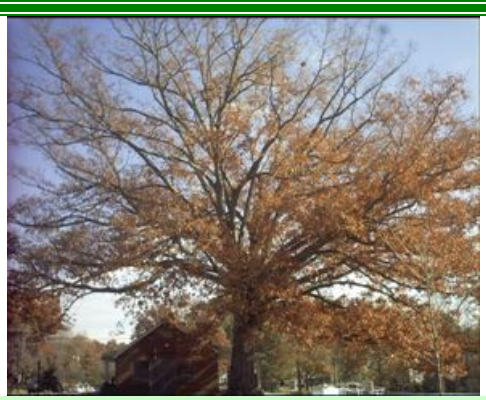




City of Charlottesville, Virginia

URBAN FOREST MANAGEMENT PLAN

May 2009

Table of Contents

Executive Summary

An Urban Forest Management Plan is intended to provide a framework for ensuring that the trees and forests of our City are appropriately cared for according to our community goals. It is a guide for City staff, landowners, utility companies, developers, and residents to follow when making decisions about trees, and the land they live on and are responsible for.

The City has a vision of becoming a Green City into the future such that:

> *Charlottesville citizens live in a community with a vibrant forest, tree-lined streets, and lush green neighborhoods. We have an extensive natural trail system, along with healthy rivers and streams. We have clean air and water, we emphasize recycling and reuse, and we minimize stormwater runoff. Our homes and buildings are sustainably designed and energy efficient – (Charlottesville City Council Vision- 2025)*

This plan discusses the benefits of trees and forests in urban areas, the current state of our forests, the people and programs that manage them, and proposed goals and actions to protect, enhance, and expand the urban forest and to promote staff, business, and citizen awareness and stewardship of this resource. The plan complements and furthers the Comprehensive Plan for the City.

Urban forests compete with many other human needs in a built environment, such as houses, sidewalks, and utility lines. It is very important to put the right tree in the right place, or the tree will either fail to thrive or create a myriad of side-effects that can be costly and detrimental to human habitation.

Basic goals of the Urban Forest Management Plan include:

- ***Preservation*** and ***Protection*** of existing forested areas and trees
- ***Enhancement*** and ***Restoration*** of forest quality
- ***Expansion*** of planted areas and total number of trees
- ***Monitoring*** and ***Documentation*** over time to track progress and needs
- ***Education*** and ***Outreach*** to involve the entire community
- ***Sustainability*** and ***Maintenance*** of plan and related codes and guides

The City's 2007 Comprehensive Plan established a goal of 40% tree canopy coverage for the City. This goal was based upon data that suggested the canopy coverage at the time was 31.6%. Further and subsequent analysis, which is detailed later in this plan, revealed that the City's current canopy coverage is actually much higher, at 46%. While this is good news, there are certain parts of the City that are deficient in their canopy coverage, and the overall quality of the urban forest still requires management, protection, and improvement. This plan will guide efforts to ensure that all areas of the City have the appropriate tree and forest presence based on land use and density characteristics.

Introduction to the Urban Forest Management Plan

Plan Purpose

The Urban Forest Management Plan has been developed to help improve and coordinate management of trees and forests in the City of Charlottesville. Over the years, various studies, proposals, and recommendations related to urban forestry have been made. This plan aims to consolidate these efforts into one comprehensive and cohesive document that will help ensure our management program can move forward in a planned and organized fashion based on sound science and policies. The plan is not meant to be a static report, but rather a plan that is continually updated and refreshed over time, much like the forest itself.

This plan aims to provide equitable forest benefits for all City residents, including access to forested areas for recreation and education, improved human and environmental health, and monetary savings generated by maintaining proper tree canopy levels.

Background & Linkage to Comprehensive Plan

For several years, the City of Charlottesville has undertaken a commitment to the stewardship of natural resources. The Charlottesville City Council has supported numerous initiatives in support of environmental sustainability within the community and the region. The City's 2025 Vision Statement presents Charlottesville as 'A leader in innovation, environmental sustainability, and social and economic justice.' Chapter Eight (8), Environment, of the *2007 Comprehensive Plan* for the City states in part:

> **"**The City of Charlottesville's environment includes a broad spectrum of elements and surroundings created by both natural and built systems. … Charlottesville's natural environment, which includes water, land, air, as well as its plant, animal and human inhabitants is equally important in providing a habitable City and is largely dependent on 'green infrastructure.' Similar to the 'grey infrastructure' of the built environment, 'green infrastructure' is the interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas, greenways, parks, and other conservation lands and forests and open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to health and quality of life "

The City of Charlottesville lies entirely within the Rivanna River watershed, a part of the larger James River and Chesapeake Bay watersheds. The major waterways within the City, including the Rivanna River, Meadow Creek and Moores Creek, along with their tributaries, including Lodge Creek, Meade Creek, Pollock's Branch, Rock Creek, St. Charles Creek, Meadowbrook Creek, Fry's Spring, and Schenk's Branch, flow through both public and private property and are flanked by major riparian buffer areas. These forested stream valleys contribute healthy tree canopy, improve water and air quality and provide wildlife habitat, stream temperature regulation, and food for fish and other aquatic life. However, the health of these streams is undermined by uncontrolled stormwater runoff that contributes to major stream bank erosion, destruction of mature healthy trees, and the delivery of harmful pollutants. Healthy, diverse populations of native fish and other

aquatic life cannot survive in urban streams severely affected by urban runoff. Invasive plant seeds are also spread by floodwaters and stormwater runoff.

Public perception of forest loss over time has led to a demand for improved tools for managing the trees in our City, both on public and private lands. The most recent Comprehensive Plan begins to address this issue, setting the stage for development of this plan. One of the four major sets of objectives in Chapter 8 of the *2007 Comprehensive Plan* focuses on the Urban Forest, with the stated Goal:

> ***Establish and maintain a 40% minimum urban tree canopy level in Charlottesville.***
>
> *Plan, develop and implement an Urban Forest Management Plan, which will serve as the City's comprehensive, long-range strategy for protecting, managing and expanding Charlottesville's urban tree canopy on public lands including streets, parks, schools and other City-owned properties as well as private lands.*

To that end, staff began working in mid-2007 on formulating the elements of an Urban Forest Management Plan (UFMP). Staff from the Department of Parks and Recreation, the Environmental Office of the Department of Public Works and Neighborhood Development Services met several times to perform a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. Based upon that analysis, staff then began to prioritize identified items and create strategic elements and tactical actions for meeting the stated 40 percent tree canopy goal. (The complete results of the SWOT Analysis are included in Appendix 7).

It was clear through this analysis that the City is well positioned to undertake this effort and ensure its success. There is a clear recognition that the development and execution of this plan is a community priority and is directly aligned with City Council Vision Statements, the Comprehensive Plan and the Strategic Plan.

Current and Previous Urban Forestry Related Studies and Efforts

The City's commitment to environmental sustainability and management of green infrastructure resources is a key component in ensuring that the community's high quality of living can be maintained for years to come. Over the past several years, the City has taken the following steps that support this commitment:

1975 Street Tree Inventory

In 1975 the City developed a Street Tree Master Plan, which made general and specific recommendations on where and how to protect and expand street tree coverage in the City.

1998 Thomas Jefferson Planning District Sustainability Accords

These Accords were developed and distilled from a large set of objectives and concerns evaluated by the Thomas Jefferson Sustainability Committee from 1994 to 1998. Taken together, these Accords create an agenda on which the community can agree. Individually, each one provides an opportunity for individual and community action toward sustainability for the region. The Accords were included as part of the 2001 City Comprehensive Plan.

2002 Street Tree Inventory
Using a Global Positioning System (GPS) unit, major streets were field checked for trees in the City right-of-way, and limited information about each tree was collected. This data resides in the City Geographic Information System (GIS) and can be compared to future tree inventories to help track the state of street trees managed by the City.

2003 Environmental Sustainability Policy
This Policy notes that Charlottesville is building a distinctive world-class small city with the vision of ensuring the quality and sustainability of the natural and built environment as part of the City's responsibility to future generations. The policy adopted four environmental stewardship principles: conservation, cooperation, environmental compliance and risk reduction, and restoration. An important element of the Policy is the commitment to the development and implementation of an Environmental Management System (EMS) based upon the ISO 14001 International Standard. The EMS aims to reduce the environmental impacts of the City's operations while fostering a safer and healthier work environment for its employees. The Parks and Recreation Department has been operating under the EMS since 2003 and the EMS continues to be implemented throughout the rest of the City in a phased approach.

2004 Water Protection Ordinance
The Water Protection Ordinance amended Chapter 34 of the City Code (Erosion and Sediment Control) and re-designated Chapter 10 as the City's Water Protection Ordinance. The ordinance, adopted in September of 2004, accomplished the following:

- Amended and updated the City's local erosion and sediment control program,
- Established a local stormwater management program,
- Established protection of 100-foot wide riparian stream buffers on properties adjacent to the Rivanna River, Moores Creek, and Meadow Creek, and
- Prohibited illicit discharges and connections to the City's storm sewer system.

2005 Water Quality Management Study
This Study conducted and incorporated the results of stream corridor assessments, collated historic information regarding the condition of urban waterways conditions, completed mapping of the streams, and includes recommendations for future strategies for the City to consider as it seeks to protect its waterways and community health.

2005 Parks and Recreation Needs Assessment
This report documented the clear need and desire on the part of the citizens of Charlottesville to preserve natural environments and open space. Selected survey results indicated that:

- 81% of survey respondents were supportive of purchasing land for passive park use
- 68% of survey respondents were supportive of protecting environmental areas in the City

- 59% of households indicate a need for natural trails/nature center
- 57% of households indicate a need for natural areas and wildlife habitat

2006 Thomas Jefferson Soil and Water Conservation District Membership

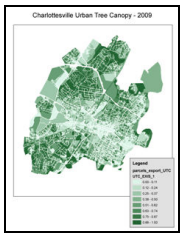
In November 2006, the Virginia Soil and Water Conservation Board approved a petition by the City of Charlottesville requesting inclusion in the Thomas Jefferson Soil and Water Conservation District (TJSWCD). The TJSWCD's mission is: "To exercise leadership in promoting natural resource protection."

2006 US Mayors Climate Protection Agreement Signatory

This agreement sets ambitious goals for improving air quality as part of the City's commitment to addressing global climate change. The City is implementing a Climate Protection Program in order to reduce greenhouse gas emissions from the community. The Mayor's office had an intern compile "Ideas for promoting tree coverage and tree planting programs in Charlottesville" in 2006, information from which was used in developing this plan.

2006 Citizen Committee for Environmental Sustainability

This Committee was charged with supporting City and regional commitment to environmental performance and stewardship, in line with the 1998 Sustainability Accords and the 2003 Environmental Sustainability Policy, and the U.S. Mayor's Climate Protection Agreement." The committee developed actionable recommendations for the City Council to consider.



2006 University of Virginia Urban Tree Canopy Study

Based on calculations made by a University of Virginia environmental planning class using CityGreen software in December 2006, it was determined that Charlottesville's urban tree canopy covered approximately 2,096 acres, or 31.6 percent of the City's total land area (6,656 acres). The canopy was estimated to absorb and filter more than 203,665 lbs. of air pollutants each year while storing up to 90,194 tons of carbon in biomass. According to the results of this analysis, the number of urban trees and extent of urban tree canopy in Charlottesville did not meet state averages or recommended national guidelines. (*See Appendix 8 for full version)*

2007 Tree City USA Designation

In April of 2007, Charlottesville received its designation as a Tree City USA from the National Arbor Day Foundation. This award demonstrates that the City has an urban forest program, spends

at least $2.00 per capita on trees, has an urban forester on staff, and has a tree ordinance. Tree City USA designation is a designation that showcases the City's appreciation and work for healthy trees and forests. The City has more work to do to improve and maintain its forests, and although this designation does not provide financial resources, the partnership with the National Arbor Day Foundation and access to the many resources the group has to offer will help Charlottesville continue to be a Tree City into the future.

2007 Invasive Plant Inventory and Management Plan

Non-native plant species (commonly referred to as 'invasives') are established and have spread throughout the City, both in developed and non-developed areas. Land Planning and Development Associates was hired to identify and map the presence of invasive plants and vines in City parks and school properties. The City is working with volunteers and staff to remove or hinder invasives and continues to monitor and restore affected lands over time to contain or eradicate these species. AmeriCorps volunteers spent six weeks of the spring of 2008 cutting vines out of trees on City lands in the areas identified as the highest priority in the Invasives Management Plan. One example of parkland in the midst of invasives management is Meadowcreek Gardens near Morton Drive. The full invasives report is too long to be included in the appendices to this report, but is available through the Parks Department, and maps are available in GIS format to assist in tracking, containment, and removal efforts over time.

State of the Urban Forest

Charlottesville's urban tree canopy is an important component of the community's green infrastructure. Our trees contribute to the City's beauty and provide a healthful environment for people, animals and birds. Forested areas provide opportunities for enjoying nature and environmental education along with numerous other environmental benefits. Within our urbanized ecosystem, trees play an important role. Amongst many associated benefits, they:

- Create shade and protection from weather and flooding
- Help improve air quality by removing significant amounts of particulate pollution from the atmosphere
- Provide areas for recreation and escape from urban pressures
- Protect water quality by absorbing and filtering stormwater runoff and recharging groundwater
- Conserve land by preventing soil erosion and decreasing the volume of stormwater run-off
- Moderate local climate by mitigating urban heat island effects
- Reduce energy demand from buildings
- Mitigate global climate change by sequestering carbon
- Provide a critical source of food and habitat for wildlife
- Buffer noise, wind, and differing land uses
- Increase real estate values
- Protect biodiversity

Urban forests can be considered in three general forms, large forested stands, smaller fragments of forest, and narrow corridors connecting fragments and stands. Individual or "specimen" trees standing by themselves in open areas are another component of the overall urban canopy. Charlottesville has examples of each type, each of which will have slight differences in uses, values, and management.

There are a number of large, particularly beautiful and/or historic trees within the City. These might be called "Champion", "Heritage", "Remarkable", or other names which imply their importance to residents. Charlottesville already has some trees included on state lists, such as the large white oak at Forest Hills Park. Protection of these special trees is of great concern to our citizens.

Charlottesville's forests have a lot of friends. The general public plays a major role in decision making and physical work involved in protecting and managing the urban forests of Charlottesville. Citizens have long been a voice in support of the forests, helping the City achieve the results it has thus far in protecting and expanding our urban canopy. There is a "Funds for the Forests" public account that people and organizations can donate to in support of City tree planting and urban forest management. Individuals and groups often spend time keeping the forests clear of invasives and litter, and helping to plant new trees. Private businesses are also supportive of the public efforts to retain a healthy forest canopy.

Urban Forest Analysis and Data Collection

2008 Urban Forest Assessment

The Parks and Recreation Department hired Environmental Services, Inc. to identify and analyze all trees on City owned lands including parks, schools, City Hall and other built properties, street medians and other known street tree locations, and cemeteries. The study provided GPS location, number, species, variety, DBH (size), condition, monetary value, and other data on all trees for which the City has maintenance responsibility. For large forested areas, plot samples were taken and extrapolated to determine the general inventory and condition of trees. This data is critical in determining the species and age diversity of the trees, amount of invasive trees, and known maintenance needs for publicly managed trees and forests. The data is in GIS format, providing improved management and maintenance decision making tools regarding the urban forest in a format that has the ability to be updated, maintained and integrated into other City mapping and planning efforts. Future inventories will be helpful in tracking the management needs of the City's trees over time. Improvements to the GIS layer for parcels will enable more precise distinction between public and private street trees. (*See Appendix 2 for full draft)*

Diversity - Species diversity stabilizes the urban forest and helps protect against insect and disease infestations that could decimate large scale monoculture plantings. The diversity chart (Figure 2 in Appendix 2) shows a good level of mixed species throughout the urban forest as a whole (Pie Chart). Our most numerous species is 14% of the total (genus: cornus). Planning for tree plantings should always consider species diversity as a critical component.

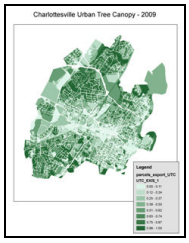
Diameter Distribution (chart) – The diameter distribution chart (Figure 1 in Appendix 2) shows a relatively young urban forest, which is consistent with development and increased tree planting on Parks and School grounds over the past 30- 40 years.

Estimated Appraised Value – The value of the trees in non-forested areas is approximately 34.1 million dollars. This figure is significant and justifies budgeting for maintenance and management to protect this resource.

Condition Rating and Risk/Hazard Assessment - These attributes provide information regarding an individual tree's health and its potential risk to people and nearby infrastructure based on its location and surrounding land use. This information is helpful in prioritizing inspections for maintenance.

