



# CARY URBAN FOREST MASTER PLAN 2023-2033



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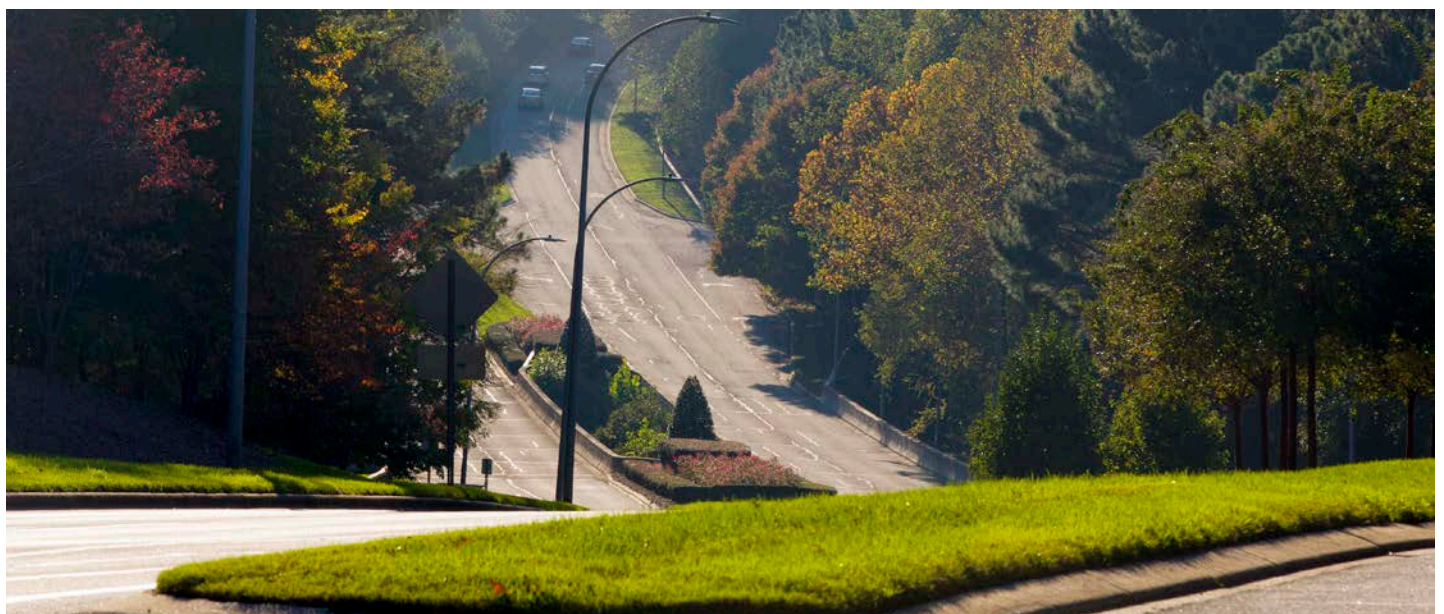
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# EXECUTIVE SUMMARY

Cary leads in planning and implementing innovative environmental stewardship through a variety of programs and projects. The Urban Forest Master Plan (UFMP) continues Cary's long-standing commitment to advancing sustainable practices and programs to maintain Cary's high quality of life. In 2019, Cary's Tree Advisory Committee submitted a report of findings and recommendations on Cary's urban forest to the Environmental Advisory Board, which was subsequently submitted to Cary's Town Council. In 2021, Cary hired its first Urban Forester to facilitate the creation of the 10-year Urban Forest Master Plan. Council intended for this master plan to address and expand on the advisory committee's report and support the implementation of the Imagine Cary Community Plan's tree-related policies.

The UFMP is providing Cary with timely guidance in the context of rapid community and regional growth. Over 90% of Cary is developed, is currently being redeveloped, or is under a near future development plan. Approximately one-third of Cary's land mass is protected open space. Additionally, climate change is rapidly impacting the natural environment, increasing temperatures, intensifying rainfall, and altering general growing conditions. Trees both slow climate change by sequestering carbon and increase Cary's resiliency in the face of climate change by modulating extreme temperatures and reducing flooding. Considering climate change and future development conditions, Cary's UFMP provides a road map to foster Cary's urban forest while maintaining the community's high quality of life.



