Appendix :

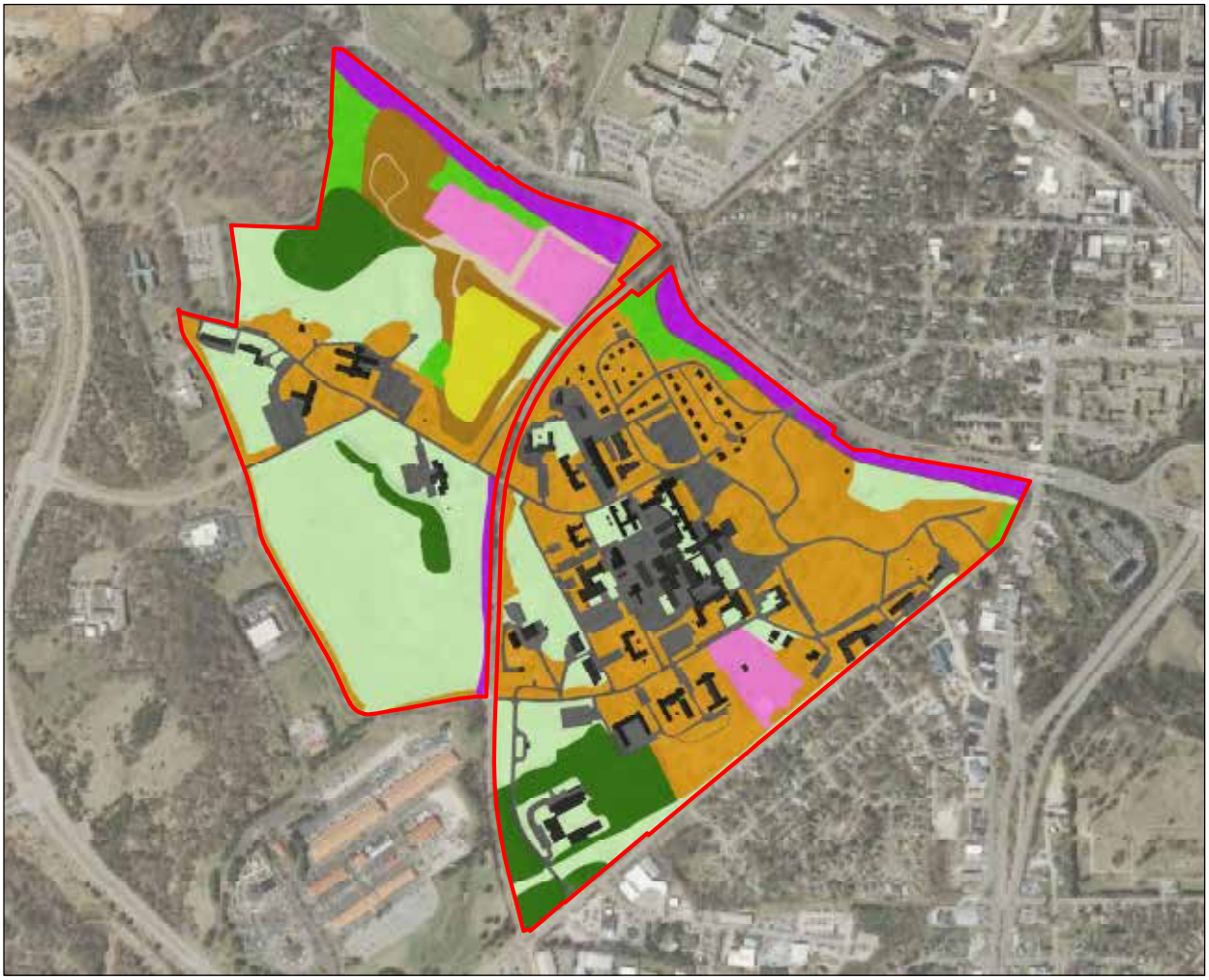
Ecology

Source:

Applied Ecological Services, Inc. (AES)

Michael Van Valkenburgh Associates, Inc.

V. Ecology; Applied Ecological Services, Inc. (AES)



Dorothea Dix Park
Master Plan

Figure 1

Existing Land Cover

- Dix Park Boundary (306.83 ac)
- Altered Forest/Woodland (9.90 ac)
- Pine Plantation (22.11 ac)
- Old Field with Trees (11.91 ac)
- Old Field (6.70 ac)
- Riparian Forest (15.20 ac)
- Oak Savanna with Turf (83.06 ac)
- Lawn (83.97 ac)
- Recreational Field (13.35 ac)
- Gravel Drive/Parking (2.97 ac)
- Pavement (41.95 ac)
- Building (15.71 ac)

Data Sources:
- City of Raleigh
- Aerial photograph (2015)

AES Project Number: 16-0982
File Name: Dix Park_AES elc_2018-02-01_v02

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M E M O R A N D U M

TO: Adrienne Heflich (MVVA)

FROM: Doug Mensing, Steve Apfelbaum (AES)

DATE: February 2, 2018

RE: Dix Park MP (AES 16-0982) – Summary of Existing Land Cover Types

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INTRODUCTION

In 2016, Applied Ecological Services (AES) was retained by Michael Van Valkenburgh Assoc., Inc. (MVVA) to provide ecological support for the Dorothea Dix Park Master Plan project in Raleigh, NC. On November 16 and 17, 2017, AES ecologists Steven Apfelbaum and Douglas Mensing conducted a field assessment of the Dix Park site, including site tours with other design team members. On December 5, 2017, AES submitted a memorandum to MVVA summarizing some of our initial observations from the initial Discovery phase of the project. This memorandum provides additional information and detail regarding our site assessment, focusing on existing land cover types and their condition.

