consequently, projects in these areas will be subject to ARB approval. To insure a smooth approval process the Board should be contacted as early as possible. An informal review may be conducted to identify any potential problems.

Current and Proposed Land Use

Fairfax County Comprehensive Plan

Laurel Hill Park is located within the Laurel Hill Community Planning Sector in the Lower Potomac Planning District, an area of approximately 3,200 acres that includes the former D.C. Department of Corrections facilities, the Vulcan Quarry and the Fairfax Water Occoquan Water Treatment Facility. The County Comprehensive Plan divides each planning sector into six land units, most of which, in turn, are divided into 'sub-units'. The plan then provides guidelines for future development and land use recommendations for each land unit. The area addressed in this report corresponds to Land Units 1, 3, 4 and a small portion of 2.

The Laurel Hill Planning Sector has both natural and heritage resources that the comprehensive plan seeks to preserve and protect. Residential development (low- to medium-density) is restricted to the northeast portion of the sector along Silverbrook Road; otherwise, the majority of the planning sector is dedicated to parkland, public facilities and open space. The northern portion of the sector, north of the I-95 Landfill contains most of the open space, including Laurel Hill Park and a small amount of residential development, while the southern portion includes the I-95 Landfill, I-95 Energy/Resource Recovery facility, the Fairfax Water Facility and Occoquan Regional Park. A number of streams border or traverse the sector. The stream valleys and their associated Environmental Quality Corridors (EQC) contribute to the network of natural resources. The northern bank of the Occoquan River and the natural resource area north of Silverbrook Road also contribute to the heritage resources noted in the comprehensive plan, as do the Occoquan Workhouse, the Central Facility and the Laurel Hill House, all of which are part of the former D.C. Corrections Facility.

In addition to outlining the overall emphasis for the planning sector on parkland, recreation and public facilities, the plan also addresses each land unit.

LAND UNIT 1
(generally Management Area A)

Land Unit 1, shown in Figure 10, is approximately 235 acres, most of which is forested. Rocky Branch and South Run flow through the land unit, while Pohick Creek flows along the northeastern edge. The comprehensive plan recognizes the upland hardwood forest and three stream valleys as environmental features that should be preserved and includes the following recommendations.

Sub-unit 1A: The EQC land, as well as the non-EQC land (i.e., the upland hardwood area) within Sub-unit 1A is planned for a Resource-based Park with limited facility development. Limited facility development may include, for example, trails, wildlife observation areas and an interpretive center. The vast majority of this sub-unit should remain in its natural undisturbed state.

Sub-unit 1B: Within Sub-unit 1B, there are two distinct areas that abut Pohick Road and are separated by an EQC. These areas are adjacent to the Laurelwood Subdivision which is

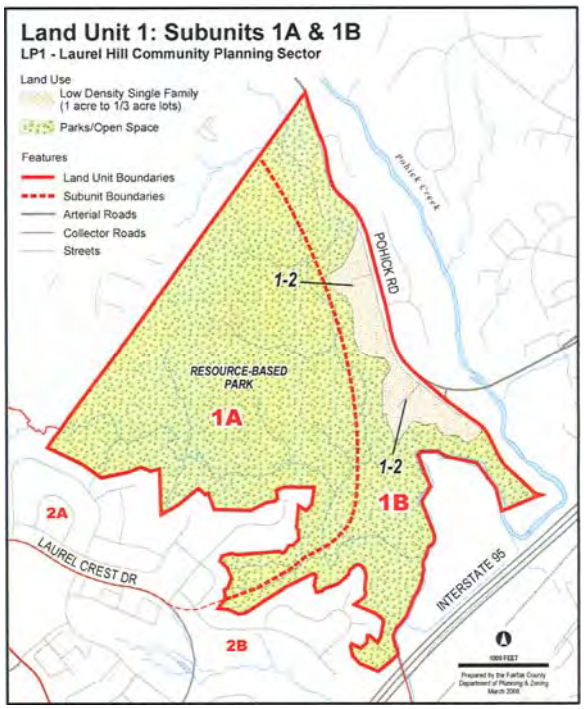

Figure 10: Map of Land Unit 1 in the Laurel Hill Community Planning Sector, Lower Potomac Planning District, Fairfax County Comprehensive Plan

developed at one dwelling unit per acre. Both areas are planned and developed for residential use at the low end of the density range of 1-2 dwellings per acre. (Fairfax County 2010, 39-42)

LAND UNIT 2
(generally includes portions of Management Area A)

Land Unit 2 (Figure 11) has EQC areas associated with those in Land Unit 1 that should be preserved. According to the comprehensive plan, they should be preserved as part of the resource-based park in Land Unit 1. In addition, Sub-unit 2B includes the northern terminus of the Laurel Hill Greenway, which is part of the larger Cross County Trail (CCT) extending from the Occoquan River in the south to the Potomac River in the north. The plan recommends that the portion of the Laurel Hill Greenway, located within this land unit be constructed along with any other planned development in the unit. (Fairfax County 2010, 42)

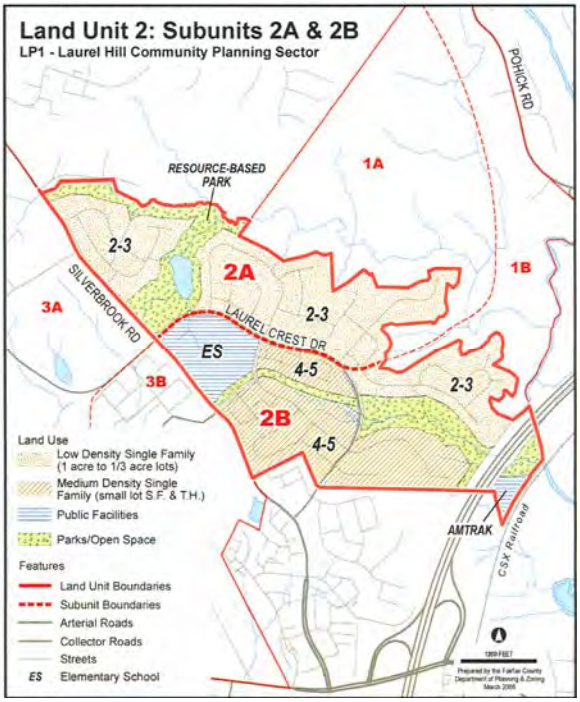

Figure 11: Map of Land Unit 2 in the Laurel Hill Community Planning Sector, Lower Potomac Planning District, Fairfax County Comprehensive Plan

LAND UNIT 3
(generally includes Management Areas AA, D, I, part of H and the golf course)

Land Unit 3 (Figure 12) is approximately 610 acres and includes a county golf course, environmentally sensitive areas, the Central Facility redevelopment area and two public school sites. Once again, the comprehensive plan emphasizes the protection of environmentally sensitive features and heritage resources.

Sub-unit 3A: The land within Sub-unit 3A is primarily gently rolling terrain with steep slopes to the west abutting the Giles Run EQC and its tributary. A major element in this sub-unit is a portion of a Countywide Park that includes a public golf course adjoining the Laurel Hill Greenway. In addition to the public golf course, other planned open space amenities include a Local Park, an interpretive exhibit for the Nike Administrative Site, and preservation of natural resource areas associated with the ponds within the sub-unit. In addition to the South County Secondary School, the remaining acreage should be developed with a Middle School, recreational facilities and open space.

The plan recommends that a natural resource protection area (RPA) be created around Silverbrook Run and the pond in the northeastern portion of the land unit and that circulation and recreation areas associated with the middle school avoid these environmentally sensitive features. The middle school site was previously planned for the parcel just north of its current location,

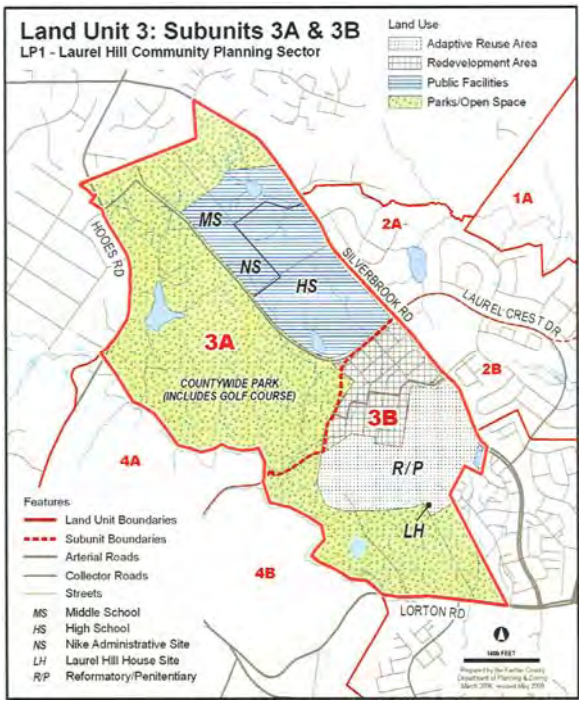

Figure 12: Map of Land Unit 3 in the Laurel Hill Community Planning Sector, Lower Potomac Planning District, Fairfax County Comprehensive Plan

and the current location was to be parkland. In November 2009, the Fairfax County School Board and Park Authority traded parcels. As a result, the middle school was sited and is currently under construction on the parcel with the pond. Because of the ecological value of the pond and surrounding habitat, that parcel is under a conservation easement and will be managed jointly by the School Board and Park Authority. The plan recommends that parkland outside of this RPA and the golf course should include both active (athletic fields) and passive recreation.

In Sub-unit B, the major land use elements are the former Central Facility redevelopment area, the adaptive reuse area and the Laurel Hill heritage resource area. The plan recommends that the Laurel Hill Greenway provide a connection between the redevelopment area and adjacent areas. The Laurel Hill house and gardens should be designated as a heritage resource, and in the southern portion of the land unit, recreational facilities "characteristic of a Countywide Park" should be developed. (Fairfax County 2010, 42-45)

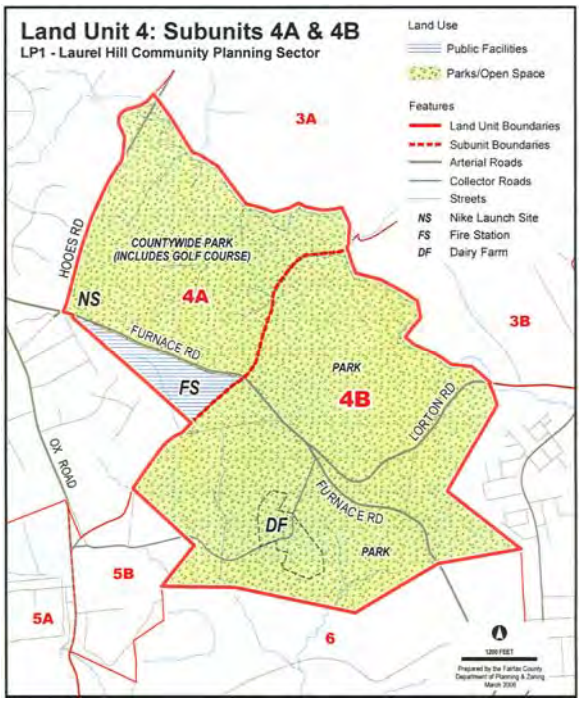

Figure 13: Map of Land Unit 4 in the Laurel Hill Community Planning Sector, Lower Potomac Planning District, Fairfax County Comprehensive Plan

LAND UNIT 4
(generally includes Management Areas E, F, G, part of H, J, K, L, M and part of the golf course)

Land Unit 4 (Figure 13) is approximately 470 acres, almost all of which is parkland/open space and 20 percent of which is considered environmentally sensitive. The County Comprehensive Plan recommends that Laurel Hill Greenway play a significant role in this land unit, creating a major linear open space linking Sub-unit 4B to those units to its north and south. In addition, Sub-unit 4A should include a park offering athletic fields, courts and picnicking. The Nike Launch Site should be restored and interpreted as a heritage resource site. The former Dairy Farm and associated pasture land should become a park with special facilities, such as a horticultural center, athletic field complex, equestrian center or other specialized use, and another park in Sub-unit 4B, north of Lorton Road should offer additional recreation characteristic of a district park. (ibid., 53)

2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

In April 2003, shortly after 2,324 acres from the former D.C. Correctional Facility was transferred to Fairfax County, the Fairfax County Park Authority initiated the planning process for its 1,200 acres of parkland. In July 2004, Fairfax County approved the Laurel Hill Park GMP/CDP, which outlines a conceptual plan for future use of the site. The GMP/CDP uses the components of the comprehensive plan as a framework and the recommendations therein as guidance for the conceptual development plan.

The GMP/CDP divides the park into geographic areas – termed management areas – that closely resemble the land unit/sub-unit structure laid out in the County's comprehensive plan, adding a level of refinement by further subdividing the units. The Management Areas addressed in this report are encompassed in Land Units 1, 3, 4 and a small portion of 2. A rough translation equates Comprehensive Plan Land Unit 1 and part of Land Unit 2 with Management Area A in the GMP/CDP. Land Unit 3 includes Management Area I and a portion of Area H. Land Unit 4 includes Management Areas G, J, K and L and the remainder of Area H.

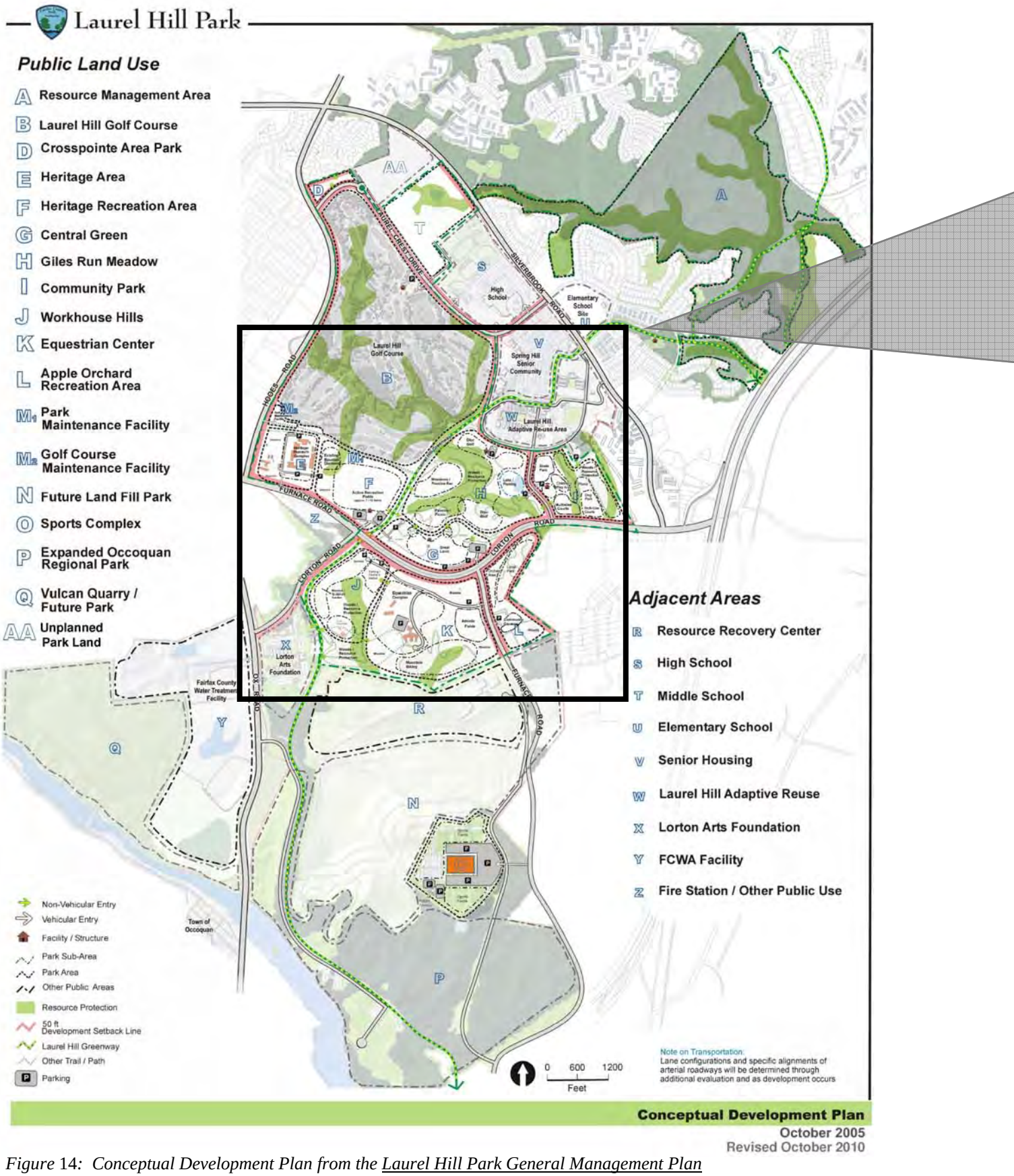

Figure 14: *Conceptual Development Plan from the Laurel Hill Park General Management Plan and Conceptual Development Plan (2004)*

Figure 15*: Enlargement of the Management Areas addressed in this plan*

The GMP/CDP (Figure 14) reflects the intent of the Lorton Technical Corrections Act to provide open space, recreational opportunities and public facilities to the Fairfax County community. The plan pays particular attention to the natural and cultural resources identified in the comprehensive plan for protection and restoration as well as programming recommended in the comprehensive plan. The result is a tricky combination of areas of human activity and areas of resource conservation and preservation. The GMP/CDP sets about reconciling these two sometimes opposing land uses, specifying a program for each Management Area. This combination presents an ongoing challenge to the Park Authority, however, as they manage the park in the future. Maintaining the health and habitat quality of the natural resources while allowing human access and appreciation of these resources will be a particular challenge.

Currently, the 2004 plan is at various stages of implementation across the site. Due to the size of the sites and the ambitious scope of the improvements proposed, these are unlikely to be fully developed in the near future. Consequently interim resource management strategies will be required for lands planned for future use but without the funds to develop them. Given the uncertainty of the time frame for implementation, some of these interim strategies may be required for a longer period of time.

In the interim, there are several projects that have been implemented at the park. A network of stone dust trails has been constructed in Management Areas G, H, J, K and L, and a disc golf course has been created in Management Area H. The portion of the CCT that traverses Laurel Hill Park, referred to as the Laurel Hill Greenway in the GMP/CDP, was completed in 2006. In addition, selected elements in a park-wide interpretation and wayfinding system have been installed in several management areas.

SECTION III: SITE CONDITIONS

Figure 16: Forest edge in Management Area H at Laurel Hill

Laurel Hill Park, especially in the central and southern section, is primarily comprised of recently abandoned agricultural land intertwined with wooded creeks and valleys. Lands at the northeastern edge of the park are heavily forested and are a part of the larger South Run stream system. The park's southern edge is also forested where it abuts Fairfax County's landfill and incinerator operations.

Plant Communities

Laurel Hill Park is a diverse landscape that includes several different forest types, meadow, thicket/shrubland, turf and developed land. The park's vegetative communities are complex for two reasons. First, the park is located in two physiographic provinces with different underlying rock and soils supporting different plant communities. The Piedmont Province supports more mountain and northern plants and the Coastal Plain Province supports bog and marsh communities characterized by pines, mountain laurel and other heath species (Hitchcock and Standley, 1919). Second, the site has been heavily manipulated over time by human habitation, affecting the degree and age of succession and the introduction of alien species.

The dynamic equilibrium or climax community for natural areas in Fairfax County is forest cover. Old fields and meadows, along with other treeless areas, are an early successional stage on a spectrum ending with forested lands. Undisturbed or not actively managed, treeless areas over time will revert to forest. The challenge for land managers is to strive for a vegetative pattern for the treeless areas that best replicate a Piedmont Prairie Community Group as characterized by the Virginia Department of Conservation and Recreation's Virginia Natural Community Classification system. (See sidebar on pages III:4 and III:5.) These Piedmont grasslands appear as prairie-like communities, are semi-natural and are influenced by artificial disturbance regimes such as ongoing mechanical removal through mowing or burning. Most regional documented sites are dominated by little bluestem and Indian grass, with frequent associates including several species of goldenrod, upland broomsedge, bush clover, bushy aster, tick-trefoil and mountain mint.

Plant Species

Field work was performed by Environmental Systems Analysis, Inc. (ESA) of Annapolis, MD in 2003 and 2009 at Laurel Hill. Complete species lists from these efforts are located in Appendix 1-b. Lists for the forest community types are a compilation of species observed during 2003 and 2009 field work. Lists for the meadow and shrubland communities include species observed in 2009 only. In the 2009 sessions, while surveying cool- and warm-season species, tall fescue and spotted knapweed were identified as the two most problematic non-native invasive plant species that occurred in the meadow areas at Laurel Hill. Species that were observed and may present challenges in the installation and management of treeless areas appear in bold print on the species lists.

RARE, THREATENED, OR ENDANGERED SPECIES

The Virginia DCR's database includes no known occurrences of Rare, Threatened, or Endangered Species within the boundaries of Laurel Hill Park (email correspondence with S. Rene` Hypes, Project Review Coordinator for DCR-DNH, dated January 29, 2009).

Site Data Collection Efforts

The Northern Virginia Audubon Society has been holding bird counts at Laurel Hill for twelve years. Their findings are published in *Birds in Northern Virginia: Documenting the Nature of Change, The Northern Virginia Bird Survey* (last published 2006). Staffed by volunteers, their years of documentation have demonstrated the valuable habitat provided by land cover at Laurel Hill.

ESA performed a baseline field investigation and inventory of the greater Laurel Hill property's natural resources and ecological communities (beyond the parameters of the current parkland component) in 2003. A second field inventory was conducted within the park land in 2009, updating the earlier efforts.

The 2003 effort included a natural resource inventory (NRI) and forest stand delineation report (FSD) of the old Lorton prison grounds during the initial planning effort for the property to evaluate existing natural features and characterize existing land cover and ecological communities. An NRI/FSD is a tool that is used to determine the most suitable and practical areas for land conservation and other land uses. ESA based the NRI/FSD on the state of Maryland's inventory procedures and on direction provided by Park Authority staff.

In 2009, ESA revisited the park, collected additional data and converted the 2003 NRI/FSD natural community names to the standard natural community names outlined in *Virginia Department of Conservation and Recreation's The Natural Communities of Virginia: Classification of Ecological Community Groups Version 2.2.*

Northern Virginia Bird Survey

The Northern Virginia Bird Survey (NVBS) began in 1994. In 1998, Laurel Hill was added to the survey because of its unique habitats. Laurel Hill offered habitat "that was becoming almost non-existent in the heavily developed, eastern portion of Fairfax County. The closure of Lorton Prison opened up access to a large segment of the property that for many decades had been used for agriculture. A dairy farm, old fields and hedgerows, ponds and buffers of mature forest along Pohick Creek and other streams provided habitat for species like kestrels, bobwhites, barn owls and meadowlarks that had earlier disappeared from surrounding developed areas" (Audubon 2006, 29).

The survey is designed to monitor the status of various bird species in representative areas throughout Northern Virginia. It is carried out during the month of June, the height of the breeding season. In order to collect the data, hundreds of designated points in over twenty-five areas are surveyed by teams of volunteers headed by Master Birders, individuals able to identify the region's birds by sight and sound. (Carolyn Williams, 3/13/2009)

At each data point, volunteers conduct one-time, five-minute counts of all birds seen or heard. Counts occur between dawn and 8:30 am when birds are most active and vocal (i.e. males and females are looking for food, male birds are pronouncing their territory, etc.) and human-associated noise is less noticeable. Volunteers also record evidence of breeding activity and information regarding changes in habitat (Audubon 2006, 5). These counts are conducted at the same sites for as long as possible, as consistently as possible. Monitoring must occur at regular intervals over a long period of time in order to track trends accurately. Ideally, this means collecting data at the same point for at least ten years, if not more. Specific information related to the bird count for the Laurel Hill site is included in Appendix 3. For each count, volunteers are given a data collection sheet that contains the following information.

- Master birder's name and phone number
- Team members
- Data and time of count
- Wind and sky conditions
- Habitat description at survey point
- Bird species surveyed/sighted
- AOU (American Ornithologists' Union) code for each species surveyed
- Census point count for each bird species
- Breeding codes (e.g. male species singing, birds feeding, birds carrying food – all indications that birds are breeding in the area)

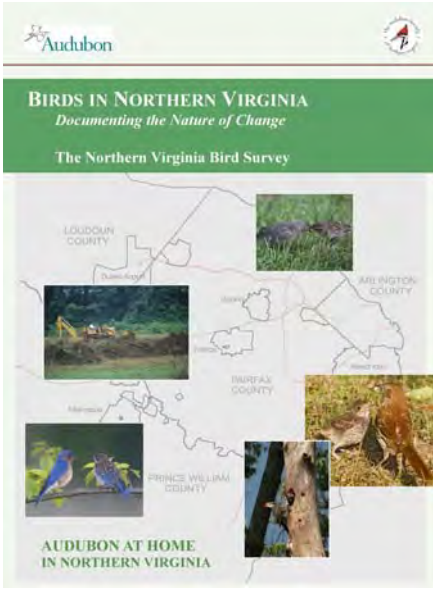

Figure 17: Birds in Northern Virginia (2006) presents the findings from the Northern Virginia Audubon Society's annual bird counts

Sample Bird Species Observed at Laurel Hill

- *White-crowned sparrow*
- *Fox sparrow*
- *Henslow's sparrow*
- *Grasshopper sparrow*
- *Bobolink (all grasslands birds)*
- *Least and Semipalmated sandpipers*
- *American pipet*
- *Northern saw-whet owl, an animal of special state concern*

2003 Baseline Data

ESA delineated forest stands using standards as documented in the *State Forest Conservation Technical Manual*, Third Edition, 1997, Maryland Department of Natural Resources. Data was collected in May and June of 2003. Some minor modifications were made to the field protocols per the request of Mr. Todd Bolton, Manager, Natural Resources Protection Group, at the Fairfax County Park Authority.

The study protocol involved the delineation of all forest stands and their acreage within the park property boundaries. The forest stands were based on species composition, density, size, condition and age of the stand. The dominant, co-dominant and sub-canopy tree species for each stand were identified and tabulated to indicate their relative frequencies and average tree diameter class, along with descriptions of each tree stand including the identification of the shrub and herbaceous species. In areas that were not forested, ESA characterized the vegetation and potential age of each natural community with fixed 0.1-acre plots and general observations.

ESA also studied aerial photography of the tract to determine ground forest conditions and to make a preliminary determination of vegetation types occurring on the site. These vegetation types were then ground-truthed to verify composition, extent and ecological importance.

2003 FIXED PLOT SAMPLING

ESA staff selected sample point locations to represent the topographical and vegetative diversity at the site. At each sample point location, they delineated a 37.2' radius circle (0.1 acre plot), flagged the center of the circle and labeled the

Methodology Change from 2003 Survey to 2009 Survey

The initial survey work in 2003 was performed according to standards and methods in use in Maryland. By 2009, the Commonwealth of Virginia's Department of Conservation and Recreation (DCR) had developed a Virginia Natural Community Classification system that is based upon the United States National Vegetation Classification (USNVC) system. DCR's system defines ecological communities as "*an assemblage of coexisting, interacting species, considered together with the physical environment and associated ecological processes, that usually recurs on the landscape*". As their web site states, "*The ecological community groups treated in this report offer a number of advantages over comparable hierarchical units based strictly on physiognomy or floristics. These include*

- *concepts and terminology that are more communicable, familiar, accessible, and useful to many potential users*
- *a system that encourages the ecological interpretation of vegetation patterns on the landscape*
- *units that have greater utility for conservation purposes and for naming community records where more detailed classifications of vegetation are lacking*."

These community groups are restricted to natural communities or "*those which have experienced only minimal human alteration or have recovered from anthropogenic disturbance under mostly natural regimes of species interaction and disturbance*" (http://www.dcr.virginia.gov/natural_heritage/ncintro.shtml). Consequently they include only natural communities that are in a mid- to late successional growth stage following human disturbances and do not address early-successional communities that have experienced recent disturbance. Such early-successional communities are present at Laurel Hill – including the pasture lands from the recent dairy activities and the blackberry thickets – as are artificially suppressed successional communities, such as the golf course greens. Because these communities are not treated in the DCR system, alternative classifications were used for the 2009 survey. These are described on the following page.

The new Virginia DCR system classifies plants and plant communities in the following hierarchy:

- System
  - Ecological Class
    - Ecological Community Group (similar to USNVC's Alliance)
      - Community Type

For those communities that met the Virginia DCR standards for successional growth and disturbance, ESA used the ecological communities listed below and highlighted in bold type, based upon Virginia's classification hierarchy.

- Palustrine System (System)
  - Alluvial Floodplain Communities Ecological Class
    - **Coastal Plain/Piedmont Floodplain Forest** Ecological Community Group

- Terrestrial System (System)
  - Low-elevation Mesic Forests (Ecological Class)
    - Mesic Mixed Hardwood Forest Ecological Community Group (Ecological Community Group)
  - Low-elevation Dry and Dry-Mesic Forests and Woodlands Ecological Class (Ecological Class)
    - Acidic Oak-Hickory Forest Ecological Community Group (Ecological Community Group)
    - Oak/Heath Forest Ecological Community Group (Ecological Community Group)
  - Low-elevation Rock Outcrops and Barrens Ecological Class (Ecological Class)
    - Piedmont Prairie Ecological Community Group (Ecological Community Group)

      Note: Because areas dominated by grasses at Laurel Hill do not include rock outcrops and barrens, the Piedmont Prairie is not an entirely accurate classification for these areas. However, Piedmont Prairie is used here because it is an accurate classification of the species and habitat present, associated ecological processes and certain abiotic factors. Throughout this management plan 'Meadow' will be used in place of 'Piedmont Prairie' to refer to treeless areas dominated by grasses. Meadow is a commonly used term to describe this habitat and cover type.

Areas of thickets and brambles found in all management areas surveyed do not fit into the DCR system because they have been disturbed by human activity and management. To address these areas, ESA borrowed the *Rubus* (Argutus, Trivialis) Shrubland Alliance (Southern Blackberry, Southern Dewberry) from the USNVC system. An Alliance in the USNVC system is at a similar classification level as the Ecological Community Group in the Virginia system.

- *Rubus* Shrubland Alliance, similar to Ecological Community Group

  Note: *Rubus* Shrublands are referred to as thickets/shrublands in this management plan.

In addition, several vegetated sites, heavily impacted or disturbed by human use, did not fit into any current cataloging system in the Virginia system, the USNVC system or other models. Based on site characteristics, ESA determined that – if undisturbed – these sites would fit within Virginia's Terrestrial System and develop into ecological community groups in either the Low-elevation Mesic Forests Ecological Class or the Low-elevation Dry and Dry-Mesic Forest and Woodlands Ecological Class. Due to their level of disturbance, however, ESA proposed alternative classifications that approximate the Ecological Community Group classification. These include the following types.

- Pine-Hardwood Forest
- Disturbed Forest
- Meadow (based on the Piedmont Prairie Ecological Community Group)
- Turf

Other ecological communities may have been missed due to oversight, or data stations were lumped into a larger classification group. For example, there are small groundwater seeps in the park that influence the vegetation within a quarter-acre or less. (See data stations A37 for an example.) However, these seeps appear to influence the herbaceous layer more than the canopy layer. The tree species present are similar to the surrounding forest. Given that observation, the seep areas were lumped into a larger community type.

flag. The approximate sample points locations are on the Ecological Communities map, a copy of which is included in Appendix 1-d. Trees that had fallen within the 0.1-acre area were identified and counted. These data were used to estimate the number of trees per acre, per each two-inch diameter class. Information in the sample point data collection included

- Percent canopy closure and tree species observed including relative dominance
- Percent and species of shrubs
- Percent and species of forest floor covered by herbaceous plants
- Percent of forest floor covered by downed woody debris
- The presence or absence of exotic or invasive species

Note: Data points were not surveyed or marked using GPS. Therefore, it is possible to have a data point that appears to be one type of ecological community in an area that is delineated on the map as a different ecological community. The ecological community boundary is approximate.

2003 FOREST STRUCTURE ANALYSIS

Additionally, a forest structure analysis evaluation was conducted at each forest data plot. The protocol was originally developed for the Maryland Forest Conservation Manual and is used in Montgomery County, MD. (See Appendix 1-h for sample data sheet.) Forest structure is often associated with better forest habitat. Seven parameters were evaluated for forest structure.

- Percent canopy closure of trees with a DBH greater than 7 inches

- Number of understory shrubs
- Number of dead trees
- Percent of dead and downed woody material
- Size class of dominant trees
- Percent of understory herbaceous coverage
- Number of tree species with a DBH greater than 7 inches

The forest structure analysis resulted in similar scores across the forest communities types, with all forest stand averages ranging from 10-12, out of 21. The Disturbed Forest had the lowest average forest structure analysis score of 10.3 and Pine-Hardwood Forest had the highest at 11.6. Disturbed Forest scored a little differently from the other forest communities because it is the youngest forest community. It had the lowest number of tree species with a diameter greater than 7 inches, the lowest canopy closure scores, the fewest standing dead trees, lowest size class of dominant trees, but the highest percentage of herbaceous vegetation due to the open canopy. Often thick cover of herbaceous vegetation is a sign of non-native species and invasive species, which was the case for the Disturbed Forest. Healthy Acidic Oak-Hickory, Mesic Mixed Hardwood and Oak-Heath Forest communities do not have thick herbaceous cover, so this forest structure parameter is misleading for these communities.

2009 Data

In mid-June 2009 and mid-September 2009, ESA staff revisited Laurel Hill to update the 2003 NRI/FSD and complete a cool-season and warm-season survey of Management Areas G, H, I, J, K, L, the golf course and a portion of A near the middle school pond. ESA staff updated the 2003 NRI/FSD by utilizing all of the 2003 data collections stations and adding numerous random, variable point sampling plots to each of the forest types identified.

In addition, staff visited several meadows and thicket/shrublands to develop vascular species lists and write general observations. As is evident in the assessment data sheets in Appendix 1-a, the data collected for the forested lands are more extensive and detailed than those for thicket/shrublands and meadows. This is in large part due to greater familiarity with the forest community types and the widespread management of forest lands. Meadows and thicket/ shrublands, on the other hand, do not have an equivalent standard whereby they can be evaluated. Instead the process of inventorying and managing these community types is less common and, in Fairfax County, relatively new. Therefore, data are more descriptive and less quantitative for these ecological communities.

2009 VARIABLE POINT SAMPLING

Whereas the 2003 NRI/FSD was conducted using a fixed plot sampling technique, the 2009 data were collected using a prism, variable point sampling field method. This method is typical/standard collection protocol of the National Park Service, U.S. Forest Service and Nature Conservancy when preparing natural resource management plans related to forestry assessment and inventory.

Variable point sampling refers to a inventory method where sample trees are selected with a probability proportional to their basal areas, where basal area is the measurement of the cross-sectional area of a tree trunk at breast height. Therefore, large trees with large basal areas have higher probabilities of selection than smaller trees. Measurements are made using a 10-factor wedge prism. Each tree selected within the variable plot represents 10 square feet of basal area per acre, hence the term 10-factor point sample. The basal area of the individual sampled trees is then compiled and summed to yield the basal area of the forest stand. Because basal area is highly correlated with tree volume, variable point sampling is an efficient method to estimate the frequency of occurrence, volume and/or

economic value of the forest stand. In addition, the variable point sampling technique averages an 80-foot radius in mature woods versus a fixed radius 1/10-acre plot (37.3-foot radius), allowing for much more characteristic and refined data to be collected and subsequently analyzed in documenting ecological communities.

At Laurel Hill, sample point locations were distributed throughout each ecological community. Within each forest type an average of one sampling plot per ten-acres was achieved, allowing for a high degree of statistical confidence. At each sample point location, trees that fell within the sample area were tallied and measured. These data were used to estimate the number of trees per acre, per each one-inch diameter class. In addition, each vegetation type's overstory tree condition was evaluated and the understory and groundcover species identified.

Sample point data collection included the following items.

- Percent canopy closure and tree species observed including relative dominance
- Percent and species of shrubs
- Percent and species of forest floor covered by herbaceous plants
- Percent of forest floor covered by downed woody debris
- Presence or absence of exotic or invasive species

Based on the basal areas calculated through variable point sampling, ESA was also able to determine stocking. Basal area equates to stocking, a general description of the density of the forest stand as compared to the desirable density for best growth and management. Stands may be described as understocked, in which case a stand of trees is so widely spaced that, even with full growth potential realized, crown closure will not occur; well stocked, where a forest stand contains trees spaced widely enough to prevent competition, yet closely enough to utilize the entire site; and overstocked, where the trees are so closely spaced that they are competing for resources, resulting in less than full growth potential for individual trees. Basal area per acre values are analyzed as non-stocked = 0 to 9; poorly stocked = 10 to 59; moderately stocked = 60 to 99; fully stocked = 100 to 129; and overstocked = 130 to 160 (Wenger 1984, 318-321). There is also a correlation between stand density and canopy closure, typically recognized as understocked, where crown closure is under 40%; well stocked, where crown closure is between 40% and 70%; and overstocked, where crown closure exceeds 70% (Stoddard 1968, 53).

Dominant species and landforms were compared to the Virginia DCR's descriptions of the Coastal Plain and Piedmont Regions' natural communities to determine which ecological community type fit each data station. The 2003 data stations were reclassified to fit DCR's natural community types where applicable. However, some ecological community descriptions did not fit DCR's descriptions because the human influence in those specific areas was too great. Instead, Tennessee's *rubus* shrubland description was used for one site, and the descriptions for the Disturbed Forest, Pine-Hardwood Forest and Meadow ecological communities were based upon data collected on-site.

Data point locations are approximate and were not surveyed or located using GPS. Consequently, it is possible to have a data point that appears to be one type of ecological community in an area that is delineated on the map as a different ecological community. Ecological community boundary delineation was based on topography and aerial photography with a spatial resolution of 0.5 feet, making all boundary data approximate.

Ecological Community Group Assessment

Each of the ecological community groups identified and inventoried on site are outlined in this section. The discussion of forest communities includes the dominant and common vegetation species, forest structure analysis scores, number of trees per acre in the forest communities, percent of invasive plants and basal area within each community. For treeless areas, data sets include species lists, observations and qualitative descriptions. Again, this is due to the familiarity with forest community types and the longstanding tradition of forest management compared to the relatively new developments in meadow management and lack of standard evaluation methods.

These particular ecological community groups appear where they do primarily because of past land use, topography and hydrology. Moisture appears to play a larger role in determining the ecological community at any given forested location at Laurel Hill than soils do, with the exception that rock outcrops and shallow soils are most often linked to the oak forest communities. Hydric soils usually appear within the floodplain forest communities. Figure 19 shows the locations of the ecological community groups at Laurel Hill. Refer to Appendix 1-d for a more detailed, full-size map.

Area A	Area G	Area H	Area I	Area J	Area K	Area L
Acidic Oak-Hickory Forest	Acidic Oak-Hickory Forest	Acidic Oak-Hickory Forest		Acidic Oak-Hickory Forest	Acidic Oak-Hickory Forest	Acidic Oak-Hickory Forest
	Disturbed Forest	Disturbed Forest	Disturbed Forest	Disturbed Forest	Disturbed Forest	
Floodplain Forest		Floodplain Forest	Floodplain Forest		Floodplain Forest	
Piedmont Prairie (Meadow)	Piedmont Prairie (Meadow)	Piedmont Prairie (Meadow)	Piedmont Prairie (Meadow)	Piedmont Prairie (Meadow)	Piedmont Prairie (Meadow)	Piedmont Prairie (Meadow)
Mesic Mixed Hardwood Forest			Mesic Mixed Hardwood Forest			
Oak-Heath Forest						
		Pine-Hardwood Forest	Pine-Hardwood Forest			Pine-Hardwood Forest
Thicket/Rubus Shrubland	Thicket/Rubus Shrubland	Thicket/Rubus Shrubland	Thicket/Rubus Shrubland	Thicket/Rubus Shrubland	Thicket/Rubus Shrubland	Thicket/Rubus Shrubland

Figure 18: Ecological community groups at Laurel Hill Park by management area

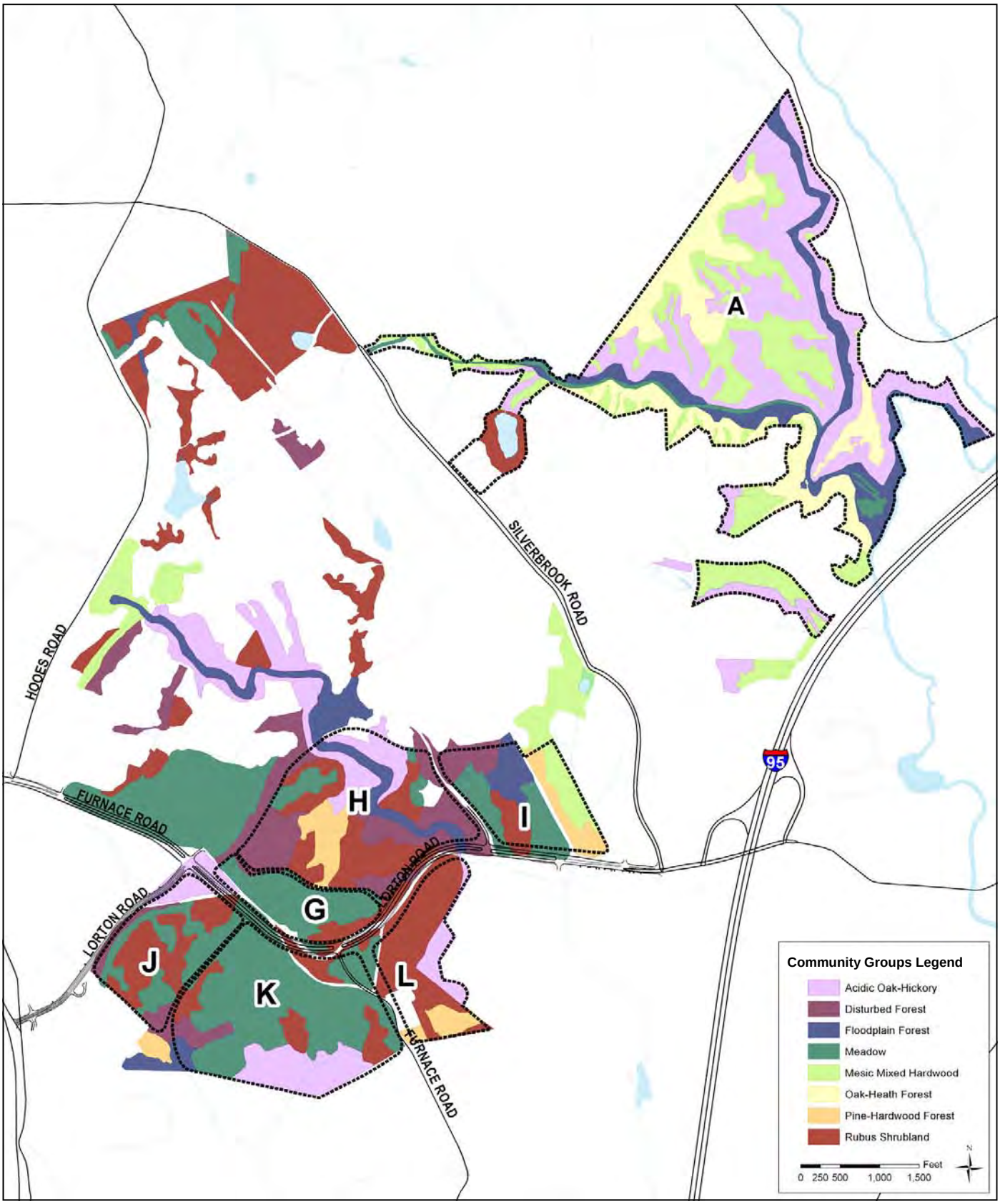

Figure 19: Ecological community groups at Laurel Hill Park

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Figure 20: Piedmont Prairie (Meadow) in the western portion of Land Bay G

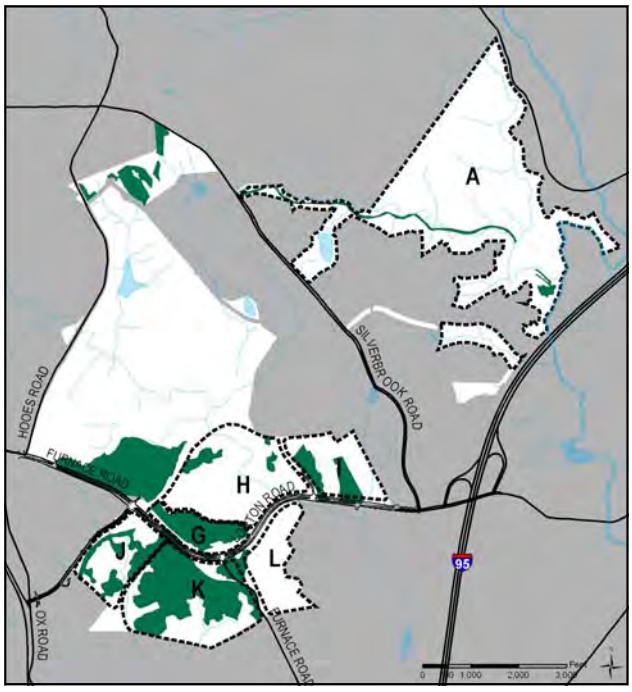

Figure 21: Location of Piedmont Prairie (Meadow) communities within Laurel Hill Park

Piedmont Prairie (Meadow)

DESCRIPTION

The Meadow communities at Laurel Hill were once grazed or mowed fields, but they have not been disturbed since approximately 1998. The species composition of these fields is slowly changing from forage grasses and legumes – such as timothy (*Phleum pratense*), orchardgrass (*Dactylis glomerata*), redtop (*Agrostis gigantea*) – and tall fescue (*Festuca arundinacea*) to native grasses such as bluegrass (*Poa pratensis*), shrubs and primary successional trees, though some plants, like tall fescue, will remain for decades. These meadows will become thicket/shrublands without active management. Already eastern red cedar (*Juniperus virginiana*) and brambles (*Rubus* spp.) are present in some Meadow communities.

A portion of Management Area G, currently categorized as meadow, is programmed to become a Central Green. The planned Central Green and other areas with Laurel Hill Park, including the golf course and athletic fields, although grassed, are not natural communities but rather artificial communities dominated by mowed, non-native turf grasses. They do not provide the same ecological function as meadows.

WHERE FOUND AT LAUREL HILL

Meadows are found in Management Areas A, G, H, I, J and K (Figure 21). Of the surveyed management areas, only Area L did not contain grounds classified as Meadow. There are approximately 793 acres of Meadow.

HABITATS

The abundance of meadows on site is unusual for the Northern Virginia region. This habitat type is declining in the larger metropolitan area due to intensified development. The meadows provide habitat for uncommon plants, such as Virginia dwarf dandelion (*Krigia virginica*), a seldom-seen native dandelion. Aggregations of other native species were seen near a pond in the area of the old rifle range. In addition, meadows provide habitat for grassland

birds, such as meadowlark, bobolinks and field sparrows. Other birds observed include the scarlet tanager and the red-winged blackbird. Of particular importance on-site are the large blocks of fallow fields near open water, such as the meadow encircling the pond in Land Bay H, that provide habitat for grassland birds, butterflies – including the silver-spotted skipper – dragonflies and damselflies. Silos and barns provide nesting sites for raptors, such as the barn owl sighted nesting in one of the silos. As part of the memorandum of understanding developed prior to the land transfer the silos are to remain standing on the site, even when the other dairy operation buildings are razed. The bird populations in this community type have been characterized by the local chapter of Audubon Society. Other wildlife that may inhabit the meadows include mice, voles, shrews, gophers, skunks, deer, rabbit, fox and coyote.

SAMPLE SPECIES OBSERVED

Generally, the meadows are dominated by common field species such as tall fescue (*Festuca arundinacea*), shasta daisy (*Leucanthemum vulgare*), redtop grass (*Agrostis gigantea*), timothy (*Phleum pratense*), bluegrass (*Poa pratensis*), deertongue grass (*Dichanthelium clandestinum*), thistle (*Cirsium* sp.), yellow mustard (*Alliaria petiolata*), annual ragweed (*Ambrosia artemisiifolia*) and goldenrods (*Solidago* spp.).

A comprehensive Meadow community species list for Laurel Hill Park can be found in Appendix 1-b.

Figure 22: Thicket/Shrubland in a finger of Management Area A, just west of Silverbrook Road

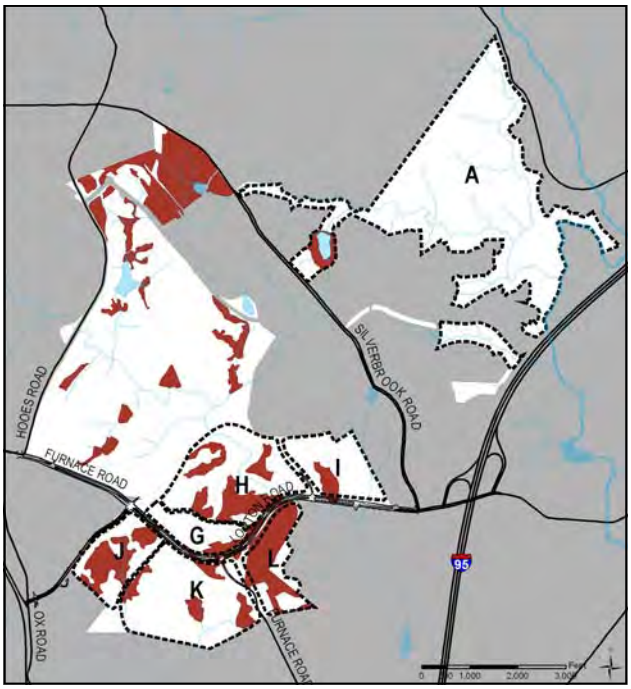

Figure 23: Location of Thicket/Shrubland communities within Laurel Hill Park

Thicket/Shrublands

DESCRIPTION

The Thicket/Shrubland community is a transitional ecological community between meadow and forest that was classified as thicket in the 2003 NRI/FSD. As Virginia's Vegetation Classification System does not include a fitting category for this non-persistent community, this natural community name comes from National Vegetation Classification System's *Rubus* (*argutus, trivialis*) Shrubland Alliance. However, the dominant blackberry at Laurel Hill Park is *Rubus allegheniensis*.

These thickets grow approximately 10 feet tall and are difficult to traverse because of the shrubs' prickles and dense arching stems. They provide excellent shelter and food for wildlife and birds. Some thickets on site act as hedgerows, separating fields or lining streams. They are dominated by red maple (*Acer rubrum*), black willow (*Salix nigra*), black cherry (*Prunus serotina*), staghorn sumac (*Rhus hirta*), sassafras (*Sassafras albidum*), grape (*Vitis* sp.), multiflora rose (*Rosa multiflora*), brambles (*Rubus* spp.), poison ivy (*Toxicodendron radicans*) and greenbriar (*Smilax rotundifolia*).

Currently, there is no regime in place to manage the thickets at Laurel Hill. Consequently, many are overgrown such that they no longer provide ideal wildlife habitat. Proper management will increase their habitat value.

WHERE FOUND AT LAUREL HILL

Thicket/Shrubland communities are found in Management Areas A, G, H, I, J, K and L (Figure 23), and cover 189 acres as of the 2009 survey. They are the one ecological community group that is consistently found across all surveyed sites, although their size and composition vary from site to site. Construction of the Laurel Hill Golf Course eliminated some of the thicket/shrublands since the 2003 survey was completed.

HABITATS

There are extensive thicket/shrublands at Laurel Hill. Like the meadows, their abundance is unusual for the region, but they are a habitat type in decline due to intensified development. Of particular importance on-site are the large blocks of fallow fields near open water, such as the farm pond in Management Area A surrounded by thicket/ shrublands.

