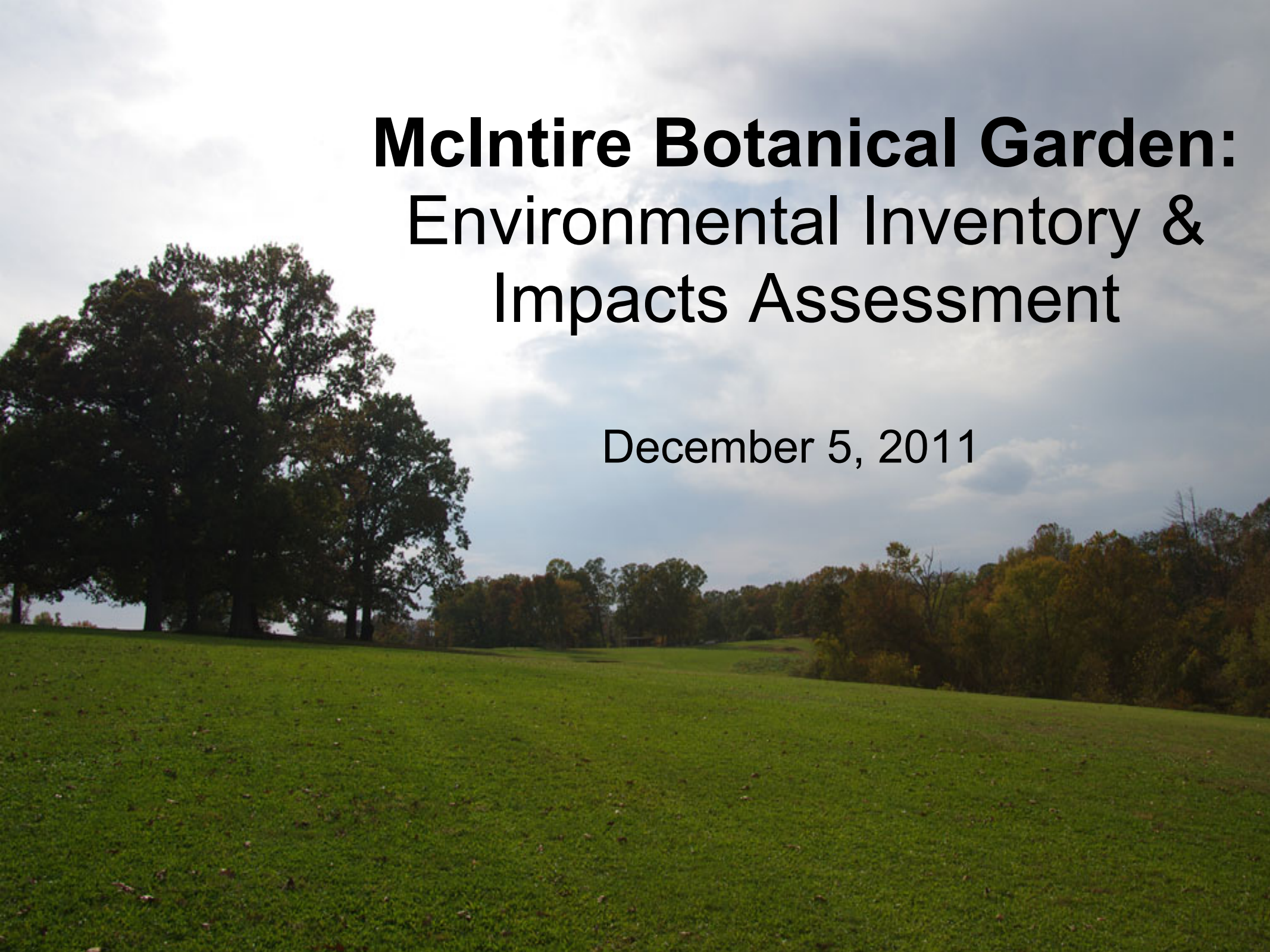


McIntire Botanical Garden: Environmental Inventory & Impacts Assessment

December 5, 2011

Timeline:
McIntire East Master Planning

2008:
- Botanical garden proposed
- First environmental impact assessment

2009:
- Master planning process started

2011:
- Public hearings and workshops

2012:
- Master plan completed

2011 Environmental Inventory & Impact Assessment

GOAL: Provide a detailed inventory of environmental resources in McIntire Park East and an analysis of the impacts of proposed garden designs

FOUR AREAS:

NOISE

AIR

WATER

VISUAL

Outline

1. Project Need & Description
2. Noise
   - Existing Resources | Project Critique | Mitigation | Conclusions
3. Air
   - Existing Resources | Project Critique | Mitigation | Conclusions
4. Water
   - Existing Resources | Project Critique | Mitigation | Conclusions
5. Visual Resources
   - Existing Resources | Project Critique | Mitigation | Conclusions
6. Alternative Sites
7. Conclusions

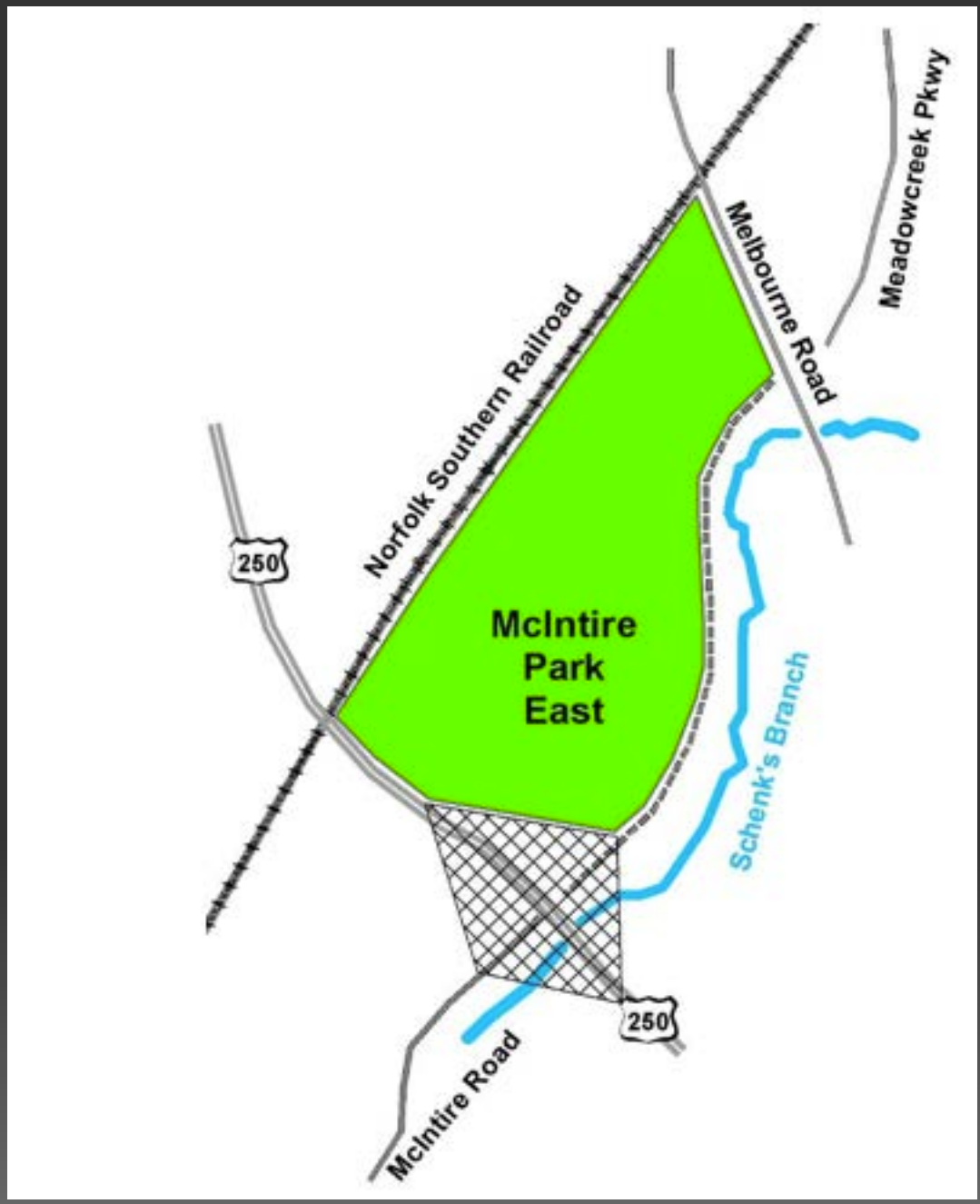
Introduction

McIntire Park East:

- Created in 1935
- 75 Acres

Current Uses:

- 9-hole municipal golf course, First Tee program
- Vietnam Dogwood Memorial
- Wading pool and playground
- Simultaneous uses: walkers, public art



Charlottesville City Parks & Recreation 2011

Project Need: Nearby Gardens

There is no existing botanical garden within 50 miles of Charlottesville

Botanical Gardens provide:

- Public education
- Conservation
- Experience in nature
- Recreation
- Opportunities for students

Site & Location	Distance[1]	Access	Description
Thomas Jefferson Parkway[8] Charlottesville VA	2.5 miles	Free public access	An arboretum with native trees and shrubs, including areas specially grouped for spring flowers, fall color and edible and useful plants; Two-miles of established trails (Monticello-Saunders), a small woodland amphitheater and pond; 89-acre Kemper Park and additional woodland and field trails
Lewis Ginter Botanical Garden[9] Richmond VA	67 miles	$11 Adult admission	15 different gardens, including a children's garden, healing garden, indoor conservatory. Also includes a visitor's center and an education and library building.
Maymont Estate Gardens[10] Richmond VA	71 miles	Free public access	14 different gardens, plus an arboretum, a children's farm, and a nature center
Orlando E. White Arboretum at the Blandy Experimental Farm[11] Clarke County VA	91 miles	Free public access	172 acres of arboretum and botanic gardens, including an herb garden, a Virginia native plant trail, trails for walking and riding horseback, an outdoor amphitheater, and indoor spaces for meetings and educational programs.