REGIONAL CONTEXT

Formation of the Blue Ridge Mountains (beginning about 1,700 million year ago) set the stage for the formation of the Appalachian Mountains and the subsequent erosional processes that created the landforms of North Carolina today. Dix Park is located in the transition zone between the Piedmont and the Coastal Plain, known as the Fall Line. This zone, which runs roughly parallel to the Atlantic Ocean coast, is characterized by moderate slopes and waterfalls that lead down into the Coastal Plain. The hilly terrain of the region has resulted in erosion of swales and ravines. Dix Park drainage generally flows southeast via Rocky Branch and south via smaller drainageways. The site's location on the edge of the Piedmont region creates an opportunity to restore a wide range of native plant communities and habitats.

EXISTING CONDITIONS

Land Cover

AES reviewed existing geographic information system (GIS) data developed by others, including

- Dorothea Dix Park boundary
- Land ownership and parcel data

- Elevation contours and steep slopes
- USDA/NRCS National Land Cover Dataset (NLCD)
- USDA/NRCS soils survey (including hydric soils)
- FEMA floodplain mapping
- Greenways, open space, trails, and natural areas mapping
- Rare natural features data (including rare plants, animals, and plant communities)
- Water features (including streams and impaired waters)
- Urban forestry priority areas
- Historical (1938) through current (2017) aerial imagery

Existing data were used in conjunction with our November 2017 field observations to create a land cover map of existing site conditions (Figure 1). Most but not all portions of the site were verified in the field; therefore, interpretation of aerial photography and other data was used to extrapolate land cover mapping for the entire site. Table 1 presents a hierarchical land cover classification. Acreages and percentages of each numbered (and mapped) land cover type are presented in the table, followed by descriptions of each numbered land cover type.

Table 1. Existing Land Cover of Dorothea Dix Park

NATURAL LAND COVERS	DEFINING CHARACTERISTICS	ACRES	PERCENT OF STUDY AREA
Upland Plant Communities	**High, dry ground**		
Forest/Woodland	50-100% tree canopy		
1. Altered Forest/Woodland	Combination of mature trees (oaks, pecan) and younger trees (elm, sweetgum, pine)	9.90	3.23
2. Pine Plantation	Mature pine trees, mostly loblolly	22.11	7.21
Savanna/Brushland	5-50% tree/shrub canopy		
3. Old Field with Trees	Non-native grasses and weeds with patchy trees and shrubs	11.91	3.88
Grassland	<5% tree/shrub canopy		
4. Old Field	Non-native grasses and weeds	6.70	2.18
Lowland Communities	**Low areas, including wetlands/streams**		
5. Riparian Forest	50-100% tree canopy	15.20	4.95
CULTURAL LAND COVERS	**DEFINING CHARACTERISTICS**		
6. Oak Savanna with Turf	Mature native oaks with mowed turf beneath	83.06	27.07
7. Lawn	Turf lawn	83.97	27.37
8. Recreational Field	Soccer field	13.35	4.35
9. Gravel Drive/Parking	Roads and parking lots	2.97	0.97
10. Pavement	Roads and parking lots	41.95	13.67
11. Building	Building structures	15.71	5.12
Totals		***306.83***[1]	***100***[1]

[1] Numbers above were rounded

Natural Land Cover types are described in the following pages.

1. Altered Forest/Woodland (9.90 acres)

The site's Altered Forest/Woodland includes old fields that were invaded by woody growth many years ago as well as other disturbed woodlands. Non-native and invasive plants are common.

Characteristic Plant Species

- Sweetgum (*Liquidambar styraciflua*)
- American elm (*Ulmus americana*)
- Winged elm (*Ulmus alata*)
- Loblolly pine (*Pinus taeda*)
- European privet (*Ligustrum vulgare*) - invasive
- Ivy (*Hedera* sp) - invasive

Historical Conditions

- Formerly disturbed areas, like crop fields and rights of way, that were colonized by pioneering native woody species (dispersed by wind-blown seeds) as well as invasive woody species such as privet (dispersed by berry-eating birds).

Restoration Opportunities

- Moderate potential for restoring native savanna or woodland, depending on species present and seedbank.

Altered Forest/Woodland with intermittent drainage, located in northwest portion of site.

2. Pine Plantation (22.11 acres)

Several pine plantations exist in the west and south portions of the site; most of these are dominated by loblolly pine estimated to be 25 to 30 years old. Non-native and invasive shrubs and herbaceous species are common in the understory and ground plane.

Characteristic Plant Species

- Loblolly pine (*Pinus taeda*)
- Sweetgum (*Liquidambar styraciflua*)
- Burningbush (*Euonymus alatus*) – invasive
- European privet (*Ligustrum vulgare*) - invasive
- Bradford pear (*Pyrus calleryana*) – invasive
- Blackberry (*Rubus allegheniensis*)
- Ivy (*Hedera* sp) - invasive
- Sericea lespedeza (*Lespedeza cuneata*) - invasive

Historical Conditions

- Most are former cropland.