The bird populations in this community group have been characterized by the local chapter of Audubon Society. In particular, the thicket/shrublands in Area A, near data station 13, and the thicket/shrublands in Area L appear to have diverse and stable bird populations.

Other wildlife that can be found in the park's thicket/shrublands includes mice, voles, moles, shrews, deer, rabbit, fox, coyote, snakes and box turtles.

SAMPLE SPECIES OBSERVED

This community group is dominated by blackberry shrubs and young trees and has been fallow for approximately a decade. Dominant woody plants include blackberry (*Rubus allegheniensis*), multiflora rose (*Rosa multiflora*), apple (*Malus* spp.), mulberry (*Morus alba*), cherry (*Prunus* spp.), winged sumac (*Rhus copallinum*), Japanese honeysuckle (*Lonicera japonica*), eastern red cedar (*Juniperus virginiana*) and tree-of-heaven (*Ailanthus altissima*). Herbaceous plants include common milkweed (*Asclepias syriaca*), dogbane (*Apocynum* sp.), vetch (*Vicia* sp.), speedwell (*Veronica* sp.), bedstraw (*Galium* sp.), Canada goldenrod (*Solidago canadensis*), redtop (*Panicum rigidulum*), mustard (*Brassica rapa*), common mullein (*Verbascum thapsus*), red sorrel (*Rumex acetosella*) and tall fescue (*Festuca arundinacea*).

A comprehensive Thicket/Shrublands community species list for Laurel Hill Park can be found in Appendix 1-b.

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Figure 24: Acidic Oak-Hickory Forest between Giles Run and the second hole on the Laurel Hill Golf Course

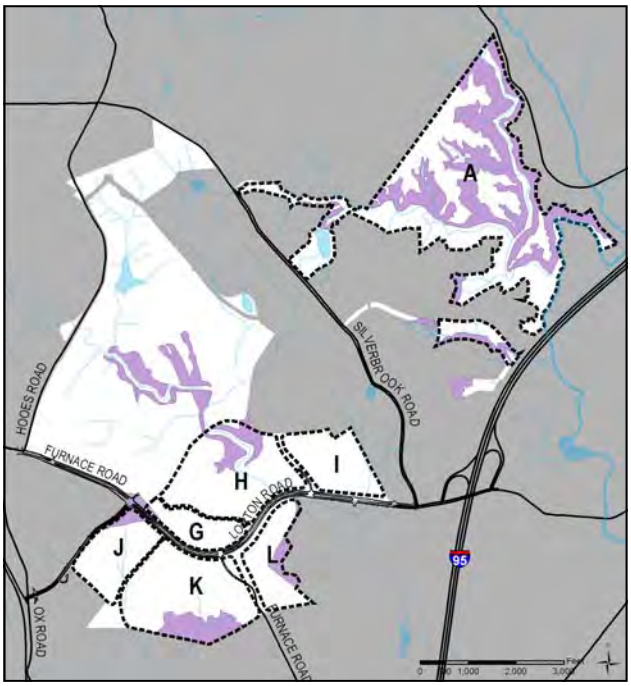


Figure 25: Location of Acidic Oak-Hickory Forest within Laurel Hill Park

Acidic Oak-Hickory Forest

DESCRIPTION

This low-elevation, dry-mesic forest is found on well-drained acidic soils. Acidic Oak-Hickory Forest generally occurs on steep slopes (approximately 15%+) with shallow soils and rock outcrops. Oaks dominate and because this stand tends to grow on steep slopes, it often is not targeted for logging, which has resulted in a more mature forest stand with larger trees. The canopy is approximately 66% closed, and there are approximately 286 trees per acre with an average basal area of 107.6 square feet. The average canopy trees are 15.4 inches in diameter at breast height (dbh). Coarse woody debris covers approximately 5% of the ground in this forest stand. The average forest structure score for this stand is 11.4, which means it has good forest structure. No data stations in this stand have forest structure scores of 15 or more ("priority" score) partially because of the closed canopy, which limits herbaceous cover and shrub development.

At Laurel Hill, understory development is also hampered by the presence of excessive deer populations in the park. Deer browse has almost eliminated the understory of this forest and has facilitated the spread of non-native invasive species (NNIs). In addition, although relatively undisturbed in Management Area A, Acidic Oak-Hickory Forests in Areas K and H have seen greater disturbance due to human activity, including trail use and disc golf.

WHERE FOUND ON LAUREL HILL

This natural community type was part of the Mixed Oak Forest type in the 2003 NRI/FSD. It is located in the following Management Areas: A, H, J, K and L (Figure 25). Acidic Oak-Hickory Forest occupied approximately 355 acres surveyed in 2003 and 196.7 acres in 2009.

HABITATS

The Acidic Oak-Hickory Forest is home to native species including violet wood sorrel (*Oxalis violacea*) and rattlesnake-weed (*Hieracium venosum*). The forest also provides habitat for wildlife species including chipmunk, gray squirrel, hawks, woodpeckers, forest interior dwelling bird species, deer, snakes, box turtle, fox and coyote.

SAMPLE SPECIES OBSERVED

The dominant species is white oak at 27.0% of the woody plants in this forest community. Other common tree species included red oak (*Quercus rubra*) at 16.7%, tulip tree (*Liriodendron tulipifera*) at 15.3%, hickories (*Carya* spp.) at 9.3% and red maple (*Acer rubrum*) at 7.2%. The stand in the northern forest block that borders South Run (Management Area A), in particular, is dominated by mountain laurel (*Kalmia latifolia*). Other common shrubs include lowbush blueberry (*Vaccinium pallidum*), witch hazel (*Hamamelis virginiana*), American holly (*Ilex opaca*), flowering dogwood (*Cornus florida*), maple-leaf viburnum (*Viburnum acerifolium*) and arrowwood viburnum (*Viburnum dentatum*). Generally, the herbaceous layer is very sparse. The most common plants are wintergreen (*Chimaphila maculata*), greenbriar (*Smilax rotundifolia*), wild yam (*Dioscorea villosa*), white wood aster (*Eurybia divaricata*), Solomon's seal (*Polygonatum biflorum*) and tick trefoil (*Desmodium* sp.). Exotic species are not common, and NNIs occupy about 6% of the shrub and herb layers.

A comprehensive Acidic Oak-Hickory Forest species list for Laurel Hill Park can be found in Appendix 1-b.

Mark Burchick

Figure 26: Floodplain Forest along Giles Run at the Laurel Hill Golf Course, northeast of the fourth hole

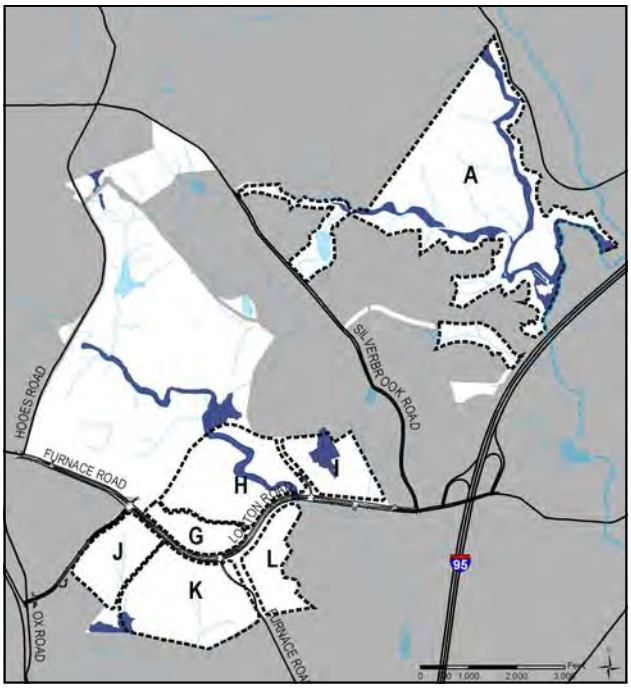


Figure 27: Location of Coastal Plain/Piedmont Floodplain Forest within Laurel Hill Park

Coastal Plain/Piedmont Floodplain Forest

DESCRIPTION

This forest includes both small and large streams, on active, non-tidal floodplains with alluvial, well-drained soils. This ecological community was defined as bottomland forest in the 2003 NRI/FSD. It is structurally and compositionally diverse. The forest age is variable, with some stands mature and greater than 80 years old, while others are disturbed and less than 20 years old. The canopy trees in this forest are, on average, 16.4 inches dbh, though some stands have trees greater than 24 inches in diameter. The average forest structure score is 11.1, meaning that this forest has good structural diversity. Canopy closure ranges from about 40% to 75%, and there are approximately 242 trees per acre with an average basal area of 93.9 square feet. Woody debris covers approximately 2% to 7% of the ground, and shrub species diversity is low; however, at an average of 39.5%, herbaceous cover is higher in this forest than the other communities on-site.

Excessive deer populations have had a detrimental effect on this forest. Deer browse has impeded regeneration and reduced understory growth. As deer move through the park, particularly along the stream corridors of the Coastal Plain/Piedmont Floodplain Forest, they contribute to the spread of NNIs.

Since 2003, a sewer line has been installed along Rocky Branch, a tributary of South Run, which drains to Pohick Creek. The line has eliminated some of this forest community, and the invasion of non-native species into this forest is likely along the utility corridor.

WHERE FOUND ON LAUREL HILL

Coastal Plain/Piedmont Floodplain Forest is found in Management Areas A, H, I and K along stream corridors (Figure 27). This forest occupied approximately 95 acres of the 2003 surveyed area and 75.6 acres of the 2009 surveyed area of the study tract.

HABITATS

Floodplain forest may be home to raccoons, skunks, fox, coyote, birds that tolerate edge environments, deer and, due to this forest's proximity to meadows and thicket/shrublands, raptors. These forests shade streams and provide large woody debris and leaf litter for the streams' biological communities.

SAMPLE SPECIES OBSERVED

The Coastal Plain/Piedmont Floodplain Forest is dominated by tulip tree (*Liriodendron tulipifera*). Tulip tree comprises 34% of the woody plants in this forest community. Associate species are American beech (*Fagus grandifolia*) at 11%, sycamore (*Platanus occidentalis*) at 9%, white oak (*Quercus alba*) at 8% and red maple (*Acer rubrum*) at 8%. Common tree species include green ash (*Fraxinus pennsylvanica),* black cherry (*Prunus serotina*), sweetgum (*Liquidambar styraciflua*), blackgum (*Nyssa sylvatica*), maples (*Acer* spp.), mulberry (*Morus* sp.), hop hornbeam (*Ostrya virginiana*) and hickories (*Carya* spp.).

Common shrubs in this stand include spicebush (*Lindera benzoin*), pawpaw (*Asimina triloba*), brambles (*Rubus* spp.), highbush blueberry (*Vaccinium corymbosum*), greenbriar (*Smilax rotundifolia*) and common elderberry (*Sambucus canadensis*).

These forests tend to have typical floodplain/bottomland understory plants including Jack-in-the-pulpit (*Arisaema triphyllum*), sensitive fern (*Onoclea sensibilis*), deertongue (*Dichanthelium clandestinum*), bladder sedge (*Carex intumesens*), false nettle (*Boehmeria cylindrica*), poison ivy (*Toxicodendron radicans*), Indian cucumber (*Mediola virginiana*), Japanese honeysuckle (*Lonicera japonica*), royal fern (*Osmunda regalis*), wild yam (*Dioscorea villosa*), grape fern (*Botrychium dissectum*), wild strawberry (*Fragaria virginiana*), Virginia white grass (*Leersia virginica*), Arthraxon (*Arthraxon hispidus*) and blue violet (*Viola* sp.).

Several of these stands are disturbed and have invasive vegetation, especially Japanese honeysuckle, cleavers (*Gallium* sp.), Asiatic bittersweet (*Celastrus orbiculatus*), tall fescue (*Festuca arundinacea*) and multiflora rose (*Rosa multiflora*). Dwarf ginseng (*Panax trifolium*), an uncommon plant in Virginia, is found in several stands of bottomland floodplain forest.

A comprehensive Coastal Plain/Piedmont Floodplain Forest species list for Laurel Hill Park can be found in Appendix 1-b.

Mark Burchick

Figure 28: Disturbed Forest in the southwest corner of Management Area H

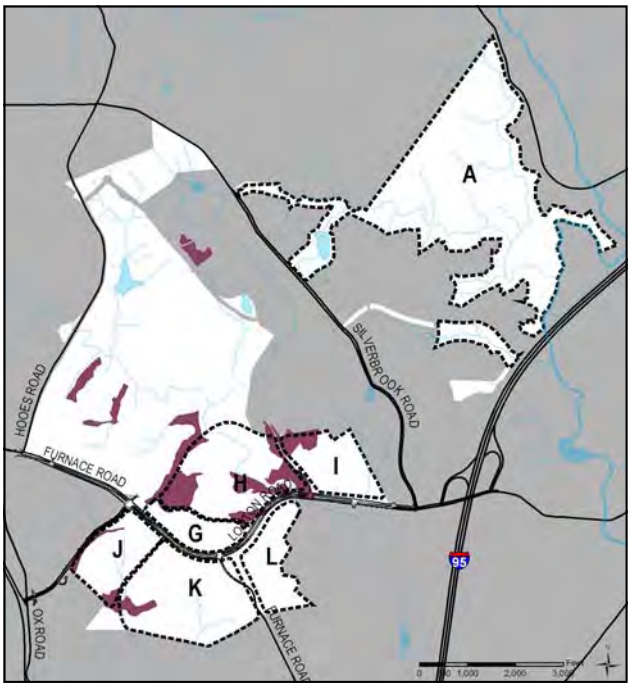


Figure 29: Location of Disturbed Forest within Laurel Hill Park

Disturbed Forest

DESCRIPTION

Disturbed Forests have a large edge effect shown by the dominance of invasive vines, such as Japanese honeysuckle, poison ivy (*Toxicodendron radicans*) and Virginia creeper (*Parthenocissus quinquefolia)*. This forest type is usually young and shows heavy human influence so there is no matching Virginia DCR natural community type. On average, this forest has 239 trees per acre with an average basal area of 61.5 square feet. The average canopy tree is 10.9 inches dbh and is 28 years old. The average forest structure analysis score is 10.3, which means this stand has good forest structure. The forest structure is good due to high herbaceous (on average 65.9%) and canopy cover (on average 52.5 %). These plots generally have little diversity in tree and shrub species and few standing dead trees. Invasive species are present in all data station plots, and there is an average of 42% invasive plant cover. This forest stand has matured in the past six years, with a higher basal area, more shrub species and fewer, larger trees. However, the canopy closure is still low and herbaceous cover and invasive species cover high. Additionally, some thicket/shrubland has grown into Disturbed Forest. Allowing this forest stand to further mature without disturbance will help control herbaceous and invasive species cover, but it will not eliminate the shade-tolerant invasive plants present, such as Asiatic bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*). Also, tree-of-heaven (*Ailanthis altissima*) is common in this forest stand and will continue to spread, replacing native trees and shrubs if it is not managed.

At Laurel Hill, the Disturbed Forests are particularly vulnerable given the edge conditions along Lorton Road, the Cross County Trail north of Lorton Road and the access road between Management Areas H and I. Edge exposure along these corridors increases the potential for the spread of NNIs and disturbance from development, traffic and other human activity.

WHERE FOUND ON LAUREL HILL

Disturbed Forest lands are found in Management Areas H, I, J and K (Figure 29). Disturbed Forest occupied approximately 59 acres in 2003 and 67.9 acres of the area surveyed in 2009.

HABITATS

This forest type has good wildlife and bird cover because of the thick herbaceous and vine layers. Wildlife that may be found here include deer, skunk, tufted titmouse, shrew, groundhog, gray squirrel, fox and coyote.

SAMPLE SPECIES OBSERVED

Common canopy species include black cherry (*Prunus serotina*) at 20% presence, tree-of-heaven (*Ailanthus altissima*) at 11.3%, red maple (*Acer rubrum*) at 18%, Norway maple (*Acer platanoides*) at 14.3% and silver maple (*Acer saccharinum*) at 15.7%.

Shrub species include invasive privet (*Ligustrum* sp.), autumn olive (*Elaeagnus umbellate*), multiflora rose (*Rosa multiflora*), bush honeysuckle (*Lonicera* sp.), wineberry (*Rubus phoenicolasius*) and barberry (*Berberis* sp.). Native elderberry (*Sambucus canadensis)* was also present.

Herbaceous plants are also mostly NNIs and include Japanese stilt grass (*Microstegium veminium*), henbit (*Lamium amplexicaule*), tall fescue (*Festuca arundinacea*), daffodils (*Narcissus* spp.), gill-over-the-ground (*Glechoma hederacea*) and bedstraw (*Galium* sp.). Native plants include milkweed (*Asclepias syriaca*), poison ivy (*Toxicodendron radicans*) and goldenrods (*Solidago* spp.). Vines include Japanese honeysuckle (*Lonicera japonica*) and Virginia creeper (*Parthenocissus quinquefolia)*.

A comprehensive Disturbed Forest species list for Laurel Hill Park can be found in Appendix 1-b.

Mark Burchick

Figure 30: Mesic Mixed Hardwood Forest in Management Area A, just north of the confluence of Rocky Branch and South Run

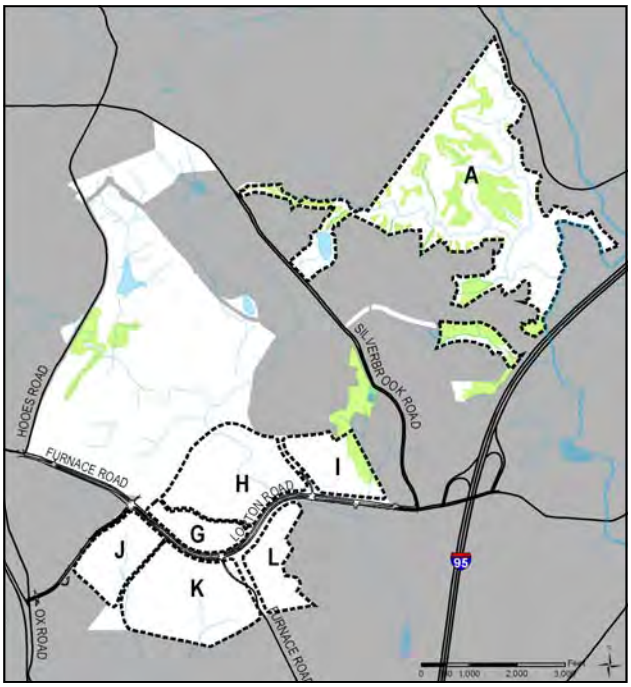


Figure 31: Location of Mesic Mixed Hardwood Forest within Laurel Hill Park

Mesic Mixed Hardwood Forest

DESCRIPTION

The Mesic Mixed Hardwood Forest occurs on shallower slopes (approximately 3% to 14%) than the Acidic Oak-Hickory Forest and along small streams where the soil is well drained and rarely flooded. Soils in the Mesic Mixed Hardwood Forest are usually acidic. This forest has a basal area of 98.0 square feet and approximately 310 trees per acre. The average tree canopy is approximately 15.8 inches dbh and is approximately 60 to 70 years old. The canopy closure is, on average, 65.5% closed. Herbaceous species cover on average 18.6% of the ground. This stand has an average forest structure analysis score of 11.2, which means that it has good forest structure. It generally has good canopy closure, number of standing dead trees (averaging 2.6 trees per data station) and larger dominant trees. The herbaceous community is more diverse and abundant than it is in the oak forest groups, but less so than in the floodplain forest. This forest stand remains similar to what it was in 2003.

As is the case throughout the park, excessive deer populations have had a detrimental effect on this forest. Deer browse has impeded regeneration and almost eliminated understory growth, though not to the extent of the oak forest groups. Deer also have the potential to spread NNIs. Currently, the prevalence of NNIs in this community group varies greatly depending on the location within the park. Coverage of NNIs ranges from 0-95%. Most data stations have very minor NNI coverage. In the large forest block of Management Area A, for example, NNIs are not as prevalent due in part to the limited human activity and/or other disturbances there. However, some data stations in the park that are closer to development and edge conditions recorded a greater presence of NNIs. Data stations E02 (on the Laurel Hill Golf Course) and E16 (just north of Management Area I) have more than 50% non-native invasive species.

WHERE FOUND ON LAUREL HILL

Mesic Mixed Hardwood Forests are found throughout Management Area A and along the eastern edge of Management Area I (Figure 31). They occupied approximately 219 acres on lands surveyed in 2003 and 112.3 acres surveyed in 2009.

HABITATS

This forest community is generally part of a larger forest that may be home to deer, forest-interior dwelling bird species such as the oven bird and cerulean warbler, pipeline swallowtail butterfly, box turtle, toad, snake, fox and coyote. Raccoons may be found near small streams.

SAMPLE SPECIES OBSERVED

This stand is dominated by tulip tree (*Liriodendron tulipifera)* at 33.6% of the woody plants in this forest type. Associate species include red maple (*Acer rubrum*) at 15.8%, white oak (*Quercus alba*) at 15.3%, northern red oak (*Quercus rubra)* at 6.3%, American beech (*Fagus grandifolia*) at 5.4% and hickories (*Carya* spp.) at 5.2%. Subcanopy trees include red maple (*Acer rubrum*), hickories (*Carya* spp.), American holly (*Ilex opaca*), Virginia pine (*Pinus virginiana*), black cherry (*Prunus serotina*), flowering dogwood (*Cornus florida)*, black gum (*Nyssa sylvatica*), ironwood (*Carpinus caroliniana*) and fringe tree (*Chionanthus virginicus*).

Common shrubs and vines include mountain laurel (*Kalmia latifolia*), greenbriar (*Smilax rotundifolia*), American holly (*Ilex opaca*), viburnums (*Viburnum* spp.), shadbush (*Amelanchier canadensis*), pink azalea (*Rhododendron periclymenoides),* highbush and lowbush blueberries (*Vaccinium* spp.) and brambles (*Rubus* spp.). There is on average three shrub species per data station.

Common herbaceous plants include Solomon's seal (*Polygonatum biflorum)*, wood reedgrass (*Calamagrostis perplexa*), spotted wintergreen (*Chimaphila maculata*), dissected grape fern (*Botrychium dissectum)*, New York fern (*Thelypteris noveboracensis*), wild yam (*Dioscorea villosa*), deertongue grass (*Dichanthelium clandestinum*), wild strawberry (*Fragaria virginiana*), tick-trefoil (*Desmodium* sp.), bloodroot (*Sanguinaria canadensis*), wood sorrel (*Oxalis* sp.), Jack-in-the-pulpit (*Arisaema triphyllum*) and Christmas fern (*Polystichum acrosticoides*).

A comprehensive Mesic Mixed Hardwood Forest species list for Laurel Hill Park can be found in Appendix 1-b.

Mark Burchick

Figure 32: Oak/Heath Forest

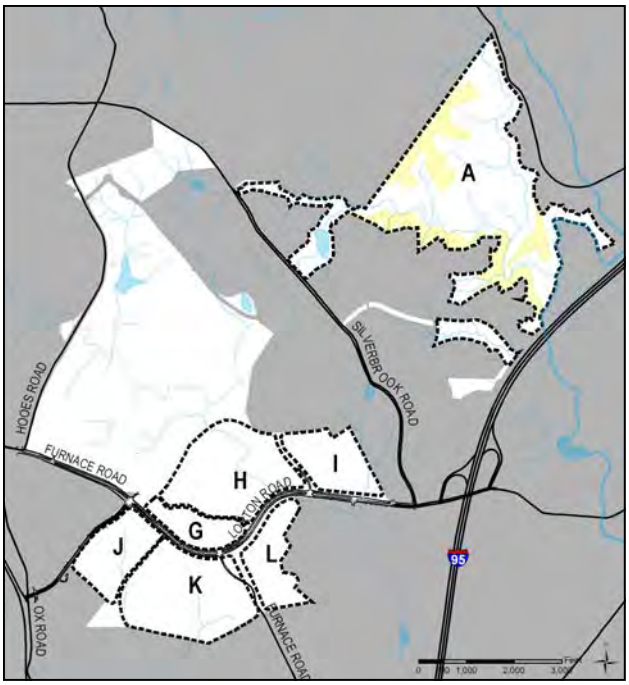


Figure 33: Location of Oak/Heath Forest within Laurel Hill Park

Oak/Heath Forest

DESCRIPTION

Oak/Heath Forest natural community occurs on the ridgetop in depauperate, dry soils. Signs of past logging are apparent, including old logging roads and coppiced trees. The trees are either younger than the Acidic Oak-Hickory Forest or have stunted growth. There is good canopy closure at an average of 62%. The average canopy tree is 15.7 inches dbh. Herbaceous cover is minimal, and the shrub layer is well developed and dominated by heaths. (Heaths refer to the Heath family (*Ericaceae*), which includes blueberries, huckleberries, azaleas and mountain laurel, among other species.) The number of shrubs is higher in this forest stand than others. There are 276 trees per acre with a basal area of 120.5 square feet. The average forest structure analysis score for the forest stand is 11.5, which is good forest structure. Although not within Laurel Hill Park but worth noting for comparison, two data stations surveyed in 2003 in Management Area P – station I 28 (located in Occoquan Regional Park) and station I37 – have forest structure scores of 16 ("priority" scores) due to their high percent canopy closure, number of shrubs standing, dead trees and size class of the dominant trees. There are no NNIs in most of the data plots. The characteristics of this forest stand have remained similar to what was surveyed in 2003.

At Laurel Hill, Oak/Heath Forest occurs in a large forest block where human activity is limited and development is less intense. Consequently, NNIs are not as prevalent as they are in other forest blocks, and there is a healthy shrub understory. However, as is the case throughout Laurel Hill Park, human activity as well as excessive deer populations can have a negative impact on this forest. Elsewhere in the park deer browse has impeded regeneration and almost eliminated understory development. In addition, as they move through the park, deer have the potential to spread NNIs in otherwise undisturbed areas.

WHERE FOUND ON LAUREL HILL

Oak/Heath Forest is only found in one of the surveyed management areas, Area A (Figure 33). At the time of the 2009 survey, Oak/Heath Forest covered 65.6 acres.

HABITATS

Plant species that may be found in Oak/Heath Forests include pink lady's slipper (*Cypripedium acaule*), dwarf iris (*Iris verna*) and large whorled pogonia (*Isotria verticillata*). The forest provides habitat for bird species including the Louisiana waterthrush, red-eyed vireo, hawks, woodpeckers and other forest interior dwelling bird species. Observed insects include the luna moth, common whitetail dragonfly, eastern tiger swallowtail and green tiger beetle. A fence lizard, *Sceloporus undulates*, was observed in a sunny patch on a tree trunk. Other wildlife species include chipmunk, gray squirrel, tufted titmouse, deer, snakes, box turtle, fox and coyote.

SAMPLE SPECIES OBSERVED

The dominant canopy species in this community are chestnut oak (*Quercus prinus*) at 34% of the woody plants present and white oak at 35%. Hickories (*Carya* spp.) are either not present or present in low numbers. Associate species include red maple (*Acer rubrum*) at 6.75%, black gum (*Nyssa sylvatica*) at 6.16% and American beech (*Fagus grandifolia*) at 4.39%. Additional trees found in this forest include northern red oak (*Quercus rubra*), American chestnut (*Castanea dentata*), tulip tree (*Liriodendron tulipifera*), Virginia pine (*Pinus virginiana*), hemlock (*Tsuga canadensis*), black cherry (*Prunus serotina*), hickory (*Carya* spp.), black oak (*Quercus velutina*), American holly (*Ilex opaca*) and persimmon (*Diospyros virginiana*).

Shrubs include mountain laurel (*Kalmia latifolia*), huckleberry (*Gaylussacia* sp.), deerberry (*Vaccinium stamineum*), low bush blueberry (*Vaccinium pallidum*), maple-leaf viburnum (*Viburnum acerifolium*), shadbush (*Amelanchier* sp.), fetterbush (*Leucothoe racemosa*) and arrowwood viburnum (*Viburnum dentatum*).

Virginia snakeroot (*Aristolochia serpentaria*), an uncommon species, was observed in May 2009, as well as several fern species (royal, grape, Christmas, New York and cinnamon fern) and large houstonia (*Houstonia purpurea*).

A comprehensive Oak/Heath Forest species list for Laurel Hill Park can be found in Appendix 1-b.

Mark Burchick

Figure 34: Pine-Hardwood Forest in Occoquan Regional Park

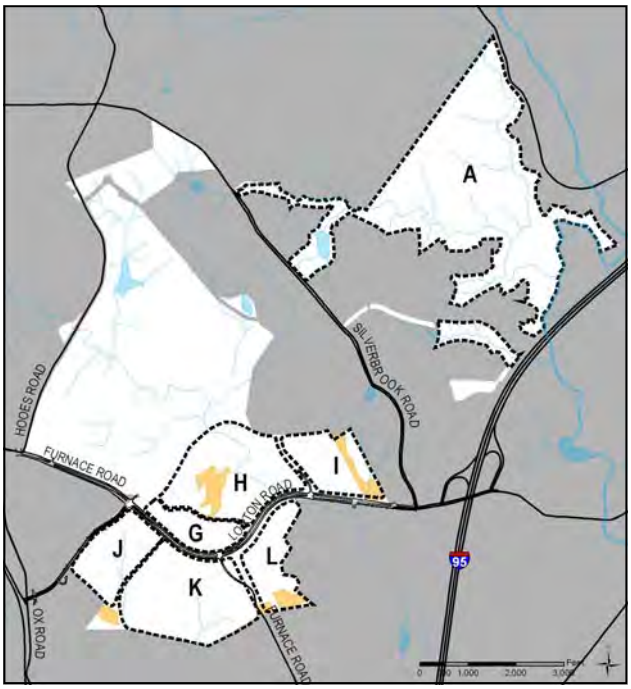


Figure 35: Location of Pine-Hardwood Forest within Laurel Hill Park

Pine-Hardwood Forest

DESCRIPTION

The Pine-Hardwood Forest stand is labeled as Pine-Dominated Forest in the 2003 NRI/FSD. There is no Virginia DCR natural community type that fits this forest because it is a forest community that has had a high level of human influence.

Virginia pine (*Pinus virginiana*) at 22.4% of the woody plants in this forest stand and loblolly pine (*Pinus taeda*) at 32.5% dominate the canopy of this stand. No pine seedlings are found in the plots, which indicates that the community will not stay pine-dominated. Instead, it is in transition to a mesic mixed hardwood, acidic oak-hickory, or Oak/Heath Forest, depending on the gradient, aspect and moisture regime. It has approximately 355 trees per acre with an average basal area of 110 square feet. Most of this stand appears to be approximately 50 to 60 years old. Downed woody debris occupies approximately 5% of the ground in the Pine-Hardwood Forest stand. The average forest structure analysis score for this stand is 11.6, which means it has good forest structure. One Pine-Hardwood Forest plot surveyed in 2003 and located in Occoquan Regional Park, data station I6, has a forest structure score of 17 due to its high canopy closure, number of understory shrubs and number of standing dead trees.

NNIs are common and occupy approximately 20% of the herbaceous and shrub layers at data stations surveyed in 2003 and 2009; however, NNI occurrences at data stations within management areas addressed in this report are somewhat lower, at 2% to 10%. Still, of concern is one data station, E36, at the southwest corner of Management Areas J and K, which has 40% NNIs, as well as station I02, located near the entrance to Occoquan Regional Park on Ox Road, that has 100% invasive coverage. Given the excessive deer populations in the area, the potential for the spread of NNIs is great.

Deer are also significantly hampering forest regeneration and are likely, in part, responsible for the lack of pine seedlings.

WHERE FOUND ON LAUREL HILL

Pine-Hardwood Forest is found in Management Areas H, I and L (Figure 35). It occupied approximately 142 acres in the 2003 survey and 23.6 acres in the area surveyed in 2009.

HABITATS

This forest is characterized by habitats that support typical suburban forest wildlife including deer, skunk, snakes, box turtle, song birds, hawks, gray squirrel and chipmunk.

SAMPLE SPECIES OBSERVED

Within this community is a monoculture white pine (*Pinus strobus*) data station, E24, and a data station dominated by white and yellow pines (*Pinus echinata*), E31. Common hardwood species found in the canopy include black locust (*Robinia pseudo-acacia*), tulip tree (*Liriodendron tulipifera*), white oak (*Quercus alba*), chestnut oak (*Quercus prinus*), red maple (*Acer rubrum*) and eastern red cedar (*Juniperus virginiana*). Seedlings include red maple (*Acer rubrum*), sassafras (*Sassafras albidum*), white oak (*Quercus alba*), black cherry (*Prunus serotina*), American beech (*Fagus grandifolia*), sweetgum (*Liquidambar syraciflua*), southern red oak (*Quercus falcata*), pignut hickory (*Carya glabra*), black locust (*Robinia pseudoacacia*), chestnut oak (*Quercus prinus*), willow oak (*Quercus phellos*), eastern red cedar (*Juniperus virginiana*), and northern red oak (*Quercus rubra*).

NNIs include tree of heaven (*Ailanthus altissima*), Japanese honeysuckle (*Lonicera japonica*), Asiatic bittersweet (*Celastrus orbiculatus*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellate*), henbit (*Lamium amplexicaule*) and Japanese knotweed (*Polygonum cuspidatum*).

In addition to those listed above, common vines and shrubs included greenbriar (*Smilax rotundifolia*), poison ivy (*Toxicodendron radicans*), American holly (*Ilex opaca*), brambles (*Rubus* spp.), Virginia creeper (*Parthenocissus quinquefolia*), persimmon (*Diospyros virginiana*), wineberry (*Rubus phoenicolasius*), maple-leaf and arrowwood viburnum (*Viburnum acerifolium* and *dentatum*) and lowbush blueberry (*Vaccinium pallidum*).

A comprehensive Pine-Hardwood Forest species list for Laurel Hill Park can be found in Appendix 1-b.

Research and Data Gaps

Despite the extensive information captured by the 2003 and 2009 natural resources inventories at Laurel Hill Park, there are still outstanding questions and holes in the research that need to be filled. As these data gaps are addressed and the Park Authority continues to build their natural resources knowledge of the site, they will be better positioned to inform and guide long-term planning and management. Management strategies outlined in Section V of this report should be periodically reassessed to respond to new data and research.

Several areas have been identified as priorities for further information gathering efforts.

- Data from the Audubon Society of Northern Virginia indicates the importance of bird and butterfly habitat. In addition to continuing the NVBS and monitoring bird and butterfly activity at Laurel Hill, the Park Authority should research management techniques for those faunal groups and determine a means of measuring management performance.
- Currently, no faunal surveys are conducted that address vertebrate and invertebrate species not covered by Audubon surveys. More information needs to be collected on these fauna at Laurel Hill. Likewise, plant surveys have been limited to the 2003 and 2009 natural resources inventories. Plant surveys need to be conducted over a period of time and the site plant lists periodically amended. Quantitative measurements of the vegetation would enable staff to better understand the distribution and composition vegetation, and regular monitoring would indicate the speed with which succession is occurring. In addition, rare species or species of concern need to be identified and managed.
- Little information regarding soil composition is available. Regular testing will indicate how the soil is changing over time, for example whether organic matter is increasing or whether pesticide residue from former land uses is present.
- A more comprehensive assessment of NNIs on site is needed. Using the Non-Native Invasive Assessment and Prioritization (NNIAP) protocol recently developed by the Park Authority and Biohabitats, NNI occurrences need to be defined site-wide and management priorities developed. Data collection over time will indicate how quickly NNIs are spreading.
- While excessive deer populations are a known problem on site, consistent monitoring and regular counts have not been performed. A regular deer census is needed to determine herd size and to monitor the success of the archery hunting program and other herd reduction efforts. Continuous monitoring of the browse impact to survey plots established in summer 2010 needs to be performed to measure vegetative response to deer herd reduction. Success will be determined by the ability of plant communities to recover and regenerate as deer populations decrease.

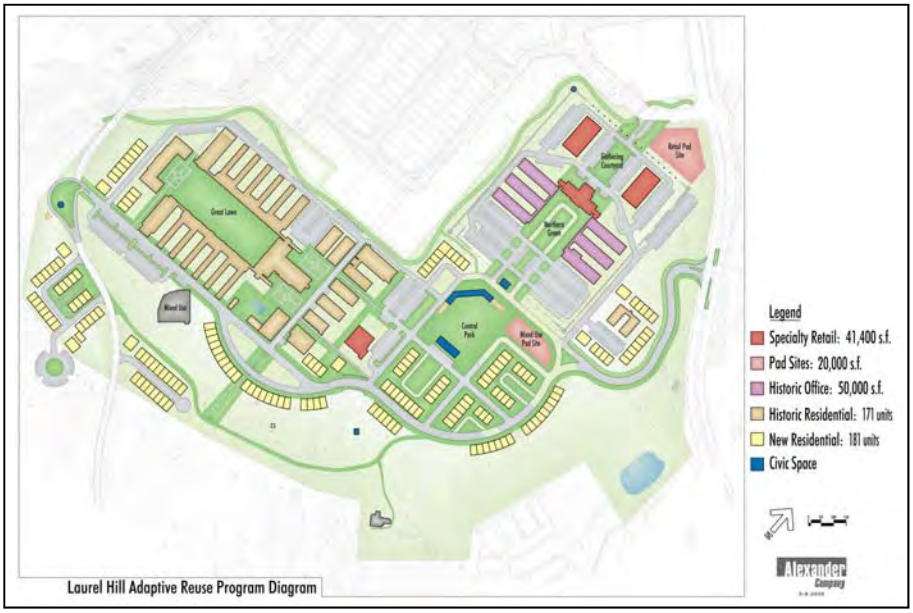
SECTION IV:
SITE DOCUMENTATION

Synopsis of Existing Plans and Studies for Laurel Hill

LAUREL HILL ADAPTIVE REUSE AREA MASTER PLAN, DECEMBER 2009

In 2004, a second Citizen's Advisory Committee (CAC) was convened – the first having met in 1995 – to develop recommendations for the adaptive reuse of the former Lorton Penitentiary and Reformatory. The site, comprised of the Penitentiary and Reformatory buildings, the prison ball field and the historic Laurel Hill House, occupies approximately 80 acres west of Silverbrook Road and north of Lorton Road and Giles Run Meadow Park, along the south and east sides of the Spring Hill senior residential community. Recommendations for the site included a mix of education, retail, professional office and residential space with magnet housing and a village center. It was recommended that the Reformatory be rehabilitated for magnet and market rate housing, the Penitentiary could house education-related uses, supporting offices, research facilities and the like, while a Village Center could include retail and profession office space along a "Main Street." The Development of all three areas would reflect the two predominant historic themes evident in the existing historic structures: the Progressive Era of prison reform and the Colonial Revival architecture of Snowden Ashford. In December 6, 2004, the Fairfax County Board of Supervisors voted unanimously to accept the *Recommendations for the Adaptive Reuse Areas within Laurel Hill*.

Two years later, in 2006, the site was listed as part of the D.C. Workhouse and Reformatory National Register District, and in December 2009, the Alexander Company completed Phase I of the master planning process, the *Laurel Hill Adaptive Reuse Area Master Plan*. This plan was approved by the Fairfax County Board of Supervisors on May 11, 2010.



Figures 36 and 37: Cover of the Recommendations for the Adaptive Reuse Areas within Laurel Hill (2004), left, and the Adaptive Reuse Area master plan, right

LAUREL HILL NATURAL RESOURCES INVENTORY: PHASE I LORTON ROAD IMPROVEMENTS, JULY 2006

In conjunction with the Phase I Lorton Road Improvements, KCI Technologies, Inc. was retained to "assess the water resources, wildlife/habitat resources, and soils in and around the proposed realignment of Lorton Road." The resulting natural resources inventory focuses on a study area on either side of Lorton Road between Ox and Silverbrook Roads. The inventory notes two wetlands, shown in Figure 38, within the study area – Wetland B, a herbaceous emergent wetland located on the north side of Lorton Road, east of the bridge over Giles Run in Area I, and Wetland C, an emergent scrub/shrub wetland that developed along an unnamed intermittent tributary of Giles Run, on the south side of Lorton Road in Area L – as well as a third that is outside the study area. In addition to wetlands, the report identifies several streams in or near the study area. Giles Run, which passes under Lorton Road, has seven unnamed perennial or intermittent tributaries in the area. Based on stream protection strategy sampling, Giles Run has good to excellent aquatic habitat conditions, which can be attributed to the low development intensity within its watershed. Mill Branch, which has its headwaters in the study area – two unnamed perennial tributaries flow under Lorton Road – has fair overall site conditions for aquatic habitat and is listed among Virginia's impaired waters under section 303(d) of the Clean Water Act. This is most likely due to the more intensive land uses in its watershed, including a sanitary landfill and sewage treatment plant. Mill Branch's status as an impaired water indicates the strain placed on natural resources in a highly developed urban/suburban area and highlights the need to monitor and protect the health of Laurel Hill's water resources.

The inventory also includes an assessment of rare, threatened and endangered flora and fauna within the study area. This assessment was based solely on reviewing available data and submitting inquiries to the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDNH). VDNH confirmed that no "rare, threatened, or endangered species or associated habitat, unique or exemplary natural communities, significant geological formations, or State listed plant or insect species are know to exist within the project area," nor are there any sensitive habitat or rare natural communities within the area (KCI Technologies 2006, 18).

Figure 38: Proposed realignment of Lorton Road atop of an aerial image showing the existing Lorton Road

Finally, a review of soils present in the study area indicated that there is generally poor infiltration within the study area. Beltsville soils and loamy/gravelly sediments are the two most prevalent soils within the study area. Both are on relatively high slopes – 14-25% and 25% respectively – and have poor infiltration. Only two soils have a hydrological soil group classification suitable for stormwater infiltration: Hyattsville soils and Louisburg soils, both classified as Group B. However, within the study area, the Hyattsville soils have a high water table and are associated with streambeds, while the Louisburg soils have greater that 25% slopes and may have shallow depths to rock. (KCI Technologies 2006, 27)

Given that much of the area has been cleared, compromised by invasive species or otherwise disturbed, the report notes that the Lorton Road improvements present several opportunities for cost-effective environmental restoration.

- Invasive plant species were found in several locations throughout the study area. Removal of undesirable vegetation should be pursued in all of these locations at the earliest possible date to avoid expansion and facilitate the healthy propagation of native plants, as well as the habitat they provide.
- Substantial clearing was found throughout the study area resulting in erosion and scour in multiple locations. Forested buffers along Giles Run and its tributaries have been cleared contributing to impacts such as lack of shade, lack of habitat, increased scour and erosion within buffer areas and reduction of carbon source to streams. Providing for stream buffer re-forestation would be expected to compliment the buffer processes as well as allow for an aesthetically pleasing recreational destination for visitors.
- Historical drainage improvements and infrastructure have resulted in drainage scour and headcuts. Through the use of hydrological modification, holistic drainage improvements and innovative approaches, it is foreseeable that many of these areas could be restored during future construction operations to prevent additional drainage impairments from developing, and potentially reversing, the existing course of degradation. (ibid., 28)

LAUREL HILL PARK GENERAL MANAGEMENT PLAN AND CONCEPTUAL DEVELOPMENT PLAN, JULY 2004

In accordance with Lorton Technical Corrections Act, passed by Congress in October 1998, Fairfax County was required to develop a reuse plan that would "maximize use of land for open space, park land, or recreation." As part of the planning process that has been initiated in response to this requirement, the County contracted with EDAW to develop a general management plan and conceptual development plan. The Laurel Hill Park General Management Plan and Conceptual Development Plan (GMP/CDP) describes Laurel Hill Park's "existing natural and cultural resources, and outlines a conceptual plan for the reuse of portions of the prison property as parkland." The plan is intended to serve as a road map for the park's future, providing guidance for the future planning and development of the park.

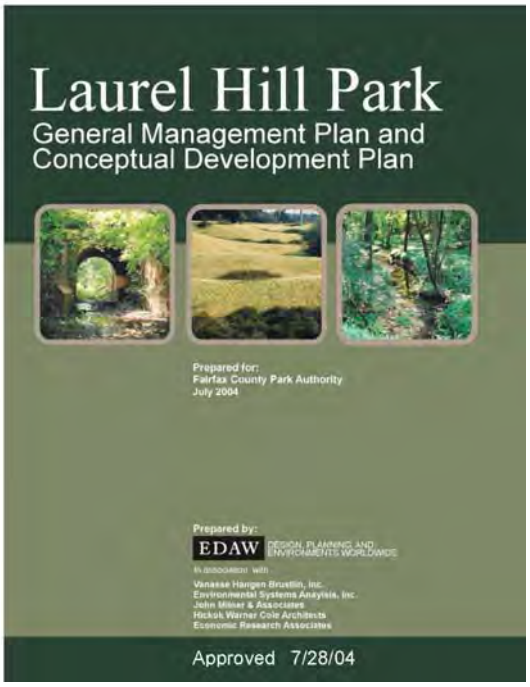


Figure 39: Laurel Hill Park GMP/CDP

A set of principles reflecting the ideals of sustainability and sense of community rooted in the Progressive Era was developed to offer structure to the CDP and provide criteria by which to evaluate future development in the park. The following principles are included.

- Promote sustainability – Sustainability requires striking a balance between protecting the sensitive natural resources on the site and meeting the recreational needs of the public. The county strives to maintain safe and caring communities; practice environmental stewardship; build livable spaces; maintain healthy economies; connect people and places; and create a culture of engagement.
- Interpret the history – The Laurel Hill site has a rich historic and cultural past that should be interpreted through museums, cultural uses, active agriculture, and the interpretation of architecture and former land uses.
- Create a unique character – For the first time in years, the site is publicly accessible and will become a public amenity. The park's unique topography, natural communities, and cultural and historical significance present an opportunity to preserve these resources and integrate recreational and educational components that together will create a special place for public enjoyment.
- Protect natural resources – A priority for Laurel Hill is to preserve open space, woodlands, distinctive agrarian lands and protect wildlife and natural habitats. This can be achieved through sustainable park and facilities design that encourages nature-based recreation and programming.
- Serve the needs of Fairfax County – A Needs Assessment conducted in conjunction with the Conceptual Plan development indicated that there is an extensive need for certain high demand facility types (e.g. athletic fields, picnic areas, trails, etc.) and a need for new types of countywide facilities (i.e. large-scale recreation facilities that did not exist at the time of the last needs assessment conducted in the early 1990s, including playgrounds, skate arks and dog parks). Consequently, in addition to preserving the park's natural resources and embracing its cultural and historical past, the park needs to contribute to the quality of life of the county's residents by providing active recreational facilities.
- Provide access and transportation – Because access to the Laurel Hill site has been restricted for so long, many of the existing roads do not meet current design standards and will not accommodate future transportation needs. Therefore, a review of the existing transportation infrastructure and future transportation needs – that includes consideration of park resources and proposed park uses – is required.
- Develop a greenway and trail network – Laurel Hill Park is ideally situated within the existing county trail network. The Laurel Hill Greenway will be a key component of the Cross County Trail, which will ultimately extend from the Occoquan River to the Potomac River in Great Falls National Park. Trail systems within the park and connections to trail networks outside the park will provide recreational opportunities for local residents and encourage protection of the natural environment. (EDAW 2004, 47-49)

NONTIDAL WETLANDS AND STREAM PERENNIALITY REPORT FOR LAUREL HILL, JULY 2003

In the spring of 2003, Environmental Systems Analysis, Inc. (ESA) was contracted by EDAW to perform a nontidal wetland delineation and stream perenniality analysis on approximately 1,363 acres at the Laurel Hill site. Wetlands were identified according to methodologies outlined in the Corps of Engineers Wetlands Delineation Manual (1987). Differentiation between perennial and intermittent streams was based on the Fairfax County Stormwater Planning Division's Perennial Stream Field Identification Protocol (December 2002), which relies on a combination of hydrological, physical and biological characteristics of a stream. A perennial stream is one that flows year-round, except during periods of extreme drought, whereas an intermittent stream flows for only part of the year when the groundwater table is high.

"Multiple forested wetlands associated with groundwater seeps along stream valleys and a few palustrine emergent wetlands were delineated" (ESA 2003, 6). Within each wetland seep and stream valley, dominant plant species were recorded, including skunk cabbage, sedges and ironwood in the forested wetland seeps; mountain laurel, witch hazel, deertongue grass and greenbrier in the eastern stream valleys; and brambles, smoother alder and horsetail along Giles Run. Large tree species included northern red oak, tulip poplar, beech and Virginia pine. (A complete list is included in Appendix B of ESA's report.) In addition, headcuts, scour and other issues were noted. Finally, several streams were evaluated for perennial flow, and the "end of perenniality was found on most stream systems, though some data points established that the particular stream reach of interest had perennial or intermittent flow" (ESA 2003, 8).

Based on the results of the investigation, further attention to the wetlands and streams on the Laurel Hill site was recommended. At the time of the report completion, ESA recommended that the flagging along the wetland boundaries be surveyed and that a jurisdictional determination from the U.S. Army Corps of Engineers be pursued. Along the site's streams, several headcuts were noted as well as one blowout, all of which require attention. Overall it was determined that there are significant natural resources on the site that are worthy of conservation.


NONTIDAL WETLANDS AND STREAM PERENNIALITY REPORT
FOR
LAUREL HILL
FAIRFAX COUNTY PARK AUTHORITY

Prepared For:
EDAW
601 Prince Street
Alexandria, VA 22314

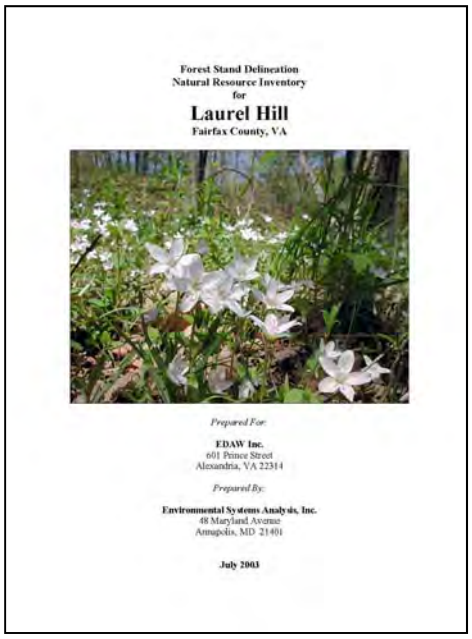
Prepared By:
ENVIRONMENTAL SYSTEMS ANALYSIS, INC.
48 Maryland Avenue, Suite 400
Annapolis, Maryland 21401

July 2003

Figure 40: ESA's 2003 analysis of the hydrologic features at Laurel Hill Park

FOREST STAND DELINEATION NATURAL RESOURCE INVENTORY FOR LAUREL HILL, JULY 2003

Also in 2003, ESA was charged with evaluating existing natural features and characterizing existing forest cover on approximately 2,439 acres at Laurel Hill. Section III of this report includes a summary of the methodology used to conduct the inventory and forest stand delineation. The resulting report was to be used in the development of the 2004 GMP/ CDP to determine the most suitable and practical areas for land conservation.


Forest Stand Delineation
Natural Resource Inventory
for
Laurel Hill
Fairfax County, VA

Prepared For:
EDAW Inc.
601 Prince Street
Alexandria, VA 22314

Prepared By:
Environmental Systems Analysis, Inc.
48 Maryland Avenue
Annapolis, MD 21401

July 2003

Figure 41: Natural resources inventory for Laurel Hill completed by ESA in 2003

Six natural communities were identified on site based on the natural resources inventory and FSD: bottomland forest, mixed oak forest, Mesic Mixed Hardwood Forest, pine-dominated forest, Disturbed Forest/scrub-shrub, field and hedgerows. (Given the change in methodology from 2003 to 2009, these community names differ from those used in the 2009 inventory.) According to the report findings, "these particular natural communities appear where they do primarily because of past land use, topography and hydrology. On the other hand, soils appear to have little influence of the locations of natural communities, except that rock outcrops and shallow soils are seen most often in the mixed oak forest [while] hydric soils usually appear within the bottomland forest community" (ESA 2003, 4).

