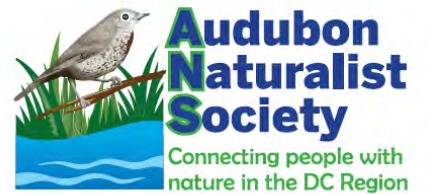




Woodend 2065

50-YEAR MASTER PLAN



Woodend 2065
50-YEAR MASTER PLAN

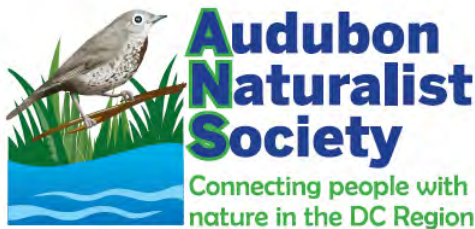


TABLE OF CONTENTS

SECTION I: Project Overview

Vision statement -----	1
Letter from the executive director -----	4
Executive summary -----	6
Master Plan process -----	7
Project team -----	8
Project schedule -----	9

SECTION II: Discovery Phase Summary

Discovery phase process -----	13
Site visit findings -----	14
Stakeholder survey summary -----	15
Site analysis summary -----	16

SECTION III: Master Plan

Master Plan trajectory -----	23
Master Plan strategies -----	24
Master Plan summary -----	25
Site organization process -----	27
Master Plan components -----	29
Ecological habitat restoration -----	43
Watershed restoration -----	69
Cultural landscape restoration -----	75
Pedestrian circulation -----	85
Vehicular circulation and parking -----	95
Landscape amenities -----	105
Sustainable Master Plan implementation ----	113

SECTION IV: Appendices

A: Archive review summary -----	129
B: Interview and meeting summary -----	130
C: Stakeholder survey finding detail -----	131
D: Site analysis detail -----	143
E: Potential sites for Education Hub -----	149
F: Reference plant communities -----	151
G: Opinion of probable cost -----	167

VISION STATEMENT

Historic Woodend Nature Sanctuary is Washington's
OASIS OF SUSTAINABLE, HEALTHY, NATURAL HABITATS
– welcoming and inspiring all people to enjoy, learn about
and protect our shared environment.





LETTER FROM THE EXECUTIVE DIRECTOR

Since its founding in 1897, the Audubon Naturalist Society has made important conservation impacts in the DC metro area and beyond. Our victories range from passage of the Migratory Bird Treaty Act, to preservation of the C&O Canal, to saving Dyke March, to protecting Ten Mile Creek. Conservation of our headquarters at Woodend Nature Sanctuary remains one of our quieter triumphs during the life of our venerable organization. At Woodend, we have effectively conserved forty unspoiled acres inside the busy DC beltway for 50 years, holding back development, preserving trees and meadows, and providing our community with an oasis of nature in a hectic, stressful region.

With the creation of the Woodend Master Plan, Audubon Naturalist Society sets forth a new 50-year vision and a plan for a bright future for the sanctuary. The vision re-imagines Woodend with its deer-devastated habitats restored so that visitors of all ages and stages can learn about nature's astonishing biodiversity in their own community. This plan sets a course that will ensure our Clean Drinking Stream flows freely again to showcase the importance and value of stream stewardship in our region. Our future includes buildings with green roofs, rain gardens, permeable pavements and solar power so that Woodend highlights the best of sustainable building

practices. It's thrilling to envision a future with a new Education Center, a nature Play Space in the Woods and accessible, well-interpreted trails that invite everyone to immerse themselves in nature. As we implement this plan in the decades ahead, Woodend will keep pace with the evolving demographics of the DC metro region. For me, the most important part of the Woodend Master Plan is that it transforms our headquarters into a place of welcome that inspires people of all ages, backgrounds and abilities to enjoy, learn about and protect the natural world.

Lisa Alexander, Executive Director
Audubon Naturalist Society



EXECUTIVE SUMMARY

Project Overview

The Audubon Naturalist Society (ANS) has conserved its 40-acre Woodend Nature Sanctuary in Chevy Chase, Maryland for nearly 50 years. Today, we look ahead 50 years and envision the future Woodend as a hub for environmental learning and innovation that will inspire people throughout the Washington DC metro region and beyond. In 2015, ANS and the landscape architecture and environmental planning firm Andropogon Associates launched the Woodend Master Plan process to re-imagine the historic property as a model of restoration and sustainability that spreads its environmental ethos throughout the region.

The Master Plan will work in tandem with ANS’s strategic plan to create a comprehensive framework that will guide stewardship of Woodend’s natural and built environments for the next 50 years.

The Master Plan emphasizes ecological restoration, stormwater management, building infrastructure, pedestrian and vehicular circulation, cultural landscape restoration, and landscape amenity improvements. An inviting entryway and education center will help attract new visitors, as will programming and communications designed specifically to welcome diverse audiences. To improve the visitor experience and minimize existing spatial conflicts between users, three geographically

distinct activity hubs are proposed: an education hub, a stewardship hub, and an administrative and event hub will enable visitors to simultaneously enjoy the oasis in nature that is Woodend.

Proposed construction phases provide a long-term approximation of resources required to realize the project’s full potential. Specific information about project sequencing and programming plans, as well as revenue and expense projections for that programming, fall within the purview of the complementary strategic plan.

Master Plan Goals

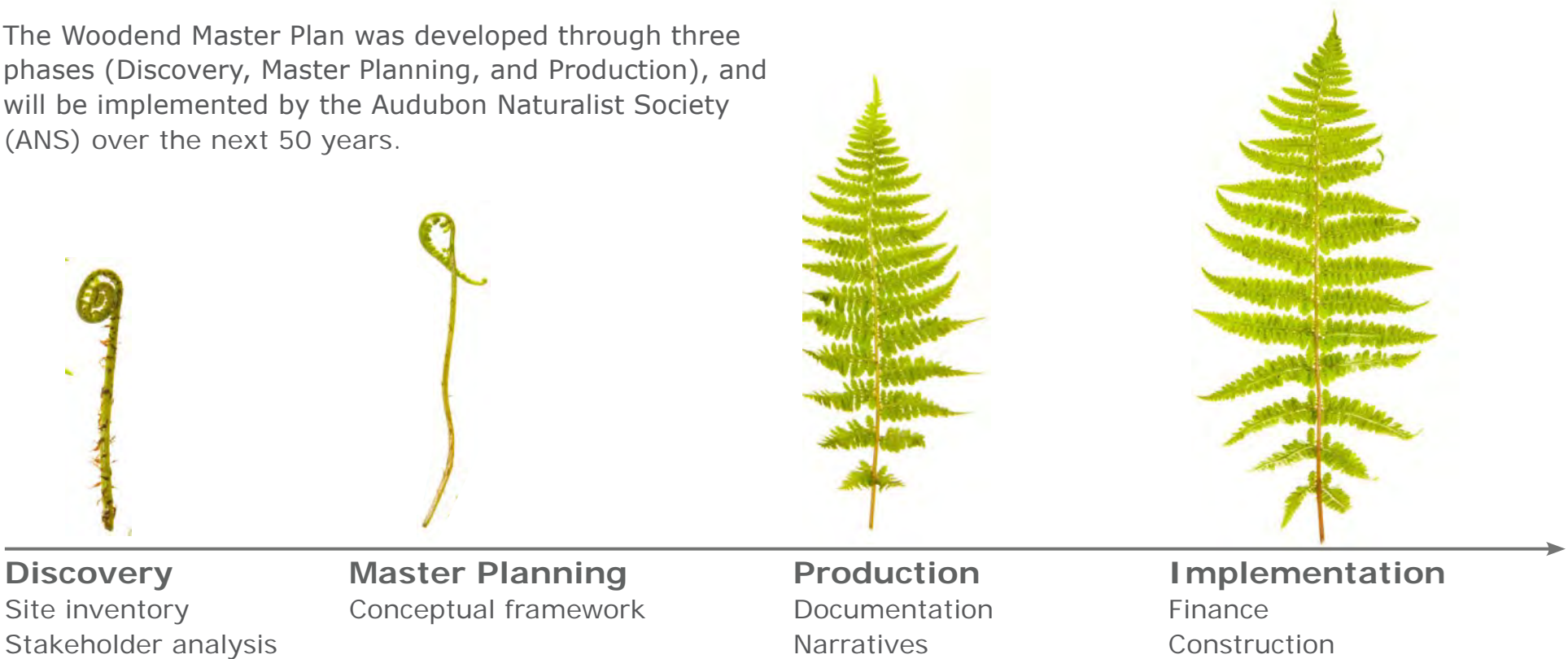
Throughout the process the Woodend Master Plan followed these guiding principles:

- Support environmental education
- Model stewardship
- Promote biodiversity
- Attract diverse audiences
- Improve watershed health
- Offer revenue potential
- Remain free and open to the public
- Preserve culture and history
- Enhance visitor experience for all

MASTER PLAN PROCESS

Master planning is a dynamic, inclusive process in which an organization’s stakeholders collaborate to envision a site’s future physical environment. The organization of circulation and site features are paramount, as are environmental considerations and the site’s estimated carrying capacity. Decisions respond to the organization’s mission and vision, stakeholder needs, and the site’s opportunities and constraints. The result is a visionary document that uses graphics and narrative to guide a process for transformation of the sanctuary, and sustain it for the future.

The Woodend Master Plan was developed through three phases (Discovery, Master Planning, and Production), and will be implemented by the Audubon Naturalist Society (ANS) over the next 50 years.



PROJECT TEAM

Master Plan Committee Audubon Naturalist Society

- Lisa Alexander - Executive Director
- Lee Babcock - ANS Member
- Diane Cameron - Director of Conservation (former)
- Megan Carroll - Committee Chair, Board of Directors
- Leslie Catherwood - President, Board of Directors
- Paul D’Andrea - Vice President, Board of Directors
- Jennifer Judd Hinrichs - Board of Directors
- Paul Honigfort - ANS Member
- Laura Hull - Board of Directors
- Diane Lill - Director of Environmental Education
- Pearl Marks - ANS Member
- Jane Davenport McClintock - Board of Directors
- Darlene Robbins - ANS Member
- Lois Taylor - Comptroller
- Rob Timmons - ANS Member
- Bonnie VanDorn - Board of Directors
- Jacky Wershbane - Director of Development

Landscape Architecture Andropogon Associates

- Thomas Amoroso, PLA - Principal-in-Charge
- Emily McCoy, PLA, ASLA - Project Manager
- Lauren Mandel, PLA, ASLA - Landscape Architect
- John Collins - Senior Designer
- Eduardo Santamaria - Landscape Designer

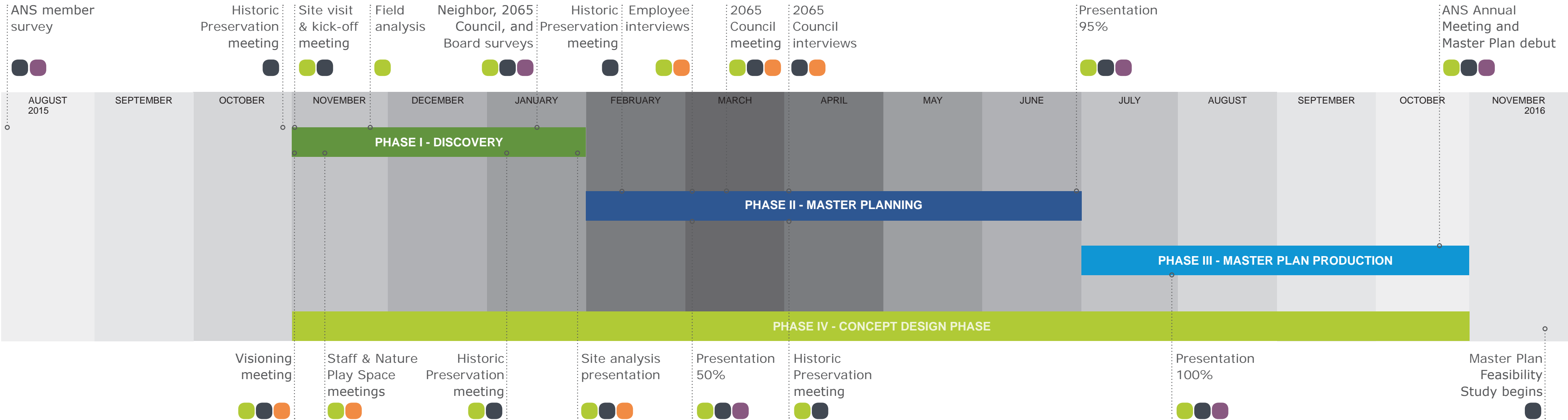
Cost Estimating International Consultants, Inc.

- Michael C. Funk - Senior Cost Estimator

2065 Council Advisory Panel of Regional Leaders

- Maiara Alves Firmino - Leadership Institute, Kennedy High School
- Pablo Blank - Immigrant Integration Programs Manager, CASA of Maryland
- Alfred C. Carr, Jr. - Maryland State Delegate
- Margaret Hathaway - Emerging Leaders Network, Chemical Review Manager, Office of Pesticide Programs, U.S. Environmental Protection Agency
- L. Patricia Hernandez, PhD - Department of Biological Sciences, The George Washington University
- Byoung-Suk Kweon, PhD - Department of Plant Science and Landscape Architecture, University of Maryland
- Ambar Martinez Velazquez - Leadership Institute, Kennedy High School
- Rubin Patterson, PhD - Chair, Department of Sociology and Anthropology, Howard University
- Claire Schwadron - Director, Project Youth ArtReach, Artivate, Inc.
- Tammy Shepherd - East County Network Builder, Impact Silver Spring
- Alan Spears - Government Affairs, Cultural Resources Director, National Parks Conservation Association
- Victor Ukpolo - Environmental Program Specialist, District Department of the Environment
- Scott Whipple - Supervisor, Historic Preservation Unit, Montgomery County Planning Department
- Beth Ziebarth - Director, Accessibility Program at Smithsonian Institution

PROJECT SCHEDULE



Input Provided By

- Andropogon Associates
- Advisors (Members, Neighbors, Board of Directors, Woodend 2065 Council)
- Master Plan Committee
- General Public



SECTION II

DISCOVERY PHASE SUMMARY

DISCOVERY PHASE PROCESS

The Discovery Phase - the first step in the Master Planning process - consisted of a detailed site inventory and stakeholder analysis to gain a thorough understanding of existing conditions, priorities, and anticipated needs. Information was gathered, analyzed, and synthesized through a five step process: 1) site visits with ANS staff, photo documentation, and behavior mapping; 2) archival document digitization and review; 3) interviews and meetings with ANS staff and committees, neighbors, and Historic Preservation; 4) stakeholder survey distribution; and 5) site analysis through Geographic Information System (GIS). See Appendices A-D for full Discovery Phase synthesis.



SITE VISIT FINDINGS

Opportunities Observed



Enhance visitor welcome



Improve circulation



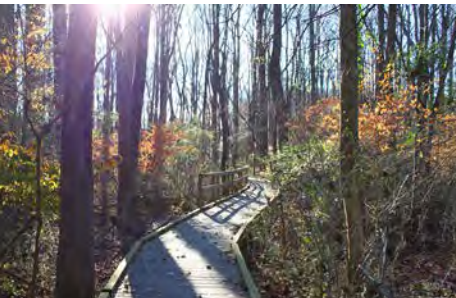
Add meaningful spaces



Restore habitats



Upgrade signage



Improve connection to Rock Creek Park

Constraints Observed



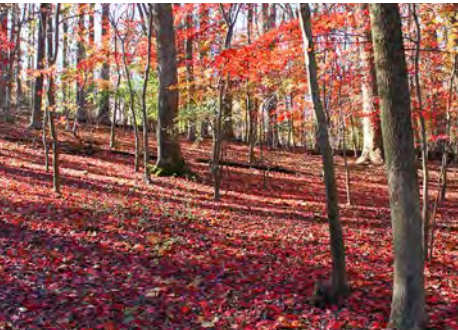
Unwelcoming entries



Habitat degradation



Stream bank erosion



Invasive species



Traffic flow limitations



Parking and staging conflicts

STAKEHOLDER SURVEY SUMMARY

Through surveys and interviews of ANS members, staff, Board of Directors, Woodend neighbors, and Woodend 2065 Council Members, the following conclusions were drawn:

Master Plan Operating Principles

- Supports environmental education
- Models stewardship
- Promotes biodiversity
- Attracts diverse audiences
- Improves watershed health
- Offers revenue potential
- Stays free and open to the public
- Preserves culture and history
- Enhances visitor experience for all

Preferred Physical Improvements

- Habitat restoration
- Informational wayfinding signage
- Watershed restoration
- Trails
- Building improvements



SITE ANALYSIS SUMMARY

Synthesis

Woodend Nature Sanctuary contains diverse natural resources and important cultural and historic resources. Through a watershed lens, Woodend lies within a relatively small drainage area of the Rock Creek Watershed and the Bethesda Mainstem Sub-Watershed that feed into the Potomac River. A wetland buffer, 100-year floodplain, and 500-year floodplain extend onto the property itself. From an ecoregion perspective, Woodend falls into the Piedmont Uplands ecoregion (Ecoregion 64c), in close proximity to the Chesapeake Rolling Coastal Plain (Ecoregion 65n).

Woodend’s forest and forest interior are adjacent to a robust network of parkland in Rock Creek Park that is made up of riparian corridors. Woodend’s boardwalk trail abuts Rock Creek Park’s multiuse trail, and provides an access point to the thousands of walkers, joggers and cyclists who traverse Rock Creek Park trails each year. Woodend is within one quarter mile of the Capital Crescent Trail and within walking distance of two

proposed Purple Line Metro Rail stops. It is located in close proximity to multiple schools and health facilities. The site is relatively steep, with a 120-foot grade change between Rock Creek and Woodend’s high point at the mansion. The site’s mansion is listed on the National Register of Historic Places and the Montgomery County Master Plan for Historic Preservation. The site’s designated period of historical significance is the 1920s, but historical records referring to the site date back to 1699.

The site supports multiple notable trees including champion trees and champion tree candidates. Woodend is mostly forested but also contains meadows and wetlands. These areas support diverse habitats, including forest interior dwelling species habitat (large, contiguous forest tracts with mature hardwood trees). The site’s most significant environmental challenges are over-browsing by deer, concentrated invasive plant species, thin or absent native plant understory, thin or absent topsoil, and stream bank erosion and scouring.



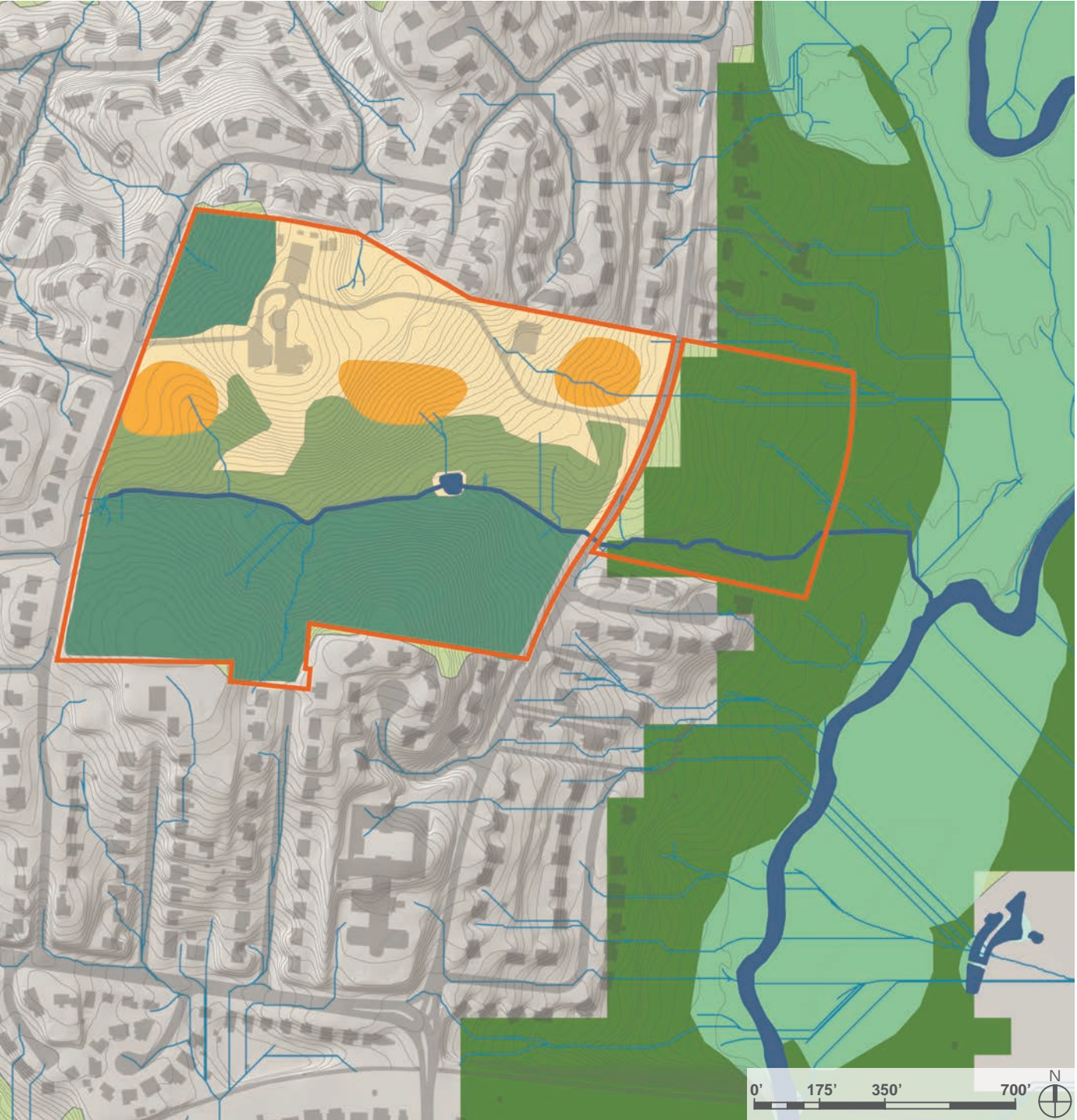
Carrying Capacity Considerations

Competing human and environmental needs at Woodend must be thoughtfully balanced, so as to preserve the oasis that the sanctuary provides to humans and nature. Strategies for maximizing Woodend’s carrying capacity include:

- Habitat restoration and conservation
- Sustainable site development
- Green building best practices
- Careful daily and seasonal program scheduling

Preliminary Recommendations

- Eradicate invasive plant species
- Encourage forest understory growth
- Build topsoil
- Balance human and environmental carrying capacities
- Manage stormwater runoff
- Stabilize stream banks
- Protect historic resources
- Provide interpretive signage
- Enhance pedestrian wayfinding
- Emphasize mansion’s main entry
- Build at addition to the mansion
- Re-think vehicular circulation and parking
- Support environmental education with new multi-use building



SITE ANALYSIS

Natural Resources and Habitat Zones

- Cultural landscape
- Meadow
- North-facing xeric-mesic forest
- South-facing xeric-mesic forest
- Interior riparian forest
- Wetland interior forest
- Pond / emergent wetland
- Site

Cultural and Historic Resources

- Forest with trails
- Historic forest edge with trails¹
- Historic structure¹
- Pond and Fern Glade¹
- Hemlock Grove¹
- Viewshed to Mansion¹
- Notable tree²
- Site

¹ = Historically significant feature

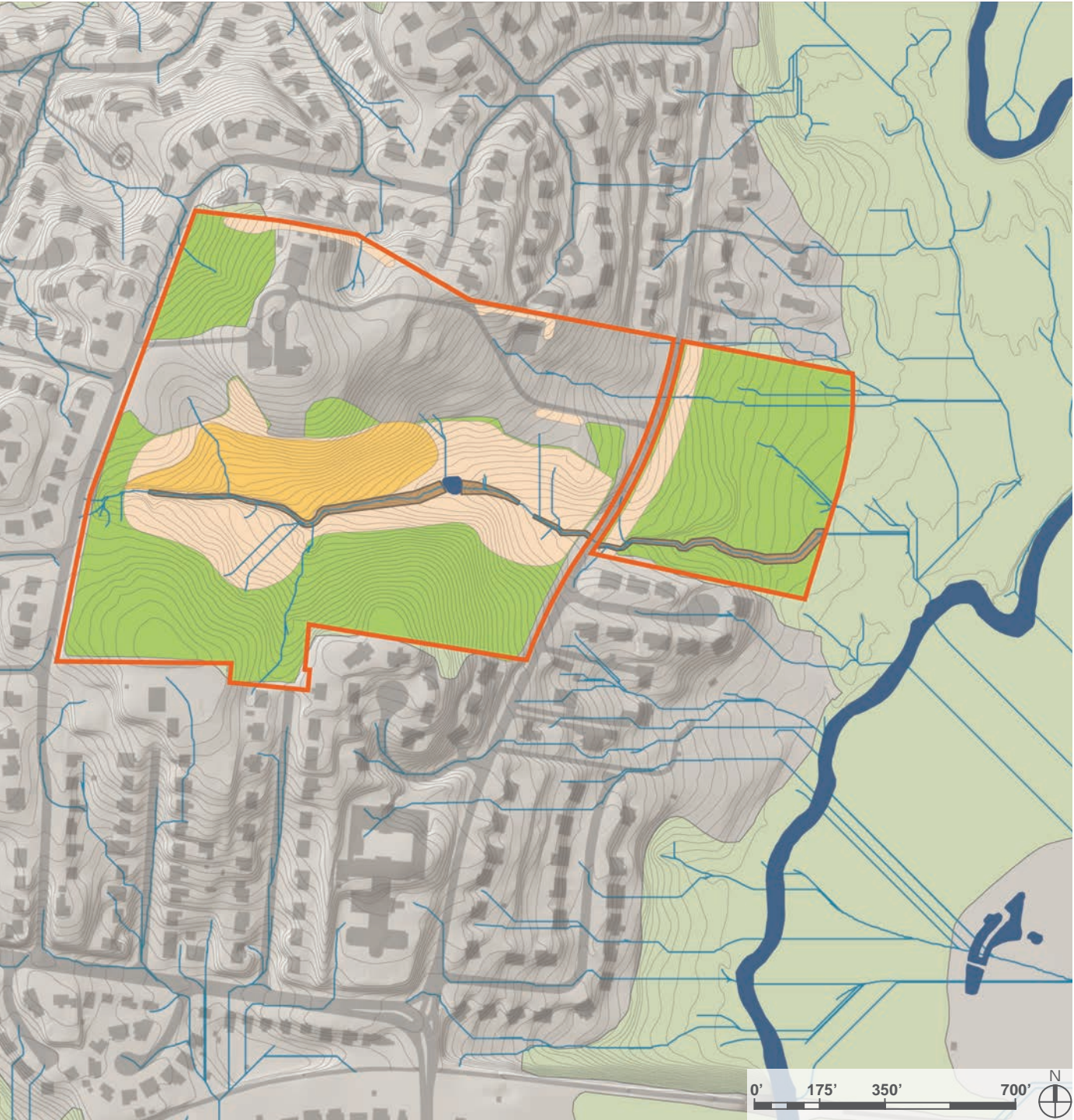
² = Source: Meetings with Remarkable Trees: A Guided Walk Around Woodend, 2002



Challenged Areas

- Forest
- Thin or absent native plant understory*
- Concentrated invasive plant species*
- Thin or absent topsoil*
- Stream bank erosion*
- Site

* = Approximate location based on site observation





SECTION III
MASTER PLAN

MASTER PLAN TRAJECTORY

Long ago in history, the land that is now Woodend was a riparian corridor of forest that buffered Rock Creek. It is likely that Native Americans traversed that forest as they used Rock Creek as a fishing and hunting grounds. After European settlers arrived, the land was transformed for other uses and a rural landscape with roads, mills and farms emerged. In 1916, U.S. Naval Captain Chester Wells and his wife Marion Dixson Wells purchased property from Robert Jones in the Clean Drinking land grant area. They commissioned renowned American architect John Russell Pope to construct Woodend mansion as an homage to Mrs. Well’s ancestral Australian home. The mansion was completed in 1928 and Mrs. Wells added birdhouses to the newly planted landscape.

An active member of ANS, Mrs. Wells bequeathed the Woodend mansion and 40 acres to the Society upon her death in 1967. A new life for the landscape began as Woodend was transformed into an environmental education destination and the first physical headquarters for the society. Over time, the buildings and grounds filled with staff, visitors, membership meetings, classes and events. Today, the ANS mission plays out at Woodend Sanctuary as thousands of people participate in environmental education and conservation programs that take place in its classrooms, meadows, forests and pond.

As we look to the future, another transformation of Woodend appears on the horizon. Through the Master Plan, ANS has set the stage to revive biodiversity at Woodend and create a vibrant living classroom that welcomes learners of all ages and abilities and serves as a flagship model for habitat restoration. Our buildings and grounds will provide a demonstration site of best green building practices for homeowners and institutions alike, and as an inspiration and training ground for conservation and stewardship activity. Over the next 50 years, ANS will strive to use Woodend as a launch pad to spread the organization’s environmental ethos throughout the DC metro region and beyond.

MASTER PLAN STRATEGIES

- 1 | Environmental Education**
Offer rich nature education experiences for all user types throughout the seasons and years
- 2 | Habitat Restoration**
Support biodiversity and multiple habitat types
- 3 | Sustainable Model**
Demonstrate best green building and site design practices that balance the carrying capacity of the site with the long term sustainability of ANS and its mission
- 4 | Welcoming Entrances**
Provide inviting entries to the property and establish a hub for visitor orientation as the gateway to Woodend
- 5 | Site Organization**
Maximize use of the site by separating conflicting uses of the sanctuary for programming and circulation both physically and operationally
- 6 | Revenue Generation**
Provide avenues for revenue generation in order to sustain the sanctuary for the long term



MASTER PLAN SUMMARY

The Woodend Master Plan emphasizes ecological restoration, stormwater management, building infrastructure, pedestrian and vehicular circulation, cultural landscape restoration, and landscape amenity improvements. The emphasis on ecological restoration strategies will strengthen the site’s long-term ecosystem health and stormwater functioning.

The Master Plan offers a reorganization of the physical site in which built infrastructure is concentrated to the north of the driveway, or “vehicular spine,” while a more natural environment is restored south of the spine. The 7-acre parcel to the east of Jones Mill Road is reserved for self-guided activities, such as birding and nature contemplation. To minimize existing spatial conflicts between users, The Woodend Master Plan offers a reorganization of the physical site around three geographically distinct activity hubs: administrative and event, stewardship, and education.

Stewardship Hub

This hub will operate as the nucleus of our conservation and restoration activities. Its building will house the conservation and property management staff as well as much needed equipment and materials storage for stewardship activities. The hub will include an outdoor classroom and working demonstrations of stormwater management techniques including rain gardens and conservation landscaping. The grounds will showcase

native plant gardening and organic gardening to inspire individuals and institutions to adopt best green practices.

Administrative and Event Hub

This hub will remain the event center for Woodend and add year-round event capacity by including an addition to the mansion. The new space will include accessible entries and state-of-the art equipment that will allow ANS to host regional environmental symposia, build our corporate event rental business and expand our existing wedding rentals. The building will house administrative staff. In the grounds closest to the mansion, we will expand native gardens, demonstrate organic lawn care, restore meadows and add new outdoor event locations.

Education Hub

This hub includes both the Teale Education Center and a new proposed Education Center. The Education Center will house classrooms, visitor information and the Naturalist Shop as well as places to picnic, drinking fountains and restrooms. The Education Hub will welcome schoolchildren, summer campers, visitors from the region and nearby Rock Creek Park. An accessible trail loop starts at the Education Center and will lead to a new nature Play Space in the Woods and an accessible boardwalk around Woodend’s restored pond and Clean Drinking stream.