Potential Planting Spaces – These locations will serve as a guide for future planting possibilities.

Forested Plot Data – Data shows the overall condition and diversity of the wooded portions of schools and parks is healthy and that the density varies with the age of the stand.



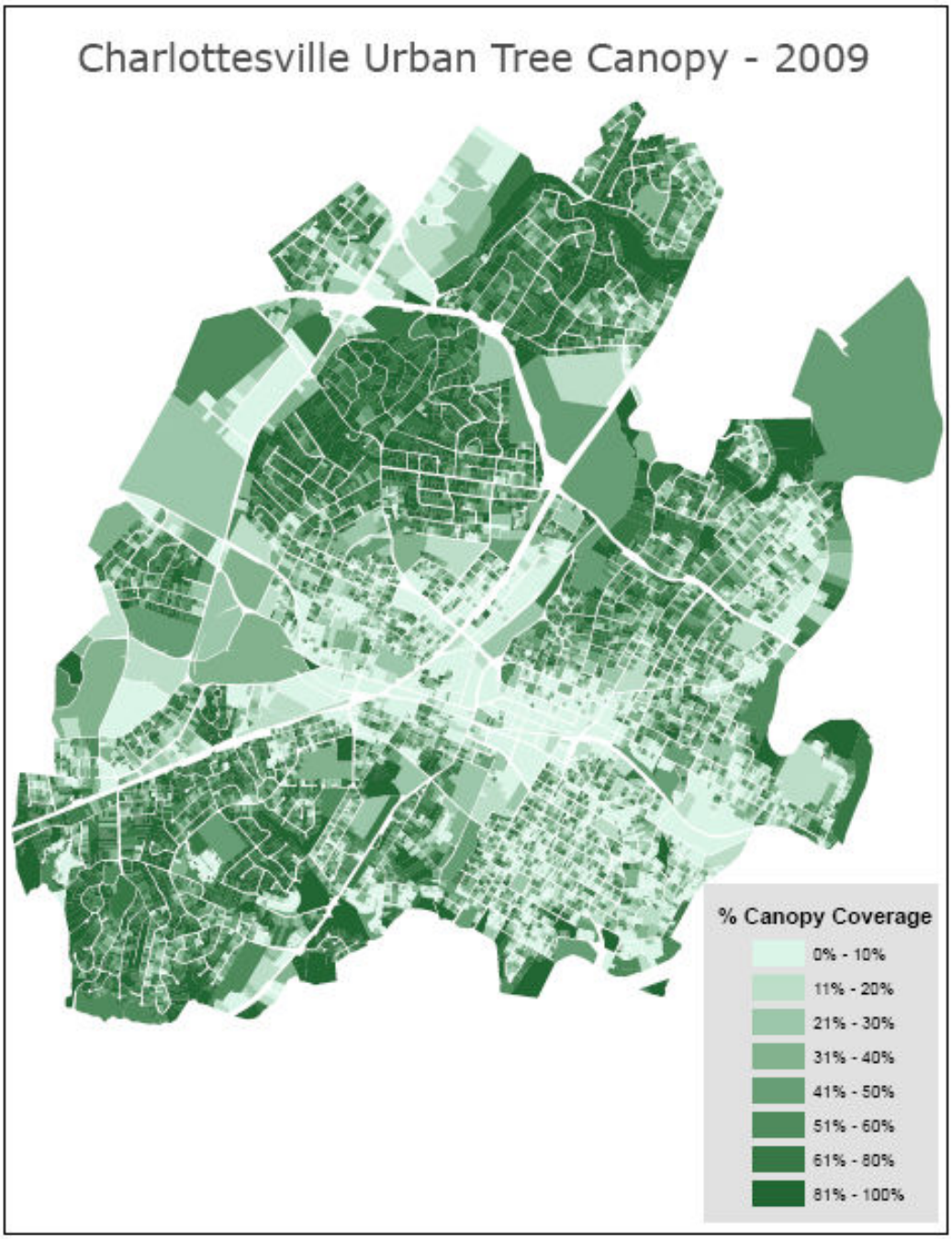
2009 Urban Tree Canopy Assessment

Working in cooperation with the Virginia Department of Forestry and Virginia Tech, the City conducted an analysis of the overall tree canopy for the land within the City limit, whether public or private. Aerial photography was taken with the leaves on the trees and included infrared and multi-spectral images for ease of analysis. GIS was used to analyze the photography and determine how much of the City has canopy coverage. Charlottesville was one of five localities in the Chesapeake Bay watershed to receive this analysis in order to refine the process in preparation of studying much more of the watershed in a similar manner.

Data is in GIS format to facilitate analysis and allow easy integration into other City mapping and planning efforts. Canopy coverage can be mapped by individual parcels, zones, or by land owner and other categories to create various reports and to determine which areas may be lacking in desired canopy coverage.

The data from the analysis shows that the City has an overall canopy coverage of 46.6%. This is higher than the 2007 Comprehensive Plan goal of 40%. The City will also be identifying different target canopy goals for different areas of the City, such as residential and business districts. With these new data in hand, we can see which neighborhoods have higher or lower canopy coverage than the target goal for their land use. Forest management efforts can then focus on expansion areas lower than desired, whereas preservation and/or enhancement might rank higher in areas already above the desired goal. All management methods will be used in all areas of the City at varying level, and these data are very helpful in setting priorities for action.

The City has a copy of the GIS model used to analyze the air photos. This will allow the City to run its own future models with the most current and best data available to track our progress. (*see Appendix 3 for full draft)*



2009 Leaf-on canopy analysis of Charlottesville
Virginia Department of Forestry and Virginia Tech

Urban Forestry Management

In developing this plan, it must be recognized that less than half of the trees and forested land in the City are publicly owned, and therefore under direct public control. The rest of the trees are on private lands. Management techniques, rules, timing, and other factors are different depending on the ownership of the land on which the trees grow.

The Parks and Recreation Department is responsible for the care and maintenance of trees throughout the City on publicly owned property. These locations include parks, school grounds, trails, street rights-of-way, thoroughfares and highway medians, cemeteries, the Downtown Pedestrian Mall and other public properties. The Department's Urban Forester and the City's tree maintenance contractor are professionally certified by the International Society of Arboriculture (ISA) as Certified Arborists.

Our goal is to provide a safe, healthy, sustainable urban forest canopy on public land through the latest industry standards supported by the I.S.A. and by following best management practices (BMPs) for urban forestry, and to provide excellence in customer service regarding tree issues. Procedures for accomplishing this goal are implemented as follows:

- Public Safety: The Parks Division receives direct contact from the public, staff, other City departments and as a result of inspections. Evaluations of individual trees are conducted and an assessment of the tree's health is made by the Urban Forester. Corrective action is initiated by the Urban Forester if safety concerns are discovered. These actions may include hazardous and dead tree removal or pruning of dead and decayed wood that represent a danger to the public. This work is accomplished by a combination of Parks Division maintenance staff and a qualified tree maintenance contractor. Hazard trees are trees that cannot be maintained in a safe condition and have significant potential for failure causing damage and destruction to targets within striking distance. Trees located on the City owned right of way along streets represent the largest portion of possible and probable hazard trees and trees requiring corrective pruning to eliminate hazardous portions including dead branches and storm damage. Charlottesville has over 150 miles of streets and the right of way is not standard throughout the system. Some streets have a very wide right of way and some have very little. The Parks Division often requests the help of engineering staff to determine if a particular tree is on City property; as the Parks Division only maintains trees on public property.

- Tree Planting: Tree removals are recorded and replacements are planted as close to the original location as possible. Limiting factors are underground and overhead utilities, adequate space for tree growth, ability to remove enough of the removed tree's stump to allow for planting, and sight distance and road frontage issues. The ability to provide water to the new plantings is another important factor. There are industry BMPs which address most of these issues and the Parks Division follows these as closely as possible.

- Tree planting in our open space areas, undeveloped park and school ground areas, and along trails on City land is accomplished by a combination of staff and volunteers. Through the

efforts of the Parks Division, significant numbers of seedling trees are planted each year. Citizens often participate in neighborhood plantings on "adopt a spot" areas of City-owned land where the Parks Division provides the materials and leads the planting process and the neighborhood provides the follow-up maintenance required to ensure survival of the plants mainly through watering and weeding. Occasionally citizens donate funds for tree planting.

- Tree Conservation, Preservation and Protection: The Parks Division is committed to tree canopy and stream buffer conservation and preservation on City owned land which contains predominately wooded and undeveloped areas. The main threats to these areas in terms of loss of tree canopy and stream buffer are invasive plants and soil erosion. The invasives assessment shows the extent of the problem and suggests steps which can be taken to provide preservation and protection of these areas. Tree protection refers to active steps which can be taken to preserve trees from damage in construction areas. Recommendations on protection measures are made according to industry accepted standards. Damage to tree roots through inadequate protection measures accounts for most tree death on construction sites.

- Preventive Tree Maintenance: In the past three (3) years the Parks Division has implemented a preventive tree maintenance program in addition to ongoing corrective work. The ability to perform preventive work provides a healthier and more resilient urban forest through structural pruning, weight reduction, and formative work on young trees. This allows for reduced future costs by reducing damage from high winds and storms and reduction of future safety pruning needs.

- Information to Citizens: As part of the Park Division's commitment to customer service, information sharing and response to citizens requests regarding tree issues are priorities.

The Department of Neighborhood Development Services handles tree related planning for developments and property redevelopments. The Department of Public Works also responds to field reports and staff identification of tree issues in public drainage areas and structures.

Private property owners, including homeowners, businesses, and railroads, are responsible for the maintenance of trees on their lands. Outside of a development activity, private landowners can generally plant, prune, or remove trees at will. Regulating tree management on private property is limited in the Unites States and Virginia, unless that property is undergoing a development or redevelopment large enough to require public reviews or rezoning.

Volunteers and non-profits are also involved in managing the urban forest. Groups including Charlottesville Area Tree Stewards, Master Naturalists, Rivanna Trails Foundation, The Nature Conservancy, Rivanna Conservation Society, Boy Scouts, and others are all involved in various efforts to protect, enhance, and restore the forests, and are of tremendous value in providing education about and interpretation of the wooded areas of the City.

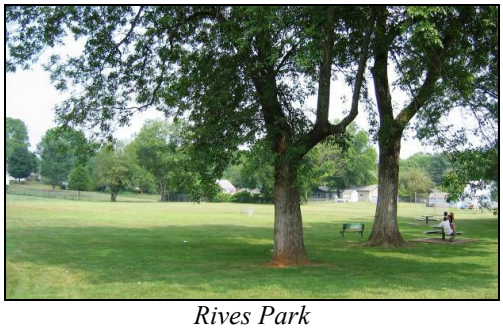
Urban Forestry Management Plan Elements

The elements outlined below represent the strategic areas under which the City can accomplish the goal of comprehensive urban forest and natural resource management. Within each element description on the following pages, issues related to each element will be defined and tactical actions to be undertaken over the next several years to bring this plan to fruition will be recommended.

- Plan Element 1 – Protection and Preservation
- Plan Element 2 – Enhancement and Restoration
- Plan Element 3 – Expansion
- Plan Element 4 – Monitoring and Documentation
- Plan Element 5 – Education and Outreach
- Plan Element 6 – Sustainability, Management, and Maintenance BMPs

This plan creates a system-wide approach necessary to achieve the City's resource stewardship vision over the long term. Some of the plan's strategies can be accomplished with existing fiscal and personnel resources, while others will require additional support. Volunteers and partnerships will play a critical role in carrying out many of the strategies, as will private landowners.

There are some obstacles to the successful implementation of this plan. The City does not currently have adequate parkland protections that ensure conservation in perpetuity. Existing City codes are not strong enough to require significant tree preservation in by-right developments. Frequently, hard infrastructure can win the battle over natural resource preservation, particularly with most power lines in the City being overhead and not underground. Invasive plant species have overtaken many City and private properties, creating a major threat to the tree canopy and overall ecosystem health. Holistic ecosystem approaches to tree planting in redevelopment or new street tree plantings are lacking, resulting in monocultures that are not conducive to long-term tree health.



Rives Park

Element 1 – Urban Forest Protection and Preservation

Protection of existing trees and forested lands is a critical component of a management plan. Ensuring that trees which are already here are protected physically and legally will help sustain the canopy coverage, and prevent further degradation of the urban forest. Trees on public lands are generally well cared for and protected from loss by rule. In Charlottesville, private land owners also generally exhibit a high respect for and stewardship of trees. There is either a perception or a reality, however, that Charlottesville is losing its tree coverage over time to land and infrastructure development. Staff and residents would like to avoid further loss of existing trees where possible.

There is a great commitment among City residents to preserve and protect natural areas. There are numerous methods to accomplish this, including the use of conservation easements, land acquisition, stronger requirements during site plan review and development inspections, fostering an ethos of stewardship on City projects, and further codifying the permanent protection of park lands.

The Parks and Recreation Needs Assessment survey revealed the following:

- 81% of survey respondents were supportive of purchasing land for passive park use
- 68% of survey respondents were supportive of protecting environmental areas in the City

These figures represent a strong commitment statistically and are indicative of the very high value Charlottesville residents place on the protection and preservation of natural areas. There is strong support for enhancement of current policies as well as new policies that would focus on preservation and protection of natural areas and their associated tree canopy.

Acquisition of environmentally sensitive areas through fee-simple acquisition, conservation easements, life estates, and other donation methods may be pursued to ensure the protection of riparian buffers and significant forest stands throughout the City. The City should pursue legal avenues that will allow and encourage these types of transactions to take place to ensure the preservation of its natural areas. This effort will also help the City to address the existing parkland deficiencies outlined in the 2007 Comprehensive Plan.

The City's primary means of park land protection is the Park Protection Overlay within the Zoning Ordinance. This overlay allows for the sale of parkland only by a supermajority of City Council, a minimum of four votes in support of a sale. This provision in the Code may be insufficient to provide permanent protection of public lands and natural resources. Placement of conservation easements over parklands or strengthening the zoning protection of parks may be the next step.

New development and redevelopment of existing properties in the City present opportunities to either lose or expand the urban forest. The development process also includes the potential for the acquisition of environmentally significant properties and/or for their permanent protection through rezoning and the site planning process. The continued redevelopment of land within the City presents a unique opportunity to strengthen existing legal authority to meet community values, and to partner with other jurisdictions in the Commonwealth to lobby the General Assembly for changes to the Code of Virginia that promote preservation.

The City has taken steps to protect trees within the authority of the existing laws of the Commonwealth. Other opportunities beyond current legal authority may exist to strengthen existing codes and ordinances to enhance preservation of the tree canopy. These ordinances apply generally to land development. Investigation of what other jurisdictions in the Commonwealth have been able to achieve must occur to ensure that Charlottesville is among the leaders in preserving its tree canopy.

One of the primary tools for ensuring that land being developed retains or creates desired canopy levels is the site planning process. The City has a Design Manual showing land developers how to meet the intent of the City Code, and includes policies and guides on tree protection and preservation. The City would like to ensure the Design Manual follows the spirit of what we are attempting in urban forestry management efforts. Weaknesses that could result in urban forest degradation need to be tightened up. Some of the areas that should be examined include:

- Add a section detailing street shading trees as larger specimens.
- Require planting strips on all new development.
- Allowing narrower roads if no on-street parking to accomplish above.
- Encourage pervious parking driveways and spaces.
- Require raised curbs to direct stormwater runoff but encourage them to direct runoff be directed into recessed planting strips designed for street shading trees.
- Mandates appropriate width planting strips, denying any other narrower planting strip that would only allow grass or ornamentals.
- Require sidewalk designs (tight radii, widest that maximizes the ROW in order to capture the most public space in perpetuity for greenery.
- Require I.S.A Certified Arborists on site plans.

Current Initiatives

- The City has performed a tree inventory on public properties within the City. GPS data, size, species and condition have been assessed to guide future management actions.
- Chapter 10 of City Code, the Water Protection Ordinance, Article IV, Stream Buffers, established protection of 100-foot riparian buffers along the Rivanna River, Meadow Creek, and Moore's Creek.
- The City is pursing a conservation easement for Greenbrier Park and other City property along Meadow Creek where a major stream restoration project will occur in partnership with The Nature Conservancy with funding from the Virginia Aquatic Resources Trust Fund. In total, this project will bring approximately 60 acres of land, the majority of which is forested, under permanent protection.
- Development of the planned greenway/trail system is leading to acquisition of land and easements along streams and forested areas into public use and management.

This plan element recommends moving forward with tree and urban forest protection on three fronts:

1. Protect existing trees and forest on public lands with improved legal protection of public trees and acquisition of private forested lands into public ownership and management.
2. Protect existing trees on developing private property through site planning & zoning.
3. Protect existing trees on private properties through education and support.