Garden Proposal: Alternative 1

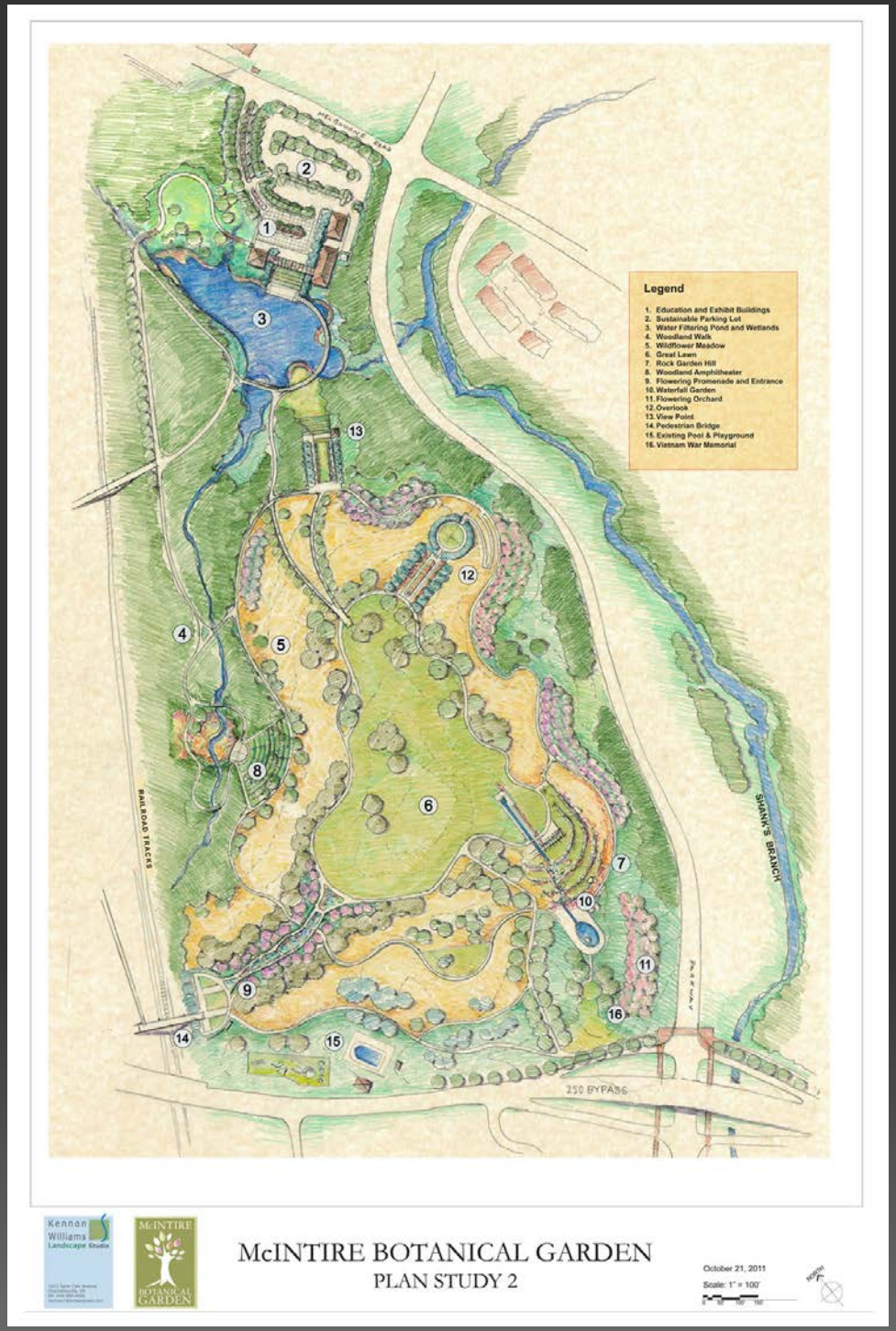
Highlights:

- Local food garden, rain garden, wetland, orchard, wildflower meadow
- Lawn area with oak trees
- Walking paths
- Wading pool + playground

Garden Proposal: Alternative 1B

Highlights:

- Parking lot
- Education building
- Woodland amphitheater
- Larger wetland with water filtration pond



2011 Environmental Inventory & Impact Assessment

FOUR AREAS:

NOISE

AIR

WATER

VISUAL

PHASES EVALUATED:

- Construction
- Operation
- Maturity

Noise Report - Introduction

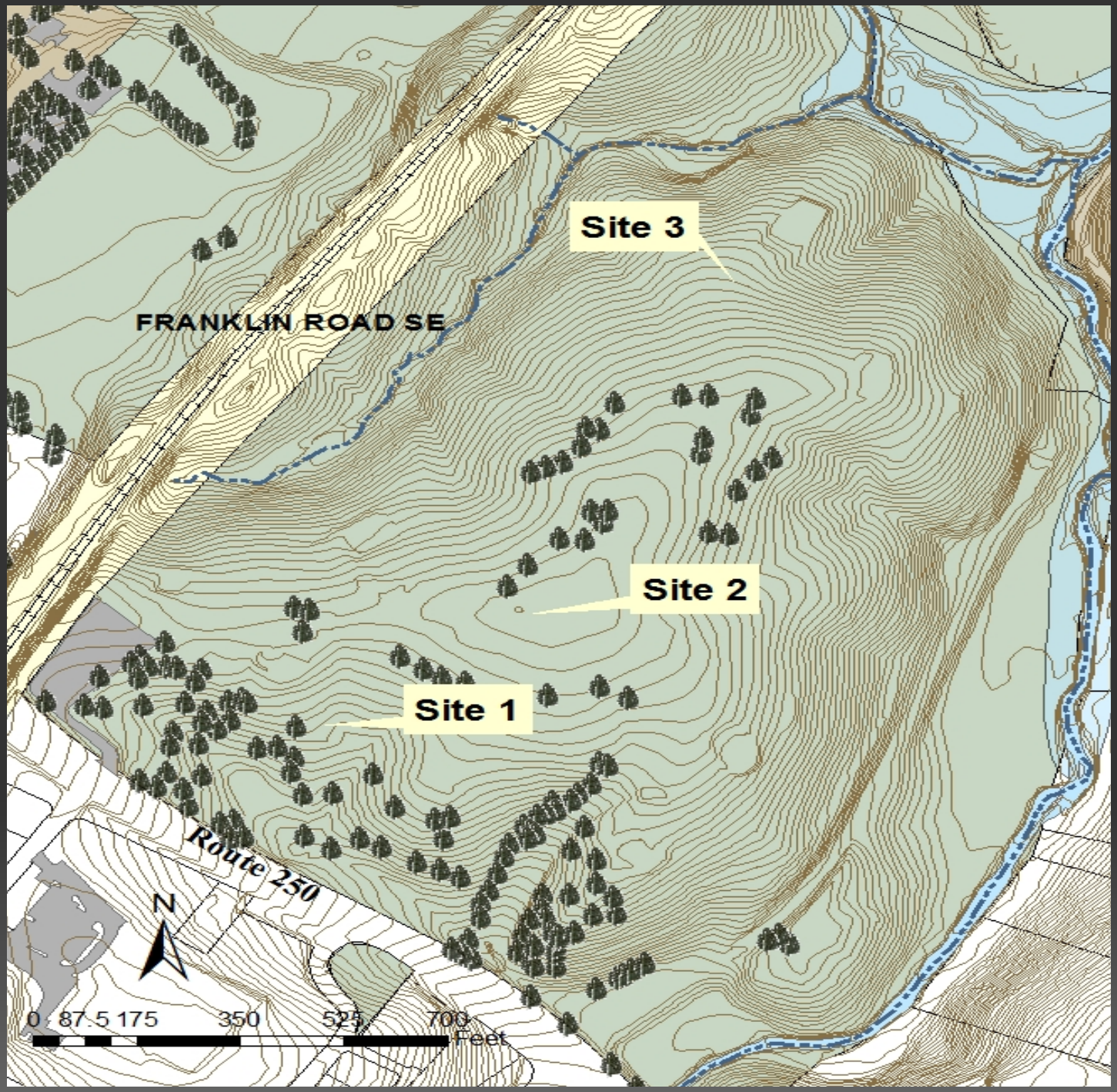
Noise evaluated with respect to:

- Existing Conditions
- Alternative 1 and 1B
  - Construction
  - Operation
  - Maturation
- Overall, minimal noise impacts are expected

Noise - Existing Conditions

- Survey Equipment and Methodology
  - EXTECH Instruments Digital Sound Level Meter
- Measurement Locations

Site	Location Description
1	Southwest corner, near the existing wading pool and the Route 250 Bypass
2	Center of the park, at the highest point of elevation
3	North end, near the Meadowcreek Parkway


Site 3
FRANKLIN ROAD SE
Site 2
Site 1
Route 250
N
0 87.5 175 350 525 700
Feet

Noise - Relevant Regulations

Charlottesville Code of Ordinance, Chapter 16

- Section 16-8: Residential Zones
  - 6:00 am to 10:00 pm, limit of 65 dB(A)

- Exemptions
  - "Athletic contests and other officially sanctioned activities in city parks"
  - "Activities related to the construction, repair, maintenance, remodeling or demolition, grading or other improvement of real property"
  - "Gardening, lawn care, tree maintenance or removal and other landscaping activities"