Based on the results of the inventory and FSD, recommendations were made to assist the Fairfax County Park Authority in making decisions regarding natural resource conservation and potential development at Laurel Hill. North of Silverbrook Road, the large block of undeveloped forest functions as an intact ecosystem, providing habitat for numerous wildlife species. Given its critical ecological value and uniqueness in Northern Virginia, the report recommended that this area be conserved. Likewise, a forest stand in the southern section of Laurel Hill adjacent to Occoquan Regional Park should be conserved for headwater protection as well as its uncommon forest community of hemlock and its steep slopes, both of which make development challenging. Patches of forest toward the middle of the site do not provide the large bock of undisturbed habitat present north of Silverbrook Road; however, the report recommends preserving forest stream buffers and expanding the buffer along portions of Giles Run. A third habitat recommended for conservation is the meadows, generally dominated by both common native and exotic species. The report suggests managing these meadows to increase ecological and structural complexity, which will encourage greater biodiversity.

RE-USE PLAN AND COMPREHENSVE PLAN AMENDMENT, 1999

In February 1995, anticipating the closure of the Lorton prison facility, the Fairfax County Board of Supervisors established the Lower Potomac Land Use CAC to make recommendations for future development potential within the property. After studying existing conditions, potential opportunities and constraints and the surrounding area, the CAC formulated seven redevelopment scenarios. In February 1998, the Board adopted a preferred development scenario, as well as a second option for redevelopment that had a public ownership emphasis, whereby the land was planned "primarily for parks and open space with some land reserved for other public uses such as schools, fire and rescue, cemetery, and roads" (Fairfax County Comprehensive Plan, LP1 Laurel Hill Community Planning Sector, amended through 2007, 24).

In January 1999, after the passage of the 1998 Lorton Technical Corrections Act, the Board of Supervisors reconvened the Lower Potomac Land Use CAC to prepare land use recommendations in keeping with the Technical Corrections Act, which mandated that the County should formulate a reuse plan … "that maximizes open space, parkland, and recreation use of the land" (Fairfax County Comprehensive Plan, LP1 Laurel Hill Community Planning Sector, amended through 2007, 25). In July 1999, the Board of Supervisors adopted the recommendations put forth by the reconvened CAC and incorporated them into the County Comprehensive Plan and the official Re-Use Plan and Comprehensive Plan Amendment.

Site Practices

Fairfax County Park Authority Operations and Procedures

LAUREL HILL GOLF COURSE

Laurel Hill Park is maintained by two separate entities. The Laurel Hill Golf course has its own staff, who mow daily during the growing season. The course was designed to blend into the landscape, with the mowing requirements and frequencies being reduced in the roughs. The roughs have two parts, an inner rough and an outer rough. The design intent was to incorporate native grasses within the roughs. Although not totally successful, the appearance is much the same even without the native component. Golf course staff work cooperatively with other Park Authority staff on the maintenance of the demonstration meadows near the clubhouse and on deer management. The course was certified by the Audubon Cooperative Sanctuary Program for Golf Courses.

AREA 4

The Fairfax County Park Authority divides maintenance and operations duties into areas of Fairfax County. Laurel Hill Park falls within Area 4. Home to over 60 parks, Area 4 staff responsible for the nonathletic field properties are able to allocate no more than 5% of their available labor time to Laurel Hill Park. Removing the golf course's 275 acres leaves a park of 925 acres, which is more than 10-15% of the total acreage within Area 4.

LAUREL HILL PARK

Maintenance responsibilities include mowing (not pastures), minimal thicket and tree clearing, weekly trash removal in Area H, monitoring for illegal dumping, litter pickup, maintaining the multi-use trail system and snow clearance. Staff is also expected to inspect, and repair if possible, signs, site fencing (several sites are fenced off for safety and security reasons), the fishing pier, a playground, a picnic area, bridges, parking areas, trails and buildings. The 20 acres devoted to disc golf is mowed throughout the growing season, as often as two times per month. No mowing has occurred since the Park Authority took control of the site for any of the existing pasture lands in Areas J and K. Some tree removal has been attempted in Area F, outside of this NRMP, but at Laurel Hill. An attempt to cut back the existing thicket at the 'Dead Cow Pit' in Area H was made several years ago by backing a bush hog into the thickets.

The lack of appropriate equipment to perform the needed maintenance tasks on the site compounds the staffing shortage. Equipment on hand is not well suited to the site's demands. The multi-use trail is too narrow for a standard tractor with a bush hog. Instead, a turf mower is used, but the landscape is rugged, making it challenging for the operator and hard on the equipment. Clearing or thinning the fields of trees and thickets requires renting an attachment for the bobcat.

Volunteers are providing donated labor through organized groups. MORE, involved with the design and development of the trail systems of off-road cycle trails in Areas J, K and L, is authorized to use hand tools to supplement the work from the Area 4 mowing crews on the trail system. Plans are to increase the Area 4 mowing cycle to once per month during the growing season from April to September as currently the thickets are overgrowing the trail within the month, creating both a hazard and a source of ticks. MORE is also responsible for maintaining the trail obstacles in Area J. Although there are equestrian users of the multi-use trails, there currently are no organized groups from the equestrian community involved in maintenance activities.

Programming at the park will increase in the future, putting more demands on the Area 4 staff members for maintenance and operations management. Area 4 staff currently mow a trail for hayrides through the park.

A land swap was made between the Park Authority and the Fairfax County Public Schools (FCPS) for construction of a new middle school. As a part of that agreement, the Park Authority has the right to manage the resources in the area surrounding the pond in cooperation with the schools. The anticipated cost to remove the large population of Bradford pears on the site is approximately $100,000. To date, the FCPS has not agreed to allow hand clearing of NNIs on site, or to allow the archery hunting program on site.

Ongoing maintenance efforts include the mowing of the two demonstration meadows adjacent to the golf course. They initially were mowed three times in the first year of installation, then mowed once during midsummer in the following year. Long term, a mow and burn combination is under consideration. For certain, mowing will occur on a swath wider than the demonstration meadows, in an attempt to knock down the knapweed on the adjacent land prior to it setting seed and then reseeding the demonstration sites.

Area 4 staff is also responsible for a number of enforcement issues. Patrolling with an eye towards vandalism at the existing buildings or fences may require filing a police report. Staff also must address ongoing poaching activities. Laurel Hill Park is remote and relatively undeveloped. It suffers from dumping of trash, rubbish and occasionally a human body.

Deer management is an extremely challenging issue for the park. Although not directly overseen by Area 4 staff, deer are hunted through group archery hunts under the Fairfax County Deer Management Program. Groups are selected by lottery. Individuals must apply with a group, no permission to hunt is granted to an individual. The groups selected through the lottery system must provide their own liability insurance. If one of the group members creates a problem, the entire group's eligibility is at risk and the group may lose its permit to hunt. The groups hunt from deer stands with bows, and under the guidance of the Fairfax County deer depopulation permit, good from September through the end of March. This group hunt is the primary tool for deer herd reduction on Laurel Hill. Hunters have taken approximately 100 deer in the last two seasons.

Current Practices in the Profession

The *Treeless Area Technical Manual*, Appendix 6, is a companion document to this report and includes the technical information needed to carry out the recommendations provided in Section V. The focus of the *Treeless Area Technical Manual* is on three types of treeless landscapes in the Mid-Atlantic region: meadow, thickets/shrublands and old fields.

The document draws upon current practices in the profession for halting the natural succession process in meadows, thickets and old fields. Site management practices related to burning, mechanical such as mowing, chemical and animal husbandry. All practices are to be evaluated and adaptive management applied.

The document's introduction raises important policy questions and reasons to embrace proactive management of treeless areas. The remainder of the document is a field tool. The structure is designed to assist park and natural resource staff members determine a decision path for managing and maintaining their treeless areas appropriately given their resources, funding levels and time-frame.

Pilot Meadow Study

Site Selection

One of the overall management plan objectives of the Laurel Hill Management Plan is to educate the public and Park Authority staff on the value and attractiveness of a native warm-season grass meadow landscape. Criteria for an appropriate meadow site for demonstration purposes are listed below.

- **Visibility** – maximize the use of a demonstration meadow as a teaching tool
- **Shape** – adequate width and depth to support a variety of plant materials while minimizing the potential intrusion of trash and bird droppings from adjacent road corridors
- **Size** – minimum size to make maintenance effort worthwhile
- **Land cover** – some thicket/shrubland is of value as habitat enhancement

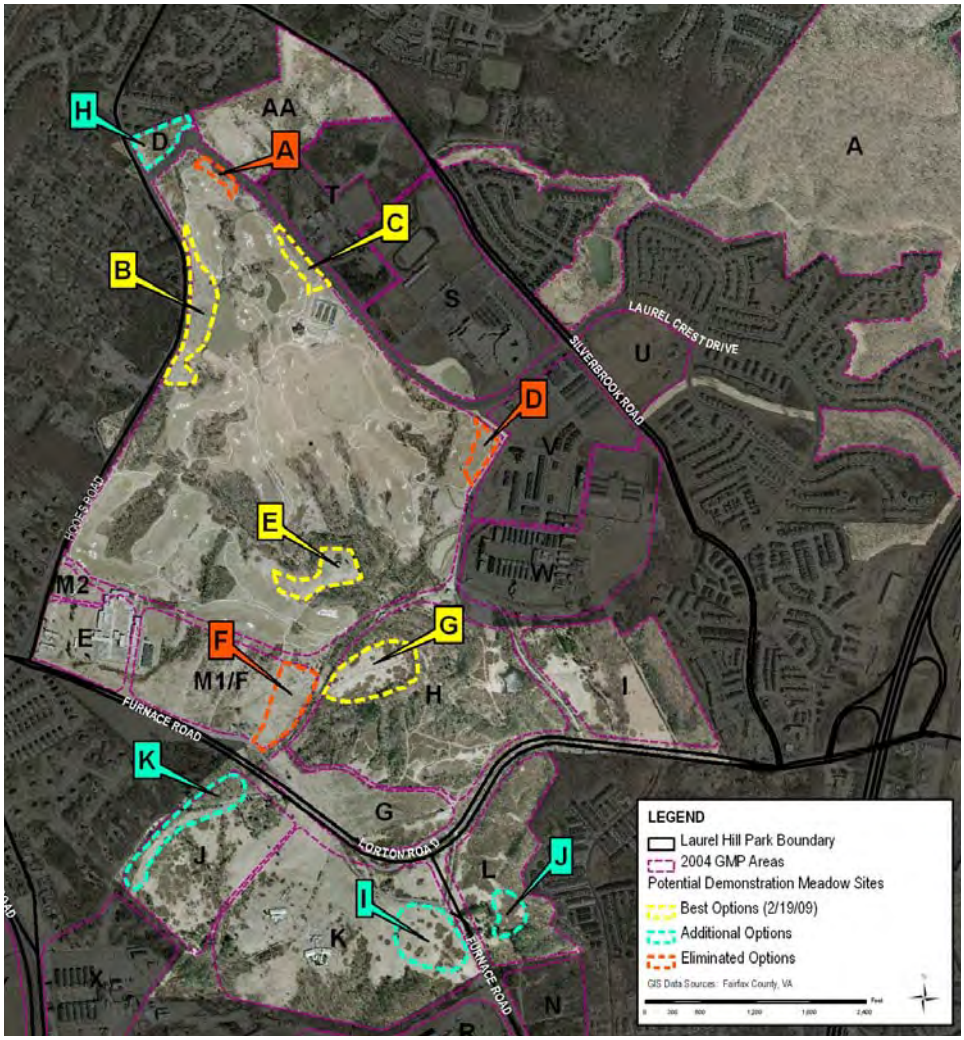


Figure 42: Map of sites A-K considered for the demonstration meadow at Laurel Hill

Existing meadows and thickets on the site were evaluated for conditions worthy of imitation in the implementation of a new meadow. These conditions include the following.

- Balance of seral growth - thickets remaining without tree establishment (woodies) provides ability to manage on a three-year mechanical cycle if burning is not an option
- Presence of native bird populations, with high bird attractant meadow characteristics of existing sites identified by the Audubon Society of Northern Virginia. Laurel Hill is unique to Northern Virginia because of the large number of meadow acres in conjunction with pond, thicket and forest habitats all on a single site.

Two sites were selected from eleven viable sites. None met the ideal size of ten acres. Instead, two smaller sites were selected at the golf course due to the visibility and high profile nature of the golf course and the aesthetic value of an old-field landscape character associated with the golf course roughs.

The shape of each of the selected sites lends itself to a variety of plant materials, one being more linear in shape and the other as broad as it is deep in size. The two sites equal approximately seven acres combined. Gently sloping topography at each site provides interest without a grade change so severe that equipment is unable to access and work the site. In addition, invasive species such as spotted knapweed and lespedeza, while present, did not overwhelm the sites and the tall fescue was manageable by mowing. One of the sites contains broomsedge, a desired species and one that was included in the seed mix for the pilot. Both sites are highly visible to golfers, students at the nearby schools and local residents.

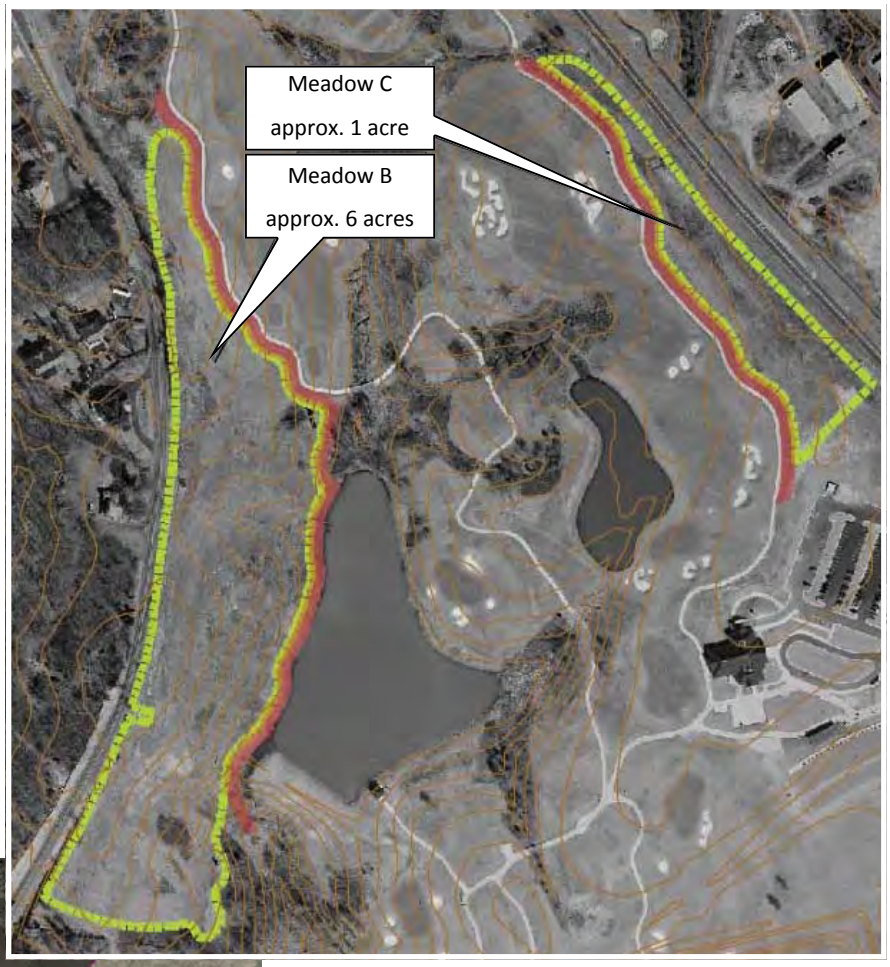


Figure 43: Map of the two sites selected for the demonstration meadow at Laurel Hill Park

Demonstration meadows at these sites will provide wildlife habitat, enhance the golf course aesthetic and provide educational opportunities for the surrounding community.

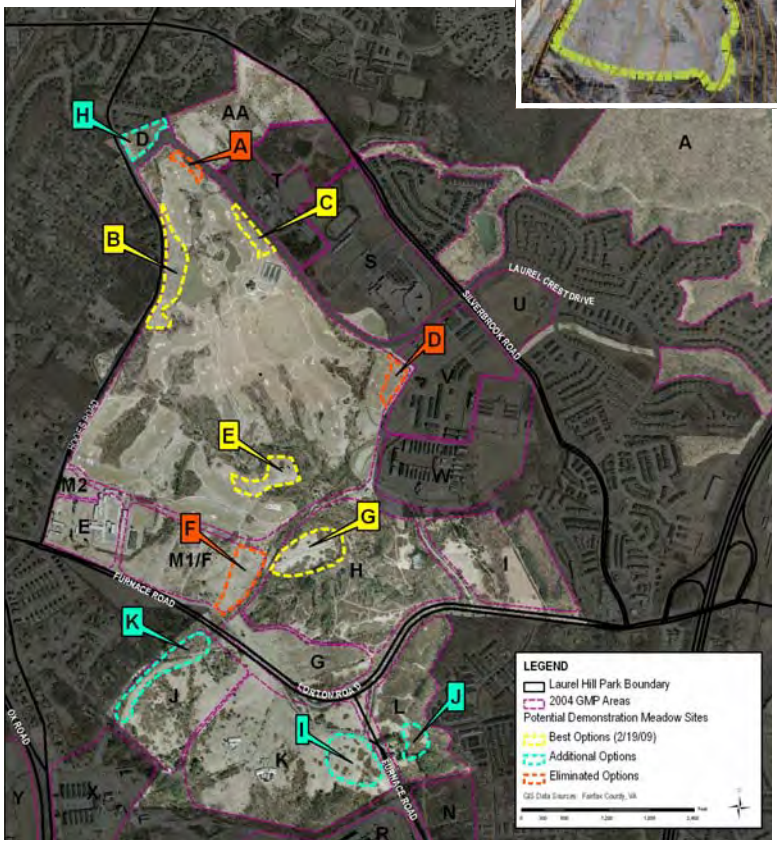


Figure 44: Map of sites A-K considered for the demonstration meadow at Laurel Hill

Site Characteristics and Evaluation

WEST MEADOW: MEADOW B

Figure 45: West meadow, Meadow B

- Approximately six acres
- Good thicket establishment – ideal bird habitat
- Species on-site: broomsedge (aspect dominant), spotted knapweed, lespedeza, deertongue, tall fescue, goldenrod, brambles, mergansers, geese (all by sight), rabbit and deer (scat), killdeer (heard)
- Evidence of self-healing - large broomsedge and goldenrod populations
- Established stand of blackberries, without treatment—will overpower site
- Permanent vehicular access to site at gate off of Hooes Road - driveway for maintenance at spillway
- Prime location within the viewshed of the golf course clubhouse dining room
- Rip rap spillway and erosion matting at low end of pond
- Numerous drainage rills—require fill prior to equipment access to site; numerous rocks need to be removed

Visibility

- Educational value – visible from clubhouse and easy access to bring groups on-site - via golf cart path at low end of slope and dam spillway road
- Aesthetic value - garner support in form of revenue or maintenance in return for long-term enhancement of view from dining room
- Challenge of high visibility location is to manage expectations – view will not immediately (if ever) reflect the catalog picture of a meadow in full flower in California, don't generate false expectations of aesthetics at maturity

Timing

- Three-year minimum growth period to establish warm-season grasses, may enhance this by increasing seeding rate (and costs) from seeding at a rate of 8-12 lbs/acre to a rate of 16-20 lbs/acre

Size

- Optimal size would accommodate 50-foot to 70-foot wide contour strips (two 70-foot strips or possibly three 50-foot strips); minimum of two-acres needed for installation

Land Cover

- Manage these areas to develop thickets with time – won't necessarily preserve those that currently exist
- Attract keystone species - grasshopper sparrow and meadow lark

- Don't underestimate the value of the native seed bank in the ground as indicated by broomsedge
- Consider nectar source of sunflower and add to mix at a suggested rate of 1/2%

Figure 46: East meadow, Meadow C

Management Recommendations

- Combine efforts with East Meadow and use the two sites for the meadow installation effort
- 50- to 70-foot contour strips; 2+ acres of contour strip drill seeding, may be able to emulate the thicket/grass conditions more appropriate to bird habitats the County is looking to manage

EAST MEADOW: MEADOW C

- Approximately one acre
- Site conditions create interspersion with areas for ground creatures and birds to move around, good for winter structure – voles, moles, shrews and mice; the big void and pocket composition provides good mammal habitat
- Some NNIs on site – spotted knapweed and lespedeza (lespedeza provides interesting nectar for some butterflies, similar in wildlife value of autumn olive and bush honeysuckle – wildlife value is a trade-off with invasive characteristics); heavy fescue infestation

Visibility

- Location directly across from new middle school and highly visible from road and golf course clubhouse provides opportunity to use the meadow as an outdoor classroom for educational opportunities and to raise public awareness
- Any improvements must minimize impact on golf course operations and maintain 30' buffer that includes the 5' golf course mow zone between cart path and meadow edge
- Image and management prescription of Site C is dictated by the golf course architect's aesthetics – rough, meadow appearance is desired
- Given the accepted aesthetic of the golf course, cultivate grass-dominant meadow
- To be consistent with architect's aesthetic goals, site will need to be maintained at a one-year meadow age – achieve with an annual mowing (winter likely) and without thicket development

Shape

- Potential contour strip meadow site (currently "rough" for golf course), don't want to cause erosion
- Potential to further define edge of meadow w/tree plantings or signage, would also prevent mowed buffer from gradually widening and encroaching on meadow area

Land Cover

- Grasshopper sparrow and meadowlark considered 'keystone' species
- Addition of a few clumps of cedars and shrubs along fence at Laurel Crest Drive provides protective cover, perch areas, potential nesting sites and escape habitat for birds and mammals (vulnerability to raptors)

Management Recommendations

- Good site for grass dominate-meadow (one-year mow cycle), strip contour drill seeding
- Management prescriptions dictated by golf course architect on this site

Meadow Installation Process

The two meadow sites on the Laurel Hill Golf Course were mowed and sprayed with a non-selective herbicide in early June 2009 using a tanker sprayer with boom wands and again mowed and sprayed in early July 2009. In mid-August, the fields were mowed and work was performed to grade minor erosion gullies (cultivator) and remove larger field rocks (Rock-Hound) as well as remove any/all trash from the fields.

The Laurel Hill Demonstration meadow was drill seeded in late August 2009. Recent rain had softened the soil so the drill seeder (Truax Drill Seeder) was able to penetrate the soil and lay-in seed, rather than the seed bouncing off of a hard, sun-baked surface. The species seed mix was dominated by the use of indiangrass, Virginia wild rye, little bluestem, purpletop and common milkweed and to a much lesser extent deertongue, grass-leaved goldenrod, stiff goldenrod, beggar-tick, smooth blue aster, early goldenrod, Virginia mountain mint and calico aster. The seed was drilled at a homogeneous blend rate of 12-seeds per square foot. After seeding the fields were treated with liquid slurry of mycorrhizal root growth stimulator (Arctech Base Actosol), 20-20-20 water soluble fertilizer and 32-0-6 osmocoated, slow release fertilizer. The seed mix used is consistent with dominance as documented in the Little Bluestem - Indiangrass Piedmont Grassland Association (Virginia Natural Heritage Program).

IMPLEMENTATION

Timing

- Decision to do fall planting in August, with site preparation throughout the summer

Site Preparation

- Measured and staked Chesapeake Bay Resource Protection Area (RPA), 100 feet from water bodies. Due to chemical applications and vegetation disturbance, required to stay outside of RPA to protect surface waters in accordance with county code and state guidelines
- Original intent to spray entire site with glysophate. Unable to completely kill the tall fescue due to land disturbance concerns; however did slow growth down using a 2, 4-D mixture, also known as a three-way herbicide, that included a broadleaf herbicide to kill forbs and a growth inhibitor for the fescue
- Periodic summer mowing to reduce biomass and to knock off inflorescences, i.e. stop grasses from dropping seed heads – sterilize area

Figure 47: Herbicide application on West Meadow in June 2009

Figures 48a-c: Drill seeding East Meadow, August 2009

Installation

- Drill seeded (2 passes, opposite directions) in late August at 15-18 PLS pounds to the acre, included Actosol Base Spray, liquid lime and 18-24-14 (50% SCU) fertilizer application or approved liquid equal
- Cost per acre approximately $4300/acre, with intermittent mowing and mowing preparation provided by others

Establishment Period Maintenance

- Requires frequent mowing due to heavy fescue infestation and inability to spray and kill fescue prior to installation

Long-term Considerations

- Challenge of knapweed blooming adjacent to treated site creates a contact battle over time
- Inability to kill outright the fescue over with a glysophate treatment has led to steady presence of fescue on site—challenge to keep mowing to knock back fescue dominance (mow as soon as the fescue doubles in height from prior cut; then mow periodically to limit fescue growth and to allow new seedlings to grow, stopping when seedlings get to mowing height)

Figure 49: Applying growth stimulator and fertilizer after drill seeding East Meadow

- Overseeding may be necessary – 4 to 7 lbs/acre
- Meadow seeding and development requires two to three-year window for establishment
- Concerns regarding use of fertilization and stormwater runoff—use granular, slow-release, sulfur coated to minimize impact
- Golf course is listed as a Certified Audubon Cooperative Sanctuary; consider application for National Wildlife certification
- Potential to mitigate or soften riprap at storm pond with step pools, make riprap throat more narrow and add rich organic soil to get thermal closure so that when water leaves pond some will infiltrate and cool as well as cool discharge that enters stream; at a minimum fill interstitial spacing in riprap with soil and hydroseed it with perennials and woodies

SECTION V: MANAGEMENT RECOMMENDATIONS

The 2004 *General Management Plan and Conceptual Development Plan* (GMP/CDP) inventoried the resources at Laurel Hill Park and made recommendations for future land uses. The proposed land uses are organized accordingly to management areas that correspond roughly to the land units defined by the *Fairfax County Comprehensive Plan*. The 2004 plan includes 18 management areas identified for public open space. This section of the Laurel Hill Natural Resource Management Plan provides management recommendations for seven of the 18 management areas: A, G, H, I, J, K and L.

In conjunction with the 2004 GMP/CDP, Environmental Systems Analysis, Inc. (ESA) performed a natural resources inventory that identifies and maps the ecological communities at Laurel Hill. The communities identified in Areas A, G, H, I, J, K and L are woodlands including Acidic Oak-Hickory, Disturbed, Floodplain, Mesic Mixed Hardwood, Oak/ Heath and Pine-Hardwood Forests as well as treeless areas classified as meadow and thicket/ shrublands. These communities are described in Section III of this report. Not surprising, the boundaries of these ecological communities do not always correspond to the management area boundaries. Instead, they often stretch across more than one management area. Consequently, the management recommendations included in this section overlap and require coordination among multiple management areas.

Figure 50: Gus Day seeding the East Meadow demonstration meadow at the Laurel Hill Golf Course in August 2009

Although the focus of this report is on Areas A, G, H, I, J, K and L, the management recommendations presented in this section are applicable to other areas in the park. The recommendations have park-wide relevance as the ecological communities in these focus areas can be found elsewhere as can the management challenges that these recommendations seek to address. The recommendations are particularly relevant to other areas that have planned future uses, but lack funding for implementation in the near future.

Management Goal

As stated in Section II, this report seeks to *provide a framework for the management and continuing stewardship of the natural resources, primarily related to treeless areas, in seven site areas (Management Areas) on Laurel Hill in an ecologically appropriate, sustainable and affordable manner, while recognizing that some sites have temporary uses and other uses are to remain in perpetuity, but that all sites are not static and will require active intervention to regain and retain their ecological integrity.*

This goal recognizes that, although organized by GMP/CDP management areas in this report, the management recommendations (1) are to be applied over time frames that are constantly changing and (2) must address ecological communities that disregard management area boundaries.

Timing

While the 2004 GMP/CDP proposes uses for each management area, the CDP is in various stages of implementation across the park. Some of the areas will remain in the use as they were when surveyed; therefore, they require management strategies aimed at maintaining or improving their condition. Others will be redeveloped at some unknown time in the future, based on funding and resources available; consequently, these areas present a set of interim management needs as well as long-term needs. Still other areas are under development currently, and resource management strategies need to incorporate management during implementation as well as management once active human use of the site begins.

Management Area Boundaries

As evident in the mapping of the ecological communities in Section III, contiguous swaths of treeless areas cover Management Areas G, H, I, J, K and L. The areas have smaller forested areas mainly along riparian corridors, but the primary focus of management recommendations for these areas is the meadow and thicket/shrubland communities and their management over time. In particular, Management Areas G and H, and south of Lorton Road, Areas J, K and L provide an opportunity for the development of strategies for managing treeless areas across management area boundaries. These areas should be considered alone but also together. In aggregate, these meadows and thicket/shrublands form a mosaic at the heart of Laurel Hill Park. These communities will work in tandem, changing slowly back and forth over time in terms of location and relative abundance. Together they create a habitat that is rare in Northern Virginia, but highly valuable for the native plant and animal species it supports.

Management Area A is unique in that it is expected to remain primarily as it is currently: a large, undisturbed forest block, somewhat isolated from the other management areas. Recommendations for this area focus on maintaining and improving the health of the forest and limiting human activity. These recommendations can be implemented now and on an ongoing basis over the long-term. They will not require coordination with other management areas.

Management Emphasis

The focus of management efforts at Laurel Hill is two-fold: (1) developing and maintaining the meadow-thicket/ shrubland mosaic at the heart of the park and (2) maintaining the health of the forest block in Management Area A.

As described under *Management Goals* above, Management Areas G, H, I, J, K and L contain a rich mosaic of meadow and thicket/shrubland communities at the heart of Laurel Hill Park. These communities are at varying stages of succession, creating diverse habitats that support numerous native animal and plant species. Given their proximity, the ecological communities in these areas will benefit from coordinated management that addresses the mosaic as a whole, allowing it to shift and change in composition over time. Emphasis should be placed on developing and managing this mosaic in the center of the park.

A second focus should be maintaining and improving the health of the forest block in Management Area A. The hardwood forest in Area A has good forest structure and has the potential to be restored to a healthy forest condition. The successful management and control of human access is essential to improving the health of this forest stand.

Management Challenges

The task of cultivating the meadow-thicket/shrubland mosaic and preserving forest lands at Laurel Hill Park is complicated by numerous management challenges. Just as the ecological communities do not adhere to management area boundaries, these challenges stretch across the entire park. Four challenges pose the biggest threats to the park as a whole: human access and land disturbance; non-native invasive plant species (NNIs); excessive deer populations and stormwater management. The management recommendations provided in Section V seek to address these challenges more specifically by management area and ecological community.

Human Access and Land Disturbance

Laurel Hill is a county park, with regional assets. The park will attract many visitors looking for public open space in which to recreate, taking advantage of the park's trails, informal playing fields, community parks and natural areas. High visitation, however, can put pressure on the natural resources at Laurel Hill. Consequently, as people are encouraged to use certain portions of the park, there are areas where the park could benefit from limited human access.

In addition, park maintenance and land development that removes vegetation and disturbs soils can disrupt vegetative communities, promote the spread of NNIs and require lengthy and expensive restoration. Minimizing these negative impacts will be critical to maintaining the health of the plant and animal communities in the park.

Non-native Invasive Plant Species (NNIs)

NNIs need to be monitored and controlled across the entire park. Utility corridors and stream valleys are particularly vulnerable to the spread of NNIs, and once they are established, NNIs can spread quickly. Kudzu and callery pears, in particular, have spread quickly over the last two years, and most of the former pasture areas are completely dominated by tall fescue. Given the ability of NNIs to crowd out native species, it is imperative that they be addressed early.

Excessive Deer Populations

Recent observations indicate that the deer population at Laurel Hill is well over the ecological carrying capacity of the site. Deer browsing can be detrimental to a community, but at this scale – at five times the ecological carrying capacity of the site – browsing can be devastating. Deer prefer to feed on young tree saplings, and large populations can wipe out an understory, severely impeding tree regeneration. Deer browse can eliminate native groundcovers and shrub layers, destroying habitat for birds and other wildlife. In addition, because they selectively feed on native species, browse adversely affects the diversity of native groundcover grasses, sedges, rushes and forbs. This creates an environment favorable to NNIs, which, in areas of over-browse, are able to establish themselves and thrive. Furthermore, deer encourage the spread of NNIs by carrying and redistributing their seeds.

Controlling the deer population would reduce the spread of NNIs and give native species the chance to recover. In addition, controlling the deer population would allow trees to regenerate, which would be particularly beneficial along streams to increase shade and expand riparian forest buffers.

Stormwater Management

As development continues to occur around Laurel Hill Park, stormwater runoff becomes a greater problem for the site and its streams. Increased volumes and rates of runoff are responsible for the erosion of stream valleys and non-point source pollution is degrading water quality. Protecting the park's water resources will require partnering with the Fairfax County Department of Public Works and Environmental Services (DPWES) to promote stormwater best management practices and encouraging nearby homeowner associations to adopt these practices.

Organization

Each management area is introduced with a brief site description, a summary of current and planned site activities and a time estimate for project implementation. A summary statement of the management recommendations is followed by an area-specific management goal, a set of objectives and corresponding action items aimed at achieving that goal. While many of the objectives and action items are appropriate for more than one management area, the application may vary slightly from one area to the next. Additional text pertaining to each action item provides further clarification as to the nuances of that particular management area. Appendix 6, the management recommendation prioritization table, summarizes these action items by priority ranking, clearly indicating the timeframe according to which each strategy should be implemented.

Each management area at Laurel Hill Park presents challenges and opportunities for resource managers. The recommendations presented here seek to manage for the health of the critical resources in each of theses areas, considering conditions in isolation as well as in conjunction with neighboring management areas; the temporal nature of these conditions; and the varying stages of CDP implementation. The *Treeless Area Technical Manual*, Appendix 6 of this report, presents the procedures for implementing these recommendations.

AREA A: RESOURCE MANAGEMENT AREA

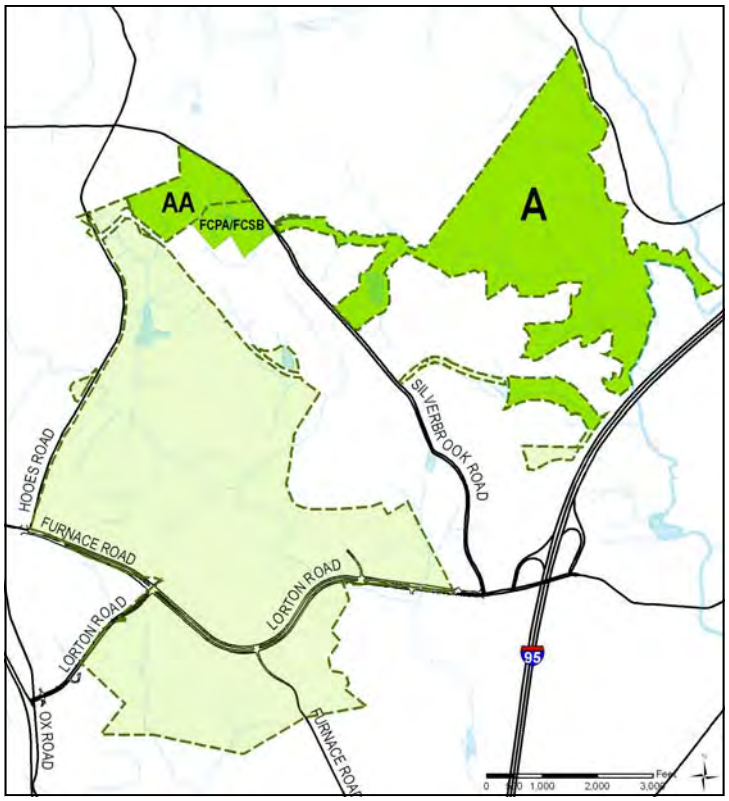


Figure 51: Location of Management Area A within Laurel Hill

Site Influences

Natural Site Conditions

In the northwestern corner of the Laurel Hill Park, Area A – a 334-acre site, of which 316 acres is owned by the Park Authority and 18 acres is jointly managed by the Park Authority and the Fairfax County School Board – represents the largest, contiguous woodland within Laurel Hill Park (Figure 51). Large blocks of undeveloped forest land are rare in the Northern Virginia region due to population growth and suburban expansion. The block of forest land at Laurel Hill is large enough to be defined as interior forest. Although dependent upon the specific needs of individual plant species, a working definition for interior forest is a forest block that is greater than 60 acres with forested lands more than 300 feet from a forest edge. Interior forests typically have less light, fewer invasive species and "tighter" nutrient cycling than edge forests, providing an intact ecosystem and habitat for wildlife that is not adapted to urban environments. Ovenbirds, wood thrush and red-eyed vireo are present in this forest and are indicators of interior forest. The interior forest in Management Area A has good structure and is highly restorable to a healthy forest condition. Restoration of this ecological community should be a priority for Area A.

Figure 52: Interior forest in Management Area A

The forest land in Area A connects to the South Run Stream Valley Park. This connectivity to other large blocks of forest allows animals and certain plant species to disperse; thereby maintaining the resiliency of the ecosystem to disturbances and contributing to regional biological community stability.

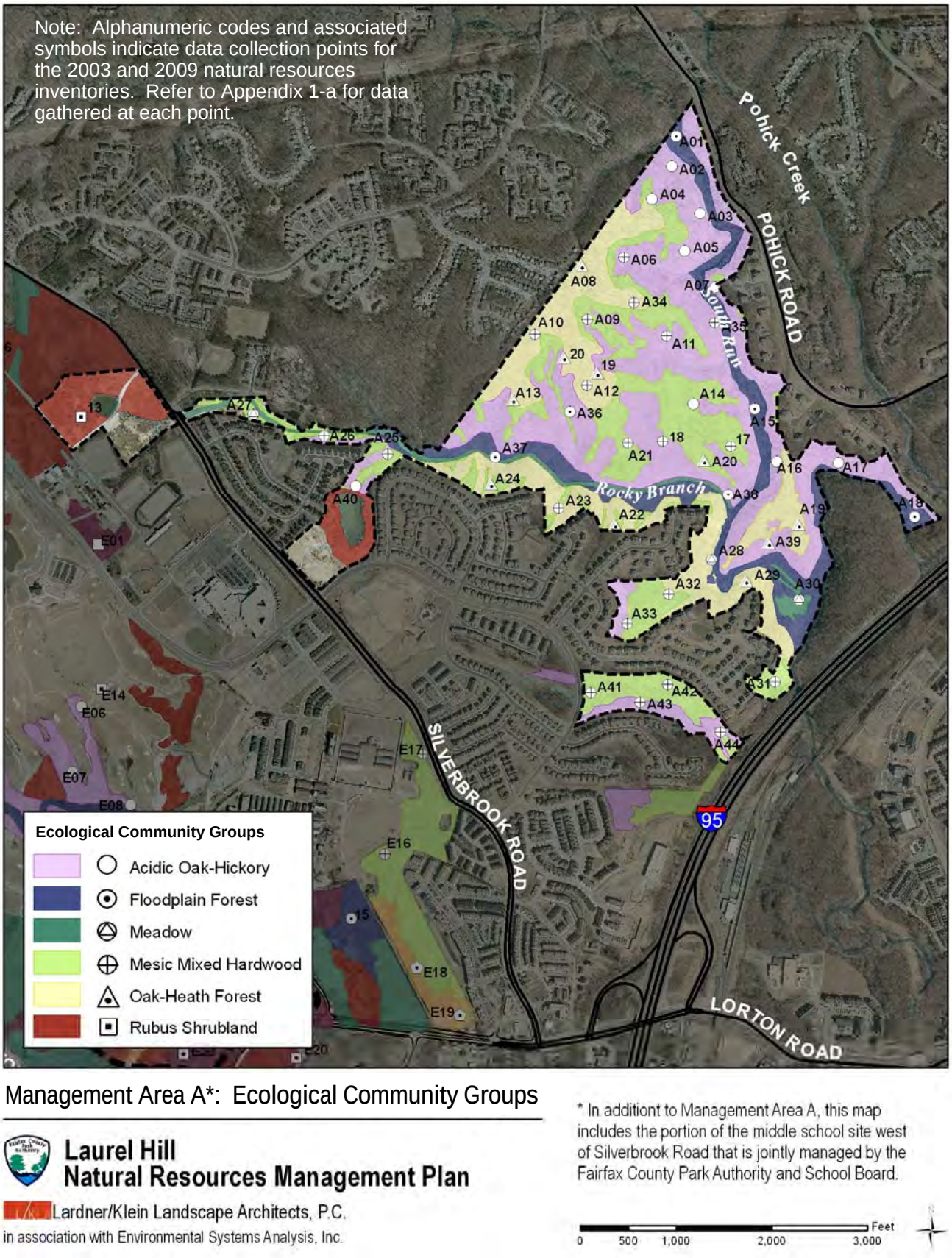


Figure 53: Map of ecological community groups found in Management Area A

South of South Run Stream Valley Park the stream flows roughly north/south along the eastern edge of Area A. Rocky Branch flows roughly east/west along the southern edge. The two streams converge in the southeast corner of the management area. There are also two ponds of significant ecological value, one of which is located in a branch of Area A that extends between two residential neighborhoods east of Silverbrook Road opposite the South County Secondary School. The second is just outside of Area A, west of Silverbrook Road at the middle school site on property jointly managed by the Fairfax County Park Authority and School Board.

As shown in Figure 53, the ecological community types for Area A are primarily forest lands (acidic oak-hickory floodplain forest; mesic mixed hardwood; and oak-heath forest). A small meadow area is located in the southeastern corner of Area A. Thicket/shrublands surround each of the ponds in the management area's western fingers.

There is a low non-native invasive plant occurrence in the core of Area A. The site is heavily impacted by deer, with almost no ground cover or regeneration due to extensive deer browse.

Planned Site Activities

The northern portion of Laurel Hill Park, Area A, is set aside for natural resource management and is dedicated to natural and wildlife habitat protection and historical interpretation. The Fairfax County Comprehensive Plan calls for the protection of Environmental Quality Corridors (EQCs) within the Area, which correspond with the Chesapeake Bay Resource Protection Areas (RPAs) for Pohick Creek, South Run and Rocky Branch. The Comprehensive Plan also refers to the rest of the forest block as part of a "Resource-based Park." The 2004 *Laurel Hill Park General Management Plan and Conceptual Development Plan* (GMP/CDP) provides for the preservation of the dense woodland character of this section of parkland by designating it a Resource Management Area. In addition, the plan suggests that there is an opportunity for environmental education and stewardship through interpretative trail signage and markers. A future trail is proposed along the existing sewer line alignment. The GMP/CDP also calls for locating a kiosk on the perimeter for interpretation of the natural resources.

Current Site Activities

This part of Laurel Hill Park does not have intensive human activity. The Cross County Trail (CCT) – known as the Laurel Hill Greenway within the park – bisects the eastern side of Area A and is a paved trail along this stretch. A

Figure 54: Paved trail in Management Area A

Figure 55: Interior forest in Management Area A

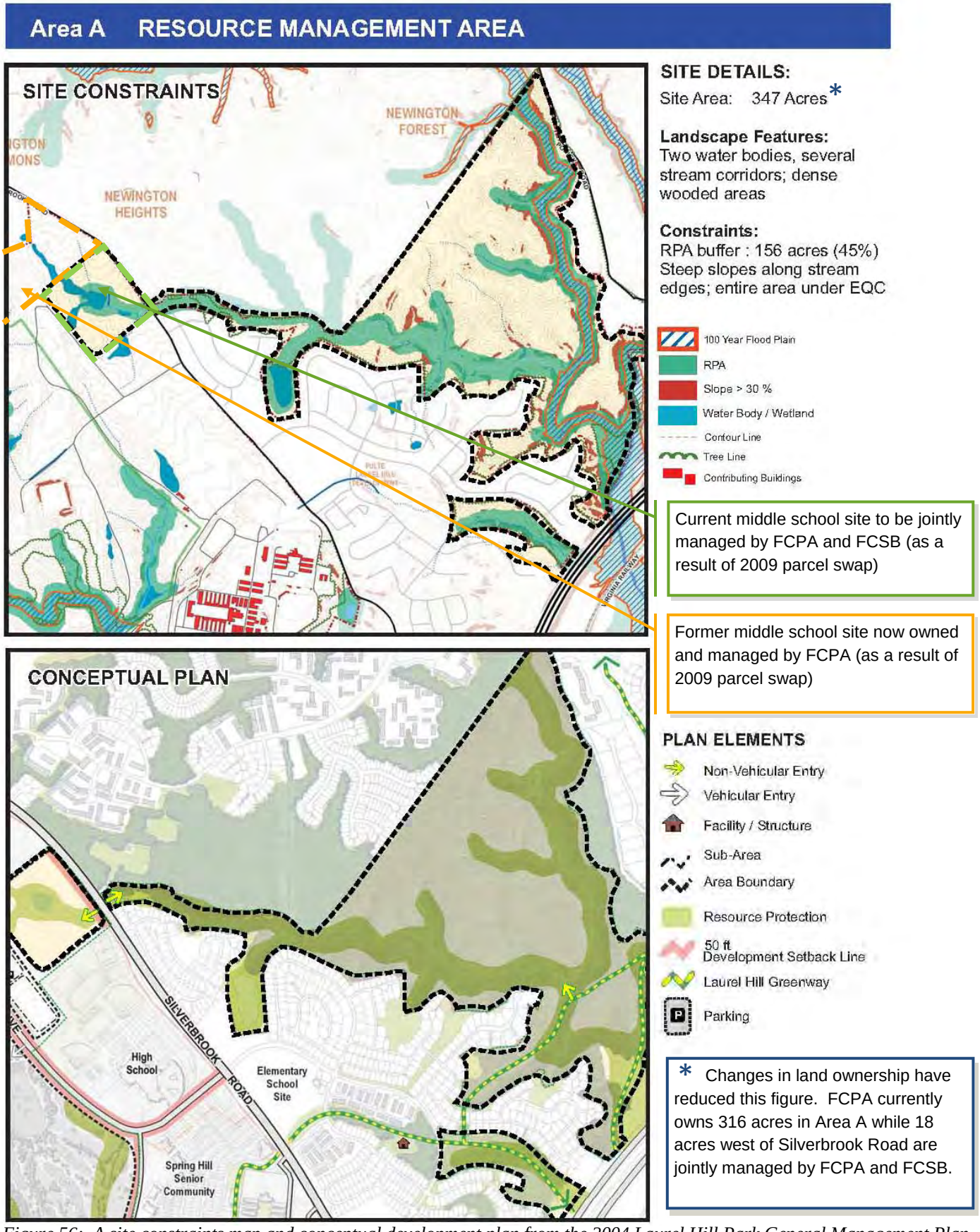


Figure 56: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

Washington Suburban Sanitary Commission (WSSC) sanitary sewer line follows Branch Run across the southern portion of the forest block. West of the forest, the South County Middle School is under construction north of the South County Secondary School. This 18-acre site was formerly parkland but is now owned by the Fairfax County School Board. In exchange for giving up the 18 acres, the Park Authority received the parcel immediately to the northwest of the middle school site, which had been the original middle school site. The current school site was placed under a conservation easement prior to School Board ownership and will be managed jointly by the Park Authority and the School Board, so that the Park Authority can access the pond for nature-related programs, provide maintenance, monitor habitat quality in the area and perform non -native invasive species management. (Refer to Appendix 4.) The pond at the middle school site is a productive birding site, and along with the pond on the other side of Silverbrook Road, provides quality habitat. Originally part of Management Area A in the 2004 GMP/CDP, the middle school site was included in both the 2003 and 2009 surveys.

Anticipated Timeline for Planned Activities Implementation

No funding has been designated for the development of kiosk. At this time, the kiosk is proposed to be relocated to Area H or I.

Visitor/Nature Center

The 2004 GMP/CDP proposes a "nature center for the interpretation of the natural resources" in Area A, as well as a visitor/nature center in Area H, which would provide "site orientation and natural and cultural resource interpretation."

Given the intent to protect the forest resources in Area A and limit human access to the site, the proposed center will not be located there. Similarly, the visitor/nature center proposed for Area H will likely be moved to Area I. This will be a small building for site orientation and interpretation.

Currently, a recently installed kiosk/ seating area near the parking lot at the northern edge of Area H provides site orientation and interpretation for Giles Run Meadow.

LHNRMP Recommendations

Given the high quality of the interior forest lands and minimal amount of human activity on the site, the Resource Management Plan recommends limiting any trail or interpretive activities to the perimeter of the site, keeping Area A relatively trail-less. (However, the Laurel Hill Trails Plan does propose a trail along the sewer line alignment. At this time, no trail has been constructed and the proposal to do so should be revisited before any plans are implemented.) A nature center may be more appropriately located near the pond in conjunction with the middle school or in Area H, neither site within the boundaries of Area A. Proper management strategies will limit human activity in the core area, prevent the spread of non-native invasive plant species (NNIs) and reduce the deer herd.

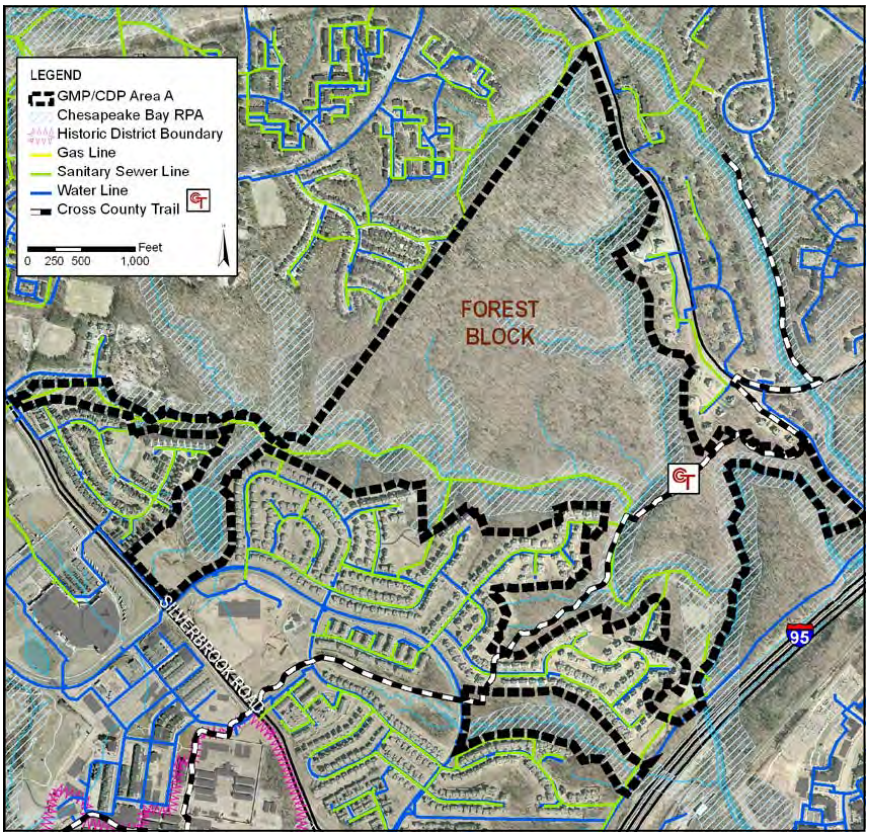


Figure 57: Existing conditions in Management Area A

Management Goal for Area A

Preserve and maintain the core of Area A as a healthy interior forest with limited human access. Encourage the development of a meadow/thicket mosaic in meadows in the Area's extremities.

Management Objectives

OBJECTIVE 1

Regularly monitor the current conditions of the natural resources within the area.

Natural environments are changing constantly, and with the increasing development and urbanization in the Washington, D.C. metropolitan area, Laurel Hill Park faces additional pressures that cause especially rapid change. In order to best manage the resources at the park, Park Authority staff need to determine the status of these resources, what changes are occurring and the impact of those changes. This requires regular, systematic monitoring that will enable staff to identify and address problems in the short-term and track more subtle changes and trends to be addressed over the long-term.