Tactical Actions

1.1 Investigate and establish Conservation Easements or other legal protections on existing and future City-owned lands to preserve lands in perpetuity.

1.2 Incorporate vacant City lots and/or other City lands that are unplanned for development into park system.

1.3 Pursue additional protection for park and school lands that requires either a unanimous City Council vote or public referendum before park or school lands are sold.

1.4 Pursue land acquisition funding to purchase forested lands, especially for greenway development and to address existing riparian buffer gaps.

1.5 Determine private properties that can be placed under conservation easement.

1.6 Coordinate with Charlottesville City Schools to develop a strategy for management of large forest stands on school property.

1.7 Ensure implementation of existing stream buffer requirements (Chapter 10 of City Code, Article IV, Stream Buffers), including the provision that requires the restoration or evolution by natural succession of vegetation within 25 feet of the top of protected stream banks.

1.8 Explore expansion of stream buffer protections for all other streams in the City, beyond Moores Creek, Meadow Creek, and the Rivanna River.

1.9 Establish grading and compaction guidelines that do not alter drainage and natural moisture patterns to preserve healthy trees and incorporate these standards into the Design Manual (e.g. site plan review).

1.10 Create tree protection guidebook for developers and private landowners that summarizes codes, laws, BMPs and goals for projects in the City.

1.11 Investigate the presence of champion, heritage and specimen trees. Identify, label, and preserve them. Work to improve legal protections for these trees.

1.12 Adopt a Tree Protection Ordinance that includes a method to establish penalties if trees are lost.

1.13 Establish a City-wide Stream Management Strategy and Maintenance Standards.

1.14 Conduct a thorough review of the current Code of Virginia, City Code, Chesapeake Bay Protection Ordinances, and the ordinances of other jurisdictions to ensure that the City is doing all it can to protect trees and natural resources.

1.15 Pursue desired state legislative changes through the General Assembly. Involve the Thomas Jefferson Planning District Commission legislative liaison in discussions regarding the General Assembly.

1.16 Establish Construction Performance and Maintenance bonds during redevelopment for tree and landscape work and ensure enforcement of bonding requirements. Utilize City Code to require this is done through ISA Certified Arborists and to ensure the bonding requirements are sufficient to maintain the sustainability of a riparian buffer or tree screen.

1.17 Analyze City by entry corridor, parks and schools, zoning categories, and sub-watersheds to determine existing canopy coverage to compare with target canopy coverage goals.

Element 2 – Urban Forest Enhancement and Restoration

Protection or acquisition of natural areas as parkland or the planting of new trees is not enough to assure urban forest preservation. Natural areas undergo constant change and require active management to retain their functions and values, especially in an urban environment such as Charlottesville where the demands of the built environment and development can place tremendous stresses on natural areas.

Many areas of the City that are forested today were farms and fields as recent as the mid 20th century. The trees and forests we see today are a mix of purposely planted areas and places that naturally vegetated once crops and animals were removed from the land. In that sense, residential development has lead to increased tree coverage within the City limits.

The quality of the urban forest, in terms of species diversity, age, general health, and level of invasives, varies across the City. Some locations with high quality mature hardwood forests include western McIntire Park, areas along Moore's and Meadow Creeks, and lower Pen Park. Most other forested areas in the City are somewhat degraded, most typically due to invasive species and vines that are preventing the trees from reaching their maximum potential. Improving the quality of existing forests is critical to ensuring they remain healthy stands into the future.

Current Initiatives

- The City has developed an Invasive Species Management Plan, which guides actions related to containing, suppressing, and eradicating invasive plant species.
- The City is collaborating with The Nature Conservancy on the Meadow Creek Stream Restoration Project, which will enhance and restore the riparian buffer along Meadow Creek with native tree plantings.

Tactical Actions

2.1 Implement the recommendations of the Invasive Species Management Plan.

2.2 Ensure adequate planning, staff and budget to manage trees on acquisitions that bring forested lands into public management.

2.3 Work with utilities on planning and design to get the right tree in the right place, use directional boring rather than trenching where possible, and to end tree topping and tunneling or convert to rubber coated wires.

2.4 Enhance and restore healthy forest canopy on vacant City lots and/or other City lands that are unplanned for development.

2.5 Establish a riparian buffer restoration program on private property.

2.6 Encourage forest species diversity to increase resistance to disease and pests, especially in development and redevelopment scenarios.

2.7 Plant native species where possible and use site adaptable trees otherwise.

Element 3 – Expansion

Planting new trees, especially in areas below targeted canopy levels, is the only way to expand the forest in urban areas. New trees can be used to add shade to hot areas, buffer differing land uses, create wind breaks, and to improve the appearance of properties.

Forested areas generally re-generate and change naturally over time. Planting efforts may still be needed in the forests to ensure proper species balance and to fill in areas that have losses due to invasives, floods, or other natural causes.

American Forests recommends the following urban tree canopy coverage for different zones within a community for metropolitan areas east of the Mississippi River:

Average tree cover counting all zones	40%
Suburban residential zones	50%
Urban residential zones	25%
Central business districts	15%

According to the results of the 2009 Urban Tree Canopy Calculation, Charlottesville has an average canopy cover of 46.6%, which exceeds the average recommended coverage, and the City's own goal of 40% coverage. When the City is analyzed by neighborhood, it becomes clear that some areas are above this average, and others are below. In order to bring more areas up to the minimum desired coverage, it will be necessary to expand the forest and tree canopy by planting new trees.

Charlottesville also intends to define forest canopy goals for other districts in the City including entry corridors, parks and schools, industrial zones and watersheds. Further analysis of the tree canopy data will provide current coverage for these districts. The Zoning Code has recommendations for desired coverage, as does the Center for Watershed Protection and the Arbor Day Foundation. Once canopy goals are set, staff can determine which areas are in need of work to achieve their target canopy coverage. For individual trees, heavily used park areas such as playgrounds lacking shade may be a higher priority for planting than the densely forested areas. Street trees may offer more benefits to more people than backyard trees, and might also rank high in need.

In those areas that are below the target canopy coverage levels, there are locations where new trees can be planted. For example, there is a high public desire for more street trees. Detailed information about nearby structures, utility conflicts, sidewalks and other hardscapes, clear zones for automobiles, fire lanes, and many other factors must be gathered in order to ensure the right tree is planted in the right place. Failure to consider the myriad of factors that can affect an urban tree's health and longevity will lead to increased maintenance costs, less healthy and attractive trees, and eventually, loss of the resource. Planting tall trees under power lines, or water-loving trees near sewer pipes will create conflicts. Sound initial planning will ensure that when the tree is planted, it can live long, grow well, and consume fewer of the City's limited resources.

Planting is not the only step in establishing new trees. New plantings must be watered for their first year to ensure survivability, and maintained for years. New trees create the need for more staff work, and this must be accounted for in budgets and schedules, and with the assistance of volunteer groups.

The City has investigated the possibility of establishing a tree nursery to help in forestry expansion and management. Given the large number of nearby private nurseries, it has been determined at this point in time that it is not cost-effective or the best use of staff resources to run a public tree nursery. The possibility of some sort of nursery remains an option if it proves cost effective and necessary in the future.

Current Initiatives

- Staff plant an average of 50 new trees annually in park and school areas.
- Volunteer plantings of seedlings and tube trees in stream buffers.
- Street trees are increasing as the City redevelops and creates new opportunities for planting.

Tactical Actions

3.1 Establish tree canopy goals for entry corridors, parks and schools, appropriate zoning categories, and watersheds.

3.2 Plant trees in appropriate public locations, including those identified in the 2008 Urban Forest Assessment.

3.3 Encourage plantings of new trees on private property through educational efforts and programs. Identify potential planting locations using City GIS and other data.

3.4 Continue tree planting programs in riparian areas for stream corridor management and health.

3.5 Establish City BMPs in line with industry BMPs for arboriculture. Ensure that these standards are required of developers during the site plan review process and construction.

3.6 Expand trail standard to include vegetative plans for areas within and adjacent to trail corridors.

3.7 Co-locate trails and utilities where appropriate to limit creation of multiple cleared corridors in forested areas.

3.8 Work with utilities on identifying good locations for tree planting near utility corridors.

3.9 Plant a tree on public property every Arbor Day as part of annual celebration.

Element 4 – Monitoring Forests and Plan Progress

Trees and forests are living entities and undergo constant change. Keeping up with these living resources requires constant monitoring to ensure management goals are attained. Trees can be added, removed, improved, moved, injured, or changed in other ways, all of which effect how the urban forest functions and their numerous benefits to quality of life.

Tracking the trees that are planted or removed on public properties will ensure the forest assessment and urban canopy calculation stays reasonably up to date, and can help analyze expected changes to overall forest age, diversity, and health. Records of tree work and updated GIS maps can alert staff and the public how forest management efforts are paying off over time, and if adjustments to the rate, direction, or priorities of forest management are still on track with community goals. Noting the presence of disease or pests with early detection can be critical in containing threats to the overall forest. It is vital to monitor both the forest and the plan over time if the goals are to be met in a responsible manner.

Current Initiatives

- The Urban Forest Assessment and Urban Tree Canopy Calculation are snapshot measurements to of the state of the City's forests. This data is comprehensive and can be replicated over time for comparison.
- Inclusion of tree and forest information in the City's GIS will assist in tracking over time and sharing with other City departments and City wide efforts.

Tactical Actions

4.1 Establish a methodology to track and maintain targeted healthy canopy coverage over time.

4.2 Load all relevant data into the City's GIS database for Citywide access.

4.3 Perform an assessment similar to the Forest Assessment every five years.

4.4 Acquire leaf-on aerial or satellite photography and perform an urban tree canopy calculation every five years.

4.5 Compare 5 year data with canopy goals set for various sub areas in the Comprehensive Plan.

4.6 Create and publish a report on the State of the Urban Forest every five years after new data collection and analysis is complete.

4.7 Include latest tree canopy information in City Comprehensive Plan updates.

4.8 Provide greater public access to forested areas to put more "eyes on the woods" to report possible concerns or changes.

4.9 Utilize a Risk Rating Index to rank tree risks.

4.10 Calculate and forecast carbon sequestration levels in the urban tree canopy as part of the climate protection agreement requirements.

4.11 Establish a Tree Commission or Board – consider using existing group, such as Parks and Recreation Advisory Board.

4.12 Track invasive species containment and removal efforts using GIS mapping.

4.13 Maintain GIS layer to include new and remove cut trees to keep inventory up to date.

4.14 Maintain records of utility work events that impact public forests (clearing land around lines).

4.15 Update GIS layers such that parcels, planning neighborhoods, and City boundary all encompass the same amount of land area.

4.16 Include tree and forest components and threat of loss in future build-out studies.

Element 5 – Education & Outreach and Partnerships

A critical element of any natural resource or urban forest management plan is increasing citizen, staff and decision-maker understanding of the value of natural resources, the importance of fiscal support for proper resource management, and the necessity of educating current and future generations about the natural world. Increasing threats to our environment from global climate change, uncontrolled stormwater runoff, air and water pollution, and invasive plant species require that education become a major component of the City's efforts.

City staff has recognized that education is vital. Dedicated educational initiatives on all levels, and partnering with other organizations in the region, will be extremely helpful to the City in creating a sustainable environment.

The development of school curriculum and City program offerings around environmental education and stewardship should be enhanced and increased. Education of City staff on important sustainable best management practices must take place. Further education of City decision-makers about the synergy between many of these issues is critical to ensure that the best and most sustainable decisions are made into the future.

Current educational initiatives among groups offering such programs in the region are not highly coordinated. Numerous entities, including the City, Albemarle County, the Ivy Creek Foundation, Tree Stewards, the Master Gardener and Master Naturalist programs, Native Plant Society, Virginia Department of Forestry, and many others offer natural resource education opportunities. Closer coordination between these groups to enhance partnerships and streamline offerings should occur to provide the holistic level of education truly required.

Current Initiatives

- The City's demonstration rain garden at Greenleaf Park has significantly furthered educational opportunities for area students and has raised awareness of stormwater management best practices.
- The Parks and Recreation Department's volunteer program incorporates environmental education during each volunteer project, and many projects include management of forests and trees.
- The City's Environmental Management System (EMS) program continues to contribute to the education of staff in various City departments about sustainable best practices.

Tactical Actions

5.1 Create, fund, and staff a City Environmental Educator position to coordinate efforts.

5.2 Develop and implement a comprehensive City staff education program. Consider using the City EMS as the tool for implementing this program.

5.3 Develop a public outreach strategy that will advance City staff and policy credibility, educate the public, and create documents for distribution.

5.4 Incorporate environmental interpretation into public education efforts in parks.

5.5 Create a public education campaign to share information on forestry and tree best management practices for public and private properties.

5.6 Develop a strategy to educate City decision makers on urban forestry BMPs.

5.7 Enhance partnership with local advocates, e.g. Tree Stewards, Neighborhood Associations, Master Naturalists & Gardeners, Native Plant Society.

5.8 Work directly with Charlottesville City Schools to enhance school curriculum on natural resources for SOL requirements.

5.9 Pursue programs for the planting of new trees on private property.

5.10 Explore options for establishing a botanical garden and/or arboretum on public lands.

5.11 Pursue funding and land to create an environmental education center.

5.12 Use the Annual Arbor Day celebration as an educational opportunity and to highlight partnerships.

5.13 Complete and utilize the planned and existing greenway system to educate trail users and park visitors about trees.

5.14 Utilize the upcoming Meadow Creek Stream Restoration project as an educational opportunity about forest management.

5.15 Promote the "Funds for the Forest" program as a means to collect donations to help implement the goals of this plan.

5.16 Inform the public about tree plantings on public lands.

Element 6 – Sustainability, Management and Maintenance Methods

As the City has gained experience with various environmental and sustainability initiatives in the past several years, it has become necessary to codify certain practices and integrate sustainable maintenance and best management practices into the daily operations of City departments. This is an important step to ensure that the culture change toward sustainability within the organization reaches all levels of staff.

The major effort that has led the way so far in this regard is the City's Environmental Management System (EMS) initiative. Begun in the Parks and Recreation Department and now being implemented in the Public Works Department and other City departments, this program uses structured objectives and targets to reach sustainability goals on many different fronts. Many of the elements described in this plan represent issues that have been brought to light through the work of staff on EMS.

As these issues and actions needed to address them have been identified, several specific initiatives have been undertaken.

Current Initiatives

- No-Mow Zones in riparian areas of parks have been identified and managed, reducing fuel consumption and air emissions and allowing natural re-vegetation to occur.
- An Invasive Species Assessment was completed in 2007, identifying those areas of public land heavily infested by invasives, and recommending management actions for control.
- Tree planting efforts in riparian areas have increased, with hundreds of tree saplings planted throughout the City.
- Industry BMPs for arboreal care are applied in all preventive and corrective tree work.

These shifts represent a major departure from the City's traditional maintenance methods and place the City in a position to continue to change the paradigm toward sustainability.

Tactical Actions

6.1 Prepare annual implementation plan to define scope of work for urban forest management.

6.2 Continue to manage Invasive Species, using recommendations contained in the Invasive Species Assessment and Management Plan.

6.3 Continue to integrate sustainable maintenance methods through the EMS for tracking and management purposes.

6.4 Adopt industry BMPs as part of the Parks and Recreation Departmental Maintenance Standards and all City landscaping decisions and new City projects.

6.5 Adopt a Wildlife Management Policy to guide staff actions when conflicts occur (e.g. with beaver, deer, Canada geese, rodents).

6.6 Expand No-Mow Zones to other areas of parks and schools, convert appropriate locations to interpretive educational areas such as meadows and rain gardens to advance educational opportunities.

6.7 Share BMPs with private landowners as information to consider in management of their tree and forest resources.

6.8 Encourage local utilities to become Tree Line USA certified through the Arbor Day Foundation.

6.9 Continue to review & update City Vegetative Debris Management Plan (See Appendix 6).

6.10 Update development codes to help ensure adequate forest canopy is preserved or replanted according to performance based standards.

6.11 Continue commitment that the City will pursue only green building practices for the development and redevelopment of all City lands, to include tree preservation tactics.

6.12 Promote urban forest tree species diversity through planting recommended site adaptable trees and encouraging (but not limiting to) use of native tree species.

6.13 Clarify property ownership of paper streets and alleys for future maintenance responsibility and planting opportunities.

6.14 Determine sustainable funding sources for urban forest activities including: Annual Operating Budget, the CIP, development proffers, non-profits, private contributions – "Funds for the Forest", grants, and the use of volunteers

6.15 Implement a stormwater utility to provide a dedicated funding stream to support a Water Resources Protection Program (WRPP) that will include stormwater management.

Implementation

Appendix 10 includes a table listing each of the tactical actions in the plan, a responsible lead department and a general timeline plan for taking action. This table is meant to be a guide for action over the next five (5) years. Many departments, agencies, and individuals may be involved in achieving these goals, and will need to be coordinated by the lead agency in each case.