Sound Levels Produced by Common Sources

Thresholds/ Noise Sources	Sound Level (dBA)	Subjective Evaluations [a]	Possible Effects on Humans [a]
Human Threshold of Pain	140	Deafening	Continuous exposure to levels above 70 can cause hearing loss in majority of population
Siren at 100 ft Loud rock band	130		
Jet takeoff at 200 ft Auto horn at 3 ft	120		
Chain saw Noisy snowmobile	110		
Lawn mower at 3 ft Noisy motorcycle at 50 ft	100	Very Loud	
Heavy truck, maximum at 50 ft	90		
Pneumatic drill at 50 ft Busy urban street, daytime	80	Loud	
Normal automobile at 50 mph Vacuum cleaner at 3 ft	70		Speech Interference
Air conditioning unit at 20 ft Conversation at 3 ft	60	Moderate	
Quiet residential area Light auto traffic at 100 ft	50		Sleep Interference
Library Quiet home	40	Faint	
Soft whisper at 15 ft	30		
Slight rustling of leaves	20	Very Faint	
Broadcasting Studio	10		
Threshold of Human Hearing	0		

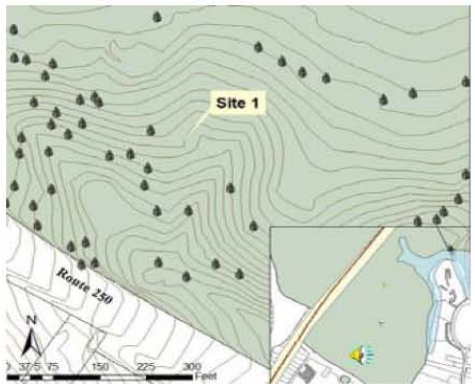
Noise - Existing Conditions

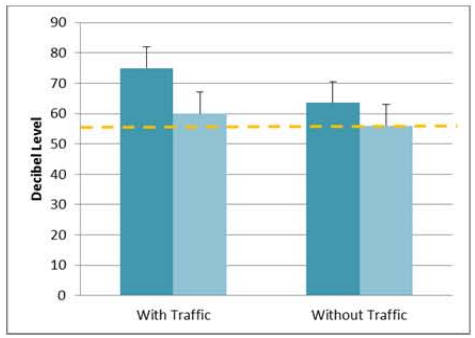
Measurements and Analysis

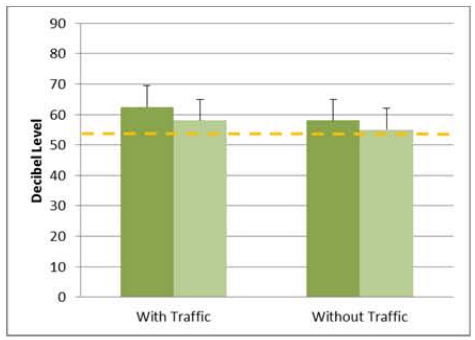
- Weekday
  - Highest Noise Levels = Site 1 (morning, w/ traffic)
  - Lowest Noise Levels = Site 3 (afternoon, w/o traffic)

- Weekend
  - Generally lower noise across all three sites
  - Fewer fluctuations in noise levels

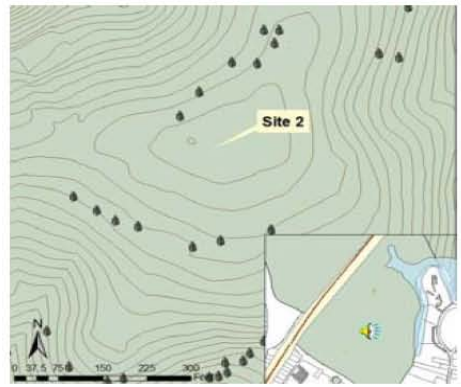
Site 1: Southwest Corner Noise Levels

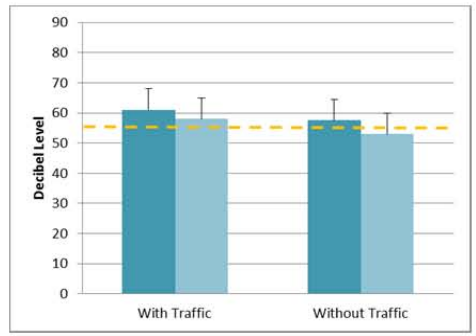




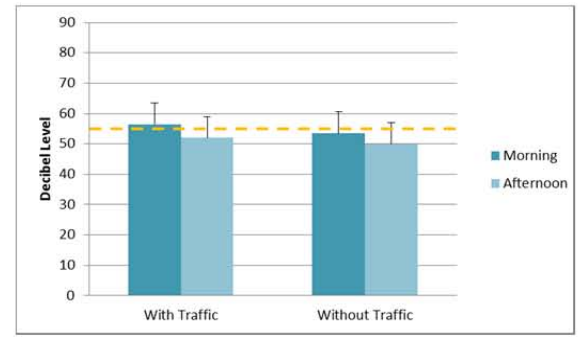


Site 2: Center of Park Noise Levels





Site 3: North End Noise Levels



Noise - Critique

Alternative 1

- Construction
  - Potential noise from clearing, grading, and paving
- Operation
  - Minimal noise impacts beyond maintenance
- Maturity
  - Trees and plants mature to help buffer noise along the Park's border; water features may also buffer noise

Alternative 1b

- Construction
  - Potential noise from clearing, grading, and paving
- Operation
  - Special events at Amphitheater may heighten noise; further tests needed
- Maturity
  - Trees and plants mature to help buffer noise along the Park's border; water features may also buffer noise

Noise - Mitigation

- Seek ways to limit and coordinate truck traffic with respect to the peak noise hour (7:30 am to 8:30 am)
- Limit 'loud' operations, such as construction activities, to daytime hours
- Establish public information program regarding noise impacts
- Establish tree buffer to screen noise from surrounding roadways

Air Report - Introduction

Air evaluated with respect to:

- Existing Conditions
- Alternative 1 and 1B
  - Construction
  - Operation
  - Maturation
- Overall, minimal impacts to air resources are expected.

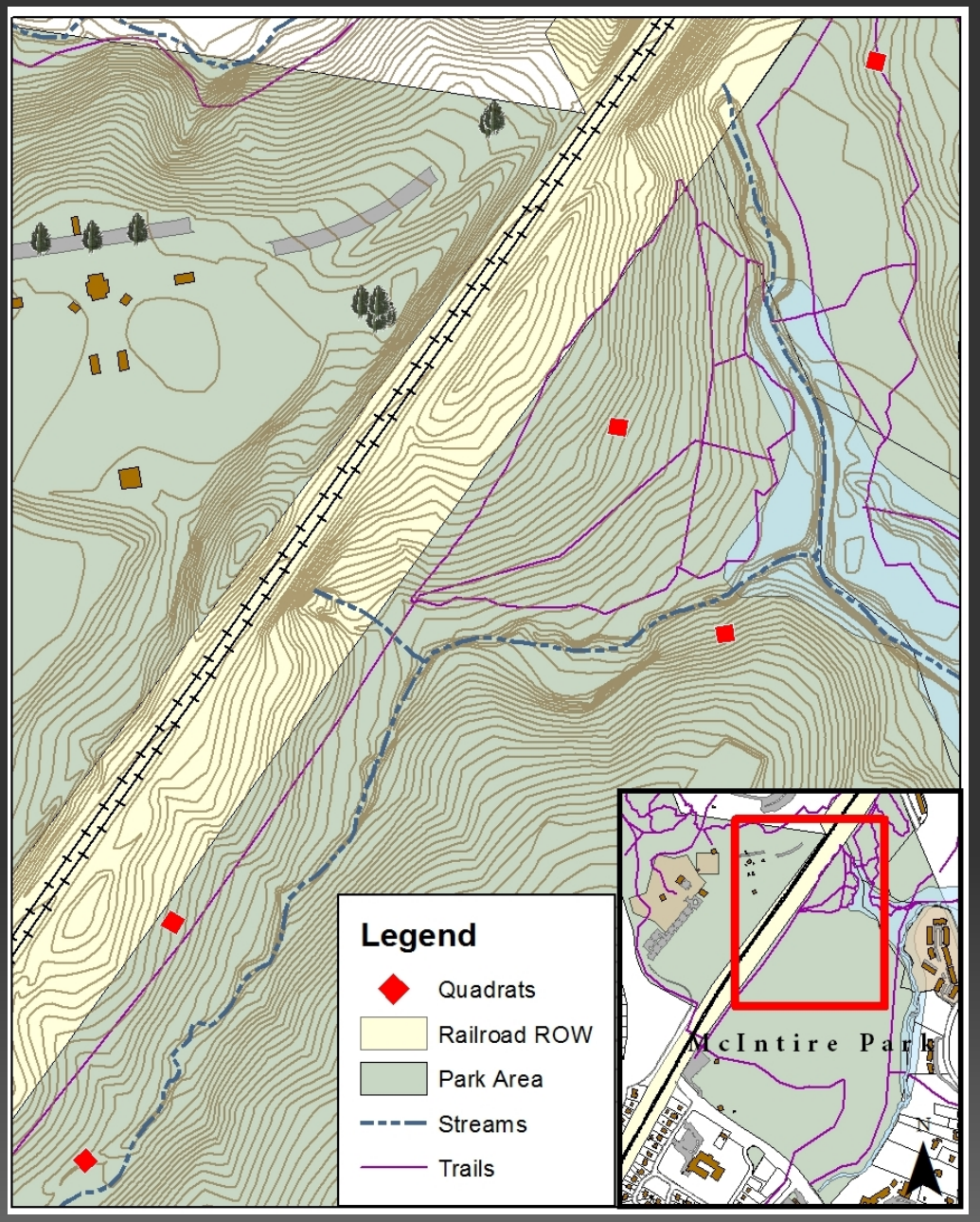
Air - Existing Conditions

250 Bypass Interchange
2009 EIA

- EPA Air Quality Attainment Area
- Less Idling

Tree Density Survey

- Trees & Air Quality
- 290.4 trees an acre in forested areas
- 3,289 lbs of pollutants reduced annually
- More comprehensive survey needed