# GOALS AND GUIDING PRINCIPLES

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The Urban Forest Master Plan is founded on three urban forest goals, governed by a set of four guiding principles. The guiding principles define the values and standards held by the community, which provide a context for all urban forestry efforts in Cary, and for the urban forest goals that follow. The addition of the Urban Forest Master Plan to Cary's planning documents will help inform the future of its urban forest and enhance the benefits the community receives from it. This plan equips Cary to be a leader in urban forestry as it continues to be a healthy and resilient community.

## **Goal: Steward and Grow Cary's Trees and Tree Canopy**

Cary will maintain and steward existing trees and forests, while looking for opportunities to expand tree canopy coverage. Particular care will be given to the growth and expansion of tree canopy where it is needed most (i.e. improving walkability, connecting fragmented forests, rebuilding canopy after losses) and where it reflects the character and needs of individual neighborhoods.

## **Goal: Improve the Quality of Cary's Trees and Forests**

Along with increasing the quantity of tree coverage, increasing the quality of tree canopy is critical for ensuring that it is resilient in the face of climate change, sustainable and long-lasting, and will serve the functional and aesthetic needs of both the community and the environment.

## **Goal: Promote a Community-wide, Shared Commitment to a Healthy Urban Forest**

This work will require Cary residents, businesses, and institutions to each do their part on their own properties and neighborhoods. Partnerships and engagement that are thoughtful and measurable will be key to making real and long-lasting progress.

### **Four Guiding Principles**

Cary values healthy and diverse ecosystems which support healthy citizens and communities.

Success requires partnerships and community-wide efforts.

Increasing knowledge about trees and tree canopy is essential.

Tree benefits should be available to all residents.

# STRATEGIES

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Progress towards reaching these three goals can be achieved through efforts of ten strategies:

- Enhance Urban Forestry Information and Data
- Incorporate the Urban Forest into Planning Efforts and Documents
- Strengthen Policies and Codes to Protect Trees and Support Healthy Growth
- Strengthen Urban Forestry Oversight and Make Operational Enhancements
- Improve Planting Strategies
- Promote and Conserve Native Forest Ecosystems, Trees, and Soils
- Explore Opportunities to Increase Partnerships and Community Involvement
- Engage and Educate on the Value of Trees
- Set the Stage for More Advanced Programs
- Institute an Approach for Continuous Measurement & Reassessment

This plan will help inform the future of Cary's urban forest and enhance the benefits the community receives from it. This plan equips Cary to be a leader in urban forestry as it continues to be a healthy and resilient community.



# INTRODUCTION

Cary is a highly regarded community within the Research Triangle area of North Carolina. Over the last decade, it has grown from a small suburban town into a large, diversified community filled with businesses, residents, and destination venues. Despite immense growth, Cary has maintained approximately 51% tree canopy cover due to deliberate planning and land management practices. Today, Cary leads the state in environmental management through its commitment to parks, open spaces, and greenways as well as an emphasis on tree management and care.



## HOW WE GOT HERE

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Cary has long valued its open space and forests, paying special attention to its trees. As such, it is worth noting the work that led up to this Urban Forest Master Plan (UFMP). This included long term leadership from Cary's Council, community planning efforts, recommendations from Cary's Environmental Advisory citizen board, and ongoing encouragement and support by Cary citizens and leaders..

**Vision and Leadership from Cary Council.** The Council's steadfast commitment to celebrating and fostering Cary's tree canopy has resulted in long term action and leadership. This support includes establishing and using trees to address flooding and stormwater issues, requiring robust buffers and open space within all planned developments, creating management plans for unique forested areas, reforesting Cary facilities, and, finally, by embarking on the Urban Forest Master Plan. Taken together, Council's leadership has created flourishing forests and the preservation of approximately one third of regulated land within Cary.