SITE ORGANIZATION PROCESS



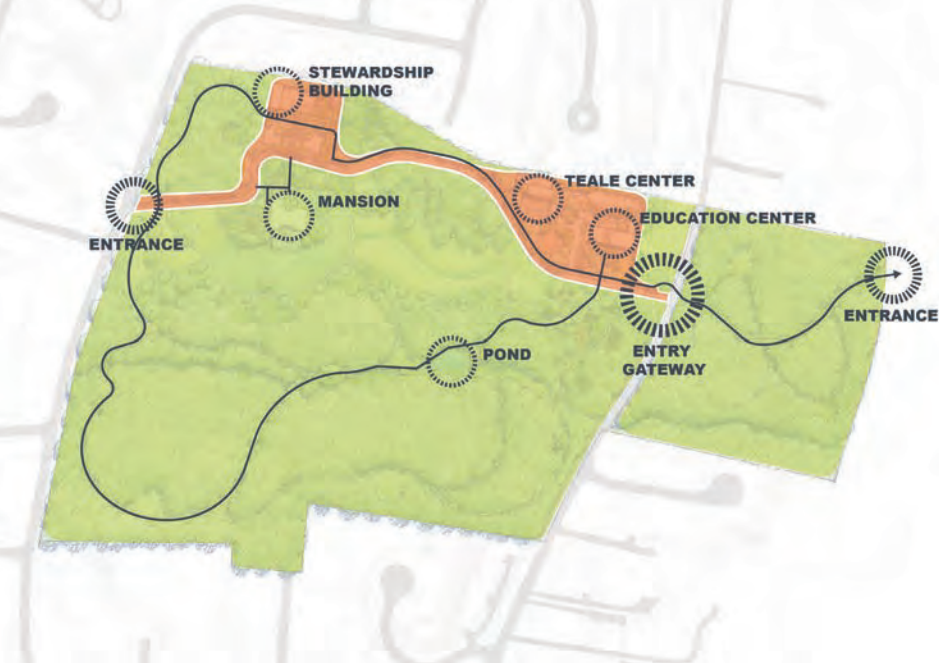
1| Identify user conflicts
Pinpoint areas of congestion and programming conflicts on the site through site visits, interviews, and surveys.



2| Organize site around driveway spine
Map out future program areas to concentrate usage along the driveway spine and minimize intrusion into natural habitat zones.



3| Create program hubs
Untangle user conflicts by giving each program its own activity hub and building – administrative and events, stewardship, and education.



4| Define movement patterns
Organize ideal pedestrian and vehicular movement patterns for visitors moving through entrances to destinations and gathering spaces.



MASTER PLAN COMPONENTS

PROGRAMMING



- ① Mansion and lawn
- ② Demonstration gardens and Stewardship Yard
- ③ Event location
- ④ Education Center and shop
- ⑤ Teale Center preschool and kindergarten
- ⑥ Play Space in the Woods
- ⑦ Improved entryway and pedestrian crossing
- ⑧ Pond and boardwalk
- ⑨ Rock Creek Park entryway

EDUCATION HUB

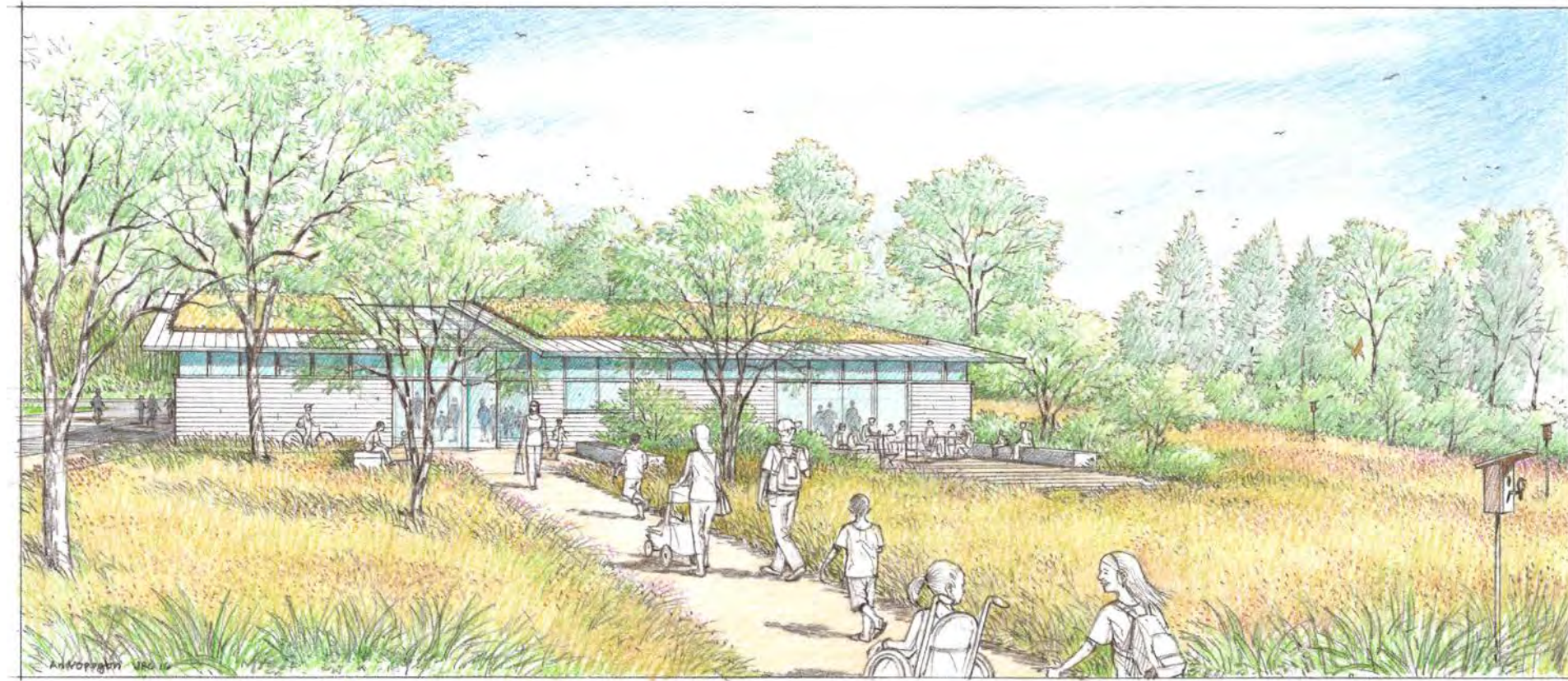


- (A) Main entrance and pedestrian crosswalk
- (B) Bus drop-off / pickup
- (C) Car drop-off / pickup
- (D) Education Center (includes visitor center, classrooms, and shop)
- (E) Outdoor classroom with cafe seating
- (F) East meadow
- (G) Delivery / loading zone
- (H) Permeable parking (see note 2)
- (I) Turn-around island
- (J) Teale Center
- (K) Teale Center drop-off / pickup
- (L) Crosswalk
- (M) Teale Center courtyard
- (N) Teale Play Area
- (O) Teale Center handicapped parking
- (P) Play Space in the Woods
- (Q) Picnic area
- (R) Fire pit
- (S) Pond and boardwalk
- (T) ADA accessible trail

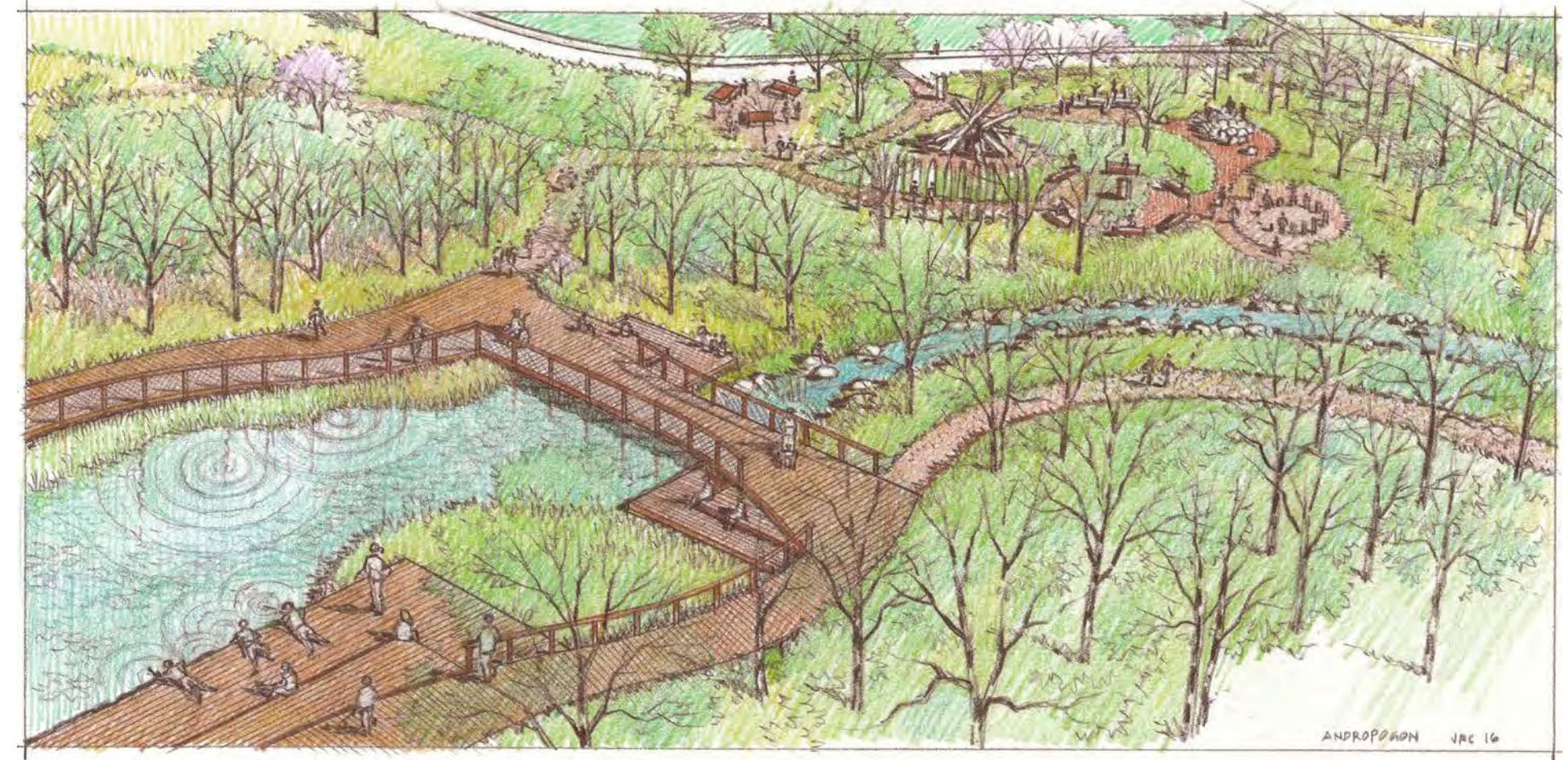
Notes:
✱ 1. Notable tree
2. Layout includes 38 parking spaces and 6 spillout parking spaces



EDUCATION HUB LANDSCAPE



This conceptual rendering shows that when visitors move along the accessible trail to the Education Center, they experience a landscape complete with meadows, rain gardens, and a green roof. The indoor and outdoor classrooms and cafe seating receive landscape views.



The restored Pond and aquatic shelf are flanked with an ADA accessible boardwalk that provides opportunities for examining flora and fauna close-up. The Play Space in the Woods beyond offers a unique opportunity for nature play.

ADMINISTRATIVE AND EVENT HUB/ STEWARDSHIP HUB



Administrative and Event Hub

- 1A Mansion
- 1B Mansion addition for events
- 1C Mansion drop-off / pickup
- 1D Mansion courtyard
- 1E Historic event location
- 1F Meadow event location
- 1G Woodland event location
- 1H Bus parking

Stewardship Hub

- 2A Stewardship building (includes storage)
- 2B Stewardship Yard
- 2C Greenhouse classroom
- 2D Children’s garden
- 2E Reflection Wetland
- 2F Rain garden
- 2G Permeable parking (see note 2)
- 2H Expanded Blair Native Plant Garden

Notes:

- * 1. Notable tree
- 2. Layout includes 48 parking spaces and 20 spillout parking spaces



ROCK CREEK CONNECTION







- (A) Pedestrian crossing
- (B) Sculptural feature
- (C) Nature trail
- (D) Clean Drinking Stream
- (E) ADA accessible boardwalk
- (F) Rock Creek Park entry



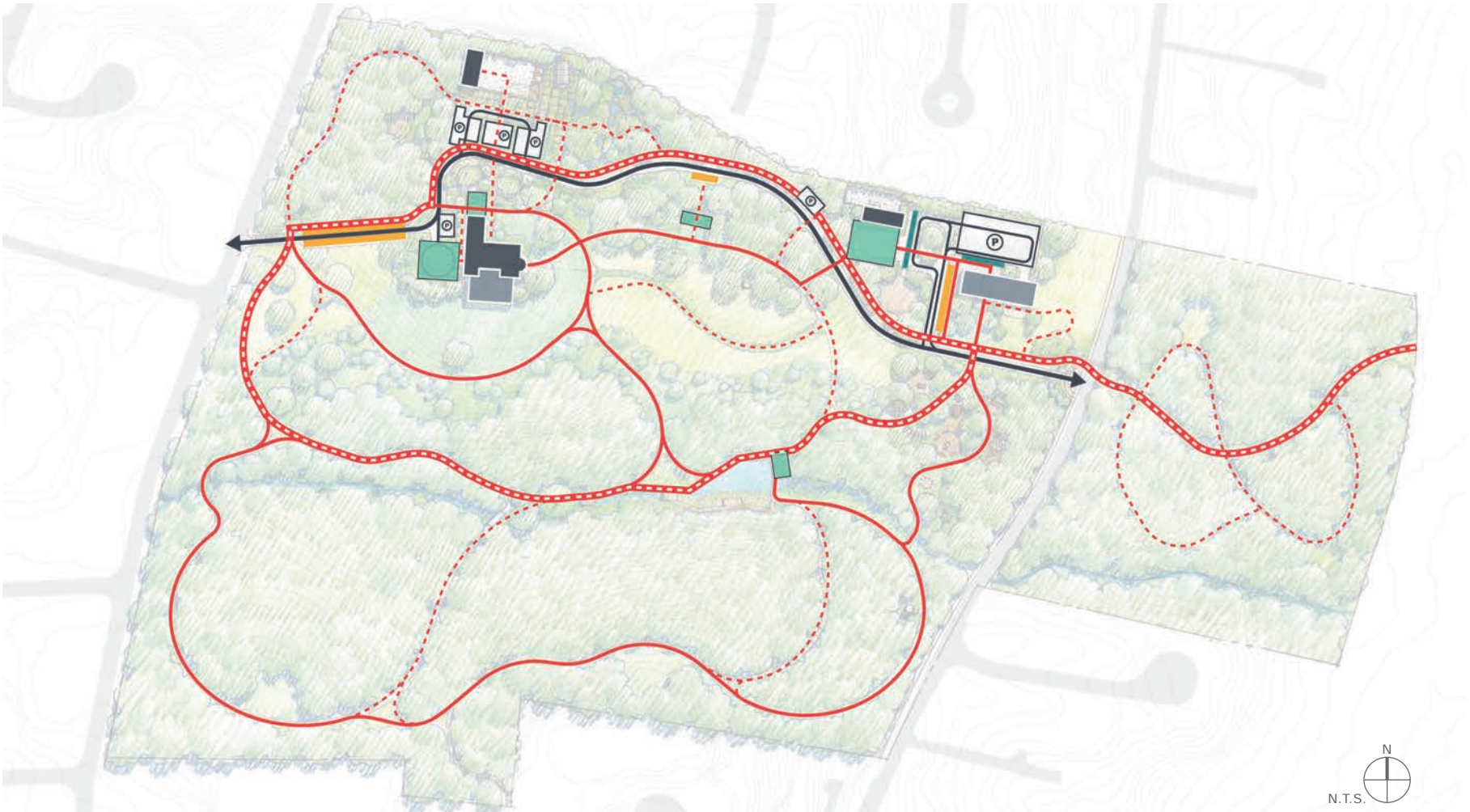


RESTORATION



-  Meadow restoration
-  Forest restoration
-  Stream & Pond restoration
-  Boardwalk & Trail improvements

SITE CIRCULATION



Legend

- Primary pedestrian circulation (accessible route)
- Secondary pedestrian circulation
- ... Tertiary pedestrian circulation
- Vehicular circulation
- Drop-off / pickup
- Bus parking / overflow parking
- Plaza / Terrace
- Existing building
- New building / addition
- P Parking (86 permanent, 26 overflow = 112)

WAYFINDING

An integrated, site-wide signage strategy will help welcome visitors, guide them to their destination and deliver environmental education. Cohesive signage will enable Woodend to establish a strong identity throughout its built environment and reinforce its brand.

Continuity is critical across wayfinding and interpretive signage, as is clarity of information. Evocative designs and interpretation strategies that serve people of all abilities and will greatly enhance the user experience.



Interpretative signage



Wayfinding signage (marker)

Wayfinding signage (secondary directional signs)



Feature sign



ECOLOGICAL HABITAT RESTORATION

GOALS

1 | **Restore Biodiversity**

Build resilient and sustainable native habitat types

2 | **Promote Environmental Education**

Inspire visitors to appreciate, understand and protect their natural environment

3 | **Retain Historic Features**

Use eco-regionally appropriate native species and eco-friendly management methods

4 | **Provide a Venue for Research**

Demonstrate and test best practices for habitat and watershed restoration, ecosystem services improvement, landscape management and stormwater control

STRATEGIES

Build the Soil Layers	Improve Watershed Health	Replenish the Lost Understory
Plant the Future Forest	Create Resiliency in the Ecosystem	Demonstrate Best Restoration Practices
Strengthen the Green Corridor Connection to Rock Creek Park	Eradicate Invasive Species	Adaptively Manage for Future Sustainability

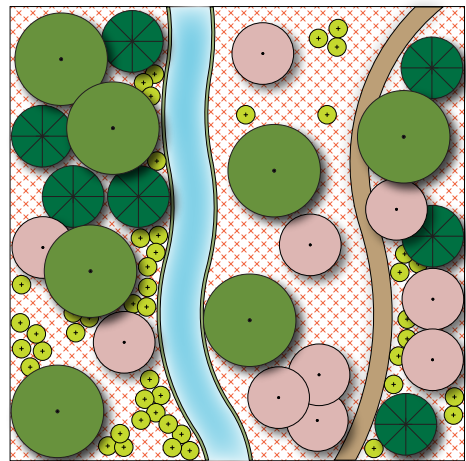


HABITAT ZONES

- ① Sycamore Floodplain Forest
- ② Northern Piedmont Small-Stream Floodplain Forest
- ③ Northern Piedmont Red Maple Seepage Swamp
- ④ Native Fern Glade
- ⑤ Water-lily – pond-lily aquatic wetland/ pond
- ⑥ Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest
- ⑦ Beech – White Oak / Mayapple Association (tulip tree variant)
- ⑧ Beech – White Oak / Mayapple Association (mixed oak variant)
- ⑨ Piedmont Acidic Oak – Hickory Forest
- ⑩ Woodland edge
- ⑪ Meadow

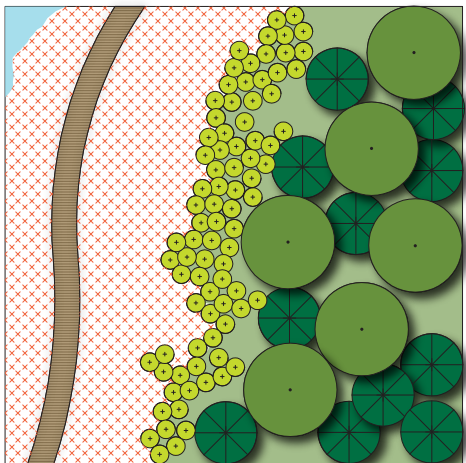
HABITAT ZONES

①② Sycamore Floodplain Forest and Northern Piedmont Small-Stream Floodplain Forest



This mixed hardwood forest is in lowlands that typically have a high water table for most of the year. Short annual flooding occurs, but does not last more than one week per year. Soils can vary from silts or clay loams to coarser substrates, depending on the flood water velocity.

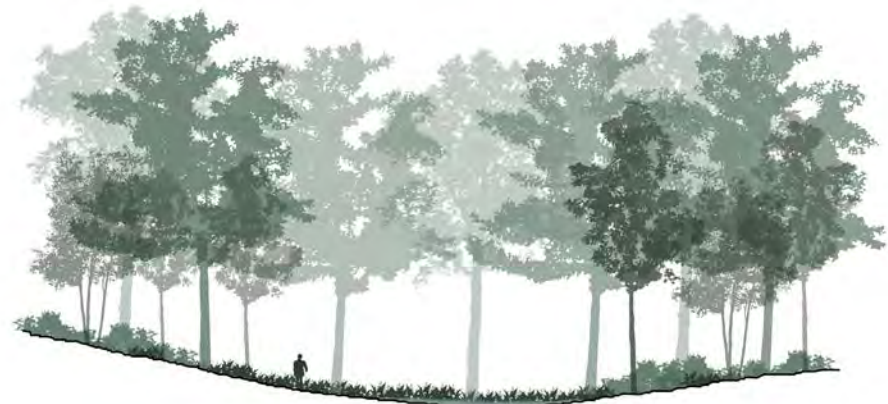
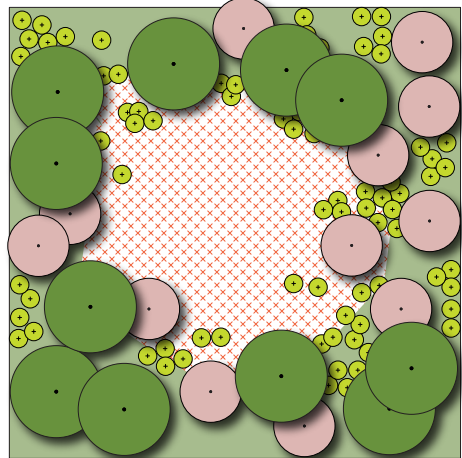
③ Northern Piedmont Red Maple Seepage Swamp



This community experiences seasonal flooding and is found in forested seeps along hillsides, at the edge of waterways, and floodplain backswamps. These areas are continually saturated from seeps or located in poorly draining low-lying depressions.

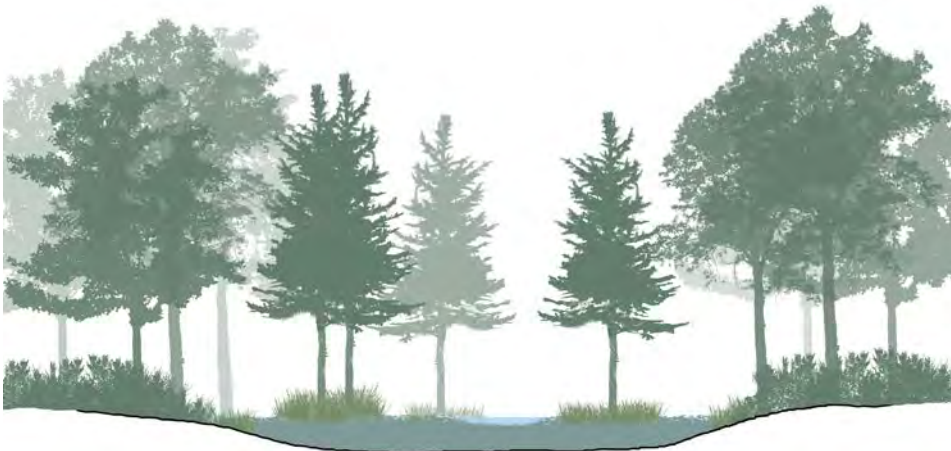
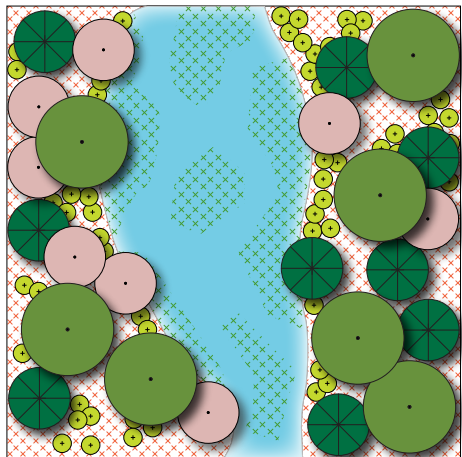
HABITAT ZONES

④ Native Fern Glade



This habitat is typified by a fern-dominant plant community found within a forest clearing. Depressions in topography coupled with mesic to hydric soils are typical.

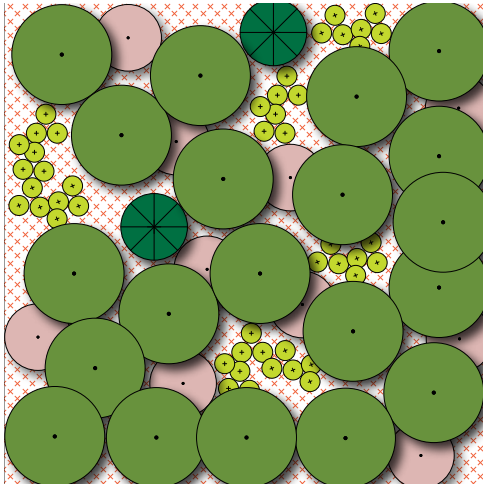
⑤ Water-Lily – Pond-Lily Aquatic Wetland / Pond



The rooted aquatic or open marsh community is present in ponds, river floodplains, slow moving streams, lakes, and shallow-water depressions. Rooted, floating-leaved aquatic species dominate, while submergent and emergent aquatics are also present.

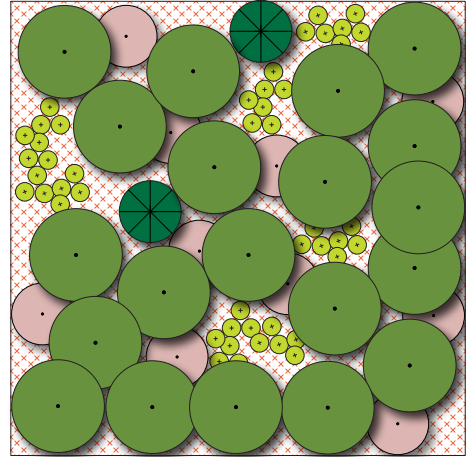
HABITAT ZONES

⑥ Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest



This mesic hardwood forest occurs in the northern Piedmont of New Jersey, Delaware, and is likely to occur in Maryland. This association occurs on gently sloping sites, and soils may be rocky. The canopy is characterized by *Fagus*, *Liriodendron* and *Betula*.

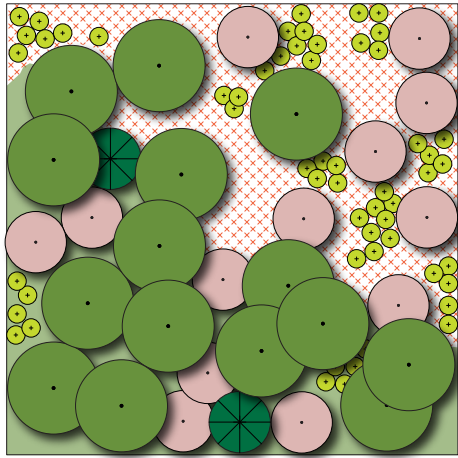
⑦⑧ Beech - White Oak / Mayapple Association (Tulip Tree and Mixed Oak Variant)



This mesic acidic forest of the West Gulf Coastal Plain is dominated by *Fagus* and *Quercus*. It is further typified by the presence of a fairly diverse number of species which indicate high-quality mesic, acidic habitats in the region, as well as patchy tall shrubs.

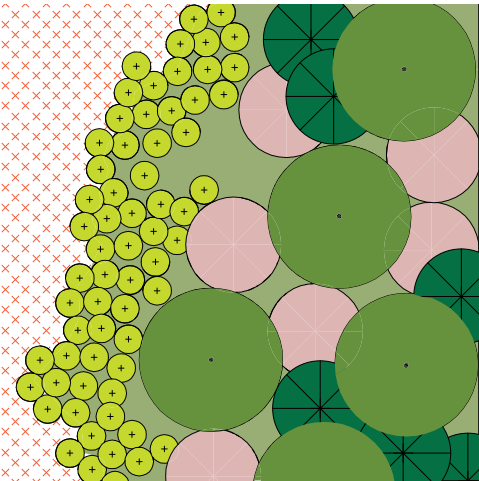
HABITAT ZONES

⑨ Piedmont Acidic Oak Hickory Forest



The canopy of this forest type can vary from closed to somewhat open. It is dominated by *Quercus*, *Carya*, *Acer*, *Cornus*, *Oxydendrum*, *Ilex* and *Nyssa*.

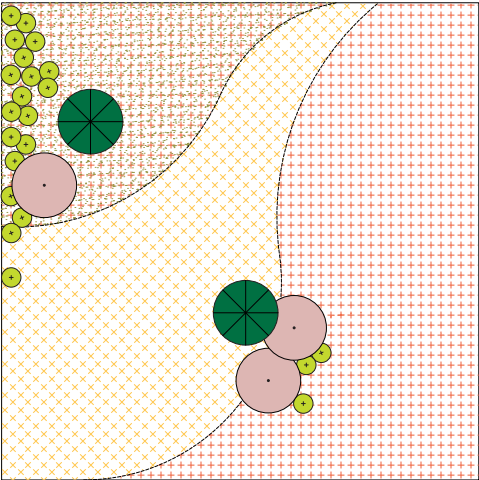
⑩ Woodland Edge



The community is defined by repeated disturbances and soils derived from granitic rock. It is comprised of grasslands with open woodlands. Tree species typically include *Quercus*, *Carya*, *Liriodendron*, *Cornus* and *Liquidambar*.

HABITAT ZONES

11 Meadow



This grassland community typically occurs on mid to upper slopes on gravelly sand or silt loam soils in full sun. Dominant grass species typically include *Schizachyrium* and *Sporobolus*, interspersed with wildflower varieties.