Air - Critique

Alternative 1

- Construction
  - Emissions from vehicles, dust from clearing & grading.
  - Opportunity for increasing vegetation.
- Operation
  - Off-site parking, vehicle trips
  - Maintenance activities
  - Nuisance plantings
- Maturity
  - 9 more acres of trees
  - Mature plants

Alternative 1b

- Construction
  - Intensive emissions from vehicles, dust from clearing & grading for more structures.
  - Opportunity for increasing vegetation.
- Operation
  - On-site parking, vehicle trips
  - Maintenance activities
  - Nuisance plantings
- Maturity
  - 4.5 more acres of trees
  - Mature plants

Air - Mitigation

- Responsible Construction
  - Eliminating sources of dust and other particulate matter
  - Minimize vehicle disturbance
- Maintenance Activities
  - Low maintenance plants - less intensive use of gas powered equipment and vehicles
  - Create best management practices to reduce spraying, land disturbance
- Increase Vegetation
  - Appropriate plantings - low VOC emitting, high pollutant filtering
  - Consider evergreens for road buffers
  - Control invasives, manage forested areas for healthy habitat
- Promote Alternative Transit to Park
  - Bicycling, bus, ride share, walking

Air - Additional Considerations

- Benefits of Increasing Tree Canopy
  - Washington, D.C. Study - average tree reduces 0.43 lbs of airborne pollutants a year.
  - Alternative 1 - assuming 9 acre increase in tree canopy, 1,122 lbs pollution reduction annually.
  - Alternative 1b - assuming 4.5 acre increase in tree canopy, 561 lbs pollution reduction annually.
  - Passenger car travelling and average of 12,500 miles a year with an efficiency of 21.5 miles per gallon emits 687.3 lbs annually.

McINTIRE BOTANICAL GARDEN

PLAN STUDY 1

October 21, 2011

Scale: 1" = 100'

McINTIRE BOTANICAL GARDEN

PLAN STUDY 2

October 21, 2011

Scale: 1" = 100'

Air - Additional Considerations

- Species Selection and Air Quality Benefits

TABLE 1

Top rated species for improving air quality. List is based on rating the combined effects of pollution removal, VOC emissions, and air temperature reduction of 242 tree species at maturity under average U.S. urban conditions (Nowak et al., in prep). Trees listed are tolerant to pollutant under which it is ranked unless otherwise noted. Overall ranking is based on individual pollutant effects weighted by the average pollutant externality value (estimate of societal cost of pollutant in the atmosphere).

OZONE	CARBON MONOXIDE	OVERALL
Ulmus procera	Tilia americana*	Ulmus procera*
Tilia europea*[I]	Fagus grandifolia	Tilia europea
Fagus grandifolia	Tilia tomentosa*	Liriodendron tulipifera*
Betula alleghaniensis[I]	Ulmus rubra	Metasequoia glyptostroboides*
Liriodendron tulipifera*[S]	Fagus sylvatica	Fagus grandifolia
Tilia americana*	Betula alleghaniensis	Tilia platyphyllos*
Fagus sylvatica	Tilia euchlora*	Betula alleghaniensis
Tilia platyphyllos*[S]	Ulmus procera*	Fagus sylvatica
Metasequoia glyptostroboides*	Ginkgo biloba*	Tilia americana*
Betula papyrifera	Liriodendron tulipifera*	Ulmus americana
		Ulmus thomas

PARTICULATE MATTER	SULFUR / NITROGEN DIOXIDE	OVERALL
		Chamaecyparis lawsoniana
Ulmus procera*	Ulmus procera*[I/U]	Tsuga heterophylla
Platanus occidentalis*	Tilia europea*[T/S]	Tilia cordata*
Chamaecyparis lawsoniana	Populus deltoides[T]	Tsuga mertensiana
Cupressocyparis x leylandii	Platanus occidentalis*[T]	Tilia tomentosa*
Juglans nigra	Platanus x acerifolia*[T]	Betula papyrifera
Eucalyptus globulus	Metasequoia glyptostroboides*[T]	Celtis laevigata*
Tilia europea	Liriodendron tulipifera*[T]	Fraxinus excelsior*
Abies alba	Juglans nigra[S/U]	Ulmus crassifolia
Larix decidua	Betula alleghaniensis[S]	Betula nigra*
Picea rubens	Fagus grandifolia	Larix decidua

* Species or various cultivars of species rated as recommended trees for street use or urban conditions (Bassuk et al., 1998; Bridwell, 1994; Flint, 1997). Note: hardiness zone and other tree factors need to be considered in urban tree selection.

I intermediate tolerance to pollutant

S sensitive to pollutant

T tolerant to sulfur dioxide (SO_2); unknown tolerance to nitrogen dioxide (NO_2).

I/U Intermediate tolerance to SO_2; unknown tolerance to NO_2

S/U Sensitive to SO_2; unknown tolerance to NO_2

T/S Tolerant to SO_2; sensitive to NO_2

- Future Analysis
  - Additional data
    - More intensive tree survey
    - Ecosystem services modeling
    - Tree planting list - native and beneficial trees

- Consider Alternative Futures for Wading Pool
  - Children very sensitive to airborne pollution
  - Wading pool within 100' of US 250 - 400' minimum recommended

Water Report - Introduction

Water evaluated with respect to:

- Existing Conditions
- Alternative 1 and 1B
  - Construction
  - Operation
  - Maturation
- Overall, minimal impacts to water resources are expected

Water - Existing Conditions

- McIntire East located within Schenks Branch Watershed

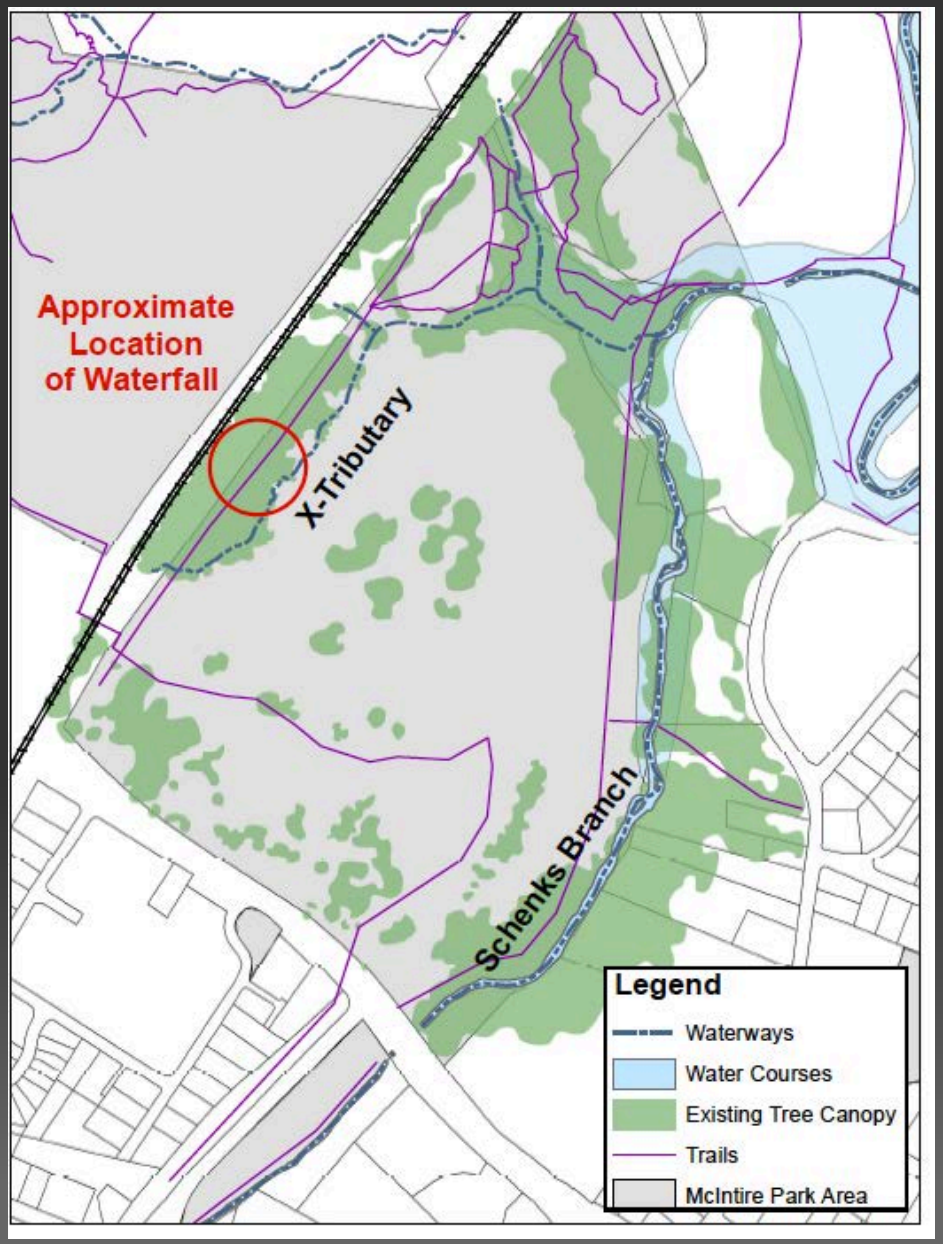
- Main waterway within park: Schenks Branch and tributary to Schenks (X-Tributary)