Many of the recommendations in the plan can be achieved within the next five years, and others will require additional time for varying reasons. It is important to push forward on those goals that can be acted on in the near term. Those items that require major effort can be worked on over time, and as opportunities arise.

Tree maintenance, invasives removal, and new plantings are ongoing efforts that will never be complete due to the nature of trees and forests. Annual work plans for staff and volunteers will help guide these efforts. Actions that are policy oriented may be reasonably low cost in dollar terms, but could take many hours, weeks, or even years of staff time to become reality and general practice.

This plan should be revisited every five years, either as a separate plan or as part of the larger City Comprehensive Plan to compare progress with stated goals and determine if new actions are needed to continue movement towards goals. Park master plans should also be consulted when determining forest management actions specific to each park.

The plan will be most successful when it becomes a normal part of routine operations. Ensuring that the goals and policies of this plan are shared with all City departments, private landowners, and the general public is the best way to keep urban forest management a priority in the long term. These partnerships are also very helpful in implementing individual projects or policy adjustments.

Funding for implementation may come from a variety of sources, including public dollars, developer contributions, private donations, and grants. There is a limit on how many trees can be planted and watered in a given year, so funding may be better secured with relatively small annual amounts that can be sustained well into the future rather than one or two big investments with no identified maintenance budget.

Urban forestry management is a long-term task. The City has major challenges to accomplish to preserve, protect, enhance, and sustain its forests, but with continued dedicated work by staff, leaders, local businesses, and the general public, the goal of a healthy urban forest for Charlottesville can be achieved.

Summary

Charlottesville has always valued its trees and forests, and always will. This plan has been created to chart a future for those trees and forests, and to assist members of the community in realizing the future we envision. This plan, like our forests, should be treated as a living entity, which is in need of a regular check-up, the occasional adjustment, and a healthy environment in which to grow.

The protection of the City's biodiversity and its natural resources through the management of the urban forest allows those forests to perform their natural functions of recharging ground water, protecting streams, reducing heat islands, providing shade and wildlife habitat, and sequestering carbon and other air pollutants. Forests are a integral part of our urban green infrastructure, and this plan ensures they remain a priority.

While there is a lot of work to be done to restore and enhance our forests to their maximum potential, the City of Charlottesville's urban forests are in good overall condition. Efforts to expand the urban forest, especially along streets and in the developed areas of the City, will help ensure the contribution of our urban forest to the community's quality of life.

Starr Hill Park

Acknowledgements

The following individuals and City Departments provided their expertise and knowledge to the development of this plan.

Planning Commission	- Bill Emory - Mike Farruggio - Mike Osteen
Parks & Recreation Department	- Brian Daly, Acting Director - Tim Hughes, Urban Forester - John Mann, Landscape Manager - Chris Gensic, Park and Trails Planner
Department of Public Works	- Kristel Riddervold, Environmental Administrator - Dan Frisbee, Stormwater Program Coordinator - Marty Quinn, P.E., Utilities Engineer
Neighborhood Development Services	- Missy Creasy, Planning Manager - Brian Haluska, Neighborhood Planner - Nick Rogers, Neighborhood Planner - Ebony Walden, Neighborhood Planner
Information Technology	- Mark Simpson, GIS Coordinator
Virginia Department of Forestry Virginia Tech (via VDOF)	- Barbara White - James Pugh (GIS Analyst)

Appendix 1

Glossary of Terms

Urban Forest – Trees growing either individually, in small groups or under forest conditions on public and private lands in our cities, towns, and suburbs. *(Chesapeake Bay Program)*

Tree Canopy – the layer of tree leaves, branches, and stems that covers the ground when viewed from above. *(Chesapeake Bay Program)*

Land Cover – Physical features of the earth mapped from satellite imagery such as trees, grass, water, and impervious surfaces *(Chesapeake Bay Program)*

Existing UTC – Amount of urban tree canopy present when viewed from above using satellite or aerial photography.

Possible UTC – amount of land theoretically available for establishment of urban tree canopy. This excludes areas covered by existing tree canopy, roads, buildings, and water

Entrance Corridor – (from Code of City of Charlottesville)
(a) Subject to subsection (b), below, entrance corridor overlay districts are hereby established upon and along the following arterial streets or highways, which are deemed by the City council to be significant routes of tourist access to the City, or to designated historic landmarks, buildings, structures or districts within the City ("EC streets"):

(1) Route 29 North from the corporate limits to Ivy Road;
(2) Hydraulic Road from the corporate limits to the 250 Bypass;
(3) Barracks Road from the corporate limits to Meadowbrook Road;
(4) Ivy Road from the corporate limits to Emmet Street;
(5) Fontaine Avenue/Jefferson Park Avenue from the corporate limits to Emmet Street;
(6) Fifth Street, SW from the corporate limits to the beginning of the Ridge Street Architectural Design Control District;
(7) Avon Street from the corporate limits to the CSX Railroad tracks;
(8) Monticello Avenue/Route 20 from the corporate limits to Avon Street;
(9) Long Street from the corporate limits to St. Clair Avenue;
(10) East High Street/9th Street from Long Street to East Market Street;
(11) Preston Avenue from McIntire Road to Rosser Avenue; and
(12) McIntire Road, from Preston Avenue to Route 250.

Best Management Practice – Industry defined highest quality method of accomplishing a task or providing a service.

Appendix 2
City of Charlottesville:
Urban Forest Assessment

1 March 2009

Prepared By:
Environmental Services, Inc.
3800 Clermont Street NW
North Lawrence, Oh 44666
(330) 833-9941

Environmental Services, LLC. (ESI) was contracted by the City of Charlottesville to conduct an inventory and assessment of the health and condition of trees on selected sites throughout the City. The specific goals of the project were to inventory and assess all trees in developed areas of parks, schoolyards, and other properties; produce a database, GIS layers, and a report on the tree inventory; and present findings to the Parks and Recreation advisory board, Planning Commission and City Council.

After receiving bid approval, ESI met with the City on the 12 June 2008. Areas to be assessed were initially provided to ESI by the City of Charlottesville in their initial Invitation for Bids (IFB) (Addendum A) and were further clarified during the meeting with the City. A memorandum of understanding was prepared by ESI and provided to the City to document the results of the discussion (Addendum B). Further adjustments to the footprint of the areas and parameters to be assessed were made through verbal approval by Tim Hughes during the course of the inventory.

Methodology and Qualifications

All fieldwork was conducted as per the International Society of Arboriculture (ISA) protocol as stated in the workbook from the *Guide for Plant Appraisal, 9th edition* (Council 2000) and *A Photographic Guide to the Assessment of Hazard Trees in Urban Areas* – Tree Hazard Form (Matheny and Clark 1994). Fieldwork was conducted from July 6, 2008 to October 29, 2008 by ISA certified arborists.

Street Trees

Parameters Assessed

For each tree in the street tree inventories, the following parameters were assessed:

- Unique ID
- Genus – Species was included whenever possible
- Diameter at breast height (DBH) – For multi trunk trees, diameter measurements were sampled at the union of all branches
- Root Condition – Assumed to be average, unless other evidence, such as girdling roots or obstructions such as pavement, were evident
- Trunk Condition – Evidence of mechanical or biological damage, as well as form
- Branch Condition – Evidence of mechanical or biological damage, as well as angle and placement of attachment
- Twig Condition – Evidence of dieback, galls or atypical growth such as witches broom
- Foliage Condition – Evidence of biological damage such as wilt, rust, or blight
- Failure Potential – Based on amount of decay, lean, position, and the combination of all other factors previously mentioned
- Size of Hazard – Approximate diameter of the largest part with failure potential
- Target – Potential target should failure of tree or portion of tree fail, including buildings, utilities, roadways, and people (based upon apparent frequency of use
- Placement – Includes aesthetic value and functional placement such as spacing and visibility issues, and other limiting factors such as buildings and overhead/underground utilities
- Comments – Comments include details of hazard/health issues and targets, maintenance recommendations, planting spaces and species recommendations, etc.

Valuation

Trees located within urban settings such as, but not limited to, roadway planting strips, playgrounds, and/or parking lot islands where assessed for both valuation and hazard rating using the above-mentioned workbooks. The valuation was determined by multiplying the condition, location and species ratings against the basic tree cost (BTC). Whereas the hazard rating was determined by adding together the failure potential, failure size and target values for each individual tree.

The Condition rating (CR) was determined by adding the values for the condition of the roots, trunk, branches, twigs and foliage; dividing by the total possible points, and multiplying by 100 to achieve a percentage:

CR = [(Roots+Trunk+Branches+Twigs+Foliage)/32]*100

The Location rating is the average of three sub-ratings: Site, Contribution, and Placement. This helps determine how the tree has been designed into the landscape, how much it contributes, and whether it is "working" to enhance that landscape. In the field we called it placement, and gave it a combined percentage. Whereas the Species rating was taken from either the 2007 ISA Mid-Atlantic tree species rating guide, or by determining the rate based on the hardiness zone, growth behavior, and tree form for the individual tree species. The average rating from the range for each species was used in the assessment.

Multiplying either the trunk basal area (TA) or the adjusted trunk area (ATA) measured at breast height to a unit cost of $75.00 determined the Basic Tree Cost (BTC). The unit cost was established by the ISA Mid-Atlantic Chapter and approved and accepted by the City of Charlottesville. Trees with a diameter of greater then 30 inches used the adjusted trunk area from Table 4.4 found in the Guide for Plant Appraisal, 9th edition. Once the BTC was calculated, it was then multiplied against the Condition, Location and Species ratings each as a percentage to produce the appraised value (AV) for the individual tree:

AV = BTC x Condition rating % x Location rating % x Species rating % = $

Per our meetings with the City of Charlottesville, a minimum replacement tree value of $1,500 was established. This was determined by the cost of purchasing a 2.5 to 3 inch caliper tree from the nursery, preparing the planting site both above and below ground, and guaranteeing/maintaining the tree for two years. Therefore, a minimum tree value of $1,500 was used and all values $5,000 or more were rounded to the nearest $100, while those values less than $5,000 were rounded to the nearest $10 per the Guide.

Hazard Rating

From *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas* (Matheny and Clark 1994); the Failure potential (FP), Size of defective part (SD), and Target ratings (T) were added together to determine the Hazard rating for an individual tree:

HR = FP + SD + T

Hazard ratings do not define 'danger', but assign the potential risk assessment associated with a tree depending on tree condition and proximity of potential targets and assist management in prioritizing workloads. "…hazard ratings define the seriousness and extent of potential danger to site users. They assign a level of risk to activity in and around individual trees. For trees where a hazard rating is 3, there is less concern about hazard than for trees with ratings of 12. Clearly the greater the hazard rating, the greater the risk associated with the tree" (Matheny and Clark 1994).

As the hazard rating guidelines specifically request that a given score not be assigned a qualifier, such as medium or moderate hazard, we have not provided one. However, within the stipulations provided for in *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas* we can state that a score of 1 is 'low hazard' and a score of 12 is 'high hazard'.

Condition Rating

The condition rating system utilized is provided by the *Guide for Plant Appraisal, 9th edition* (Council 2000). The condition rating was derived for each tree by summing the individual scores for roots, trunk, branches, twigs and foliage, dividing by the total possible points (32), and multiplying by 100. Where:

100 = No apparent problems
75 = Minor problems
50 = Major problems
25 = Extreme problems

Specimen Trees

Specimen trees were identified as any tree with a DBH greater than 30 inches and a condition rating of greater than 75 points. This formula was approved by Tim Hughes of the City of Charlottesville.

Forested plots

Parameters Assessed

Parameters assessed include all parameters previously stated for street trees, with the exception of placement, as it was not applicable to these areas.

Valuation

The same formulas stated above, with some modifications, were used to determine the value and condition of the tenth acre forested plots. Per the City of Charlottesville, the averages for the plots are to be used, the unit cost for a forest grown tree was $50, and the minimum replacement value was $500.

Such that the basic tree cost (BTC) for the forested plots was calculated by using the average trunk area for the trees measured and multiplying that by the unit cost of $50:

BTC = Average Trunk Area x 50 = $

The averages of all the different tree units measured were used in the formulas to determine the average tree per plot. Such as the average for each of the roots, trunk, branches, twigs, and foliage rates were used to calculate the Condition rating (CR) for the plots:

CR = [(Avg.Roots+Avg.Trunk+Avg.Branches+Avg.Twigs+Avg.Foliage)/32]*100

The Location Rating due to being a forested plot was given a constant value of 90% per the City of Charlottesville, and the Species rating was determined by a weighted average per volume of the tree species measured in each of the plots. Then these average ratings were used to calculate the Average Appraised value (AAV) for each tree:

AAV = BTC x Avg. Condition % x Avg. Location % x Avg. Species rating %

This AAV was then multiplied by the number of trees in each plot to determine the total plot value (TPV) for each site. The total plot values for each site were then summed up and divided by the total number of plots in the site to calculate an Overall Average Appraised value (OAAV) of the tenth acre plots for each of the forested sites:

OAAV = Σ TPV / # plots

This OAAV can be then used to determine the appraised value of the forested areas by multiplying the number of acres by tenth acre then by the OAAV.

Forested area value = OAAV x 10 x number of acres = $

Forest Condition

In the forested areas we were directed not to determine the hazard rating due to the decrease in targets, but to determine the condition of the plots by adding the averages of the Failure potential (FP) and Size of defective part (SD) for each of the plots. Again, this value does not determine the danger that may be associated with an individual tree, but this plot condition will assist management in shaping protocols for the forested areas located within the City of Charlottesville. The scoring system was as follows:

8 = No apparent problems
6 = Minor problems
4 = Major problems
2 = Extreme problems

Summary of Findings

As requested by the City of Charlottesville, findings are reported for number of trees inventoried, diameter distributions, genus distributions, and hazard distributions. Shape files for all trees assessed have been created which outline all relevant parameters for each tree. After additional consultation with the City a PowerPoint presentation will be created to highlight all relevant aspects of the assessment.

Inventory Numbers

A combined total of 61,508 trees were directly and indirectly (derived from plots) inventoried within all areas sampled in the City of Charlottesville. 5,988 trees were directly sampled; 2,577 within parks, 1,068 within schools, 693 within other facilities and 1,650 street trees. A total of 55,520 trees were estimated to be within the forested areas, expanded from the forested inventory. Park specific totals are included in table 1 below. Additionally, 211 potential planting spaces were identified with planting recommendations for size and type of tree based on a spot assessment of limiting factors such as power lines, sidewalks, roadways, etc. Please keep in mind spaces for potential plantings are very subjective, and may not take into consideration indeterminable factors such as underground utilities or infrastructure. Each planting space is indicated by a unique id and point on the shape files.

Trees Assessed in Non-Forested Areas

Direct Sample

Facilities	Number of Trees
Art Center	38
Community Attention	2
Courts	29
Downtown Mall	101
Downtown Pavillion	63
Gordon Library	51
Library	14
Maplewood Cemetery	66
Market Parking	12
Oakwood Cemetery	156
Public Works	108
Ridge Street Fire Station	16
Rothwell	11
Starr Hill	3
Starr Hill expansion	10
West Market	13
Total	**693**

Schools	
Buford School	108
Burnely Moran School	114
Charlottesville High School	361
Clark School	67
Greenbriar School	81
Jackson Via School	88
Johnson School	114
Venable School	62
Walker School	73
Total	**1,068**

Parks	Number of Trees
Azalea Park	28
Belmont Park	111
Craw Garden	13
Fivefille Park	8
Forest Hills Park	60
Greenleaf Park	57
Jackson Park	8
Jordan Park	17
Lee Park	35
McGuffey Park	35
McIntire Golf Course	148
McIntire Park	301
McIntire Skate Park	12
Meade Park	84
Northeast Park	106
Pen Park	1,087
Quarry Park	18
Riverview Park	22
Rives Park	58
Schenk's Greenway	82
Tonsler Park	126
Washington Park	161
Total	**2,577**

Other	
Streets and medians	1,650
Total	**1,650**

Grand Non-Forested Total	**5,988**

Trees Assessed in Forested Areas

Plot Sample

Parks	
Azalea Park	1250
Bailey Park	240
Greenbriar Park	6960
Greenleaf Park	1930
McIntire Park	14720
McIntire Golf Course and Skate Park	2430
Meadowbrook Park	180
Northeast Park	820
Pen Park	18030
Quarry Park	690
Riverview Park	2800
Schenk's Greenway	190
Washington Park	280
Total	**50520**

Schools	
Buford School	460
Charlottesville High School	1330
Greenbriar School	580
Jackson Via School	940
Johnson School	1550
Walker School	140
Total	**5000**

Grand Forested Total	**55,520**

Table 1. – Tree Totals Sampled by Location

Diameter Distributions

Diameter distributions have been created from the in field measurements for all non-forested (non-plot) trees. The diameter distributions represent the diameter class into which the majority of the trees inventoried fall. From this information additional assumptions can be made with regard to age, risk, and other factors. The majority of trees fell within the 2 inch to 20 inch diameter class, indicating a relatively young population.