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks to qualitatively monitor the health of the large forest block, streams and smaller meadow and thicket/shrubland areas. If problem areas are identified, increase field walks to quarterly.***

  Field walks are one of the ways the National Park Service monitors its units, and this technique can easily be applied to Laurel Hill Park. Park Authority natural resources management staff should walk the property boundaries, trails, utility corridors and streams two times a year noting all observations. If problems are noted, quarterly walks of problem areas should be completed. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

  The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the following concerns.

  Trails

  - Unauthorized trails
  - Vegetation overhanging trails
  - Trail markers that are missing or in need of repair

  Abutting Properties

  - Property intrusions, mowing, clearing trails
  - Property markers that are missing or in need of repair
  - Dumping

  Streams

  - Down trees on trails or blow downs (i.e. fallen trees) in streams
  - Stream blow-outs or head cuts
  - Bad odors or gray water

General

- Non-native invasive species, particularly their spread into the forest block
- Popped manhole covers – walk the sewer line. If a manhole cover has popped once, it is likely to do so again. Such covers should be monitored because they are indicative of a pressure point in the sewer line.
- Log jams in or failure of pond dam and intake
- Defoliation in trees or other signs of tree disease
- Indications of damage from wildlife
- Erosion on steep slopes

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and maintenance plans developed to address these problems.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  A BioBlitz is typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area. This event could be organized by a graduate student or intern and performed with the help of Park Authority staff, community members, students and other volunteers.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Control NNIs, particularly in the interior forest.

Given the significant ecological value of the forest block in Area A and the serious threat posed by NNIs, controlling such species should be a priority in this Area. The sewer line corridor, stream valleys and trails are particularly vulnerable to the invasion of NNIs. Particular attention should be paid to the utility corridor that runs through the southern portion of the forest and the stream valleys that run across the southern and down the eastern edges of the Area. Once NNIs establish in these corridors they can quickly and easily invade the adjacent forest; therefore, it is important to address NNI threats immediately.

ACTION ITEMS

- ***Conduct a Level One* Non-Native Invasive Plant Site Prioritization *as described in Appendices E and H of the* Fairfax County Non-Native Invasive Plant Assessment.**

Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment.* A more comprehensive follow up to that initial assessment should be completed for the forested lands in Area A. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control Strategies* of the *Fairfax County Non-Native Invasive Plant Assessment*.

- ***Address NNIs in the utility corridor and stream valleys first so as to prevent invasion into the adjacent forest.***

  Because these areas are particularly vulnerable and serve as gateways to the rest of the forest block, they should be treated first. The Park Authority should work with the utility company to treat with herbicides and then overseed the corridor with native warm-season grasses. In the riparian corridors, priority tree planting should be performed to shade out sun-loving NNIs and provide thermal closure to the stream. Tree planting is an ideal activity for volunteers.

- ***Remove callery pears in meadows.***

OBJECTIVE 3

Monitor for forest insects and disease.

During one of their site visits to Laurel Hill Park, ESA staff observed teams spraying for cutworm (*Agrotis, Amathes, Peridroma, Prodenia* spp.). At that time, cutworms had already chewed through 30% or more of the green leaves on oaks and other hardwoods. Park Authority staff should also look for Emerald Ash Borer (*Agrilus planipennis*). Although eradicated in 2002, the borer reappeared in 2008 and continues to plague the ash population in Fairfax County. These insects, as well as other insects and disease, pose a threat to the forest in Area A. Populations need to be monitored and controlled to ensure the health of the forest.

Additional threats to the forest in Area A include

Insects

- Asian Gypsy Moth (AGM) *(Lymantria dispar)*
- Asian Longhorned Beetle *(Anoplophora glabripennis)*

Diseases

- Beech Bark Disease *(Neonectria coccinea)*
- Dogwood Anthracnose *(Discula destructiva)*
- Dutch Elm Disease *(Ophiostoma ulmi)*
- Elm Phloem Necrosis
- Oak Decline
- Oak Wilt *(Ceratocystic fagacearum)*

ACTION ITEMS

- ***Look for and record evidence of forest insects and disease as part of a semi-annual field walk by Park Authority natural resources management staff.***

  During their semi-annual walks, staff should record the locations of trees showing evidence of damage from insects or disease and create a work order for treatment.

- ***Treat for cutworm and other threatening insects or diseases.***

  The Park Authority should continue to spray for cutworm and treat for other pests as necessary.

OBJECTIVE 4

Manage the meadow community in the southeast corner of Area A as a meadow/thicket habitat to enrich the value of Area A, reducing the number of trees to 25 to 50 trees per acre within this community.

Stopping or stalling succession is of primary importance in the management of the treeless areas. In Area A, a treeless area is located in the southeastern corner of the area. The trees growing in these thicket/shrublands and meadows need to be removed, reducing the total number of trees to 25 to 50 per acre. Retain trees that provide wildlife habitat support through the provision of fruit – both hard mast, such as acorns from oak trees, and soft mast, such as apples and cherries – or cover.

ACTION ITEMS

- ***Identify and remove unhealthy, non-native invasive or otherwise undesirable trees, approximately two-thirds of trees in non-forested portions of Area A.***

  Approximately two-thirds of the trees in meadows should be removed. Diseased trees or non-native invasive trees such as tree-of-heaven should be priorities for removal. These should be removed using one of the following methods: girdling; frilling; felling and treating the stump with herbicide; or, for trees less than four to six inches in diameter, performing a basal bark spray, whereby the lower 12 to 18 inches of the trunk are sprayed with an herbicide.

- ***After removing trees, mow the site and continue on a regular mowing cycle.***

  Mow the meadow in the southeastern corner of Area A at least once every three years. A three-year mowing cycle permits some woody growth and for blackberry fruiting but frequent enough to halt the natural succession pattern.

  Mow thicket areas less frequently, on a three- to five-year cycle. Only one-third of the thicket stand should be mown at a time to retain its wildlife value.

OBJECTIVE 5

Monitor and assess the health of Silver Brook, Rocky Branch and South Run streams in cooperation with Fairfax County Department of Public Works and Environmental Services (DPWES).

With increasing urbanization surrounding the park, poorly managed stormwater will continue to degrade Area A and its habitat. It is likely that the streams may continue to down cut and widen their channels without intervention given the population growth predicted for the area.

In order to protect these resources, the Park Authority should partner with DPWES in promoting the use of best management practices that include stormwater controls to improve water quality on site and address water quality issues related to park uses.

ACTION ITEMS

- ***Look for evidence of stream bank degradation as part of a semi-annual field walk by Park Authority natural resources management staff.***

  Park Authority staff should evaluate stream health in the semi-annual field walks. If problems are encountered, additional quarterly walks may be necessary for monitoring. A separate, more complex, stream evaluation may be necessary if the stream observed is in particularly poor condition. Head cuts, failing banks, exposed utilities and undercut roadways should be noted. The location of blow downs should be noted, as excessive woody debris – which in moderation can enhance stream health – has the potential dam waterways, leading to further erosion and stream bank degradation. Finally, human activity, such as illegal dumping, should be recorded.

  Initial monitoring efforts should include the installation of cross-sectional data stations to create a baseline of knowledge related to assessing future in-stream decline. Rebar installed at head cuts and in gullies can be used to measure stream migration. Once installed, these tools can be checked during the field walks.

Figure 58: Undercutting along Rocky Branch in Area A

Figure 59: Exposed culvert in Area A

- ***Coordinate with Fairfax County DPWES's Stormwater Branch and work with neighboring home owners associations (HOAs) to strengthen stormwater management programs and promote best management practices.***

  The Fairfax County DPWES has been conducting watershed studies and devising a watershed management plan for each of the County's watersheds. The *Lower Occoquan Watershed Management Plan* was adopted by the Board of Supervisors on January 25, 2011. (The plan is available on the Fairfax County web site at http://www.fairfaxcounty.gov/dpwes/watersheds/loweroccoquan_docs.htm). The plan identifies areas of concern within the watershed and proposes strategies to address these concerns. Park Authority staff should work with the DPWES and refer to the watershed management plan for best management practices to address problems caused by stormwater runoff in Laurel Hill Park.

In addition, the Park Authority should evaluate stormwater management practices in upstream neighborhoods to determine whether they are sufficient to control water volume and quality prior to the water entering the Park. Park Authority staff may need to work with HOAs and encourage them to utilize Low Impact Development (LID) techniques to manage runoff in their neighborhoods. To be most effective, these techniques should be implemented first at the top of the stream valley, with additional improvements added downstream over time. In Management Area A, particular attention should be paid to the pond east of Silverbrook Road, which is sandwiched between two residential neighborhoods, but has good habitat quality.

Finally, the Park Authority should work with DPWES and the Fairfax County School Board to insure that the second pond, located on the South County Middle School site is protected during school construction and thereafter. Already of concern are the spillway and intake pipe for the pond. The Park Authority should ensure that the area is monitored and should coordinate management activities with the Fairfax County School Board.

- ***Prioritize any resource threats, concerns and hazards noted during the field walks and identified in the watershed studies and develop action plans for problems found in streams.***

  Once concerns have been identified and prioritized, they should be addressed using the restoration strategies and stormwater best management practices outlined in the *Lower Occoquan Watershed Management Plan*.

- ***Organize volunteer tree planting to provide shade for streams.***

  Increased water temperatures can be detrimental to macroinvertebrates, fish and other aquatic species. Tree shade is essential to regulating temperatures and in turn, maintaining stream health. Planting trees is an activity that can be coordinated among volunteers and nonprofit groups.

OBJECTIVE 6

Monitor human activity and address human intrusions, such as illegal dumping, boundary encroachment and unwanted, informal trail and bicycle access that would adversely affect the natural resources.

Balancing the interplay between park users and natural resources is a concern throughout the park. Area A is the largest contiguous area of the seven studied in this document. The forest has good structure and is highly restorable to a healthy forest condition. There is little human activity in the Area. The interplay between park users and the natural resources should be minimal. Limiting human activity and managing the little activity that does occur with in the forest block is necessary to ensure that the forest's health continues to improve.

ACTION ITEMS

- ***Install monuments along forest edge, near houses.***

  Area A is bounded by neighborhood subdivisions on all but short stretches of its perimeter. Being the 'backyard' to suburban neighbors is a good way to grow a constituency but also leaves the edge vulnerable to intended and unintended encroachment. Forested lands may be used as dump sites for yard or construction debris, as additional space for personal gardens, or as a site for illegal structures serving the adjacent property owner, such as storage sheds or gazebos.

The property boundary should be well marked with point-on-line witness markers in order to prevent such encroachment. Monuments installed along the property boundaries will educate neighbors as to the location of the boundary and assist park managers in determining whether encroachments are taking place. If illegal dumping or encroachments occur, Park Authority staff should contact both the adjacent neighborhood association and the individual property owner to ask that they be a good neighbor and stop the illegal activity.

- ***Plan new trail alignments primarily along the periphery, keeping Area A largely trail-less.***

  While it is important to limit human activity in the forest, the hope remains that visitors to the Park will be able to enjoy the forest habitat and appreciate its ecological value. To this end, trails should be constructed only along the periphery of the forest block, along the utility corridor or in the stream valley. Providing some officially sanctioned trails will deter park users and neighbors from creating their own "desire paths" – unplanned trails that can lead to additional corridors for the conveyance of undesired plant material and litter, and, if poorly sited, are subject to erosion. Planned trails should include interpretive panels to highlight significant ecological features. However, these trails should not extend into the core of the forest block.

- ***Erect clear signage listing appropriate behavior within park bounds.***

  To further discourage unplanned trails, illegal dumping and other activities detrimental to the health of the forest, signs should be posted along the park boundary and at trail heads and intersections listing appropriate activities within the Park.

  Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

- ***Review site plans for planned middle school to determine what impact, if any, it will have on the site, particularly on the pond quality habitat that surrounds it.***

  A new school offers many opportunities for exposing young people to the natural environment; however, as is the case where residential subdivisions border the Park, such interplay requires management. The Park Authority should work with the Fairfax County School Board to educate students about the vulnerability of the forest and thicket/shrubland communities and teach them appropriate behavior. The *Fairfax County Comprehensive Plan* and 2004 GMP/CDP call for a natural resources interpretive center in Management Area A. However, the middle school site may be more appropriate location for such a facility, given the middle and secondary school students in the immediate vicinity. In addition, a nature center would provide a closely monitored environment in which to expose young people to the rich habitat at the pond and in the surrounding thicket/shrublands.

  Note: This report recommends Management Area H or I as a second potential location for a nature center.

- ***Ensure that the middle school site is monitored and management activities are conducted in collaboration with the Fairfax County School Board.***

  In anticipation of completion of the South County Middle School – expected in 2012 – the Park Authority should work with the School Board to develop management practices and guidelines for student access to and use of the jointly managed site.

OBJECTIVE 7

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impacts of various management techniques.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work, develop protocols and encourage volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  With the BioBlitz serving as a baseline, subsequent wildlife studies should be conducted to determine population or behavioral changes and track trends, particularly as the management objectives listed above are carried out.

  Like the Northern Virginia Bird Survey (NVBS) conducted by the Audubon Society of Northern Virginia, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Monitor and reduce deer populations, and fully implement the County's deer management strategy.***

  Groundcovers and low growing shrubs in the forest in Area A show evidence of deer browsing. Survey plot data collected in Area A by Fairfax County Park Authority staff in the summer of 2010 indicate severe browse by white-tailed deer, indicated by a complete removal of the understory in most areas, elimination of all plants below five feet in most areas and no forest regeneration. These browse levels are consistent with deer populations of at least 100 deer per square mile. This is approximately five times the ecological carrying capacity of 15 to 20 deer per square mile.

  Deer browsing can be devastating to a forest. Deer prefer to feed on young tree saplings, and large populations can wipe out an understory, severely impeding tree regeneration. Deer browse can eliminate native groundcovers and shrub layers, destroying habitat for birds and other wildlife. In addition, because they selectively feed on native species, browse adversely affects the diversity of native groundcover grasses, sedges, rushes and forbs. This creates an environment favorable to non-native invasive species, which, in areas of over-browse, are able to establish themselves and thrive. Furthermore, deer encourage the spread of non-native invasive plant species by carrying and redistributing their seeds.

  Controlling the deer population would reduce the spread of NNIs and give native species the chance to recover. In addition, controlling the deer population would allow trees to regenerate, which would be particularly beneficial along streams to increase shade and expand riparian forest buffers.

  Given these threats to the forest community, the deer population should be reduced at Laurel Hill Park, such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

OBJECTIVE 8

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

Currently, Laurel Hill Park is one of the data collection sites for the Audubon Society's NVBS. The data collected during the survey are useful in determining the health of and appropriate management practices for the ecological community types at Laurel Hill. Establishing partnerships with similar organizations has the potential to increase support for the Park and its maintenance, provide opportunities to collect more data and in turn, learn more about the various habitats present.

ACTION ITEMS

- ***Encourage the Northern Virginia Audubon Society to continue their monitoring programs and add permanent data points to the NVBS within Area A.***

  The meadow and pond within the former boundaries of Area A provide high quality bird habitat. The Audubon Society has a permanent monitoring station for the NVSB here. The Park Authority, in conjunction with the Fairfax County Public School system, should continue its support of this free, volunteer -based monitoring program that provides high quality data.

- ***Encourage volunteer groups or offer site access to graduate students to systematically survey mammals, birds, reptiles, amphibians and invertebrates.***

  As stated under Objective 7, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

MANAGEMENT AREA A – MANAGEMENT RECOMMENDATION PRIORITIZATION						
Ecological Community Type	Acidic Oak-Hickory Forest	Floodplain Forest	Mesic Mixed Hardwood Forest	Oak/Heath Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 1: Monitor current conditions						
• Perform semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept
• Develop annual maintenance plans	**1**	**1**	**1**	**1**	**1**	**1**
• Perform BioBlitz	**2**	**2**	**2**	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**	**3**	**3**	**3**
Objective 2: Control NNIs, particularly in the interior forest						
• Conduct NNIAP study –Interior forest	**1**	**1**	**1**	**1**		
• Address NNIs in utility corridor and stream valleys		**1**				
• Remove callery pears in meadow					**3**	
Objective 3: Monitor for forest insects and disease						
• Record evidence of infestation	**2**	**2**	**2**	**2**		
• Treat for cutworm and other insect or disease infestations present	**2**	**2**	**2**	**2**		
Objective 4: Reduce tree growth to no more than 25-50/acre in meadows and thicket/shrublands						
• Reduce tree cover to less than 1/3 of site					**2**	**2**
• Establish mowing cycle					**2**	**2**
Objective 5: Monitor three streams – Silver Brook, Rocky Branch, South Run						
• Look for and record stream degradation		**1**				
• Coordinate off-site planning efforts w/ DPWES		**1**				
• Prioritize resource threats		**1**				
• Organize volunteer tree planting		**3**				

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 60: Prioritization of action items in Management Area A by community group

MANAGEMENT AREA A – MANAGEMENT RECOMMENDATION PRIORITIZATION						
Ecological Community Type	Acidic Oak-Hickory Forest	Floodplain Forest	Mesic Mixed Hardwood Forest	Oak/Heath Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 6: Monitor human activity and address human intrusions						
• Install monuments on property boundaries	**2**	**2**	**2**	**2**	**2**	**2**
• Keep new trails on periphery	**2**	**2**	**2**	**2**	**2**	**2**
• Erect clear signage listing appropriate behavior	**3**	**3**	**3**	**3**	**3**	**3**
• Review site plans for middle school						**1**
• Coordinate management of and access to pond site with FCSB					**1**	**1**
Objective 7: Monitor and manage wildlife						
• Conduct wildlife studies	**2**	**2**	**2**	**2**	**2**	**2**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**	**1**	**1**	**1**
Objective 8: Form partnerships with nonprofits and others						
• Encourage Audubon Society efforts	**1**	**1**	**1**	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 60, continued: Prioritization of action items in Management Area A by community group

AREA G: CENTRAL GREEN

Figure 61: Management Area G looking northeast from Furnace Road

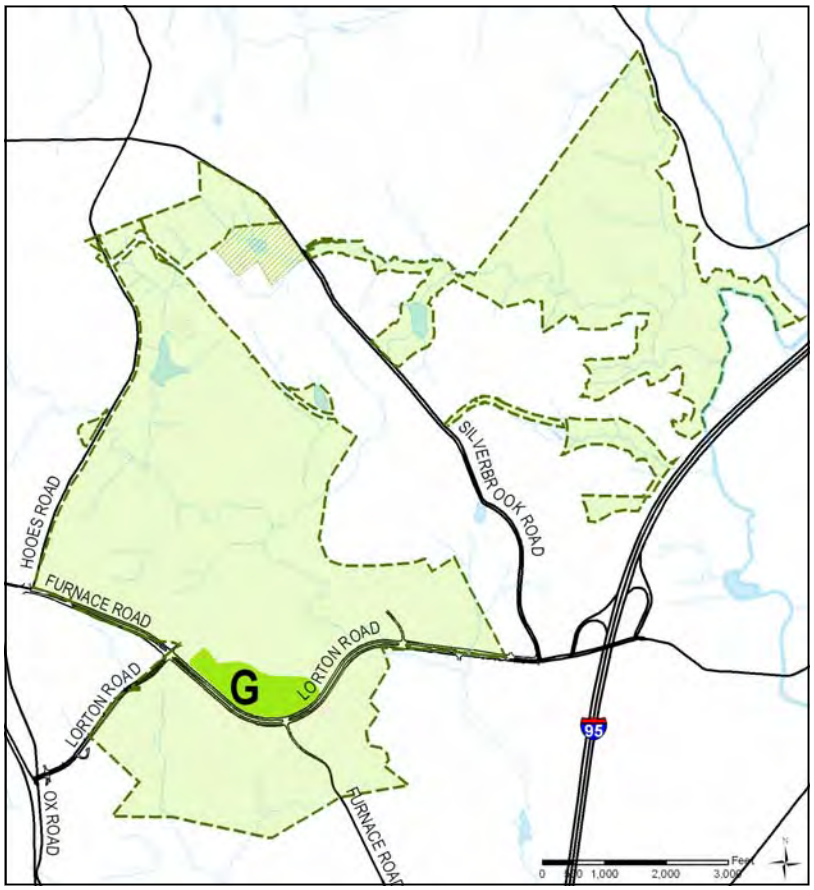


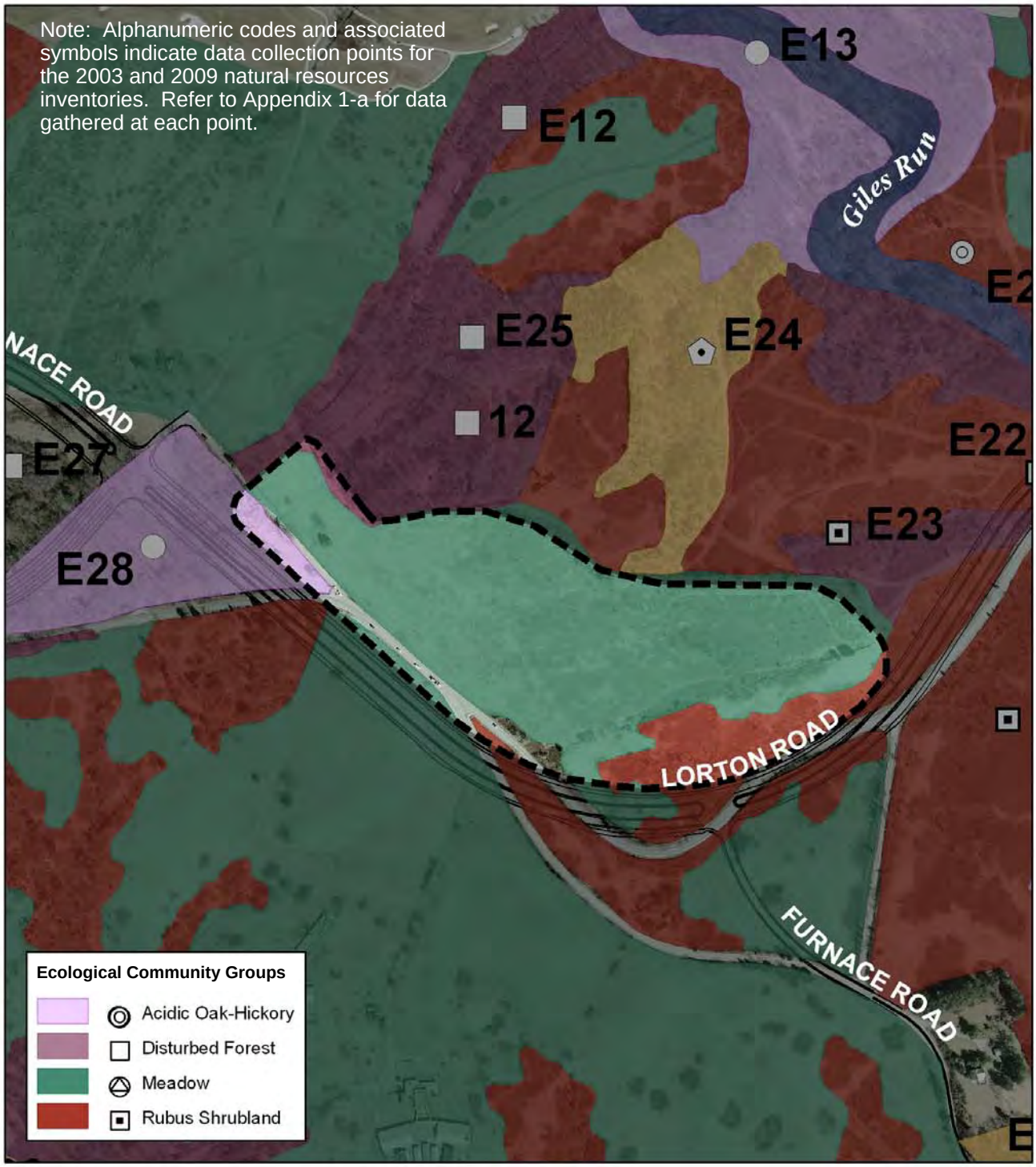
Figure 62: Location of Management Area G within Laurel Hill Park

Site Influences

Natural Site Conditions

Area G, a 34-acre site, is located in the center of the park, immediately north of Lorton Road and east of the Cross County Trail (CCT), which is known as the Laurel Hill Greenway within the park. The realignment of Lorton Road will slightly modify the area's southern edge. This new alignment and the location of Area G is shown in Figure 62.

The site's landscape character is open and primarily covered in meadow and thicket/shrubland (Figure 62). The meadow exhibits aggregates of dogbane, milkweed, goldenrod and broomsedge. Thicket growth within this area is young and concentrated in the southeastern corner. Minimal wooded growth is also found in the southeastern corner of the site, near the thicket mosaic. Area G, located in the center of the Park, sits in the midst of a large area between Silverbrook Road and the landfill where the patches of forest have a high edge to core ratio and are over-run with non-native invasive plant species (NNIs).



Management Area G: Ecological Community Groups

Laurel Hill
Natural Resources Management Plan

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

0 250 500 1,000 Feet

Figure 63: Map of ecological community groups found in Management Area G

Planned Site Activities

Area G is planned to be used for community events, informal sports, hiking and picnicking. The Central Green (Figure 66) is envisioned as a vast maintained lawn with meadow around the perimeter, suitable for a wide range of community activities such as fairs, markets and special events. This area will also provide opportunities for various sports such as kite flying, hiking and periodic use of model rocketry (subject to park regulations).

Within the Central Green are additional opportunities to develop pavilions, an amphitheater for community events and picnic grounds. Trails in this area will have many uses: they will provide connectivity to the CCT/Laurel Hill Greenway and other elements of the park; allow park users controlled access into the meadow preservation areas; provide access for Park Authority staff to perform meadow maintenance; and act as a fire break during prescribed burns.

Figure 64: Location of Management Area G within the National Register District

Current Site Activities

Area G falls within the D.C. Workhouse and Reformatory National Register District and viewshed for the Laurel Hill property. Any site development within the district that requires a site plan permit will also require approval from the Fairfax County Architectural Review Board. In addition, the land transfer agreement requires approval from the Virginia Department of Historic Resources and the Lorton Heritage Society before any development can occur.

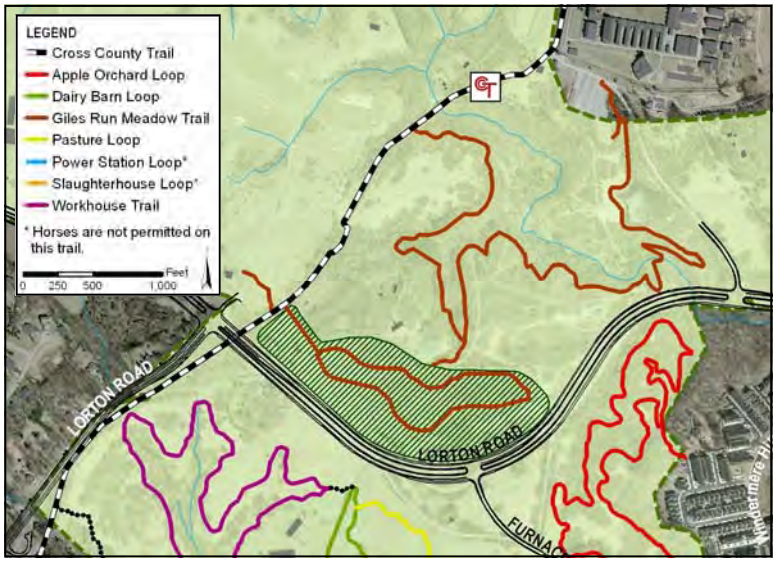


Figure 65: Giles Run Meadow Trail (in brown) forms a loop in Management Area G

The CCT passes under Furnace Road through a bridge known as Barrel Bridge. North of the Barrel Bridge, the trail follows the northwest border of Management Area G. An arm of the Giles Run Meadow Trail connects the CCT to a mowed loop trail within Area G – the Central Green Loop – shown in brown in Figure 65, and to the network of multi-use trails in Management Area H. In addition, a disc golf course covers a large percentage of Area G.

A gas line (Figure 69) cuts across the western corner of Area G near Barrel Bridge. Management activities in this area must take into account any setbacks or other restrictions related to the pipeline.

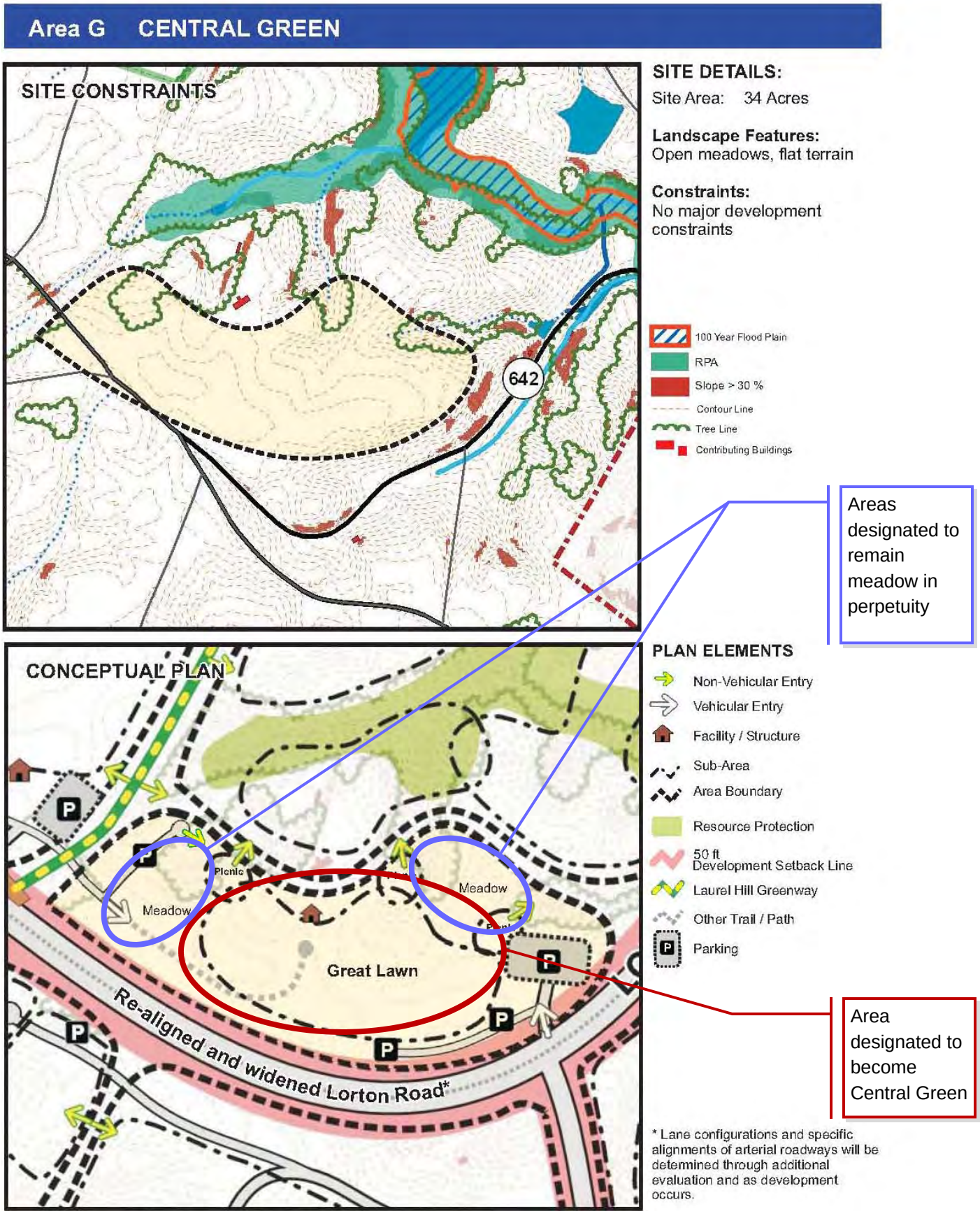


Figure 66: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

In addition, the construction of an effluent waterline running from the I-95 Landfill/Energy Resource Recovery Center south of Area K into Area I is nearing completion. The line runs along the western side of Furnace Road and then the northern side of Lorton Road before turning into Area I at the access road.

Anticipated Timeline for Planned Activities Implementation

The southeastern corner of the site is slightly wooded. This area will be heavily impacted by the realignment of Lorton Road and is programmed to become a parking area for the Central Green.

Approximately half of the site is to remain as managed meadow and the other half is to be developed as a Central Green. The Green is envisioned as a maintained lawn in the *Laurel Hill General Management Plan and Conceptual Development Plan* (GMP/CDP); mown turf grass rather than knee to waist-high native grasses in full flower. The area designated as the Central Green, which is currently meadow and thicket, should be managed as such accordingly to an interim management regime until development occurs. The area designated as meadow should be managed as such from now into perpetuity. These areas are circled blue (meadows) and red (lawn) in Figure 66.

Opportunities to vegetate the parking lots planned for the eastern and western sides with more native plant materials should be discussed with the planning and design team when the Central Green's plans are underway.

Figure 67: Cross County Trail along the northwestern edge of Area G as it passes under Furnace Road at the Barrel Bridge

Figure 68: Signage along the Cross County Trail where it intersects with an arm of the Giles Run Meadow Trail leading into Area G

LHNRMP Recommendations

Meadow management and enhancement should begin immediately in the locations noted as meadow on the Laurel Hill CDP, northeast of and to the west of the Great Lawn. Intensive cultivation and seeding of those areas is appropriate.

The entire area should be managed as meadow on an interim basis through prescribed burning or mechanical means. Given the long-term desire to have a cultivated lawn as the Great Lawn, investment in seeding and the development of a complex meadow planting in that area should not be undertaken. However, approximately half of Area G is to remain as meadow in perpetuity and as such should be enriched and cultivated in conjunction with similar efforts in Area H. Refer to the sidebar on page V:93 regarding the existing gas line and potential management practices.

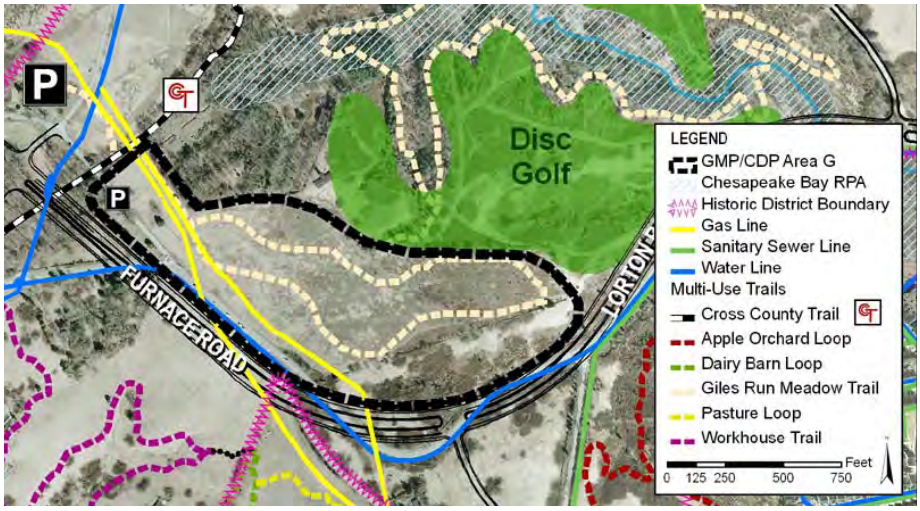


Figure 69: Existing conditions in Management Area G

Management Goal for Area G

Actively manage and enhance the meadows in perpetuity for ecological value while managing the Central Green area as meadow as an interim use until the Green is developed.

Management Objectives

In addition to experiencing changes brought about by outside development pressures common to the park as a whole, Area G will undergo internal development as the proposed location for a Central Green according to the 2004 GMP/ CDP. The management challenge for this area is to accommodate the interim land use and resources needed to manage it in a fiscally and environmentally appropriate manner until the planned green is developed. Parking is proposed for the southeastern corner of the Area, the site of existing forested lands that are heavily infested with NNIs. Once the Area is developed as planned in the CDP, the presumption is that the Central Green maintenance will be taken care of by Park Authority mowing crews. The meadows remaining in perpetuity and any associated thickets provide one of the habitat types most recommended by the Audubon Society of Northern Virginia due to their importance and support of seldom seen species such as the yellow-breasted chat and orchard oriole. Areas both preserved in perpetuity and proposed for future active uses should be maintained in a meadow/thicket mosaic.

OBJECTIVE 1

Monitor the current conditions of the natural resources within the area regularly.

Given the proposed land use changes within Area G, monitoring of the existing meadows and their transformation will be essential to determine the impact of those changes. Regular, systematic monitoring will enable staff to identify and address problems in the short term and track more subtle changes and trends to be addressed over the long term.

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks to qualitatively monitor the health of the meadows and thicket/shrubland, paying particular attention to those bordering Area H. As plans for the Central Green are implemented these walks must include assessing the impact of the construction and use of the park on the remaining peripheral forest and thicket/shrubland.***

  Park Authority natural resources management staff should conduct semi-annual field walks to qualitatively monitor the health of the meadow, small woodland area and young thicket/shrubland. Staff should walk the Area boundaries and any informal trails, noting all observations. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

  The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the following concerns.

  Trails

  - Unauthorized trails

General

- Dumping
- Non-native invasive species
- Defoliation on trees or other signs of tree disease
- Indications of damage from wildlife

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and maintenance plans developed to address these problems.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  A BioBlitz – typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area – for Area G should be performed before plans for the Central Green are implemented, so that a before-and-after comparison can be made to determine the impact of the Central Green. This event could be organized by a graduate student or intern and performed with the help of Park Authority staff, community members, students and other volunteers.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Determine management priorities for existing meadows and thicket/shrubland based on current ecological health, location and planned future activities for the Area.

Area G is expected to retain approximately half of the existing meadow area due to the establishment of the Central Green and its associated parking in the center of Area G. No timeframe for the development of the green is known. Given the proposed change in land use, the central portion of the Area should be maintained as a temporary resource and subject to a temporary management regime as open meadow land. The challenge is to manage the resource for its existing habitat value without expending inordinate financial and staff resources on the site that may be reconstructed in the future.

ACTION ITEM

- ***Map meadows and thicket/shrublands that the Park Authority should seek to preserve during the design of the Central Green. As shown on the CDP (Figure 66), these meadows are located to the Central Green's northeast and west. Areas in meadow or thickets with high ecological value are of particular importance. Meadows and thickets outside the boundaries of the proposed Central Green will benefit from an active and long-term management time-frame while the area to become the Central Green and its associated supporting elements should be managed as meadow in the interim time frame.***

  Because the Green is still in the conceptual phase, Park Authority staff may have an opportunity to influence the design. Park Authority natural resources management staff should evaluate the existing meadows and thicket/shrublands to determine whether there are areas worth preserving. In particular, efforts should be made to retain the thicket/shrublands along the shared border with Area H – which should then be managed in conjunction with those in Area H – as well as the thicket/shrublands in the southeastern corner, which may serve as a buffer to Lorton Road.

  Following evaluation, these areas should be mapped, so that they may be incorporated into the design for the Central Green. A soft edge of native warm-season grasses and thicket/shrublands would serve the aesthetic purpose of framing the mowed Green and the ecological purpose of retaining still valuable habitat.

OBJECTIVE 3

As an interim use for the future Central Green, halt succession and place existing meadows and thicket/ shrublands in a holding pattern that have been identified for the Central Green until plans for the park are implemented.

Once staff has identified the communities to be preserved and those that are to become mowed turf for the Central Green, short- and long-term management regimes should be implemented. The central area should be managed in the short term according to a regime that is economically and logistically reasonable. Management strategies requiring greater investment in financial resources, labor and equipment should be reserved for the long-term management of the fringe areas identified for preservation beyond construction of the Central Green. Currently, portions of the Central Green are mowed on a regular schedule.

ACTION ITEM

- ***Mow or burn meadows and thicket/shrublands in central portion of the area to suppress woody growth and prevent it from overtaking the treeless area.***

  Given the plans to convert this area to a Central Green, woody growth should be kept to a minimum and existing thicket/shrubland should be reduced. The proposed Green will be a suburban mowed turf lawn, devoid of ecological habitat and diversity. Consequently, management decisions should be based more on the practical and efficient use of resources than the development of a diverse ecological community.

  In determining whether to mow or burn as a means of suppressing woody growth, the following considerations should be made:

  - Clearly define the mow boundaries of the Central Green and of the meadow/thicket mosaic to remain in perpetuity.
  - Given the temporary nature of this management regime, performing multiple burns for the purpose of eliminating fescue and initiating a slow reclamation may not be appropriate. The increased plant

diversity and other ecological benefits of a prescribed burn may not be as valuable in this part of Area G that is to become the Central Green and is currently mowed on a consistent basis. In fact, the hardiness and durability of fescue may make it an appropriate groundcover given the proposed uses for the site.

- With the exception of a small area in the southwest corner, the area is more than 1,000 feet from all private structures, and therefore permission from private property owners would not be required to perform a burn.
- A gas line cuts across the western corner of Area G, crossing Furnace Road near Barrel Bridge. Burning or mowing may be subject to certain setbacks or other restrictions in the vicinity of the pipeline.
- Mowing is generally less costly and logistically complicated than burning, particularly for a smaller open area, like Management Area G, in an otherwise heavily populated, densely developed area.
- Mow the Central Green accordingly to a regular schedule, as is done currently in portions of Area G.

OBJECTIVE 4

Manage existing peripheral meadow and thicket/shrubland as healthy ecological communities in conjunction with similar land cover found in Area H and others.

Existing meadow and thicket/shrubland communities expected to remain after the construction of the Central Green (as identified in Objective 2) should be part of a long-term management regime that contributes to the establishment of a meadow/shrubland mosaic at the heart of Laurel Hill Park. Given the permanent nature of these communities, their management may require a greater investment of financial resources, labor and equipment. Given their location, they should be managed in conjunction with neighboring meadows and thicket/shrublands in Area H.

Management Areas H, I, J, K and L have similar meadow/thicket compositions. Consequently, they should be considered when developing management strategies and maintenance schedules for Areas G and H. Because Areas G and H are immediately adjacent to one another, management tasks performed in Area G can easily be applied to Area H at the same time. However, Areas J, K and L are separated from G and H by Lorton Road; therefore, whether or not to carry out management activities in J, K and L at the same time will depend on time available, equipment needed, the logistics of moving that equipment, etc.

ACTION ITEMS

- ***Perform a prescribed burn, or if not possible use mechanical methods, in the meadows along the shared border with Area H to promote native warm-season grasses and forbs and to eradicate woody seedlings. Use mechanical methods in meadows at the west end of Area G pending further clarification from utility operator due to the gas line traversing that corner of the Management Area.***

  Throughout Laurel Hill Park, tall fescue has become the dominant species on former pasture and meadow sites. Dense stands of fescue should be burned to mineral soil – again, in conjunction with burn efforts in Area H – in late winter or early spring. While burning will not kill the crowns, it will destroy the thick thatch and inhibit fescue growth, giving a competitive edge to native grasses. Given the density of the thatch and moisture retention that comes with remaining green for most of the year, it may be necessary to burn two or three years in succession. If three burning cycles does not adequately control the fescue, a chemical treatment (glyphosate) should be applied in early spring or late autumn – when fescue is green but native species are dormant – and followed up with a burn again in late winter or early spring.

Alternatively, if a burn is not possible, chemical treatment should be applied to the fescue prior to mowing. Following an application of glyphosate, the site should be mowed twice with a mulching blade. Two months after mowing, the site should be drill seeded and the placed on a one- to three-year mowing cycle.

Meadows in Areas I, J, K and L are also dominated by fescue and should be considered when developing mow/burn cycles for Areas G and H.

- ***Manage tree growth to achieve a maximum of 25 to 50 trees per acre on meadow sites.***

  In order to maintain the open character of a meadow, trees should be limited to no more than 25 to 50 per acre. Burning will most likely kill the younger unhealthy trees that should be targeted for removal. If there are larger, mast-producing trees (like oaks) that the Park Authority wishes to retain, a circle should be mowed around the tree to reduce fuel loads prior to the burn. In the absence of a burn, the selective removal of unhealthy, non-native invasive or otherwise undesirable trees can be achieved using one of the following methods of removal: girdling; frilling; felling and treating the stump with herbicide; or, for trees less than four to six inches in diameter, performing a basal bark spray, whereby the lower 12 to 18 inches of the trunk are sprayed with an herbicide.

- ***Drill seed meadow site two months after prescribed burn or chemical treatment.***

  Once mineral soil has been exposed, the meadow site should be drill seeded with native warm-season grasses.

  Note: In locations where reclamation can occur over a longer time period – converting fescue fields to native warm-season grass meadows over a period of ten years or more – Park Authority staff should perform repeated burns in conjunction with repeated mowing cycles, thereby allowing native plants and the native seed bed on site to dominate over time. This more gradual conversion is an alternative strategy to the burn/ mechanical/chemical method described above and precludes the need for drill seeding with cultivated seeds, thereby reducing costs.

- ***Mow or burn thickets /shrublands along the shared border with Area H, placing them on a five-year mowing/ burning cycle, only mowing/burning one-third of the thicket at a time to retain some habitat and food sources. Mow until adequate fuel is available to burn thicket growth to manage extent of coverage, height and age of thicket stands.***

  Rubus thickets in Area G exist primarily along the shared border with Area H. Intervention is required to halt the succession pattern and to restore their interior growth for more productive cover and food supply for wildlife. Thickets will benefit from mechanical or burn management. Until adequate fuel to supply a burn is available, reduce the height and mass of the thicket swath by mowing. When fuel is adequate, burn to kill vegetation above the surface. Root stock will remain viable and will re-sprout.

  Older thicket/shrubland in Area H should be addressed first, mowing or burning within the next year or two, and then a five-year mowing/burning cycle should be established. Younger thicket/shrubland in Area G need not be mowed/burned immediately but can be incorporated into the mow/burn cycle for Area H during the following rotation. Only one-third of the thicket/shrubland should be treated at any given time to retain some habitat and food.

Again, given their similar compositions, thicket/shrublands in Areas I, J, K and L, should be considered when developing the mow/burn cycles for Areas G and H. Like Area H, Management Area L has older thicket/shrublands that should be addressed first.

OBJECTIVE 5

Control NNIs.

Area G has a small forested area that is heavily infested with NNIs. These include tall fescue, autumn olive, and pear species (*malus/pyrus* spp.). Given the location of NNIs in the area that is planned for future parking, determination of the likely time period for construction of the parking lot will inform whether removal of the NNIs is a worthwhile effort. If plans for construction are within the next ten years, mowing the perimeter of the woodlands to keep NNIs from spreading should be done on a repeating cycle, species dependent. If construction is unlikely to occur within the next ten years, NNIs present should be addressed as specified in the *Fairfax County Non-Native Invasive Plant Assessment.*

Tall fescue, kudzu and tree-of-heaven (*Ailanthus altissima*) are present in the treeless portions of Area G. Eliminating these species should be considered in determining the interim strategy for the Central Green. Early action should be taken to prevent NNIs in the treeless areas from spreading into the perimeter thicket/shrublands and forested portions of Area G.

ACTION ITEMS

- ***Conduct Level One* Non-Native Invasive Plant Site Prioritization *as described in Appendices E and H of the* Fairfax County Non-Native Invasive Plant Assessment.**

  Although Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment,* a more comprehensive follow up to that initial assessment is in order, particularly in the communities along the shared border with Area H as well as the small, young forest stand in the southeast corner of Area G. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control* Strategies of the *Fairfax County Non-Native Invasive Plant Assessment*.

- ***Mow or burn to contain NNIs in forested area.***

  Until the forested lands are removed (anticipated) for either the realignment of Lorton Road or the development of supporting activities for the Central Green, mow the perimeter of the Disturbed Forest community to limit the spread of NNIs.

- ***Treat kudzu in Area G.***

  The Park Authority has sprayed kudzu in the western portion of Area G along the CCT two years in a row. Pending an inspection of the area, further spraying may be required. Park Authority staff should periodically monitor this area to insure that the kudzu does not return once eliminated.

OBJECTIVE 6

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impact of various management techniques. In addition, in Area G, regular monitoring will show the impact of the Central Green on wildlife populations.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work and developing protocols and encouraging volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  With the BioBlitz serving as a baseline, subsequent wildlife studies frequency should be conducted to determine population or behavioral changes and track trends, particularly as the management objectives listed above are carried out. Once plans for the Central Green have been implemented, wildlife studies should focus on the peripheral meadow and thicket/shrubland in conjunction with Area H.

  Like the Northern Virginia Bird Survey (NVSB) conducted by the Audubon Society of Northern Virginia, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Provide nesting boxes on site to enhance bird nesting and habitat.***

  Bluebird boxes should be installed in the meadow, even on a temporary basis. No more than one box per two acres should be placed on the site. All boxes should face east. This should be done in coordination with the Virginia Bluebird Society which generally works under permit to build, install, monitor and maintain nest boxes for cavity nesting birds. Once nesting boxes have been installed, they should be monitored, unwanted birds' nests such as house sparrows should be removed, and predator guards should be installed.

- ***Direct management efforts toward achieving the meadow/shrubland mosaic described under Objective 4.***

  The meadow/shrubland mosaic offers the best supporting habitat for the greatest diversity of birds and other wildlife. Objective 4 describes how meadow and thicket/shrubland habitats in Management Area G can be managed in conjunction with other management areas to create a mosaic at the heart of Laurel Hill Park and provides recommendations for doing so. The *Treeless Area Technical Manual*, Appendix 6, provides the practical steps for carrying out these recommendations.

- ***Monitor and reduce deer populations, and fully implement the County's deer management strategy.***

  The deer population at Laurel Hill Park is well above the ecological carrying capacity, posing a significant threat to plant communities on-site. Selectively feeding on native species, deer reduce species diversity and richness. The absence of strong native plant communities creates an environment favorable to NNIs. Gaining the competitive advantage, NNIs are able to establish themselves and thrive. In addition, deer encourage the spread of NNIs by carrying their seeds and redistributing them.

  The deer population at Laurel Hill Park should be reduced such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

OBJECTIVE 7

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

The Park Authority's relationship with the Northern Virginia Audubon Society has been critical to data collection at Laurel Hill Park. Establishing partnerships with similar organizations offers the potential to increase support for the Park and its maintenance, provide opportunities to collect additional data and in turn, learn more about the various habitats present.

ACTION ITEM

- ***Encourage the Northern Virginia Audubon Society to continue their monitoring programs and retain their NVBS data collection station in Area G.***

  Currently the Northern Virginia Audubon Society has a data collection point for the NVBS in the eastern portion of Area H. Should this data point be situated in the Central Green once implemented, a new data point should be established further east in the meadow and thicket/shrubland communities that remained along the shared border with Area H.

- ***Encourage volunteer groups or offer site access to graduate students to systematically survey mammals, birds, reptiles, amphibians and invertebrates.***

  As stated under Objective 6, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

OBJECTIVE 8

Monitor human activity and natural resource interaction – address human intrusions, such as illegal dumping and unwanted, informal trail and bicycle access that would adversely affect the natural resources.

Area G will have activities that invite visitors to the area – the Central Green. The CCT runs along its northwestern border. Multi-use trails, including equestrian and bike trails, provide connections from the CCT to a mowed loop within Area G that is part of the Giles Run Meadow Trail and to the rest of the Giles Run Meadow Trail network that extends into Area H. Lorton Road, a heavily traveled thoroughfare forms the area's southern boundary. Given the multiple circulation paths in and around Area G, there is no easy way to limit human activity in the area. Instead, with the future attraction of the Central Green, the number of users along the trail system and drivers on Lorton Road, the site provides a unique teaching opportunity for the ecological value of treeless areas.

ACTION ITEMS

- ***Install interpretive panels along the CCT, along Lorton Road and adjacent to the Central Green and picnic areas that illustrate and explain the value of treeless areas.***

  Many future visitors will come to Area G for traditional 'park' activities. The permanent meadows on either side of the area offer an unusual education opportunity for park visitors.

Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

- ***Monitor trail use, trail expansion and the likely development of informal paths.***

  Trail connectors are in place between the CCT, the Giles Run Meadow Trail and the areas of activity in Area G and H. With the additional uses proposed for these areas, Park Authority staff must be vigilant in ensuring that any future trails are developed where they will have the least detrimental effect on the natural resources.

  The Park Authority has entered a maintenance agreement with the group, Mid-Atlantic Off Road Enthusiasts (MORE). MORE has "adopted" the trails and will assume trail maintenance responsibility. The Park Authority should work with MORE to insure the safety of the Laurel Hill Park trail system and should encourage similar partnerships with other organizations.

- ***Erect clear signage listing appropriate behavior within park bounds.***

  To further discourage unplanned trails, illegal dumping and other activities detrimental to the health of the forest, signs should be posted at the future parking areas, at trail heads and at trail intersections listing appropriate activities within the park.

  Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

- ***Review site plans for planned Central Green and associated parking to see if there are opportunities to incorporate natural resource sensitive techniques–in the parking and stormwater drainage, in the landscaping, etc.***

  The Central Green will likely draw many traditional park users to Area G. Integrated natural resource friendly techniques will provide a low-key teaching opportunity for visitors.

MANAGEMENT AREA G – MANAGEMENT RECOMMENDATION PRIORITIZATION			
Ecological Community Type	Disturbed Forest	Piedmont Prairie (Meadow)	Thicket/Shrubland
Objective 1: Monitor current conditions			
• Perform semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept
• Develop annual maintenance plans	**1**	**1**	**1**
• Perform BioBlitz	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**
Objective 2: Determine management priorities for meadows and thicket/shrublands			
• Map and assess ecological value		**1**	**1**
Objective 3: Interim management methods for future Central Green site - halt succession			
• Mow or burn		**1**	**2**
Objective 4: Long-term enhancement of existing meadows and thicket/shrublands to remain in perpetuity			
• Mow or burn meadows along Area H		**1**	
• Manage tree growth		**1**	
• Drill seed meadow		**2**	
• Mow or burn thicket/shrublands along Area H			**2**
Objective 5: Control NNIs			
• Conduct NNIAP study	**1**		
• Mow or burn perimeter of forest land	**1**	**1**	
• Treat kudzu, pending inspection of area	**2**		
Objective 6: Monitor and manage wildlife			
• Conduct wildlife studies	**2**	**2**	**2**
• Provide nesting boxes		**3**	
• Direct management efforts for mosaic		**1**	**1**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**
Objective 7: Form partnerships with nonprofits and other agencies			
• Encourage Audubon Society efforts	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 70: Prioritization of action items in Management Area G by community group

MANAGEMENT AREA G – MANAGEMENT RECOMMENDATION PRIORITIZATION			
Ecological Community Type	Disturbed Forest	Piedmont Prairie (Meadow)	Thicket/Shrubland
Objective 8: Monitor human and natural resource interactions			
• Install interpretive panels		**3**	**3**
• Monitor trail use and expansion	**2**	**2**	**2**
• Erect clear signage listing appropriate behavior	**3**	**3**	**3**
• Review plans for Central green	**UNKNOWN TIME FRAME - opportunistic**		

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 70, continued: Prioritization of action items in Management Area G by community group

AREA H: GILES RUN MEADOW

Figure 71: Management Area H looking southwest across the pond

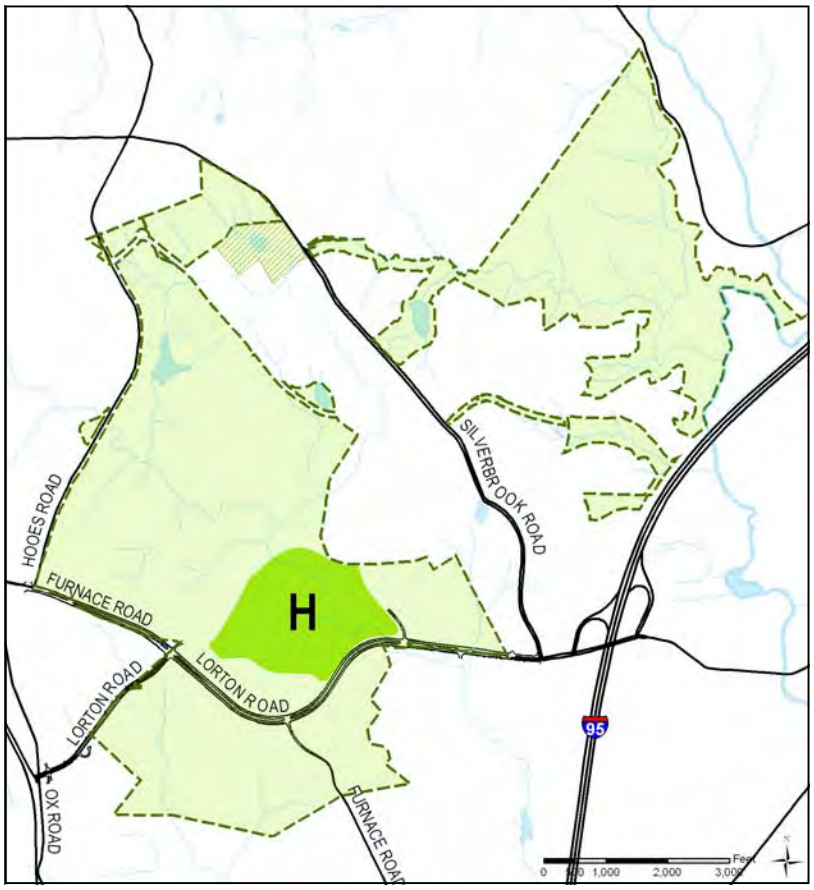


Figure 72: Location of Management Area H within Laurel Hill Park

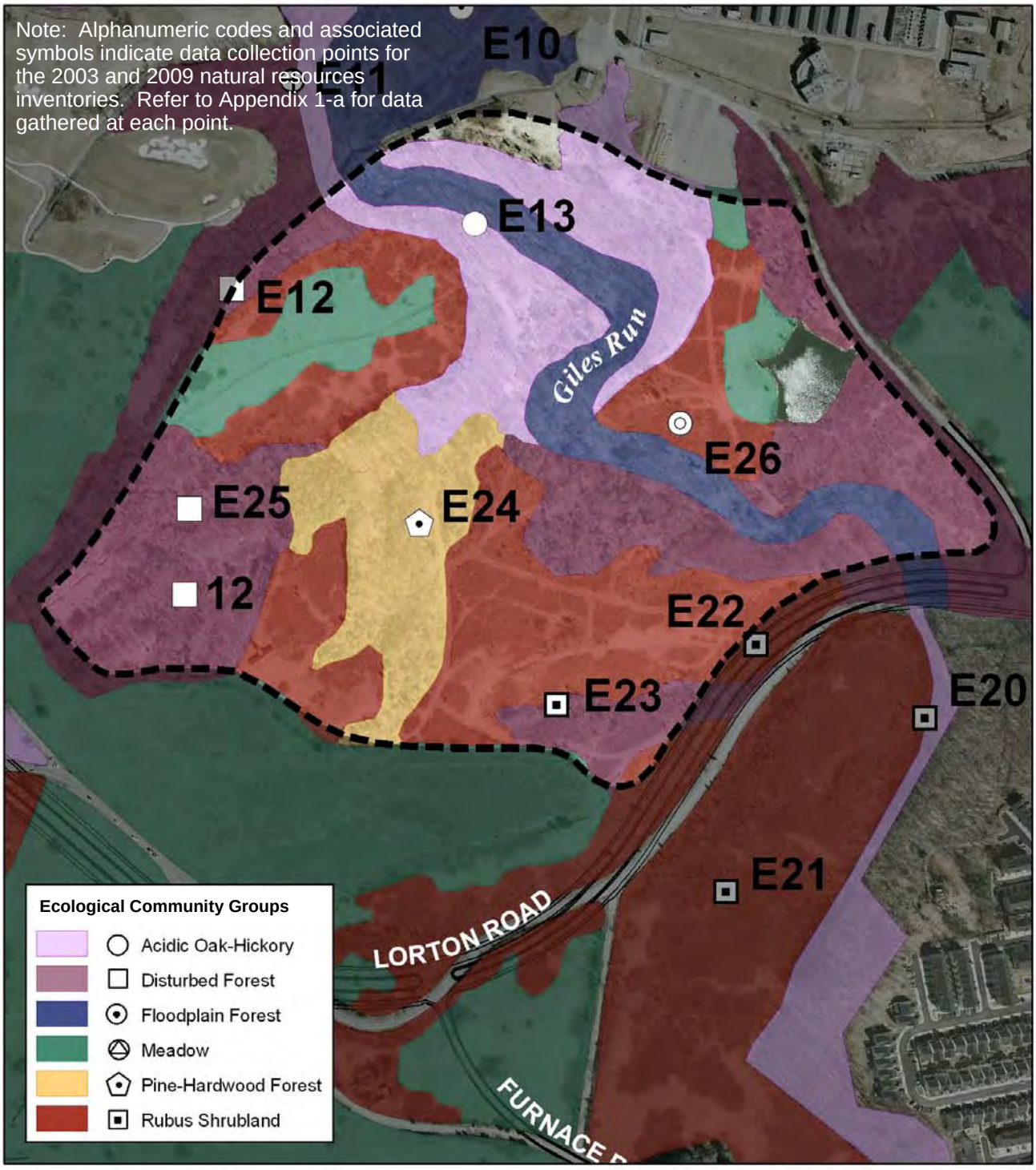
Site Influences

Natural Site Conditions

Area H is located in the center of the park, immediately north of Lorton Road and south of the former maximum security prison (Figure 72). The site is approximately 87 acres, with three areas of pasture/meadow. The remainder of Area H is covered in thickets and woodland.

The meadow known informally as the Dead Cow Pit, just under eight acres in size, is covered in tall fescue, red maple, biannual mullein andropogan, cedar (browsed by deer), ailanthus, multi-flora rose, *rubus* species and bramble thicket aggregates. Thickets comprise about three of the eight acres. The significant *rubus* thicket is too tall for real value at eight feet and is continuing to expand horizontally. It is estimated that the thicket's footprint could expand as much as twenty feet in one growing season. A better height to support bird habitat is four to five feet or half of its current height.

Although *rubus* growth is not inhibited by the tall fescue found on site, other plant growth is hindered. This particular pasture has a few eastern red cedar trees and tree of heaven breaking through the tall fescue dense cover. Without any intervention, a pasture land so heavy in tall fescue may persist as such for more than twenty years before woody plants begin to assert shade tolerance and the fescue retreats.



Management Area H: Ecological Community Groups

Laurel Hill
Natural Resources Management Plan

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

0 250 500 1,000 Feet

Figure 73: Map of ecological community groups found in Management Area H

The mosaic of meadow and thickets contributes to the great concentration of birds found on the site. The site is not an official Audubon survey spot, but a concentration of wintering sparrows was recorded on the site during an Audubon count. Two smaller patches of meadows, in addition to the Dead Cow Pit, are located in the eastern portion of Area H. One is on the western shore of the large pond, and a smaller meadow is located in the northeastern corner of Area H, just south of the existing parking lot. Thickets are also heavily distributed in the southern portion of the Area and on the western side of the pond.

Area H has a Disturbed Forest on its southwestern edge and eastern corner, as well as more centrally located acid oak-hickory, pine-hardwood and floodplain forests. These are shown in Figure 73, the ecological community types map. Although relatively heavily forested, much of the forest land is fragmented, resulting in much forest edge and a high edge to core ratio. This type of pattern increases the forest's vulnerability to non-native invasive plant species (NNIs). Still, the forested area close to Lorton Road provides good reptile and amphibian habitat.

This area also has an extensive riparian corridor that is part of a Chesapeake Bay Resource Protection Area (RPA) and County Environmental Quality Corridor (EQC). Some of the riparian corridor has poor tree cover, which also makes the forested land vulnerable to NNIs. The south-facing slopes, on the north side of the Giles Run have more problems with NNIs than the north-facing slopes.

Planned Site Activities

Area H includes significant areas for resource protection. These are associated with riparian woodlands along Giles Run, which flows across Area H northwest to southeast, and a smaller stream that flows from the west into Giles Run in the middle of the Area. Forest communities extend from the center of Area H to the southeastern and southwestern corners. (Figure 73). The space between the protected stream corridors is planned open space with activities, some that are compatible with resource protection and others not. A meadow with passive recreation is to occupy the western third of Area H. Passive recreation is also proposed for a portion of the southern third. In addition to the recently installed kiosk/seating area near the parking lot at the northern edge of the area, the 2004 *Laurel Hill General Management Plan and Concept Development Plan* (GMP/CDP) proposes a visitor/ nature center. This, however, will likely be moved to Area I. The planned natural and cultural resource interpretation will be substantially greater that the existing kiosk signs and will be an outgrowth of the planned visitor/nature center.

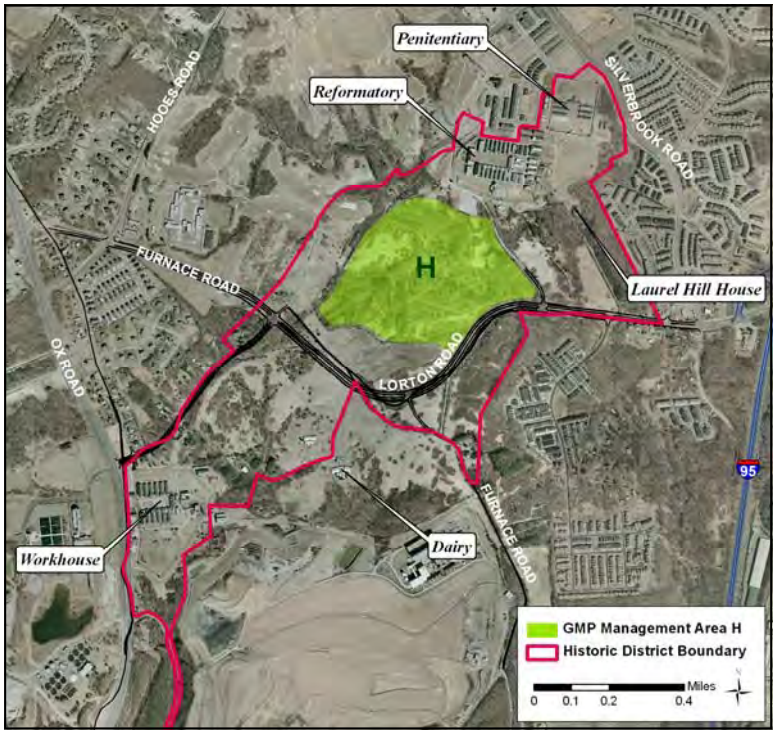


Figure 74: Location of Management Area H within the National Register District

Current Site Activities

Area H falls within the D.C. Workhouse and Reformatory National Register District and viewshed for the Laurel Hill property. Any site development within the district that requires a site

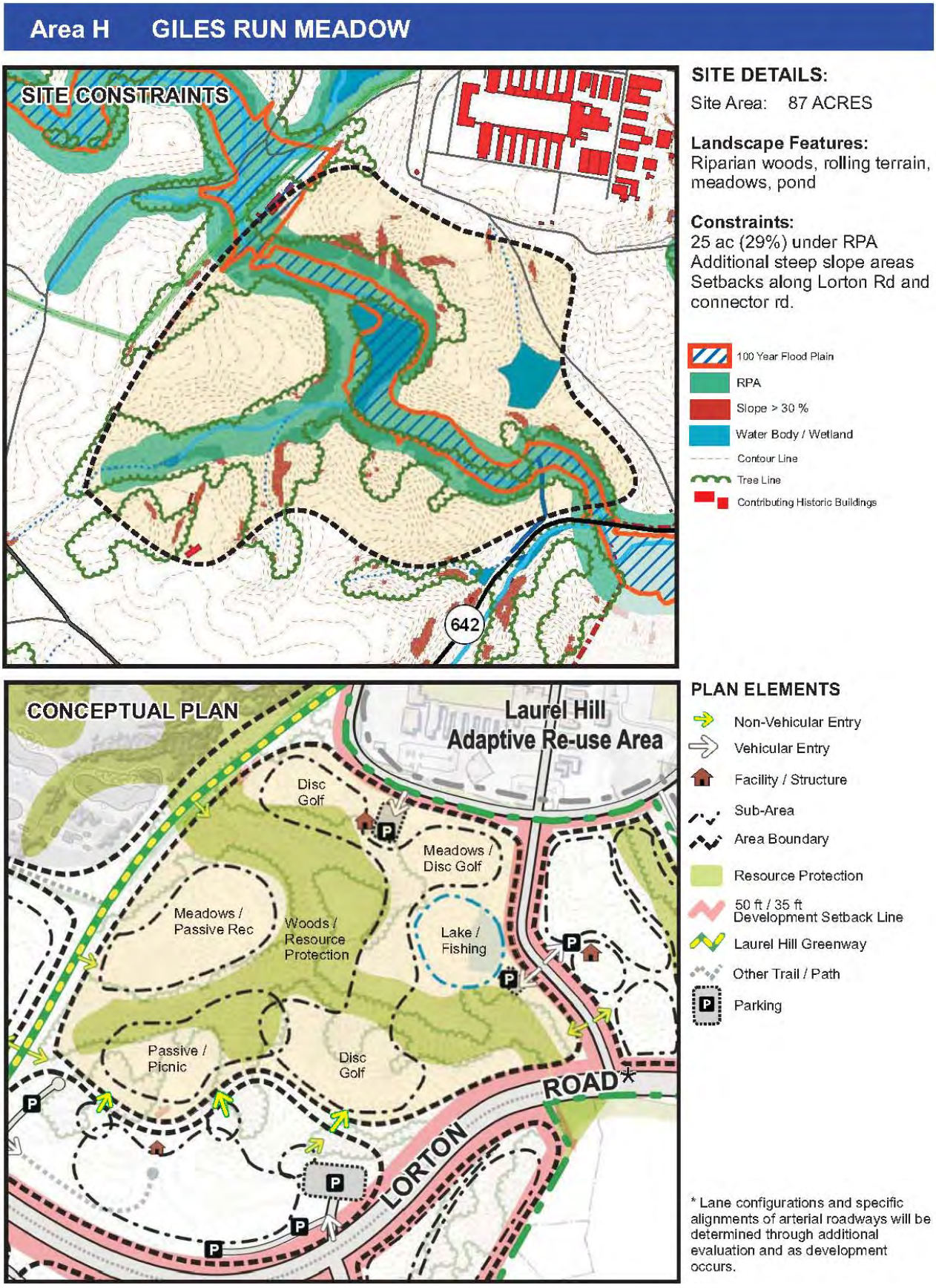


Figure 75: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

plan permit will also require approval from the Fairfax County Architectural Review Board. In addition, the land transfer agreement requires approval from the Virginia Department of Historic Resources and the Lorton Heritage Society before development can occur.

The Giles Run Meadow Trail, shown in brown in Figure 76, is in place. It is part of a more intricate trail network that extends into Management Area G. The Giles Run Meadow Trail also connects amenities within Area H. One terminus is located at the parking lot on the northern edge of the management area. The parking lot provides 245 standard parking spaces and 6 universally accessible spaces; however, this parking facility may be lost as Management Area W is developed. Currently, the lot is a convenient point of orientation and source of information: a kiosk that was built in the last several years as part of a larger cultural resource interpretation effort is situated at the southeast corner. From the parking lot, the Giles Run Meadow Trail runs south, along the western shore of the pond. A dock extends into the pond, which is a current fishing site. Opposite the pond, on the eastern side of the trail, is the disc golf course. The course reaches from the parking lot north of Area H, through the central portion of the management area and into Area G, occupying approximately 25 acres. Fairways and greens for the course are mowed.

The disc golf course has had several negative impacts on Area H. Clearing the land to construct the course removed extensive habitat and has fragmented the habitat that remains, resulting in a high level of human contact which disrupts many wildlife species. The golfers prefer that the green is closely mown, reducing or removing any ecological value. Further disruption occurs as disc golfers trample surrounding vegetation to retrieve lost discs and establish shortcuts through the vegetation to shorten their walking distance from one tee to the next.

Finally, the construction of an effluent waterline running from the I-95 Landfill/Energy Resource Recovery Center south of Area K into Area I is nearing completion. The line runs along the western side of Furnace Road and then the northern side of Lorton Road before turning into Area I at the access road.

Visitor/Nature Center

The 2004 GMP/CDP proposes a "nature center for the interpretation of the natural resources" in Area A, as well as a visitor/nature center in Area H, which would provide "site orientation and natural and cultural resource interpretation."

Given the intent to protect the forest resources in Area A and limit human access to the site, the proposed center will not be located there. Similarly, the visitor/nature center proposed for Area H will likely be moved to Area I. This will be a small building for site orientation and interpretation.

Currently, a recently installed kiosk/ seating area near the parking lot at the northern edge of Area H provides site orientation and interpretation for Giles Run Meadow.

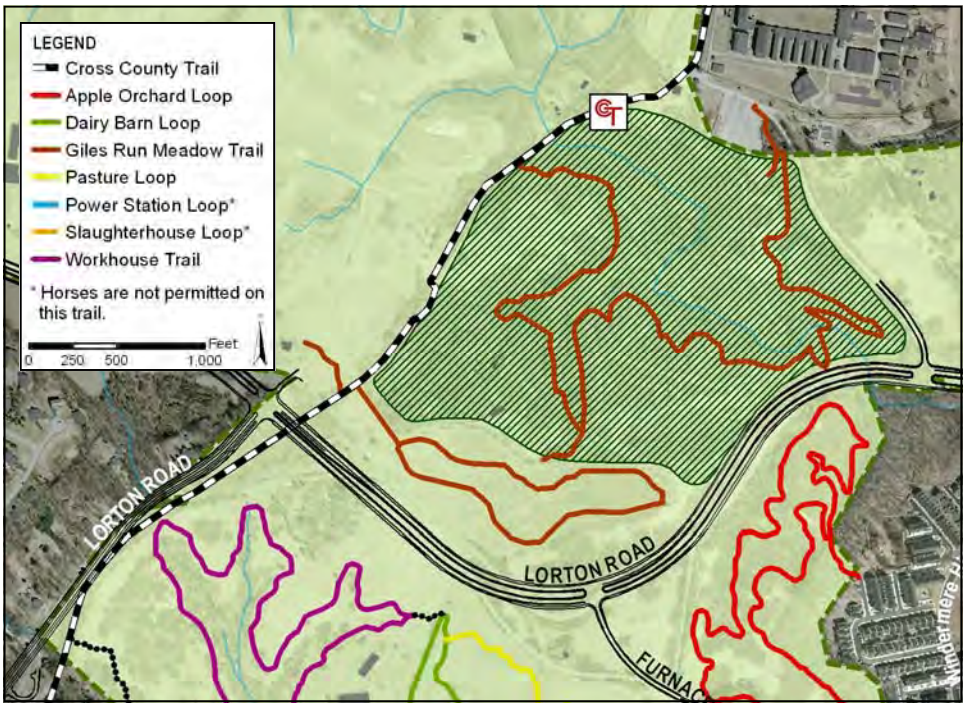


Figure 76: Giles Run Meadow Trail winds through Management Areas G and H

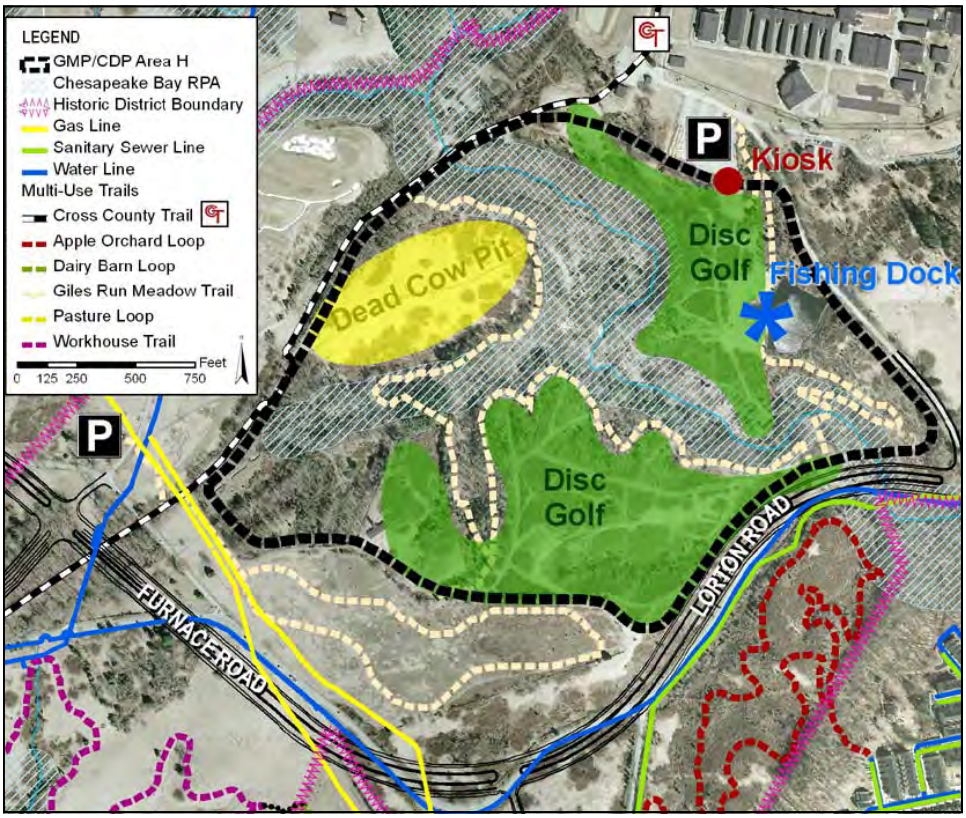


Figure 77: Map of existing conditions in Management Area H

Anticipated Timeline for Planned Activities Implementation

Disc golf, a picnic area and fishing facilities are installed and in use within Area H. The parking area at the northern end of the area – recycled from a former reformatory parking facility – is open and currently available for park visitor use, though this may change pending possible development in Area W. No timetable has been established for the development of the picnic areas or the other parking locations. Any intensive or costly development within Area H is unlikely to occur within the next fifteen to twenty years.

Management of the EQCs along Giles Run and the enhancement of the existing pasture areas should begin immediately.

LHNRMP Recommendations

The activities recommended for Area H are heavily focused on the site's natural resources, with minimal encroachment of programmed human activities. This combination creates a real opportunity for intense resource management activities, developing a rich mosaic of ecological community types that support a broad array of wildlife.

The former pasture areas are good candidate sites for prescribed burns. The Dead Cow Pit, located on the crown of a hill, has good site contours for fire control. Its remoteness also makes it a good candidate site for slow reclamation, using burn and mechanical methods for enhancing the former pasture area and for managing the height and spread of the thickets. It is anticipated that with burning, Indian grass would come in well in the area.

Management practices in this area should seek to retain and protect the riparian forest along Giles Run. Much of this is within the RPA; however, areas of acidic oak-hickory and Pine-Hardwood Forest extend beyond the 100-foot buffer. These areas are vulnerable to disc golfers who stray off the course looking for lost discs or create shortcuts to the next tee.

In addition to the disc golfers, the numerous trails that cross Area H create management challenges for resource managers. Minimizing negative impacts from human activity is critical to maintaining the health of the area's natural resources.

Management Goal for Area H

Intensively manage and enhance the natural resources for wildlife habitat value–the large aggregate of meadow-thicket mosaics, the riparian stream corridors and the large farm pond.

Management Objectives

OBJECTIVE 1

Monitor the current conditions of the natural resources within the area regularly.

Area H includes several different ecological community types, each representing a different stage of succession. The ecological diversity makes this a particularly dynamic area, and its location at the heart of the park makes it a critical piece in the overall ecological landscape of Laurel Hill.

Figure 78: Dead Cow Pit in Management Area H (above)

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks to qualitatively monitor the health of the meadows, thicket/shrublands, riparian woodlands and stream valleys. If problem areas are encountered, quarterly walks should be scheduled to monitor those areas.***

  Park Authority natural resources management staff should conduct semi-annual field walks to qualitatively monitor the health of the various ecological communities. Staff should walk the property boundaries, stream valleys and trails, noting all observations. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

  The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the concerns listed on the next page.

Figure 79: 1,000-foot burn buffer around private structures

Trails
- Unauthorized trails
- Vegetation overhanging trails
- Trail markers that are missing or in need of repair
- Down trees on trails

Pond
- Pond edge and dam

Streams
- Blow downs (i.e. fallen trees) in streams
- Stream blow-outs or head cuts
- Bad odors or gray water

General
- Non-native invasive species, particularly their spread into the forest block
- Defoliation in trees or other signs of tree disease
- Indications of damage from wildlife
- Erosion on steep slopes

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and work orders to address these problems developed.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  In Area H, a BioBlitz – typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area – should be conducted before any significant alterations are made to the landscape through burning or mowing.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Initiate slow reclamation, converting existing fescue-dominated treeless areas to native warm season grassed meadow.

There are three mapped areas of grasslands/meadow/pasture on the natural resource inventory in Area H. Two are of similar size and potentially offer, with good management, valuable landscape mosaics for wildlife habitat. One is immediately west of the farm fishing pond. Surrounded by thickets, the combination of open water, thickets, woodlands in the RPA and the grasslands provide a rich ecological community and is well worth enhancing. The most prominent fescue-ridden treeless area in Area H is the Dead Cow Pit, a former pasture. Overrun by tall fescue, the dense cover is inhibiting the growth of native warm-season grasses and thus its value for native wildlife. *Rubus* thickets in and surrounding the pasture known as the Dead Cow Pit and adjacent to the pond are overgrown. In addition to the tall fescue, NNIs such as tree-of-heaven have taken hold. These factors make it a challenging site for meadow restoration. However, to restore ecological diversity to the site, Park Authority staff should pursue a course of slow reclamation, gradually returning the pasture lands to native warm-season grasses. Similar issues are present at the two other meadow sites in Area H–near the pond and in the northeastern corner of the area.

ACTION ITEMS

- ***Perform a prescribed burn, or if not possible use mechanical methods, in the three grassland areas to promote native warm-season grasses and forbs and to eradicate woody seedlings.***

  The Dead Cow Pit is a good candidate for a prescribed burn at Laurel Hill Park. The site is remote; the dense fescue will serve as a slow-burning fuel; and the gently rolling topography lends itself to a more controlled burn. In addition, the site would benefit greatly from the effects of a burn: reducing litter build up, setting back succession, releasing nutrients and stimulating herbaceous growth. There are no proposed uses planned for the area that require a temporary management regime. Instead, management of Area H can be carried out over the long-term. Strategies that are inappropriate in the short-term because of the financial and logistical resources required are appropriate here.

  Dense stands of fescue, such as those in the Dead Cow Pit, should be burned in late winter or early spring. While burning will not kill the crowns, it will destroy the thick thatch and inhibit fescue growth, giving a competitive edge to native grasses. Given the density of the thatch and moisture retention that comes with remaining green for most of the year, it may be necessary to burn two or three years in succession. If three burning cycles does not adequately control the fescue, a chemical treatment (glyphosate) should be applied in early spring or late autumn – when fescue is green but native species are dormant – and followed up with a burn again in late winter or early spring.

  Alternatively, if a burn is not possible, chemical treatment should be applied to the fescue prior to mowing. Following an application of glyphosate, the site should be mowed twice with a mulching blade. Two months after mowing, the site should be drill seeded and the placed on a one- to three-year mowing cycle.

- ***Manage tree growth to achieve a maximum of 25 to 50 trees per acre on meadow sites.***

  In order to maintain the open character of a meadow, trees should be limited to no more than 25 to 50 per acre. Burning will most likely kill the younger unhealthy trees that should be targeted for removal. If there are larger, mast-producing trees (like oaks) that the Park Authority wishes to retain, a circle should be mowed around the tree to reduce fuel loads prior to the burn. In the absence of a burn, the selective removal of unhealthy, non-native invasive or otherwise undesirable trees can be achieved using one of the following

methods of removal: girdling; frilling; felling and treating the stump with herbicide; or, for trees less than four to six inches in diameter, performing a basal bark spray, whereby the lower 12 to 18 inches of the trunk are sprayed with an herbicide.

- ***Drill seed meadow site two months after prescribed burn or chemical treatment.***

  Once mineral soil has been exposed, the meadow site should be drill seeded with native warm-season grasses.

  Note: In locations where reclamation can occur over a longer time period – converting fescue fields to native warm-season grass meadows over a period of ten years or more – Park Authority staff should perform repeated burns in conjunction with repeated mowing cycles, thereby allowing native plants and the native seed bed on site to dominate over time. This more gradual conversion is an alternative strategy to the burn/ mechanical/chemical method described above and precludes the need for drill seeding with cultivated seeds, thereby reducing costs.

OBJECTIVE 3

Manage existing thicket/shrubland to maximize habitat value.

In addition to the thickets in the Dead Cow Pit, significant thicket/shrublands exist in Area H, primarily south of Giles Run. These are among the oldest at Laurel Hill Park. The thicket/shrublands found in Area H outside of the Dead Cow Pit have a larger proportion of thicket and are at a later stage of succession.

In order to restore habitat value to the thicket/shrubland and to interrupt succession, Park Authority staff should reduce the height of thickets, reduce their footprint and redirect the location of other stands. Management methods such as chemical or mechanical methods or burning can be employed to reduce the footprint and redirect the growth pattern. Mechanical methods will be needed to lower the height of thicket stands. One method is to use a mower with an attached seven- or eight-foot sickle bar or bat wings for stabilization on slopes. A third of each stand should be untouched in a cycle to retain habitat and food sources throughout the reclamation process.

ACTION ITEMS

- ***Assess thicket/shrubland***

  Using the two inventory data sets (2003 and 2009) Park Authority natural resources management staff should evaluate Area H as a whole to determine which thicket/shrublands are to remain, which are to be scaled back and which are to be redirected. These areas should be identified on a site map and annotations should describe the desired future distribution of thicket/shrublands. As these maps are developed consideration should be given to thicket/shrublands in neighboring areas and the creation of a mosaic that spans areas. (See Objective 4.)

- ***Place thickets on a five-year mowing/burning cycle, only mowing/burning one-third of the thicket at a time to retain some habitat and food sources. Mow until adequate fuel is available to burn thicket growth to manage extent of coverage, height and age of thicket stands in Area H.***

  Large swaths of *rubus* thickets occupy a significant portion of the Dead Cow Pit and other areas in Area H. Intervention is required to halt the succession pattern and to restore their interior growth for more productive

cover and food supply for wildlife. Thickets will benefit from mechanical or burn management. Until adequate fuel to supply a burn is available, reduce the height and mass of the thicket swath by mowing. When fuel is adequate, burn to kill vegetation above the surface. Root stock will remain viable and will re-sprout.

OBJECTIVE 4

Coordinate meadow and thicket/shrubland management in Area H with that in Area G as well as Areas I, J, K and L, to create aggregate.

Area H and the eastern end of G have the potential to create a large aggregate of meadow/thicket. Given their shared border and similar ecological composition, it is logical to coordinate their management.

Management Areas I, J, K and L have similar meadow/thicket compositions. Consequently, their management should be coordinated with Areas G and H. Because Areas G and H are immediately adjacent to one another, management tasks performed in Area G can easily be applied to Area H at the same time. However, Areas J, K and L are separated from G and H by Lorton Road; therefore, whether or not to carry out management activities in J, K and L at the same time will depend on time available, equipment needed, the logistics of moving that equipment, etc.

ACTION ITEMS

- ***Create overlay map identifying congruous areas of meadow and thicket/shrubland.***

  Park Authority natural resources staff should evaluate the locations of thicket/shrubland, meadows and any forest stands in the three areas. Incorporating the maps created for establishing a mosaic in Area H (See Objective 3.), staff should diagram areas that are to be managed as meadow and thicket/shrubland as well as those that will shift in location or change in composition.

- ***Establish coordinated burning/mowing cycles for meadow and thicket/shrubland aggregate in Areas G and H as well as I, J, K and L.***

  Based upon the patterns discerned in the overlay map identifying congruous areas of meadow and thicket/ shrubland, develop a maintenance schedule that spans area boundaries and is based on the ecological community type. Permission to burn in Areas I and L is likely to be more complex to obtain than in Areas G and H due to private residences with 1,000 feet of the management area. Burning in Areas G and K will require special consideration due to the gas line that crosses both of these areas.

OBJECTIVE 5

Monitor for forest insects and disease.

A stand of pine in Area H is comparable in size to the Dead Cow Pit. Trees found in the pine forest are particularly vulnerable to the following threats: engraver beetle *(Ips* spp.*)*, southern pine beetle (*Dendroctonus frontalis),* pales weevil *(Hylobius pales)*, white pine weevil *(Pissodes strobi).*

ACTION ITEMS

- ***Look for and record evidence of forest insects and disease as part of a semi-annual field walk by Park Authority natural resources management staff.***

  During the semi-annual walks, staff should record trees and their locations that have evidence of damage from insects or disease. Based upon those recordings, a work order for appropriate treatment should be developed.

- ***Treat for threatening insect or disease infestations present.***

  The Park Authority should treat for pests as necessary.

OBJECTIVE 6

Monitor the health of Giles Run in cooperation with Fairfax County Department of Public Works and Environmental Services (DPWES) .

Giles Run cuts through the Area in a northwest/southeast direction to the east of the Dead Cow Pit, and a tributary flows in an easterly direction along the southern edge of the Cow Pit.

In order to protect these resources, the Park Authority should partner with DPWES in promoting the use of best management practices that include stormwater controls to improve water quality on site and address water quality issues related to park uses.

ACTION ITEMS

- ***Look for evidence of streambank degradation as part of a semi-annual field walk by Park Authority natural resources management staff or in-stream evaluation. If problem areas are identified, those areas should be visited quarterly.***

  While conducting the field walks, Park Authority staff should evaluate stream health. If necessary, perform a separate in-stream evaluation. Make note and take corrective action for any failing banks, exposed utilities and blow downs, as well as human activity, such as illegal dumping.

- ***Prioritize any resource threats, concerns and hazards noted during the field walks and identified in the watershed studies and develop action plans for problems found in the streams, promoting stormwater best management practices.***

  Once concerns have been identified and prioritized, they should be addressed. Restoration strategies and stormwater best management practices are outlined in the *Lower Occoquan Watershed Management Plan.* (The plan is available on the Fairfax County web site at http://www.fairfaxcounty.gov/dpwes/watersheds/loweroccoquan_docs.htm).

- ***Organize volunteer tree planting in areas of poor tree cover, primarily along the north side of the stream.***

  The Giles Run stream valley is overrun with non-native invasive species. Tree planting will help shade out sun-loving invasive species and help regulate stream temperatures. Several locations would benefit from an expanded stream buffer.

OBJECTIVE 7

Manage the pond edge and water quality.

The farm pond on the eastern side of Area H provides one of the few spots of still open water on the Laurel Hill site. It should be managed for aquatic habitat as well as for its edge conditions.

ACTION ITEM

- ***Develop a baseline for aquatic habitat and water quality in the pond***

  The pond provides a unique natural resource, even more valuable in the context of its neighboring ecological communities.

OBJECTIVE 8

Manage for invasive plant species.

Area H has extensive riparian corridors, some with poor tree cover, which makes it vulnerable to non-native invasive plant species. The south-facing slopes on the northern side of Giles Run are particularly overrun with NNIs. Both the riparian forests and small forest stands elsewhere in the Area had high edge to core ratios, which make them more susceptible to NNIs.

ACTION ITEMS

- ***Conduct a Level One* Non-Native Invasive Plant Site Prioritization *as described in Appendices E and H of the* Fairfax County Non-Native Invasive Plant Assessment.**

  Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment.* A more comprehensive follow up to that initial assessment should be completed in Area H. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control* Strategies of the *Fairfax County Non-Native Invasive Plant Assessment*.

- ***Address NNIs in the stream valleys first so as to prevent invasion into the adjacent forest and subsequently the thicket/shrublands and meadows.***

  Because these areas are particularly vulnerable and serve as gateways to the rest of the Area, the stream valleys should be treated first. In the riparian corridors, priority tree planting – an ideal activity for volunteers – should be performed to shade out sun-loving NNIs and provide thermal closure to the stream. Not only should management of the riparian forest seek to eliminate NNIs, but also to expand the stream buffer.

  Areas of Disturbed Forest in the eastern portion and southwest corner of Area H are also overrun by NNIs. While large specimen trees in these areas should be protected, the overwhelming presence of NNIs makes these areas less ecologically valuable.

OBJECTIVE 9

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impact of various management techniques.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work and developing protocols and encouraging volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  Birders performing the Audubon Society's Northern Virginia Bird Survey (NVBS) have observed owls, among others, at Laurel Hill Park. The trees within close proximity to thicket/shrublands provide good habitat for the owls. The trees offer roosts for owls and the brambles provide habitat for the small mammals upon which owls prey. Such conditions occur in numerous locations throughout the park, including Area H.

  Like the Bird Survey, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Monitor and reduce deer populations and implement the County's deer management strategy. Ensure that any field survey work include review of deer trails for indication of NNIs.***

  Deer carry NNIs, already rampant in the stream valleys of Area H, into the interior portions of the Area.

  The deer population at Laurel Hill Park is well above the ecological carrying capacity, posing a significant threat to plant communities on-site. Selectively feeding on native species, deer reduce species diversity and richness. The absence of strong native plant communities creates an environment favorable to NNIs. Gaining the competitive advantage, NNIs are able to establish themselves and thrive. In addition, deer encourage the spread of NNIs by carrying their seeds and redistributing them. The stream valleys in Area H are already host to significant NNI plant communities, and deer are carrying these species into the interior portions of the management area.

  Controlling the deer population would reduce the spread of NNIs and give native species the chance to recover. In addition, controlling the deer population would allow trees to regenerate, which would be particularly beneficial along streams to increase shade and expand riparian forest buffers.

  The deer population at Laurel Hill Park should be reduced such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

- ***Stock pond.***

  The Park Authority should promote catch and release fishing in the pond, periodically adding large-mouth bass.

- ***Provide nesting boxes on site to enhance bird nesting and habitat.***

  Bluebird boxes should be installed in the meadow, even on a temporary basis. No more than one box per two acres should be placed on the site. All boxes should face east. This should be done in coordination with the Virginia Bluebird Society which generally works under permit to build, install, monitor and maintain nest boxes for cavity nesting birds.

- ***Construct tunnel for wildlife crossing under realigned Lorton Road.***

  Lorton Road as well as the other major roads that pass through Laurel Hill Park poses significant obstacles to wildlife. The change in groundcover from earth to pavement and the noise associated with vehicular traffic is confusing to many animals. In addition, cars move through the park at high speeds, which can be dangerous for wildlife. A tunnel would allow for the safe, uninterrupted passage of wildlife under Lorton Road.

- ***Direct management efforts toward achieving the meadow and thicket/shrubland mosaic described under Objective 4.***

  The meadow and thicket/shrubland mosaic offers the best supporting habitat for the greatest diversity of birds and other wildlife. Objective 4 describes how meadow and thicket/shrubland habitats in Management Area H can be managed in conjunction with other management areas to create a mosaic at the heart of Laurel Hill Park and provides recommendations for doing so. The *Treeless Area Technical Manual*, Appendix 6, provides the practical steps for carrying out these recommendations.

OBJECTIVE 10

Educate park users about the natural resources – and their value – in the community.

ACTION ITEMS

- ***Enhance trails with proper maintenance and interpretation along trails and around pond.***

  Numerous trails traverse Area H, winding through thicket/shrubland and riparian forest. The Park Authority should consider installing interpretive panels along these trails and around the pond to educate park users about the site and the habitats therein.

  The Park Authority has entered a maintenance agreement with the group, Mid-Atlantic Off Road Enthusiasts (MORE), according to which the group has "adopted" the trails and will assume trail maintenance responsibility. The Park Authority should work with MORE to insure the safety of the Laurel Hill Park trail system and should encourage similar partnerships with other organizations.

- ***Work with the local high school and future middle school to develop an outdoor education program utilizing the park.***

  The 2004 GMP/CDP proposes an education center in Area H, along the northern edge of the area, next to the disc golf course and parking facility. Most likely this center will be relocated to Area I and will be a small

orientation/interpretation center. (Refer to sidebar on page V:41.) Still, because nearby schools are likely to be frequent users of any educational facilities at the center, the Park Authority should collaborate with them during its development.

- ***Work with disc golfers to minimize their impact.***

  Disc golf has proven harmful to habitats in Area H. The establishment of the course destroyed significant areas of meadow and thicket, and what remains is fragmented. In addition, golfers stray from the course disrupting wildlife and trampling valuable vegetation.

  The Park Authority should conduct an outreach effort targeted at disc golfers to educate them about the importance of the habitat surrounding the course and communicate the steps they can take to minimize their impact on plant and animal communities in Area H.

- ***Erect clear signage listing appropriate behavior within park bounds.***

  To further discourage unplanned trails, illegal dumping and other activities detrimental to the health of the forest, signs should be posted at the future parking areas, at trail heads and at trail intersections listing appropriate activities within the park.

  Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

OBJECTIVE 11

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

ACTION ITEMS

- ***Encourage the Northern Virginia Audubon Society to make the Dead Cow Pit an official data gathering site.***

  Although the site is not one of the Audubon Society's regular data collection points, birders have observed an active and diverse bird population in the Dead Cow Pit. Making this site an official survey point could yield valuable data for Laurel Hill Park.

- ***Encourage volunteer groups or offer site access to graduate students to systematically survey mammals, birds, fish, reptiles, amphibians and invertebrates.***

  As stated under Objective 9, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

MANAGEMENT AREA H – MANAGEMENT RECOMMENDATION PRIORITIZATION						
Ecological Community Types	Acidic Oak-Hickory Forest	Disturbed Forest	Floodplain Forest	Pine-Hardwood Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 1: Monitor current conditions						
• Conduct semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	April/Sept
• Develop annual maintenance plans	**1**	**1**	**1**	**1**	**1**	**1**
• Perform BioBlitz	**2**	**2**	**2**	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**	**3**	**3**	**3**
Objective 2: Initiate slow reclamation of fescue-dominated pastures and grasslands (3 areas)						
• Mow or burn meadows					**1**	
• Manage tree growth					**1**	**1**
• Drill seed meadow					**2**	
Objective 3: Manage thicket/shrublands						
• Assess quality of thicket/ shrublands						**1**
• Put on five year rotation for mowing/burning						**2**
Objective 4: Coordinate meadow and thicket/shrubland management with adjacent Areas G, H, I, J, K and L						
• Develop overlay map					**1**	**1**
• Coordinate management methods					**1**	**1**
Objective 5: Monitor for forest insects and disease in the Pine-Hardwood Forest						
• Record evidence of infestation				**2**		
• Treat insect and disease				**2**		
Objective 6: Monitor the health of Giles Run						
• Look for and record stream degradation			**1**			
• Prioritize threats to stream			**1**			
• Organize volunteer tree planting			**3**			

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 80: Prioritization of action items in Management Area H by community group

MANAGEMENT AREA H – MANAGEMENT RECOMMENDATION PRIORITIZATION						
Ecological Community Types	Acidic Oak – Hickory Forest	Disturbed Forest	Floodplain Forest	Pine-Hardwood Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 7: Manage the pond, pond edge and water quality						
• Develop a baseline		**2**			**2**	
Objective 8: Manage for invasive plants (NNIs)						
• Conduct NNIAP study	**1**	**1**	**1**	**1**	**1**	**1**
• Address NNIs in stream valleys			**2**			
Objective 9: Monitor and manage wildlife						
• Conduct wildlife studies	**2**	**2**	**2**	**2**	**2**	**2**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**	**1**	**1**	**1**
• Stock pond		**2**			**2**	
• Install nesting boxes					**3**	
• Install tunnel for wildlife crossing		**1**		**1**		**1**
• Direct management efforts for mosaic (also see Obj. 4)					**1**	**1**
Objective 10: Educate park users about natural resources						
• Add interpretative signage to trails					**3**	**3**
• Use Area H for educational opportunities					**2**	
• Work with disc golfers to minimize impact	**1**	**1**	**1**	**1**	**1**	**1**
• Erect clear signage listing appropriate behavior	**3**	**3**	**3**	**3**	**3**	**3**
Objective 11: Form partnerships with nonprofits and agencies						
• Encourage Audubon Society efforts	**1**	**1**	**1**	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 80, continued: Prioritization of action items in Management Area H by community group

AREA I: COMMUNITY PARK

Figure 81: Management Area I from Lorton Road

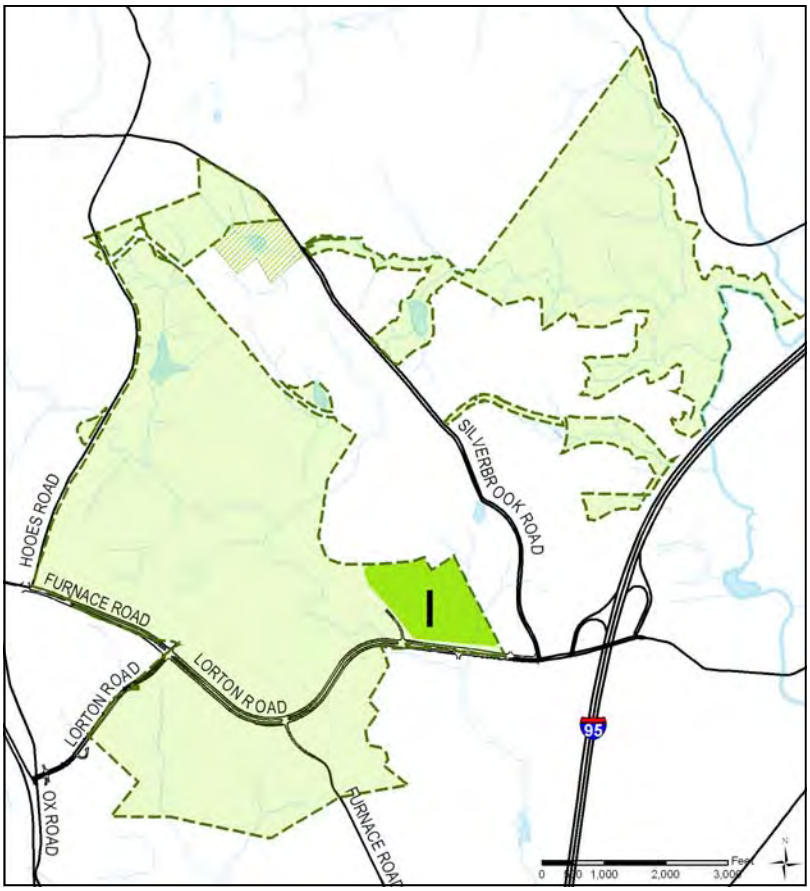


Figure 82: Location of Management Area I within Laurel Hill Park

Site Influences

Natural Site Conditions

Area I is a 38-acre site, on the far eastern edge of the Laurel Hill Park property (Figure 82). Abutting residential housing, its eastern edge is comprised of a Mesic Mixed Hardwood Forest and Pine-Hardwood Forest, both planned to remain as a woods that serve as a buffer to the adjacent neighborhood (Figure 83). The former entry road to the Laurel Hill House serves as a natural divide between the forested lands to the east and more open young meadows on the slopes and thicket lands to the west. A small patch of floodplain forest is flanked by a similarly sized patch of Disturbed Forest to its northwest. Much deer activity is visible on this area.

Two formally designated Chesapeake Bay Resource Protection Area (RPA) corridors bisect the area, aligned with two tributary stream valleys (Figures 85-86).