Restoration Opportunities

- Moderate potential for restoring savanna or woodland. This may require removal of existing pines, which could be phased in over time.

Pine Plantation, located in northwest portion of site.

3. Old Field with Trees (11.91 acres)

Old fields that have been invaded relatively recently by woody vegetation exist in the northwest portion of the site. The largest area of Old Field with Trees (in the northwest portion of the site) has developed on a closed landfill, where the topsoil was scraped away and the area seeded with stabilizing cover crop. Non-native and invasive plants are common.

Characteristic Plant Species

- American Sycamore (*Platanus occidentalis*)
- Loblolly pine (*Pinus taeda*)
- Sweetgum (*Liquidambar styraciflua*)
- Bradford pear (*Pyrus calleryana*) – invasive
- Winged elm (*Ulmus alata*)
- Eastern baccharis (*Baccharis* halimifolia)
- European privet (*Ligustrum vulgare*) - invasive
- Japanese honeysuckle (*Lonicera japonica*) - invasive
- Blackberry (*Rubus allegheniensis*)
- Sericea lespedeza (*Lespedeza cuneata*) - invasive
- Canada goldenrod (*Solidago canadensis*)
- Johnsongrass (*Sorghum halepense*) – invasive
- Bermudagrass (*Cynodon dactylon*)

Historical Conditions

- Most are former cropland.

Restoration Opportunities

- Moderate potential for restoring native savanna or prairie, but will require removal of non-native trees/shrubs and replacement of weedy ground plane vegetation. Soil amendments may be warranted on the landfill site.

Old Field with Trees, located in northwest portion of site.

4. Old Field (6.70 acres)

An Old Field exists in the northwest portion of the site; this area is just beginning to be invaded by woody vegetation. Non-native and invasive plants are common.

Characteristic Plant Species

- Eastern baccharis (*Baccharis* halimifolia)
- Blackberry (*Rubus allegheniensis*)
- Sericea lespedeza (*Lespedeza cuneata*) – invasive
- Broomsedge bluestem (*Andropogon virginicus*)
- Canada goldenrod (*Solidago canadensis*)
- Johnsongrass (*Sorghum halepense*) – invasive
- Bermudagrass (*Cynodon dactylon*)

Historical Conditions

- Former cropland.

Restoration Opportunities

- Moderate potential for restoring native savanna or prairie, but will require replacement of weedy ground plane vegetation.

Old Field, located near the center of the site.

5. Riparian Forest (15.20 acres)

Riparian Forest exists along Rocky Branch, the stream that flows west to east along the northern edge of the site. This plant community also exists along a drainageway in the south-center portion of the site, immediately west of the railroad corridor. While some Riparian Forest is situated above the floodplain, it is considered a Lowland Community due to the influence of the drainageways and runoff that flows into these low-lying areas.

Characteristic Plant Species

- American Sycamore (*Platanus occidentalis*)
- Pecan (*Carya illinoinensis*)
- Black locust (*Robinia pseudoacacia*)
- Bald cypress (*Taxodium distichum*)
- Sweetgum (*Liquidambar styraciflua*)
- American elm (*Ulmus americana*)
- Black willow (*Salix nigra*)
- Chinaberry (*Melia azedarach*) - invasive
- Sassafras (*Sassafras albidum*)
- White mulberry (*Morus alba*) - invasive
- Grapevine (*Vitis* sp)
- Trumpet creeper (*Campsis radicans*)
- Ivy (*Hedera* sp) - invasive
- North American bamboo (*Arundinaria* sp)
- Virginia wildrye (*Elymus virginicus*)
- Japanese stiltgrass (*Microstegium vimineum*) – invasive
- Violets (*Viola* sp)
- Sedges (*Carex* spp)

Historical Conditions

- Most of the site's Riparian Forest was formerly cropland. Sometime between 1959 and 1971, Rocky Branch was re-routed to the north (just south of Western Boulevard).

Riparian Forest, along Rocky Branch.

Cultural Land Cover types are described on the following pages.

6. Oak Savanna with Turf (83.06 acres)

Dorothea Dix Park's most defining land cover is probably its Oak Savanna with Turf. These areas contain the site's oldest, most majestic oaks, growing on well-drained sandy loam soils. In the 1938 aerial photograph, these areas were dominated by large-crowned trees, which created a broken canopy that allowed a moderate amount of light to reach the ground. A similar "parkland" structure is maintained today, with a broken canopy dominated by tall, mature native trees, no subcanopy or sapling/shrub layer, and a ground plane of mowed lawn. This is considered a cultural land cover type due to the regularly maintained (mowed) turf ground plane of non-native vegetation and the presence of ornamental tree and shrub plantings, particularly near site buildings.

Characteristic Plant Species

- White oak (*Quercus alba*), a native remnant of the site's former oak savannas
- Willow oak *(Q. phellos*), a rapidly growing oak, which has been planted at the site
- Red and scarlet oak (*Q. rubra and Q. coccinea*)
- Sweetgum (*Liquidambar styraciflua*)
- Ornamental trees and shrubs
- Bermudagrass (*Cynodon dactylon*)
- Other turf grasses

Historical Conditions

- Prior to European settlement in the region, oak savannas historically burned relatively frequently (approximately once every 5 to 10 years).
- Low-intensity surface fires were important for maintaining plant community structure and species composition. Without intermittent fire, sun-requiring species disappear, reducing the variety of plants and insects in the community.