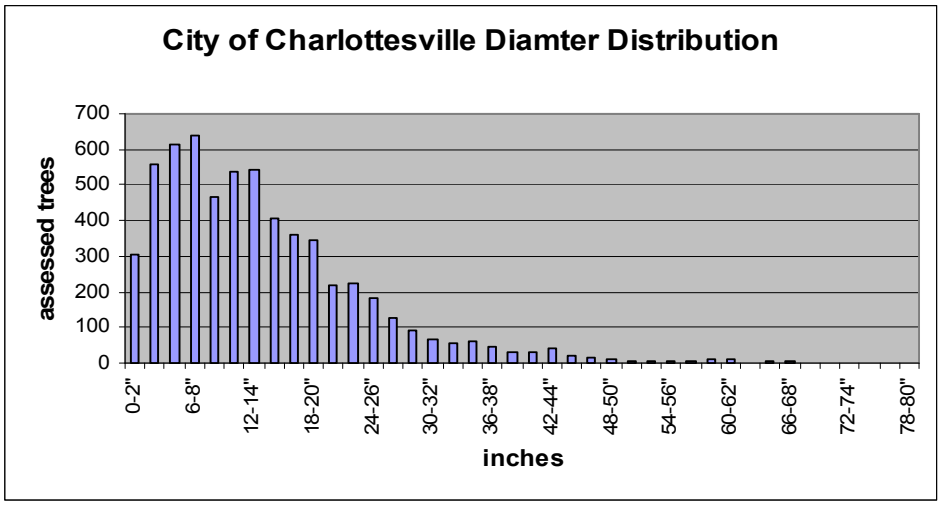


Figure 1 – Diameter Distributions

Genus Distributions

Genus distributions indicate the overall diversity of trees in the areas inventoried. The largest genus group was Cornus (dogwood) at 14%, followed by Quercus (oak) at 13%, and Acer (maple) at 12%. The "other" genus category is a pooling of all genus with a less than 4 % share of the distribution. A list including the name and number of trees in all genus is also included below.

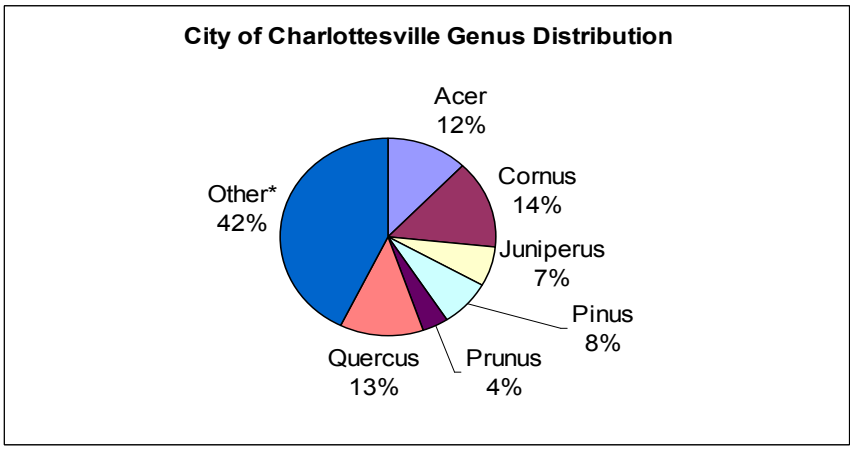


Figure 2 – Genus Distributions

Genus Distribution Table

Genus	Trees	Genus	Trees	Primary Genus	Trees
*Aesculus**	6	*Morus**	33	*Acer*	729
*Ailanthus**	17	*Nyssa**	29	*Cornus*	864
*Albizzia**	12	*Olea**	6	*Juniperus*	399
*Amelanchier**	35	*Ostrya**	3	*Pinus*	461
*Betula**	4	*Phellodendron**	13	*Prunus*	230
*Broussonetia**	3	*Photinia**	1	*Quercus*	754
*Buxus**	3	*Picea**	17		
*Camellia**	1	*Plantanus**	192		
*Carpinus**	60	*Pyrus**	58		
*Carya**	39	*Robinia**	67		
*Castanea**	4	*Salix**	8		
*Catalpa**	22	*Sassafras**	9		
*Cedrus**	3	*Sophora**	12		
*Celtis**	111	*Sorbus**	1		
*Cercidiphlum**	8	*Syringa**	21		
*Cercis**	173	*Taxodium**	8		
*Chamaecyparis**	35	*Taxus**	1		
*Crataegus**	69	*Thuja**	157		
*Cryptomeria**	2	*Tilia**	46		
*Cupressocyparis**	168	*Toxicodendron**	1		
*Diospyros**	12	*Tsuga**	23		
*Fagus**	33	*Ulmus**	23		
*Fraxinus**	113	*Vitex**	4		
*Ginkgo**	136	*Zelkova**	173		
*Gleditsia**	7				
*Gordonia**	1				
*Gymnocladus**	2				
*Halesia**	17				
*Heteromeles**	1				
*Ilex**	106				
*Juglans**	38				
*Koelreuteria**	29				
*Lagerstroemia**	109				
*Ligustrum**	9				
*Liquidambar**	58				
*Liriodendron**	115				
*Maclura**	8				
*Magnolia**	43				
*Malus**	47				
*Metasequia**	1				

Hazard (risk) Distributions

Hazard (risk) distributions have been created from the in field measurements for all trees sampled. This distribution illustrates the proportion of hazard trees within the City. The distribution indicates that the majority of tress fall within the 'average' risk class, with proportionally more weight toward higher hazard trees.

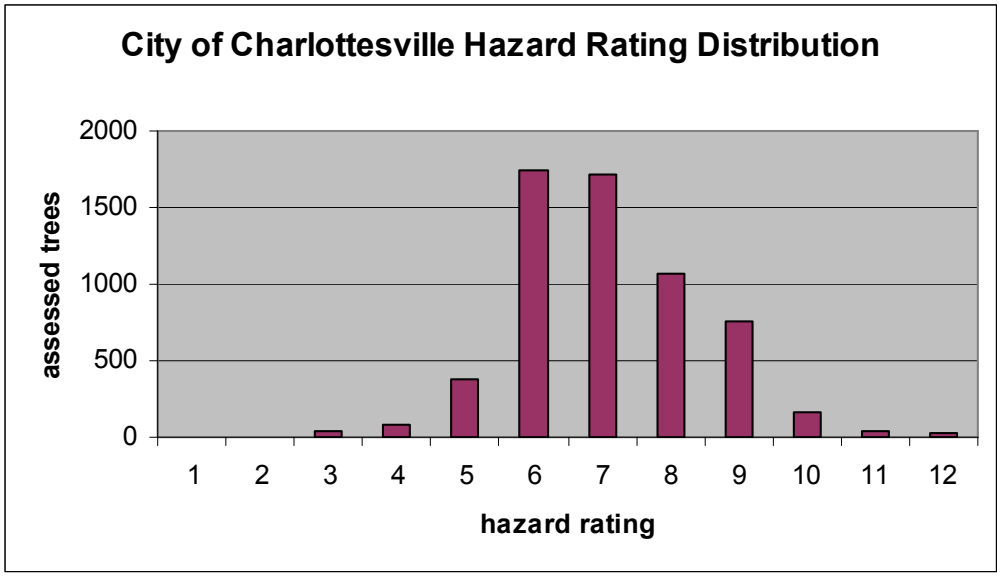


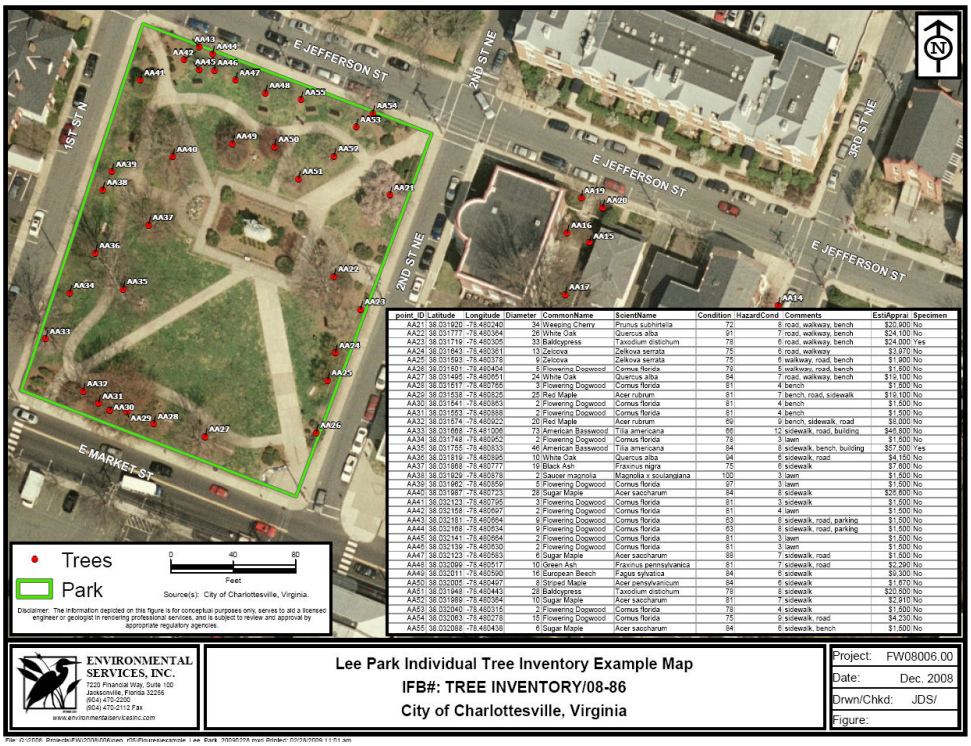
Figure 3 – Hazard Distributions*

* As the hazard rating guidelines specifically request that a given score not be assigned a qualifier, such as medium or moderate hazard, we have not provided one. However, within the stipulations provided for in *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas* we can state that a score of 1 is 'low hazard' and a score of 12 is 'high hazard'.

* Non-forested areas only.

Shapefiles

Shapefiles have been created which include parameters for each tree or forested plot assessed. For street/park trees the parameters include a unique tree ID, latitude and longitude, species, DBH, condition rating, hazard rating, appraised value, specimen trees, available planting spaces, and general comments. For each forested plot, the parameters include appraised value and a hazard rating. A sample shape file and data table for Mead Park is included below (Figure 4).



point_ID	Latitude	Longitude	Diameter	CommonName	ScientName	Condition	HazardCond	Comments	EstiApprai	Specimen
AA21	38.031920	-78.480240	34	Weeping Cherry	Prunus subhirtella	72	6	road, walkway, bench	$25,800	No
AA22	38.031777	-78.480364	26	White Oak	Quercus alba	91	7	road, walkway, bench	$24,100	No
AA23	38.031719	-78.480305	33	Baldcypress	Taxodium distichum	75	6	road, walkway, bench	$24,400	Yes
AA24	38.031643	-78.480361	13	Zelcova	Zelkova serrata	75	6	road, walkway	$3,070	No
AA25	38.031593	-78.480378	9	Zelcova	Zelkova serrata	75	6	walkway, road, bench	$1,900	No
AA26	38.031501	-78.480404	8	Flowering Dogwood	Cornus florida	79	5	walkway, road, bench	$1,600	No
AA27	38.031495	-78.480651	24	White Oak	Quercus alba	84	7	road, walkway, bench	$19,100	No
AA28	38.031617	-78.480765	3	Flowering Dogwood	Cornus florida	81	4	bench	$1,500	No
AA29	38.031538	-78.480826	25	Red Maple	Acer rubrum	81	7	bench, road, sidewalk	$19,100	No
AA30	38.031641	-78.480863	3	Flowering Dogwood	Cornus florida	81	4	bench	$1,500	No
AA31	38.031563	-78.480888	3	Flowering Dogwood	Cornus florida	81	4	bench	$1,500	No
AA32	38.031574	-78.480922	20	Red Maple	Acer rubrum	69	9	bench, sidewalk, road	$8,000	No
AA33	38.031668	-78.481006	73	American Basswood	Tilia americana	66	12	sidewalk, road, building	$48,800	No
AA34	38.031748	-78.480952	2	Flowering Dogwood	Cornus florida	76	3	lawn	$1,500	No
AA35	38.031755	-78.480833	46	American Basswood	Tilia americana	84	8	sidewalk, bench, building	$57,500	Yes
AA36	38.031819	-78.480895	10	White Oak	Quercus alba	94	6	sidewalk, road	$4,150	No
AA37	38.031868	-78.480777	19	Black Ash	Fraxinus nigra	75	6	sidewalk	$7,600	No
AA38	38.031929	-78.480878	3	Saucer magnolia	Magnolia x soulangiana	100	3	lawn	$1,500	No
AA39	38.031962	-78.480859	5	Flowering Dogwood	Cornus florida	97	3	lawn	$1,500	No
AA40	38.031987	-78.480723	28	Sugar Maple	Acer saccharum	94	6	sidewalk	$26,800	No
AA41	38.032123	-78.480795	3	Flowering Dogwood	Cornus florida	81	3	sidewalk	$1,500	No
AA42	38.032158	-78.480907	2	Flowering Dogwood	Cornus florida	81	4	lawn	$1,500	No
AA43	38.032181	-78.480954	5	Flowering Dogwood	Cornus florida	63	8	sidewalk, road, parking	$1,500	No
AA44	38.032168	-78.480834	9	Flowering Dogwood	Cornus florida	63	8	sidewalk, road, parking	$1,500	No
AA45	38.032141	-78.480864	2	Flowering Dogwood	Cornus florida	81	3	lawn	$1,500	No
AA46	38.032139	-78.480830	2	Flowering Dogwood	Cornus florida	81	3	lawn	$1,500	No
AA47	38.032123	-78.480563	6	Sugar Maple	Acer saccharum	88	7	sidewalk, road	$1,500	No
AA48	38.032099	-78.480517	10	Green Ash	Fraxinus pennsylvanica	81	7	sidewalk, road	$2,290	No
AA49	38.032011	-78.480500	16	European Beech	Fagus sylvatica	84	6	sidewalk	$9,300	No
AA50	38.032005	-78.480497	8	Striped Maple	Acer pensylvanicum	84	6	sidewalk	$1,670	No
AA51	38.031948	-78.480443	28	Baldcypress	Taxodium distichum	78	8	sidewalk	$20,500	No
AA52	38.031989	-78.480364	10	Sugar Maple	Acer saccharum	81	7	sidewalk	$2,910	No
AA53	38.032040	-78.480315	2	Flowering Dogwood	Cornus florida	78	4	sidewalk	$1,500	No
AA54	38.032063	-78.480278	15	Flowering Dogwood	Cornus florida	75	6	sidewalk, road	$4,230	No
AA55	38.032088	-78.480438	6	Sugar Maple	Acer saccharum	84	6	sidewalk, bench	$1,500	No

Figure 4 - Sample shape file and data set for Lee Park

Conclusion

The City of Charlottesville has a unique resource in the aesthetic, environmental and historic value of its trees. Our inventory found that the general condition of the trees was above average for a City of this size. Notably, there are many trees worthy of comment due to their age, size, and history. These traits and additional comments have been noted within the attribute tables for each tree. ESI has enjoyed the opportunity to work with the City of Charlottesville and in particular, the staff of the Parks and Recreation Division. Upon request, we will be glad to provide any clarifications necessary.

REFERENCES

Council of Tree and Landscape Appraisers, Guide for Plant Appraisal, ninth edition, International Society of Arborculture, Savoy, Il, 2000.

Matheny, N. P., and J. R. Clark. 1994. A photographic guide to the evaluation of hazard trees in urban areas. International Society of Arboriculture, Savoy, II, 85 P. (Second Edition)

Appendix 3
Urban Tree Canopy Calculation

The City of Charlottesville applied for assistance from the Virginia Department of Forestry to analyze our urban forestry canopy in 2006. The City was awarded a grant through the Urban and Community Forestry program. The City purchased a handheld GPS and software to help analyze aerial photography in order to take stock of our urban forest. The Department of Forestry then partnered with Virginia Tech to analyze five localities in the state that are within the Chesapeake Bay watershed in order to help determine if the state is close to meeting its goals under the Bay Act and Charlottesville was selected for the project.

Aerial photograph was flown in July 2008 under leaf-on conditions. Data from this photograph is loaded into a model that can assess the overall canopy of the City and project areas where trees might be planted in the future. While the model is not intended to be an exact determination of canopy coverage, it is a reasonably accurate tool to use for general planning purposes.