PLANT SCHEDULE

Sycamore Floodplain Forest and Northern Piedmont Small-Stream Floodplain Forest

TREES	
Acer rubrum	Red Maple
Celtis occidentalis	Common Hackberry
Juglans nigra	Black Walnut
Platanus occidentalis	American Sycamore
Quercus palustris	Pin Oak
UNDERSTORY	
Carpinus caroliniana	American Hornbeam
Carya cordiformis	Bitternut Hickory
SHRUBS / VINES	
Cornus amomum	Silky Dogwood
Lindera benzoin	Northern Spicebush
Viburnum dentatum	Southern Arrowwood
Viburnum prunifolium	Blackhaw
Parthenocissus quinquefolia	Virginia Creeper
HERBACEOUS	
Impatiens pallida	Pale touch-me-not
Impatiens capensis	Jewelweed
Laportea canadensis	Canadian woodnettle
Verbesina alternifolia	Wingstem
Thalictrum pubescens	King of the meadow
Hydrophyllum canadense	Bluntleaf waterleaf
Podophyllum peltatum	Mayapple
Symplocarpus foetidus	Skunk cabbage
Circaea lutetiana	Broadleaf enchanter’s nightshade
Boehmeria cylindrica	Smallspike false nettle
Onoclea sensibilis	Sensitive fern
Arisaema triphyllum	Jack in the pulpit

Northern Piedmont Red Maple Seepage Swamp

TREES	
Acer rubrum	Red Maple
Betula lenta	Sweet Birch
Fagus grandifolia	American Beech
Liquidambar styraciflua	American Sweetgum
Liriodendron tulipifera	Tulip Tree
Pinus strobus	White Pine
Prunus serotina	Black Cherry
Quercus bicolor	Swamp White Oak
Quercus palustris	Pin Oak
SHRUBS	
Alnus serrulata	Hazel alder
Clethra alnifolia	Sweet Pepperbush
Cornus amomum	Silky Dogwood
Ilex verticillata	Common Winterberry
Lindera benzoin	Northern Spicebush
Rhododendron viscosum	Swamp Azalea
Vaccinium corymbosum	Highbush Blueberry
HERBACEOUS	
Symplocarpus foetidus	Skunk cabbage
Osmunda cinnamomea	Cinnamon fern
Onoclea sensibilis	Sensitive fern
Osmunda regalis	Royal fern
Thelypteris palustris	Eastern marsh fern
Thelypteris noveboracensis	New York fern

Native Fern Glade

HERBACEOUS	
Athyrium filix-femina	Lady fern
Onoclea sensibilis	Sensitive fern
Osmunda cinnamomea	Cinnamon fern
Osmunda regalis	Royal fern
Polystichum acrostichoides	Christmas fern
Thelypteris noveboracensis	New York fern
Thelypteris palustris	Eastern marsh fern

Water-Lily – Pond-Lily Aquatic Wetland / Pond

HERBACEOUS	
Brasenia schreberi	Watershield
Cabomba caroliniana	Carolina fanwort
Ceratophyllum demersum	Coon’s tail
Eleocharis robbinsii	Robbins’ spikerush
Heteranthera dubia	Grassleaf mudplantain
Lemna spp.	Duckweed
Nuphar advena	Yellow pond-lily
Nymphaea odorata	American white waterlily
Saururus cernuus	Lizard’s tail
Sparganium americanum	American bur-reed
Spirodela polyrrhiza	Common duckmeat
Stuckenia spp.	Pondweed
Typha latifolia	Broadleaf cattail

Northern Coastal Plain /
Piedmont Mesic Mixed Hardwood Forest

TREES	
Acer rubrum	Red Maple
Liquidambar styraciflua	American Sweetgum
Liriodendron tulipifera	Tulip Poplar
Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
Quercus falcata	Southern Red Oak
Quercus rubra	Northern Red Oak
Quercus velutina	Black Oak
UNDERSTORY	
Carpinus caroliniana	American Hornbeam
Carya alba	Mockernut Hickory
Carya glabra	Pignut Hickory
Carya ovalis	Red Hickory
Cornus florida	Flowering Dogwood
Ilex opaca	American Holly
Nyssa sylvatica	Black Tupelo
Oxydendrum arboreum	Sourwood
Sassafras albidum	Sassafras

SHRUBS / VINES	
Euonymus americanus	Strawberry Bush
Smilax glauca	Cat Greenbrier
Vaccinium pallidum	Blue Ridge Blueberry
Vaccinium stamineum	Deerberry
Viburnum acerifolium	Mapleleaf Viburnum
Viburnum dentatum	Arrowwood Viburnum
Viburnum rafinesquianum	Downy arrowwood
Vitis rotundifolia	Muscadine
HERBS	
Chimaphila maculata	Striped prince’s pine
Desmodium nudiflorum	Nakedflower ticktrefoil
Goodyera pubescens	Downy rattlesnake plantain
Hieracium venosum	Rattlesnakeweed
Maianthemum racemosum	Feathery false lily of the valley
Polygonatum biflorum	Smooth Solomon’s seal
Tipularia discolor	Crippled cranefly
Viola hastata	Halberdleaf yellow violet

Beech - White Oak / Mayapple Association
(Tulip Tree and Mixed Oak Variant)

TREES	
Acer rubrum	Red Maple
Carya alba	Mockernut Hickory
Carya glabra	Pignut Hickory
Fagus grandifolia	American Beech
Liquidambar styraciflua	American Sweetgum
Liriodendron tulipifera	Tulip Poplar
Nyssa sylvatica	Black Tupelo
Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
Quercus falcata	Southern Red Oak
Quercus rubra	Northern Red Oak
Quercus velutina	Black Oak
UNDERSTORY	
Carpinus caroliniana	American Hornbeam
Cornus florida	Flowering Dogwood
Sassafras albidum	Sassafras
Ilex opaca	American Holly
SHRUBS / VINES	
Asimina triloba	Pawpaw
Euonymus americanus	Strawberry Bush
Parthenocissus quinquefolia	Virginia Creeper
Oxydendrum arboreum	Sourwood
Smilax glauca	Cat Greenbrier
Vaccinium pallidum	Blue Ridge Blueberry
Viburnum acerifolium	Mapleleaf Viburnum
Viburnum dentatum	Arrowwood Viburnum
Vitis rotundifolia	Muscadine

HERBS	
Arisaema triphyllum	Jack-in-the-pulpit
Athyrium filix-femina	Lady fern
Carex digitalis	Slender woodland sedge
Carex swanii	Swan’s sedge
Carex willdenowii	Willdenow’s sedge
Chimaphila maculata	Striped prince’s pine
Cypripedium acaule	Moccasin flower
Desmodium nudiflorum	Nakedflower ticktrefoil
Epifagus virginiana	Beechdrops
Eurybia divaricata	White wood aster
Goodyera pubescens	Downy rattlesnake plantain
Maianthemum canadense	Canada mayflower
Maianthemum racemosum	Feathery false lily of the valley
Medeola virginiana	Indian cucumber
Mitchella repens	Partridgeberry
Podophyllum peltatum	Mayapple
Polygonatum biflorum	Smooth Solomon’s seal
Polystichum acrostichoides	Christmas fern
Thelypteris noveboracensis	New York fern
Tipularia discolor	Crippled cranefly
Uvularia perfoliata	Perfoliate bellwort

Piedmont Acidic Oak Hickory Forest

TREES	
Carya alba	Mockernut Hickory
Carya glabra	Pignut Hickory
Carya ovalis	Red Hickory
Fagus grandifolia	American Beech
Liquidambar styraciflua	American Sweetgum
Liriodendron tulipifera	Tulip Tree
Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
Quercus falcata	Southern Red Oak
Quercus rubra	Northern Red Oak
Quercus velutina	Black Oak
UNDERSTORY	
Acer rubrum	Red Maple
Cornus florida	Flowering Dogwood
Ilex opaca	American Holly
Nyssa sylvatica	Black Tupelo
Oxydendrum arboreum	Sourwood
SHRUBS / VINES	
Euonymus americanus	Bursting-heart
Vaccinium pallidum	Blue Ridge Blueberry
Viburnum acerifolium	Mapleleaf Viburnum
Viburnum rafinesquianum	Downy arrowwood
Vitis rotundifolia	Muscadine

HERBACEOUS	
Chimaphila maculata	Striped prince’s pine
Desmodium nudiflorum	Nakedflower ticktrefoil
Goodyera pubescens	Downy rattlesnake plantain
Hexastylis spp.	Heartleaf
Hieracium venosum	rattlesnakeweed
Maianthemum racemosum	Feathery false lily of the valley
Polygonatum biflorum	Smooth Solomon’s seal
Tipularia discolor	Crippled cranefly
Viola hastata	Halberdleaf yellow violet

Woodland Edge

TREES	
Carya alba	Mockernut Hickory
Carya glabra	Pignut Hickory
Liriodendron tulipifera	Tulip Poplar
Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
Quercus falcata	Southern Red Oak
Quercus stellata	Post Oak
Quercus velutina	Black Oak
UNDERSTORY	
Cornus florida	Flowering Dogwood
Liquidambar styraciflua	American Sweetgum
Sassafras albidum	Sassafras
SHRUBS	
Diospyros virginiana	Common persimmon
Hypericum hypericoides ssp.	St. Andrew’s cross
Rhus copallinum	Winged sumac
Rhus glabra	Smooth sumac
Ulmus alata	Winged elm
Vaccinium pallidum	Blue Ridge blueberry
Vitis rotundifolia	Muscadine

HERBACEOUS	
Andropogon ternarius	Splitbeard bluestem
Clitoria mariana	Atlantic pigeonwings
Danthonia sericea	Downy danthonia
Desmodium ciliare	Hairy small-leaf ticktrefoil
Desmodium laevigatum	Smooth ticktrefoil
Desmodium marilandicum	Smooth small-leaf ticktrefoil
Desmodium nuttallii	Nuttall’s ticktrefoil
Desmodium paniculatum	Panickedleaf ticktrefoil
Desmodium perplexum	Perplexed ticktrefoil
Dichanthelium depauperatum	Starved panicgrass
Dichanthelium dichotomum	Cypress panicgrass
Eupatorium altissimum	Tall thoroughwort
Eupatorium godfreyanum	Godfrey’s thoroughwort
Eupatorium hyssopifolium	Hyssopleaf thoroughwort
Eupatorium pubescens	Roundleaf thoroughwort
Eupatorium rotundifolium var. ovatum	Roundleaf thoroughwort
Eupatorium sessilifolium	Upland boneset
Galactia regularis	Eastern milkpea
Helianthus atrorubens	Purpledisk sunflower
Lespedeza procumbens	Trailing lespedeza
Liatris pilosa	Shaggy blazing star
Schizachyrium scoparium	Little bluestem
Solidago erecta	Showy goldenrod
Solidago nemoralis	Gray goldenrod
Solidago rugosa	Wrinkleleaf goldenrod
Sorghastrum elliotii	Slender indiagrass
Tephrosia virginiana	Virginia tephrosia



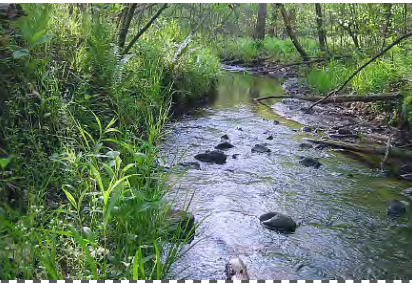


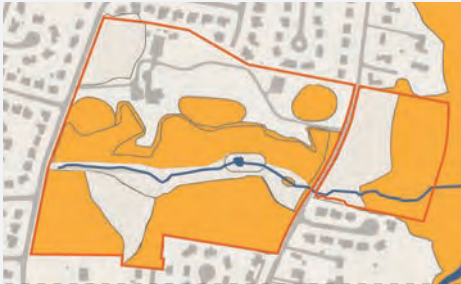



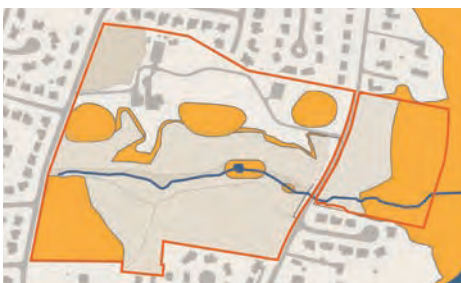



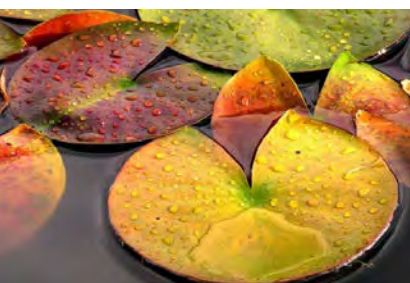

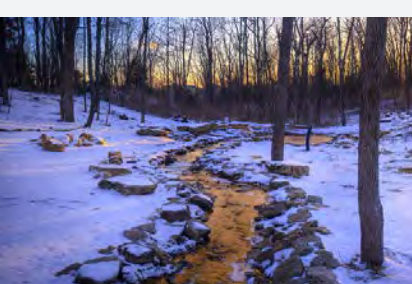

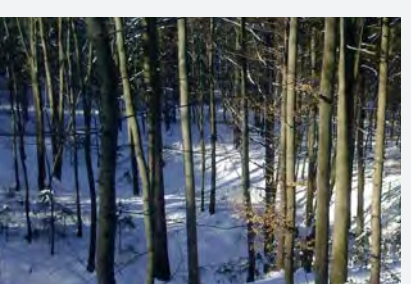
Meadow

HERBACEOUS	
Asclepias verticillata	Whorled milkweed
Arabis lyrata	Lyrate rockcress
Cerastium arvense var. villosum	Field chickweed
Dichanthelium sphaerocarpon	Roundseed panicgrass
Liatris pilosa	Shaggy blazing star
Packera anonyma	Small’s ragwort
Pycnanthemum tenuifolium	Narrowleaf mountainmint
Schizachyrium scoparium	Little bluestem
Scleria pauciflora	Fewflower nutrush
Solidago juncea	Early goldenrod
Solidago nemoralis	Gray goldenrod
Sorghastrum nutans	Indiangrass
Sporobolus heterolepis	Prairie dropseed
Thalictrum revolutum	Waxy Meadow Rue
Zizia aptera	Meadow zizia




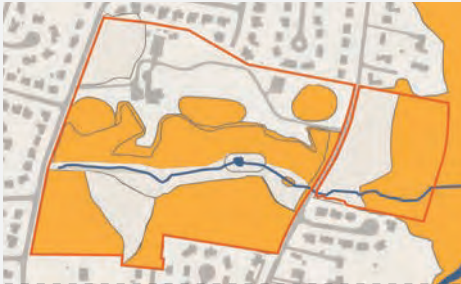

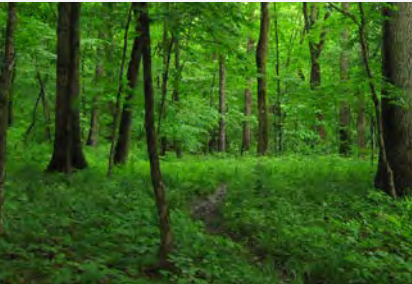


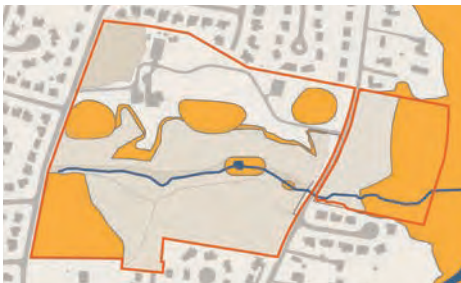
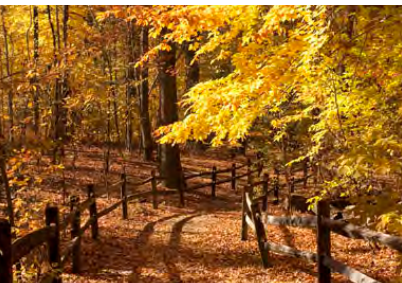






For more information on each plant community, see Appendix E.



SEASONAL INTEREST

	Sycamore Floodplain Forest	Northern Piedmont Small- Stream Floodplain Forest	Native Fern Glade	Northern Piedmont Red Maple Seepage Swamp	Water-Lily Pond-Lily Aquatic Wetland / Pond	Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest	Beech – White Oak / Mayapple Association (Tulip Tree Variant)
spring							
summer							
fall							
winter							

SEASONAL INTEREST

	Beech – White Oak / Mayapple Association (Mixed Oak Variant)	Piedmont Acidic Oak – Hickory Forest	Woodland Edge	Meadow	Rain Gardens	
spring						
summer						
fall						
winter						

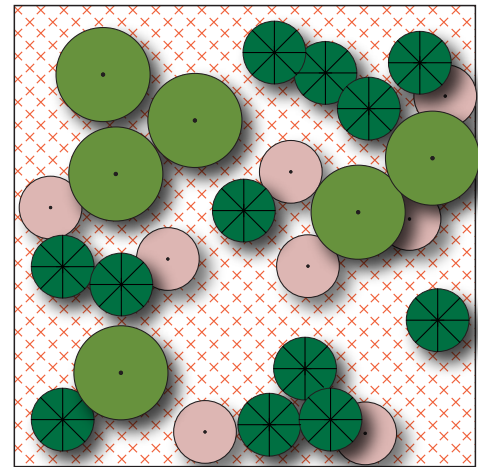


HABITAT RESTORATION GOALS

Ecosystem	Native Plant Community	Wildlife Supported	Stewardship Techniques
Forest woodland buffers	<ul style="list-style-type: none"> - Sycamore – Green ash floodplain forest - Northern Piedmont Small-Stream Floodplain Forest - Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest - Beech – White Oak / Mayapple Association - Piedmont Acidic Oak – Hickory Forest 		<ul style="list-style-type: none"> - Invasive species removal - Slope stabilization - Canopy management - Planting
Woodland seep and pond	<ul style="list-style-type: none"> - Northern Piedmont Red Maple Seepage Swamp - Water-lily and pond-lily aquatic wetland / pond 		<ul style="list-style-type: none"> - Pond restoration - Canopy management - Planting
Meadows	<ul style="list-style-type: none"> - Mixed Forb – Graminoid Meadow 		<ul style="list-style-type: none"> - Planting - Strategic mowing - Invasive species removal

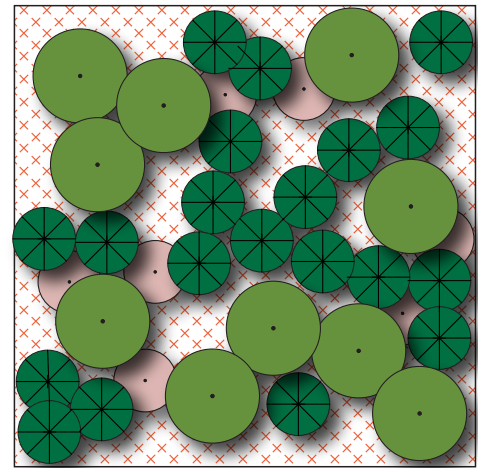
HABITAT RESTORATION CONDITIONS

New Forest / Woodland
(All forest types with low invasive pressure)



In forest and woodland areas with low invasive pressure, canopy management and supplementary understory planting can help achieve biodiversity targets.

New Forest
(All forest types with high invasive pressure)

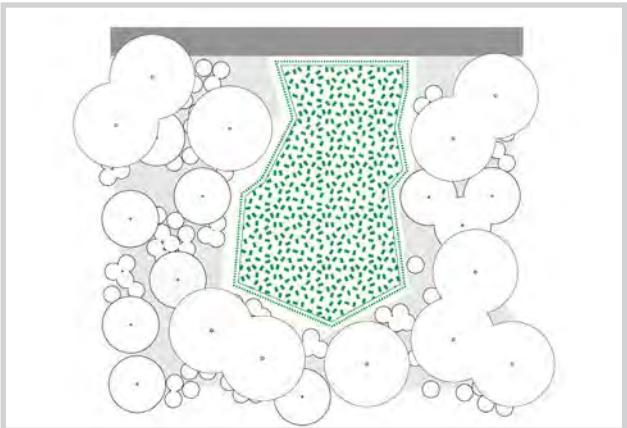


Forested areas with high invasive species pressure require continual invasive species removal paired with a robust restoration planting strategy to achieve a healthy, stable forest.

HABITAT RESTORATION TECHNIQUES



Plant a continuous, layered woodland edge to diversify bird habitat



Exclude deer to promote native herbaceous plant growth



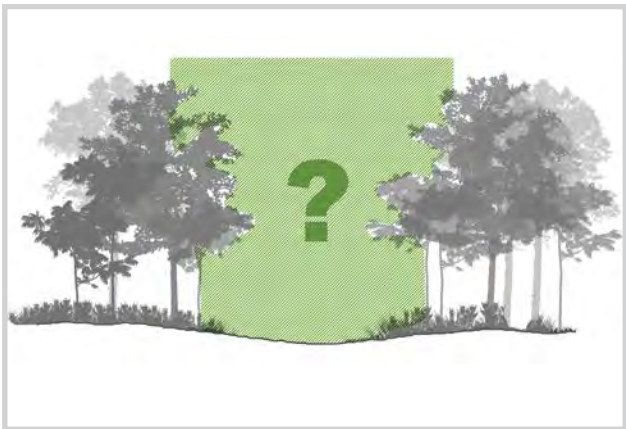
Plant cover crops on bare soil to keep soil cool, thereby avoiding invasives



Supplement planting in event of large disturbance to out-compete invasives



Remove invasive species each year before they produce seeds



Shade 'hot spots' to prevent invasives and maximize habitat value



WATERSHED RESTORATION

HEALING THE STREAM BANKS

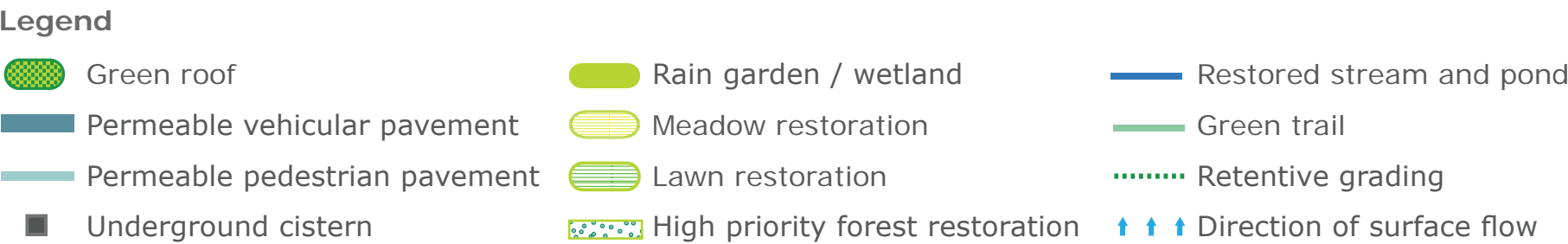
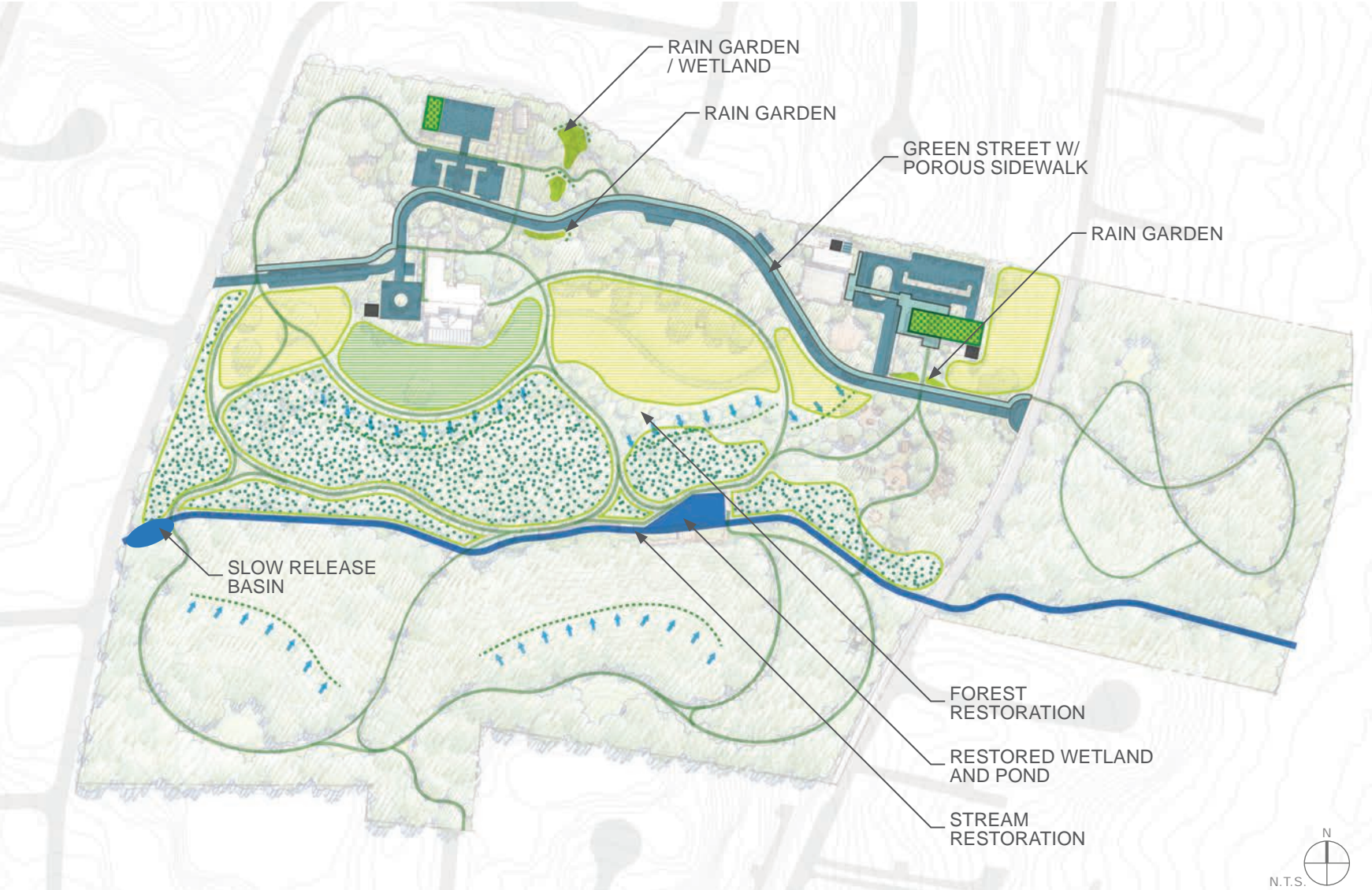


STORMWATER MANAGEMENT

Thin or absent native plant understory and topsoil coupled with undeterred drainage paths have caused problematic stormwater runoff patterns and compromised watershed health at Woodend. These issues are amplified within the site’s flashy stream, which has been shaped by extreme bank erosion and scouring, particularly downstream toward its confluence with Rock Creek (see photos on previous page). These conditions contribute to turbidity, low dissolved oxygen, and low aquifer recharge.

Healing the stream banks and ameliorating these water quality conditions must be addressed through a comprehensive site strategy. Luckily, Woodend has already set a stormwater management goal of achieving net zero runoff. This performance target can be achieved through a coordinated strategy that focuses on treating stormwater where it falls using green infrastructure (e.g. rain gardens, green roofs, pervious pavement) rather than traditional gray infrastructure (e.g. inlets, pipes).

Particular attention should be paid to minimizing impervious surfaces and considering upstream causes of runoff within Woodend. “Green trails” - those that are properly sited and graded - are a simple tool for reducing runoff problems within the watershed.



WATERSHED RESTORATION TOOLS



Rain garden



Cistern



Green roof



Constructed wetland



Permeable pedestrian pavement -----



Meadow restoration



Stream bank restoration



Properly sited and graded trails



Retentive grading



Permeable vehicular pavement -----



A large, leafless tree with a thick trunk and sprawling branches dominates the left side of the image. In the background, a two-story brick house with white columns and a balcony is visible. The sky is clear and blue.

CULTURAL LANDSCAPE RESTORATION

GOALS

- 1 | Protect and restore the historic landscape**
Including elements under historic designation - such as the lawn, fern glade, and historically significant viewsheds - and adding interpretive signage where appropriate
- 2 | Celebrate notable trees**
Using interpretive signage, plaques or interactive media with information about tree species, age and significance
- 3 | Provide culturally relevant demonstrations**
Such as sustainability-oriented residential demonstration, educational elements about cultural/ ecological history of the site, and event locations that are meaningful to a broad audience



CHARACTER ZONES

	Stewardship	Conservation	Education
Residential Landscape Demonstration	<div>Native plant gardens</div> <div>Eco-friendly lawn care</div>	<div>Rain gardens</div> <div>Permeable pavement</div>	<div>Edible native landscapes</div> <div>Healthy living</div>
Institutional Landscape Demonstration	<div>Landscapes for wildlife</div> <div>Eco-friendly lawn care</div>	<div>Stormwater management</div> <div>Renewable energy</div>	<div>Invasive management</div> <div>Tree maintenance</div>
Historical Landscape Demonstration	<div>Hemlock grove restoration</div>	<div>Historic building conservation</div>	<div>Notable trees</div>

RESIDENTIAL DEMONSTRATION IDEAS



Eco-lawns and sustainable lawn care



Gardening for wildlife



Protecting pollinators



Composting



Organic gardening



Managing stormwater



Supporting reptiles and amphibians



Stream restoration



Increase the urban tree canopy



Sheltering native wildlife



Feeding native birds and insects

MATERIALS: EDUCATION HUB

The Education Hub’s landscape palette will emphasize natural materials with refined finishes. Visually, these materials will bridge the look of the Historic and Natural material palettes.



Paths



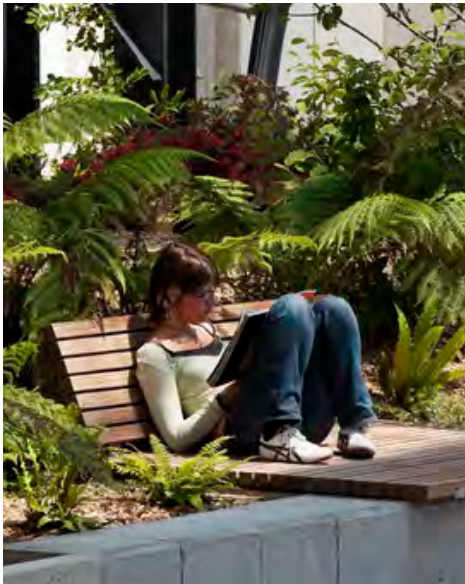
Pervious Unit Pavement



Aggregate Pavement



Table Chairs



Bench



Stone Wall

MATERIALS: ADMINISTRATIVE AND EVENT HUB

The formal material palette surrounding historically designated buildings and landscape elements within the Administrative and Event Hub will be selected in accordance with Historic Preservation standards.

Shown here are evocative examples of how cohesive material selection can enhance a sense of place. Materials can achieve multiple objectives, such as pervious pavement, which is aesthetically pleasing and effective at managing stormwater runoff.



Aggregate Pavement



Pedestrian Unit Pavement



Vehicular Unit Pavement



Pervious Concrete



Granite Curb



Stone Wall

MATERIALS: STEWARDSHIP HUB

Landscape materials within the Stewardship Hub will be similar to the Natural materials palette, with the addition of concrete, metal, and glass or UV-stabilized plastic due to their permanence in the working landscape.



Outdoor Classroom



Greenhouse



Trail



Aggregate pavement



Planting benches



Seedling benches

MATERIALS: RESTORATION ZONES AND ROCK CREEK CONNECTION

Sustainably harvested natural building materials - like wood and stone - will be deployed throughout Woodend's landscape, mostly outside of the program hubs. These materials will work in tandem with the comprehensive site signage strategy to visually tie the site together.



Boardwalk



Outdoor classroom



Bridge



Overhead Structure



Gate








Trail



PEDESTRIAN CIRCULATION

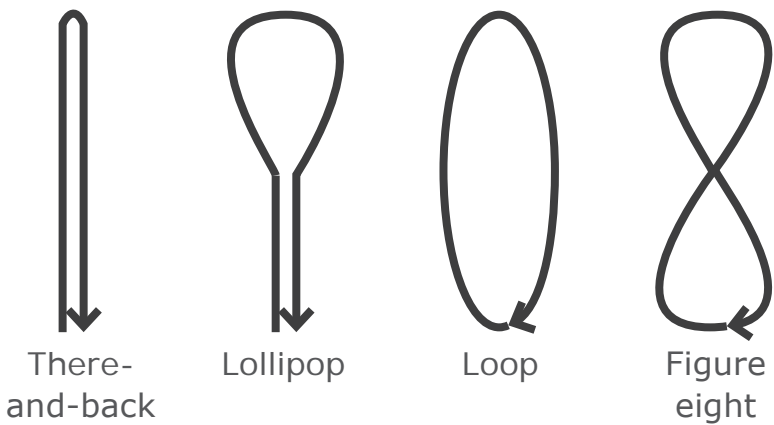


Legend

- | | | | |
|---|---|---|-------------------------------------|
|  | Primary circulation
(accessible route) |  | Terrace / patio |
|  | Secondary circulation |  | Existing building |
|  | Tertiary circulation |  | New building /
building addition |

TRAIL TYPOLOGIES

Common Trail Configurations



Hierarchy within a pedestrian circulation system can support intrinsic wayfinding and help people move through a landscape in an intentional way. Woodend’s landscape will contain three typical pedestrian circulation typologies: primary, secondary, and tertiary trail.

- The primary trail will be a 6’-wide paved surface (concrete or stabilized aggregate, depending on the location), with slopes and curb conditions fully accessible to visitors and staff in wheelchairs or with strollers.
- Secondary trail will be a 4’-wide aggregate surface that provides access throughout Woodend, in particular to established destinations. Water bars and similar features can direct runoff and avoid erosion.
- Tertiary trail will be a 4’-wide mulch surface or mown path that provides shortcuts or access to less heavily-accessed areas.