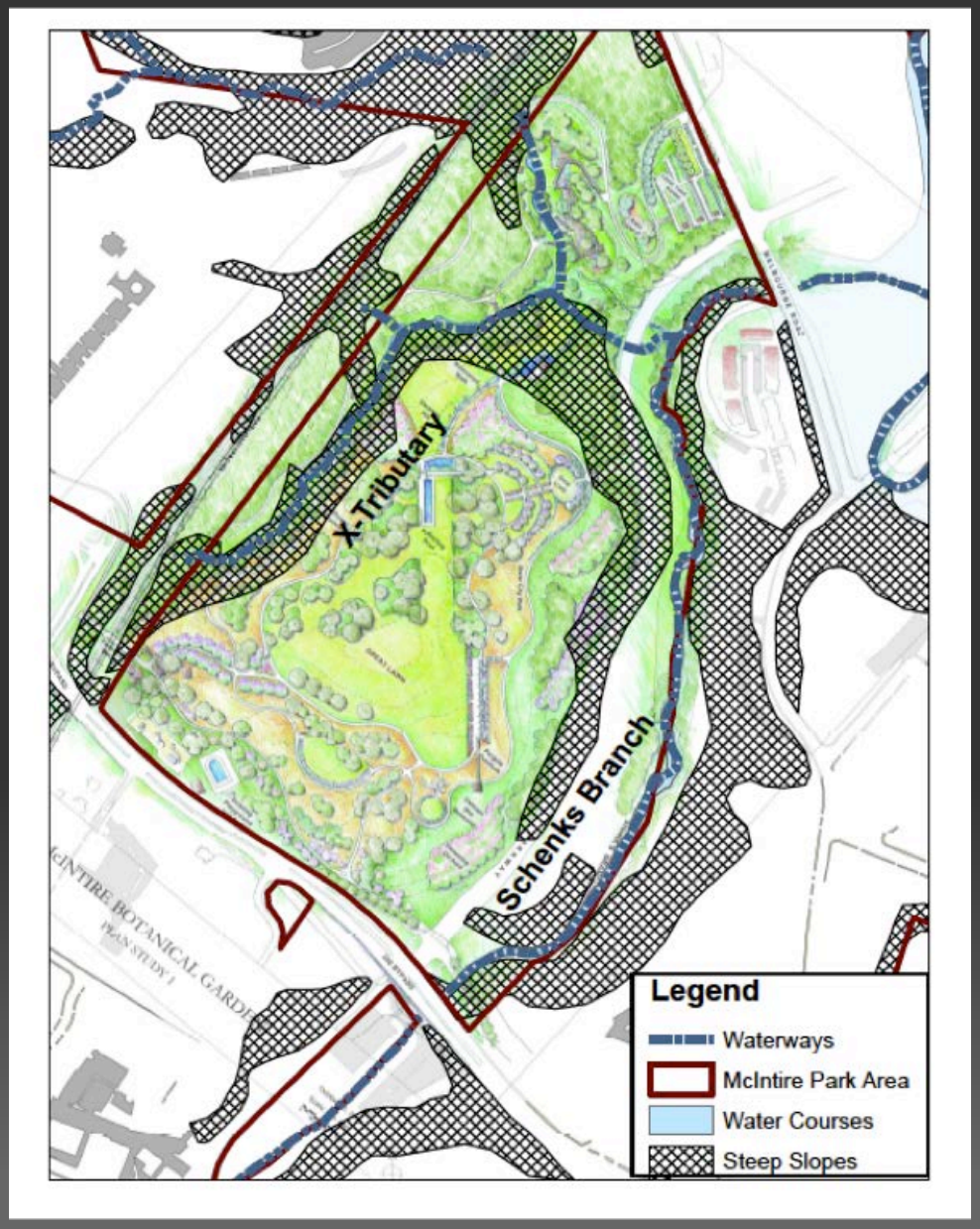
- <u>SCHENKS:</u>
  - 2500 linear feet
  - Avg. depth: 7 inches
  - Avg. width: 6 feet
  - Drainage area: 2.2 square miles

- <u>X-TRIBUTARY:</u>
  - Intermittent, channel is defined by storm flow (not perennial)

Water - Other Features

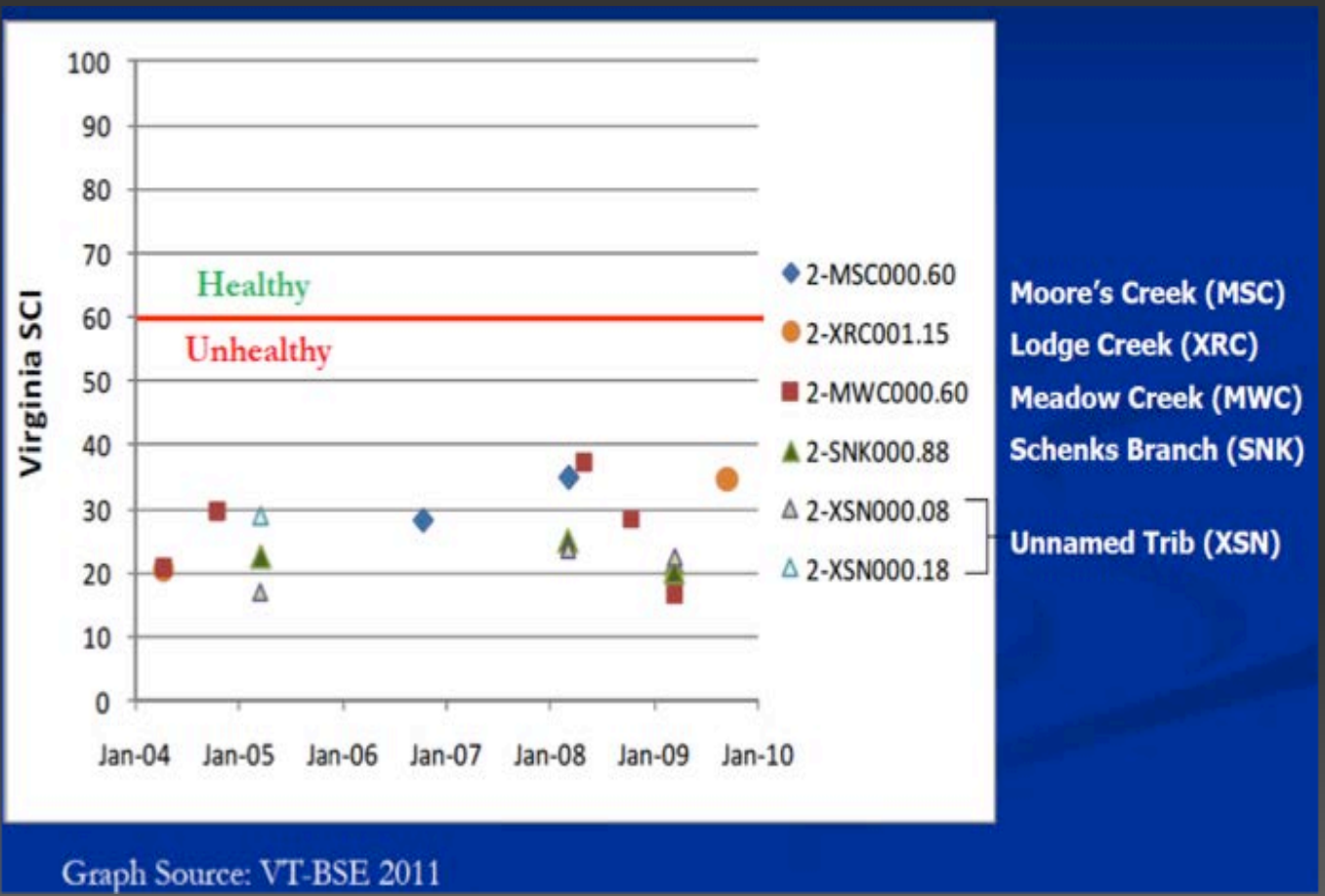
Waterfall, tree cover, steep slopes





Water - Impairment

- Schenks Branch is impaired; TMDL plan is in development



Graph Source: VT-BSE 2011

- Impairments from hydraulic modifications, excess sediment and chlordane
- Percent impervious surfaces in watershed:
  - Schenks: 32.6%
  - Lodge: 30.7%
  - Meadow: 31.9%

Water - Context

- Route 250 Interchange and McIntire Road Extended/ Meadow Creek Parkway
  - Potential impacts to Schenks Branch and X-Tributary
  - Additional impervious surfaces
  - Botanical garden would further affect these waterways

Rendered Master Plan
McIntire Road Extended/Meadow Creek Parkway
City of Charlottesville/Albemarle County

Water - Relevant Regulations

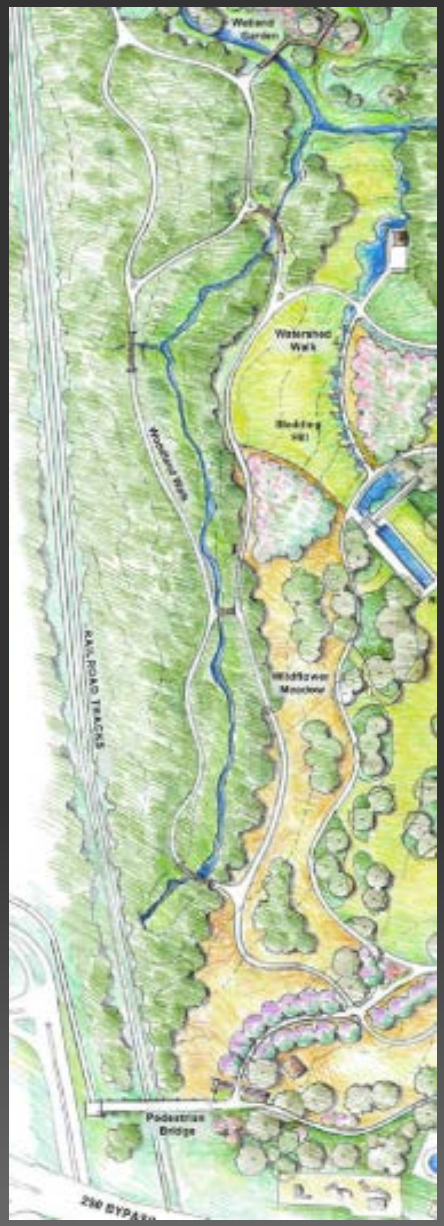
- Compliance with Water Protection Ordinance:
  - City's stormwater management program
  - Stormwater plan and permit for land disturbance (erosion and sediment control)
  - Compliance with state stormwater regulations
- Compliance with Steep Slopes Ordinance
  - Avoid development in critical slopes areas
- Coordination with DEQ on TMDL plan for Schenks (still in development)