Restoration Opportunities

- High potential for restoring native oak savanna through conversion of turf to native savanna grass, sedge, and wildflower species.

Oak Savanna with Turf, in north portion of site.

7. Lawn (83.97 acres)

Areas of open lawn exist throughout the site, with a large "great lawn" located in the west-central portion of the site. Occasional ornamental tree and shrub plantings exist within Lawn areas, particularly near site buildings. While a cultural land cover type, Lawn can be restored to prairie or other native landscapes.

Large Lawn, located in west portion of site.

8. Recreational Field (13.35 acres)

Recreational Fields exist in the northwest portion of the site (soccer fields) and southeast portion of the site (baseball field). The northwest Recreational Fields were constructed on a closed landfill; soils in this area appeared to be poor quality, and vegetation was sparse in areas. While a cultural land cover type, Recreational Fields can be restored to prairie or other native landscapes. Soil amendments may be warranted on the landfill site.

Recreational Field (background) and Gravel Drive/Parking (foreground), located in northwest portion of site.

9. Gravel Drive/Parking (2.97 acres)

Gravel parking lots and drives exist in the northwest portion of the site. While not completely impervious, these areas are typically heavily compacted and convey runoff in a manner similar to asphalt or concrete. Evidence of gully and rill erosion was observed in some of the site's gravel surfaces. See preceding photo for image of Gravel Drive/Parking.

10. Pavement (41.95 acres)

Consisting mostly of roads and parking lots, pavement is a primary contributor to urban runoff – a major stressor on surface water resources such as lakes and streams. Reducing the extent of or "breaking up" continuous impervious cover to interrupt and intercept stormwater flow is an effective strategy to reduce runoff.

Pavement (roads and parking lots), near the N.C. Division of Development and Early Education (image from Google Earth Street View).

11. Building (15.71 acres)

The site contains many buildings, most of which are associated with state social services. Rooftops of these buildings intercept precipitation and transfer it to the ground as concentrated runoff. Runoff is best managed in a diffuse and intentional manner, as close as possible to where it is generated. See preceding photo for an image of site Buildings.

Wildlife

AES did not conduct formal wildlife surveys during our November 2017 field assessment; however, Table 2 presents wildlife species that were documented. As indicated in the table, an impressive diversity of bird species was recorded in the "Old Field with Trees" land cover type. Common wildlife, such as crows, robins, and gray squirrels were observed in many portions of the site, but were not always documented.

Table 2. Anecdotal Wildlife Observations by Land Cover Type

LAND COVER TYPE	WILDLIFE OBSERVATIONS
1. Altered Forest/Woodland	none documented
2. Pine Plantation	Pileated woodpecker Red-bellied woodpecker
3. Old Field with Trees	American crow American robin Black-capped chickadee Blue jay Carolina wren House finch Northern cardinal Northern flicker Red-tailed hawk White-breasted nuthatch White-crowned sparrow White-throated sparrow
4. Old Field	none documented
5. Riparian Forest	Cooper's hawk Turkey vulture White-tailed deer
6. Oak Savanna with Turf	none documented
7. Lawn	none documented
8. Recreational Field	none documented
9. Gravel Drive/Parking	none documented
10. Pavement	none documented
11. Building	none documented

Restoring native plant communities and enhancing other natural areas at Dix Park would be expected to greatly increase the abundance and diversity of native wildlife. Habitat restoration work can be targeted at certain species or groups of species (e.g., rare or declining wildlife, such as pollinators). Conducting baseline wildlife surveys (such as those planned at Dix Park in early 2018) are important so wildlife populations are better understood prior to restoration and management. Subsequent wildlife monitoring, following ecological restoration and management, are an effective means of measuring restoration success and engaging the public and other stakeholders.

CLOSING

Thank you for the opportunity for AES to provide MVVA with these recommendations. Please contact us if you have any questions, comments, or additional needs, and we look forward to continuing our work with you on this project.

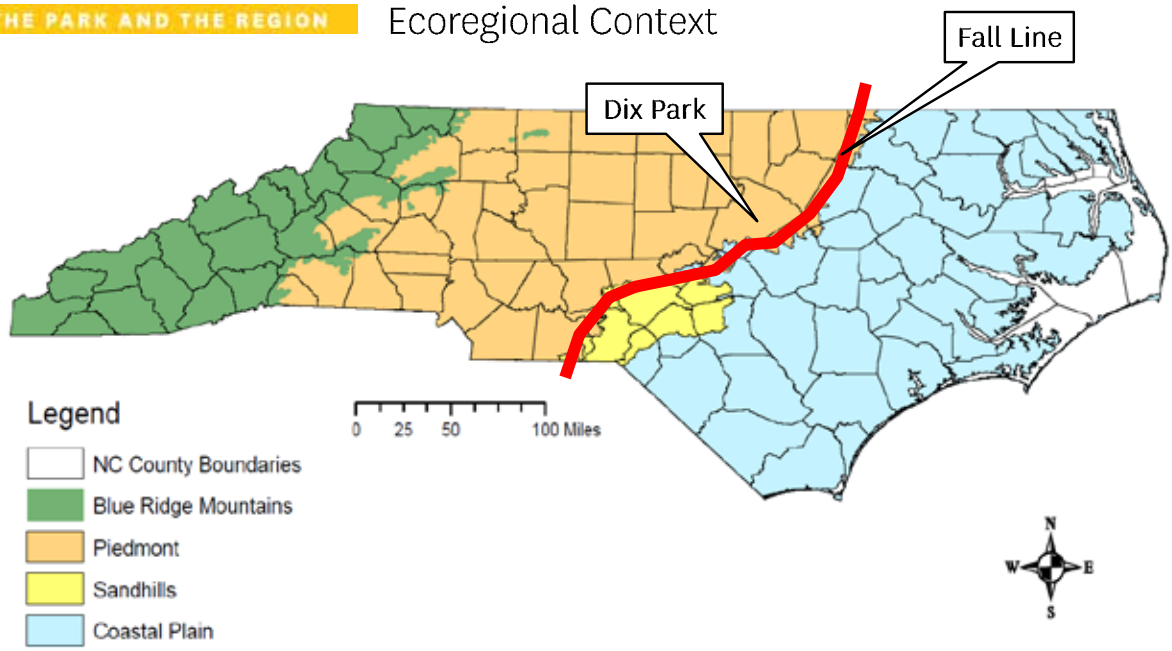
Sincerely,
Applied Ecological Services, Inc.