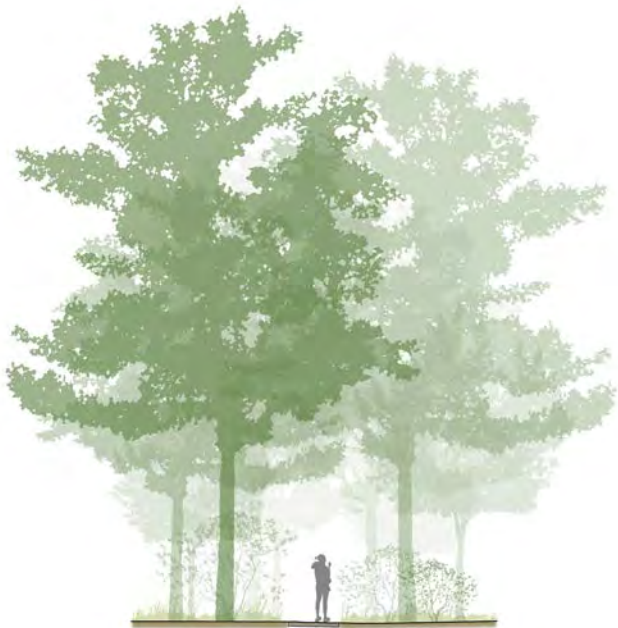
User experience will be largely shaped by the route of travel through the landscape. The routes depicted on the following pages represent a typical experience for various types of visitors. Each route is identified as one of four common trail configurations, typical to the hiking world (see diagram on this page).



Primary trail

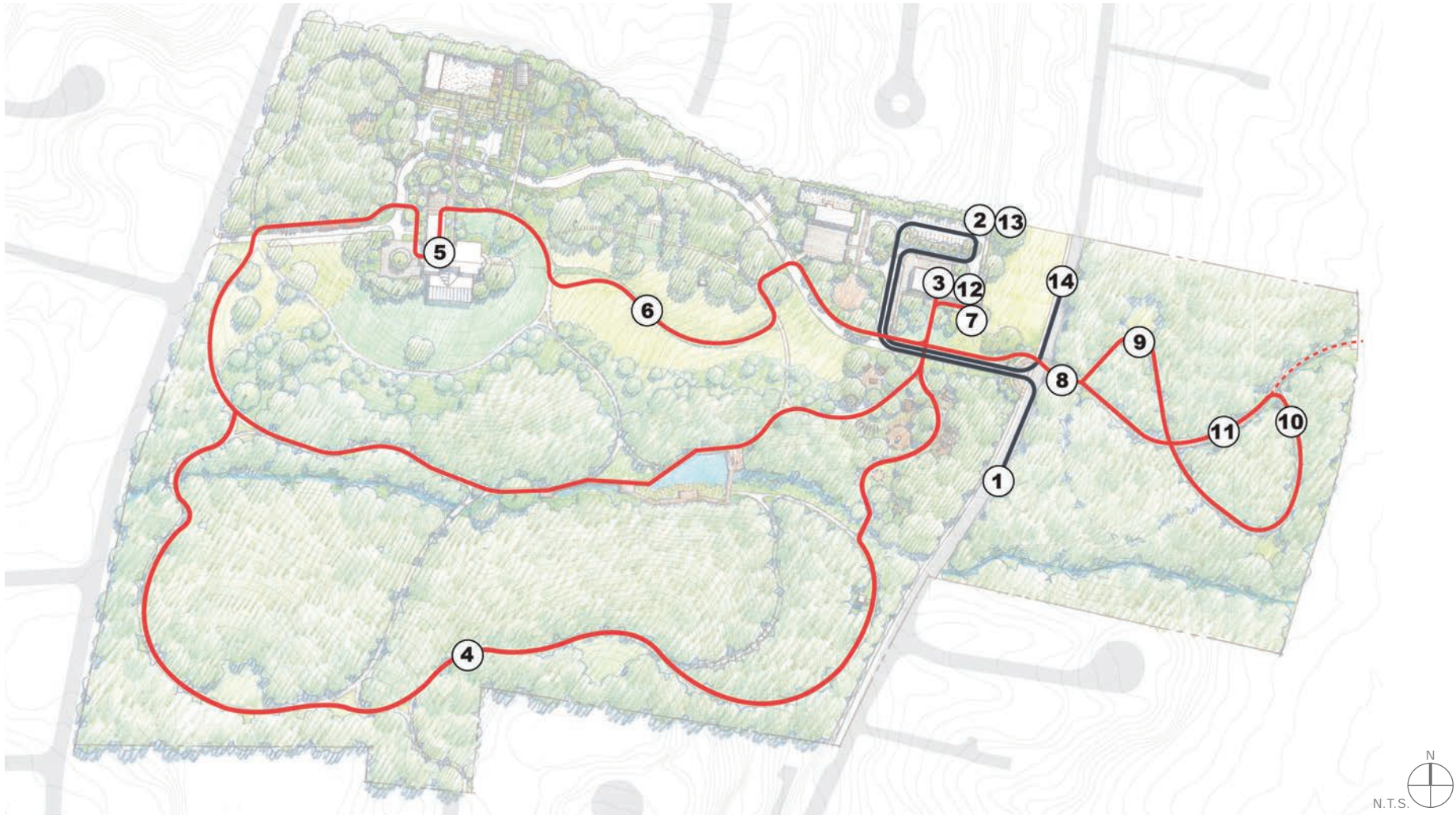


Secondary trail



Tertiary trail

GENERAL VISITOR



- | | | |
|-------------------------|--------------------------------|---------------------------------|
| 1) Enter by car or bike | 6) Walk the Meadow | 10) Connect to Rock Creek Trail |
| 2) Park / secure bike | 7) Picnic | 11) Walk the Boardwalk |
| 3) Get oriented | 8) Enter Rock Creek Connection | 12) Visit Naturalist Shop |
| 4) Explore trails | 9) Visit feature | 13) Access car / bike |
| 5) Visit Mansion | | 14) Depart |

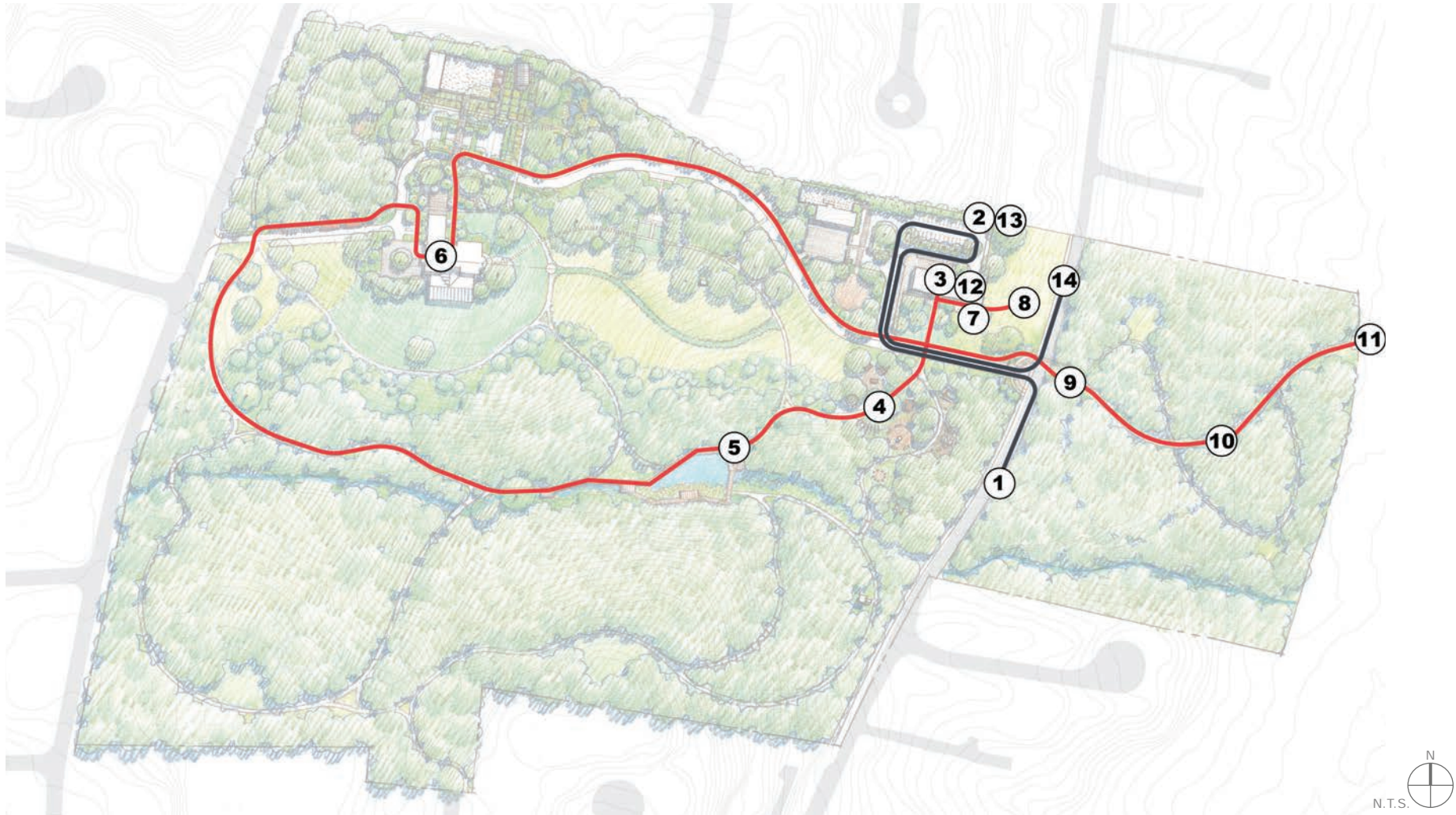
Legend

— Vehicular route

— Pedestrian route

① Point of interest

VISITOR WITH MOBILITY LIMITATIONS



- | | | |
|-------------------------------|--------------------------------|---------------------------|
| Wheelchair or Stroller | 5) Explore pond and trails | 10) Visit Boardwalk |
| 1) Enter by car | 6) Visit Mansion | 11) Connect to trail |
| 2) Park | 7) Picnic | 12) Visit Naturalist Shop |
| 3) Get oriented | 8) Visit East Meadow | 13) Access car |
| 4) Play | 9) Enter Rock Creek Connection | 14) Depart |

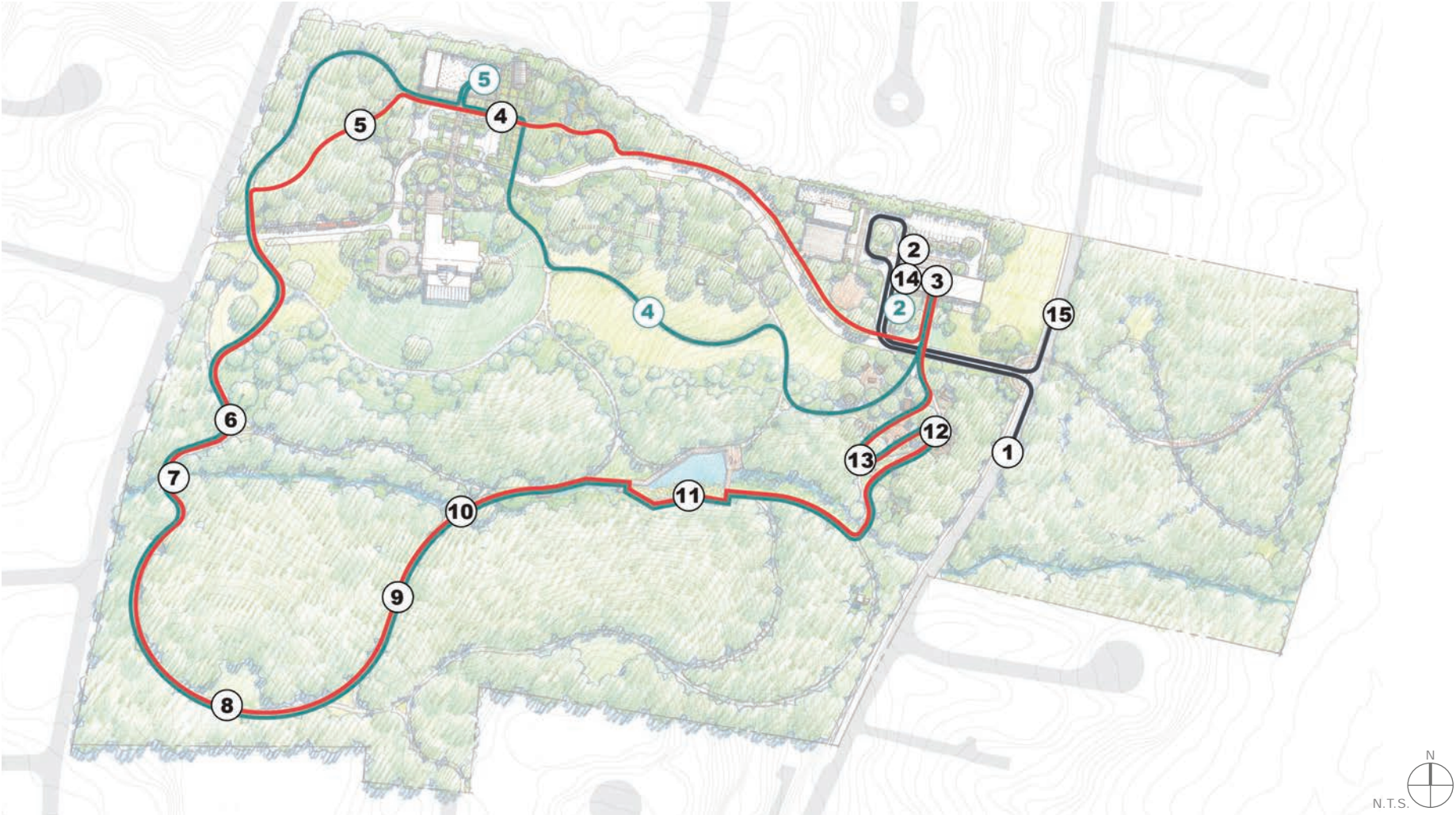
Legend

— Vehicular route

— Pedestrian route

① Point of interest

SUMMER CAMPER / FIELD TRIP STUDENT

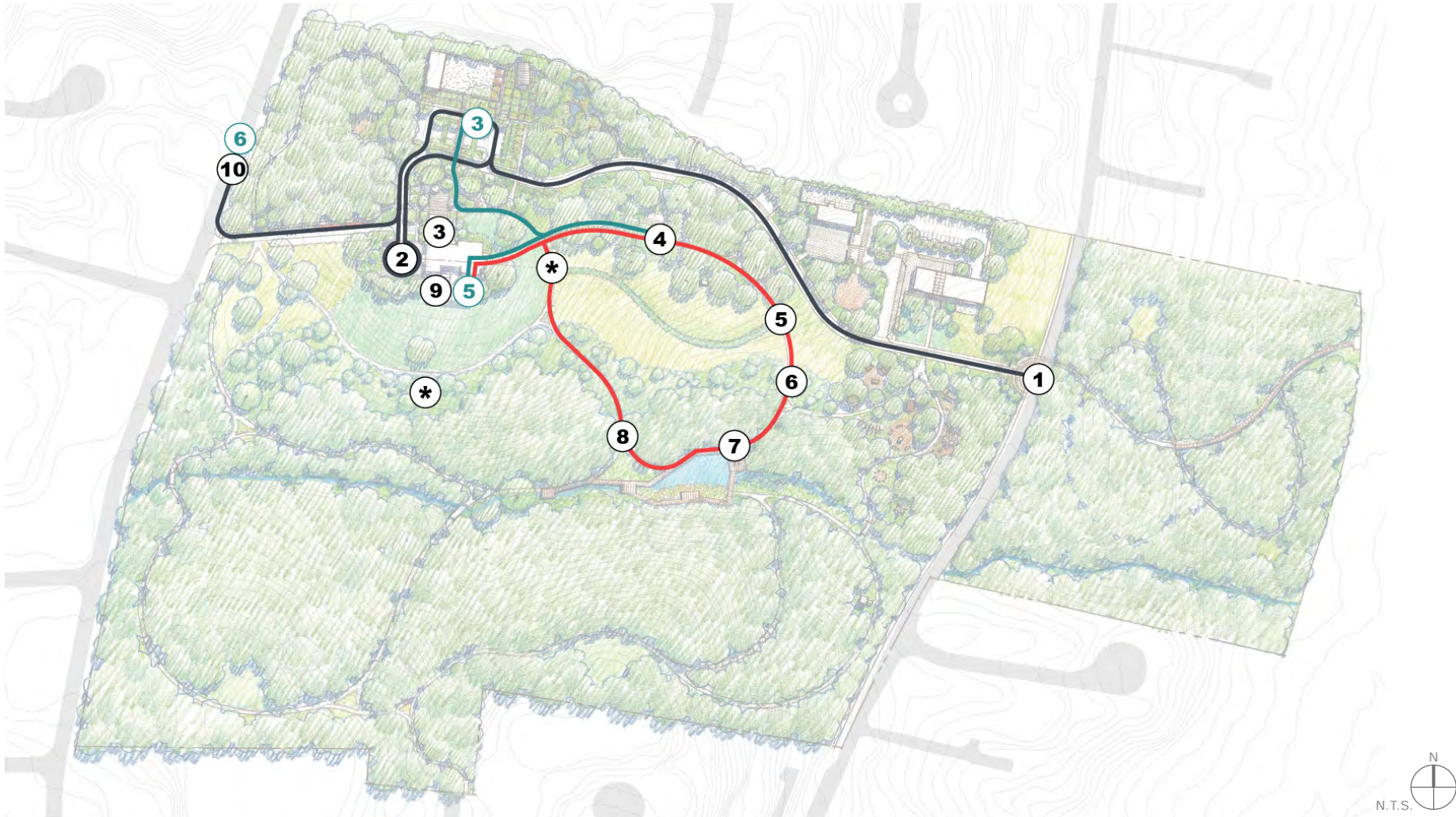


Legend			
	Vehicular route		Summer camper pedestrian route
	School student pedestrian route		Summer camper point of interest
			School student point of interest

Summer Camper	School Student
1) Enter by car	1) Enter by bus
2) Get dropped off by car	2) Get dropped off by bus
3) Meet ANS camp counselor	3) Meet ANS Naturalist
4) Tend Children's Garden	4) Visit meadow
5) Reflect in outdoor classroom	5) Turn compost
6) Visit Forest Edge	6) Visit forest edge
7) Visit headwaters	7) Visit headwaters
8) Gather	8) Reflect in outdoor classroom
9) Visit Mature Forest	9) Visit mature forest
10) Visit stream	10) Visit stream
11) Dip nets in pond	11) Dip nets in pond
12) Enjoy nature Play Space	12) Enjoy nature Play Space
13) Picnic	13) Picnic
14) Get picked up by car	14) Get picked up by bus
15) Depart	15) Depart



WEDDING PARTY / EVENT GUEST



Legend

Vehicular route

Wedding party pedestrian route

Event guest pedestrian route

Alternative wedding ceremony location

Wedding party point of interest

Wedding guest point of interest

Wedding Party

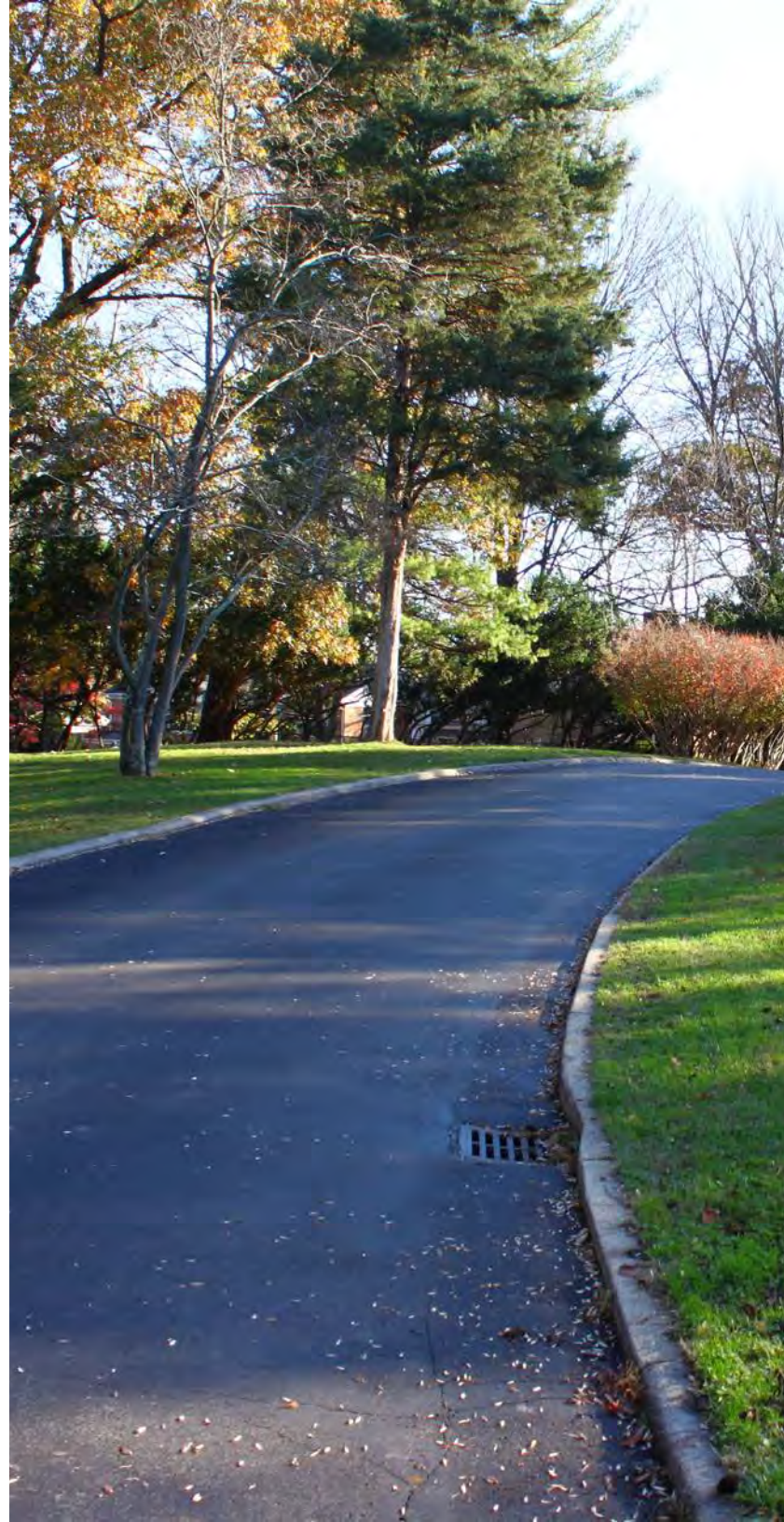
- 1) Enter
- 2) Get dropped off
- 3) Experience "first look" at Mansion courtyard
- 4) Wedding ceremony
- 5) Take photos at Meadow
- 6) Take photos at Forest Edge
- 7) Take photos at Pond
- 8) Take photos in Forest
- 9) Wedding reception
- 10) Depart

Event Guest

- 1) Enter
- 2) Drop off guests
- 3) Park
- 4) Attend ceremony
- 5) Attend reception
- 6) Depart

A photograph showing a lush green lawn with long shadows cast by large, mature trees. The scene is bright and sunny, with a clear blue sky visible through the branches of the trees.

93



VEHICULAR CIRCULATION AND PARKING



Legend

- Vehicular circulation
- Drop-off / pickup
- Bus parking / overflow parking
- Existing building
- New building / building addition
- Temporary pull-off
- Parking: 86 permanent / 26 overflow (112 for events)
- Handicapped parking
- Mansion drop-off / pickup

JONES MILL ROAD ENTRY



This conceptual rendering shows Woodend's existing Jones Mill Road driveway entry geometry embellished with a new sidewalk, deer fence, signage, planting, and a crosswalk realignment.



Reconfiguring the entryway with softer geometry offers a more welcoming arrival while providing opportunity for the occasional curb-side drop-off.

ADMINISTRATIVE EVENT HUB



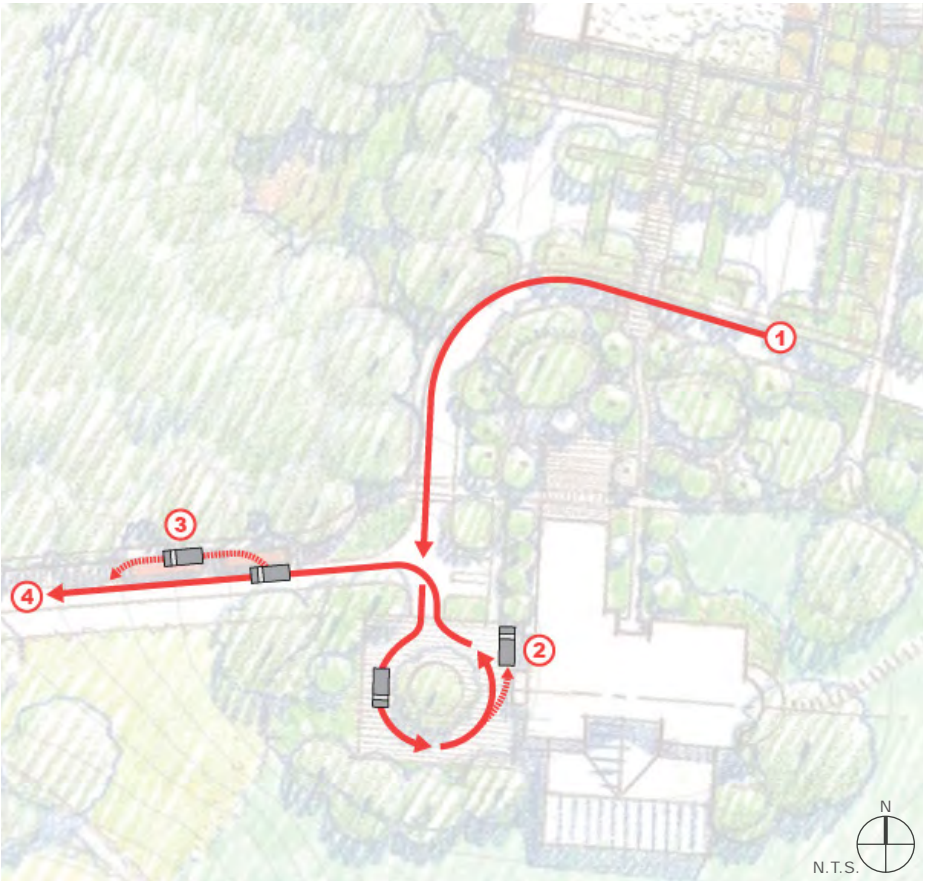
Proposed Jones Mill Road pedestrian crossing and customizable promotional event signage.

Staff and Event Guest



- ① Enter
- ② Pedestrian crosswalk
- ③ Park
- ④ Drop-off / pickup (if necessary)
- ⑤ Depart

Deliveries



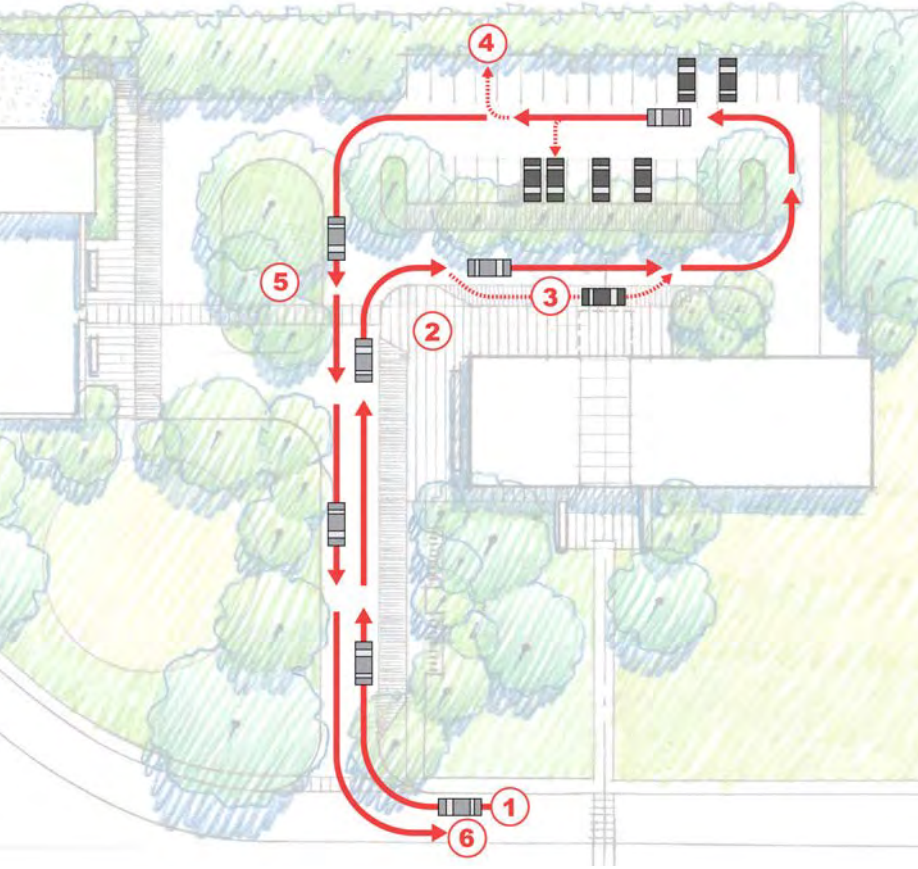
- ① Enter
- ② Delivery drop-off / pickup
- ③ Park
- ④ Depart

Legend

- Vehicular circulation
- Pull-off / parking

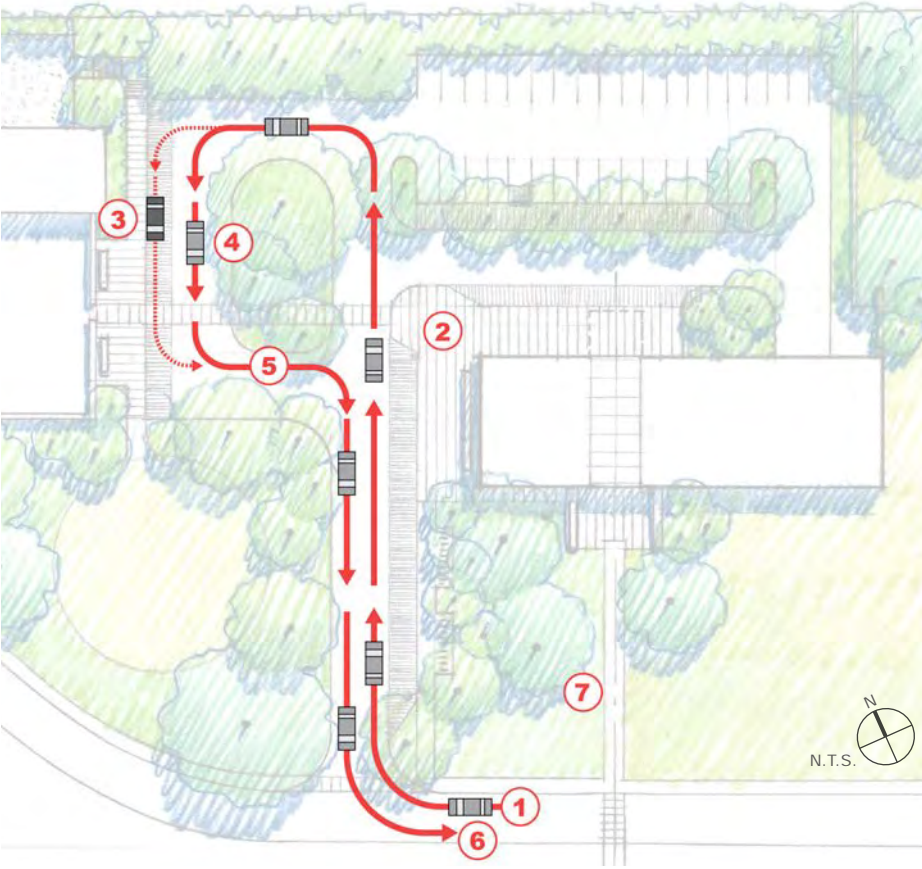
EDUCATION HUB

Staff and General Visitor



- ① Enter
- ② Pedestrian crosswalk
- ③ Drop-off / pickup
- ④ Park
- ⑤ Pedestrian crosswalk
- ⑥ Depart