Water - Potential Impacts

1. Stormwater Runoff
2. Flow Disruption to Existing Tributaries
3. Increased Water Resource Consumption

Water - Stormwater Runoff

Alternative 1



Alternative 1b

Water - Flow Disruption

Alternative 1b

Water - Increased Consumption

Alternative 1

Alternative 1b

Water - Critique

Alternative 1

- Construction
  - No significant impacts
- Operation
  - Little impact, impervious surfaces, questionable water feature systems
- Maturity
  - Positive impacts from natural infiltration rain & wetland garden systems, new tree border

Alternative 1b

- Construction
  - vehicle & machinery intrusion, topography alteration
- Operation
  - Potential for significant impact with addition of multiple water features
- Maturity
  - Potential for negative impacts from more intensive construction process & larger water features

Water - Mitigation

- Use pervious paving systems
- Design natural water features to maintain the existing flow patterns of the X-Tributary & Schenks Branch
- Limit construction vehicle & machinery activity
- Use silt fencing during construction
- Implement a water management plan

Visual Report - Introduction

Visual resources evaluated with respect to:

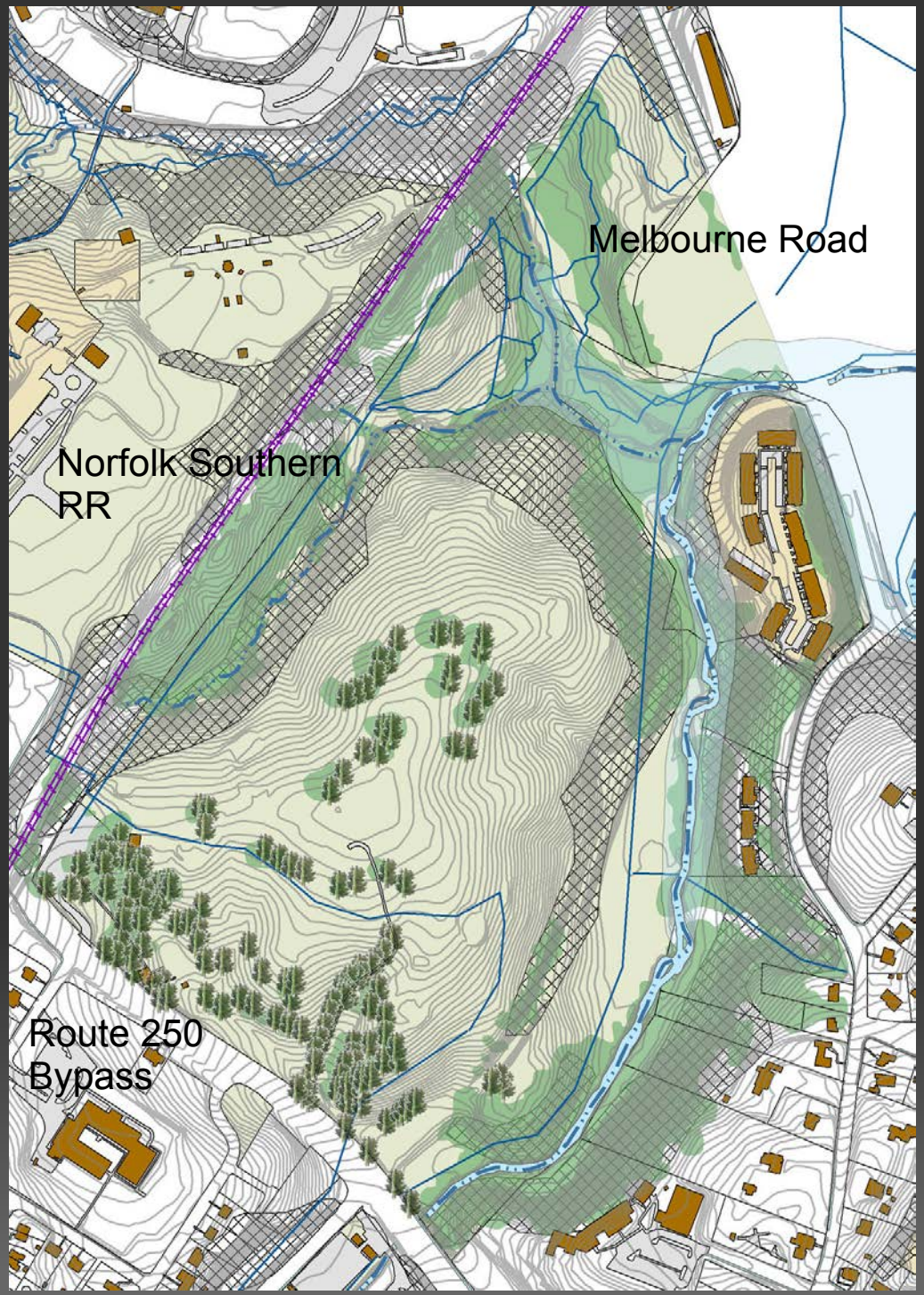
- Existing Conditions
- Alternative 1 and 1B
  - Construction
  - Operation
  - Maturation
- Overall, minimal negative impacts to visual resources are expected and opportunities exist to improve existing conditions

Visual - Existing Conditions

- Existing character is that of pastoral golf course and municipal park
- Maintained lawn and meadowland dominate rolling terrain, and a grove of mature oak trees crown the hillside

Visual - Assessment

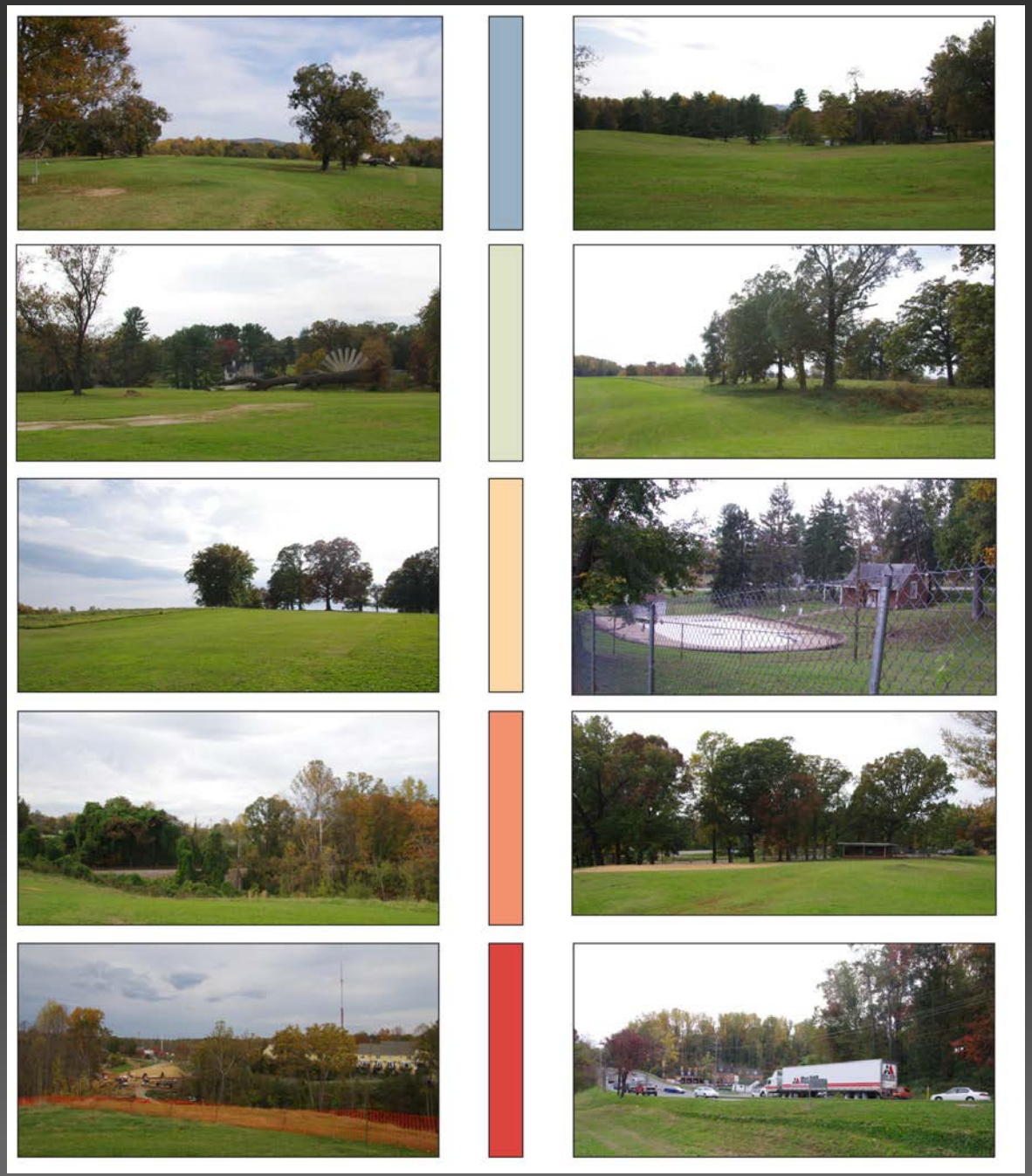
- Visual assessment conducted to establish baseline conditions and evaluate future impacts of two alternatives
- Garden will be visible from neighboring residential areas, Rt 250 Bypass, 250 Interchange, Meadowcreek Parkway and Melbourne Road