Steven I. Apfelbaum, MS
Senior Ecologist

Douglas M. Mensing, MS
Senior Ecologist

THE PARK AND THE REGION

Ecoregional Context



Map adapted from "North Carolina Ecoregions" (Bailey 2009)

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Historical Conditions

- Historical mixed pine & hardwood forest, with other interspersed vegetation types responding to geologic, soils, moisture, slope and aspect conditions

Annie-Louise Wilkerson Nature Preserve, Raleigh

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Historical Conditions

- Over the centuries, land cleared for:
  - crops
  - pine plantations
  - buildings & development

Raleigh Map (1872)

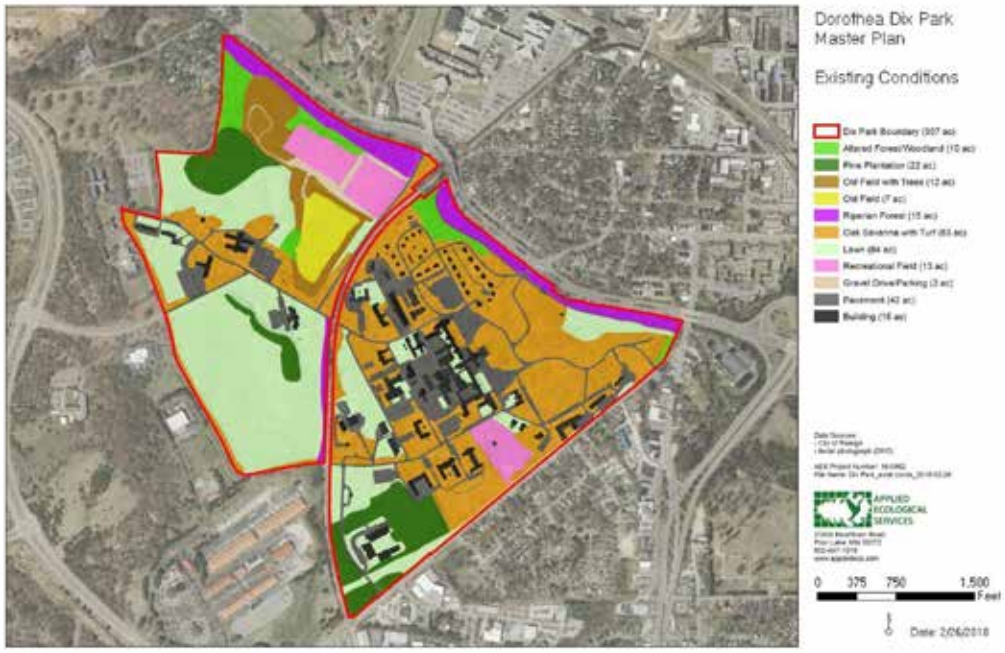
THE PARK AND THE SITE

Historical Conditions

- Current park boundary on 1938 aerial photograph

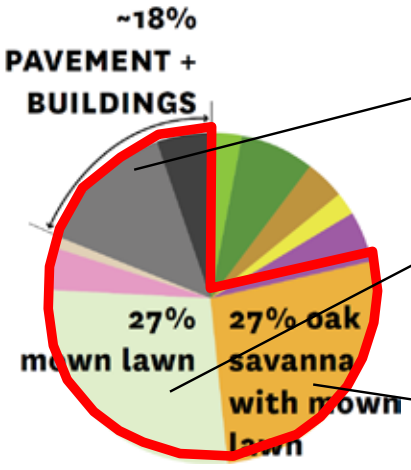
Existing Conditions

- Results of 2017 field assessment



Existing Conditions

(~78% cultural)



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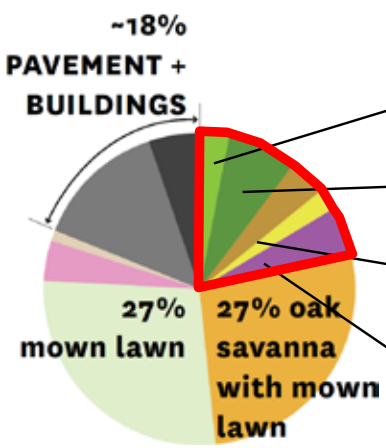
Existing Conditions