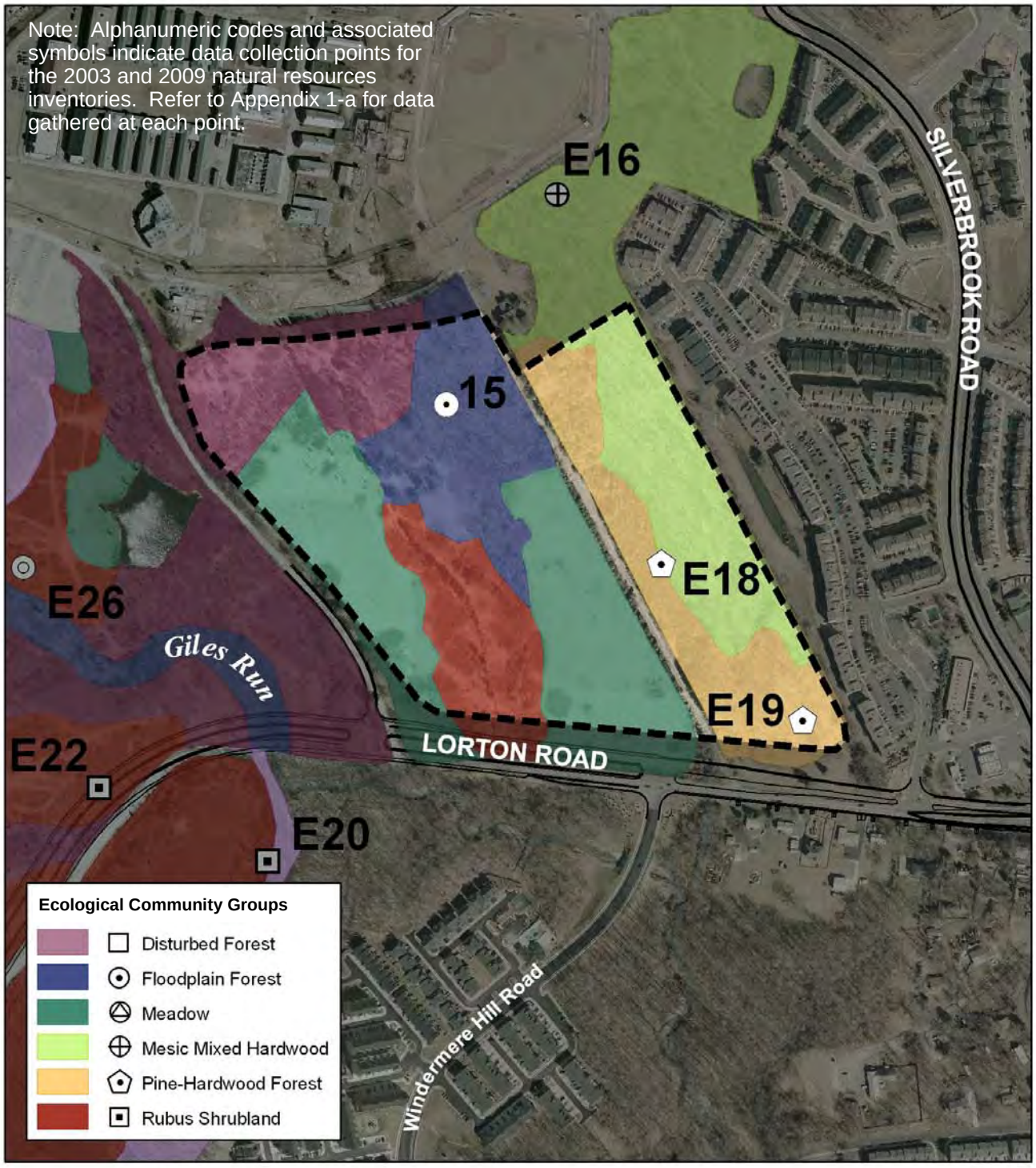


Figure 83: Map of ecological community groups found in Management Area I

Planned Site Activities

The western portion of this site is planned for active recreation uses, among them a children's play area, a skate park, a dog park and two areas of multi-use courts. A picnic area is proposed as a transition between these uses and the resource protection area to the east.

Area I can be accessed from Lorton Road and will serve the residents located to the east and south of the park. Directly north of the Area is the historic Laurel Hill House, a part of the Reuse Area.

A visitor/nature center proposed for Area H may be relocated to Area I to provide site orientation and interpretation.

No formal trail system is proposed for this site.

Visitor/Nature Center

The 2004 GMP/CDP proposes a "nature center for the interpretation of the natural resources" in Area A, as well as a visitor/nature center in Area H, which would provide "site orientation and natural and cultural resource interpretation."

Given the intent to protect the forest resources in Area A and limit human access to the site, the proposed center will not be located there. Similarly, the visitor/nature center proposed for Area H will likely be moved to Area I. This will be a small building for site orientation and interpretation.

Currently, a recently installed kiosk/ seating area near the parking lot at the northern edge of Area H provides site orientation and interpretation for Giles Run Meadow.

Current Site Activities

Area I falls within the D.C. Workhouse and Reformatory National Register District and viewshed for the Laurel Hill property (Figure 84). Any site development within the district that requires a site plan permit will also require approval from the Fairfax County Architectural Review Board. In addition, the land transfer agreement requires approval from the Virginia Department of Historic Resources and the Lorton Heritage Society before development can occur.

Implementation of the facilities proposed in the 2004 *Laurel Hill Park General Management Plan and Conceptual Development Plan* (GMP/CDP) has not begun. There are no formal trails, parking facilities, etc. in Area I. However, the construction of an effluent waterline running from the I-95 Landfill/Energy Resource Recovery Center south of Area K into Area I is nearing completion. The line runs along the western side of Furnace Road and then the northern side of Lorton Road before turning into Area I at the access road.

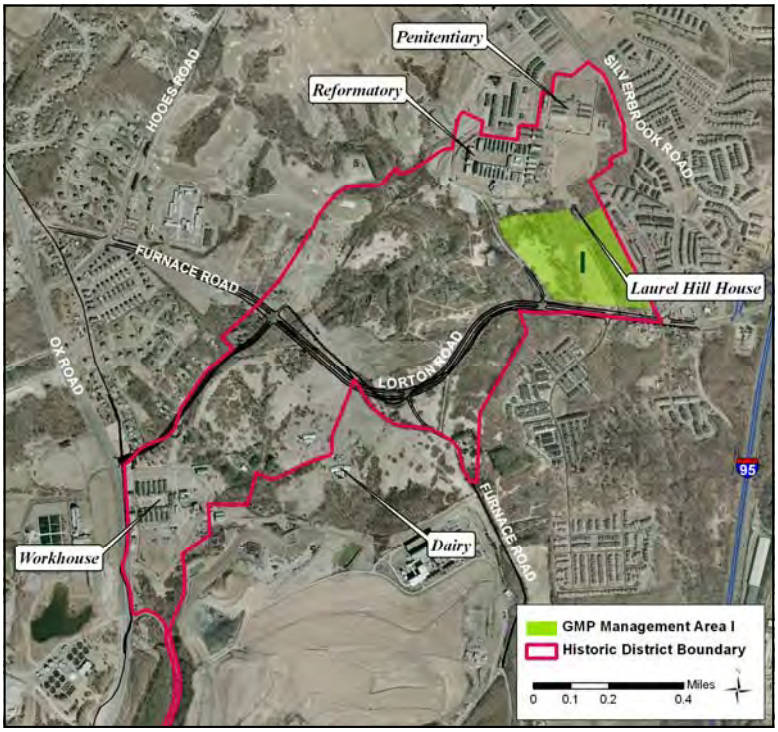


Figure 84: Location of Management Area I within the National Register District

Anticipated Timeline for Planned Activities Implementation

More than half of Area I is programmed for intense active recreation in future development. However, funding for the improvements has not been allocated, nor is there a timetable for improvements. It is likely that improvements will not be made in the next fifteen to twenty years.

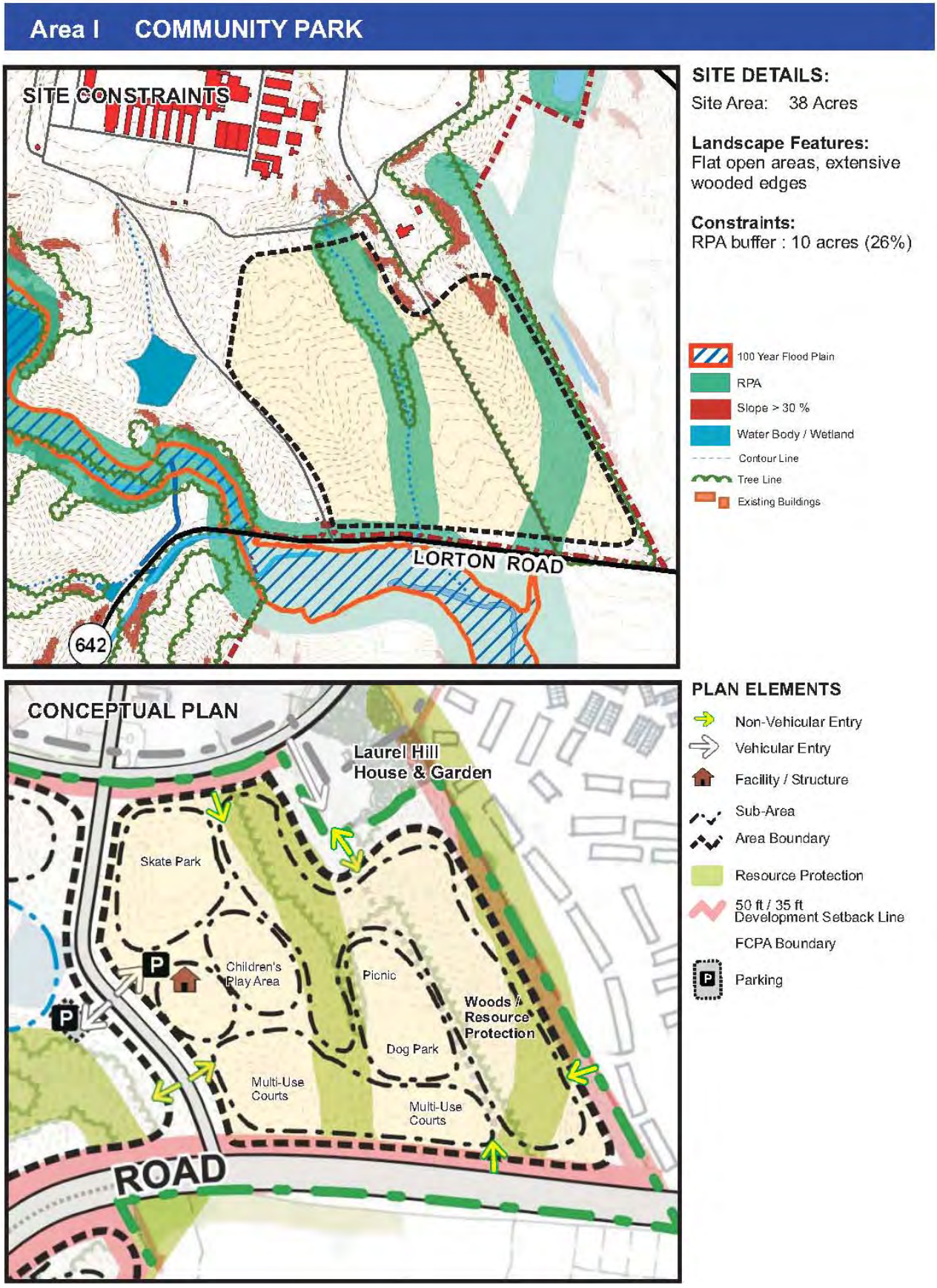


Figure 85: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

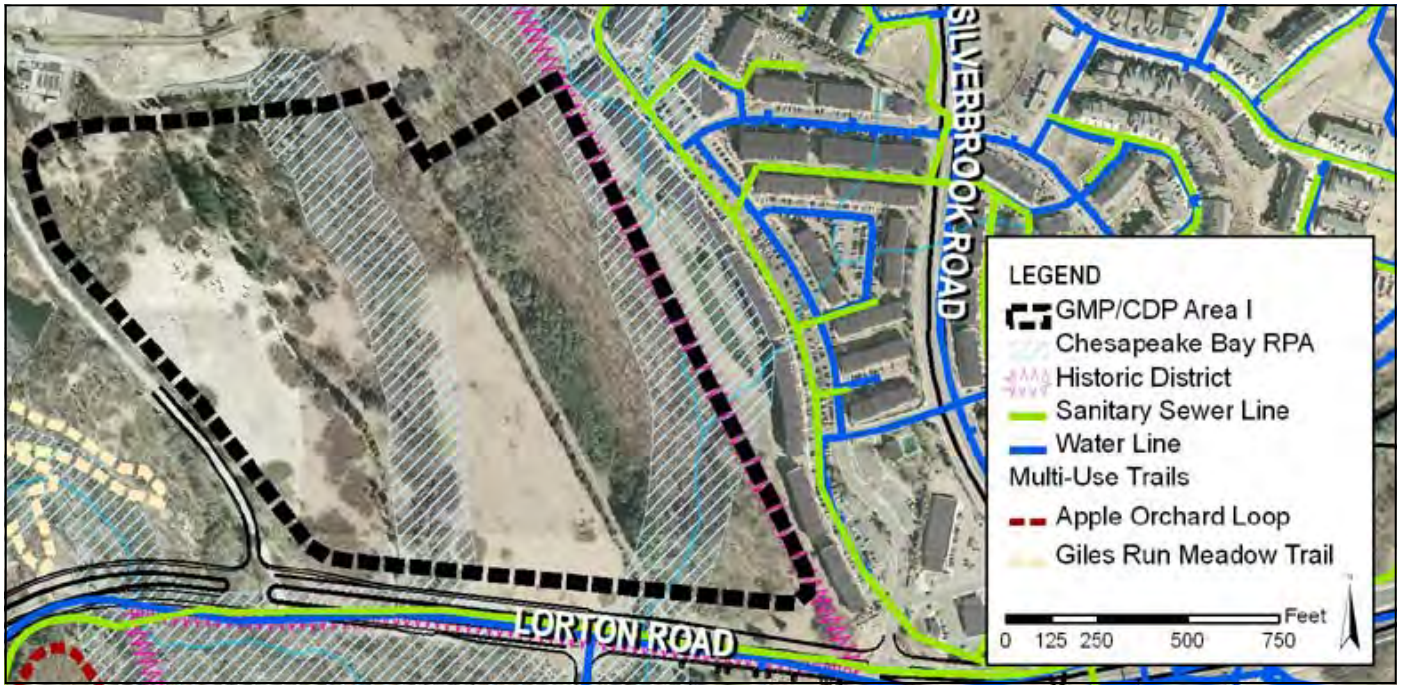


Figure 86: Existing conditions in Management Area I

LHNRMP Recommendations

The proposed activities for the western side of Area I are intensive active recreation. Northeast of the site, abutting it, is the historic Laurel Hill House and gardens. The access drive to the house, now abandoned, serves as a natural corridor leading from Lorton Road to the house. It is somewhat overgrown and flanked with the remnants of a red brick wall. At the intersection of the access drive with Lorton Road, an old sign frame and red brick building remain from earlier days. This corridor can serve as a natural break between the active recreation program west of the drive and the woods and resource protection area east of the drive.

Natural Resource management should focus on ensuring that NNIs do not further invade the Pine-Hardwood and Mesic Mixed Hardwood Forests to the east while managing the meadow and grasslands to the west on an interim basis. In addition to controlling NNIs, particularly in the resource protection areas, reducing the deer population throughout the park will be critical, given their tendencies to spread NNIs and impede forest regeneration and understory growth.

Management Goal for Area I

Improve the ecological health of the woodlands in the eastern portion of Area I while managing the meadow and thicket/shrublands on the western side of the area as interim uses until plans for a active recreation are implemented.

Management Objectives

The meadows, thicket/shrublands and riparian forests in the western half of Area I are to become a Community Park, filled with active recreation uses. Planned activities for the park include a children's playground, dog and skate parks and multi-use courts, all of which are activities that assume a more suburban park aesthetic. Until these plans are implemented, which may be as long as fifteen or twenty years in the future, these areas should be maintained according to their current ecological community type. Once the active recreation uses are in place, Area I will require a long-term management regime for the interplay of neighboring park users with the woodlands that are to remain in the eastern portion of the site.

The existing woodlands on the eastern perimeter of the site and within the RPA boundary will remain woodlands in perpetuity. Management of the woodlands should focus on improving their health and removing non-native invasive plan species (NNIs) over the long term.

OBJECTIVE 1

Monitor the current conditions of the natural resources within the area regularly.

Given the proposed land uses for Area I, monitoring will be essential to determine the impact of those changes. Regular systematic monitoring will enable staff to identify and address problems in the short term and track more subtle changes and trends to be addressed over the long term.

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks by Park Authority natural resources staff to qualitatively monitor the health of the woodlands and stream. If problem areas are noted, those areas should be walked quarterly.***

  Park Authority natural resources management staff should conduct semi-annual field walks to qualitatively monitor the health of the meadows and woodlands. Staff should walk the property boundaries, trails and stream valleys, noting all observations. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

  The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the following concerns.

  Trails

  - Unauthorized trails
  - Vegetation overhanging trails

Abutting Properties

- Property intrusions, mowing, clearing trails
- Property markers that are missing or in need of repair
- Dumping

Streams

- Down trees on trails or blow downs (i.e. fallen trees) in streams
- Stream blow-outs or head cuts
- Bad odors or gray water

General

- Non-native invasive species, particularly their spread in the eastern woodlands
- Defoliation in trees or other signs of tree disease
- Indications of damage from wildlife
- Erosion on steep slopes

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and maintenance plans developed to address these problems. The list should be developed by season, so that necessary activities can be completed when operations staff has time for 'fillers'.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  A BioBlitz – typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area – for Area I should be performed before plans for the Community Park are implemented, so that a before-and-after comparison can be made to determine the impact of the Community Park. This event could be organized by a graduate student or intern and performed with the help of Park Authority staff, community members, students and other volunteers.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Manage the lands slated to be developed for active recreation uses for interim use (fifteen to twenty years anticipated) as meadows and thicket/shrublands.

The western portion of Area I should be managed for interim uses (fifteen to twenty year timeframe) according to a regime that is economically and logistically reasonable.

ACTION ITEMS

- ***Perform a prescribed burn, or if not possible use mechanical methods, in areas of open meadows and thickets.***

  There are two significant treeless areas in Area I; one along its western edge and a second in its center, between the two Chesapeake Bay RPAs. As is the case in Areas G, H, J, K and L, all of which have similar meadow/thicket composition, these treeless areas are overrun with tall fescue. Given their close proximity and similar ecological composition, meadows in Areas G, H, J, K and L should be considered when developing mow/burn cycles for Area I.

  Dense stands of fescue should be burned in late winter or early spring. While burning will not kill the crowns, it will destroy the thick thatch and inhibit fescue growth, giving a competitive edge to native grasses. Given the density of the thatch and moisture retention that comes with remaining green for most of the year, it may be necessary to burn two or three years in succession. If three burning cycles does not adequately control the fescue, a chemical treatment (glyphosate) should be applied in early spring or late autumn – when fescue is green but native species are dormant – and followed up with a burn again in late winter or early spring.

  Alternatively, if a burn is not possible, chemical treatment should be applied to the fescue prior to mowing. Following an application of glyphosate, the site should be mowed twice with a mulching blade. Two months after mowing, the site should be drill seeded and the placed on a one- to three-year mowing cycle.

  Burn or mechanical management methods will interrupt succession and maintain the sites as treeless areas. The initial disturbance action should take place in the next two years, after which a regular mow/burn schedule should be established. The following considerations should be made in determining whether to mow or burn:

  - Burning to mineral soil will better than mechanical methods promote forbs and warm-season grasses, increasing plant diversity and encouraging growth of native species.
  - The best estimate for the interim time period is fifteen to twenty years before the meadow and thicket areas are developed for active recreation uses, making a slow reclamation process through burning and mowing possible.
  - Permission will be required from adjacent property owners prior to any burn.
  - The thicket/shrublands and riparian forest land that divide the two meadows are essential to the health of the stream. Any management activities conducted in the meadow areas should preserve that stream buffer, at least 100 feet on either side of the stream as specified by the Chesapeake Bay Preservation Ordinance. Specific regulations govern any activities that take place in the RPA.

- ***Manage tree growth to achieve a maximum of 25 to 50 trees per acre on meadow sites.***

  In order to maintain the open character of a meadow, trees should be limited to no more than 25 to 50 per acre. Burning will most likely kill the younger unhealthy trees that should be targeted for removal. If there are larger, mast-producing trees (like oaks) that the Park Authority wishes to retain, a circle should be mowed around the tree to reduce fuel loads prior to the burn. In the absence of a burn, the selective removal of unhealthy, non-native invasive or otherwise undesirable trees can be achieved using one of the following methods of removal: girdling; frilling; felling and treating the stump with herbicide; or, for trees less than four to six inches in diameter, performing a basal bark spray, whereby the lower 12 to 18 inches of the trunk are sprayed with an herbicide.

- ***Drill seed meadow site two months after prescribed burn or chemical treatment.***

  Once mineral soil has been exposed, the meadow site should be drill seeded with native warm-season grasses.

  Note: In locations where reclamation can occur over a longer time period – converting fescue fields to native warm-season grass meadows over a period of ten years or more – Park Authority staff should perform repeated burns in conjunction with repeated mowing cycles, thereby allowing native plants and the native seed bed on site to dominate over time. This more gradual conversion is an alternative strategy to the burn/ mechanical/chemical method described above and precludes the need for drill seeding with cultivated seeds, thereby reducing costs.

- ***Mow or burn thicket/shrublands between the two meadows.***

  Thickets between the two meadows are overgrown and need to be knocked back. Intervention is required to halt the succession pattern and to restore their interior growth for more productive cover and food supply for wildlife. Thickets will benefit from mechanical or burn management. Until adequate fuel to supply a burn is available, reduce the height and mass of the thicket swath by mowing. When fuel is adequate, burn to kill vegetation above the surface. Root stock will remain viable and will re-sprout.

  Thickets should be mowed or burned within the next year or two, and then a five-year mowing/burning cycle should be established. Only one-third of the thickets should be treated at any given time to retain some habitat and food.

  Note: Some of these thickets are located within the Chesapeake Bay RPA, which extends 100 feet from the stream. Specific regulations govern any activities that take place within these area. These regulations should be reviewed before any thicket management strategies are implemented.

OBJECTIVE 3

Monitor for forest insects and disease.

During one of their site visits to Laurel Hill Park, ESA staff observed teams spraying for cutworm (*Agrotis, Amathes, Peridroma, Prodenia* spp.). Cutworms, as well as other insects and disease, pose a threat to the forests in the eastern portion of Area I. Populations need to be monitored and controlled to ensure the health of the forest.

Threats to the Mesic Mixed Hardwood Forest in Area I include the following list.

Insects

- Asian Gypsy Moth (AGM) *(Lymantria dispar)*
- Asian Longhorned Beetle *(Anoplophora glabripennis)*

Diseases

- Beech Bark Disease *(Neonectria coccinea)*
- Dogwood Anthracnose *(Discula destructiva)*
- Dutch Elm Disease *(Ophiostoma ulmi)*
- Elm Phloem Necrosis
- Oak Decline
- Oak Wilt *(Ceratocystic fagacearum)*

In Area I, the pine stands are particularly vulnerable to the following insects.

- Engraver Beetle *(Ips* spp.*)*
- Southern Pine Beetle (*Dendroctonus frontalis)*
- Pales Weevil *(Hylobius pales)*
- White Pine Weevil *(Pissodes strobi)*

ACTION ITEMS

- ***Look for and record evidence of forest insects and disease as part of a semi-annual field walk by Park Authority natural resources management staff.***

  Look for emerald ash borer in green ash trees within the floodplain forest. Although eradicated in 2002, the borer reappeared in 2008 and continues to plague the ash population in Fairfax County. Cutworms are also a problem. During field work, ESA observed that cutworms had chewed through 30% or more of the green leaves on oaks and other hardwoods.

  Record the locations of trees showing evidence of damage from insects or disease and create a work order for treatment.

- ***Treat for cutworm and other threatening insect or disease infestations present.***

  The Park Authority should continue to spray for cutworm and treat for other pests as necessary.

OBJECTIVE 4

Improve stream health in cooperation with Fairfax County Department of Public Works and Environmental Services (DPWES) .

With increasing urbanization surrounding the park, poorly managed stormwater will continue to degrade Area I and its habitat.

In order to protect these resources, the Park Authority should partner with DPWES in promoting the use of best management practices that include stormwater controls to improve water quality on site and address water quality issues related to park uses.

ACTION ITEMS

- ***Look for evidence of stream degradation as part of a semi-annual field walk by Park Authority natural resources management staff. If problem areas are noted, field walks should be increased to quarterly excursions.***

  Evaluate stream health during walks and determine if a separate in-stream evaluation is needed. Note any failing banks, exposed utilities and blowdowns, as well as human activity such as illegal dumping.

- ***Prioritize any resource threats, concerns and hazards noted during the field walks and identified in the watershed studies and develop action plans for problems found in the streams, promoting stormwater best management practices.***

  Once concerns have been identified and prioritized, they should be addressed. Restoration strategies and stormwater best management practices are outlined in the *Lower Occoquan Watershed Management Plan.* (The plan is available on the Fairfax County web site at http://www.fairfaxcounty.gov/dpwes/watersheds/loweroccoquan_docs.htm).

- ***Organize volunteer tree planting in areas of poor tree cover.***

  The stream valleys in Area I are victim to NNIs. Tree planting will help shade out sun-loving invasive species and help to regulate stream temperatures. Several locations would benefit from a more robust stream buffer.

- ***Enlist volunteers to clear rubble out of stream.***

  The streams need to be cleared of debris, litter and rubble. This type of clean up activity is an opportunity to engage the community and enlist volunteers.

OBJECTIVE 5

Manage for NNIs, particularly in the pine-hardwood and mesic mixed forests in the eastern portion of the Area.

NNIs are one of the biggest threats to the health of the forest stands at Laurel Hill Park. Because the pine-hardwood and mesic mixed forests in the eastern portion of Area I are not expected to be developed as part of the Community Park, the long term health of those forests is particularly important.

ACTION ITEMS

- ***Conduct a Level One* Non-Native Invasive Plant Site Prioritization *as described in Appendices E and H of the* Fairfax County Non-Native Invasive Plant Assessment.**

  Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment.* A more comprehensive follow up to that initial assessment should be completed in Area I. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control Strategies* of the *Fairfax County Non-Native Invasive Plant Assessment.*

- ***Address NNIs in the stream valleys first so as to prevent invasion into the adjacent forest.***

  Because stream valleys are particularly vulnerable and serve as gateways to the forest stands, they should be treated first. Priority tree planting should be performed to shade out sun-loving NNIs and provide thermal closure to the stream. Tree planting is an ideal activity for volunteers.

- ***Allow the forest to mature to promote shade and a more mature forest structure, which will deter invasive species from spreading.***

  Tree-of-heaven should be removed from the forest stands. Within the Disturbed Forest tracts, the ecological community should be allowed to mature. Once the forest structure is better established, sun-loving NNIs will have difficulty establishing.

OBJECTIVE 6

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impact of various management techniques.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work and developing protocols and encouraging volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  With the BioBlitz serving as a baseline, subsequent wildlife studies should be conducted to determine population or behavioral changes and track trends, particularly once the plans for the Community Park have been implemented and the land uses for that site change. Studies should focus on the forests in the eastern and northern portions of the Area.

  Like the Northern Virginia Bird Survey (NVBS) conducted by the Audubon Society of Northern Virginia, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Monitor and reduce deer populations and fully implement the County's deer management strategy.***

  The deer population at Laurel Hill Park is well above the ecological carrying capacity, posing a significant threat to plant communities on-site. Selectively feeding on native species, deer reduce species diversity and richness. The absence of strong native plant communities creates an environment favorable to NNIs. Gaining the competitive advantage, NNIs are able to establish themselves and thrive. In addition, deer encourage the spread of NNIs by carrying their seeds and redistributing them.

  Significant deer activity was observed in Area I over the course of site visits and field work. Deer browse

has been detrimental to the young samplings in the forest communities, and the stream valleys are of particular concern given their vulnerability to the spread of NNIs. Controlling the deer population would allow trees to regenerate, which would be particularly beneficial along streams to increase shade and expand riparian forest buffers.

The deer population at Laurel Hill Park should be reduced such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

OBJECTIVE 7

Minimize encroachment into Area I.

Manage human activity and interplay of park users and natural resources in Area I, addressing human intrusions such as illegal dumping, boundary encroachments and inappropriate behavior that would adversely affect the natural resources.

ACTION ITEMS

- ***Install monuments along property boundaries, both along park edge and private residences.***

  Area I is bordered by a residential community to the east and south. Once the Adaptive Reuse Plan for the former Lorton Prison Reformatory and Penitentiary is implemented, a mixed-use community will be located to the north. Such close proximity to a forest can be tempting to neighbors: forest blocks may be used as dumping sites for yard or construction debris or as personal space for illegal structures such as storage sheds. In order to prevent such encroachment, the property boundary should be well articulated (monumented) and should include point-on-line witness markers where needed along the urban interface. Monuments installed along the property boundary will educate neighbors as to the location of the boundary and assist park managers in determining whether encroachments are taking place. If illegal dumping or encroachments occur, Park Authority staff should contact both the adjacent neighborhood association and the individual property owner to ask that they be a good neighbor and stop the illegal activity.

- ***Minimize or avoid impacting large woodland blocks with new trail alignments or trail connections.***

  Currently, Area I is void of the walking and bicycle trails that attract visitors to some of the other Areas in the park. However, the planned Community Park will introduce a new level of activity to the Area, and many of the visitors will be coming from the residential communities to the east and south and in the future, to the north as well. To deter park users from forging their own trails – which can create additional corridors for the conveyance of undesired plant material and litter, and if poorly sited, can cause erosion – the Park Authority should construct trails between the Community Park and these residential areas. These trails should provide access to the park along routes that do not cut into vulnerable forest blocks.

- ***Erect clear signage listing appropriate behavior within the park bounds and in woodland edges.***

  To discourage unplanned trails, illegal dumping and other activities detrimental to the health of the forest, signs should be posted along the park boundary and at trail heads and intersections listing appropriate activities within the park.

Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

- ***Provide a visitor/nature center offering basic services and interpretation.***

  The 2004 GMP/CDP proposes an education center in Area H, along the northern edge of the area, next to the disc golf course and parking facility. Most likely this center will be relocated to Area I and will take the form of a small orientation/interpretation center. In addition to providing site orientation, interpretation and other basic visitor information, this facility should be used to educate park users about the site's natural resources and their value to the community, promoting proper behavior within the park and encouraging stewardship of the natural environment at Laurel Hill Park and beyond.

OBJECTIVE 8

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

More than half of Area I is planned for very active recreation uses. Establishing monitoring and tracking now during the interim use of the meadows and thicket/shrublands, followed by monitoring after construction may yield supportive and interesting data on the value of open meadows and thickets.

ACTION ITEMS

- ***Encourage the Northern Virginia Audubon Society to continue their monitoring programs and retain their NVBS data collection station in Area I.***

  Currently the Northern Virginia Audubon Society has one data collection point in the northwestern corner of the Area. A second data collection point is located just east of the Area in the townhouse community. Park Authority staff should encourage the Audubon Society volunteers to maintain that second data point, moving it slightly west, outside of the townhouse community and along the eastern edge of Area I.

- ***Encourage volunteer groups or offer site access to graduate students to systematically survey mammals, birds, fish, reptiles, amphibians and invertebrates.***

  As stated under Objective 6, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

MANAGEMENT AREA I – MANAGEMENT RECOMMENDATION PRIORITIZATION						
Ecological Community Type	Disturbed Forest	Floodplain Forest	Mesic Mixed Hardwood Forest	Pine- Hardwood Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 1: Monitor current conditions						
• Perform semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept
• Develop annual maintenance plans	**1**	**1**	**1**	**1**	**1**	**1**
• Perform BioBlitz	**2**	**2**	**2**	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**	**3**	**3**	**3**
Objective 2: Manage grasslands and thicket/shrublands as interim uses						
• Mow or burn meadows					**1**	
• Manage tree growth					**1**	**1**
• Drill seed meadow					**2**	
• Mow or burn thickets/ shrublands						**2**
Objective 3: Monitor for forest insects and disease						
• Record evidence of infestation	**2**	**2**	**2**	**2**		
• Treat for cutworm and other insect or disease infestations present	**2**	**2**	**2**	**2**		
Objective 4: Improve stream health						
• Look for and record stream degradation		**2**				
• Prioritize threats to stream		**2**				
• Organize volunteer tree planting		**3**				
• Clear rubble		**3**				
Objective 5: Manage for NNIs in woodlands						
• Conduct NNIAP study	**1**	**1**	**1**	**1**		
• Address NNIs in stream valley first		**2**				
• Let forest mature for shade creation						

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 87: Prioritization of action items in Management Area I by community group

MANAGEMENT AREA I – MANAGEMENT RECOMMENDATION PRIORITIZATION						
Ecological Community Type	Disturbed Forest	Floodplain Forest	Mesic Mixed Hardwood Forest	Pine-Hardwood Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 6: Monitor and manage wildlife						
• Conduct wildlife studies	**2**	**2**	**2**	**2**	**2**	**2**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**	**1**	**1**	**1**
Objective 7: Minimize encroachments						
• Install monuments on property boundaries			**2**	**2**	**2**	**2**
• Minimize or avoid woodlands for new trails or trail connections	**2**	**2**	**2**	**2**		
• Erect clear signage listing	**3**	**3**	**3**	**3**	**3**	**3**
• Create nature center					**3**	
Objective 8: Form partnerships with nonprofits and agencies						
• Encourage Audubon Society	**1**	**1**	**1**	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 87, continued: Prioritization of action items in Management Area I by community group

AREA J: WORKHOUSE HILLS

Figure 88: Picture of Management Area J from Furnace Road

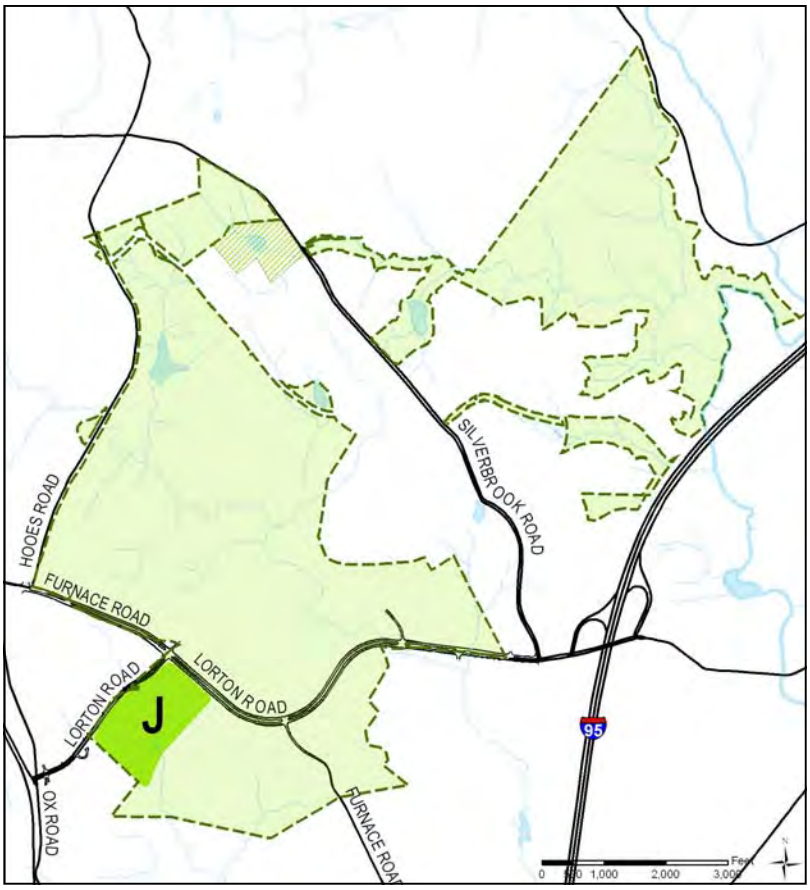


Figure 89: Location of Management Area J within Laurel Hill Park

Site Influences

Natural Site Conditions

Area J, at 41 acres in size, is located on the western edge of Laurel Hill Park, south and east of Lorton Road (Figure 89). The site is composed of open meadows bisected by a stream encapsulated by a Chesapeake Bay Resource Protection Area (RPA). The meadows are composed of heavy, dense fescue and cover approximately half of the site. The remaining site is primarily thicket/shrubland growth within the stream valley. Small areas of heavy tree growth (oak-hickory) and thicket are found on the area's northwestern perimeter. Disturbed Forest woodlands are located along the western perimeter of the area and in the southeastern corner of the area (Figure 90).

Planned Site Activities

Undulating hills and meadows are characteristic of the Workhouse Hills' pastoral history. Uses are proposed in the 2004 *Laurel Hill Park General Management Plan and Conceptual Development Plan* (GMP/CDP) that will compliment the adaptive reuse of the adjacent Occoquan Workhouse and include an exhibit area for various art and sculpture displays, ornamental garden areas, a periodic market and picnic shelters. Recreation is proposed through a variety of trails that traverse the open meadows and hills, as well as designated locations for tent and RV camping

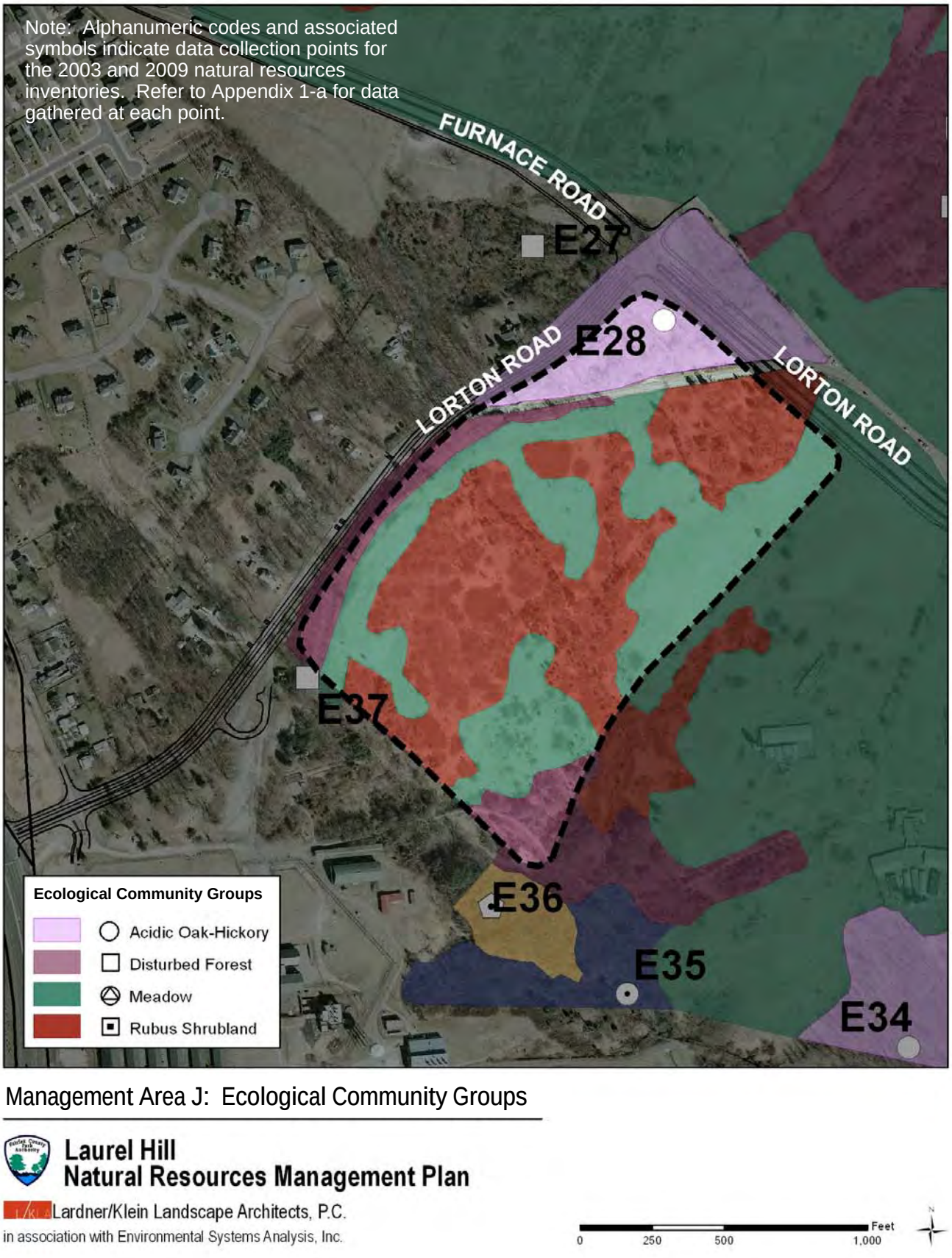


Figure 90: Map of ecological community groups found in Management Area J

(EDAW 2004, 62). These trails will connect to the Cross County Trail (CCT) – known as the Laurel Hill Greenway within the park – and other elements of the park.

Current Site Activities

The CCT/Laurel Hill Greenway (bluestone and recycled asphalt millings surfacing) is located on the western side of the Area J. Future trail connections (natural surfaces—stone dust and gravel mix) into Area J are proposed, connecting the Workhouse to the future picnic and garden site. A shared-use trail, the Workhouse Trail, loops around the perimeter of the Resource Protection Area. The Slaughterhouse Trail is located in the far southern corner of Area J and is not open for equestrian use. The off-road bike loop trails extend into the southern portion of the Area J.

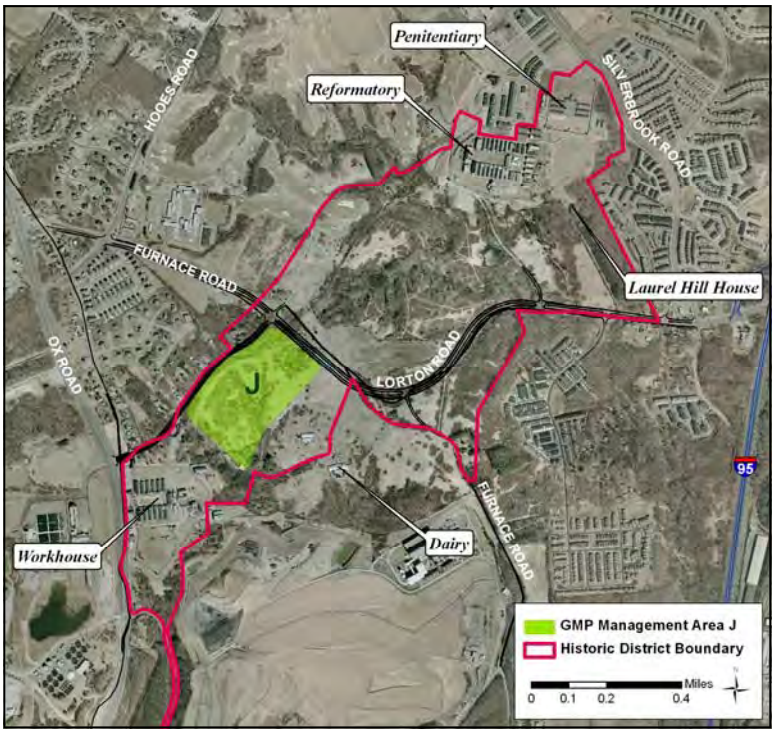


Figure 91: Location of Management Area J within the National Register District

Area J falls within the D.C. Workhouse and Reformatory National Register District and viewshed for the Laurel Hill property. Any site development within the district that requires a site plan permit will also require approval from the Fairfax County Architectural Review Board. In addition, the land transfer agreement requires approval from the Virginia Department of Historic Resources and the Lorton Heritage Society before development can occur.

Anticipated Timeline for Planned Activities Implementation

There has been some discussion of using the meadows as pasture for the future equestrian facility, primarily located in Area K, with the potential to extend west into Area J. Funds for development of any of the proposed facilities, other than trail development, have not been allocated and are unlikely to be available in the near future. It is reasonable to manage the site as an interim use area for the next fifteen to twenty years, slowly converting former pasture from a tall fescue-dominated landscape to a native warm-season grass meadow regardless of future uses, horse

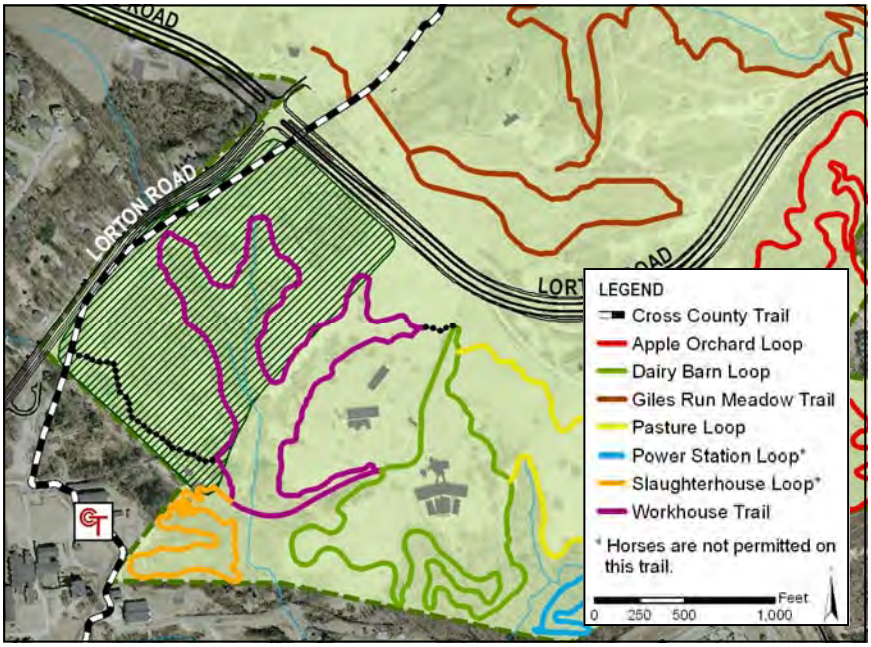


Figure 92: Workhouse Trail in Management Area J

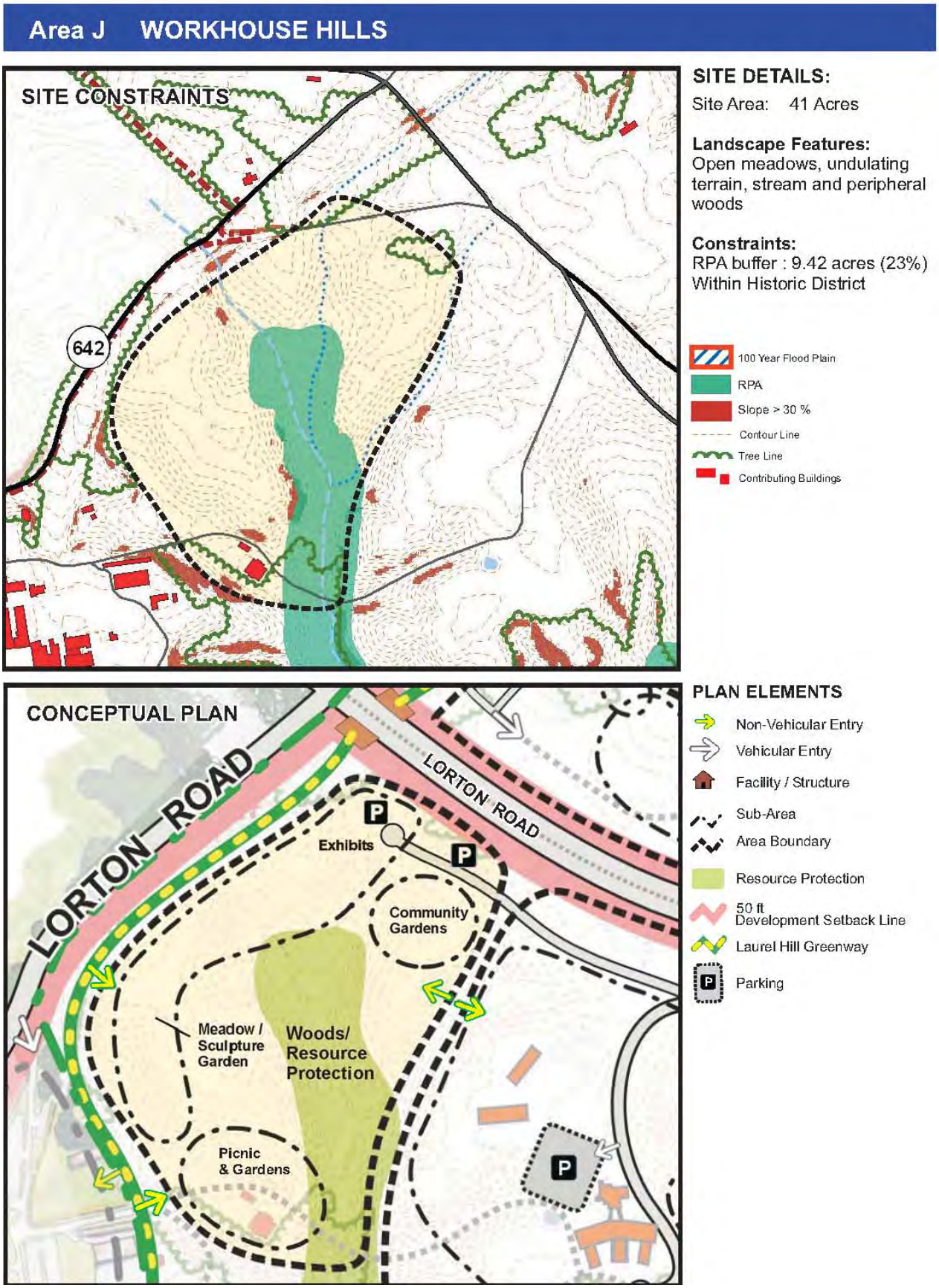


Figure 93: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

pasture or otherwise. This is particularly true for the western area of the site, slated to become a meadow/sculpture garden.

LHNRMP Recommendations

Renovate and enhance the existing pasturelands, moving them from fescue-heavy fields to populations of native warm-season grasses. There is some research on the use of native warm-season grasses as pasture for horses (University of Kentucky; NVSWCD) that should be further explored. The extensive thicket areas should be managed as control elements to keep park users on defined trails and for their ecological value as part of a meadow/thicket mosaic.

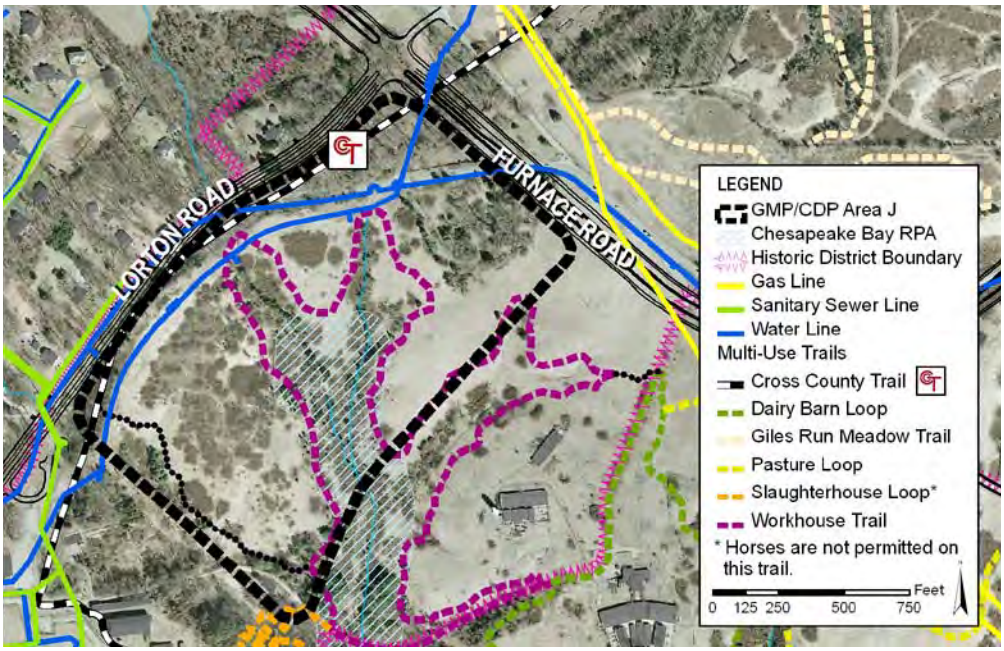


Figure 94: Existing conditions in Management Area J

Management Goal for Area J

Manage the existing meadows and thickets as interim uses in a way that will facilitate the transition to native warm-season grass pasture land, the RPA and its associated woodland in perpetuity and establish measures to protect Area J's natural resources from the shared use trail system (equestrian, pedestrian, bike), recognizing that the planned future use of portions of the site may eventually infringe on the interim use of the meadows and thicket/shrublands.