The model started out with a basemap DOF landcover, classifying what exists on the surface of the earth, whether vegetation, pavement, buildings, or water. The City provided local data layers including the City limit, property parcels, and rights-of-way (streets). The model can subtract buildings or pavement from its measurement of areas that could be planted to expand canopy coverage.

Since the model is an extension of GIS, City staff can replicate it, and use it to analyze the City by sub-zones. For example, staff can define the area that makes up an entry corridor, measure existing canopy and project locations for possible planting. The more detailed our input data is, such as location of utilities, the more accurate the list of possible planting sites will be.

The model is only as accurate as the data loaded into it, and there are some City data sets that are not completely accurate and may need to be adjusted to improve the model's value. These data inaccuracies should be corrected for this model and for future planning purposes.

<u>Model Definitions</u>
UTC existing=
UTC possible
UTC veg
UTC – imperv..

Appendix 4

2007 Comprehensive Plan
Goals and Objectives and Action Items
Urban Forest Management

Chapter 6 – Transportation

Modal Goals and Objectives – Goal I - Increase safer accommodations for pedestrians, bicyclists and citizens with disabilities while within existing roadway network.

Objective C: Evaluate how street trees, sidewalk width and buffers between motor vehicles and sidewalks can enhance pedestrian travel, especially in development corridors.

Chapter 8 – Environment

Climate Protection – Goal I - Strategically continue, expand, and implement environmentally sustainable initiatives and measures that contribute to climate protection and support key actions outlined in the US Mayor's Climate Protection Agreement.

Objective I: Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO2 (addressed extensively in a subsequent section of this chapter).

Water Quality, Stormwater, and Watershed – Goal I - Promote, protect and restore riparian (streamside) and stream ecosystems to protect habitat and water quality for people and animals.

Objective B: Promote and participate in existing programs to accept conservation or open-space easements of forested stream-side lands to ensure permanent protection.

Objective E: Restore degraded stream buffers through voluntary planting programs and the removal of pollution sources and invasive plants.

Objective H: Examine the feasibility of adding vegetated buffer requirements of varying widths to Schenk's Branch, Lodge Creek, Pollock's Branch, St. Charles Creek and Rock Creek and their tributaries under the City's Water Protection Ordinance. (See Potential Streams Buffers Map, Fall 2006)

Urban Forest – Goal I - Establish and maintain a 40 percent minimum urban tree canopy level in Charlottesville.

Objective A: Plan, develop, and implement an Urban Forest Management Plan, which will serve as the City's comprehensive, long-range strategy for protecting, managing and expanding Charlottesville's urban tree canopy on public lands including streets, parks, schools and other City-owned properties as well as private lands.

Objective B: Create a mechanism for evaluating how increasing tree canopy will meet the U.S. Mayor's Climate Protection Agreement.

Objective C: Building on the 2006 street tree inventory, conduct inventories to document the characteristics and location of the City's street trees and urban tree canopy to inform the tree planting, adoption, and maintenance program across City neighborhoods.

Objective D: Develop a City-owned tree nursery for saplings that will be planted throughout Charlottesville in partnership with City residents to provide an ongoing source for new tree planting.
Objective E: Expand the City of Charlottesville's tree planting list provided to developers to include a larger variety of tree options to ensure a diversity of species with an emphasis on native species.
Objective F: Share information with community members about tree protection, proper maintenance and replanting opportunities and programs through brochures, workshops and City newsletters.
Objective G: Maximize opportunities for restoring existing trees lost to development and improving the diversity of trees on development sites by requesting that larger, native Virginia trees are selected.
Objective H: Consider offering incentives, such as reduced setbacks or increased building densities in exchange for further tree preservation, maintenance, and/or expansion of trees on sites.
Objective I: Educate developers and contractors about the importance of implementing protective measures for trees and tree roots prior to the construction process and strictly enforce these measures during construction.
Objective J: Develop and implement management strategies over the next five years that acts upon the recommendations of the invasive species assessment and management plan developed for the Department of Parks and Recreation in 2006.

Implementation - Key Actions
Key actions are those recommendations that should be undertaken within the next five years. This work program should be updated each year as the plan is reviewed.

Comp Plan Chapter	Key Action	Parties Responsible	Estimated Cost	Timeframe
Transportation	16. Provide design features on existing roadways to improve the safety and comfort level of all users by enhancing the pedestrian and bicycle facility network, using the Safe Routes to School program in the vicinity of schools and consistently applying ADA standards to facility design. An example would be establishing planting strips between the sidewalk and the road.	Neighborhood Development Services, Parks and Recreation Department, Public Works	N/A	Undetermined
Transportation	17. Complete the sidewalk network using a priority system of: dual-side safe	Neighborhood Development Services,	N/A	Undetermined

Comp Plan Chapter	Key Action	Parties Responsible	Estimated Cost	Timeframe
	routes to all City schools; dual-side routes along all arterial and collector routes; dual-side routes to parks and public facilities; completing routes that have less than ¼ mile sections missing; mitigating rain runoff and drainage problems and citizen agreements to implement shade tree planting and maintenance programs	Parks and Recreation Department, Public Works		
Environmental Sustainability	2. Promote and participate in existing programs to accept conservation easements or open-space easements of forested stream-side lands to ensure permanent protection	Public Works Parks and Recreation Department	N/A	Ongoing
Environmental Sustainability	5. Restore degraded stream buffers through voluntary planting programs and the removal of invasive species	Public Works	N/A	Ongoing
Environmental Sustainability	8. Examine the feasibility of adding vegetated buffer requirements to Schenks Branch and tributaries, Lodge Creek, Pollocks Branch, St. Charles Creek, and Rock Creek under the City's Water Protection Ordinance	Neighborhood Development Services	N/A	FY 2008
Environmental Sustainability	24. Plan, develop, and implement an Urban Forest Management Plan to serve as the City's comprehensive strategy for protecting, managing, and expanding Charlottesville's urban tree canopy on public and private lands	Parks and Recreation, Neighborhood Development Services, City Council	N/A	FY 2010
Environmental Sustainability	25. Create a mechanism for evaluating how increasing tree canopy will meet the U.S. Mayor's Climate Protection	Parks and Recreation Department, Neighborhood	N/A	FY 2009

Comp Plan Chapter	Key Action	Parties Responsible	Estimated Cost	Timeframe
	Agreement	Development Services, City Council, City Manager's Office		
Environmental Sustainability	26. Building on the 2006 street tree inventory, conduct additional inventories to document the characteristics and location of the City's street trees and urban tree canopy to inform the tree planting, adoption, and maintenance program across City neighborhoods	City Council, City Manager's Office, Parks and Recreation Department	N/A	FY 2009
Environmental Sustainability	27. Consider developing a City-owned tree nursery for saplings that will be planted throughout the City, in partnership with City residents	City Council, City Manager's Office, Parks and Recreation	N/A	FY 2010
Environmental Sustainability	28. Expand the City of Charlottesville's tree planting list provided to developers to include a larger variety of tree options to ensure a diversity of species with an emphasis on native species	Neighborhood Development Services	N/A	Spring 2007
Environmental Sustainability	29. Share information with community members about tree protection, proper maintenance and replanting opportunities and programs through brochures, workshops and City newsletters.	Neighborhood Development Services	N/A	Spring 2007
Environmental Sustainability	30. Maximize opportunities for restoring existing trees lost to development and improving the diversity of trees on development sites by requesting that larger, native Virginia trees are selected	Parks & Recreation	N/A	Ongoing
Environmental Sustainability	31. Consider offering developers incentives in	Neighborhood Development	N/A	FY 2008

Comp Plan Chapter	Key Action	Parties Responsible	Estimated Cost	Timeframe
	exchange for further tree preservation, maintenance, and/or expansion of trees on sites	Services		
Environmental Sustainability	32. Educate developers and contractors about the importance of implementing protective measures for trees and tree roots prior to the construction process and strictly enforce these measures	Neighborhood Development Services	N/A	FY 2008
Environmental Sustainability	33. Develop and implement management strategies over the next five years that acts upon the recommendations of the invasive species assessment and management plan developed for the Department of Parks and Recreation in 2006	Parks & Recreation	N/A	FY 2013

Appendix 5
Charlottesville Code of Ordinances - Trees
Code of Ordinances, Charlottesville Virginia, codified through Sept. 19, 2006

Sec. 34-868. Trees, generally.

(a) All trees to be planted shall be selected from the City's list of approved plantings, or a substitution approved by the director, and shall meet the specifications of the American Association of Nurserymen.
(b) The planting of trees shall be done in accordance with either the standardized landscape specifications jointly adopted by the Virginia Nurserymen's Association, the Virginia Society of Landscape Designers and the Virginia Chapter of the American Society of Landscape Architects, or the road and bridge specifications of the Virginia Department of Transportation.
(c) Planting islands shall contain a minimum of fifty (50) square feet per tree, with a minimum dimension of five (5) feet, in order to protect landscaping and allow for proper growth. Wheel stops, curbing or other barriers shall be provided to prevent damage to landscaping by vehicles. Where necessary, trees shall be welled or otherwise protected against grade changes.
(d) Only trees having a mature height of less than twenty (20) feet may be installed under overhead utility lines.
(9-15-03(3))

Sec. 34-869. Tree cover requirements.

(a) The provisions of the City's tree canopy ordinance adopted June 25, 1990, are hereby continued in effect and incorporated in this zoning ordinance, as follows:
(1) All developments, public or private, requiring submission and approval of a site plan shall include provisions for the preservation and planting of trees on the site to the extent that, at ten (10) years from planting, minimum tree canopies or covers will be provided as follows:
TABLE INSET:

Zoning Districts	Percentage of Site Cover
R-3, B-1, B-2, B-3, IC	10 percent
R-2	15 percent
R-1, R-1A	20 percent

The area to be occupied by the building footprint(s) and driveway access area(s) proposed for a development site shall be subtracted from the gross site area before calculating required tree coverage only when the site is located within that portion of the City described in section 34-971 (parking exempt area). This exclusion from gross site area calculations shall be allowed whether or not the proposed development will add more than ten (10) percent floor area to an existing building or is found to be newconstruction in the context of the off-street parking requirements.

(2) Existing trees infested with disease or insects or structurally damaged to the extent that they pose a hazard to persons or property, or to the health of other trees on site, shall not be included to meet the tree cover requirements.
(3) The requirements of this section may be waived, in whole or in part, by the director of neighborhood development services or the planning commission in the following circumstances: to allow for the reasonable development of areas devoid of woody materials, dedicated school sites, playing fields and other non-wooded recreation areas, and other facilities and uses of a similar nature; to allow for the preservation of wetlands; or when strict application of the requirements would result in unnecessary or unreasonable hardship to the developer.
(b) Within all zoning districts other than those specifically referenced within paragraph (a), above, tree cover shall be provided to the extent that, at twenty (20) years, minimum tree canopies or covers will be provided (relative to the gross area of the development site) as follows:
(1) Ten (10) percent canopy for a development site zoned for business, commercial or industrial use;
(2) Ten (10) percent for a development zoned for residential use at a density of twenty (20) or more units per acre;
(3) Fifteen (15) percent for a development zoned for residential use at a density of more than ten (10) but less than twenty (20) units per acre; and
(4) Twenty (20) percent for a development zoned for residential use at a density of ten (10) units per acre or less.
(5) The area to be occupied by the building footprint(s) and driveway access area(s) proposed for a development site shall be subtracted from the gross site area before calculating required tree coverage only when the site is located within that portion of the City described in section 34-971 (parking exempt area), or within one (1) of the following mixed-use zoning districts: Downtown (D); West Main North (WM-N), and West Main South (WM-S). The following areas may be deducted, at the option of the developer, from the gross area of the site: required recreation areas; required open space areas; land dedicated to public use; playing fields and recreation areas attendant to schools, day care, and similar uses; areas required for the preservation of wetlands, floodplain or other areas required to be maintained in a natural state by this chapter or other applicable law; and other areas approved by the director as part of a variation or waiver of the landscape plan requirements.
(6) For any mixed-use development: whether such development falls within the category of a site zoned for residential, commercial or industrial use shall be determined by the principal (predominant) use.
(c) Where existing trees are preserved on the development site, a bonus shall be granted as follows ("tree canopy bonus"): in calculating the coverage provided by trees shown on the approved landscape plan, an existing tree included on the developer's conservation checklist shall be deemed to cover an area equal to one and one-half (1.5) times the diameter of the tree's existing dripline. In order to qualify for this bonus, an existing tree must have a caliper of at least eight (8) inches.
(d) Streetscape trees required by section 34-870 may be counted toward tree cover requirements.
(e) Within the City's list of approved plantings, the director shall designate any tree species that cannot be planted to meet minimum tree canopy requirements due to tendencies of such species to: (i) negatively impact native plant communities; (ii) cause damage to nearby structures and infrastructure; or (iii) which possess inherent physiological traits that cause such trees to structurally fail.

(9-15-03(3))

Sec. 34-870. Streetscape trees.

(a) Streetscape trees shall be planted along all existing or proposed public streets; however, the following areas are exempt from the requirement of streetscape trees:
(1) Areas subject to a zero (0) building setback requirement, or
(2) Areas where the maximum permitted building setback is fewer than ten (10) feet.
(b) Streetscape trees shall be large canopy trees; however, upon a determination by the director that site conditions warrant smaller trees, the director may approve the substitution of a medium canopy tree.
(c) Streetscape trees shall be planted with even spacing in a row, at intervals sufficient to allow for their healthy growth and development.
(1) One (1) large tree shall be required for every forty (40) feet of road frontage, or portion thereof, if twenty-five (25) feet or more; or,
(2) Where permitted, one (1) medium tree shall be required for every twenty-five (25) feet of road frontage, or portion thereof, if twenty (20) feet or more.
(3) Where required along the edge of a parking lot (as set forth within section 34-873, one (1) large tree shall be required for every fifteen (15) feet of street frontage.
(4) There shall be a minimum distance of thirty (30) feet between a large and medium tree planted adjacent to one another. Flowering understory trees shall be planted in groups; there shall be a minimum distance of fifty (50) feet between such groups.
(d) Streetscape trees shall be planted outside existing or proposed rights-of-way, but within fifteen (15) feet of the edge of such rights-of-way; however:
(1) Streetscape trees shall be planted within five (5) feet of the edge of the right-of-way within an entrance corridor overlay district, and
(2) For certain parking lots adjacent to public rights of way (see section 34-873), streetscape trees shall be planted within ten (10) feet of the edge of the right-of-way.
(e) In the case of a development subject to the Virginia Property Owners' Association Act, required streetscape trees shall be designated as part of the common area to be maintained by a property owner's association. Otherwise, maintenance of the required streetscape trees shall be the responsibility of the owner of the lot on which such trees are located.

Sec. 34-871. Screening--Generally.

(a) For the purposes of this section, the terms "screening" and "screen" shall be deemed synonymous with "buffering" and "buffer."
(b) When required by this chapter, screening shall consist of a planting strip, existing vegetation, a slightly opaque wall or fence, or combination thereof, to the reasonable satisfaction of the director. The following types and categories of screening shall apply throughout this chapter:
Screen 1 ("S-1"). The S-1 buffer/screen requires an open landscaping scheme, and is generally to be utilized between relatively similar land uses. Plantings allowed by the S-1 designation consist of the following (an applicant has the option of selecting the combination of plantings from among options "A", "B" and "C" within this screen-type):

TABLE INSET:

Screen 1 (Expressed as a number of plant units per square foot of area to be covered)			
Type of Plant	A	B	C
Large Canopy Trees	1/1000 SF	1/1000 SF	1/1,000 SF
Medium Canopy Trees	1/1000 SF	1/1000 SF	1/1,000 SF
Understory Trees	n/a	1/1000 SF	n/a
Evergreen Trees	n/a	n/a	1/350 SF
Shrubs	1/100 SF	1/100 SF	1/200 SF

Screen 2 ("S-2"). The S-2 buffer/screen requires a semi-opaque landscaping scheme, which should partially block views between adjacent properties. This type of screening is generally to be utilized between dissimilar land uses, and the plantings allowed by the S-2 designation consist of the following (an applicant has the option of selecting the combination of plantings from among options "A", "B" and "C" within a designated screen-type):

TABLE INSET:

Screen 2 (Expressed as a number of plant units per square foot of area to be covered)			
Type of Plant	A	B	C
Large Canopy Trees	1/1000 SF	1/750 SF	1/1000 SF
Medium Canopy Trees	1/1000 SF	1/1000 SF	1/1,000 SF
Understory Trees	n/a	1/500 SF	n/a
Evergreen Trees	1/500 SF	1/500 SF	1/175 SF
Shrubs	1/100 SF	1/100 SF	1/200 SF

Screen 3 ("S-3"). The S-3 buffer/screen requires an opaque landscaping scheme, one that blocks views between two adjacent properties. This type of screening is for use between dissimilar land uses, where the maximum amount of visual shielding is desired. The plantings allowed by the S-3 designation consist of the following (an applicant has the option of selecting the combination of plantings from among options "A", "B" and "C" within a designated screen-type):

TABLE INSET:

Screen 3 (Expressed as a number of plant units per square foot of area to be covered)			
Type of Plant	A	B	C
Large Canopy Trees	1/1000 SF	1/1000 SF	1/1,000 SF

Medium Canopy Trees	1/1000 SF	1/1000 SF	1/1,000 SF
Understory Trees	1/500 SF	1/250 SF	1/500 SF
Evergreen Trees	1/500 SF	1/500 SF	1/175 SF
Shrubs	1/100 SF	1/100 SF	1/200 SF

With the approval of the director, an opaque wall or fence may be utilized for, or as part of, a required S-3 screen. Where allowed, such wall or fence (including any gate(s) forming a portion of such structure) shall be at least six (6) feet tall, or an alternate height deemed necessary by the director to protect required sight distances along a public right-of-way.
(9-15-03(3))

Appendix 6

Parks and Recreation Department Vegetative Debris Management Plan

Adopted December 2007

Debris handling options are listed in priority order in each debris category.
NOTE: Emergency (weather) situations supersede all of the handling options.