(~22% semi-natural)



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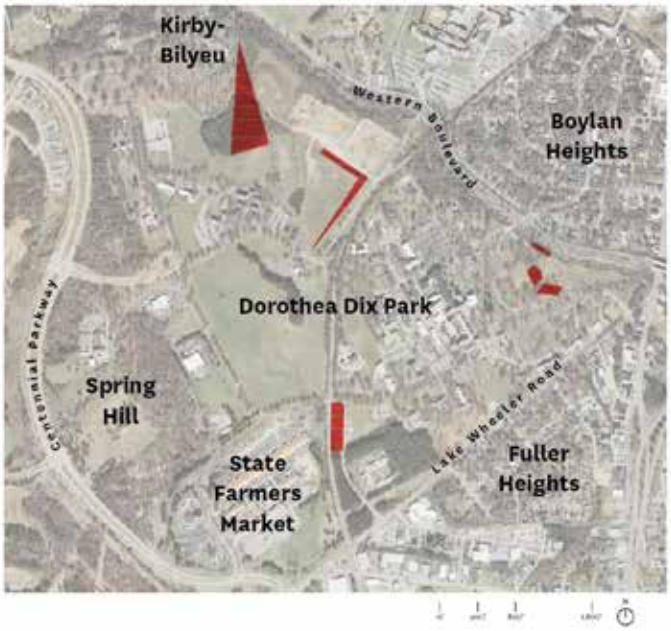
Existing Conditions

- Park characteristics
  - Little natural habitat
  - Little structural diversity (i.e., habitat diversity)
  - Low native plant species diversity
  - Poor habitat connectivity
  - Poor-moderate wildlife diversity
- Many invasive plants
  - White mulberry
  - Callery pear
  - Chinaberry
  - European privet
  - Multiflora rose
  - Japanese honeysuckle
  - English Ivy
  - Sericea lespedeza
  - Johnsongrass
  - Japanese stiltgrass
- Mostly “generalist” wildlife species
  - White-tailed deer
  - American crow
  - American robin
  - Black-capped chickadee
  - Blue jay
  - Carolina wren
  - House finch
  - Northern cardinal

Existing Maintenance Regimes

- Cultural areas
  - Extensive mowing of lawns, including beneath mature oaks
  - Tree pruning/removal as needed
- Semi-natural areas
  - Invasive brush removal
  - Native seeding
  - Native tree planting

Existing Maintenance Regimes - Volunteers



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Existing Maintenance Regimes - Volunteers

Volunteers removing invasive brush – Dix Park

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Existing Maintenance Regimes - Volunteers

Before (Feb. 2018)

After (Mar. 2018)

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Regional Connectivity

- Dix Park plays an important role in existing regional greenways/connectivity...but this could be greatly enhanced

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Existing Conditions Summary

- Land use history of the park has resulted in the loss of almost all natural communities
- Maintenance in cultural areas limits natural habitat
- Limited maintenance in semi-natural areas insufficient for invasive plant species and other stressors
- Some connectivity to other natural open space, but limited

- All of these factors have resulted in limited site biodiversity...

...but, Dix Park presents a unique opportunity to restore healthy and diverse native Piedmont habitats and species, as well as enhance connectivity for regional ecological improvement.

THE PARK AND THE SITE

Potential Future Conditions

- Convert underutilized turf areas to more diverse, soil stabilizing, lower maintenance prairies and savannas

Existing

Proposed

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Potential Future Conditions

Existing

Proposed

Potential Future Conditions

Existing

Proposed

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Potential Future Conditions

- Increase invasive plant removal efforts and replant with appropriate, local ecotype native species

Existing

Proposed

Additional Restoration Opportunities

- Plant native oaks, shortleaf pine and other species in existing pine plantations and near old trees to facilitate more natural succession
- Enhance Rocky Branch riparian corridor, including channel habitat diversification and bank vegetation restoration
- Construct naturalized stormwater best practices to better manage runoff and increase habitat diversity (e.g., wetlands)
- Manage and monitor efforts to ensure conservation goals are met
- Engage partners and the public to assist with stewardship

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Additional Restoration Opportunities

- Increase park complexity and diversity
  - Restore the structure, composition and function of native plant communities:
    - Oak-hickory forest
    - Beech forest
    - Pine forest
    - Oak & pine savanna/barrens
    - Piedmont prairie/meadow
    - Perched wetlands
    - Seeps
    - Floodplain forest
  - Results in more resilient, lower-maintenance landscapes that will persist under environmental change

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Additional Restoration Opportunities

- Maintain site integrity
  - Collect and grow local ecotype, wild-type native plant species (including rare species)
  - Opportunities for on-site nursery
  - Opportunities for partnerships

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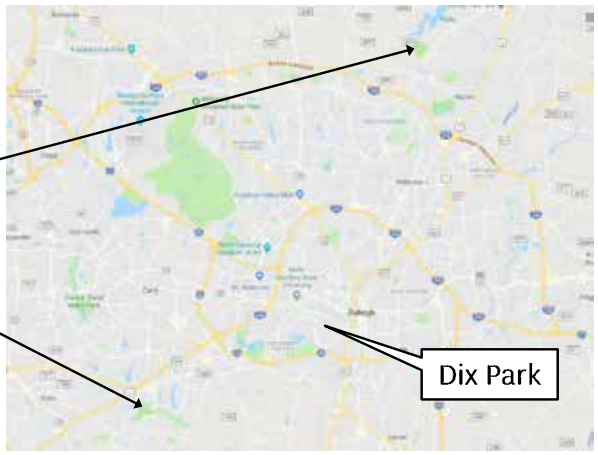
Potential Future Maintenance