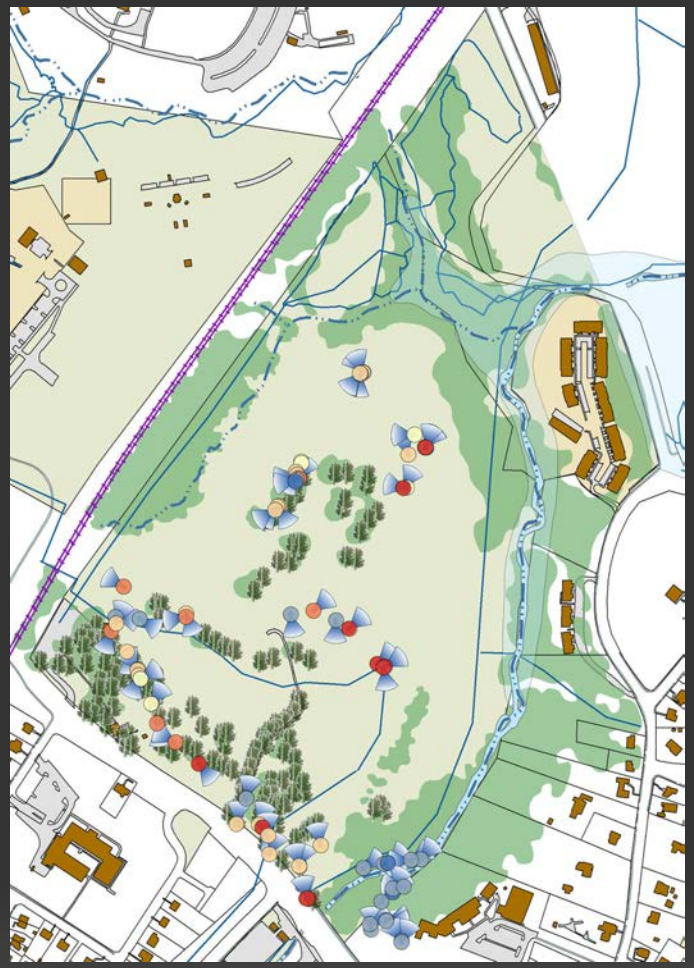
Visual - Baseline

Baseline:

1. Very good, preserve
2. Good, preserve if possible
3. Moderately good view,
4. Poor view, screen if possible
5. Very poor view, must screen



Visual



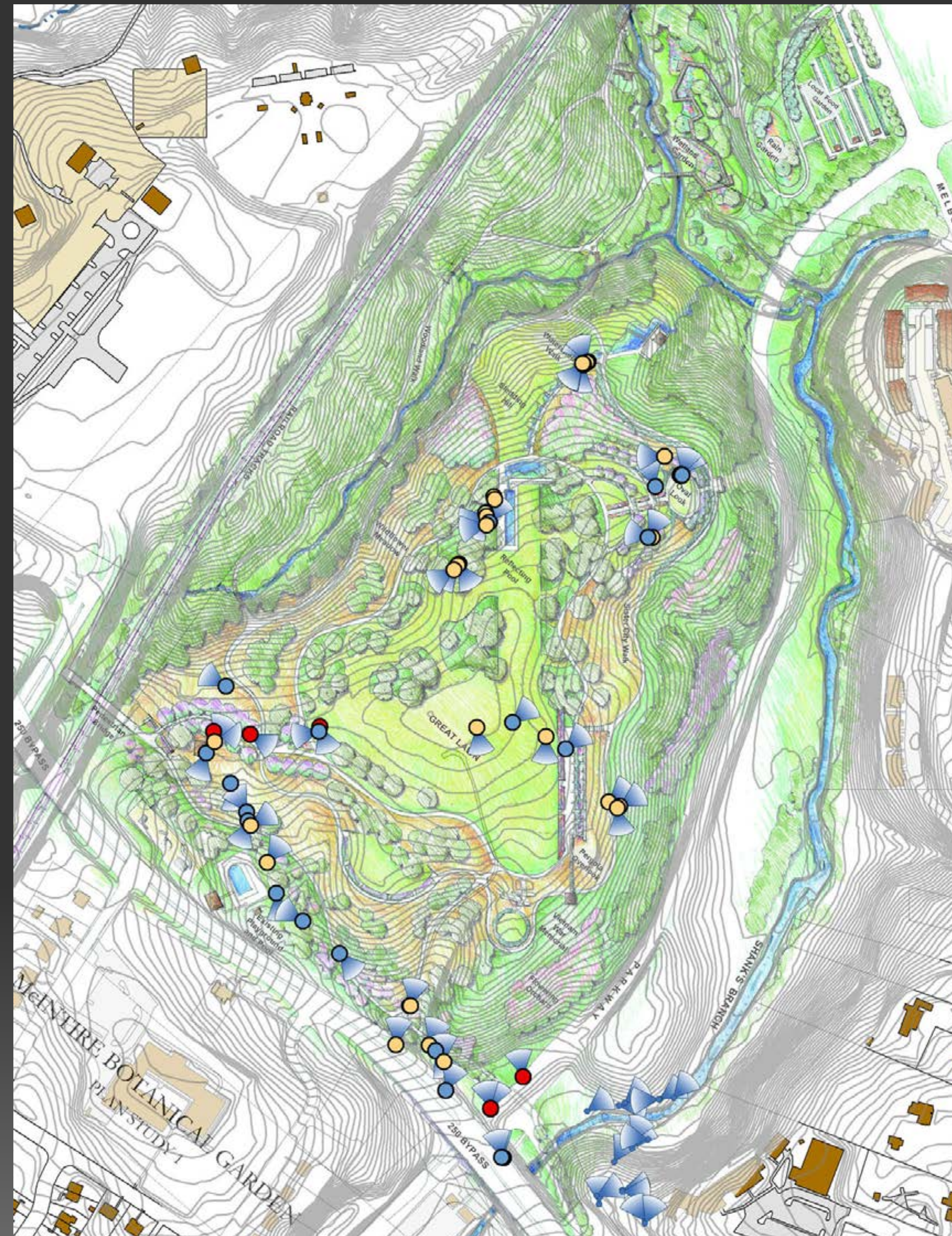
Legend

- 0 - null rating
- 1 - very good views, preserve
- 2 - good views, preserve if possible
- 3 - moderately good views, could be used to project's advantage
- 4 - poor views, screen if possible
- 5 - very poor views, must screen
- direction of view

Visual – Critique

Alternative 1

- Baseline points overlaid with alternative plans
- Team made generalized predictions to determine impacts of views
- This plan will create new visual interest from seasonal ornamentals, day-lighting streams, and carefully planned pathways



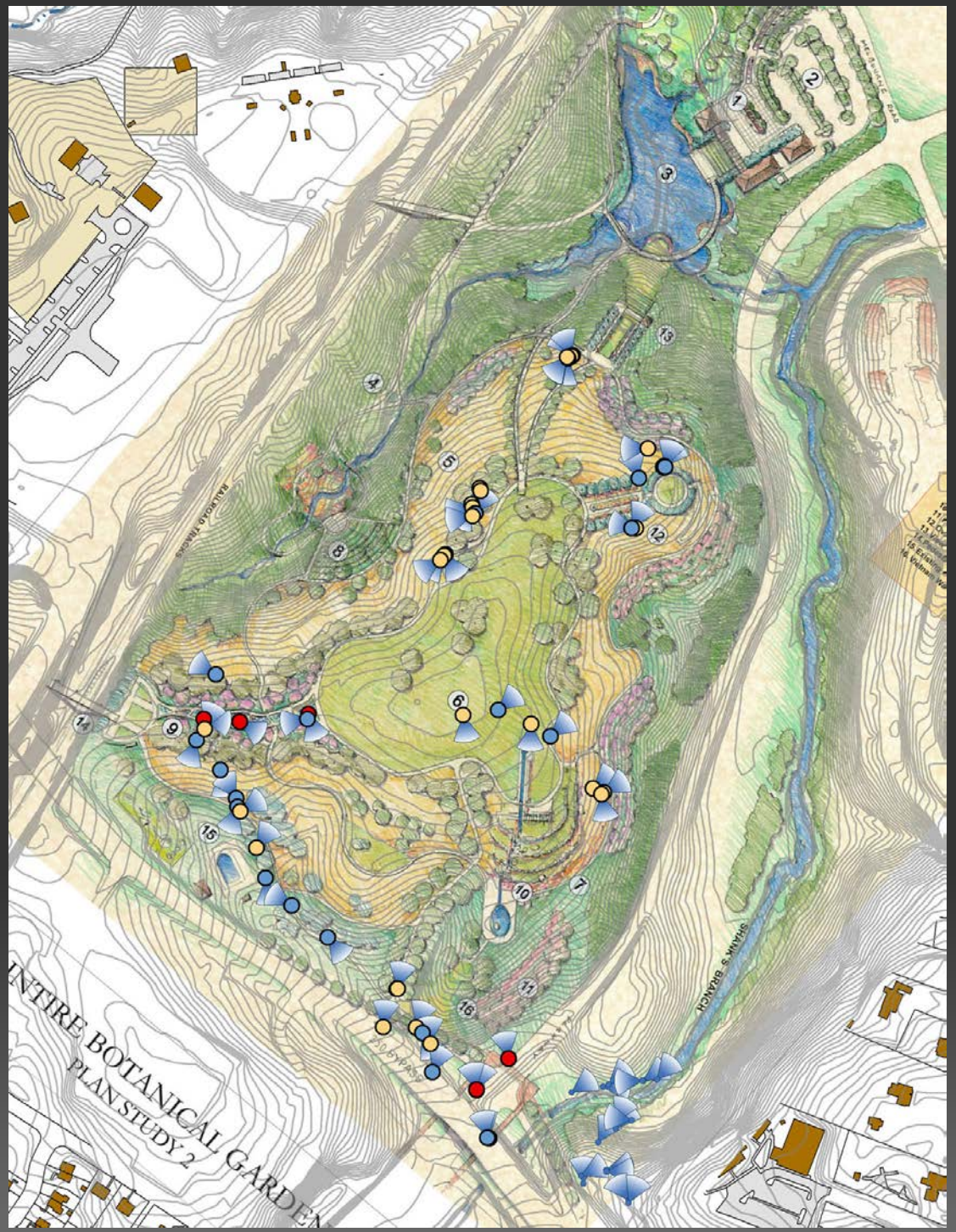
Legend

- 1 - Improved view
- 2 - No significant change
- 3 - Potentially degraded view
- Out of study area