Management Objectives

OBJECTIVE 1

Monitor the current conditions of the natural resources within the area regularly.

Natural environments are changing constantly, and with the increasing development and urbanization in the Washington, D.C. metropolitan area, Laurel Hill Park faces additional pressures that cause especially rapid change. In order to best manage the resources at the park, Park Authority staff need to determine the status of these resources, what changes are occurring and the impact of those changes. This requires regular, systematic monitoring that will enable staff to identify and address problems in the short-term and track more subtle changes and trends to be addressed over the long-term.

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks to qualitatively monitor the health of the meadows, thicket/shrublands and forested stream valleys. Identified problem areas should be walked quarterly.***

  Park Authority natural resources management staff should conduct semi-annual field walks to qualitatively monitor the health of the meadow, riparian forests and thicket/shrublands. Staff should walk the property boundaries, stream valleys and trails, noting all observations. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

  The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the following concerns:

  Trails

  - Unauthorized trails
  - Vegetation overhanging trails
  - Trail markers that are missing or in need of repair
  - Down trees on trails

  Streams

  - Blow downs (i.e. fallen trees) in streams
  - Stream blow-outs or head cuts
  - Bad odors or gray water

  General

  - Illegal dumping
  - Non-native invasive species, particularly their spread into the Resource Protection Area
  - Defoliation in trees or other signs of tree disease
  - Indications of damage from wildlife
  - Erosion on steep slopes

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and work orders to address these problems developed.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  A BioBlitz – typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area – for Area J should be performed before plans for an equestrian center are implemented, so that a before-and-after comparison can be made to determine the impact of the conversion to pasture. This event could be organized by a graduate student or intern and performed with the help of Park Authority staff, community members, students and other volunteers.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Reclaim fescue-dominated treeless areas and restore to native warm-season grass meadows with intention of becoming pasture in future.

The 2004 GMP/CDP specifies several uses for Area J including a sculpture park, market and gardens. More recently the area has been identified as additional pasture land to support an equestrian center planned for Area K. Tall fescue, a non-native invasive plant species (NNI), provides no ecological value and can be toxic to horses. Eliminating it, regardless of the future uses for Area J, is beneficial to the ecological systems of the park. Given the proximity to Areas K, G and H, enhancement and installation of native warm-season grasses is of particular value.

ACTION ITEMS

- ***Eliminate tall fescue through burning and/or treatment with mechanical or chemical methods.***

  The elimination of tall fescue from Area J should begin immediately, whether the site will be used for horse pasture or not. Shared-use trails bisect the site, including trails used by the equestrian community. Horses are particularly sensitive to fescue toxicity.

  Dense stands of fescue, like those found in Area J, should be burned in late winter or early spring. Given the density of the thatch and moisture retention that comes with remaining green for most of the year, it may be necessary to burn two or three years in succession. If three burning cycles does not adequately control the fescue, a chemical or mechanical method should be used. If chemical, it should be applied in early spring or late autumn – when fescue is green but native species are dormant – and followed up with a burn again in late winter or early spring.

  Alternatively, if a burn is not possible, a combination of chemical and mechanical methods should be employed, with a chemical spray (glyphosate) applied to the fescue, followed by mowing twice with a

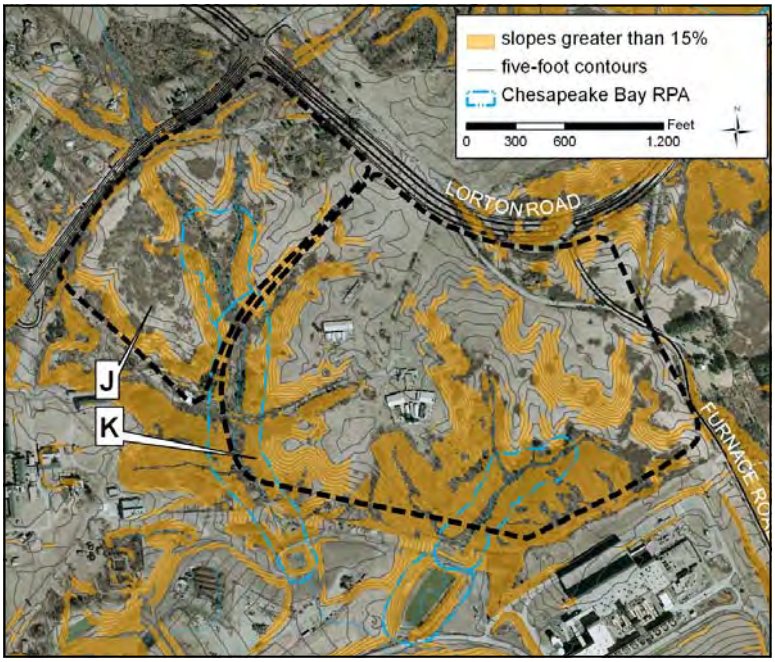


Figure 95: Slopes greater than 15% Management Areas J and K

mulching blade. Two months after mowing, the site should be drill seeded and the placed on a one- to three -year mowing cycle.

When deciding whether to mow or burn, the following considerations should be made.

- Burning to mineral soil will promote forbs and warm-season grasses, increasing plant diversity and encouraging growth of native species.
- Because of the close proximity of private residences to the west of the Area J, staff will need to get permission to burn from adjacent residents.
- Some parts of Area J have slopes above 15%. These are primarily wooded areas or thicket/shrublands located along the southern edge of the management area or along stream valleys; however, small areas of fescue occur on slopes above 15% just north of the Chesapeake RPA shown in Figure 94. These areas may be good candidates for burning due to potential difficulties operating equipment on such steep slopes. On the other hand, burning on slopes may present safety hazards, as fire can spread quickly and may be harder to control on a slope. These issues should considered carefully to determine the most appropriate management strategy.
- The thicket/shrublands and riparian forest that line the stream in the southeast corner of Area J are essential to the health of the stream. Any management activities conducted in the meadow areas should preserve that stream buffer.

- ***Remove trees in excess of 25 to 50 per acre.***

  Unhealthy, invasive or otherwise undesirable trees should be removed using any of the following methods: axe frill; girdle and bark paint herbicide; or fell and treat stump with appropriate chemical method.

- ***Seed site two months after prescribed burn or chemical treatment.***

  After the tall fescue has been removed, the site can be seeded with a drill seeder. Areas that have been approved for pasture can be seeded with cool-season grasses appropriate for horse forage including timothy, Kentucky bluegrass and perennial ryegrass. Appropriate warm-season grasses include big and little bluestem, Indian grass and eastern gamagrass (NRCS 2008, 13-14).

  Areas not approved for pasture should be converted to native warm-season grass meadows or a meadow/ thicket mosaic.

  Note: In locations where reclamation can occur over a longer time period, converting fescue fields to native warm-season grass meadows over a period of ten years or more, Park Authority staff should perform repeated burns in conjunction with repeated mowing cycles, thereby allowing native plants and the native seed bed on site to dominate over time. This more gradual conversion is an alternative strategy to the burn/ mechanical/chemical method described above and precludes the need for drill seeding with cultivated seeds.

OBJECTIVE 3

In the long term, manage meadow and thicket/shrublands as healthy ecological communities in conjunction with similar land cover found in Areas G, H, I, K and L.

Existing meadow and thicket/shrubland communities expected to remain should be part of a long-term management regime that contributes to the establishment of a meadow and thicket/shrubland mosaic at the heart of Laurel Hill

Park. Given the permanent nature of these communities, their management may require a greater investment of financial resources, labor and equipment. Given their location, they should be managed in conjunction with neighboring meadows and thicket/shrublands in Areas G, H, I, K and L.

ACTION ITEMS

- ***Mow or burn thickets and thicket/shrublands along the shared border with Area K (with the understanding the Area K can NOT be burned unless permission is obtained from the gas line operator).***

  Management of the meadows and thicket/shrublands in Area J should be coordinated with the efforts in Area K. Older thicket/shrublands in Areas J and K should be addressed first, mowing or burning (not K, unless permission is obtained from the gas pipeline operator) within the next year or two, and then a three- to five-year mowing/burning cycle should be established. Only one-third of the thicket/shrubland should be treated at any given time to retain some habitat and food.

- ***Once native warm-season grass meadow has been established, explore grazing as a meadow management strategy.***

  Once tall fescue and any other potentially toxic species have been eliminated, Park Authority staff should explore the possibility of introducing livestock to graze the meadows in Area J.

  Grazing as a treeless areas strategy requires that pasture management practices be employed with an emphasis on site-specific, seasonal grazing rotations. Rotation grazing can be an effective management strategy to sustain meadow and has been a cultural resource element in Virginia since the late 1600s. In addition, close attention must also be paid to the ongoing removal of plant species that are problematic/ poisonous to horses and other livestock, including cocklebur, beefsteak, black cherry, black locust, buttercups, jimsonweed, Johnsongrass, milkweed, mustard and pokeweed. Manure clumps must be raked frequently to distribute the manure more evenly; thereby promoting its breakdown and absorption by pasture plants as fertilizer. Manure can also be splayed into the pastures with a manure spreader. Periodically, the pasture should be overseeded with desirable/palatable and nutritious species that horses or other livestock require.

- ***Manage grassland meadows and thicket areas in Areas J, K, G, H, I and L in concert.***

  The core area of Laurel Hill park can be cultivated for a significant mosaic of grasslands and thickets. No funding is available for the implementation of many of the planned activities, suggesting that interim uses may be for as many years as fifteen to twenty, if not longer. Given this timeframe, transforming the ecological value of the existing pasture lands and thicket/shrublands is an important effort.

OBJECTIVE 4

If equestrian use is brought to Area J, and pasture land is required, develop best management practice (BMP) protocols to reduce the impact on the adjacent stream valleys.

The management of the pasturelands used by horses is a complex undertaking. In addition to understanding the grazing practices of horses, manure management presents a specific challenge. The Northern Virginia Soil and

Water Conservation District (NVSWCD) offers much literature and knowledge to assist in the development of a best management plan.

ACTION ITEM

- ***Develop a Natural Resources Conservation Service (NRCS)-approved pasture management plan that incorporates agricultural BMPs.***

  Before converting Area J to pasture, Park Authority natural resources management staff should develop a plan that addresses issues specific to agricultural land use. The plan should include measures to insure the following items.

  - Protection of grazing lands ecosystems
  - Prevention of soil erosion
  - Maintenance or enhancement of soil quality
  - Sustained forage and livestock production
  - Improved water yield and quality
  - Diverse wildlife habitat
  - Aesthetics and open space
  - Quality recreational opportunities

  (*National Range and Pasture Handbook*, page 1-2, NRCS online at http://www.glti.nrcs.usda.gov/technical/ publications/ nrph.html)

OBJECTIVE 5

Manage existing thicket/shrublands to maximize habitat value and provide a riparian buffer within the Chesapeake Bay RPA.

The thicket/shrublands tend to be located on the steeper slopes of the stream valley. They provide ecological value for habitat and food source for wildlife and potential filtering value for stormwater management.

ACTION ITEM

- ***Burn or mow on a five-year cycle, only treating one-third of the thicket/hedgerow at a time to retain some habitat and food at all times.***

  Prescribed burn may also be used to manage the thicket/shrublands. Following the initial burn, thickets should be burned on a five-year cycle.

OBJECTIVE 6

Manage Acidic Oak-Hickory Forest as interim use.

The plan for Area J calls for parking at some date in the same area as the oak-hickory forest is located. Until that time, the forest lands should be monitored to ensure that disease or insects do not take root there and that NNIs are eradicated.

ACTION ITEMS

- ***Look for and record evidence of forest insects and disease as part of a semi-annual field walk by Park Authority natural resources management staff. Treat for threatening insect or disease infestations present.***

  Although likely the stand will be impacted by the future construction of parking, it is important to monitor the stand for insects and disease to benefit the overall health of the Laurel Hill park.

- ***Monitor for NNIs.***

  Remove NNIs from the forest stand and/or mow the perimeter of the stand to contain or prevent the invasion of meadow and thickets by NNIs.

OBJECTIVE 7

Improve stream health in cooperation with Fairfax County Department of Public Works and Environmental Services (DPWES).

With the amount of development on the western side of Area J and its proximity to heavily trafficked roadways, poorly managed stormwater will continue to degrade Area J.

In order to protect the water resources in Area J, the Park Authority should partner with DPWES in promoting the use of BMPs that include stormwater controls to improve water quality on site and address water quality issues related to park uses.

ACTION ITEMS

- ***Obtain base level water quality readings in the stream tributaries for nutrients, sediments/turbidity, dissolved oxygen, macro-invertebrate community.***

  Water quality will become particularly important in Area J once the site is put to agricultural use. An evaluation should be conducted prior to converting the site to equestrian pasture. A schedule for regular water quality testing should be developed as part of the pasture management plan. In addition, BMPs, including the proper storage of manure and stream crossings, should be implemented.

- ***Look for evidence of stream degradation as part of a semi-annual field walk by Park Authority natural resources management staff.***

  While conducting their field walks, Park Authority staff should evaluate stream health. Based on observations made during the field walk, it may become evident that a separate in-stream evaluation is needed. Any failing banks, exposed utilities and blow downs, as well as human activity, such as illegal dumping, should be recorded.

- ***Prioritize any resource threats, concerns and hazards noted during the field walks and identified in the watershed studies and develop action plans for problems found in the streams, promoting stormwater management best practices.***

  Once concerns have been identified and prioritized, they should be addressed. Restoration strategies and stormwater BMPs are outlined in the *Lower Occoquan Watershed Management Plan*. (The plan is available on the Fairfax County web site at http://www.fairfaxcounty.gov/dpwes/watersheds/lowerоccoquan_docs.htm).

- ***Explore the potential restoration of the former prison stormwater pond near the Slaughterhouse.***

  A stormwater pond, in use when the site was a functioning workhouse and reformatory, is located just upstream of the former Slaughterhouse along the maintenance road that runs roughly east/west through Areas J and K. Park Authority staff should work with DPWES stormwater staff and others to assess restoration of this pond to improve water quality in support of the Laurel Hill portion of the Lower Occoquan Watershed Management Plan.

OBJECTIVE 8

Control NNIs.

NNIs will be addressed in much of the area as a result of fescue elimination efforts; however, the stream valleys and associated riparian forest stands remain vulnerable. NNIs threatening riparian areas should be addressed early, before they gain competitive advantage and begin to overtake native species.

ACTION ITEMS

- ***Conduct a Level One* Non-Native Invasive Plant Site Prioritization *as described in Appendices E and H of the* Fairfax County Non-Native Invasive Plant Assessment.**

  Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment.* However, a more comprehensive follow up to that initial assessment is in order. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control Strategies* of the *Fairfax County Non-Native Invasive Plant Assessment*.

- ***Address NNIs in the stream valleys first so as to prevent invasion into the adjacent forest.***

  Because these areas are particularly vulnerable and serve as gateways to the adjacent ecological communities, they should be treated first. In the riparian corridors, priority tree planting should be performed to shade out sun-loving NNIs and provide thermal closure to the stream. Tree planting is an ideal activity for volunteers.

- ***Address NNIs potential related to shared–use, including equestrian, trail that loops the perimeter of the Resource Protection Area.***

  Horse defecation may provide means for distribution of weed seeds on site.

OBJECTIVE 9

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impact of various management techniques.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work and developing protocols and encouraging volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  With the BioBlitz serving as a baseline, subsequent wildlife studies should be conducted to determine population or behavioral changes and track trends, particularly as the management objectives listed above are carried out. In the event Area J is approved for pasture in conjunction with an equestrian facility, once the treeless areas in Area J are converted to native warm-season grass pastures, greater emphasis should be placed on continued studies in the forested and riparian areas.

  Birders performing the Audubon Society's Northern Virginia Bird Survey have observed owls in the dairy farm buildings at Laurel Hill Park. The tall silos and trees within close proximity to thicket/shrublands provide good habitat for the owls. The trees offer roosts for owls and the brambles provide habitat for the small mammals upon which owls prey. Such vegetative conditions occur in numerous locations throughout the park, including Area J.

  Like the Bird Survey, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Provide nesting boxes on site to enhance bird nesting and habitat.***

  Bluebird boxes should be installed in the meadow, even on a temporary basis. No more than one box per two acres should be placed on the site. All boxes should face east. This should be done in coordination with the Virginia Bluebird Society which generally works under permit to build, install, monitor and maintain nest boxes for cavity nesting birds.

- ***Direct management efforts toward achieving the meadow and thicket/shrubland mosaic described under Objective 3.***

  The meadow and thicket/shrubland mosaic offers the best supporting habitat for the greatest diversity of birds and other wildlife. Objective 3 describes how meadow and thicket/shrubland habitats in Management Area J can be managed in conjunction with other management areas to create a mosaic at the heart of Laurel Hill Park and provides recommendations for doing so. The *Treeless Area Technical Manual*, Appendix 6, provides the practical steps for carrying out these recommendations.

- ***Monitor and reduce the deer populations and fully implement the County's deer management strategy.***

  The deer population at Laurel Hill Park is well above the ecological carrying capacity, posing a significant threat to plant communities on-site. Selectively feeding on native species, deer reduce species diversity and richness. The absence of strong native plant communities creates an environment favorable to NNIs. Gaining the competitive advantage, NNIs are able to establish themselves and thrive. In addition, deer encourage the spread of NNIs by carrying their seeds and redistributing them.

The deer population at Laurel Hill Park should be reduced such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

OBJECTIVE 10

Monitor human activity and interplay of park users and natural resources in Area J.

Area J is not immediately adjacent to residential development and therefore is not faced with some of the encroachment challenges that exist elsewhere in Laurel Hill Park. Instead, the primary interplay between park user and natural resources occurs on the multi-use trails.

ACTION ITEMS

- ***Perform necessary maintenance on existing trails and plan new trail alignments, avoiding forest stands and Chesapeake Bay RPAs.***

  The shared-use trail system located in Area J will bring bikes, horses and walkers to the site. Park Authority staff should monitor the system to ensure that informal trails and cut-through paths are not developed. Equestrian use is particularly challenging, as feces may contribute weed seeds to the site.

  The Park Authority has entered a maintenance agreement with the group, Mid-Atlantic Off Road Enthusiasts (MORE), according to which the group has "adopted" the trails and will assume trail maintenance responsibility. The Park Authority should work with MORE to insure the safety of the Laurel Hill Park trail system and should encourage similar partnerships with other organizations.

- ***Erect clear signage along trails outlining appropriate behavior within park bounds.***

  Educating the public in the proper use of the trail system and the need to respect wildlife and plantings is an important component to further the knowledge of the value of resource management.

  Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

OBJECTIVE 11

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

Currently, Laurel Hill Park is one of the data collection sites for the Audubon Society's Northern Virginia Bird Survey (NVBS). The data collected during the survey are useful in determining the health of and appropriate management practices for the ecological community types at Laurel Hill. Establishing partnerships with similar organizations has the potential to increase support for the Park and its maintenance, provide opportunities to collect more data and in turn, learn more about the various habitats present.

ACTION ITEMS

- ***Encourage the Northern Virginia Audubon Society to continue their monitoring programs.***

  Currently the Northern Virginia Audubon Society has one NVBS data collection point in the northern portion of the Area J.

- ***Encourage and assist volunteer groups or offer site access to graduate students to systematically expand the wildlife monitoring programs to include mammals, birds, fish, reptiles, amphibians and invertebrates.***

  As stated under Objective 9, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

MANAGEMENT AREA J – MANAGEMENT RECOMMENDATION PRIORITIZATION				
Ecological Community	Acidic Oak-Hickory Forest	Disturbed Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 1: Monitor current conditions				
• Conduct semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept
• Develop annual maintenance plans				
• Perform BioBlitz	**2**	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**	**3**
Objective 2: Reclaim fescue-dominated treeless areas and restore to native warm-season grasses				
• Eliminate fescue			**1**	
• Reduce tree cover to less than 1/3 of site			**2**	**2**
• Drill seed meadow			**3**	
Objective 3: Coordinate treeless area management with adjacent areas				
• Mow or burn thicket/shrublands in conjunction with Areas G, H, K and L; burn thicket/shrublands in conjunction with G, H and L				**2**
• Explore grazing as management option			**3**	
• Manage meadows and thicket/shrublands in Areas J, K, G, H, I and L in concert			**1**	
Objective 4: Develop BMPs for equestrian pasture use				
• Develop NRCS pasture management plan			**3**	
Objective 5: Manage thicket/shrublands to maximize habitat value				
• Burn or mow on five-year cycle				**2**
Objective 6: Interim management of Acidic Oak-Hickory forest lands				
• Monitor for insect and disease infestations and treat those present	**2**			
• Monitor for NNIs	**2**			

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 96: Prioritization of action items in Management Area J by community group

MANAGEMENT AREA J – MANAGEMENT RECOMMENDATION PRIORITIZATION				
Ecological Community	Acidic Oak-Hickory Forest	Disturbed Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 7: Improve stream health				
• Establish base water quality readings				**2**
• Look for and monitor degradation				**2**
• Prioritize threats to streams				**2**
• Explore restoration of stormwater pond		**3**		
Objective 8: Control NNIs				
• Conduct NNIAP study	**1**	**1**	**1**	**1**
• Address NNIs in stream valleys first				**2**
• Address NNIs related to trail use			**2**	**2**
Objective 9: Monitor and manage wildlife				
• Conduct wildlife studies	**2**	**2**	**2**	**2**
• Provide nesting boxes			**3**	
• Direct management efforts for mosaic			**1**	**1**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**	**1**
Objective 10: Monitor human activity and interplay with resources				
• Maintain trails and new alignments	**2**	**2**	**2**	**2**
• Erect clear signage listing appropriate behavior	**3**	**3**	**3**	**3**
Objective 11: Form partnerships with nonprofits and agencies				
• Encourage Audubon Society efforts	**1**	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 96, continued: Prioritization of action items in Management Area J by community group

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AREA K: EQUESTRIAN CENTER

Figure 97: Former pasture in Management Area K

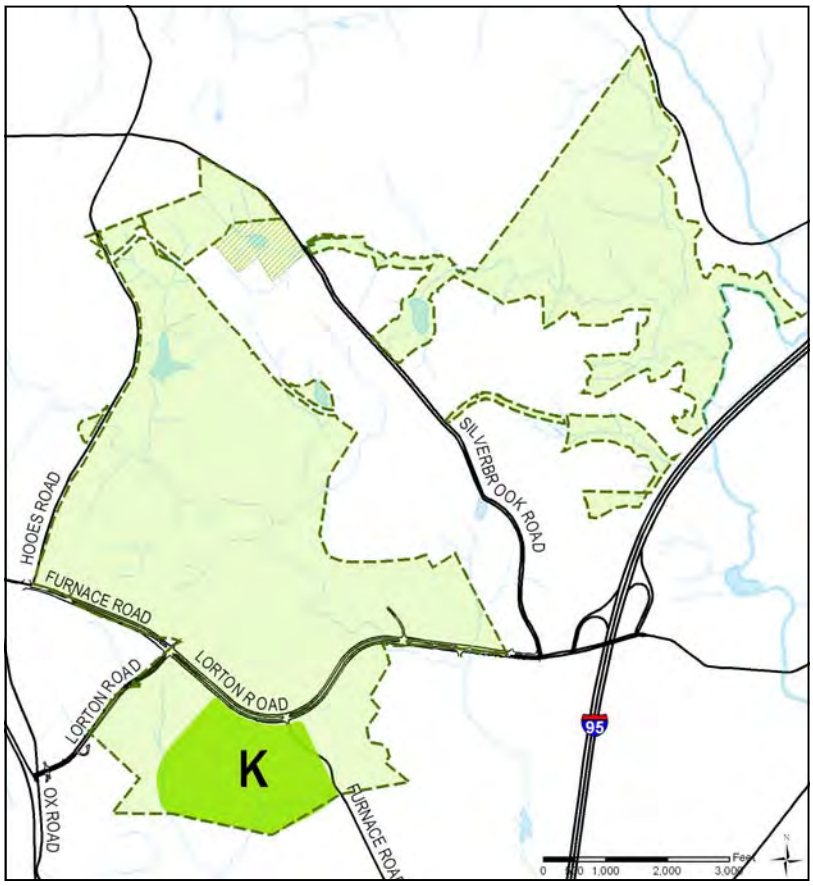


Figure 98: Location of Management Area K within Laurel Hill Park

Site Influences

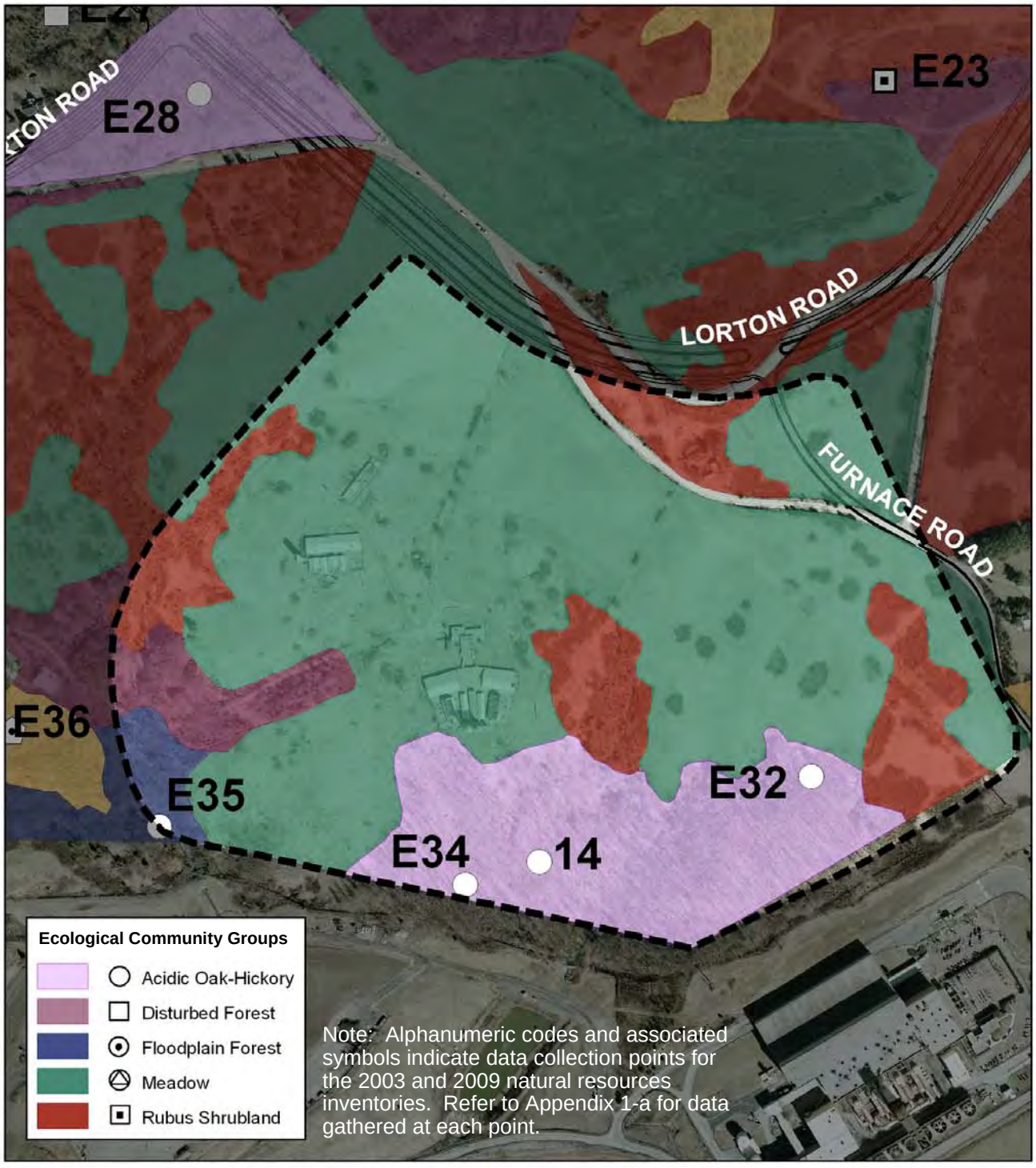
Natural Site Conditions

Area K, at 98 acres in size, is composed of former dairy pasture land (fescue-dominant) and thicket/shrubland growth. Its southern edge has an oak-hickory forest stand. Located south of Lorton Road and west of Furnace Road, it is a rolling landscape with some steep slopes covered with thickets and woody growth. The silos and barns from the former dairy operation provide nesting sites for raptors, such as barn owls, one of which was observed nesting in a silo.

A small forest stand is separated from the pasture lands by an ephemeral stream at the southern end of Area K. The forested stream has a head cut.

Planned Site Activities

As proposed in the 2004 *Laurel Hill Park General Management Plan and Conceptual Development Plan* (GMP/CDP), an equestrian center is to be located at the site of the former dairy operation. It is proposed as a full service resident horse facility for classes, stabling, riding and therapeutic riding programs. The center will also include show rings, paddocks, stables, barns and meadows for horse trails. Other proposed uses on this site include



Management Area K: Ecological Community Groups

Laurel Hill
Natural Resources Management Plan

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

0 250 500 1,000 Feet

Figure 99: Map of ecological community groups found in Management Area K

community gardens and designated locations for tent and RV camping (EDAW 2004, 62). Recreational fields are proposed along Furnace Road, just south of the entrance drive and parking facility. Three shared-use trails traverse Area K: the Workhouse Trail, the Dairy Barn Loop and the Pasture Loop. The Power Station Loop is in the far southern end of the area but is not open to horses.

Current Site Activities

Portions of Area K fall within the D.C. Workhouse and Reformatory National Register District and viewshed for the Laurel Hill property. Any site development within the district that requires a site plan permit will also require approval from the Fairfax County Architectural Review Board. In addition, the land transfer agreement requires approval from the Virginia Department of Historic Resources and the Lorton Heritage Society before development can occur.

A riding ring and parking area are currently under review by Fairfax County. The riding ring will be located immediately north of the dairy operations cluster of buildings, most of which have or will be removed. The silos will remain on-site.

A multi-use trail system has been developed in the southern section of Area K, as shown in Figure 101.

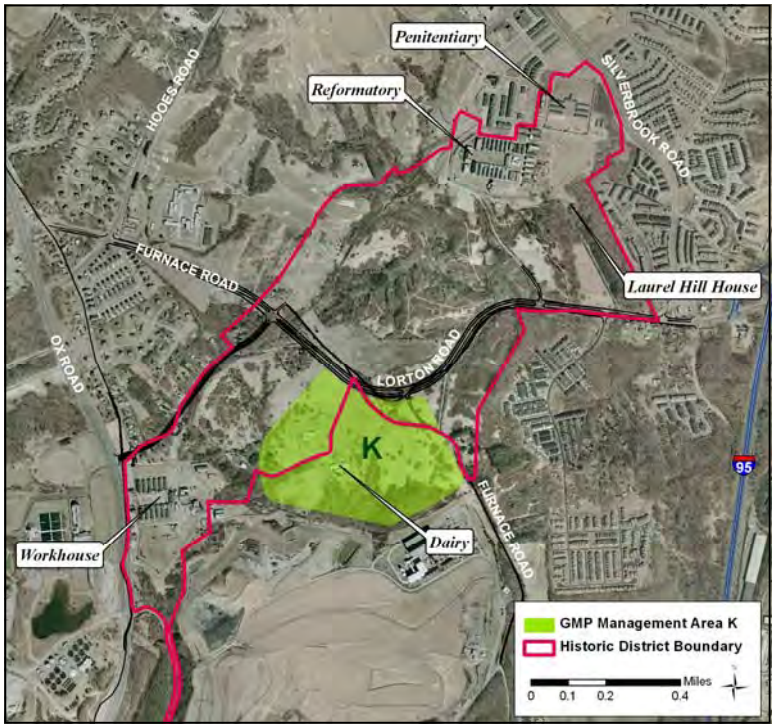


Figure 100: Location of Management Area K within the National Register District

Finally, Area K is affected by utilities. A gas pipeline – shown in yellow in Figure 103 – bisects the pastureland in Area K. Any form of activity in the area will require permission from and coordination with the pipeline operator. (Refer to the sidebar on page V:93.)

In addition, the construction of an effluent waterline running from the I-95 Landfill/Energy Resource Recovery Center south of Area K into Area I is nearing completion. This line runs along Area K's eastern edge at Furnace Road and then parallels the north side of Lorton Road before turning into Area I at the access road.

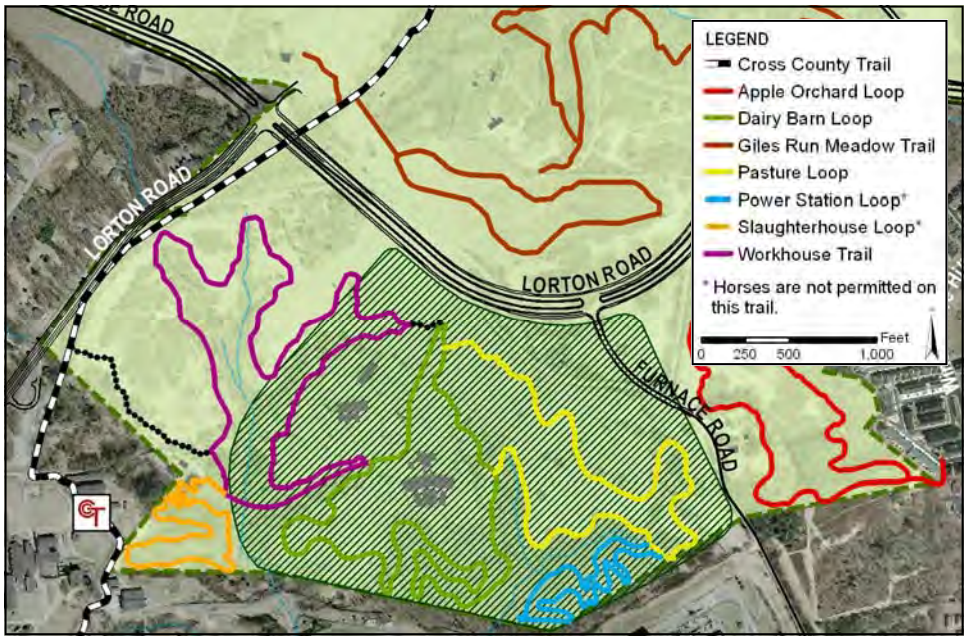


Figure 101: Three multi-use trails wind through Management Area K and connect to the Workhouse Loop in adjacent Area J

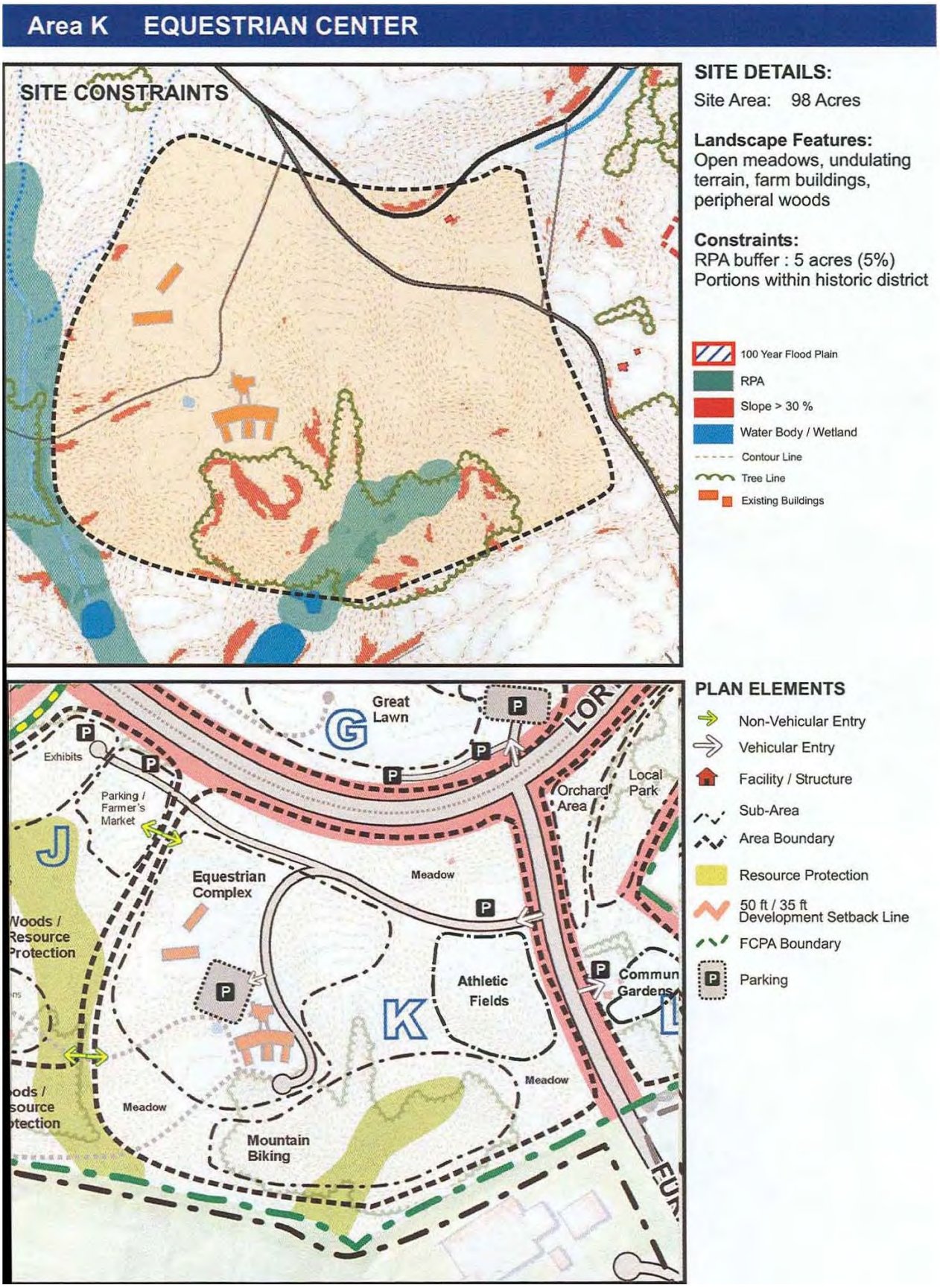


Figure 102: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

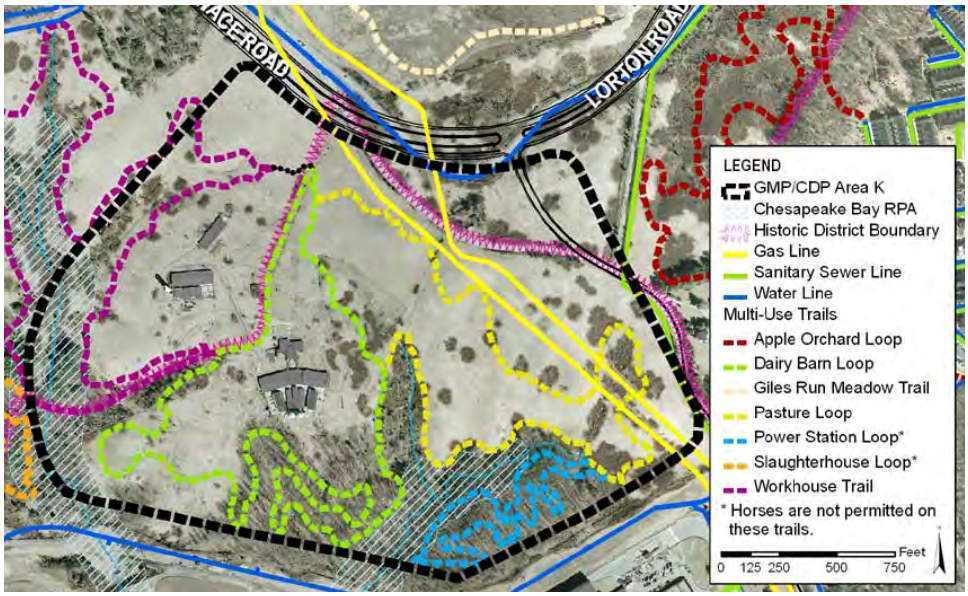


Figure 103: Existing conditions in Management Area K

Anticipated Timeline for Planned Activities Implementation

Trails (natural surface, stonedust and gravel mix) have been constructed for off-road bicycling, equestrian and pedestrian uses. Certain elements of the equestrian center are anticipated to be constructed in the near future. The Park Authority has submitted a plan to Fairfax County Land Development Services (LDS) to build a new entrance road, parking lot, riding rink and stormwater management pond as a first phase of development for the equestrian center.

There is no other funding for the planned site activities, so interim uses can be estimated to be in place for the next fifteen to twenty years.

LHNRMP Recommendations

Managing and transforming the existing pasture lands to native warm-season grasslands is an important interim activity. Given the equestrian trail use of the site and the proposed equestrian focus, the eradication of non-native invasive plant species (NNIs) such as tall fescue from the pasturelands is of value regardless of the timeline for proposed activities. The existing thicket growth should be managed to interrupt succession and to assist in managing trail use of the multi-use trail system.

Prescribed Burns and Gas Lines

Managed Burn: 'I'll need to ask our management team the formal response to conduct a managed burn and how close to our pipeline you can get (Greg?). I know that question has come up before. Whatever the distance, we would need to conduct a leak survey of the site just prior to the burn. While we maintain a highly safe transmission system, the controlled burn should have no affect on our operations. Personally, I am more concerned with other pipeline systems in the area and the affect they could have on us. While I am not suggesting that other pipeline companies maintain their system less stringently, I would simply caution that we take the time to consider all the possibilities. Great question and appreciate your consideration to ask and help protect the integrity of our pipeline.'

- excerpts from email communication, Kelly Davis, Park Authority staff, 1/20/2011

Based on the email above, Park Authority staff contacted Dominion gas line operations staff in February 2011 to inform them that the PA was planning to burn and would maintain a 50-foot minimum buffer from the gas line. The initial staff contacts at Dominion indicated that they thought that would be fine.

- Charles Smith, personal interview

Management Goal for Area K

Manage the existing meadows and thickets to facilitate the transition from fescue-ridden pasture land to native warm-season grasslands, using management methods that protect Area K's natural resources while encouraging human activity on shared-use trails and the equestrian facility.

Management Objectives

OBJECTIVE 1

Monitor the current conditions of the natural resources within the Area regularly.

Natural environments are changing constantly, and with the increasing activities related to trail and equestrian use on -site, Park Authority staff need to determine the status of the natural resources, what changes are occurring and the impact of those changes. This requires regular, systematic monitoring that will enable staff to identify and address problems in the short-term and track more subtle changes and trends to be addressed over the long-term.

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks to qualitatively monitor the health of the meadow, thicket/shrublands and forested stream valleys. Trails should be walked an additional two times each year.***

  Park Authority natural resources management staff should conduct semi-annual field walks to qualitatively monitor the health of the meadow, riparian forests and thicket/shrublands. Staff should walk the stream valleys and trails, noting all observations. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

  The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the following concerns.

  Trails
  - Unauthorized trails
  - Vegetation overhanging trails
  - Trail markers that are missing or in need of repair

  Streams
  - Down trees on trails or blow downs (i.e. fallen trees) in streams
  - Stream blow-outs or head cuts
  - Bad odors or gray water

  General
  - Non-native invasive species, particularly their spread into the forest block
  - Defoliation in trees or other signs of tree disease
  - Indications of damage from wildlife

- Erosion on steep slopes
- Dumping

Figure 104: Fescue-covered slopes in Management Area K

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and maintenance plans developed to address these problems.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  A BioBlitz – typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area – for Area K should be performed before plans for an equestrian center are implemented, so that a before-and-after comparison can be made to determine the impact of the conversion to pasture. This event could be organized by a graduate student or intern and performed with the help of Park Authority staff, community members, students and other volunteers.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Reclaim fescue-dominated treeless areas and restore to native warm-season pasture land suitable for equine grazing.

Tall fescue is highly toxic for horses and therefore must be removed in order for this Area to be put to use as an equestrian facility. Given the existing shared use trail access, this transformation should begin immediately, benefitting the equestrian community as well as enhancing the ecological value of Area K.

ACTION ITEMS

- ***Eliminate tall fescue through treatment with chemical and mechanical methods.***

  The elimination of the NNI tall fescue from Area K should begin immediately.

  As an allelopath, fescue releases poison from its root system, inhibiting other species from establishing, especially woody plants. While this keeps other NNIs at bay, it creates a sterile landscape. Moles and voles will run through a fescue-dominant meadow, but the fescue has no significant nutrient or habitat value for other wildlife. Without competition from other species, the fescue develops in heavy clumps with thick, interwoven root systems and stems that form a dense thatch. Matted together, the fescue clumps are difficult to separate or penetrate. In addition, fescue remains green for most of the year, retaining a high moisture content. Together, these factors make the grass hard to eradicate.

  Horses are particularly sensitive to fescue toxicity, suffering "abortion, prolonged gestation, difficulty with birthing, thick placenta, foal deaths, retained placentas, reduced (or no) milk production and death of mares during foaling" (*A Landowner's Guide to Native Warm-Season Grasses in the Mid-South*, UT Extension 2004, 7).

  Burning is not a viable management method without permission from the gas pipeline operator. If unable to burn, the existing fescue pasture should be killed using a chemical method (glyphosate) followed by a mechanical method–mowing twice with a mulching blade. Following the initial mowing with a mulching blade, the meadows should be placed on a one- to three-year mowing cycle.

- ***Remove trees in excess of 25 to 50 per acre.***

  Unhealthy, invasive or otherwise undesirable trees should be removed using any of the following methods: axe frill; girdle and bark paint herbicide; or fell and treat stump with herbicide.

- ***Seed site two months after herbicide treatment.***

  After the tall fescue has been removed, the site can be seeded with a drill seeder where possible. Pasture land on the east side of the Area is too steep for drill seeding and will have to be hydroseeded.

  Areas that have been approved for pasture can be seeded with cool-season grasses appropriate for horse forage including timothy, Kentucky bluegrass and perennial ryegrass and appropriate warm-season grasses include big and little bluestem, indian grass and eastern gamagrass (NRCS 2008, 13-14).

  Areas not approved for pasture should be converted to native warm-season grass meadows or a meadow/ thicket mosaic.

OBJECTIVE 3

In the long term, manage meadow and thicket/shrubland as healthy ecological communities in conjunction with similar land cover found in Areas G, H, I, J and L.

Existing meadow and thicket/shrubland communities expected to remain should be part of a long-term management regime that contributes to the establishment of a meadow and thicket/shrubland mosaic at the heart of Laurel Hill Park. Given the permanent nature of these communities, their management may require a greater investment of financial resources, labor and equipment. Given their location, they should be managed in conjunction with neighboring meadows and thicket/shrublands in Areas G, H, I, J and L.

To date, only limited areas within Area K have been approved for conversion to pasture for equestrian use; therefore, establishing native warm-season grass meadows as part of the larger meadow/thicket mosaic at the heart of Laurel Hill Park should be the primary focus.

ACTION ITEMS

- ***Mow or burn thicket/shrublands along the shared border with Area J.***

  Management of the meadows and thicket/shrublands in Area K should be coordinated with the efforts in Area J. Older thicket/shrublands in Areas J and K should be addressed first, mowing or burning within the next year or two, and then a three- to five-year mowing/burning cycle should be established. Only one-third of the thicket/shrublands should be treated at any given time to retain some habitat and food.

  Any burning will require permission from the gas pipeline operator.

- ***Once native warm-season grass meadow has been established, explore grazing as a meadow management strategy.***

  Once tall fescue and any other potentially toxic species have been eliminated, Park Authority staff should explore the possibility of introducing livestock to graze the meadows in Area K.

  Grazing as a treeless areas strategy requires that pasture management practices be employed with an emphasis on site-specific, seasonal grazing rotations. Rotation grazing can be an effective management strategy to sustain meadow and has been a cultural resource element in Virginia since the late 1600s. In addition, close attention must also be paid to the ongoing removal of plant species that are problematic/ poisonous to horses and other livestock, including cocklebur, beefsteak, black cherry, black locust, buttercups, jimsonweed, Johnsongrass, milkweed, mustard and pokeweed. Manure clumps must be raked frequently to distribute the manure more evenly; thereby promoting its breakdown and absorption by pasture plants as fertilizer. Manure can also be splayed into the pastures with a manure spreader. Periodically, the pasture should be overseeded with desirable/ palatable and nutritious species that horses require.

Equestrian Management

- *Promote rotational grazing.*
- *Deny the horses access to the streams and install waterers in each paddock.*
- *Monitor water quality in the streams for nutrients, sediment/ turbidity, dissolved oxygen, macroinvertebrate community.*
- *Fence trees in order to retain them; otherwise, horses will girdle them.*
- *Provide at least two acres of pasture per horse if not providing supplemental feed.*
- *Install grass-lined swales that are mowed once per year to filter sediment out of run-off.*
- *Compost horse manure and keep it in a covered barn/structure. Develop appropriate manure-related stormwater management controls.*
- *Spread manure in pastures.*
- *Mow paddocks periodically to control plants that horses do not eat, including seedlings.*
- *Control beef steak (Perilla frutescens) in pastures, as it is poisonous to horses.*
- *Overseed with clover and timothy into pastures.*
- *Harden equestrian trail on steep slopes once erosion is apparent. Use soil cement to harden trails.*
- *Install water bars along trails to prevent and control trail erosion.*

Horse Owners Seminar

Winter 2008

USDA, NRCS, Montgomery County Cooperative Extension Service in Cooperation with the University of Maryland Cooperative Extension Service and Montgomery County Soil Conservation District

- ***Manage grassland meadows and thicket areas in Areas L, J, K, G, H and I in concert.***

  The core area of Laurel Hill park can be cultivated for a significant mosaic of grasslands and thickets. No funding is available for the implementation of many of the planned activities, suggesting that interim uses may be for as many years as fifteen to twenty, if not longer. Given this timeframe, transforming the ecological value of the existing pasture lands and thicket/shrublands to a native warm season grass and thicket/shrubland mosaic is of great value.

OBJECTIVE 4

If equestrian use is brought to Area K, and pasture land is required, develop best management practice (BMP) protocols to reduce their impact on the adjacent stream valleys.

The management of pasturelands used by horses is a complex undertaking. In addition to understanding the grazing practices of horses, manure management presents a specific challenge. The Northern Virginia Soil and Water Conservation District (NVSWCD) offers much literature and knowledge to assist in the development of a best management plan.

ACTION ITEM

- ***Develop a Natural Resources Conservation Services (NRCS)-approved pasture management plan that incorporates agricultural BMPs.***

  Before converting Area K to pasture, Park Authority natural resources management staff should develop a plan that addresses issues specific to agricultural land use. The plan should include measures to insure the following items.