A. Woody Debris (for mulch)

All woody material resulting from maintenance projects should be field chipped wherever possible:

1. Distribute mulch on site if possible in natural areas.
a. Direct chipper chute to fan out mulch on banks, un-mowed fields, woods or reclamation sites.
b. Spread mulch out to depth not to exceed 4 inches.

2. Wood chip mulch may be piled in designated location at Pen Park Shop for use:
a. Suitable for landscape mulch
b. Suitable for trail mulch
c. Incorporated into planting areas as soil amendment.
d. Used to improve topsoil pile at Oakwood Cemetery
e. Distributed in natural areas for "sheet composting".
f. Schedule Mulch distribution give-a ways for public.

3. Wood mulch unsuitable for landscape use ("*stringy*", "*twiggy*"),
a. Full truck load is to be taken to Panorama Farms for composting. (*Operations Manager has the entry card required for admittance to Panorama dump site*).
b. Distribute mulch in an appropriate natural area for sheet composting.
c. Partial load may be piled at Pen Park Shop with materials unsuitable for chipping to be transferred to Panorama Farms for composting.

B. Woody Debris (logs)

Stockpiling of logs at Pen Park Shop is to be avoided:

1. Woody materials over 6 inches in diameter or tree debris that is not chip-able:
a. To be cut into 16" log lengths at removal site and placed in designated "wood only" pile at Pen Park Shop. City Employees may remove or cut firewood for personal use after work hours at their own risk from this pile.
b. Wood cut to size on site may be given to, and removed by City residents who request it, at the discretion of Tree Crew Supervisor.
c. Wood not suitable for firewood or excessive quantities of wood are to be placed in "Wood Only" pile to be shredded by contracted tub grinder every other year or as needed by Urban Forester.

C. Woody Debris -Contracted Tree Services

1. Tree Contractor is to be directed and contract administered by Urban Forester as to how woody debris is to be handled:

a. Contractor is to remove and dispose all wood debris from removal site.
b. Contractor is to cut logs into 16" lengths and place them in "wood only" pile at Pen Park Shop.
c. Contactor is to dump only suitable wood chip mulch in designated wood mulch pile at Pen Park Shop on an "as needed" basis only.

D. Herbaceous/ Woody (non-tree) Vegetative Debris

1. Weeds, plant materials or brush unsuitable for chipping are to be piled in designated pile at Pen Park Shop area, separately from woody materials.
   a. The pile must be kept pushed together and is to be collected with the claw truck when sufficient quantity allows collection and delivery to Panorama Farms.
   b. Lumber, treated lumber, metal, concrete, garbage and trash are not to be in vegetative debris piles.
   c. Large quantities of "cut back" materials may be left on site for claw truck pick-up.
   d. Invasive plant materials are to be placed in pile at Pen Park Shop.
2. Leaves and grass clippings (mowed sites)
   a. Are mower ground up on site for natural decomposition.
   b. Small quantities may be placed adjacent to community garden sites.
   c. Additional collected leaves are placed in designated herbaceous debris pile for transport to Panorama Farms.
3. Leaves collected from Downtown Mall
   a. Are placed in designated herbaceous debris pile.
   b. Garbage and trash are not to be in vegetative debris piles and must be removed.

E. Management of Vegetative Debris Piles

1. **Treated lumber, metal, concrete, garbage and trash** are not to be in vegetative debris piles (place in designated locations in shop yard).
2. Use of claw truck from Public Works, **pile management**, and bills from Panorama farms or landfill to be directed by the Operations Manager or designee.
3. **Firebreaks** must surround piles to allow clear passage of a vehicle.
4. Double ground and shredded wood mulch should be **piled no higher than 5-6 feet**.
5. **No burying** of vegetative debris is permitted (exclusive of wood chip mulch incorporation for soil amendment).
6. Vegetative piles are to be **inspected monthly** using inspection form by the Operations Manager or designee, corrective actions made, completed inspection forms to be filed in EMS fenceline representative's office.
7. **Records of loads** of chipped material used in maintenance or materials taken to Panorama farms must be reported by supervisors to EMS Fenceline representative for recycling records.
8. **Excessive storm damage debris** may need a permit for temporary site storage through DEQ, application and management of permit is directed by Environmental Management Office.
9. **Repeated violations** of pile management procedures may result in disciplinary actions for those involved.
10. **Emergency notification** in the event of piles catching fire must be reported to Fire Department, P&R Assistant Director, and Operations Manager.

Appendix 7
Summary of Staff Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

Executive Summary – (Where we are today-snapshot in time)

Strengths

- (10) Recognition of the UFMP as a community value and objective aligned with the City Council Vision Statements / Community Interest, Support, Passion, Availability of Volunteers, City Leadership/City Council is also interested.
- (7) Quantity of Tree Canopy (initially estimated at 31%-requires confirmation)
- (4) Skilled and professional staff w/ multi disciplinary experience
- (1) Diversity and quality of trees, in terms of age, size and species
- (1) Space is still available for additional trees on public and private land
- Consistent maintenance by the same department (Parks & Recreation) on parks and schools

Weaknesses

- (10) City codes for tree protection and preservation are simplistic and basic / Lack of enforcement of existing codes and buffer ordinances / Existing codes are not strong enough to ensure tree preservation in new development, by-right zoning does not help / Permanent Conservation of lands is not in place
- (5) Hard infrastructure frequently "wins the battle" over natural resources / Existing right-of-way and streets are not always suitable for tree planting / overhead utility lines require maintenance and destruction of trees / competition with underground utilities with tree roots / A holistic approach to street trees and right of ways is not taken, rather a spot-by-spot approach in isolation
- No true tree inventory for public land and rights-of-way

Opportunities

None identified from SWOT for the Executive Summary

Threats

- (6) Invasive Plant Species
- "Green" initiatives get cut in tough budget times
- Global warming / climate change

Inventory of Tools Cross-Check

- Council 2025 Vision Statements
- GIS / Green City Software / 2006 Tree Canopy baseline
- Park & Recreation Needs Assessment / Strategic Plan
- Water Protection Ordinance
- Professional Standards / Industry Best Management Practices
- EMS

- Mayor's Climate Protection agreement
- City Sustainability Policy
- Professional Standards / Industry Best Management Practices
- Support from the community and elected officials
- Credible and knowledgeable staff
- Other existing UFM Plans in other communities

Element: Water Quality & Air Quality

Strengths

None

Weaknesses

- (2) No stream management plan in place or maintenance standards for streams – no recognition that longitudinal stream movement is natural and healthy. Who is responsible for stream management and maintenance?

Opportunities

- (7) Link the Plan to air and water quality

Threats

- (7) New development / policy conflicts in new development: not all development is consistent with stated goals and visions
- Uncontrolled stormwater runoff
- Global warming / climate change

Inventory of Tools Cross-Check

- Stream Corridor Assessment
- Water Protection Ordinance

Potential Tactics

Energy Conservation

- Buffer restoration program on private properties where there are gaps in the buffer-possibly funded through the stormwater utility down the road.
- Calculating and forecasting carbon sequestration in the canopy as part of the climate protection agreement requirements.
- Establish a City-wide Stream Management Strategy and Maintenance Standards – tie back to water quality standards
- Establish or reforest vacant City lots or other City lands that are unplanned

Things in the pipeline

- Proposal to expand the stream buffer protections-going to the Planning Commission in September for all other streams in the City beyond Moore's, Meadow Creeks and the Rivanna River
- Stormwater Utility proposal in September, 2007

Benefits of this Element that can be included in the narrative portion of the element
Wildlife habitat
Erosion and flooding control
Protection of biodiversity
Recharge ground water
Manage reduce and treat storm water
Reduce greenhouse gases,
Reduce heat islands, provide shade, reductions in energy usage

Element: Private Land (as an opportunity)

Strengths
- New development in City offers opportunities

Weaknesses
- (10) City codes for tree protection and preservation are simplistic and basic / Lack of enforcement of existing codes and buffer ordinances / Existing codes are not strong enough to ensure tree preservation in new development, by-right zoning does not help / Permanent Conservation of lands is not in place
- Lack of trees on private land

Opportunities
- (7) New development & re-development is a trigger for additional trees
- (3) Land acquisition

Threats
None

Inventory of Tools Cross-Check
- Developers willing partner

Potential Tactics
- Quantify value of trees monetarily through appraisals by Certified Arborists like Arlington and Fairfax have done. There are penalties equivalent to the value of the tree when developers screw up.
- Protect existing trees and encourage plantings of new trees on private property through educational efforts and programs like Neighborwoods.
- Establish a heritage, specimen or champion tree program through inventory and clear definition of what heritage, specimen or a champion tree means.

Staff Responsible
Parks, NDS, Legal, Private landowners, developer representation

Element: Legal and Ordinances

Strengths
- Some existing codes and ordinances exist
- New development in City offers opportunities

Weaknesses
- (10) City codes for tree protection and preservation are simplistic and basic / Lack of enforcement of existing codes and buffer ordinances / Existing codes are not strong enough to ensure tree preservation in new development, by-right zoning does not help / Permanent Conservation of lands is not in place
- (2) No mechanism to assign a monetary or environmental value to trees that are lost.
- Many new landscape "designs" are monocultures of all the same tree species
- Dillon Rule/ Commonwealth laws

Opportunities
- (3) Land acquisition
- (3) Get clarity of property ownership / easements / alleys / Inconsistency of maintenance on utility easements
- Create a tree commission

Threats
- (8) No permanent land protection measures exist
- (7) New development / policy conflicts in new development: not all development is consistent with stated goals and visions

Inventory of Tools Cross-Check
- Zoning Code
- Water Protection Ordinance

Potential Tactics
- City-wide Green Building Policy for all new City buildings – this is in the works currently
- Review of Existing codes and ordinances
- Review applicability and enact Chesapeake Bay Protection Ordinances and Regulations that expand the City's ability to protect trees
- Construction Performance and Maintenance bonds for tree and landscape work and enforcement of those bonding requirements; specify or change City code to determine how this is done through Certified Arborists; and to ensure the bonding requirements ensure the sustainability of a buffer or screen, etc.
- Research legislative authority that already exists and what other Va. Jurisdictions are doing

- Proffers – for all public improvement needs and into a "Tree Fund" that could be used for maintenance.
- Our own internal standards must be equal or stronger and better that what the City requires others to do.
- Include the Planning District Commission legislative liaison in this discussion so that these desires are communicated to the General Assembly, coordinate with other jurisdictions in the Commonwealth.

Element: Preservation and Protection Policies

Strengths

- (5) Invasive Species Assessment is completed / Funding in CIP in place / EMS / Staff has become proactive with arboreal maintenance / Needs Assessment and Strategic Plan in place / The Urban Forest Management Plan is in the City's 2007 Comprehensive Plan
- New development in City offers opportunities
- Some land acquisition through easements has taken place

Weaknesses

- (10) City codes for tree protection and preservation are simplistic and basic / Lack of enforcement of existing codes and buffer ordinances / Existing codes are not strong enough to ensure tree preservation in new development, by-right zoning does not help / Permanent Conservation of lands is not in place
- (2) No mechanism to assign a monetary or environmental value to trees that are lost.
- There are numerous City-owned parcels that are not classified as Parks or for other uses – Maintenance responsibility for these parcels is cloudy
- Lack of innovation on our own City projects, without an ethos of stewardship
- Staff resources are stretched on the maintenance end / We plant a lot of trees but do not have the resources to keep them all alive / Massive invasive species problems, without the resources to tackle it.

Opportunities

- (7) New development & re-development is a trigger for additional trees
- (3) Land acquisition
- Create a tree commission

Threats

- (8) No permanent land protection measures exist
- (7) New development / policy conflicts in new development: not all development is consistent with stated goals and visions
- (6) Invasive Plant Species
- Uncontrolled stormwater runoff
- School and Housing Authority land could be sold, loss of trees
- "Green" initiatives get cut in tough budget times

- Disease and insects

Inventory of Tools Cross-Check

- Zoning Code
- Invasive Species Assessment
- Stream Corridor Assessment
  Water Protection Ordinance
- Professional Standards / Industry Best Management Practices

Potential Tactics

- Establish Permanent Conservation Easements on City-owned lands to permanently preserve lands in perpetuity
- Separate Preservation or Conservation policies through protection when construction is on-going – grading policies, compaction, and alteration of drainage and natural moisture patterns. Health of the forest and active management plans are critical to develop within this element
- Protection Policies are reflected through disease control, invasive control, etc.
- Focus on
- Balance between Hard and Soft Infrastructure
- Arboriculture standards for Charlottesville, using industry BMP's (e.g. critical root zones for certain species)
- Look for champion trees, preserve them
- Establish a date by which the City will reach the stated 40% tree canopy goal.
- Establish quickly those properties that can be placed under conservation easement within the next 12 months.

Element: Education & Outreach / Collaborations

Strengths

- Some well organized neighborhood associations

Weaknesses

- (3) City Staff are not perceived as credible or knowledgeable by City Council, BAR and even some in City Administration
- Minimal recognition on the part of the community that trees are renewable resources, not permanent fixtures
- Interdepartmental communication at a Policy level is weak
- Internal education of staff is required to effectively enforce codes – staff must be properly equipped
- The BAR is not educated on Best Management Practices for Forestry / There is tremendous community passion on this issue, but the community is not always knowledgeable about BMP's
- There is not a balance between maintenance responsibilities and public "passion"
- Many new landscape "designs" are monocultures of all the same tree species

- Lack of innovation on our own City projects, without an ethos of stewardship

Opportunities

- (8) Engage Energetic community partners

Albemarle Tree Stewards	Master Gardeners
Master Naturalists	Friends of Parks & Recreation
Sustainability Committee	Department of Forestry
Native Plant Society	Rivanna Conservation Society
The Nature Conservancy	Rivanna Trails Foundation
UVa.	Etc.

- (3) Get clarity of property ownership / easements / alleys / Inconsistency of maintenance on utility easements
- Enhance school curriculums and City program offerings

Threats

- (2) The BAR is perceived as not fully educated on forest management, and not focused on best management practices
- Charlottesville is defined by its history and can't seem to look forward

Inventory of Tools Cross-Check

- Stream Corridor Assessment
- Department of Forestry assistance
- Staff Resources and Volunteer energy
- Ability to make connections between public bodies
- Support from the community and elected officials
- Grant Funding
- Staff to implement the plan
- Developers willing partner
- Cooperative partners in Albemarle County and UVa.

Potential Tactics

- Staff education
- Marketing strategy to 1-advance credibility, 2-educate, 3-documents for distribution
- Interpretation
- Public education of BMP's particularly on private property for routine and other tree care/maintenance
- Educate leaders of BMP's – Council, PC, BAR
- Website promotion
- Tree Stewards/Partnerships/Neighborhood Associations
- 5 year report on state of the Urban Forest
- Staff requirements for interpretation, environmental education,
- Enhance school curriculum
- Neighborwoods or similar planting programs

- Virtual tour of specimen trees of cool things in the City right now on our website or

Element: Sustainability, Management and Maintenance Methods

Strengths

- (5) Invasive Species Assessment is completed / Funding in CIP in place / EMS / Staff has become proactive with arboreal maintenance / Needs Assessment and Strategic Plan in place / The Urban Forest Management Plan is in the City's 2007 Comprehensive Plan
- (4) Skilled and professional staff w/ multi disciplinary experience
- Consistent maintenance by the same department (Parks & Recreation) on parks and schools

Weaknesses

- (5) Hard infrastructure "wins the battle" over natural resources / Existing right-of-way and streets are not always suitable for tree planting / overhead utility lines require maintenance and destruction of trees / competition with underground utilities with tree roots / A holistic approach to street trees and right of ways is not taken, rather a spot-by-spot approach in isolation
- (2) No stream management plan in place or maintenance standards for streams – no recognition that longitudinal stream movement is natural and healthy. Who is responsible for stream management and maintenance?
- There is not a balance between maintenance responsibilities and public "passion"
- Many new landscape "designs" are monocultures of all the same tree species
- Lack of innovation on our own City projects, without an ethos of stewardship
- Staff resources are stretched on the maintenance end / We plant a lot of trees but do not have the resources to keep them all alive / Massive invasive species problems, without the resources to tackle it.