Visual – Critique

Alternative 1b

- More intensive interventions may require more grading and soil transport
- Likely to be more facility structures due to intensive uses



Visual - Critique

Construction: Negative visual impacts from demolition, clearing, and grubbing, and movement of construction vehicles, material stockpiling, site grading, hardscape construction and planting

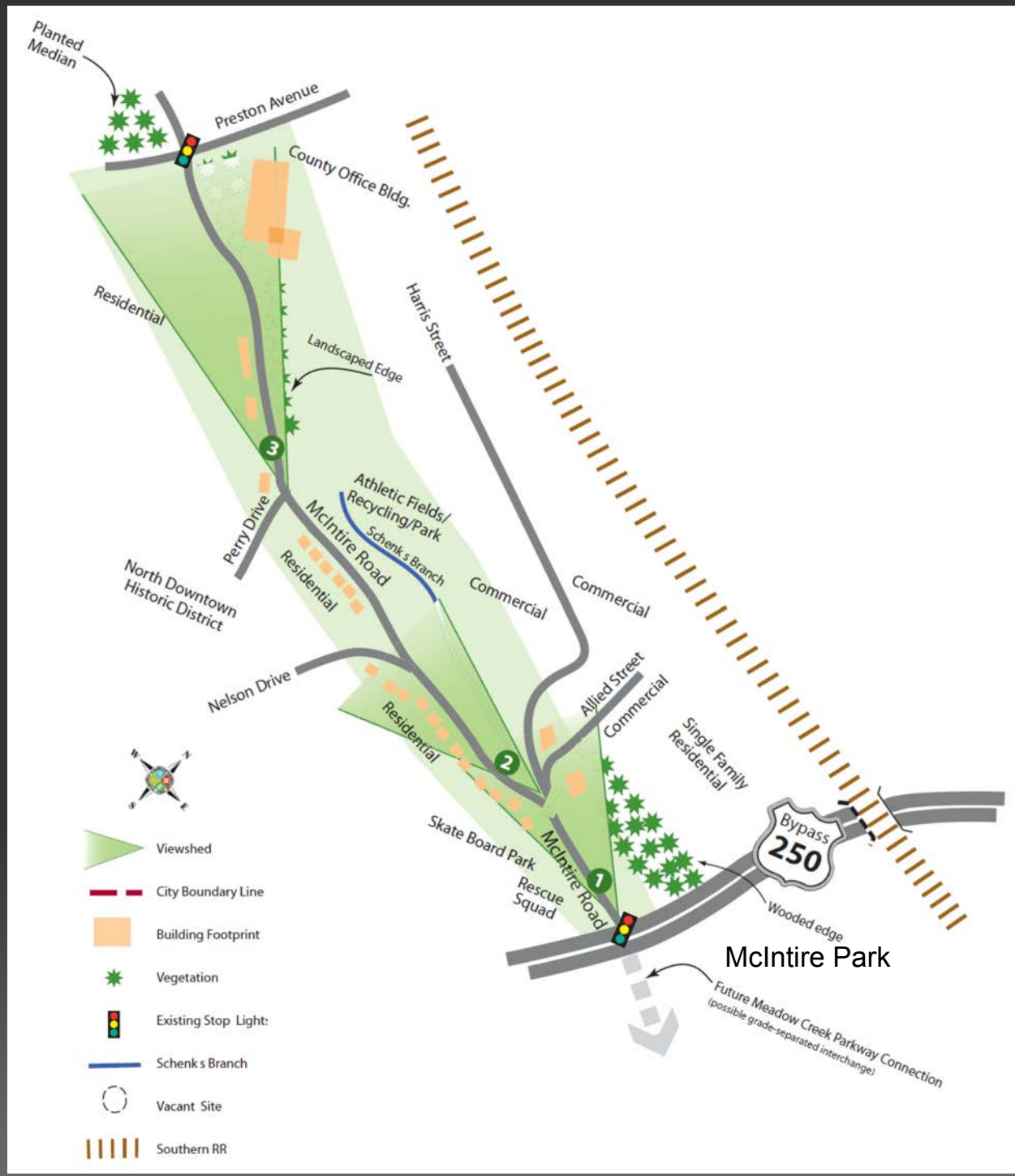
Operation: Minimal negative impacts occurring, if appropriate buffers and screen are used
Impacts could be from parking lots, lighting, fencing, and construction activities

Maturity: Minimal negative impacts, if site is monitored and maintained appropriately

Visual

McIntire Road Entrance Corridor

- Special land-use requirements may be extended to the future Meadow Creek Parkway
- Structures will need approval from BAR
- Landscape and vegetative screening have specific requirements



Visual - Mitigation

- Select compatible colors and materials for built structures
- Select unobtrusive lighting
- Appropriately site trails and benches to minimize negative visual impacts of surroundings
- Careful planting of vegetative screens will improve over time
- Site utilities and electrical wires should be buried underground to minimize visual impact

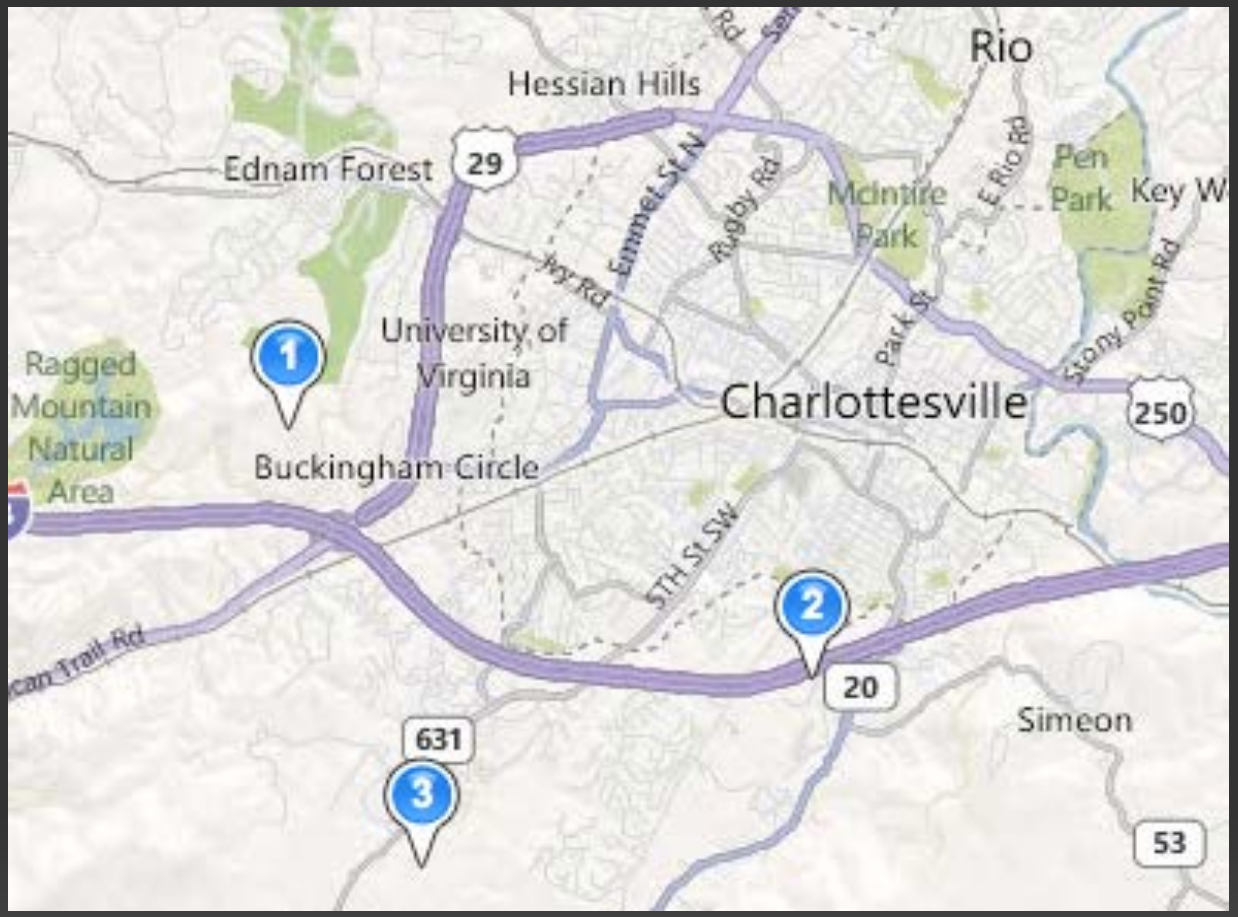
Conclusions

- Alternative 1 preferred
- A thorough evaluation requires more detailed information about the plans:
  - Specific plantings
  - Additional research on existing tree cover and sequestration potential

There may be alternative sites available for creating a local botanical garden.

Alternative Sites

1. Ragged Mountain Area
2. Piedmont Virginia Community College
3. Biscuit Run State Park



Map created with Bing Maps (c) Microsoft 2011 (c) NAVQUEST 2011