  - Protection of grazing lands ecosystems
  - Prevention of soil erosion
  - Maintenance or enhancement of soil quality
  - Sustained forage and livestock production
  - Improved water yield and quality
  - Diverse wildlife habitat
  - Aesthetics and open space
  - Quality recreational opportunities

  (*National Range and Pasture Handbook*, page 1-2, NRCS online at http://www.glti.nrcs.usda.gov/technical/ publications/ nrph.html)

OBJECTIVE 5

Manage existing thicket/shrublands to maximize habitat value and provide a riparian buffer within the Chesapeake Bay Resource Protection Area (RPA).

ACTION ITEM

- ***Mow on a three- to five-year cycle, treating one-third of the thicket at a time to retain some habitat and food at all times.***

  Thickets should be mowed on a three- to five-year cycle. In some cases, a 100-foot no-mow buffer on either side of the streams may be required to avoid disturbance in Chesapeake Bay Resource Protection Areas. The Park Authority has an understanding with the Fairfax County Environmental and Site Review Division whereby "existing" management – including bush hogging, burning, spraying and maintaining turf areas – may continue provided they were in practice before current rules were established. Consequently, mowing is allowed without obtaining a permit near streams if those areas were mowed under prior regulations. Permits are required if areas are newly mowed within 100 feet of streams.

OBJECTIVE 6

Manage Acidic Oak-Hickory Forest on the southern edge of Area K, recognizing a portion of the woodlands are bisected by an RPA and stream valley, and the multi-use trail network crosses through the forest lands.

A multi-use trail network is located in the woodlands of Area K, making the management of the forest more complex. Trails are good conveyors for NNIs, and trail users are known to create informal trail connections.

ACTION ITEMS

- ***Look for and record evidence of forest insects and disease as part of a semi-annual field walk by Park Authority natural resources management staff. Treat for threatening insect or disease infestations present.***

  It is important to monitor the stand along the southern border of Area K for insects and disease to benefit the overall health of the Laurel Hill park.

- ***Monitor for NNIs.***

  Remove NNIs from the forest stand and/or mow the perimeter of the stand to contain or prevent the invasion of meadow and thickets by NNIs. The trail network should be monitored in particular, as shared-use trails bring horses onto the site.

OBJECTIVE 7

Improve stream health in cooperation with Fairfax County Department of Public Works and Environmental Services (DPWES) .

With the transformation of the pasture to horse use, poorly managed stormwater will degrade Area K and its habitat. It is likely that the stream may continue to down cut without intervention.

In order to protect the water resources in Area K, the Park Authority should partner with DPWES in promoting the use of BMPs that include stormwater controls to improve water quality on site and address water quality issues related to park uses.

ACTION ITEMS

- ***Obtain base level water quality readings in the streams for nutrients, sediments/turbidity, dissolved oxygen, macroinvertebrate community.***

  Water quality will become particularly important in Area K once the site is put to agricultural use. An evaluation should be conducted prior to converting the Area to pasture and a schedule for regular water quality testing should be developed as part of the pasture management plan. In addition, BMPs outlined in the management plan, including the proper storage of manure and stream crossings, should be implemented.

- ***Look for evidence of stream degradation as part of a quarterly field walk by Park Authority natural resources management staff.***

  While conducting their field walks, Park Authority staff should evaluate stream health. Based on observations made during the field walk, it may become evident that a separate in-stream evaluation is needed. Any failing banks, exposed utilities and blowdowns, as well as human activity, such as illegal dumping, should be recorded.

  The headcut already identified in the data surveys should be addressed with the installation of intermittent check dams.

- ***Prioritize any resource threats, concerns and hazards noted during the field walks and identified in the watershed studies and develop action plans for problems found in the streams, promoting stormwater best management practices.***

  Once concerns have been identified and prioritized, they should be addressed. Restoration strategies and stormwater BMPs are outlined in the *Lower Occoquan Watershed Management Plan.* (The plan is available on the Fairfax County web site at http://www.fairfaxcounty.gov/dpwes/watersheds/loweroccoquan_docs.htm).

OBJECTIVE 8

Control NNIs.

NNIs will be addressed in much of Area K as a result of tall fescue elimination efforts; however, the stream valleys and associated riparian forest stands remain vulnerable. NNIs threatening riparian areas should be addressed early, before the NNIs gain competitive advantage and begin to overtake native species.

ACTION ITEMS

- ***Conduct a Level One*** **Non-Native Invasive Plant Site Prioritization** ***as described in Appendices E and H of the*** **Fairfax County Non-Native Invasive Plant Assessment.**

  Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment.* However, a more comprehensive follow up to that initial assessment is in order. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control Strategies* of the *Fairfax County Non-Native Invasive Plant Assessment*.

- ***Address NNIs in the stream valleys first so as to prevent invasion into the adjacent forest.***

  Because these areas are particularly vulnerable and serve as gateways to the adjacent ecological communities, they should be treated first. In the riparian corridors, priority tree planting should be performed to shade out sun-loving NNIs and provide thermal closure to the stream. Tree planting is an ideal activity for volunteers.

- ***Address NNIs potential related to the shared–use trail that includes equestrian use, looping the perimeter of the Resource Protection Area.***

  Horse defecation may provide means for distribution of weed seeds beyond the extent of the pasture land, along the trail corridor.

OBJECTIVE 9

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impact of various management techniques.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work and developing protocols and encouraging volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  With the BioBlitz serving as a baseline, subsequent wildlife studies should be conducted to determine population or behavioral changes and track trends, particularly as the management objectives listed above are carried out. Once the equestrian center is in place, wildlife studies in Area K should focus on the forested areas in the southern portion of the area.

  Birders performing the Audubon Society's Northern Virginia Bird Survey (NVBS) have observed owls in the dairy farm buildings at Laurel Hill Park. The tall silos and trees within close proximity to thicket/ shrublands provide good habitat for the owls. The trees offer roosts for owls and the brambles provide habitat for the small mammals upon which owls prey. Such vegetative conditions occur in numerous locations throughout the park.

  Like the NVBS, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Provide nesting boxes on site to enhance bird nesting and habitat.***

  Bluebird boxes should be installed in the meadow, even on a temporary basis. No more than one box per two acres should be placed on the site. All boxes should face east. This should be done in coordination with

the Virginia Bluebird Society which generally works under permit to build, install, monitor and maintain nest boxes for cavity nesting birds.

- ***Direct management efforts toward achieving the meadow and thicket/shrubland mosaic described under Objective 3.***

  The meadow and thicket/shrubland mosaic offers the best supporting habitat for the greatest diversity of birds and other wildlife. Objective 3 describes how meadow and thicket/shrubland habitats in Management Area K can be managed in conjunction with other management areas to create a mosaic at the heart of Laurel Hill Park and provides recommendations for doing so. The *Treeless Area Technical Manual,* Appendix 6, provides the practical steps for carrying out these recommendations.

- ***Monitor and reduce deer populations and fully implement the County's deer management strategy.***

  The deer population at Laurel Hill Park is well above the ecological carrying capacity, posing a significant threat to plant communities on-site. Selectively feeding on native species, deer reduce species diversity and richness. The absence of strong native plant communities creates an environment favorable to NNIs. Gaining the competitive advantage, NNIs are able to establish themselves and thrive. In addition, deer encourage the spread of NNIs by carrying their seeds and redistributing them.

  The deer population at Laurel Hill Park should be reduced such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

OBJECTIVE 10

Manage human activity and interplay of park users and natural resources in Area K.

Area K is not immediately adjacent to residential development and therefore is not faced with some of the encroachment challenges that exist elsewhere in Laurel Hill Park. Instead, the primary interplay between park user and natural resources occurs on the multi-use trails.

ACTION ITEMS

- ***Perform necessary maintenance on existing trails and plan new trail alignments, avoiding forest stands and Chesapeake Bay RPAs.***

  Shared use trails will require monitoring and maintenance to ensure that users are staying on the trail system. If loops are added to trails, they should be avoid sensitive natural areas such as spring seeps, steep slopes and wetlands/waters that could be impaired by siltation, erosion, denuding and waste.

  Clean up from the shared-use equestrian trails is important to avoid inadvertently spreading NNIs and weed seed from horse defecation.

  Management of thickets will assist in controlling trail use, minimizing the development of 'short cuts' that may lead to erosion and damage of important stands of vegetation.

  The Park Authority has entered a maintenance agreement with the group, Mid-Atlantic Off Road Enthusiasts (MORE), according to which the group has "adopted" the trails and will assume trail maintenance responsibility. The Park Authority should work with MORE to insure the safety of the Laurel Hill Park trail system and should encourage similar partnerships with other organizations.

- ***Erect clear signage along trails outlining appropriate behavior within park bounds.***

  Educating the public in the proper use of the trail system and the need to respect wildlife and plantings is an important component to further the knowledge of the value of resource management.

  Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

OBJECTIVE 11

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

Currently, Laurel Hill Park is one of the data collection sites for the Audubon Society's NVBS. The data collected during the survey are useful in determining the health of and appropriate management practices for the ecological community types at Laurel Hill. Establishing partnerships with similar organizations has the potential to increase support for the park and its maintenance, provide opportunities to collect more data and in turn, learn more about the various habitats present.

ACTION ITEMS

- ***Encourage the Northern Virginia Audubon Society to continue their monitoring programs within the Area.***

  Currently the Northern Virginia Audubon Society has two data collection points in Area K, one in the western portion of the Area, west of the former dairy silos along the old farm road, and a second in the eastern portion, just north of the Acidic Oak-Hickory Forest.

- ***Encourage volunteer groups or offer site access to graduate students to systematically survey mammals, birds, fish, reptiles, amphibians and invertebrates.***

  As stated under Objective 9, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

MANAGEMENT AREA K – MANAGEMENT RECOMMENDATION PRIORITIZATION					
Ecological Community Types	Acidic Oak-Hickory Forest	Disturbed Forest	Floodplain Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 1: Monitor current conditions					
• Conduct semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept
• Develop annual maintenance plans	**1**	**1**	**1**	**1**	**1**
• Perform BioBlitz	**2**	**2**	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**	**3**	**3**
Objective 2: Reclaim fescue-dominate treeless areas and restore to native warm-season grasses					
• Eliminate fescue				**1**	
• Reduce tree cover to less than 1/3 of site				**2**	**2**
• Drill seed meadow				**3**	
Objective 3: Coordinate treeless area management with adjacent areas					
• Mow or burn meadow and thicket/shrublands in conjunction with Areas G, H, I, J, K and L				**2**	**2**
• Explore grazing as management option				**3**	
• Manage meadow and thicket/shrublands in				**1**	
Objective 4: Develop BMP's for equestrian pasture use					
• Develop NRCS pasture management plan				**3**	
Objective 5: Manage thicket/shrublands to maximize habitat value					
• Mow on three– to five-year cycle					**2**
Objective 6: Manage Acidic Oak-Hickory Forest					
• Monitor for insect and disease infestations and treat those present	**2**				
• Monitor for NNIs	**2**				

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 105: Prioritization of action items in Management Area K by community group

MANAGEMENT AREA K – MANAGEMENT RECOMMENDATION PRIORITIZATION					
Ecological Community Types	Acidic Oak-Hickory Forest	Disturbed Forest	Floodplain Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 7: Improve stream health					
• Establish base water quality readings	**2**	**2**	**2**		
• Look for and monitor degradation	**2**	**2**	**2**		
• Prioritize threats to streams	**2**	**2**	**2**		
Objective 8: Control NNIs					
• Conduct NNIAP study	**1**	**1**	**1**	**1**	**1**
• Address NNIs in stream valleys first	**2**		**2**		
• Address NNIs related to trail use	**2**	**2**	**2**	**2**	**2**
Objective 9: Monitor and manage wildlife					
• Conduct wildlife studies	**2**	**2**	**2**	**2**	**2**
• Provide nesting boxes				**3**	
• Direct management efforts for mosaic				**1**	**1**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**	**1**	**1**
Objective 10: Monitor human activity and interplay with resources					
• Maintain trails and new alignments	**2**	**2**	**2**	**2**	**2**
• Erect clear signage listing appropriate behavior	**3**	**3**	**3**	**3**	**3**
Objective 11: Form partnerships with nonprofits and agencies					
• Encourage Audubon Society efforts	**1**	**1**	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 105, continued: Prioritization of action items in Management Area K by community group

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AREA L: APPLE ORCHARD RECREATION AREA

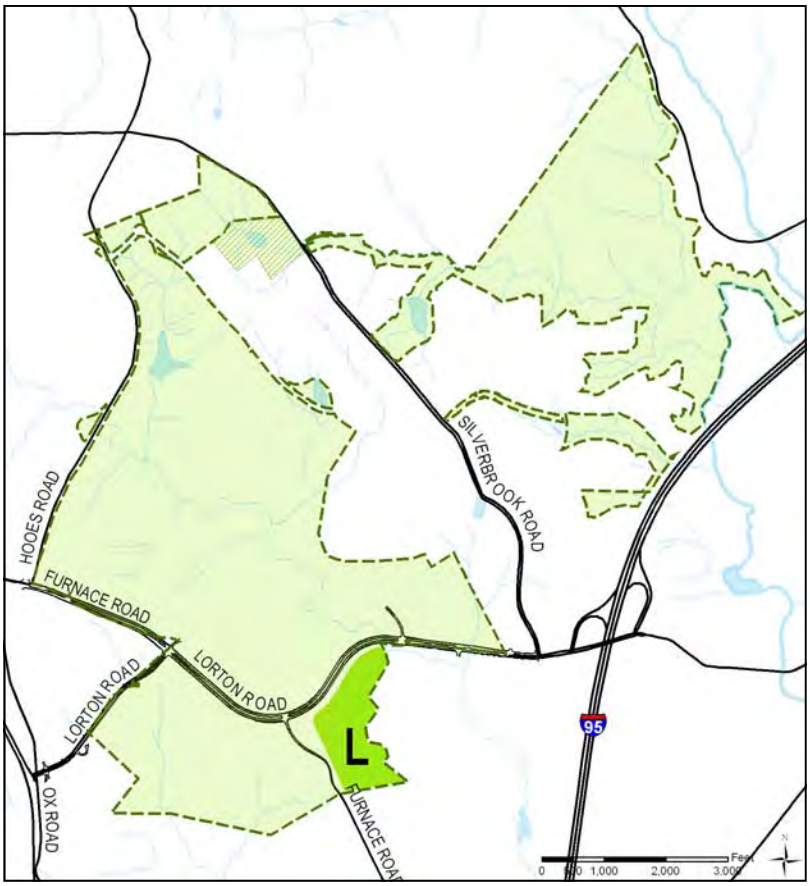

Figure 106: Location of Management Area L within Laurel Hill Park

Site Influences

Natural Site Conditions

Area L is located in the eastern side of Laurel Hill Park, south of Lorton Road and east of Furnace Road. It is covered with numerous pockets of *rubus* thickets. Flanked to the east by one of the best forest stands (oak-hickory) still standing on the Laurel Hill property and a Pine-Hardwood Forest on the southern edge, the site has outstanding bird diversity with meadow habitat surrounding pockets of blackberry thickets. The rolling landscape provides an attractive vista point, overlooking the parkland to the west.

The Audubon Society has a permanent monitoring plot in the thicket/shrublands for its data collection during its annual Northern Virginia Bird Survey (NVBS).

Figure 107: Rubus *thickets in Management Area L*

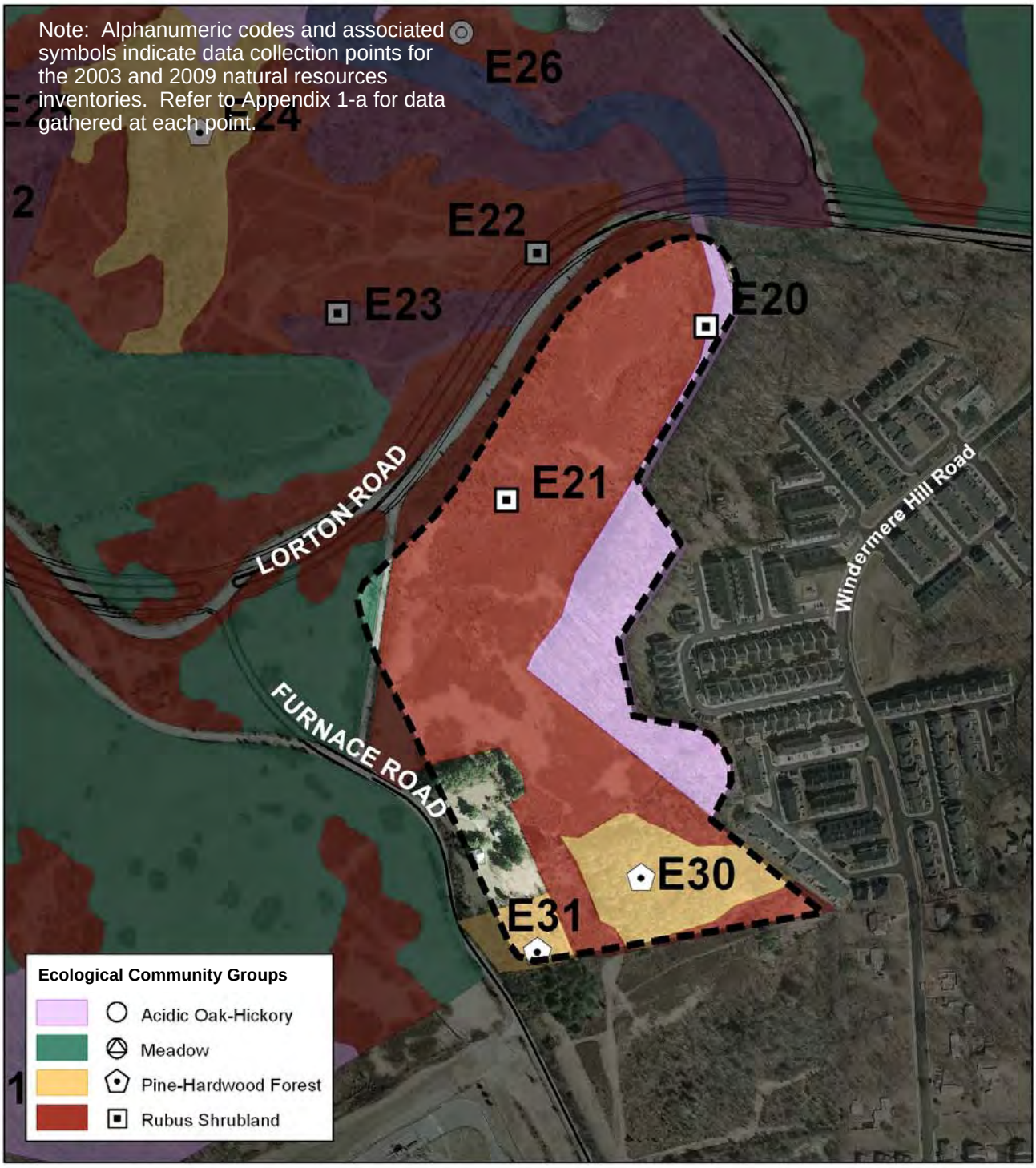

Figure 108: Map of ecological community groups found in Management Area L

Planned Site Activities

The 2004 *Laurel Hill Park General Management Plan and Concept Development Plan* (GMP/CDP) proposes a local neighborhood park, trails and opportunities for community garden plots for the Apple Orchard Recreation Area, Area L.

The existing historic residence on the site will be re-used for park administrative purposes.

Current Site Activities

A portion of Area L falls within the D.C. Workhouse and Reformatory National Register District and viewshed for the Laurel Hill property. Any site development within the district that requires a site plan permit will also require approval from the Fairfax County Architectural Review Board. In addition, the land transfer agreement requires approval from the Virginia Department of Historic Resources and the Lorton Heritage Society before development can occur.

The Apple Orchard Loop, a multi-use, natural-surfaced trail, has been constructed in Area L (Figure 110). Signs pertaining to trail etiquette and safety have been erected along the route (Figure 116).

Anticipated Timeline for Planned Activities Implementation

The trail system is likely to be the only planned facility developed in the near future. It is reasonable to assume an interim time period of at least fifteen to twenty years before other planned elements are constructed.

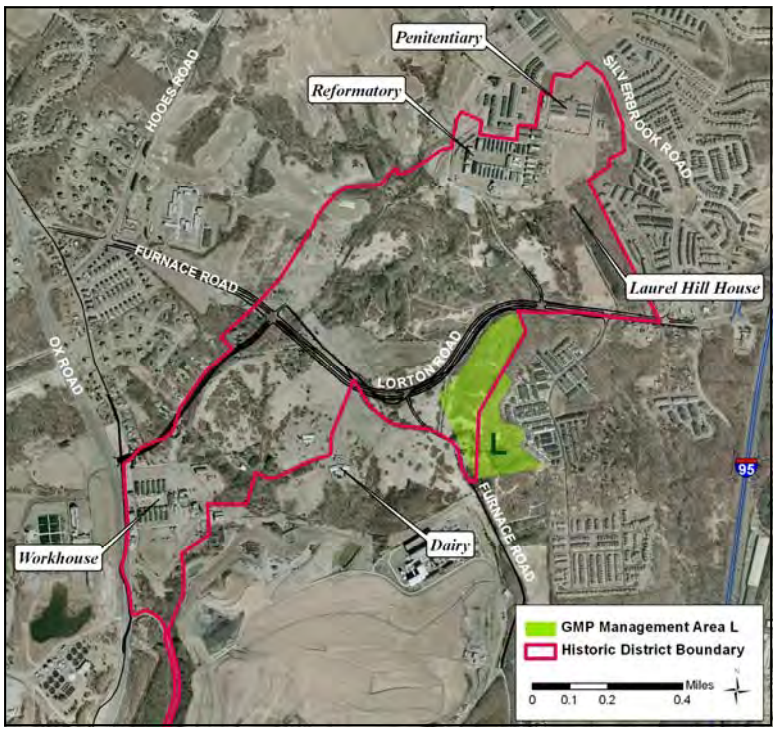

Figure 109: Location of Management Area L within the National Register District

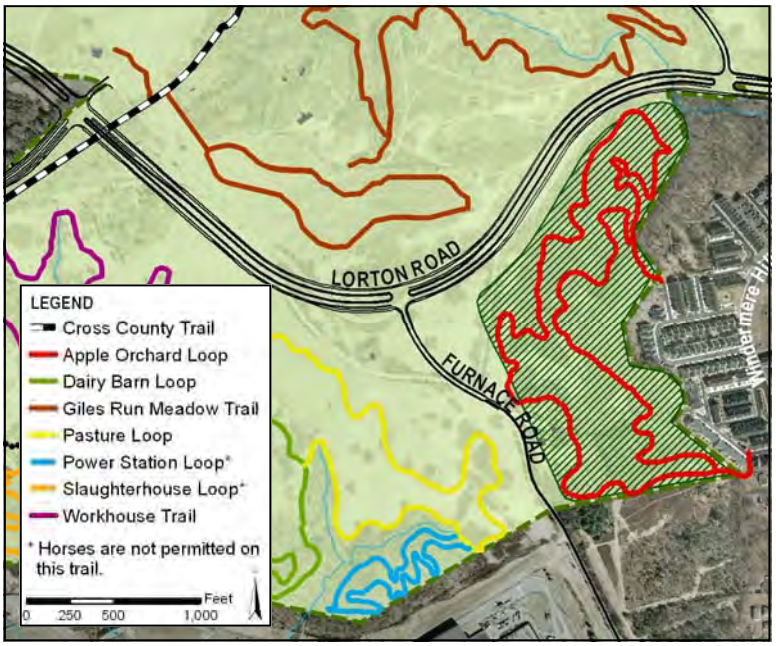

Figure 110: The Apple Orchard Loop provides access to Management Area L from the residential community to the east

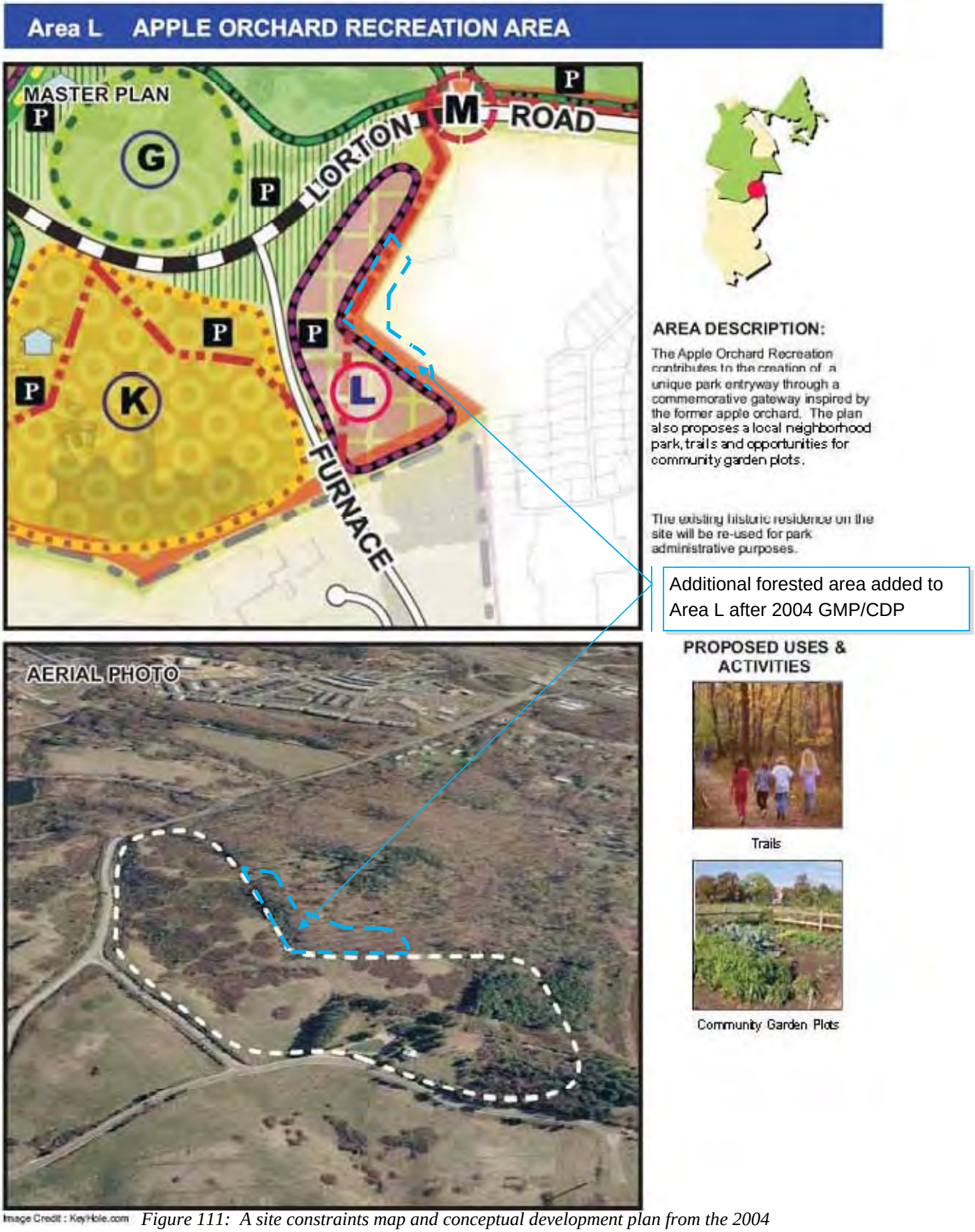

Figure 111: A site constraints map and conceptual development plan from the 2004 Laurel Hill Park General Management Plan and Conceptual Development Plan

LHNRMP Recommendations

Much of area L is developed with mountain bike trails winding through *rubus* thickets on the hilly western edge of the site. The thickets serve as a barrier and prevent bikers from cutting through from one trail segment to another. They should be reshaped, while retaining large masses that serve as barriers between trail segments, and burned so that a meadow and thicket/shrubland mosaic can be developed.

The existing thicket/shrubland stand needs a significant burn to reduce the stand's footprint, giving mangers time to develop a healthy mosaic.

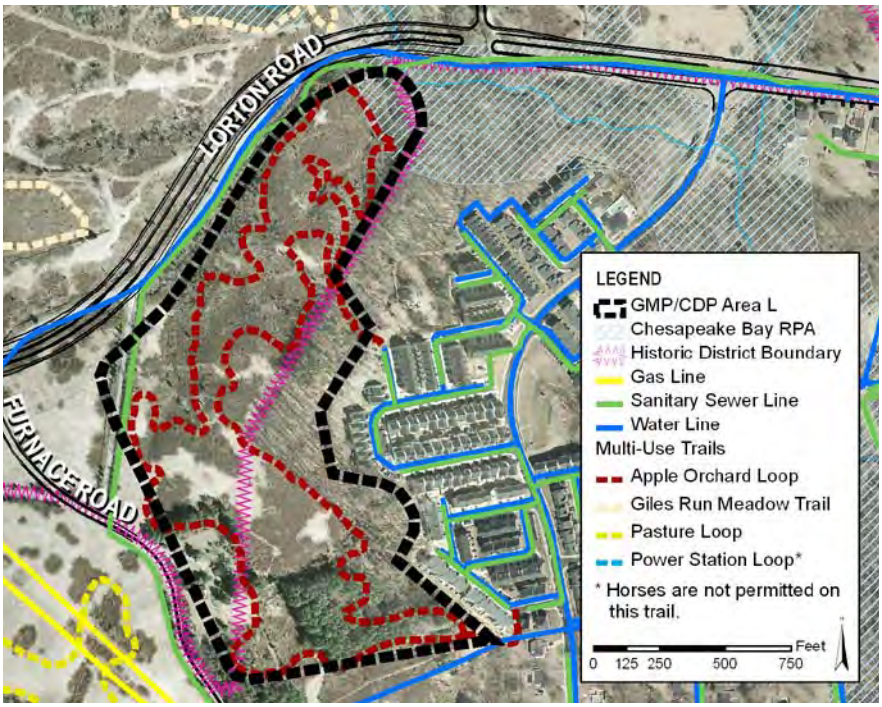

Figure 112: Existing conditions in Management Area L

Management Goal for Area L

Manage and protect existing thicket/shrubland community, reclaim fescue-dominated areas as native warm season grasslands and protect the woodlands while allowing for human activity within the management area.

Management Objectives

OBJECTIVE 1

Monitor the current conditions of the natural resources within the Area regularly.

Natural environments are changing constantly, and with the increasing activities related to trail and equestrian use on -site, Park Authority staff need to determine the status of the natural resources, what changes are occurring and the impact of those changes. This requires regular, systematic monitoring that will enable staff to identify and address problems in the short-term and track more subtle changes and trends to be addressed over the long-term.

ACTION ITEMS

- ***Perform semi-annual (once in the growing season and once in the non-growing season) field walks to qualitatively monitor the health of the meadows, thicket/shrublands and forest edge. Trails should be walked an additional two times each year.***

  Park Authority natural resources management staff should conduct semi-annual field walks to qualitatively monitor the health of the meadow, thicket/shrublands and forest. Staff should walk the property boundaries and trails, noting all observations. Staff should bring a journal, recent aerial photos, a camera and pencils to record their observations.

The purpose of these walks is not to perform a comprehensive natural resources inventory but rather to inspect current conditions within the park, discover problem areas and determine management needs. In particular, staff should look for the following concerns in the list below.

Trails
- Unauthorized trails
- Vegetation overhanging trails
- Trail markers that are missing or in need of repair

Abutting Properties
- Property intrusions, mowing, clearing trails
- Property markers that are missing or in need of repair
- Dumping

Streams
- Down trees on trails or blow downs (i.e. fallen trees) in streams
- Stream blow-outs or head cuts
- Bad odors or gray water

General
- Non-native invasive species, particularly their spread into the forest block
- Defoliation in trees or other signs of tree disease
- Indications of damage from wildlife
- Erosion on steep slopes

- ***Based on the results of the field walk, develop annual maintenance plans.***

  During the field walk, staff should compile a running list of problems that need to be addressed. Following the walk, these problems should be prioritized and work orders to address these problems developed.

- ***Hire a graduate student or intern to organize a BioBlitz.***

  In Area L, a BioBlitz – typically a 24-hour biological inventory that identifies and records all plant and animal species within a specific area – should be conducted before any significant alterations are made to the landscape through burning or mowing.

- ***Perform periodic – five- to eight-year cycle – natural resources inventory, building upon the data set from the 2003 and 2009 inventories.***

  While the semi-annual field walks provide an opportunity to monitor conditions within the park and determine management needs, a formal natural resources inventory should be performed every five to eight years to measure changes in the ecological composition of the park against the baseline inventory conducted by Environmental Systems Analysis, Inc. (ESA) in 2003/2009. Subsequent inventories should build on the 2003 and 2009 data sets, using the same data stations. A BioBlitz could be a part of this effort, but a more significant effort is needed on a repeating cycle.

OBJECTIVE 2

Initiate slow reclamation, restoring native warm-season grasses to existing fescue-dominated treeless areas.

Currently, large masses of shrubs lands are surrounded by the NNI tall fescue. Over the long term, these fescue-dominated areas should be replaced with native warm-season grasses to create a meadow/thicket mosaic. As fescue is eliminated and thickets are managed, the relative coverage of meadow should increase somewhat over time. As a healthy meadow habitat is established, management strategies will not be aimed at maintaining a static meadow/ thicket mosaic but rather will allow the two communities to exist in constant flux over long periods of time with the mosaic shifting across the landscape.

ACTION ITEMS

- ***Eliminate tall fescue through burning and/or treatment with chemicals.***

  Dense stands of fescue should be burned in late winter or early spring. While burning will not kill the crowns, it will destroy the thick thatch and inhibit fescue growth, giving a competitive edge to native grasses. Given the density of the thatch and moisture retention that comes with remaining green for most of the year, it may be necessary to burn two or three years in succession. If three burning cycles does not adequately control the fescue, a chemical treatment (glyphosate) should be applied in early spring or late autumn – when fescue is green but native species are dormant – and followed up with a burn again in late winter or early spring.

  Alternatively, if a burn is not feasible, chemical treatment should be applied to the fescue prior to mowing. Following an application of glyphosate, the site should be mowed twice with a mulching blade. Two months after mowing, the site can be drill seeded and the placed on a one- to three-year mowing cycle.

  When deciding whether to mow or burn, the following considerations should be made.

  - Burning to mineral soil will promote forbs and warm-season grasses, increasing plant diversity and encouraging growth of native species
  - Permission will be required from adjacent residences
  - Any areas that require mowing should be mowed in the winter when the mower can see the contours and respond appropriately to steep slopes
  - The historic house in Area L will require protection prior to burning

Mark Burchick

Figure 113: Woody growth in Management Area L

Mark Burchick

Figure 114: Rubus *thickets surrounded by tall fescue in Management Area L*

- ***Remove trees in excess of 25 to 50 per acre.***

  To retain the ecological and aesthetic characteristics of a meadow community, there should be no more than 25 to 50 trees per acre. Unhealthy, invasive or otherwise undesirable trees should be removed using any of the following methods: axe frill; girdle and bark paint herbicide; or fell and treat stump with herbicide.

- ***Drill seed site two months after prescribed burn or herbicide treatment.***

  Once mineral soil has been exposed, either through mowing or burning, the site can be drill seeded with native warm-season grasses.

OBJECTIVE 3

Manage existing thickets/shrublands to maximize habitat value and create a meadow/thicket mosaic.

The thicket/shrublands in Area L, particularly to the north, are part of the thicket/shrubland aggregate at the heart of Laurel Hill Park that also spans Areas H and G. Unlike those in Area G, the thicket/shrublands in Areas H and L are older and therefore less productive as habitat and forage and should be addressed first. While some immediate action may necessary to maintain the health and habitat value of the thicket/shrublands, long-term management actions should be aimed at creating the mosaic, while continuing to provide habitat.

ACTION ITEMS

- ***Reduce footprint of thickets and redirect location to facilitate development of meadow/thicket mosaic.***

  Park Authority natural resources management staff should evaluate Area L as a whole to determine which thicket/shrublands are to remain, which are to be scaled back and which are to be redirected. These should be identified on a site map. Also on that map or on a second map, staff should draw the desired future distribution of thicket/shrublands.

- ***Mow thicket/shrublands now.***

  The thicket/shrublands in Area L are quickly dominating the site and will take over the remaining grasslands if not cut back. The best mix of ecological types in Area L is a mix of grasslands, thickets and forest. Ideally, a third of the overall thicket/shrubland would be cut annually, while also redirecting growth to maximize grassland growth. Cutting back the thicket by 300 feet in depth will buy five years of future growth expansion under normal growth patterns.

- ***Mow or burn thickets on a five-year cycle to create mosaic.***

  Currently the site is overgrown. The desired mosaic requires a significant burn if it is to be kept in old field condition. Area L is also home to an historic residence. That building, plus the proximity of private residences on the eastern border may make an alternative management method to burning more appealing.

  The thickets in Area L may benefit from a combination of sickle bar mowing and burning. These activities should be coordinated so as to treat only one-third of the thicket at a time to retain some habitat and food at all times. Also, any areas that require mowing should be mowed in the winter when the mower can see the contours and respond appropriately to steep slopes.

OBJECTIVE 4

Monitor for forest insects and disease.

Although most of Area L is dominated by thicket/shrubland, there is a small Pine-Hardwood Forest on the southern end of the area and an acidic oak –hickory forest stand on its eastern edge.

ACTION ITEM

- ***Look for and record evidence of forest insects and disease as part of a semi-annual field walk by Park Authority natural resources management staff. In particular, monitor the pine stand in the southern portion of Area L. Treat for threatening insect or disease infestations present.***

  The pine stand is particularly susceptible to the insects on the following insects.

  - Engraver Beetle *(Ips* spp.*)*
  - Southern Pine Beetle (*Dendroctonus frontalis)*
  - Pales Weevil *(Hylobius pales)*
  - White Pine Weevil *(Pissodes strobi)*

OBJECTIVE 5

Control NNIs.

Given the significant ecological value of the acidic–oak forest block in Area L and the serious threat posed by NNIs, controlling such species should be a priority in this area. Tall fescue should be eliminated from the meadows.

ACTION ITEMS

- ***Conduct a Level One* Non-Native Invasive Plant Site Prioritization *as described in Appendices E and H of the* Fairfax County Non-Native Invasive Plant Assessment.**

  Laurel Hill Park was one of the Park Authority units evaluated as part of the initial assessment in the *Fairfax County Non-Native Invasive Plant Assessment.* However, a more comprehensive follow up to that initial assessment is in order. Once a thorough site assessment and prioritization has been conducted, high priority areas should be treated per *Appendix I: Recommended Control Strategies* of the *Fairfax County Non-Native Invasive Plant Assessment*.

- ***Target tree-of-heaven for removal.***

  Tree-of-heaven is particularly invasive and was observed in Area L. There is a grove of the species, though it covers only approximately 1% of the entire Area.

Mark Burchick

Figure 115: Tree-of-heaven stand in Management Area L

All Tree-of-heaven should be girdled, followed by an application of chemicals (100% garlon or cacodylic acid) using an axe-frill method.

OBJECTIVE 6

Monitor and manage wildlife.

The presence and absence of certain wildlife can be indicative of habitat health. Wildlife at Laurel Hill should be monitored to assess the ecological impact of various management techniques.

As Area L becomes a more popular biking destination and there is more traffic on the trails, the human disturbance may cause some wildlife to migrate to another area of the park. Regular monitoring of wildlife populations will enable Park Authority natural resources management staff to determine the effects of human activity and observe changes in wildlife populations and behaviors.

ACTION ITEMS

- ***Conduct wildlife studies, building upon the Audubon Society's ongoing work and developing protocols and encouraging volunteers to complete surveys for mammals, birds, fish, reptiles, amphibians and invertebrates.***

  With the BioBlitz serving as a baseline, subsequent wildlife studies should be conducted to determine population or behavioral changes and track trends, particularly as the management objectives listed above are carried out.

  Birders performing the Audubon Society's NVBS have observed owls, among others, at Laurel Hill Park. The trees within close proximity to thicket/shrublands provide good habitat for the owls. The trees offer roosts for owls and the brambles provide habitat for the small mammals upon which owls prey. Such vegetative conditions occur in numerous locations throughout the park, including Area L.

  Like the NVBS, wildlife studies reveal important relationships between animals and their habitat. Data collected from such studies are useful tools for determining the value of different habitat characteristics and, in turn, managing these habitats. The Park Authority should encourage the local high schools, regional colleges and universities and other research organizations to use Laurel Hill Park as an outdoor laboratory, as the Audubon Society – which has been collecting both bird and butterfly data – already does. Studies conducted by these groups will provide the information needed to refine their management techniques to enhance wildlife.

- ***Direct management efforts toward achieving the meadow and thicket/shrubland mosaic described under Objective 3.***

  The meadow and thicket/shrubland mosaic offers the best supporting habitat for the greatest diversity of birds and other wildlife. Objective 3 describes how meadow and thicket/shrubland habitats in Management Area L can be managed in conjunction with other management areas to create a mosaic at the heart of Laurel Hill Park and provides recommendations for doing so. The *Treeless Area Technical Manual*, Appendix 6, provides the practical steps for carrying out these recommendations.

- ***Monitor and reduce deer populations and fully implement the County's deer management strategy.***

  Deer browsing can be harmful to a forest, adversely affecting hardwood regeneration and the diversity of groundcover grass, sedges, rushes and forbs. In addition, deer provide a vector for the establishment and spread of NNIs. Given these threats to the forest community, the deer population should be controlled.

The deer population at Laurel Hill Park is well above the ecological carrying capacity, posing a significant threat to plant communities on-site. Selectively feeding on native species, deer reduce species diversity and richness. The absence of strong native plant communities creates an environment favorable to NNIs. Gaining the competitive advantage, NNIs are able to establish themselves and thrive. In addition, deer encourage the spread of NNIs by carrying their seeds and redistributing them.

The deer population at Laurel Hill Park should be reduced such that it is at or below the ecological carrying capacity of 15 to 20 deer per square mile.

OBJECTIVE 7

Manage human activity and interplay of park users and natural resources in Area L, addressing human intrusions such as off trail use, illegal dumping, boundary encroachments and inappropriate behavior that would adversely affect the natural resources.

ACTION ITEMS

- ***Install monuments along property boundaries, both along park edge and private residences.***

  Area L is bordered by a residential community to the east. Such close proximity to a forest can be tempting to neighbors: forest blocks may be used as dumping sites for yard or construction debris or as personal space for illegal structures such as storage sheds. In order to prevent such encroachment, the property boundary should be well articulated (monumented) and should include point-on-line witness markers where needed along the urban interface. Monuments installed along the property boundary will educate neighbors as to the location of the boundary and assist park managers in determining whether encroachments are taking place. If illegal dumping or encroachments occur, Park Authority staff should contact both the adjacent neighborhood association and the individual property owner to ask that they be a good neighbor and stop the illegal activity.

- ***Plan new trail alignments avoiding large woodland blocks.***

  Area L includes a healthy, mature stand of acidic-oak forest. New trail loops and alignments should avoid this forested land. To deter park users from forging their own trails – which can create additional corridors for the conveyance of undesired plant material and litter, and if poorly sited, can cause erosion – the Park Authority should construct trails between the proposed neighborhood park and the residential areas. These trails should provide access to the park along routes that do not cut into vulnerable forest blocks.

- ***Perform necessary maintenance on existing trails and plan new trail alignments.***

  The Apple Orchard Loop is the shared-use trail that winds through Area L, closely hugging the site's contours. This is the primary means through which park users can experience the site and engage with its natural resources. For the safety of park users and the ecological communities in the area, it is important that this trail is properly maintained. By providing safe, comfortable and clearly marked trails, the Park Authority discourages park users from forging their own trails and engaging in behavior that could be detrimental to valuable habitats.

The Park Authority has entered a maintenance agreement with the group, Mid-Atlantic Off Road Enthusiasts (MORE), according to which the group has "adopted" the trails and will assume trail maintenance responsibility. The Park Authority should work with MORE to insure the safety of the Laurel Hill Park trail system and should encourage similar partnerships with other organizations.

Figure 116. Existing signage indicating proper trail etiquette

- ***Erect clear signage listing appropriate behavior within the park bounds and in woodland edges.***

  In addition to restricting human activities to officially sanctioned trails, Park Authority should erect signs outlining appropriate behavior. These signs should include messages prohibiting dumping and requiring that park users remain on trails.

  Directional signs should indicate connections to other trails in the Park as well as access to nearby residential areas. Currently, two branches of the Apple Orchard Loop extend into the neighboring residential area; however, park users not familiar with these access points may try to cut through the forest to enter the Area. Clearly visible signage can direct people to official access points and reduce unwanted cut-through paths.

  Signs should also include warnings for animal crossings along trails. Snakes sunning on the hot pavement risk being run over by fast-moving bicyclists, but warning signs and speed limits could protect them and other wildlife.

  Note: All proposed signage should be developed according to the guidelines set forth in the *Laurel Hill Signage and Wayfinding Plan*.

- ***Use thickets to direct human activity.***

  Although human behavior often shapes the landscape and influences ecological health, in Area L, the thicket/shrublands can direct human activity. The dense thicket/shrublands on the site can be used to channel park users and discourage them from leaving officially sanctioned trails. Retaining thicket/ shrublands in and around sensitive habitat will force park users to keep their distance and prevent curious visitors from disrupting wildlife.

OBJECTIVE 8

Form partnerships with nonprofits and other agencies to continue the ongoing site monitoring and research.

Currently, Laurel Hill Park is one of the data collection sites for the Audubon Society's NVBS. The data collected during the survey are useful in determining the health of and appropriate management practices for the ecological community types at Laurel Hill. Establishing partnerships with similar organizations has the potential to increase support for the park and its maintenance, provide opportunities to collect more data and in turn, learn more about the various habitats present.

ACTION ITEMS

- ***Encourage the Northern Virginia Audubon Society to continue their monitoring programs within the Area.***

  The Audubon Society has one data collection point for the NVBS in Area L, in the southwestern corner of the Area. A second point is further north just outside the Area, between the Laurel Hill Park boundary and the residential development.

  The Audubon Society should continue to conduct bird counts at these points and possibly another within the Area. Data already collected indicate that Area L has a diverse bird population. The Survey will be a valuable way for Park Authority natural resources management staff to track changes in bird populations as a result of changing management techniques. Similarly, the Survey will enable Park Authority staff to determine the effects of increased traffic on bicycle trails.

- ***Encourage volunteer groups or offer site access to graduate students to systematically survey mammals, birds, reptiles, amphibians and invertebrates.***

  As stated under Objective 6, Laurel Hill Park has the potential to serve as an outdoor laboratory for wildlife studies and research. Its close proximity to Washington, D.C. presents numerous opportunities to partner with educational institutions, government agencies and nonprofit organizations in mutually beneficial relationships. These range from inviting graduate students and volunteers to conduct research on the site – and then using the research to inform management decisions – to opening the site to natural resources agencies in neighboring jurisdictions as an example of current resource management in practice, thereby encouraging an exchange of information, techniques and resources among similar agencies in the area.

MANAGEMENT AREA L – MANAGEMENT RECOMMENDATION PRIORITIZATION				
Ecological Community	Acidic Oak-Hickory Forest	Pine-Hardwood Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 1: Monitor current conditions				
• Conduct semi-annual field walks	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept	**1**–April/Sept
• Develop annual maintenance plans	**1**	**1**	**1**	**1**
• Perform BioBlitz	**2**	**2**	**2**	**2**
• Perform inventory updates	**3**	**3**	**3**	**3**
Objective 2: Reclaim fescue-dominate treeless areas and restore to native warm-season grasses				
• Eliminate fescue			**1**	
• Reduce tree cover to less than 1/3 of site			**2**	**2**
• Drill seed site			**3**	
Objective 3: Manage existing thicket/shrublands to maximize habitat value and create meadow/thicket mosaic.				
• Reduce thicket/shrubland footprint in Area L				**2**
• Mow thicket/shrublands				**2**
• Mow or burn on five-year cycle				**3**
Objective 4: Monitor for forest insects and disease				
• Monitor for forest insects and disease infestations, particularly in the pine stand, and treat those present		**1**		
Objective 5: Control NNIs				
• Conduct NNIAP study	**1**	**1**	**1**	**1**
• Target Tree of Heaven for removal			**2**	**2**
Objective 6: Monitor and manage wildlife				
• Conduct wildlife studies	**2**	**2**	**2**	**2**
• Direct management efforts for mosaic			**1**	**1**
• Monitor and reduce white-tailed deer population to or below ecological carrying capacity (i.e. 15 to 20 deer per square mile)	**1**	**1**	**1**	**1**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 117: Prioritization of action items in Management Area L by community group

MANAGEMENT AREA L – MANAGEMENT RECOMMENDATION PRIORITIZATION				
Ecological Community	Acidic Oak-Hickory Forest	Pine-Hardwood Forest	Piedmont Prairie (Meadow)	Thicket/ Shrubland
Objective 7: Manage human activity				
• Install monuments on property boundaries	**3**	**3**		**3**
• Plan new trail alignments to avoid large woodland block			**2**	**2**
• Manage and maintain trail extensions			**2**	**2**
• Erect clear signage listing appropriate behavior	**3**	**3**	**3**	**3**
• Use thicket/shrublands to manage trail use				**1**
Objective 8: Form partnerships with nonprofits and agencies				
• Encourage Audubon Society efforts	**1**	**1**	**1**	**1**
• Encourage other volunteer and student groups	**2**	**2**	**2**	**2**

1 Priority 1 – Immediate **2** Priority 2 – 2-5 years **3** Priority 3 – 5+ years

Figure 117, continued: Prioritization of action items in Management Area L by community group

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SECTION VI: CONCLUSION

Figure 118: Looking across thicket/shrublands in Areas G south toward Area K

Meadows and thickets/shrublands as well as undisturbed hardwood forests are a rarity in Northern Virginia. Laurel Hill Park offers a unique opportunity to restore and manage these valuable ecological communities. The abandoned prison pastures have already developed into meadow and thicket communities that support a diverse array of plant and animal species, and the hardwood forests, particularly those in the northeastern portion of the site, provide healthy woodland habitat. This natural resource management plan demonstrates the first step in protecting and improving the health of these communities. The greater challenge will be the steps that follow: implementing the management recommendations presented in this plan.

Focusing on Management Areas G, H, I, J, K, L and portions of A, Fairfax County Park Authority staff and their consultants identified the most significant threats to the ecological community groups on site: human access, non-native invasive plant species, excessive deer populations and stormwater management. Negating the damaging impact of human activity will require providing access to the site within clearly defined limits and educating the public as to the value of these natural communities and the effect their behavior has on these community. With the completion of the Non-Native Invasive Assessment and Prioritization protocol, Fairfax County is in a good position to assess NNIs at Laurel Hill and develop priorities for controlling their spread. Similarly, the County has already implemented deer population control measures at other Park Authority sites. Doing so at Laurel Hill will increase the ability for native plants to thrive and forest species to regenerate. Finally, with the adoption of the Lower Occoquan Watershed Management Plan by the Board of Supervisors in January 2011, the County is well-positioned to manage stormwater runoff, which will be increasingly important as Laurel Hill Park is surrounded by increasing development.

The Fairfax County Park Authority recognizes the importance of this landscape. The wealth of native Mid-Atlantic ecological communities within these 1,200 acres is a precious resource that will require proper management if it is to thrive. Already, many of the tools needed to protect and care for this landscape are ready and available for use. This plan outlines how these tools can best be put to work and suggests other tools for the Park Authority to consider. The plan provides recommendations and outlines strategies to guide the management of the Laurel Hill Park landscape. The table at the end of each management area section identifies priorities for implementation. These tables, along with the Recommendation Prioritization Table in Appendix 6, indicate what needs to happen right away, what needs to be done two to five years from now and what should happen in five or more years, providing a starting point from which the County can take action. It is at this point that this plan is no longer a planning document but becomes a living, breathing plan of action put into practice. This was just the first step. Taking action – protecting and management these valuable hardwood forests and treeless meadow areas – is the next step.