- Prescribed burning an important ecological management tool
  - initial restoration efforts
  - long-term maintenance
- Prescribed burning is used locally
  - Annie Louise Wilkerson, MD Nature Preserve Park (Raleigh) - Spring 2017
  - Hemlock Bluffs (Cary, NC) – since 2012



Potential Future Maintenance

- Annie Louise Wilkerson, MD Nature Preserve Park – Spring 2017 Burn

Potential Future Maintenance

- Hemlock Bluffs (Cary, NC) – Spring 2017 Burn

Photos: Michael Papich

THE PARK AND THE SITE

Potential Future Maintenance

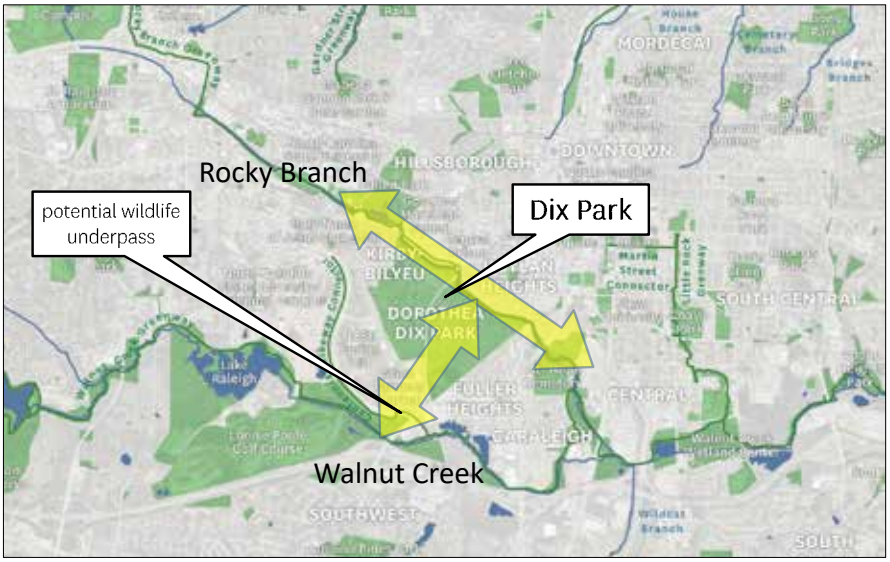
- Hemlock Bluffs (Cary, NC) – Spring 2017 Burn

Photos: Michael Papich

THE PARK AND THE REGION

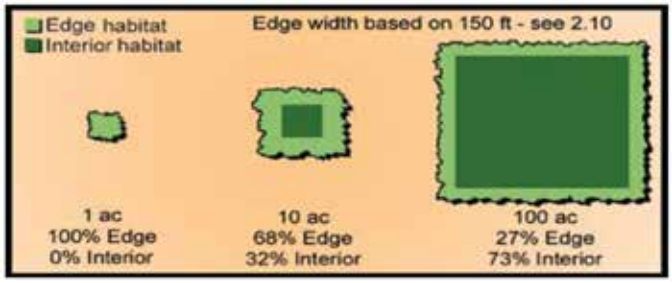
Regional Connectivity Considerations

- Park restoration will consider regional context and connectivity opportunities



Site Restoration Considerations

- Identify/restore **large contiguous blocks** of habitat with minimal "edge effect"
- Provide **critical patch size of different habitats** to attract and sustain maximum species diversity of plants and animals
- Provide **habitat mosaics** that fulfill life-cycle needs of species :
  - Adjacent wetlands and woodlands for amphibians
  - Open basking areas and hibernacula for reptiles



Graphic: Bentrup 2008

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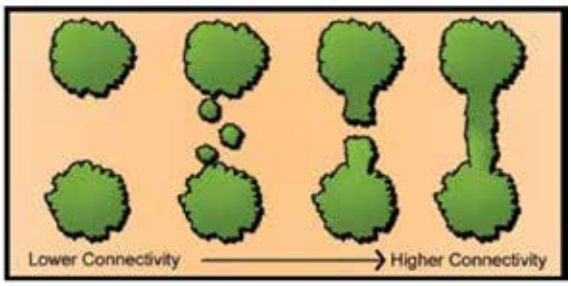
Site Restoration Considerations

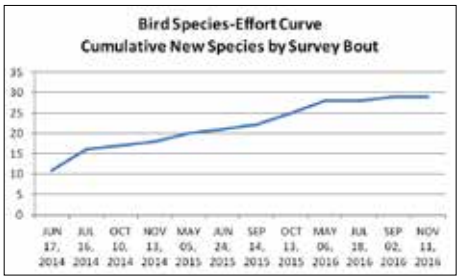
- Restored **forests** should have continuous/closed canopy for interior forest birds
- Restored **savannas** should have patches of shrubs mixed among the trees and groundlayer species
- Restored **prairies** should:
  - have a diversity of continuously flowering (early spring through late fall) species for pollinators
  - retain dead prairie vegetation over winter to allow spring emergence of larvae
- Restored **perched wetlands** and **seeps** should have areas of open water, emergent vegetation, and native upland buffer prairie/savanna