Teale Center Drop-Off

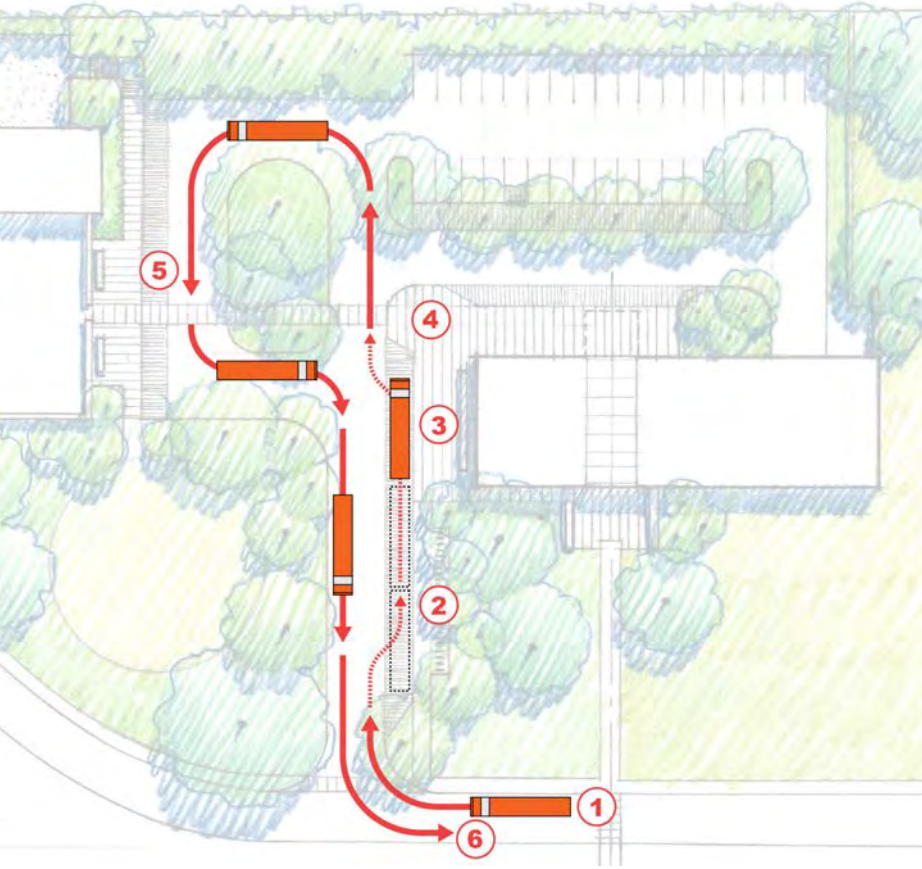


- ① Enter
- ② Pedestrian crosswalk
- ③ Drop-off / pickup
- ④ Pedestrian crosswalk
- ⑤ Turn toward exit
- ⑥ Depart

Legend

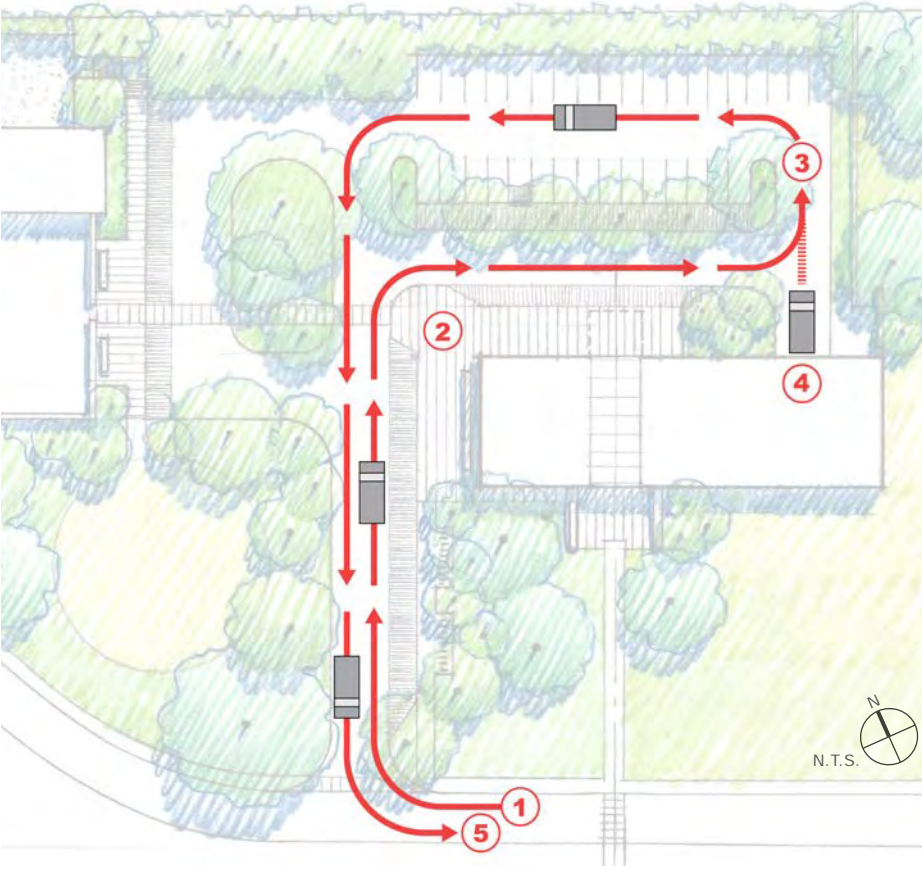
- ← Vehicular circulation
- ← Pull-off / parking

School Bus



- ① Enter
- ② Pull into bus parking
- ③ Drop off
- ④ Pedestrian crosswalk
- ⑤ Turn to depart
- ⑥ Depart

Deliveries



- ① Enter
- ② Pedestrian crosswalk
- ③ Back into loading area
- ④ Load / unload
- ⑤ Depart

Legend

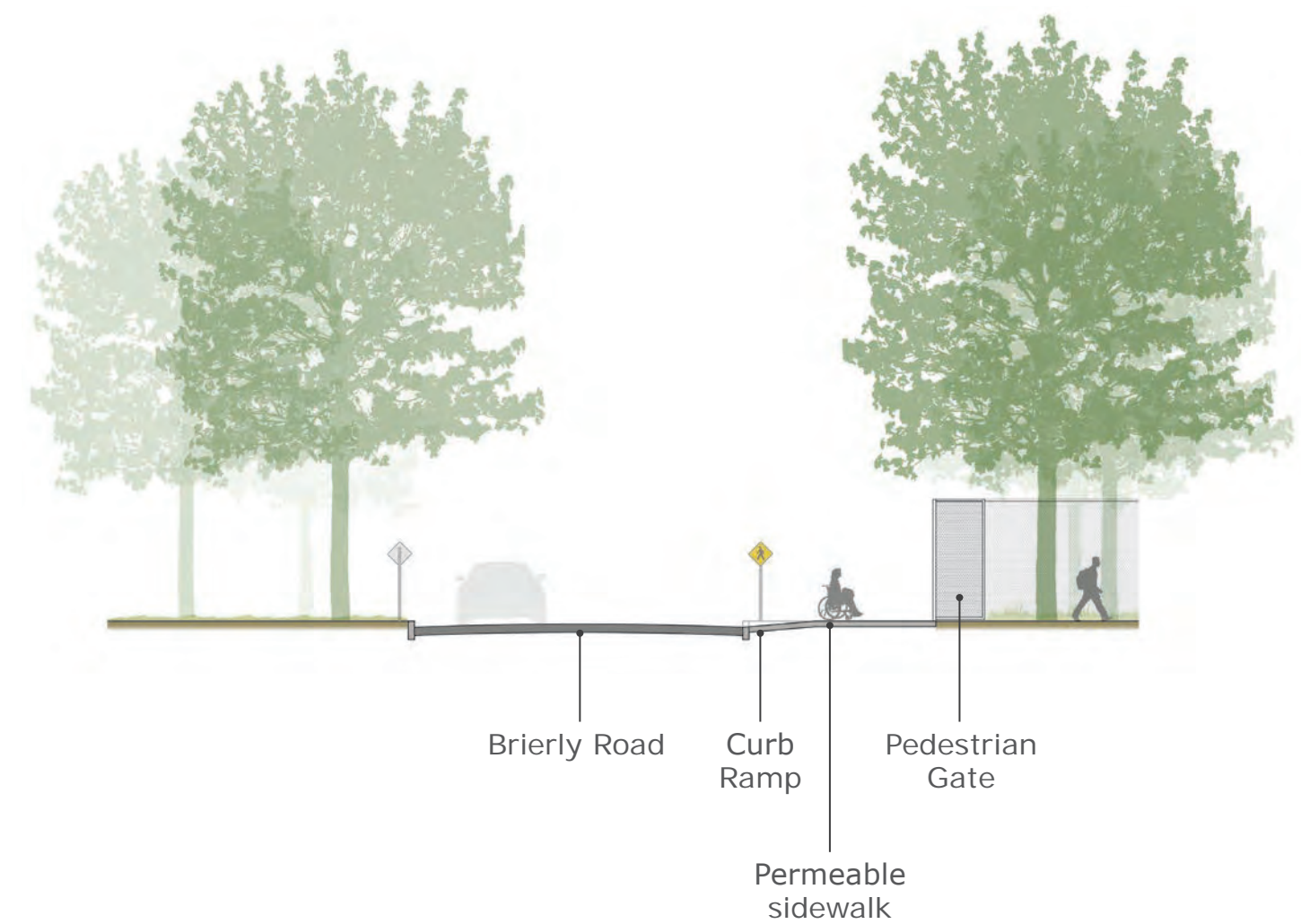
- ← Vehicular circulation
- ← Pull-off / parking

STREET EDGES

Jones Mill Road
Cross section looking north



Brierly Road
Cross section looking north





LANDSCAPE AMENITIES

NATURE PLAY



Nature Play fosters cognitive development, independence and confidence in children through outdoor play in nature. The Teale Center's existing tulip tree nature play area will be maintained for use by children enrolled in ANS Nature Preschool, Forest Kindergarten and Camp Woodend. An additional public nature Play Space will attract new visitors, foster children's love for nature, and serve visiting schoolchildren and families as a community resource. In the new Play Space in the Woods, children will immerse themselves in nature while learning by creating, digging, imagining, building, and climbing.



OUTDOOR CLASSROOMS



Woodend offers boundless opportunities for learning in the great outdoors. Outdoor classrooms offer locations where environmental education will inspire visitors through naturalist-led courses, volunteer trainings, field trip stops for schoolchildren, small group exploration and personal reflection.

These outdoor learning spaces will take many forms, small and large, from a traditional seating ring, to a belly-flop boardwalk for safely dipping nets into the pond, to an outdoor Little Library.



SOCIAL SPACES



Social spaces at Woodend aim to embrace or rekindle connections to the outdoors through social activity. Outdoor seating areas, fire rings, wide boardwalks, and even forest and meadow clearings can provide inspiring places for people to gather and celebrate nature. Spaces that support outdoor events, like weddings, can be particularly effective at introducing new visitors, and potential members, to Woodend.



SCULPTURAL FEATURES



Sculptural features, or follies, are secret places that visitors discover or prominent destinations embedded in the landscape. Features may be interactive, artful, or whimsical, and they often frame views or cleverly integrate with the circulation system.



EVENT LOCATIONS



Event rentals generate critical revenue that helps support ANS’s bottom line while exposing new potential members to Woodend. Rehabilitating the Historic Event Location and constructing a Meadow Event Location and Woodland Event Location will provide unique options for wedding ceremonies, educational events, outdoor concerts, yoga classes, and quinceaneras. The Mansion addition will support year-round rentals, including weekday corporate events.





SUSTAINABLE MASTER PLAN IMPLEMENTATION

GOALS AND STRATEGIES

The recipe for success of the 50-year Master Plan relies on a strong, but adaptable vision that sets the priorities for all decision-making based on the input of stakeholders and with achievable implementation strategies paramount. These implementation strategies protect the very elements of Woodend that make it a unique and wonderful place. The plan allows for minimal disruption to the operations and services provided by Audubon Naturalist Society, and protects the important and sensitive features of the sanctuary. The goal is to implement the full Master Plan vision by 2065. This will require a consistent level of effort to execute the phases sequentially in order to maintain momentum and excitement among nearby neighbors to ANS, staff, and members of new communities that ANS aspires to serve.

The phasing strategy is organized into project groupings that offer opportunities to pair and sequence projects that rely on one another for performance or function. To the extent possible, the implementation sequence is planned so that no newly implemented project will be disturbed by a future project phase. The implementation of the Master Plan will demonstrate sustainable, best practices for the built environment and replicable ecological restoration strategies of natural environments – the stream, pond, meadow and forest habitats that are

so essential to the character of Woodend. All of these restoration and demonstration projects will occur within the unique constraints of a property protected on the National Register of Historic Places, located within the unique constraints of Montgomery County, Maryland zoning regulations. Every new project at Woodend strives to be regenerative — that is go beyond “doing no harm” to proposing strategies that balance improving the environment and cultural health of a place within sustainable economic, historic and regional parameters.

GOALS AND STRATEGIES (cont.)

For the phases of the Master Plan, the following principles are required for each project:

- **Overall Sustainable Site Design and Construction:** Follow the Sustainable SITES Initiative (SITES) guidelines for all new projects. For new building performance goals, consider Living Building Challenge certification or LEED Gold at a minimum.
- **Habitat:** Restore critical habitats including the stream, pond, meadows and forest with an emphasis on increasing biodiversity. Use plants native to the ecoregion (EPA Level III 64 Northern Piedmont, Level IV 64c Piedmont Uplands) and procure plant material with local genotypes whenever possible. Limit habitat disturbance in all cases.
- **Stormwater Management:** Commit to Net-Zero Runoff for each project or phase’s site boundary or limit of disturbance and prioritize connected green infrastructure best practices (rain gardens, bioswales, etc.) over traditional gray infrastructure best practices (pipes, tanks, etc). Add mitigating stormwater management installations to buffer runoff from existing structures.
- **Tree Conservation:** Avoid removal of all native trees to the greatest extent possible and protect trees during construction by erecting substantial protective fencing at the root zone using Matheny and Clark’s method for determining the root zone.
- **Invasive Species Management:** Devote resources to controlling introduction of invasive species, pests, and disease during site construction. Develop and implement a sanctuary-wide invasives removal and control plan to be implemented on an ongoing basis, annually when possible.
- **Materials:** Utilize sustainable, non-toxic materials. Select materials that demonstrate best sustainable building practices for homeowners and institutions. Avoid materials on the International Living Future Institute’s “Red List.”

SITES REQUIREMENTS OVERVIEW

The Sustainable SITES Initiative (SITES) is a rating system and set of guidelines developed to define and measure the performance of built landscapes designed to align with healthy ecosystems. Unlike most other rating systems that require the establishment of performance benchmarks during design, SITES requires pre-construction and post-occupancy monitoring to ensure that the project is actually performing as intended. Overarching goals are to:

- Create regenerative systems and foster resilience
- Ensure future resources supply and mitigate climate change
- Transform the market through design, development, and maintenance practices
- Enhance human well-being and strengthen communities

SITES V2 is arranged into 10 sections with 200 potential points and 48 credits. The sections include credits dedicated to:

1. Site context
2. Pre-design assessment and planning
3. Site design- water
4. Site design- soil and vegetation

5. Site design- materials selection
6. Site design- human health and well-being
7. Construction
8. Operations and maintenance
9. Education and performance monitoring
10. Innovation or exemplary performance

To achieve SITES certification, the project must meet all pre-requisites in addition to achieving a minimum amount of points. For SITES projects at Woodend, the most challenging pre-requisites to conform to will be:

- Pre-requisite 1.1- Limit development on farmland (Woodend contains some prime farmland soil. However the pre-requisite allows for mitigation by proposing new food production areas)
- Pre-requisite 1.2- Protect floodplain functions (The 7-acre parcel contains a 100-year floodplain. Although no plans propose building structures in the floodplain, there may be challenges in documenting new trails or a boardwalk system)

For more information, see www.sustainablesites.org

DESIGN AND CONSTRUCTION

Site Protection and Preparation

Install fencing to the limit of damaging activities and around the drip line of all trees to remain.

- Avoid disturbing tree roots. When disturbing tree roots is unavoidable, take special measures to minimize damage. Consult with a certified arborist.
- When clearing vegetation, avoid straight lines by feathering and thinning remaining vegetation. Always minimize clearing and disturbance as much as possible and consider transplanting plants and soil for reuse.
- Use non-invasive temporary cover crops, such as annual rye grass, when soil will be left bare as outlined in the regulatory requirements for erosion and sedimentation control.
- Remove invasive plant material within the limits of disturbance before planting. This may require two rounds of treatment to ensure species are removed. Prioritize removal of wind-dispersed species before seed set. Avoid herbicides by using suppressive mulches, physical removal, girdling, altering hydrology, prescribed burning, shading, etc.

Soil Stabilization, Improvements and Management of Steep Slopes

Steep Slopes

- Stabilize slopes greater than 15% with bioengineering techniques, which use plant materials and structures to stabilize slopes. Possible techniques include live stakes, live fascines, brushlayers, branchpacking, live cribwalls, vegetated rock gabions, vegetated rock walls, joint planting, and compost blankets [Refer to USDA NRCS Engineering Field Handbook Chapter 18 (Gray, 1996) for more information].
- Utilize small plant material (bareroot, whips, containers) on slopes for ease of installation and increased survivability.
- Leave leaf litter in-place.

Compacted Soils

- Re-mediate compacted soil (soil greater than 200 PSI using a soil penetrometer) by ripping, scarifying, vertical staking, and/or incorporating organic matter.
- Leave leaf litter in-place.
- Incorporate diverse soil microorganisms in the soil to promote soil health by using third party-certified compost or third party-certified compost tea at least twice a year during establishment.

Earthwork

- Avoid excessive cuts and fills.
- Retain existing rock formations, vegetation, and effectively drained soils when possible.
- Prohibit dumping or sloughing excess earth/rock on downhill slopes.
- Use retaining walls to reduce the amount and extent of earthwork. Use culturally relevant or local, natural materials and colors for the walls.
- Use landforms that mimic surrounding form, line, color and texture to hide disturbance.
- Stockpile existing soil for reuse. Do not stockpile soil in mounds greater than 7 ft.
- Do not disturb soil when it is wet.

Planting

- Replant areas of disturbance to mimic natural plant density patterns found in the area - clumps-and-gaps - and with mix of types of plants (herbaceous plants, shrubs, trees) and sizes. Do not plant in uniform rows or with only one or two different sizes or species of plant material.
- Provide gradual transitions between different landscape types (wetlands, meadows, woodlands, forests).
- Use plants that can thrive in the existing or new

environmental conditions. Choose locally grown species that are straight species (no cultivars except near buildings) and are local genotypes.

- Propose a mix of diverse plants: deciduous and evergreen, early-successional (majority) and late-successional (minority), and different habits and forms.
- Propose plants that are diverse in color, texture, type and size.
- Plant in densities that can out-compete invasive species, particularly adjacent to areas with invasive species and south-facing edges and slopes. Manage invasive species over the long-term to protect new plants before and after planting.
- When seeding, properly prepare the seedbed by decompacting the soil and ensuring good seed-to-soil contact. Consider using techniques such as land imprinting to prepare the soil and soil drills or a two-step hydroseeding/hydromulching method for seeding.
- Plant at the best time for each group of plants. Do not plant anything in the summer and avoid planting fall hazard trees in the fall. Use non-invasive, annual cover crops to stabilize soil in the winter.
- Protect plants from herbivory by deer, etc.
- Consider stockpiling native vegetation in areas to be graded in a temporary nursery so they can be reused on the project.

DESIGN AND CONSTRUCTION (cont.)

Stormwater Management

- Concentrate on managing stormwater where it falls using green infrastructure (e.g. bioswales, rain gardens, continuous tree trenches, porous pavement, re-use cisterns, green roofs) rather than gray infrastructure where possible.
- Infiltrate stormwater on plateaus above steep slopes to avoid sending water down slopes.
- Use infiltration berms, check logs, and retentive grading at the top of slopes.
- Infiltrate stormwater as close to the sources of runoff as possible. Do not allow stormwater to flow unmanaged to wetland area.
- Protect drainage channels with bioengineering techniques. (See Soil Stabilization.)
- Use native plants in stormwater management areas. Avoid turf in these areas.



MONITORING AND STEWARDSHIP

- Track changes in vegetation and environmental conditions on an annual basis at a minimum. Set a baseline condition and goals for the landscape at set time intervals for monitoring. Set indicators to monitor to assess whether or not the landscape is on a positive or negative trajectory. Indicators to monitor include:
 - Vegetation and litter cover
 - Soil structure (compaction, crusting, aggregate size)
 - Organic matter
 - Infiltration, water-holding capacity of soil
 - Erosion and sedimentation, gullies and rills
 - Plant diversity, invasive species
 - Soil biology, presence of earthworms
 - Soil chemical properties (pH, salinity, CEC, etc.)
 - Excessive herbivory
- Devote resources to controlling invasive species, pests, and disease on a biannual basis at a minimum.
- Monitor the site after any disturbances in the landscape that may encourage invasive species. Opportunities in landscapes and wetlands caused by natural or man-made events (hurricanes, large storms, run-off from upland landscapes, etc.) where invasive species tend to proliferate include:
 - Canopy gaps, where trees have fallen
 - Nutrient pulses (for example, from runoff from recently fertilized adjacent site)
 - Sediment deposition and bare soil (for example, from soil erosion from an upland area where stormwater is not controlled)
- Devote resources for supplemental planting in the event of a large disturbance. Use rhizomatous and/or fast-growing native species with temporary cover crops on the ground layer supplemented with native trees and shrubs in order to discourage invasive species establishment.
- Protect new plants from herbivores.



PHASING STRATEGY AND OPINION OF COST

Strategic Orchestration

Phasing is a planning process by which a large project, in this case a master plan, is divided into sequential stages of implementation. The master plan's phases are strategically orchestrated to leverage fundraising opportunities, maximize efficient construction, and foster ecological health. Woodend's Master Plan phasing strategy is organized into four phases, intended to be completed in a strategic order. Each phase consists of a grouping of projects, or "sub-phases," that may be deployed in a flexible manner, meaning in any logical order within the phase.

The phasing sequence is organized so that, to the greatest extent possible, newly implemented projects do not disrupt projects completed during previous phases. Sometimes a newly implemented sub-phase can even benefit a future sub-phase. For example, an upstream slow release basin would logically be implemented before downstream improvements to allow the first portion of work to support the second. Other sub-phases should logically be implemented in tandem within a phase because they support each other's performance, such as rain gardens that treat the runoff from a new building or a cistern that collects water from a permeable parking lot. When considering the implementation of a phase or sub-phase out of sequence, consider the short and long-term economic and ecological implications of the decision.

Order of Operations

From a constructability and regulatory standpoint, there are some projects that make sense economically, ecologically or pragmatically to occur in a certain sequence. Phasing considerations include:

- Stream restoration projects should be implemented beginning at the top elevation of Woodend's drainage areas.
- Stormwater projects that facilitate new development containing impervious surfaces need to be paired together to meet stormwater requirements, such as:
 - Teale Center landscape and parking and drop-off
 - Maintenance Building and stormwater facilities
- Projects that may be compromised due to construction activities of other projects.
- Projects that need to be completed prior to other projects in order to provide access (pedestrian or vehicular) or maintain the operations of Woodend, such as parking lots or drop-off areas.

PHASING STRATEGY

Phase 1

ANS is setting the stage for future Master Plan improvements by prioritizing the implementation of projects that are in progress via fundraising, design and/or construction.

Sub-Phases

- A) Entry signs and drive
- B) Deer fence
- C) Teale Center landscape
- D) Parking and drop-off
- E) Play Space in the Woods
- F) Reflection Wetland

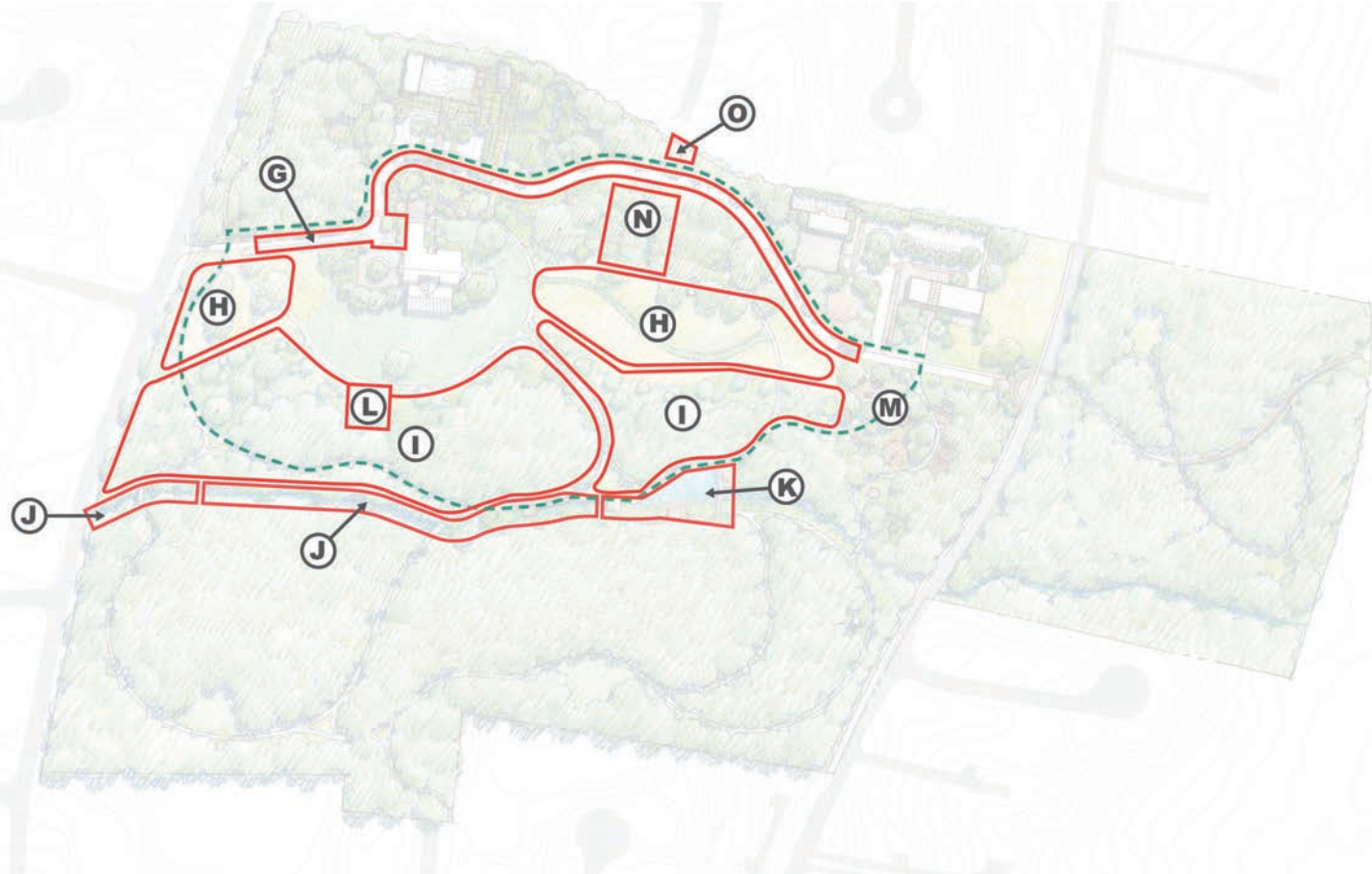


Phase 2

This phase offers an ADA accessible loop, ecological restoration, the rehabilitation of Woodend’s historic event location, and the provision of a new event location.

Sub-Phases

- G) Permeable pavement and accessible sidewalk
- H) Meadow restoration
- I) Forest restoration and retentive grading
- J) Slow release basin and stream restoration
- K) Pond and boardwalk
- L) Woodland event location
- M) Accessible trail loop
- N) Historic event location restoration
- O) Residential path



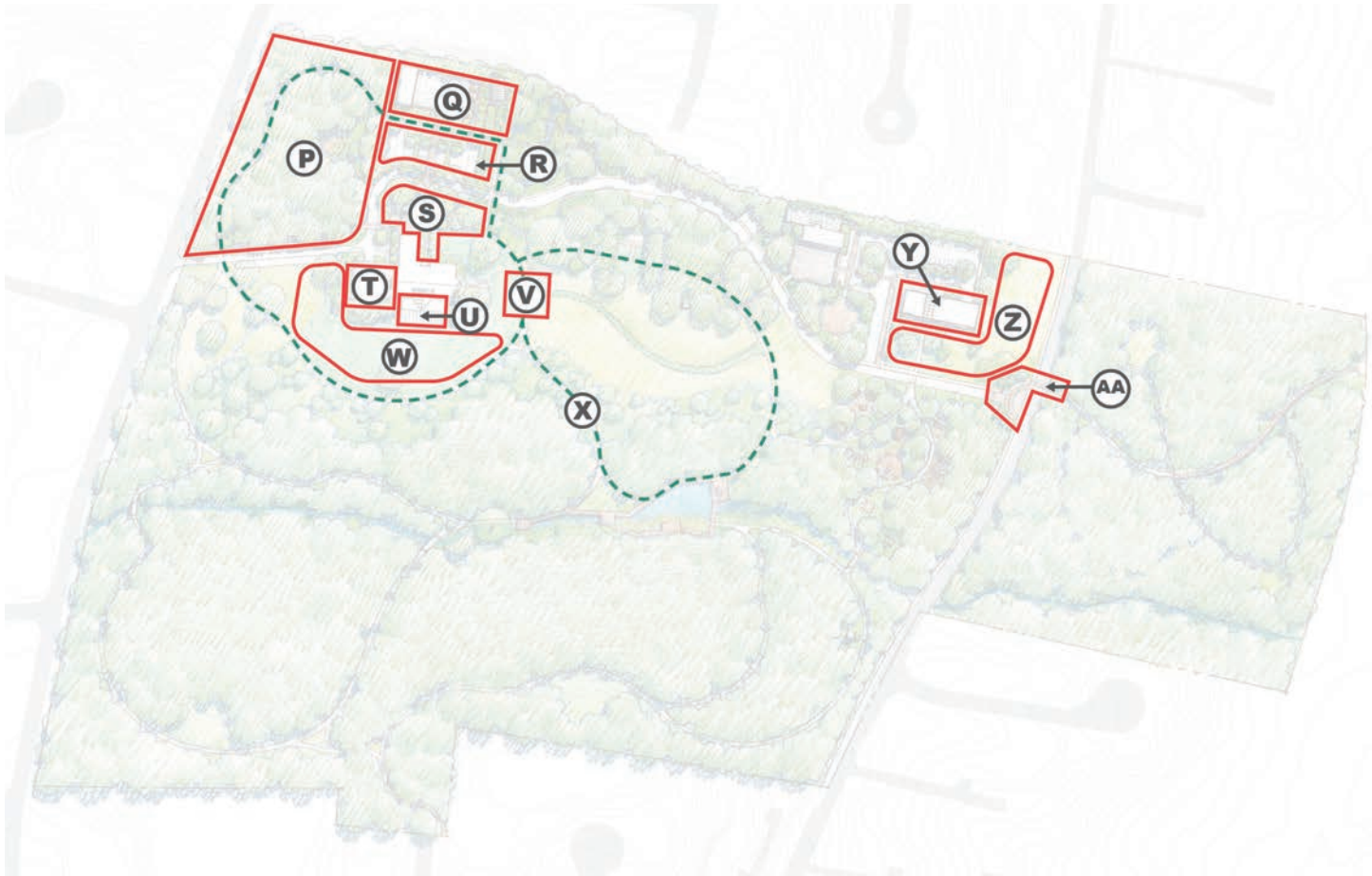
PHASING STRATEGY (cont.)