Opportunities

- None

Threats

- (6) Invasive Plant Species
- Uncontrolled stormwater runoff
- "Green" initiatives get cut in tough budget times
- Disease and insects
- Underground utility maintenance and replacement

Inventory of Tools Cross-Check

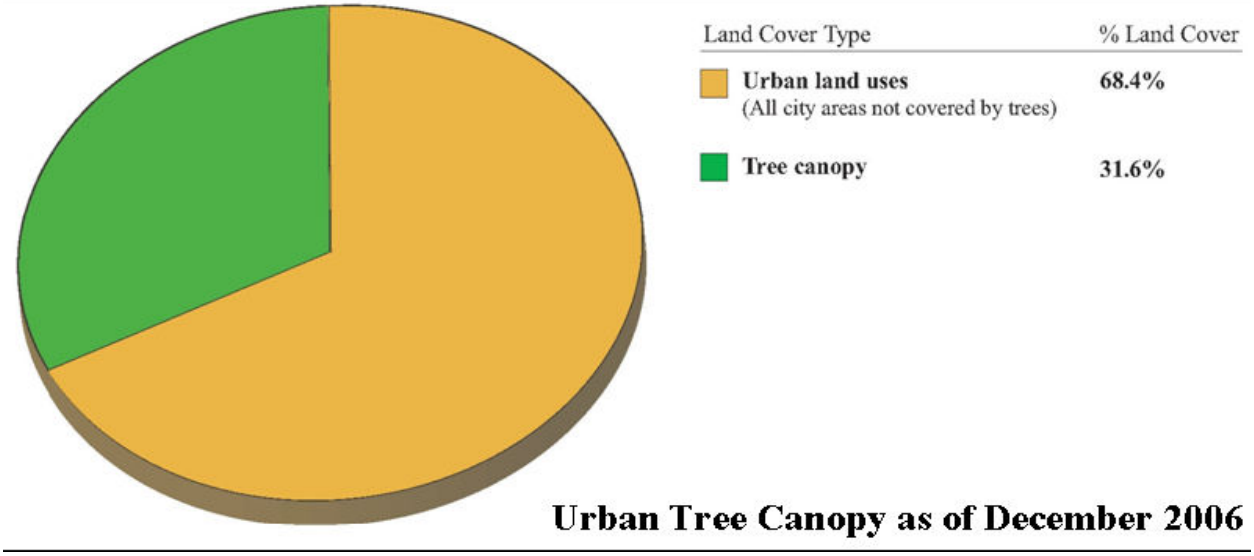
- Invasive Species Assessment
- Professional Standards / Industry Best Management Practices
- Staff to implement the plan

Potential Tactics

Invasive Species Management
Street Tree Assessment
Tree Canopy Assessment/Analysis what does 40% actually mean
Roll into EMS
Review of other plans and BMP's
Planting in Riparian areas
No-Mow Zones
School Grounds – opportunities
Track Progress annually
Variety in tree species
Establish a tree nursery
Adopt Industry BMP's as part of our Departmental Maintenance Standards and all City landscaping decisions or City-owned developments and new City projects

Appendix 8
UVa Canopy study 2007

Figure 1



Appendix 9
Forestry Resources and Other Plans

Numerous other urban forest and natural resource management plans exist in communities across the nation. These plans take several forms dependent upon each community's values, environment and existing resources. The plans listed below are a representative sample of the type of plan that Charlottesville has strived to create for its community.

Urban Forestry Resources

Virginia Department of Forestry
http://www.dof.virginia.gov

USDA Forest Service
http://www.fs.fed.us

Chesapeake Bay Local Assistance Division

Virginia Extension Office

Virginia Urban Forest Council
http://www.treesvirginia.org

Arbor Day Foundation
http://www.arborday.org

American Forests
http://www.americanforests.com

National Association of Homebuilders
http://www.nahb.org

Virginia Native Plant Society

VA DCR?

Tree Stewards
Trained volunteers whose mission is to support rural and urban forests, to increase public awareness of he value and beauty of trees, to educate the public about trees and tree care, and to partner with local government agencies and civic groups to improve and restore the area's tree canopy.

Other Urban Forestry Plans

Arlington County, Virginia – Urban Forest Master Plan
http://www.arlingtonva.us/departments/ParksRecreation/scripts/planning/ParksRecreationScriptsPlanningComprehensivePlanning.aspx

Town of Leesburg, Virginia – Urban Forestry Management Plan
http://www.leesburgva.org/Services/planning/doc/UFMPL_06-02-28.pdf

City of Kirkland, Washington – Natural Resource Management Plan
http://www.ci.kirkland.wa.us/__shared/assets/Nat_Rsrc_Mgt_Plan_II352.pdf

Park and Recreation Commission for the Parish of East Baton Rouge, Louisiana - Cultural, Historical and Natural Resource Management Plan
http://www.brec.org/assets/docs/iyp_chapter09.pdf

Fairfax County Park Authority, Fairfax, Virginia – Natural Resource Management Plan
http://www.fairfaxcounty.gov/parks/GMP/nrmpfinal1-14-04.pdf

City of Baltimore, Maryland – Report on Tree Canopy – Prepared by the Maryland Department of Natural Resources
http://parksandpeople.org/publications/special_reports/Baltimore%20UTC%20report%20FINAL.pdf

National Park Service – Natural Resource Challenge
http://www.nature.nps.gov/challenge/challengedoc/NatRes2.pdf

Appendix 10
Implementation Tables

1. Preservation and Protection

Number	Tactic	Lead Department	Time Frame
1.1	Investigate and establish Conservation Easements or other protections on existing and future City-owned lands to preserve lands in perpetuity.	Parks, Attorney's Office, City Manager	medium
1.2	Incorporate vacant City lots and/or other City lands that are unplanned for development into park system	Parks, Attorney's Office, City Manager	medium
1.3	Pursue additional protection for park and school lands that requires either a unanimous City Council vote or public referendum before park or school lands are sold.	Parks, NDS, Attorney's Office	medium
1.4	Pursue land acquisition funding to purchase forested lands, especially for greenway development and to address existing riparian buffer gaps.	Parks	ongoing
1.5	Determine private properties that can be placed under conservation easement.	Parks, Attorney's Office, Environmental	long
1.6	Coordinate with Charlottesville schools to develop a strategy for management of large forest stands on school property.	Parks, schools	medium
1.7	Establish 50 foot vegetated riparian buffers (25 on each side) for creeks in protection	Landowners	ongoing
1.8	Explore expansion of stream buffer protections for all other streams in the City, beyond Moore's Creek, Meadow Creek, and the Rivanna River.	NDS	medium
1.9	Establish grading and compaction guidelines that do not alter drainage and natural moisture patterns to preserve healthy trees.	NDS, Parks	ongoing
1.10	Create tree protection guidebook for developers and private landowners that summarizes codes, laws, BMPs and goals for projects in the City	Parks, NDS	short
1.11	Investigate the presence of champion, heritage and specimen trees. Identify, label, and preserve them. Work to improve legal protections for these trees.	Parks	short
1.12	Adopt a Tree Protection Ordinance that includes a method to establish penalties if trees are lost	NDS, Parks	long

1.13	Establish a City-wide Stream Management Strategy and Maintenance Standards	Parks, Public Works	medium
1.14	Conduct a thorough review of the current Code of Virginia, City Code, Chesapeake Bay Protection Ordinances, and the ordinances of other jurisdictions to ensure that the City is doing all it can to protect trees and natural resources.	NDS, Parks, Attorney's Office, Public Works	long
1.15	Pursue desired state legislative changes through the General Assembly. Involve the Thomas Jefferson Planning District Commission legislative liaison in discussions regarding the General Assembly.	Attorney's Office	ongoing
1.16	Establish Construction Performance and Maintenance bonds during redevelopment for tree and landscape work and ensure enforcement of bonding requirements. Utilize City Code to require this to be done through ISA Certified Arborists and to ensure the bonding requirements are sufficient to maintain the sustainability of a riparian buffer or tree screen.	NDS	medium
1.17	Analyze City by entry corridor, parks and schools, zoning categories and sub-watersheds to determine existing canopy coverage to compare with target canopy coverage goals.	IT, Public Works, Parks, NDS	short

2. Enhancement and Restoration

Number	Tactic	Lead Department	Time Frame
2.1	Implement the recommendations of the Invasives Species Management Plan	Parks	ongoing
2.2	Ensure adequate planning, staff and budget to manage trees on acquisitions that bring forested lands into public management.	Parks	ongoing
2.3	Work with utilities to end tree topping & tunneling, or convert to rubber coated wires	Attorney's Office, Parks, City Manager	long
2.4	Enhance and restore healthy forest canopy on vacant City lots and/or other City lands that are unplanned for development	Parks	medium
2.5	Establish a riparian buffer restoration program on private property	Parks, PW, NDS	medium
2.6	Encourage forest species diversity to increase resistance to disease and pests, especially in development and redevelopment scenarios	Parks	ongoing
2.7	Plant native species where possible and use site adaptable trees otherwise	Parks, NDS, PW	ongoing

3. Expansion

Number	Tactic	Lead Department	Time Frame
3.1	Establish tree canopy goals for entry corridors, parks and schools, appropriate zoning categories, and watersheds.	NDS, Parks, PW	short
3.2	Plant trees in appropriate public locations, including those identified in the 2008 Urban Forest Assessment	Parks	short
3.3	Encourage plantings of new trees on private property through educational efforts and programs. Identify potential planting locations using City GIS and other data	Parks, PW, NDS	medium
3.4	Continue tree planting programs in riparian areas for stream corridor management and health	Parks	ongoing
3.5	Establish City BMPs in line with industry BMPs for silviculture. Ensure that these standards are required of developers during the site plan review process and construction	Parks, NDS	medium
3.6	Expand trail standard to include vegetative plans for areas within and adjacent to trail corridors	Parks, NDS, PW	ongoing
3.7	Collocate trails and utilities where appropriate to limit creation of multiple corridors in forested areas	Parks, PW, NDS	ongoing
3.8	Work with utilities on identifying good locations for tree planting near utility corridors	Parks, NDS, PW	ongoing
3.9	Plant a tree on public property every Arbor Day as part of annual celebration	Parks	ongoing

4. Monitoring

Number	Tactic	Lead Department	Time Frame
4.1	Establish a methodology to track and maintain targeted healthy canopy coverage over time	Parks	short
4.2	Load all relevant data into the City's GIS database for Citywide access	IT, Parks	short
4.3	Perform an assessment similar to the Forest Assessment every five years	Parks	5 years
4.4	Acquire leaf-on aerial or satellite photo and perform an urban tree canopy calculation every five years	Parks	5 years
4.5	Compare 5 year data with canopy goals set for various sub areas in the Comprehensive Plan	Parks, NDS, Public Works	5 years
4.6	Create and publish a report on the State of the Urban Forest every five years after new data collection and analysis is complete	Parks	5 years
4.7	Include latest urban tree canopy information in comprehensive plan updates	Parks, NDS	5 years
4.8	Provide greater trail access into public forested areas	Parks	medium
4.9	Utilize a Risk Rating Index to rank tree risks	Parks	ongoing
4.1	Calculate and forecast carbon sequestration levels in the urban tree canopy as part of the climate protection agreement requirements	Parks, PW	short
4.11	Establish a Tree Commission or Board – consider using existing group, such as Parks and Recreation Advisory Board	Parks, NDS, Manager	short
4.12	Track invasives species removal using GIS mapping	Parks, IT	ongoing
4.13	Maintain GIS layer to include new and remove cut trees to keep inventory up to date	Parks, IT	ongoing
4.14	Maintain records of utility work events that impact public forests (clearing land around lines)	Parks	ongoing
4.15	Update GIS layers such that parcels, planning neighborhoods, and City boundary all encompass the same amount of land area	Parks, IT, NDS	ongoing
4.16	Include tree and forest components and threat of loss in future build-out studies	NDS, TJPDC	medium

5. Education and Outreach

Number	Tactic	Lead Department	Time Frame
5.1	Create, fund, and staff a City Environmental Educator position to coordinate efforts	Parks, Public Works	short
5.2	Develop and implement a comprehensive City staff education program. Consider using the City EMS as the tool for implementing this program.	Parks, Public Works	medium
5.3	Develop a public outreach strategy that will advance City staff and policy credibility, educate the public, and create documents for distribution		medium
5.4	Incorporate environmental interpretation into public education efforts in parks	Parks, Public Works	medium
5.5	Create a public education campaign to share information on forestry and tree best management practices for public and private properties	Parks, NDS	medium
5.6	Develop a strategy to educate City decision makers on urban forestry BMPs		medium
5.7	Enhance partnership with local advocates, e.g. Tree Stewards, Neighborhood Associations, Master Naturalists & Gardeners, Native Plant Society	Parks, Public Works, NDS	medium
5.8	Work with Charlottesville City Schools to enhance school curriculum on natural resources for SOL requirements	Parks, Schools	medium
5.9	Pursue programs for the planting of new trees on private property		ongoing
5.10	Explore options for establishing a botanical garden and/or arboretum on public lands	Parks	medium
5.11	Puruse funding and land to create an environmental education center (possibly shared with the botanical/arboretum)	Parks, Public Works, NDS	medium
5.12	Use the Annual Arbor Day celebration as an educational opportunity and to highlight partnerships	Parks	annual
5.13	Complete and utilize the planned and existing greenway system to educate trail users and park visitors about trees	Parks, NDS	medium

5.14	Utilize the upcoming Meadow Creek Stream Restoration project as an educational opportunity about forest management	Parks, NDS, Public Works	short
5.15	Promote the "Funds for the Forest" program as a means of collecting donations to implement the goals of this plan	Parks, NDS, Public Works	short
5.16	Inform the public about tree plantings on public lands	Parks	ongoing

6. Sustainability and Management

Number	Tactic	Lead Department	Time Frame
6.1	Prepare annual implementation plan to define scope of work for urban forest management	Parks	annual
6.2	Continue to manage Invasive Species, using recommendations contained in the Invasive Species Assessment and Management Plan	Parks	ongoing
6.3	Continue to integrate sustainable maintenance methods through the EMS for tracking and management purposes	Parks, PW	ongoing
6.4	Adopt industry BMPs as part of the Parks and Recreation Departmental Maintenance Standards and all City landscaping decisions and new City projects	PW, NDS	medium
6.5	Adopt a Wildlife Management Policy to guide staff actions when conflicts occur (e.g. with beaver, deer, Canada geese, rodents, etc.)	Parks	short
6.6	Expand No-Mow Zones to other areas of parks and schools, convert appropriate locations to interpretive educational areas such as meadows and rain gardens to advance educational opportunities	Parks	ongoing
6.7	Share BMPs with private landowners as information to consider in management of their tree and forest resources.	Parks	medium
6.8	Encourage local utilities to become Tree Line USA certified through the Arbor Day Foundation	Parks	medium
6.9	Continue to review & update City Vegetative Debris Management Plan (See Appendix 6)	Parks, PW	ongoing
6.10	Update development codes to help ensure adequate forest canopy is preserved or replanted according to performance based standards	NDS	medium
6.11	Continue commitment that the City will only pursue green building practices for the development and redevelopment of all City lands, to include tree preservation tactics	NDS, Parks, PW, Manager	ongoing
6.12	Promote urban forest tree species diversity through planting recommended site adaptable trees and encouraging use of native tree species	Parks, NDS	ongoing
6.13	Clarify property ownership of paper streets and alleys. Inconsistency of maintenance on utility easements; potential for new tree planting in alleys that are truly private property	NDS, IT, PW, Parks	medium

6.14	Determine sustainable funding sources for urban forest activities including: Annual Operating Budget, CIP budget, development proffers, non-profits, private contributions – "Funds for the Forest", grants, and use of free volunteers	Parks	ongoing
6.15	Implement a stormwater utility to provide a dedicated funding stream to support a Water Resources Protection Program (WRPP) that will include stormwater management improvements	PW	short