Potential Future Conditions

- Indicators of restoration success (and how measured)
  - Increased **area** of natural habitat (mapping, acres)
  - Increased **structural/habitat diversity** (visual, vegetation plots, mapping)
  - Increased native plant **species diversity** (plant surveys/monitoring)
  - Increased **habitat connectivity** (mapping of natural areas and connections)
  - Increased wildlife **species diversity**, including pollinators (animal surveys/monitoring)



Graphic: Bentrup 2008



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Potential Future Conditions

- Potential indicator species
  - **Pollinators**, conveying restored prairie, savanna and forest (perhaps bumble bees, Monarch butterfly, and/or the Zebra swallowtail, which is dependent on pawpaw)
  - **Amphibians**, conveying restored aquatic habitats and adjacent woodlands and meadows (perhaps Upland chorus frog, Cope's gray treefrog, Southern leopard frog, and/or Spotted salamander)
  - **Birds**, conveying restored habitats (perhaps Red-eyed vireo, Brown thrasher)

The Trees of Dix Park

- Large Sized Trees include:
- Carya, Castanea, Juglans, Liriodendron, Metasequoia, Pinus, Platanus, Populus, Quercus, Tilia, Tsuga
-
- Medium Sized Trees include:
- Acer, Ailanthus, Betula, Carya, Catalpa, Celtis, Fagus, Fraxinus, Ginkgo, Gleditsia, Koelreuteria, Liquidambar, Magnolia, Melia, Morus, Paulownia,
-
- Small Sized Trees include: Albizia, Amelanchier, Asimina, Carpinus, Cedrus, Cercis, Chamaecyparis, Cornus, Cryptomeria, Cupressocyparis, Diospyros, Ficus, Hibiscus, Ilex, Juniperus, Lagerstroemia, Ligustrum, Magnolia, Nyssa, Prunus, Pyrus, Salix, Sassafras, Stewartia, Thuja, Ulmus

KEY
Large Tree
Medium Tree
Small Tree
Building to Rehabilitate
N
0
400’
800’

Analysis

1. TREES BY SIZE CLASS

KEY

- Large Tree
- Medium Tree
- Small Tree
- Mature
- Maturing
- Established
- Young

These maps were prepared using data gathered in a tree inventory conducted by Davey Trees in 2017. Davey Research Group inventoried over 5,000 trees with a diameter at breast height (DBH) greater than or equal to 3 inches. In some of the densest thickets of the greenway easement, a slightly greater DBH threshold was used for selecting trees. Within the boundaries of wooded areas (shown on the map), a traditional forest plot analysis was conducted using 25 1/10-acre plots.

Concerning tree health as shown on map 2, common tree problems include dead limbs, trunk decay, root damage, mechanical wounds, stump sprouts, an d threatening vine growth.

The following lists the species associated with the different plant communities shown on map 3:

- **Riparian Forest:** Box elder, River Birch, Pawpaw, River Birch, Green Ash, Red Mulberry, American
- Sycamore, Eastern Cottonwood,
- Swamp White Oak, Water Oak, Pin Oak,
- Willow Oak, Black Walnut, Hackberry,
- American Hornbeam, Black Willow,
- Winged Elm, American Elm
- **Oak-Hickory Forest:** White Oak, Scarlet Oak, Southern Red Oak, Post Oak, Black Oak, Black-jack
- Oak, Mockerut Hickory, Bitternut Hickory,
- Blackgum
- **Pine Forest:** Loblolly Pine
- **Basic Mesic Forest:** American Beech, Northern Red Oak
- **Generalists:** Red Maple, Eastern Red Cedar, Eastern
- Redbud, Flowering Dogwood, American
- Persimmon, Sweetgum, Tuliptree,
- Cherrylaurel, Black Cherry, Wild Plum,
- American Holly, Black Locust, Sassafras
- **Mountain Species:** Sugar Maple, Serviceberry, Eastern Hemlock, Chestnut, White Ash, Crab apple,
- Fire Cherry, American Linden
- **Coastal Plain Species:** Dahoon Holly, Yaupon, Shumard Oak, Silky Camellia, Bald Cypress
- **Non-native Species:** Hedge Maple, Japanese Maple, Mimosa, Pecan, Atlas Cedar, Austrian Pine,
- Arborvitae, Leyland Cypress, Catalpa,
- Kousa Dogwood, Fig, Gingko, Honey Locust,
- Rose-of-Sharon, Golden Rain Tree, Crape
- Myrtle, Star Magnolia, Saucer Magnolia,
- Chinaberry, Dawn Redwood, White
- Mulberry, Japanese Flowering Cherry,
- Callery Pear, Japanese Zelkova

2. TREE HEALTH

KEY

- Good
- Fair
- Poor
- Dead

3. PLANT COMMUNITY ASSOCIATIONS

KEY

- Riparian Forest
- Oak-Hickory Forest
- Pine Forest
- Basic Mesic Forest
- Generalists
- Mountain Species
- Coastal Plain Species
- Non-native Species

4. DECIDUOUS + CONIFEROUS TREES

KEY

- Deciduous Tree
- Coniferous Tree

5. SIGNATURE SPECIES OF THE PARK

KEY

- Willow Oak, *Quercus phellos*
- Loblolly Pine, *Pinus taeda*

N 0 300' 600'