Phase 3

This phase focuses on the built environment within the Stewardship, Administrative and Events, and Education Hubs, as well as ecological restoration of the adjacent areas.

Sub-Phases

- P) Forest restoration
- Q) Stewardship building, Yard and growing fields
- R) Parking lot
- S) Blair Native Plant Garden expansion
- T) Mansion drop-off plaza
- U) Mansion addition
- V) Meadow event location
- W) Eco-lawn
- X) Trails and trail restoration
- Y) Education Center
- Z) Meadow restoration
- AA) Pedestrian crossing entry improvements

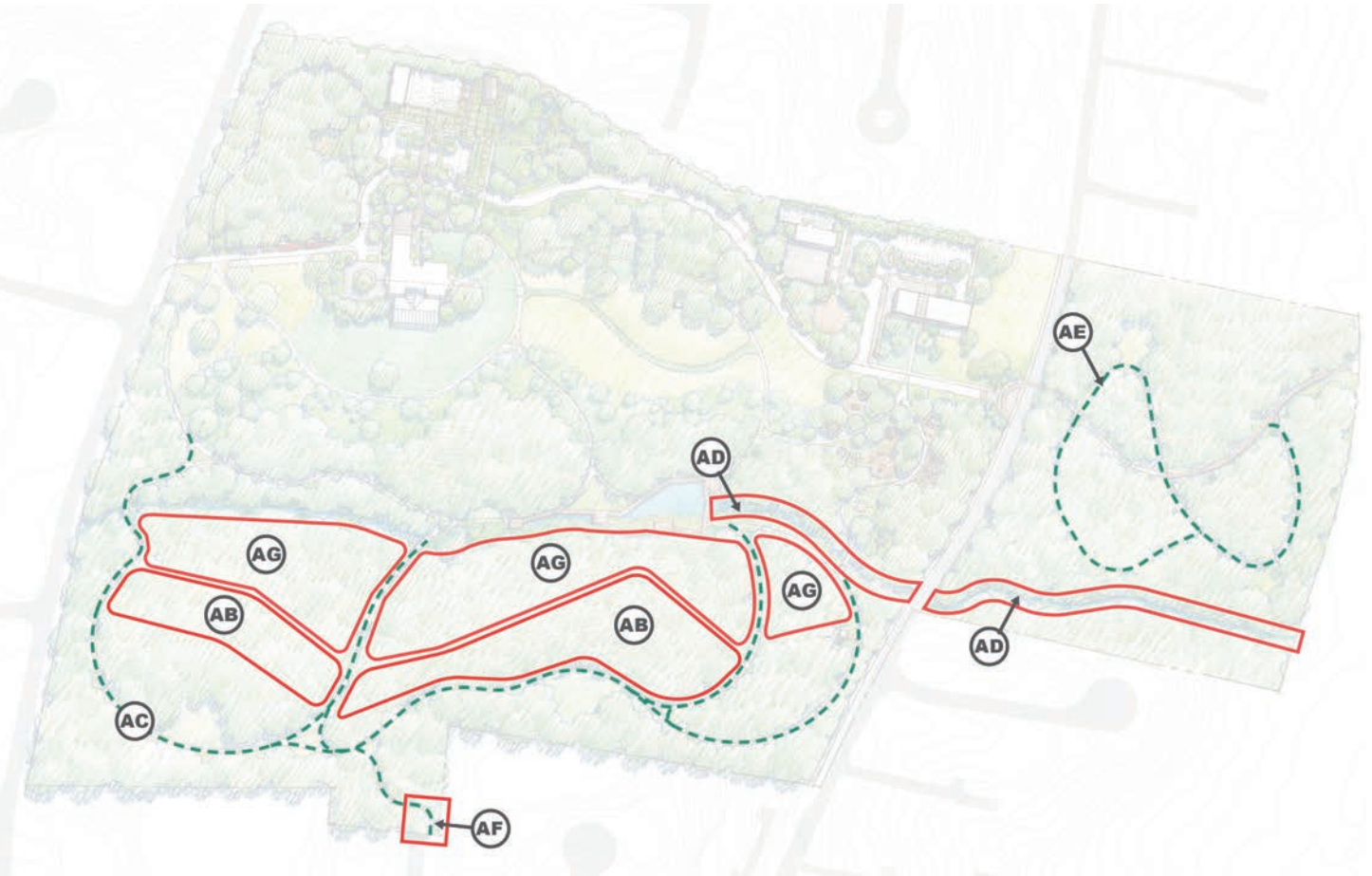


Phase 4

The final improvements address the south and east sides of the site, which relate to self-guided recreation and indirect revenue generation.

Sub-Phases

- AB) Forest restoration and retentive grading
- AC) Trails and trail restoration
- AD) Stream restoration
- AE) Nature trail
- AF) Residential path
- AG) Forest restoration





SECTION IV

APPENDICES

A| ARCHIVE REVIEW SUMMARY

Past Reports

- 1974 Historic Narrative
- 2014 Entry Sign Permit Application
- 2015 ANS Annual Report
- 2015 ANS Visitor Map
- 2015 Board of Appeals
- 2015 Capital Conditions Assessment
- 2015 Center for Watershed Protection Report
- 2015 Historic Preservation Consultation
- 2015 Historic Preservation Letter
- 2015 Legacy Open Space Pitch
- 2015 Member/Staff Survey
- 2015 Nature Play Space Estimate
- 2015 Nature Play Space Report
- 2015 Public Meeting Notes
- 2015 Roofing Estimate
- 2015 Sanctuary Committee Notes
- 2015 Teale Center Renovation Design
- 2016 Geotechnical Engineering Report

See attached compact disc for digitized documents listed on this page.

Historical Drawings

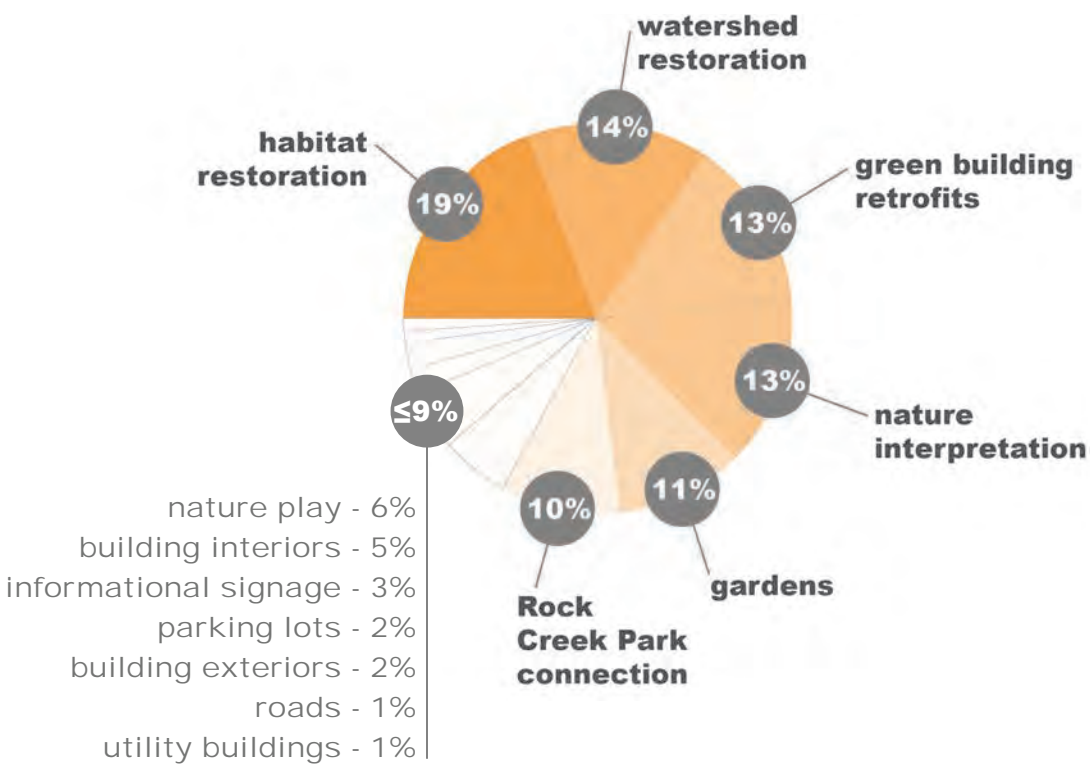
- 1994 Survey, Teale Center and Entry Meadow
- 1995 Pond Dredging and Sediment Control Plans
- 1996 Mansion Planting Plan
- 2014 Legal Description
- 2014 Plat
- 2015 Survey, East Entrance
- 2015 Survey, North Side Drainage Area
- 2015 Survey, Shop Parking Lot
- 2015 Survey, West Entrance

B| INTERVIEW MEETING SUMMARY

Master Plan Committee meeting	10.13.15	2065 Council conference calls	5.4.16
Historic Preservation meeting	10.28.15	Master Plan Committee meeting	6.22.16
Director of Education interview	11.13.15	Master Plan Committee meeting	9.7.16
Volunteer Coordinator interview	12.3.15	Board of Directors meeting	9.21.16
Property Manager interview	12.3.15	Annual meeting and Master Plan debut	10.20.16
Staff meeting	12.3.15		
Director of Conservation interview	12.9.15		
Master Plan Committee meeting	12.9.15		
Nature Play Space Committee meeting	10.13.15		
Teale Center meeting	12.9.15		
Master Plan Committee meeting	12.9.15		
Neighbor meeting	12.16.15		
Historic Preservation meeting	1.6.16		
Historic Preservation meeting	2.18.16		
Youth Education Camp Director interview	2.18.16		
Signage meeting	2.18.16		
Master Plan Committee meeting	2.24.16		
Director of Events interview	3.2.16		
Board of Directors meeting	3.13.16		
2065 Council meeting	3.14.16		
Historic Preservation meeting	3.27.16		
Board of Directors meeting	4.20.16		
Master Plan Committee meeting	4.27.16		
2065 Council conference calls	4.29.16		

C| STAKEHOLDER SURVEY FINDING DETAIL

Member Survey Preferred Improvements



Comments

“It’s a model of how an elegant property can be managed as a wildlife habitat. I believe this to be its most important contribution to people in the area - to see that wildlife and “civilization” can co-habitate.”

“The staff have such passion for their work!”

“I don’t own a car so Woodend is not accessible to me.”

“There is so much potential to be a haven for families with young children! Please make improvements so it is more of a destination.”

Takeaway

408 Respondents

Top Preferred Improvements

- 1st — Habitat restoration
- 2nd — Watershed restoration
- 3rd — Green building retrofits
- Nature interpretation

Master Plan Operating Principles

	preserves culture + history	attracts diverse audiences	supports environmental ed.	stays free + open to the public	improves watershed health	enhances visitor experience for all	offers revenue potential	promotes biodiversity	models stewardship
strongly agree	19%	3%	47%	19%	3%	6%	0%	47%	63%
agree	6%	19%	28%	22%	13%	3%	0%	9%	34%
total	25%	22%	75%	41%	16%	9%	0%	56%	97%

Takeaway

Top Master Plan Operating Principles (rated by members)

- 1st — Models stewardship
- 2nd — Supports environmental education
- 3rd — Promotes biodiversity

WHY DO YOU VISIT?

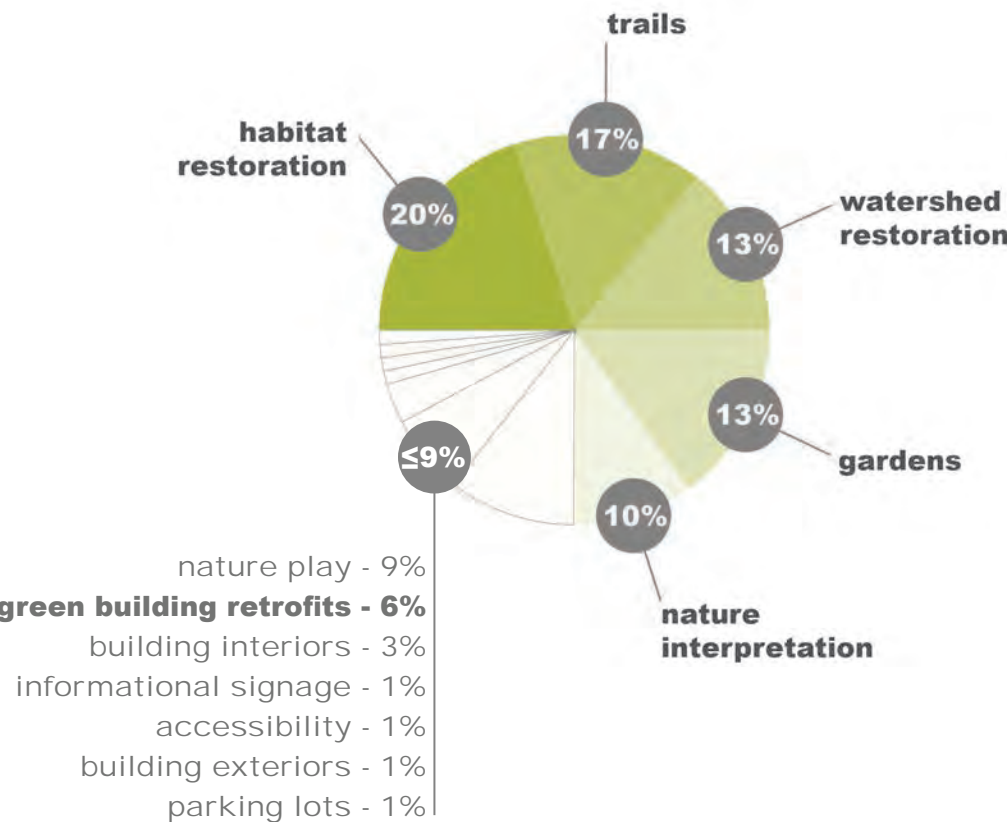


WHAT LIMITS YOUR ACTIVITY?



Neighbor Survey

Preferred Improvements



Comments

“I’d love for my elderly parents to be able to experience the trails. Making them walker and wheelchair accessible would be wonderful.”

“More information signs on trails... what am I looking at (tree types, vegetation, plants,etc.), or for (animals, birds) in this area.”

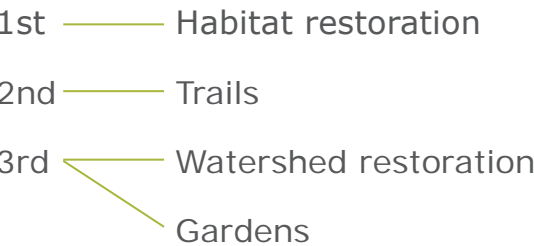
“Event space is prohibitively expensive for school / non-profit groups and the center should focus on providing more opportunities for groups to utilize the spaces for meetings, clubs, etc.”

“Get rid of the deer leaving Woodend and coming into our neighborhood.”

Takeaway

132 Respondents

Top Preferred Improvements



Master Plan Operating Principles

	preserves culture + history	attracts diverse audiences	supports environmental ed.	stays free + open to the public	improves watershed health	enhances visitor experience for all	offers revenue potential	promotes biodiversity	models stewardship
strongly agree	73%	28%	73%	77%	65%	44%	34%	65%	68%
agree	21%	40%	24%	18%	29%	38%	39%	30%	23%
total	94%	68%	97%	95%	94%	82%	73%	95%	91%

Takeaway

Top Master Plan Operating Principles (rated by neighbors)

- 1st
- Supports environmental education
- 2nd
- Stays free and open to the public
- Promotes biodiversity
- 3rd
- Improves watershed health
- Preserves culture and history

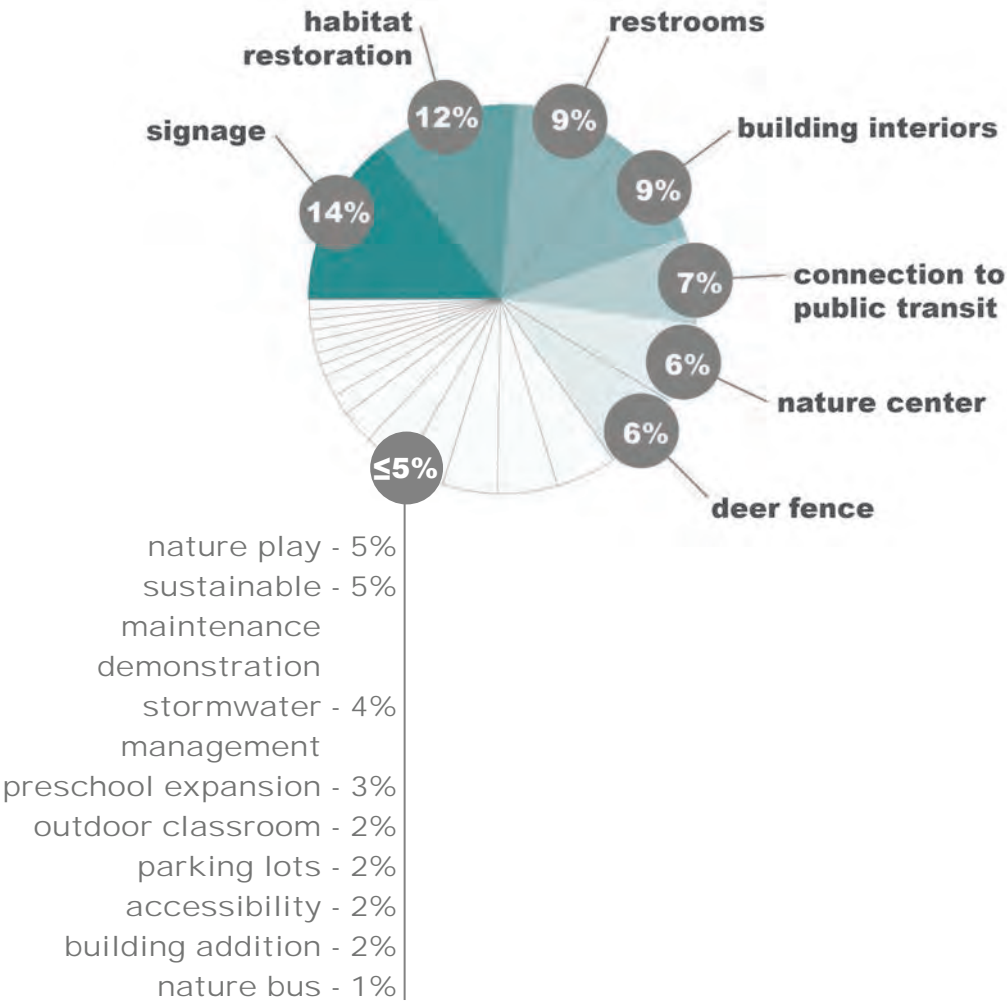
WHAT'S MOST APPEALING?

beauty accessibility children's programs
connectivity to Rock Creek Park adult programs event space
exploration & discovery family-friendly flora free gardens habitat
haven for deer home value teaching & learning mansion mature trees
meadow models stewardship Naturalist Shop nature
neighborhood amenity open space
peaceful respite photography safe seasonal fairs stream
trails watershed protection wildlife woodland

WHAT WOULD YOU CHANGE?

ADA accessibility affordable event space building upgrades cafe
deer fence dog-friendly expand size
family-friendly programming free programming grounds maintenance
interpretive signage less traffic in neighborhood more trails
native plantings & habitat nature playspace new pedestrian access points parking
plant trees remove fence remove gardens restore historic gardens
trail maintenance upgrade Naturalist Shop wayfinding signage

Staff Survey
Preferred Improvements



Comments

“Informing people about the wonders of the natural world and getting them to experience it.”

“The opportunity to introduce all ages to nature and environmental discovery - to help people to find their niche and feel part of not only the ANS community, but the larger community of those who participate in the protection of our natural resources.”

“Emphasis on creating a diverse community of nature enthusiasts.”

“Connecting people to nature.”

Takeaway

35 Respondents

Top Preferred Improvements

- 1st — Signage
- 2nd — Habitat restoration
- 3rd — Restrooms
- Building interiors

Master Plan Operating Principles

	preserves culture + history	attracts diverse audiences	supports environmental ed.	stays free + open to the public	improves watershed health	enhances visitor experience for all	offers revenue potential	promotes biodiversity	models stewardship
agree	89%	91%	97%	*	97%	91%	94%	89%	*
no opinion	11%	6%	3%	*	3%	9%	6%	11%	*

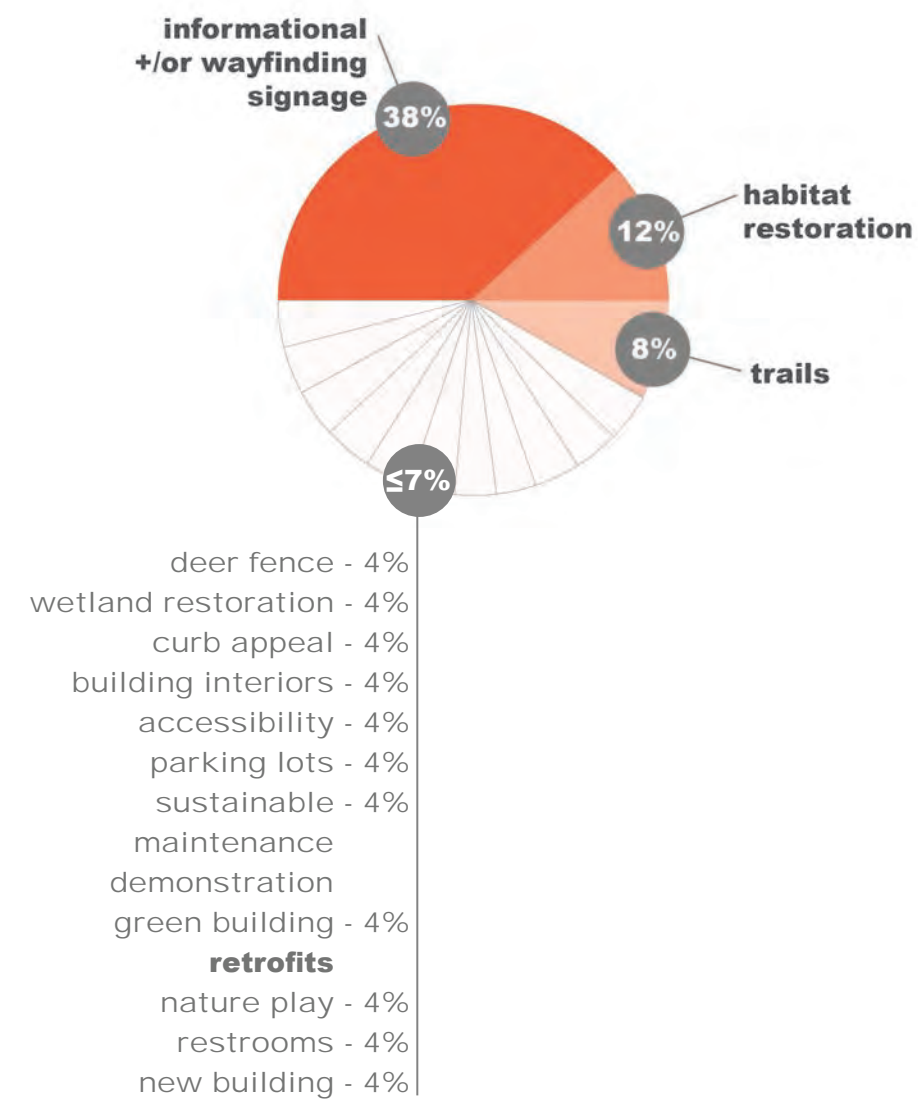
* = group not asked about this criterion

Takeaway

Top Master Plan Operating Principles (rated by staff)

- 1st — Supports environmental education
- Improves watershed health
- 2nd — Offers revenue potential
- 3rd — Attracts diverse audiences
- Enhances visitor experience for all

Board of Directors Survey
Preferred Improvements



Comments

“To ‘inspire’ is a terrific, strong, actionable word that neatly summarizes our work.”

“Expanding efforts to reach out to areas of DC that have less exposure and opportunity to benefit from all that Woodend has to offer.”

“Supporting projects that restore natural habitat and demonstrate sound environmental practices.”

“I think the key is to restore and sustain as much of the authentic natural environment as possible.”

“Connecting people to nature.”

Takeaway

14 Respondents

Top Preferred Improvements

- 1st — Informational /or wayfinding signage
- 2nd — Habitat restoration
- 3rd — Trails

Master Plan Operating Principles

	preserves culture + history	attracts diverse audiences	supports environmental ed.	stays free + open to the public	improves watershed health	enhances visitor experience for all	offers revenue potential	promotes biodiversity	models stewardship
agree	86%	100%	93%	86%	86%	86%	100%	86%	93%
no opinion	14%	0%	0%	14%	14%	7%	0%	14%	7%

Takeaway

Top Master Plan Operating Principles (rated by board of directors)

- 1st — Attracts diverse audiences
- Offers revenue potential
- 2nd — Supports environmental education
- Models stewardship

2065 Council Interviews

The Woodend 2065 Council is a panel of regional leaders that advised the Audubon Naturalist Society during the Master Plan process in order to help connect more diverse audiences to nature at Woodend.

WHAT’S WOODEND’S GREATEST ASSET?

connection to Rock Creek Park educational infrastructure habitat
meeting space with character **oasis in the city**
landscape variety **location** natural resource size

HOW CAN WOODEND BETTER SERVE AND ATTRACT DIVERSE COMMUNITIES?

accessibility **advocacy** all-day programming applied science **art**
biking community **build partnerships** communications **education**
electric car charging station faith community **health**
historic programming innovative events internships jobs nature play
outreach policy recreation **social events**
special needs community thought leader transportation

Comments

“Partner with organizations to reach vulnerable communities.”

“Serve as example of conservation choices in the built environment.”

“Educate about the importance of natural spaces, habitat, diversity.”

“Be a model and a resource.”

“Use Woodend to help people understand the history of our area.”

“Woodend needs to reflect the diverse audience it wants to bring in.”

Takeaway

16 Interviewees

Increased Visitor Diversity Requires

1st — Partnerships

2nd — Advocacy and outreach

3rd — Maintaining natural and historic resources

Comparative Stakeholder Analysis

What’s important to Woodend’s stakeholders?

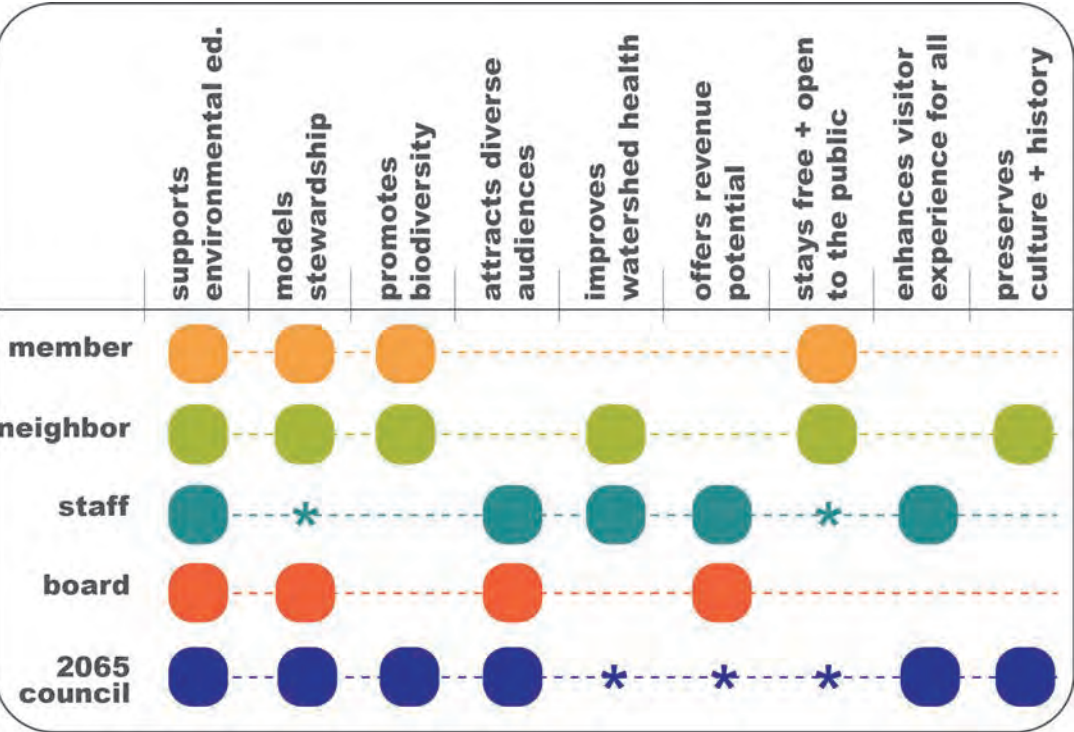
Elements: habitat watershed green building parking signage habitat deer trails watershed gardens programs nature open space signage discovery exposure opportunity model resource

Descriptors: destination passion accessible inexpensive peaceful beautiful diverse oasis diverse

Actions: interpret model inform experience connect restore inspire restore demonstrate sustain partner educate understand

Member Board
Neighbor 2065 Council
Staff

Which are the most important Master Plan operating principles?



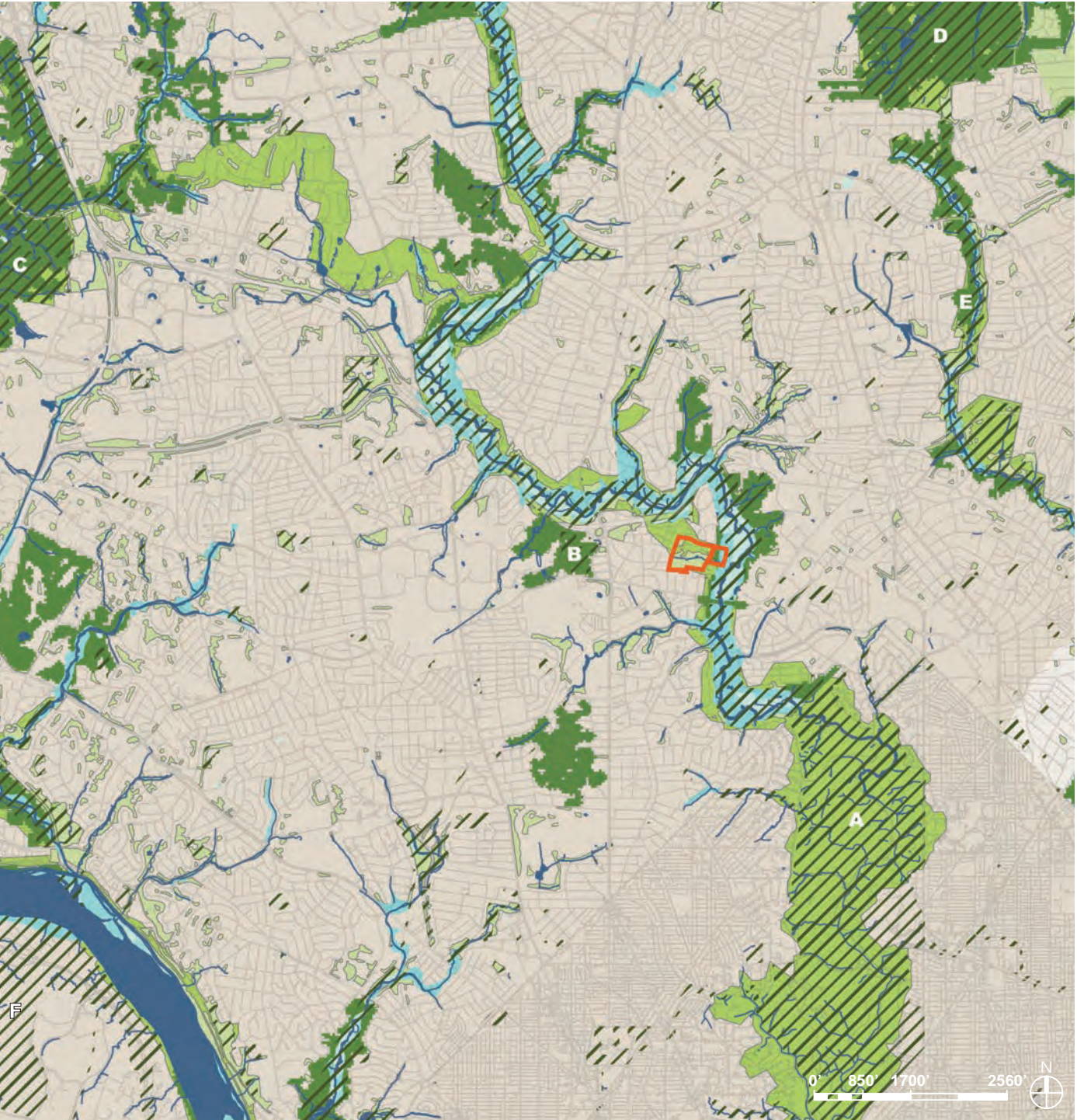
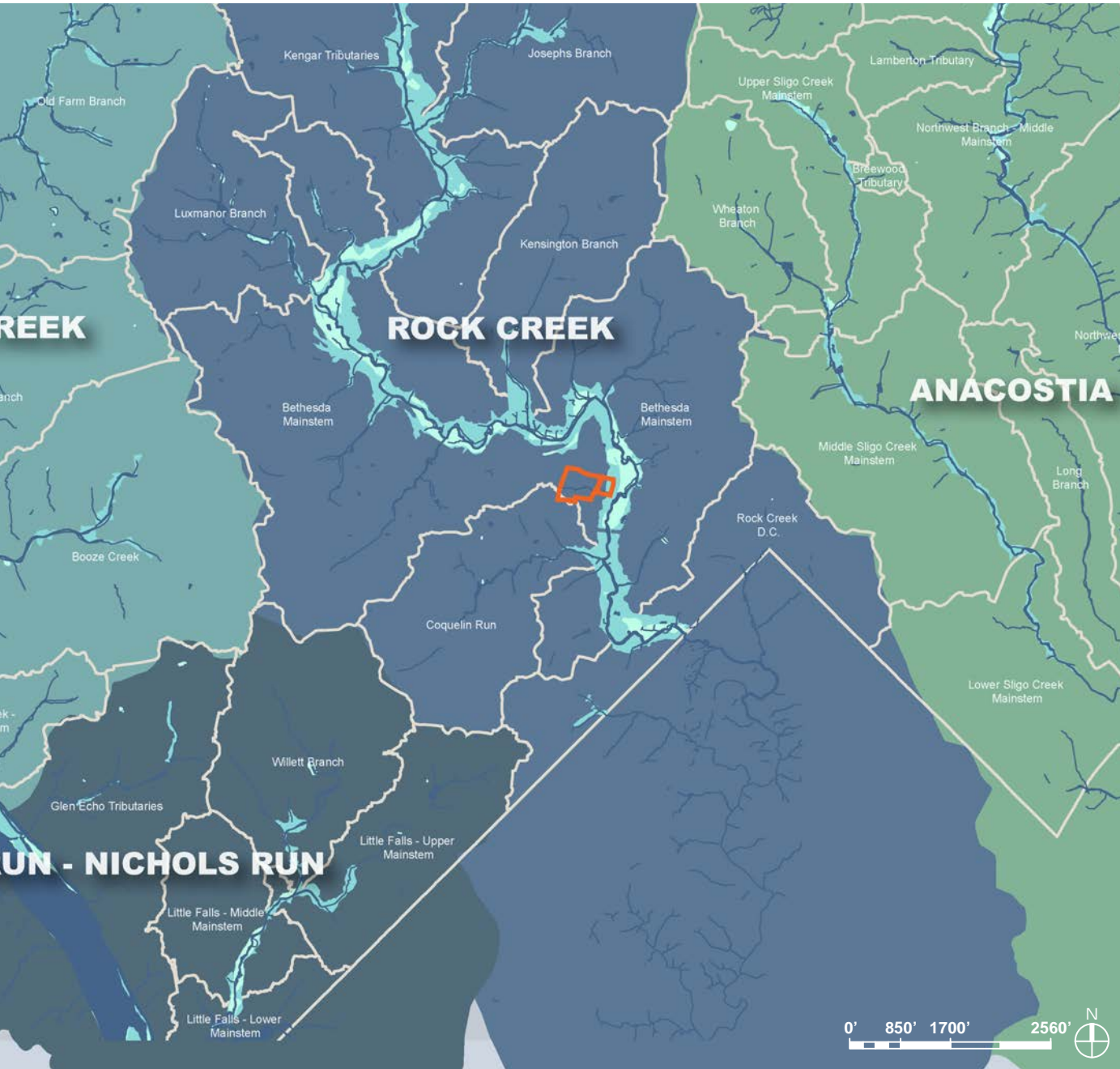
* = group not asked about this criterion
Order based on quantitative analysis of survey responses.

D| SITE ANALYSIS DETAIL

Watersheds and Sub-Watersheds

- Watershed
- Floodplain
- Wetland
- Water body
- Sub-watershed
- Site

Woodend Characteristics:
- Lies within the Rock Creek Watershed the Bethesda Mainstem Sub-Watershed



Vegetation and Parkland

- Ecoregion 64c, Piedmont Uplands
- Ecoregion 65n, Chesapeake Rolling Coastal Plain
- Forest
- Forest interior ¹
- Planned green infrastructure ²
- Parkland
 - A- Rock Creek Park
 - B- North Chevy Chase Local Park
 - C- Cabin John Park
 - D- Brookside Gardens
 - E- Sligo Creek Park
 - F- Langley Oaks Park
- Site

¹ Source: Environmental Resources Inventory Potomac Subregion, 1998

² Source: Montgomery County Green Infrastructure Plan, 2009

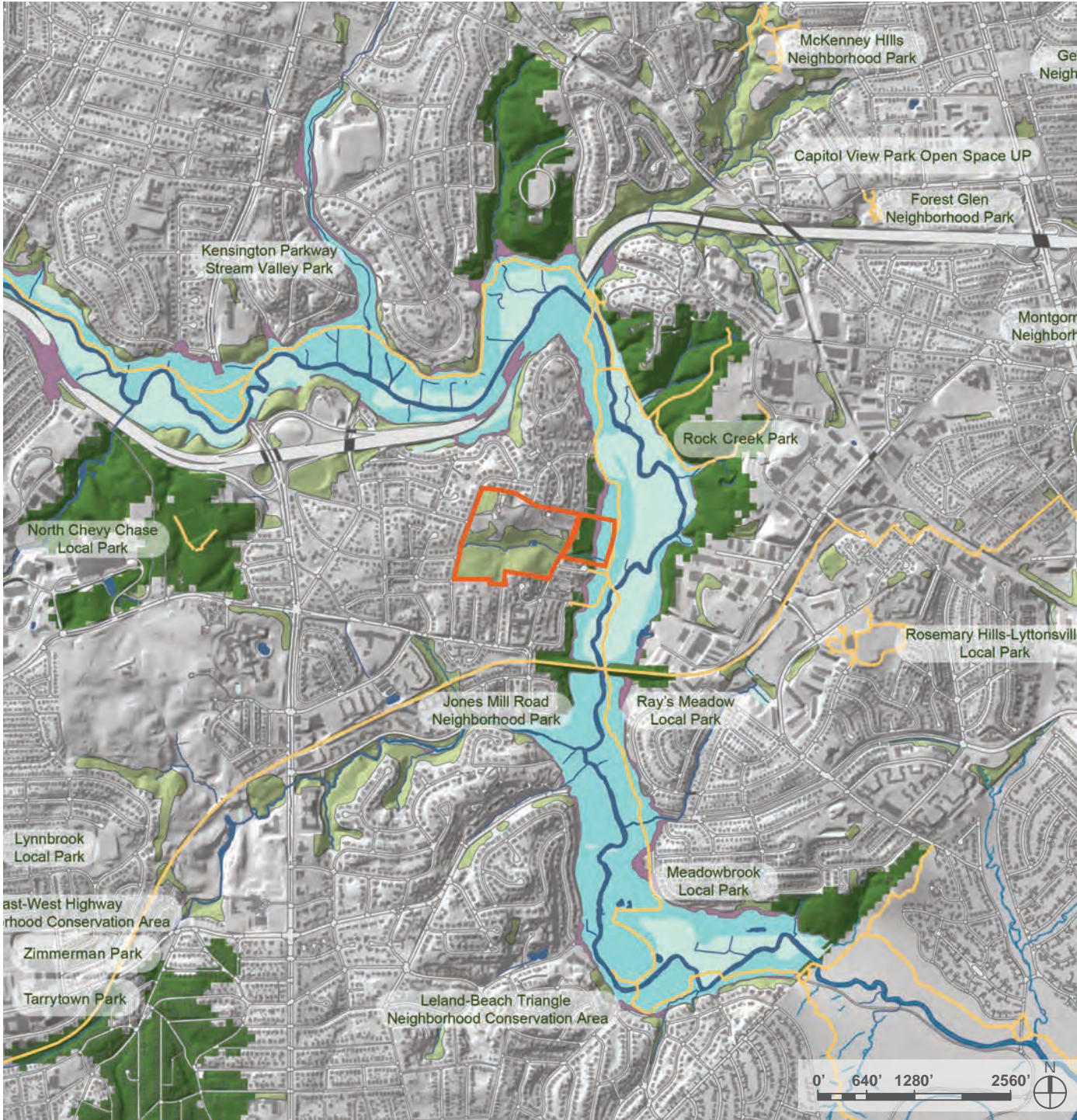
Ecological Context

- Forest
- Forest interior dwelling species habitat*
- Wetland
- 100 year floodplain
- 500 year floodplain
- Water body
- Park trail
- Site

* Large, contiguous forest tracts with mature hardwood trees

Woodend Characteristics:

- Lies partially within the 100 and 500 year floodplains

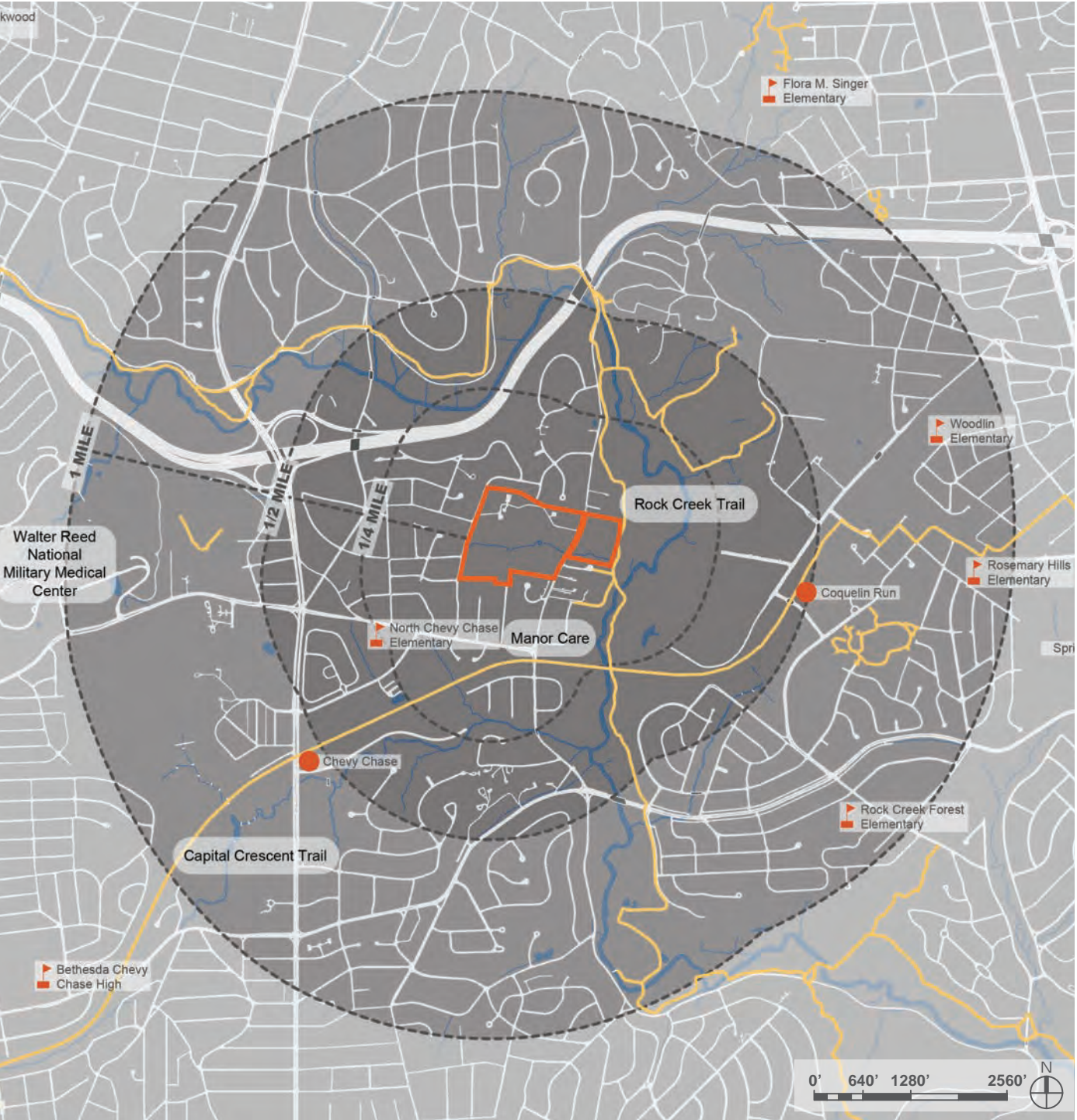


Community Context

- Walking distance from Woodend (0.25, 0.5, 1.0 and miles)
- Park trail
- School
- Proposed Purple Line Metro stop
- Site

Woodend Characteristics:

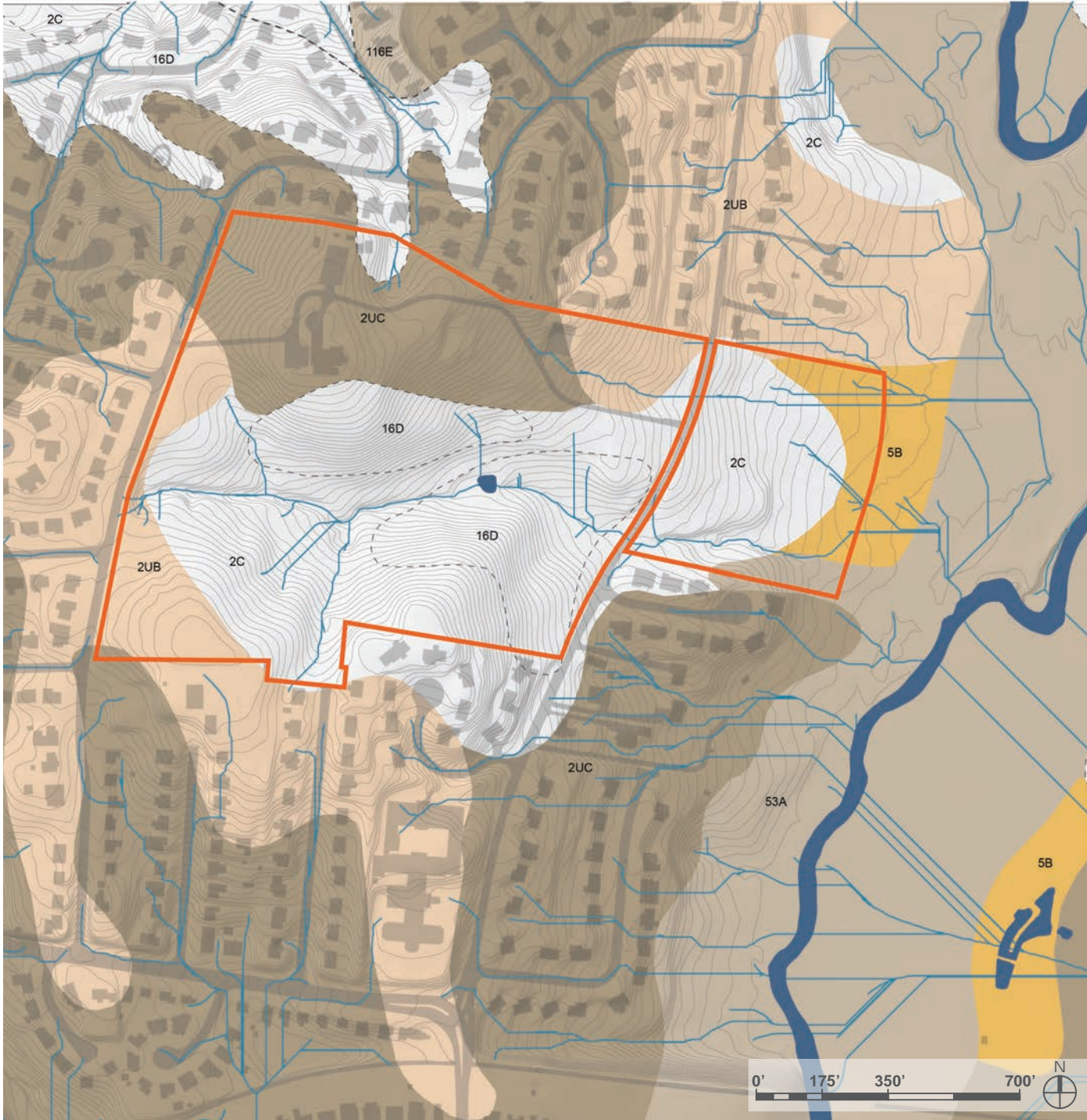
- Is close to health facilities schools
- Is within walking distance of two proposed Metro Rail stops
- Is within walking distance of Rock Creek Park Capital Crescent trails



Soils

- 2C: Glenelg silt loam, (prime farmland)
- 16D: Brinklow-Blocktown channery silt loams (highly-erodible)
- 2UC: Glenelg-Urban land complex
- 53A: Codorus silt loam
- 2UB: Glenelg-Urban land complex
- 5B: Glenville silt loam
- Drainage path
- Site

Woodend Characteristics:
- White represents areas least suitable for building construction



Physiography and Hydrology

- High point
- Low point
- Wetland
- Water body
- Site

Woodend Characteristics:
- 120' grade change between mansion and Rock Creek Park

E| POTENTIAL SITES FOR EDUCATION HUB



SITE CONSIDERATIONS

A

Pros

- Near parking lot
- Could integrate historic greenhouse foundation

Cons

- Likely to increase stormwater runoff problems
- Size restricted by notable tree

B

Pros

- Gentle slope
- Near existing utilities

Cons

- Hides activity at back of site
- Provides little spatial separation between program hubs

C

Pros

- Activates underutilized area

Cons

- In mature forest
- Difficult for driveway access
- Too removed from other buildings

D

Pros

- Highly visible from arterial road
- Offers landmark building location
- Relatively close to Rock Creek trail
- Ideal location for welcome center
- Can provide Teale drop-off and parking
- Close to proposed nature Play Space in the Woods location
- Demonstrates 'cluster development'
- Reinforces sense of arrival
- Differentiates program hubs spatially

Cons

- May require Historic Preservation approval

E

Pros

- Activates underutilized area
- Near Rock Creek trail

Cons

- Prohibitively dangerous road crossing
- Disjointed from site
- Unclear entry hierarchy
- Requires Environmental approval

— Pros dominate
— Cons dominate

F | REFERENCE PLANT COMMUNITIES

Sycamore Floodplain Forest

Liriodendron tulipifera - Acer (rubrum, negundo) - (Platanus occidentalis) / Carpinus caroliniana / Polygonum virginianum Forest

Translated Name: Tuliptree - (Red Maple, Box-elder) - (American Sycamore) / American Hornbeam / Jumpseed Forest

Common Name: Northern Piedmont Small-Stream Floodplain Forest

Unique Identifier: C EGL006492

Classification Approach: International Vegetation Classification (IVC)

Summary: This community occupies floodplains and terraces of medium-sized streams (large streams and small rivers) in the Piedmont of Maryland and Virginia. These floodplains are moderately extensive and subject to frequent overflow, but topographically fairly homogeneous. In these habitats, the alluvial landforms (e.g., levees, backswamps) are poorly developed or occur at very small scales. Hydrologic regime is temporarily flooded. Soils are generally alluvial silt loams and sands washed from various metamorphic and igneous rocks. This association is a closed forest with consistent overstory codominance by Liriodendron tulipifera in variable combinations with other trees. Acer negundo, Acer rubrum, or both are characteristic in the overstory or understory. Platanus occidentalis varies from codominant to absent. Other trees that may be important in some stands include Juglans nigra, Fraxinus pennsylvanica, Fraxinus americana, Carya cordiformis, Ulmus americana, Betula nigra, and Quercus palustris. Linder a benzoin, Carpinus caroliniana, and, less constantly, Asimina triloba and/or Viburnum prunifolium dominate the shrub layer. Vines of Toxicodendron radicans and other species may occur. Relatively diverse herb layers are composed of both mesophytic and hydrophytic species. Common herbs include Arisaema triphyllum, Geum canadense, Polygonum virginianum, Carex amphibola, Circaea lutetiana ssp. canadensis, Verbesina alternifolia, Carex radiata, Carex blanda, Impatiens capensis, Boehmeria cylindrica, Viola sororia, and Symphyotrichum lateriflorum. Although less constant, Elymus virginicus, Claytonia virginica, and Erythronium americanum form dominance patches in some stands. Because land-use effects (agriculture, grazing, utility corridors in and near the floodplain, excessively frequent flooding and sediment deposition following watershed development) frequently disturb the habitat, the herb layer is often weedy and is commonly dominated by the exotic grass Microstegium vimineum.

Vegetation

Vegetation Summary: This association is a closed forest with consistent overstory codominance by Liriodendron tulipifera in variable combinations with other trees. Acer negundo, Acer rubrum, or both are characteristic in the overstory or understory. Platanus occidentalis varies from codominant to absent. Other trees that may be important in some stands include Juglans nigra, Fraxinus pennsylvanica, Fraxinus americana, Carya cordiformis, Ulmus americana, Betula nigra, and Quercus palustris. Linder a benzoin, Carpinus caroliniana, and, less constantly, Asimina triloba and/or Viburnum prunifolium dominate the shrub layer. Vines of Toxicodendron radicans and other species may occur. Relatively diverse herb layers are composed of both mesophytic and hydrophytic species. The most constant herbs in 15 Virginia and Maryland plot samples were Arisaema triphyllum, Geum canadense, Polygonum virginianum, Carex amphibola, Circaea lutetiana ssp. canadensis, Verbesina alternifolia, Carex radiata, Carex blanda, Impatiens capensis, Boehmeria cylindrica, Viola sororia, and Symphyotrichum lateriflorum. Although less constant, Elymus virginicus, Claytonia virginica, and Erythronium americanum form dominance patches in some stands. Because land-use effects (agriculture, grazing, utility corridors in and near the floodplain, excessively frequent flooding and sediment deposition following watershed development) frequently disturb the habitat, the herb layer is often weedy and is commonly dominated by the exotic grass Microstegium vimineum.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Betula nigra		Broad-leaved deciduous tree	Tree canopy	✓				
Carya cordiformis		Broad-leaved deciduous tree	Tree canopy	✓				
Fraxinus americana		Broad-leaved deciduous tree	Tree canopy	✓				
Fraxinus pennsylvanica		Broad-leaved deciduous tree	Tree canopy	✓				
Juglans nigra		Broad-leaved deciduous tree	Tree canopy	✓				
Liriodendron tulipifera		Broad-leaved deciduous tree	Tree canopy		✓			
Quercus palustris		Broad-leaved deciduous tree	Tree canopy	✓				
Ulmus americana		Broad-leaved deciduous tree	Tree canopy	✓				
Acer negundo		Broad-leaved deciduous tree	Tree subcanopy		✓			
Acer rubrum		Broad-leaved deciduous tree	Tree subcanopy		✓			
Toxicodendron radicans		Liana	Shrub/sapling (tall & short)		✓			
Carpinus caroliniana		Broad-leaved deciduous shrub	Tall shrub/sapling	✓	✓			
Lindera benzoin		Broad-leaved deciduous shrub	Tall shrub/sapling	✓	✓			
Arisaema triphyllum		Flowering forb	Herb (field)		✓			
Boehmeria cylindrica		Flowering forb	Herb (field)		✓			
Circaea lutetiana ssp. canadensis		Flowering forb	Herb (field)		✓			
Geum canadense		Flowering forb	Herb (field)		✓			
Impatiens capensis		Flowering forb	Herb (field)		✓			
Phacelia covillei		Flowering forb	Herb (field)					
Polygonum virginianum		Flowering forb	Herb (field)		✓			
Symphyotrichum lateriflorum		Flowering forb	Herb (field)		✓			
Verbesina alternifolia		Flowering forb	Herb (field)		✓			

Viola sororia		Flowering forb	Herb (field)		✓			
Carex amphibola		Graminoid	Herb (field)		✓			
Carex blanda		Graminoid	Herb (field)		✓			
Carex radiata		Graminoid	Herb (field)		✓			
Microstegium vimineum		Graminoid	Herb (field)					

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Northern Piedmont Small-Stream Floodplain Forest

Liriodendron tulipifera - Acer (rubrum, negundo) - (Platanus occidentalis) / Carpinus caroliniana / Polygonum virginianum Forest

Translated Name: Tuliptree - (Red Maple, Box-elder) - (American Sycamore) / American Hornbeam / Jumpseed Forest

Common Name: Northern Piedmont Small-Stream Floodplain Forest

Unique Identifier: C EGL006492

Classification Approach: International Vegetation Classification (IVC)

Summary: This community occupies floodplains and terraces of medium-sized streams (large streams and small rivers) in the Piedmont of Maryland and Virginia. These floodplains are moderately extensive and subject to frequent overflow, but topographically fairly homogeneous. In these habitats, the alluvial landforms (e.g., levees, backswamps) are poorly developed or occur at very small scales. Hydrologic regime is temporarily flooded. Soils are generally alluvial silt loams and sands washed from various metamorphic and igneous rocks. This association is a closed forest with consistent overstory codominance by Liriodendron tulipifera in variable combinations with other trees. Acer negundo, Acer rubrum, or both are characteristic in the overstory or understory. Platanus occidentalis varies from codominant to absent. Other trees that may be important in some stands include Juglans nigra, Fraxinus pennsylvanica, Fraxinus americana, Carya cordiformis, Ulmus americana, Betula nigra, and Quercus palustris. Linder a benzoin, Carpinus caroliniana, and, less constantly, Asimina triloba and/or Viburnum prunifolium dominate the shrub layer. Vines of Toxicodendron radicans and other species may occur. Relatively diverse herb layers are composed of both mesophytic and hydrophytic species. Common herbs include Arisaema triphyllum, Geum canadense, Polygonum virginianum, Carex amphibola, Circaea lutetiana ssp. canadensis, Verbesina alternifolia, Carex radiata, Carex blanda, Impatiens capensis, Boehmeria cylindrica, Viola sororia, and Symphyotrichum lateriflorum. Although less constant, Elymus virginicus, Claytonia virginica, and Erythronium americanum form dominance patches in some stands. Because land-use effects (agriculture, grazing, utility corridors in and near the floodplain, excessively frequent flooding and sediment deposition following watershed development) frequently disturb the habitat, the herb layer is often weedy and is commonly dominated by the exotic grass Microstegium vimineum.

Vegetation

Vegetation Summary: This association is a closed forest with consistent overstory codominance by Liriodendron tulipifera in variable combinations with other trees. Acer negundo, Acer rubrum, or both are characteristic in the overstory or understory. Platanus occidentalis varies from codominant to absent. Other trees that may be important in some stands include Juglans nigra, Fraxinus pennsylvanica, Fraxinus americana, Carya cordiformis, Ulmus americana, Betula nigra, and Quercus palustris. Linder a benzoin, Carpinus caroliniana, and, less constantly, Asimina triloba and/or Viburnum prunifolium dominate the shrub layer. Vines of Toxicodendron radicans and other species may occur. Relatively diverse herb layers are composed of both mesophytic and hydrophytic species. The most constant herbs in 15 Virginia and Maryland plot samples were Arisaema triphyllum, Geum canadense, Polygonum virginianum, Carex amphibola, Circaea lutetiana ssp. canadensis, Verbesina alternifolia, Carex radiata, Carex blanda, Impatiens capensis, Boehmeria cylindrica, Viola sororia, and Symphyotrichum lateriflorum. Although less constant, Elymus virginicus, Claytonia virginica, and Erythronium americanum form dominance patches in some stands. Because land-use effects (agriculture, grazing, utility corridors in and near the

floodplain, excessively frequent flooding and sediment deposition following watershed development) frequently disturb the habitat, the herb layer is often weedy and is commonly dominated by the exotic grass Microstegium vimineum.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Betula nigra		Broad-leaved deciduous tree	Tree canopy	✓				
Carya cordiformis		Broad-leaved deciduous tree	Tree canopy	✓				
Fraxinus americana		Broad-leaved deciduous tree	Tree canopy	✓				
Fraxinus pennsylvanica		Broad-leaved deciduous tree	Tree canopy	✓				
Juglans nigra		Broad-leaved deciduous tree	Tree canopy	✓				
Liriodendron tulipifera		Broad-leaved deciduous tree	Tree canopy		✓			
Quercus palustris		Broad-leaved deciduous tree	Tree canopy	✓				
Ulmus americana		Broad-leaved deciduous tree	Tree canopy	✓				
Acer negundo		Broad-leaved deciduous tree	Tree subcanopy		✓			
Acer rubrum		Broad-leaved deciduous tree	Tree subcanopy		✓			
Toxicodendron radicans		Liana	Shrub/sapling (tall & short)		✓			
Carpinus caroliniana		Broad-leaved deciduous shrub	Tall shrub/sapling	✓	✓			
Lindera benzoin		Broad-leaved deciduous shrub	Tall shrub/sapling	✓	✓			
Arisaema triphyllum		Flowering forb	Herb (field)		✓			
Boehmeria cylindrica		Flowering forb	Herb (field)		✓			
Circaea lutetiana ssp. canadensis		Flowering forb	Herb (field)		✓			
Geum canadense		Flowering forb	Herb (field)		✓			
Impatiens capensis		Flowering forb	Herb (field)		✓			
Phacelia covillei		Flowering forb	Herb (field)					
Polygonum virginianum		Flowering forb	Herb (field)		✓			

Symphyotrichum lateriflorum		Flowering forb	Herb (field)		✓			
Verbesina alternifolia		Flowering forb	Herb (field)		✓			
Viola sororia		Flowering forb	Herb (field)		✓			
Carex amphibola		Graminoid	Herb (field)		✓			
Carex blanda		Graminoid	Herb (field)		✓			
Carex radiata		Graminoid	Herb (field)		✓			
Microstegium vimineum		Graminoid	Herb (field)					

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Northern Piedmont Red Maple Seepage Swamp

Acer rubrum - Fraxinus (pennsylvanica, americana) / Lindera benzoin / Symplocarpus foetidus Forest

Translated Name: Red Maple - (Green Ash, White Ash) / Northern Spicebush / Skunk-cabbage Forest

Common Name: Southern New England / Northern Piedmont Red Maple Seepage Swamp

Unique Identifier: CEGLO06406

Classification Approach: International Vegetation Classification (IVC)

Summary: This association is a seepage swamp dominated by Acer rubrum and ranging from southern New England south to the Piedmont of Virginia. It generally occurs in saturated situations on slightly sloping hillsides, along small streams, or in basins that receive overland flooding in addition to groundwater influence. In general, these swamps are moderately acidic to moderately basic and have some seepage indicators but are not particularly species-rich. Soils are shallow to moderately deep mucks over mineral soils. Acer rubrum dominates the canopy; Fraxinus pennsylvanica or Fraxinus americana are usually also found in the canopy and can be codominant. Fraxinus nigra is not generally associated with this type at the northern portion of the range, and, if present, occurs only as scattered individuals, but this species does occur in this type in Pennsylvania. Other canopy or subcanopy associates may include Liriodendron tulipifera, Quercus bicolor, Quercus palustris, Prunus serotina, Fagus grandifolia, Betula lenta, Ulmus americana, and Ulmus rubra. Conifers such as Tsuga canadensis or Pinus strobus are generally absent or occur in very low abundance. The shrub layer may be fairly open to quite dense, depending on the amount of canopy closure. Shrub species commonly include Ilex verticillata, Rhododendron viscosum, Clethra alnifolia, Lindera benzoin, Cornus amomum, Alnus serrulata, and less commonly Vaccinium corymbosum, Lyonia ligustrina, Ilex montana, Toxicodendron vernix, Viburnum dentatum, and Viburnum nudum var. cassinoides (= Viburnum cassinoides). The herbaceous layer is variable in cover; Symplocarpus foetidus and Osmunda cinnamomea are nearly always present. In some areas, tall ferns (Osmunda cinnamomea, Onoclea sensibilis, Osmunda regalis, Thelypteris palustris, Thelypteris noveboracensis) form an herbaceous canopy within which other species are scattered. Microtopography is generally pronounced, resulting from tip-ups. Tree seedlings and Sphagnum mosses are common on hummocks but do not in general form extensive carpets. Additional nonvascular species can include Plagiomnium cuspidatum (= Mnium cuspidatum) and Calliargon spp. Invasive shrubs and herbs, including Berberis thunbergii, Rosa multiflora, Lonicera morrowii, Alliaria petiolata, and Microstegium vimineum, may be abundant.

Vegetation

Vegetation Summary: Acer rubrum dominates the canopy; Fraxinus pennsylvanica or Fraxinus americana are usually also found in the canopy and either can be codominant in the canopy. Fraxinus nigra is not generally associated with this type and, if present, occurs only as scattered individuals. Other canopy or subcanopy associates may include Liriodendron tulipifera, Quercus bicolor, Quercus palustris, Prunus serotina, Fagus grandifolia, Betula lenta, Ulmus americana, and Ulmus rubra. Conifers such as Tsuga canadensis or Pinus strobus are generally absent or occur in very low abundance.

The shrub layer may be fairly open to quite dense, depending on the amount of canopy closure. Shrub species commonly include Ilex verticillata, Rhododendron viscosum, Clethra alnifolia, Lindera benzoin, Cornus amomum, Alnus serrulata, Carpinus caroliniana, and less commonly Vaccinium corymbosum, Lyonia ligustrina, Ilex montana, Toxicodendron vernix, Viburnum dentatum, and Viburnum nudum var. cassinoides (= Viburnum cassinoides). The herbaceous layer is variable in cover; Symplocarpus foetidus and Osmunda cinnamomea are nearly always present. In some areas, tall ferns (Osmunda cinnamomea, Onoclea sensibilis, Osmunda regalis, Thelypteris palustris, Thelypteris noveboracensis) form an herbaceous canopy within which other species are scattered. These other herbaceous species include Impatiens capensis, Galium aparine, Geum canadense, Arisaema triphyllum, Carex stricta, Carex gracillima, Carex intumescens, Carex radiata, Carex laevivaginata, Veratrum viride, Boehmeria cylindrica, Chelone glabra, Cardamine pensylvanica, Pilea pumila, and Glyceria spp. At the southern end of the range in Maryland and Virginia, Symplocarpus foetidus is usually greatly dominant (>50% cover) early in the growing season, with Saururus cernuus frequently assuming patch-dominance during the summer. Tree seedlings and Sphagnum mosses are common on hummocks but do not in general form extensive carpets. Additional

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Acer rubrum		Broad-leaved deciduous tree	Tree (canopy & subcanopy)	✓	✓			
Fraxinus americana		Broad-leaved deciduous tree	Tree (canopy & subcanopy)	✓	✓			
Fraxinus pennsylvanica		Broad-leaved deciduous tree	Tree (canopy & subcanopy)	✓				
Clethra alnifolia		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Ilex verticillata		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)		✓			
Lindera benzoin		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Rhododendron viscosum		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Symplocarpus foetidus		Flowering forb	Herb (field)	✓	✓			
Osmunda cinnamomea		Fern (Spore-bearing forb)	Herb (field)	✓	✓			

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Water-Lily – Pond-Lily Aquatic Wetland / Pond

Nuphar advena - Nymphaea odorata Herbaceous Vegetation

Translated Name: Broadleaf Pond-lily - American White Water-lily Herbaceous Vegetation
Common Name: Water-lily Aquatic Wetland
Unique Identifier: CEGLO02386

Classification Approach: International Vegetation Classification (IVC)
Summary: This rooted aquatic or open marsh community occupies shallow-water depressions, oxbow ponds, backwater sloughs of river floodplains, slow-moving streams, ponds, and small lakes throughout the central and eastern United States. It is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. Nuphar advena (= Nuphar lutea ssp. advena) and Nymphaea odorata are dominants, either in combination together, or each singly. Other species present include Brasenia schreberi, various Potamogeton and Stuckenia spp., Eleocharis robbinsii and other Eleocharis spp., Polygonum amphibium, Polygonum amphibium var. emersum (= Polygonum coccineum), Sparganium americanum, Lemna spp., Spirodela polyrrhiza, Typha latifolia, and Saururus cernuus. Submerged aquatics more common in the southern part of the range include Cabomba caroliniana, Ceratophyllum demersum, and Heteranthera dubia.

Vegetation

Vegetation Summary: This community is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. Nuphar advena (= Nuphar lutea ssp. advena) and Nymphaea odorata are dominants, either in combination together, or each singly. Other species present include Brasenia schreberi, various Potamogeton and Stuckenia spp., Eleocharis robbinsii and other Eleocharis spp., Polygonum amphibium, Polygonum amphibium var. emersum (= Polygonum coccineum), Sparganium americanum, Lemna spp., Spirodela polyrrhiza, Typha latifolia, and Saururus cernuus (Anderson 1982, G. Fleming pers. comm.). Submerged aquatic species more common in the southern part of the range include Cabomba caroliniana, Ceratophyllum demersum, and Heteranthera dubia. This broadly conceived

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Nuphar lutea ssp. advena		Aquatic herb	Floating aquatic	✓	✓			
Nymphaea odorata		Aquatic herb	Floating aquatic	✓	✓			

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest

Quercus alba - Quercus rubra - Carya alba / Cornus florida / Vaccinium stamineum / Desmodium nudiflorum Piedmont Forest

Translated Name: White Oak - Northern Red Oak - Mockernut Hickory / Flowering Dogwood / Deerberry / Naked-flower Tick-trefoil Piedmont Forest
Common Name: Piedmont Dry-Mesic Acidic Oak-Hickory Forest
Unique Identifier: CEGLO08475

Classification Approach: International Vegetation Classification (IVC)
Summary: This forest is found on submesic to subxeric upland sites throughout the Piedmont of Georgia, the Carolinas, Virginia, and south-central Maryland. It favors mid- to upper-slope positions with northerly or easterly aspects, or mid- to lower slopes with more southerly aspects. In drier landscapes, this type occupies habitats considered relatively mesic (e.g., concave slopes, lower slopes, shallow ravines). These sites are described as dry to intermediate in soil moisture. The soils are moderately to strongly acidic and nutrient-poor, being weathered primarily from felsic metamorphic, metasedimentary, and sedimentary rocks, or composed of unconsolidated sediments. At some sites, soils are weathered from interbedded metasedimentary and mafic rocks, resulting in soil chemistry that is intermediate or slightly basic. Stands of this forest are closed to somewhat open and are dominated by mixtures of oaks and hickories, with Quercus alba being most prevalent, along with Quercus rubra, Quercus coccinea, Quercus velutina, Quercus falcata, Carya alba, Carya ovalis, and Carya glabra. Carya spp. are common in this type but often most abundant in the understory. In forests with a history of disturbance, such as selective logging or windstorms, early-successional species such as Liriodendron tulipifera or Pinus sp. may codominate. In Virginia examples, Quercus prinus is inconstant but sometimes important. In addition, Pinus spp., Liriodendron tulipifera, Liquidambar styraciflua, and Acer rubrum may be common. Understory species include Acer rubrum, Cornus florida, Oxydendrum arboreum, Ilex opaca, and Nyssa sylvatica. Shrubs include Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Viburnum rafinesquianum, and Euonymus americanus. The woody vines Vitis rotundifolia and Toxicodendron radicans often are present. Herbs vary from sparse to moderately dense, with dry-mesophytic, acid-tolerant species such as Hexastylis spp., Goodyera pubescens, Chimaphila maculata, Desmodium nudiflorum, Maianthemum racemosum, Polygonatum biflorum, Viola hastata, Tipularia discolor, and Hieracium venosum prevalent. This association occupies less nutrient-rich habitats than Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum Forest (CEGL007237).

Vegetation

Vegetation Summary: Stands of this forest are closed to somewhat open, and are dominated by mixtures of oaks and hickories, with Quercus alba being most prevalent, along with Quercus rubra, Quercus coccinea, Quercus velutina, Carya alba, Carya ovalis, and Carya glabra. Carya spp. are common in this type but often most abundant in the understory. In Virginia examples, Quercus prinus and Quercus falcata are inconstant but sometimes important. In addition, Pinus spp., Liriodendron tulipifera, Liquidambar styraciflua, and Acer rubrum may be common, especially in disturbed stands. Understory species include Acer rubrum, Cornus florida, Oxydendrum arboreum, Ilex opaca, and Nyssa sylvatica. Shrubs include Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Viburnum rafinesquianum, and Euonymus americanus. In Virginia, Vaccinium pallidum and Vaccinium stamineum are the principal ericads of patchy low-shrub layers (G. Fleming pers. comm. 2004). The woody vines Vitis rotundifolia and Toxicodendron radicans often are present. Herbs vary from sparse to moderately dense, with dry-mesophytic species such as Hexastylis spp., Goodyera pubescens, Chimaphila maculata, Desmodium nudiflorum, Maianthemum racemosum, Polygonatum biflorum, Viola hastata, Tipularia discolor, Carex albicans, and Hieracium venosum prevalent (Schafale and Weakley 1990). Although not lush, these forests can be impressively species-rich, with high woody diversity and many low-cover herbaceous species occurring. Species richness of 116 Virginia plots averages 53 taxa per 400 square meters, varying from a low of 17 to a high of 114. Low species richness in this type is most often the result of long-term overgrazing by large deer populations. At least some of the stands with high species richness are located on sites where deer populations are effectively controlled.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Acer rubrum		Broad-leaved deciduous tree	Tree (canopy & subcanopy)	✓				
Carya alba		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Carya glabra		Broad-leaved deciduous tree	Tree canopy	✓	✓			

Carya ovalis		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Liquidambar styraciflua		Broad-leaved deciduous tree	Tree canopy	✓				
Liriodendron tulipifera		Broad-leaved deciduous tree	Tree canopy	✓				
Quercus alba		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Quercus coccinea		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Quercus rubra		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Quercus velutina		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Cornus florida		Broad-leaved deciduous tree	Tree subcanopy	✓	✓			
Nyssa sylvatica		Broad-leaved deciduous tree	Tree subcanopy	✓	✓			
Oxydendrum arboreum		Broad-leaved deciduous tree	Tree subcanopy	✓	✓			
Ilex opaca		Broad-leaved evergreen tree	Tree subcanopy	✓	✓			
Viburnum acerifolium		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Viburnum rafinesquianum		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Toxicodendron radicans		Liana	Shrub/sapling (tall & short)	✓				
Vitis rotundifolia		Liana	Shrub/sapling (tall & short)	✓				
Chimaphila maculata		Dwarf-shrub	Short shrub/sapling	✓				
Euonymus americanus		Dwarf-shrub	Short shrub/sapling	✓				
Vaccinium pallidum		Broad-leaved deciduous shrub	Short shrub/sapling	✓				
Vaccinium stamineum		Broad-leaved deciduous shrub	Short shrub/sapling	✓				
Desmodium nudiflorum		Flowering forb	Herb (field)	✓				
Goodyera pubescens		Flowering forb	Herb (field)	✓				
Hieracium venosum		Flowering forb	Herb (field)	✓				

Maianthemum racemosum		Flowering forb	Herb (field)	✓				
Polygonatum biflorum		Flowering forb	Herb (field)	✓				
Tipularia discolor		Flowering forb	Herb (field)	✓				
Viola hastata		Flowering forb	Herb (field)	✓				

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Beech-White Oak / Mayapple Association (Tulip Tree and Mixed Oak Variant)

Fagus grandifolia - Quercus (alba, rubra) - Liriodendron tulipifera / (Ilex opaca var. opaca) / Polystichum acrostichoides Forest

Translated Name: American Beech - (White Oak, Northern Red Oak) - Tuliptree / (American Holly) / Christmas Fern Forest

Common Name: Mid-Atlantic Mesic Mixed Hardwood Forest

Unique Identifier: C EGL006075

Classification Approach: International Vegetation Classification (IVC)

Summary: This forest of mesic to submesic, well-drained soils occurs in the Piedmont and Coastal Plain of Virginia and Maryland, extending north to southern New England on the Coastal Plain. It also occurs occasionally at low elevations of the Blue Ridge and adjacent Ridge and Valley in Virginia and Maryland. It is characteristically a mixed forest dominated by Fagus grandifolia, Quercus alba, Quercus rubra, and Liriodendron tulipifera in various proportions. Overstory associates over the range include Quercus velutina, Quercus falcata, Quercus coccinea, Liquidambar styraciflua, Acer rubrum, Nyssa sylvatica, Carya alba, Carya glabra, and Fraxinus americana. The subcanopy is characterized by young Fagus grandifolia, Acer rubrum, Carpinus caroliniana, Cornus florida, and Sassafras albidum. Ilex opaca is particularly characteristic and abundant on the Coastal Plain. The shrub layer varies from very sparse to well-developed and can include Asimina triloba, Viburnum acerifolium, Viburnum dentatum, and Euonymus americanus. Heath shrubs, such as Vaccinium corymbosum and Vaccinium pallidum, may be common but not abundant. Vines are common, including Parthenocissus quinquefolia, Smilax glauca, and Toxicodendron radicans. In the southern part of the range, Oxydendrum arboreum and Vitis rotundifolia may be conspicuous members of the understory. The herb layer is composed of Polystichum acrostichoides, Thelypteris noveboracensis, Uvularia perfoliata, Cypripedium acaule, Mitchella repens, Tipularia discolor, Goodyera pubescens, Eurybia divaricata (= Aster divaricatus), Chimaphila maculata, Carex swanii, Medeola virginiana, Athyrium filix-femina, Carex digitalis, Carex willdenowii, Epifagus virginiana, Maianthemum canadense, Desmodium nudiflorum, Polygonatum biflorum, Podophyllum peltatum, Arisaema triphyllum, and Maianthemum racemosum (= Smilacina racemosa).

Vegetation

Vegetation Summary: Rangewide, this vegetation type is characteristically a mixed mesophytic forest dominated by Fagus grandifolia, Quercus alba, Quercus rubra, and Liriodendron tulipifera in various proportions. Overstory associates over the range include Carya alba, Carya glabra, Quercus velutina, Quercus falcata, Quercus coccinea, Liquidambar styraciflua, Acer rubrum, Nyssa sylvatica, and Fraxinus americana. The subcanopy is characterized by young Fagus grandifolia, Acer rubrum, Carpinus caroliniana, Cornus florida, Ilex opaca, and Sassafras albidum. The shrub layer varies from very sparse to well-developed and can include Asimina triloba, Viburnum acerifolium, Viburnum dentatum, and Euonymus americanus. Heath shrubs, such as Vaccinium corymbosum and Vaccinium pallidum, may be common but not abundant. Vines are common, including Parthenocissus quinquefolia, Smilax glauca, and Toxicodendron radicans. The herb layer is composed of Polystichum acrostichoides, Uvularia perfoliata, Cypripedium acaule, Mitchella repens, Tipularia discolor, Goodyera pubescens, Eurybia divaricata (= Aster divaricatus), Chimaphila maculata, Carex swanii, Medeola

virginiana, Athyrium filix-femina, Carex digitalis, Carex willdenowii, Epifagus virginiana, Maianthemum canadense, Desmodium nudiflorum, Polygonatum biflorum. Podophyllum peltatum, Arisaema triphyllum, and Maianthemum racemosum (= Smilacina racemosa).

Several intergrading compositional variants have been noted in regional and local landscape analyses. On more submesic, convex slopes, Fagus grandifolia, Quercus alba, Cornus florida, and Vaccinium pallidum tend to be prominent, while pronounced mesophytes such as Carpinus caroliniana and herbaceous species in general are usually sparse. Coastal Plain stands tend to have understories heavily dominated by Ilex opaca, while Piedmont stands generally have only scattered Ilex opaca as well as slightly higher herbaceous richness.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Fagus grandifolia		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Liriodendron tulipifera		Broad-leaved deciduous tree	Tree canopy		✓			
Quercus alba		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Cornus florida		Broad-leaved deciduous tree	Tree subcanopy		✓			
Ilex opaca		Broad-leaved evergreen tree	Tree subcanopy	✓	✓			
Viburnum acerifolium		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓	✓			
Parthenocissus quinquefolia		Liana	Shrub/sapling (tall & short)		✓			
Isotria medeoloides		Flowering forb	Herb (field)					
Panax quinquefolius		Flowering forb	Herb (field)					
Podophyllum peltatum		Flowering forb	Herb (field)		✓			
Polygonatum biflorum		Flowering forb	Herb (field)		✓			
Polystichum acrostichoides		Fern (Spore-bearing forb)	Herb (field)		✓			
Carex laxiculmis var. laxiculmis		Graminoid	Herb (field)	✓				

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Piedmont Acidic Oak-Hickory Forest

Quercus alba - Quercus rubra - Carya alba / Cornus florida / Vaccinium stamineum / Desmodium nudiflorum Piedmont Forest

Translated Name: White Oak - Northern Red Oak - Mockernut Hickory / Flowering Dogwood / Deerberry / Naked-flower Tick-trefoil Piedmont Forest

Common Name: Piedmont Dry-Mesic Acidic Oak-Hickory Forest

Unique Identifier: C EGL008475

Classification Approach: International Vegetation Classification (IVC)

Summary: This forest is found on submesic to subxeric upland sites throughout the Piedmont of Georgia, the Carolinas, Virginia, and south-central Maryland. It favors mid- to upper-slope positions with northerly or easterly aspects, or mid- to lower slopes with more southerly aspects. In drier landscapes, this type occupies habitats considered relatively mesic (e.g., concave slopes, lower slopes, shallow ravines). These sites are described as dry to intermediate in soil moisture. The soils are moderately to strongly acidic and nutrient-poor, being weathered primarily from felsic metamorphic, metasedimentary, and sedimentary rocks, or composed of unconsolidated sediments. At some sites, soils are weathered from interbedded metasedimentary and mafic rocks, resulting in soil chemistry that is intermediate or slightly basic. Stands of this forest are closed to somewhat open and are dominated by mixtures of oaks and hickories, with Quercus alba being most prevalent, along with Quercus rubra, Quercus coccinea, Quercus velutina, Quercus falcata, Carya alba, Carya ovalis, and Carya glabra. Carya spp. are common in this type but often most abundant in the understory. In forests with a history of disturbance, such as selective logging or windstorms, early-successional species such as Liriodendron tulipifera or Pinus sp. may codominate. In Virginia examples, Quercus prinus is inconstant but sometimes important. In addition, Pinus spp., Liriodendron tulipifera, Liquidambar styraciflua, and Acer rubrum may be common. Understory species include Acer rubrum, Cornus florida, Oxydendrum arboreum, Ilex opaca, and Nyssa sylvatica. Shrubs include Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Viburnum rafinesquianum, and Euonymus americanus. The woody vines Vitis rotundifolia and Toxicodendron radicans often are present. Herbs vary from sparse to moderately dense, with dry-mesophytic, acid-tolerant species such as Hexastylis spp., Goodyera pubescens, Chimaphila maculata, Desmodium nudiflorum, Maianthemum racemosum, Polygonatum biflorum, Viola hastata, Tipularia discolor, and Hieracium venosum prevalent. This association occupies less nutrient-rich habitats than Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum Forest (C EGL007237).

Vegetation

Vegetation Summary: Stands of this forest are closed to somewhat open, and are dominated by mixtures of oaks and hickories, with Quercus alba being most prevalent, along with Quercus rubra, Quercus coccinea, Quercus velutina, Carya alba, Carya ovalis, and Carya glabra. Carya spp. are common in this type but often most abundant in the understory. In Virginia examples, Quercus prinus and Quercus falcata are inconstant but sometimes important. In addition, Pinus spp., Liriodendron tulipifera, Liquidambar styraciflua, and Acer rubrum may be common, especially in disturbed stands. Understory species include Acer rubrum, Cornus florida, Oxydendrum arboreum, Ilex opaca, and Nyssa sylvatica. Shrubs include Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Viburnum rafinesquianum, and Euonymus americanus. In Virginia, Vaccinium pallidum and Vaccinium stamineum are the principal ericads of patchy low-shrub layers (G. Fleming pers. comm. 2004). The woody vines Vitis rotundifolia and Toxicodendron radicans often are present. Herbs vary from sparse to moderately dense, with dry-mesophytic species such as Hexastylis spp., Goodyera pubescens, Chimaphila maculata, Desmodium nudiflorum, Maianthemum racemosum, Polygonatum biflorum, Viola hastata, Tipularia discolor, Carex albicans, and Hieracium venosum prevalent (Schafale and Weakley 1990). Although not lush, these forests can be impressively species-rich, with high woody diversity and many low-cover herbaceous species occurring. Species richness of 116 Virginia plots averages 53 taxa per 400 square meters, varying from a low of 17 to a high of 114. Low species richness in this type is most often the result of long-term overgrazing by large deer populations. At least some of the stands with high species richness are located on sites where deer populations are effectively controlled.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Acer rubrum		Broad-leaved deciduous tree	Tree (canopy & subcanopy)	✓				
Carya alba		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Carya glabra		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Carya ovalis		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Liquidambar styraciflua		Broad-leaved deciduous tree	Tree canopy	✓				
Liriodendron tulipifera		Broad-leaved deciduous tree	Tree canopy	✓				
Quercus alba		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Quercus coccinea		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Quercus rubra		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Quercus velutina		Broad-leaved deciduous tree	Tree canopy	✓	✓			
Cornus florida		Broad-leaved deciduous tree	Tree subcanopy	✓	✓			
Nyssa sylvatica		Broad-leaved deciduous tree	Tree subcanopy	✓	✓			
Oxydendrum arboreum		Broad-leaved deciduous tree	Tree subcanopy	✓	✓			
Ilex opaca		Broad-leaved evergreen tree	Tree subcanopy	✓	✓			
Viburnum acerifolium		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Viburnum rafinesquianum		Broad-leaved deciduous shrub	Shrub/sapling (tall & short)	✓				
Toxicodendron radicans		Liana	Shrub/sapling (tall & short)	✓				
Vitis rotundifolia		Liana	Shrub/sapling (tall & short)	✓				
Chimaphila maculata		Dwarf-shrub	Short shrub/sapling	✓				
Euonymus americanus		Dwarf-shrub	Short shrub/sapling	✓				

Vaccinium pallidum		Broad-leaved deciduous shrub	Short shrub/sapling	✓				
Vaccinium stamineum		Broad-leaved deciduous shrub	Short shrub/sapling	✓				
Desmodium nudiflorum		Flowering forb	Herb (field)	✓				
Goodyera pubescens		Flowering forb	Herb (field)	✓				
Hieracium venosum		Flowering forb	Herb (field)	✓				
Maianthemum racemosum		Flowering forb	Herb (field)	✓				
Polygonatum biflorum		Flowering forb	Herb (field)	✓				
Tipularia discolor		Flowering forb	Herb (field)	✓				
Viola hastata		Flowering forb	Herb (field)	✓				

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Piedmont Acidic Oak-Hickory Forest

Quercus alba - Quercus velutina - Quercus stellata / Schizachyrium scoparium - Desmodium spp. Woodland

Translated Name: White Oak - Black Oak - Post Oak / Little Bluestem - Tick-trefoil species Woodland

Common Name: Piedmont Granitic White Oak - Black Oak Savanna

Unique Identifier: CEGLO03722

Classification Approach: International Vegetation Classification (IVC)

Summary: This is a fire-maintained woodland of the Piedmont of Virginia and South Carolina, occurring on soils derived from granitic rock. It may also persist in a slightly altered state due to particularly rigorous mowing regimes. Although the fire or mowing frequency is abnormally high at known sites (on Fort Pickett), this community may be quite similar to some presettlement Piedmont communities. Canopy dominants include Quercus alba, Quercus velutina, Quercus stellata, Quercus falcata, Quercus coccinea, Carya alba, Carya glabra, and Liriodendron tulipifera. The subcanopy may include Cornus florida and Liquidambar styraciflua, but can also be fairly open. Shrubs and woody vines include Rhus copallinum, Rhus michauxii, Rhus glabra, Diospyros virginiana, Ulmus alata, Sassafras albidum, Vaccinium pallidum, Vaccinium stamineum, Hypericum hypericoides ssp. multicaule (= Hypericum stragulum), Toxicodendron pubescens, Vitis rotundifolia. The herb layer is dominated by Schizachyrium scoparium or sometimes Danthonia sericea, and also includes Desmodium laevigatum, Desmodium marilandicum, Desmodium nuttallii, Desmodium paniculatum, Desmodium perplexum, Desmodium ciliare, Eupatorium hyssopifolium, Eupatorium godfreyanum, Clitoria mariana, Eupatorium rotundifolium var. ovatum (= Eupatorium pubescens), Eupatorium sessilifolium, Eupatorium altissimum (= Eupatorium saltuense), Galactia regularis, Lespedeza procumbens, Dichanthelium dichotomum, Dichanthelium depauperatum, Solidago pinetorum, Solidago rugosa, Solidago nemoralis, Solidago erecta, Helianthus atrorubens, Coreopsis major, Liatris pilosa (= Liatris graminifolia), Andropogon ternarius, Tephrosia virginiana, Clitoria mariana, and Sorghastrum elliotii. At Cowpens in South Carolina, historical accounts from the Revolutionary War (1781) all describe open fields in the area where this community now sits. Historic descriptions of upstate South Carolina uplands from as late as 1775 suggest woodlands and open areas covered with "grasses and the wild pea-vine, growing as high as a horse's back" were common. These historical accounts suggest that the remnants in South Carolina and Virginia may indeed approximate the vegetation of the upland areas of the Piedmont of 250 years ago.

Vegetation

Vegetation Summary: Canopy dominants include Quercus alba, Quercus velutina, Quercus stellata, Quercus falcata, Quercus coccinea, Carya alba, Carya glabra, and Liriodendron tulipifera. The subcanopy may include Cornus florida and Liquidambar styraciflua, but can also be fairly open. Shrubs and woody vines include Rhus copallinum, Rhus michauxii, Rhus glabra, Diospyros virginiana, Ulmus alata, Sassafras albidum, Vaccinium pallidum, Vaccinium stamineum, Hypericum hypericoides ssp. multicaule (= Hypericum stragulum), Toxicodendron pubescens, and Vitis rotundifolia. The herb layer is dominated by Schizachyrium scoparium or sometimes Danthonia sericea, and also includes Desmodium laevigatum, Desmodium marilandicum, Desmodium nuttallii, Desmodium paniculatum, Desmodium perplexum, Desmodium ciliare, Eupatorium hyssopifolium, Eupatorium godfreyanum, Clitoria mariana, Eupatorium rotundifolium var. ovatum (= Eupatorium pubescens), Eupatorium sessilifolium, Eupatorium altissimum (= Eupatorium saltuense), Galactia regularis, Lespedeza procumbens, Dichanthelium dichotomum, Dichanthelium depauperatum, Solidago pinetorum, Solidago rugosa, Solidago nemoralis, Solidago erecta, Helianthus atrorubens, Coreopsis major, Liatris pilosa (= Liatris graminifolia), Andropogon ternarius, Tephrosia virginiana, Clitoria mariana, and Sorghastrum elliottii.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Quercus alba		Broad-leaved deciduous tree	Tree canopy		✓			
Rhus michauxii		Broad-leaved deciduous shrub	Short shrub/sapling					
Schizachyrium scoparium		Graminoid	Herb (field)		✓			

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

Meadow

Schizachyrium scoparium - Sporobolus heterolepis Serpentine Herbaceous Vegetation

Translated Name: Little Bluestem - Prairie Dropseed Serpentine Herbaceous Vegetation

Common Name: Serpentine Little Bluestem - Prairie Dropseed Grassland

Unique Identifier: CEGLO06442

Classification Approach: International Vegetation Classification (IVC)

Summary: This serpentine grassland community of Pennsylvania and Maryland is associated with soils derived from weathered serpentine bedrock. It typically occurs on mid to upper slopes on very shallow (0-10 cm deep) stony or gravelly sand or silt loam soils. Exposed bedrock and bare ground are common at some locations. Soils are typically very dry, reflecting well-drained to excessively well-drained soil conditions and shallow depth to bedrock. Slope aspect is variable but is rarely due east. The slope angle ranges from 1-16° and is most often between 3-6°. The dominant species in this community are the grasses Schizachyrium scoparium and Sporobolus heterolepis. Other characteristic herbaceous species may include Symphyotrichum depauperatum (= Aster depauperatus), Scleria pauciflora, Cerastium arvense var. villosum, Solidago nemoralis, Packera anonyma (= Senecio anonymus), Dichanthelium sphaerocarpon (= Panicum sphaerocarpon), and Arabis lyrata. Woody plants are rare and usually include Juniperus virginiana or pine seedlings and saplings of Pinus rigida and/or Pinus virginiana. A subtype of this community occurs on gravel barrens in Pennsylvania

and Maryland. These barrens have the same species composition; however, they typically have less than 60% vegetation cover and exposed serpentine bedrock and gravel as the dominant cover type. Gravel barrens occur at midslope positions with a steep slope (>6° and as much as 16°).

Vegetation

Vegetation Summary: The dominant species in this community are the grasses Schizachyrium scoparium and Sporobolus heterolepis. Other characteristic herbaceous species may include Symphyotrichum depauperatum (= Aster depauperatus), Scleria pauciflora, Cerastium arvense var. villosum, Solidago nemoralis, Packera anonyma (= Senecio anonymus), Dichanthelium sphaerocarpon (= Panicum sphaerocarpon), and Arabis lyrata. Woody plants are rare and usually include Juniperus virginiana or pine seedlings and saplings of Pinus rigida and/or Pinus virginiana.

Vegetation Composition (incomplete)								
Species Name	Rounded Global Status	Growth Form	Stratum	Charact-eristic	Dominant	Constant	Cover Class %	Con-stancy %
Symphyotrichum depauperatum		Flowering forb	Herb (field)	✓				
Talinum teretifolium		Flowering forb	Herb (field)					
Schizachyrium scoparium		Graminoid	Herb (field)	✓	✓			
Sporobolus heterolepis		Graminoid	Herb (field)	✓	✓			

Excerpt from Nature Serve Explorer. See attached compact disc for full digitized document.