**Stormwater and Floodplain Preservation (1992).** The Council has long recognized the value trees provide in mitigating flooding and managing stormwater, requiring open space in all new developments. In 1992 Cary established floodplain maps, and shortly thereafter implemented water quality rules. Then, in 2000 and 2001, Cary passed ordinances which prohibit development within areas defined as urban transition and riparian buffers, as well as the 100-year floodplain. Riparian buffer requirements are required for new development, which protect sensitive lands along streams, including heavily forested areas. These changes helped improve water quality, limited development in flood prone areas, and ultimately conserved forests growing along streams, creating ribbons of connected lowland forest growing across Cary. From then on, Cary's stormwater strategies included restoring natural lands and using trees as green infrastructure for flood mitigation.

**Imagine Cary Community Plan (2017).** In 2017, the Cary Town Council approved the Imagine Cary Community Plan. Chapter 8 reaffirms Cary's commitment to sustainability and environmental stewardship. It includes specific policies that emphasize the protection and stewardship of open space, integrating policies of resilience and adaptation, and preserving and protecting Cary's urban trees.

**Environmental Advisory Board (2019).** In 2019, to further support of the policies in Imagine Cary Community Plan, the Tree Advisory Committee created a Tree Recommendations Report for Cary's Environmental Advisory Board, which was subsequently accepted by Cary's Town Council.





**Walnut Creek Study (2022).** In 2022, work was initiated on a long-term vision for the Walnut Creek Watershed that will utilize natural lands and vegetation to address flooding and enhance the quality of life for residents. This work builds on the Walnut Creek Adaptive Stormwater Initiative and will serve as a model for retrofitting areas developed prior to the key stormwater ordinance changes in 2000. This work to restore natural lands will utilize trees and forests as stormwater infrastructure, in addition to other innovative green stormwater infrastructure projects.

**Open Space Master Plan (2024).** Cary launched the Open Space Master Plan in 2022 in coordination with the Parks, Recreation, and Cultural Resources Master Plan. Through the efforts of strategic land acquisition, natural resource preservation, and development regulations a large amount of open space in Cary has been conserved. The plan will develop an inventory of open space land, consider new open space policy, and provide recommendations for prioritization criteria and implementation tools for the management of open space.

**Sustainability and Climate Action Strategy (2024).** Cary embarked on a path towards collective action for a sustainable, resilient future with the creation of a Sustainability and Climate Action Strategy in 2022. This strategy will include a section on Natural Resources that seeks to protect and enhance Cary's natural areas, ensuring open spaces and ecosystems are healthy, biodiverse, resilient, connected, and accessible to all now and for future generations.

**Urban Forest Master Plan (2024).** Put together, these efforts led to this project – the Urban Forest Master Plan (UFMP). Initiated in 2022, the Urban Forest Master Planning process included robust citizen engagement, comprehensively assessed the state of Cary's trees and forests, then analyzed their physical infrastructure as well as their social and political context. From this process,

Cary established four guiding principles, three goals, and ten strategies, for the management of Cary's trees and forests. Following a strong culture of citizen oriented, data-based planning, the Urban Forest Master Plan builds on the policies of the Imagine Cary Community Plan. The plan goes beyond a simple focus on preservation by aspiring to grow the urban forest of the future through leadership, stewardship, sustainability, and resilience. The addition of the Urban Forest Master Plan to Cary's planning documents will help inform the future of its urban forest and enhance the benefits the community receives from it.

## UNDERSTANDING CARY'S BOUNDARIES

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Analyzing tree canopy in Cary is complex, partly because Cary's boundaries are complex. It is important to understand the differences here, to better understand variations in canopy cover numbers across multiple studies. Cary has political boundaries, legislative boundaries, watershed boundaries, and areas of land managed cooperatively through partner agreements. In this way, Cary is truly a community that grows and changes over time. This means it is important to be specific when analyzing the trees and forests of Cary, defining exactly which are Cary's and which are not.

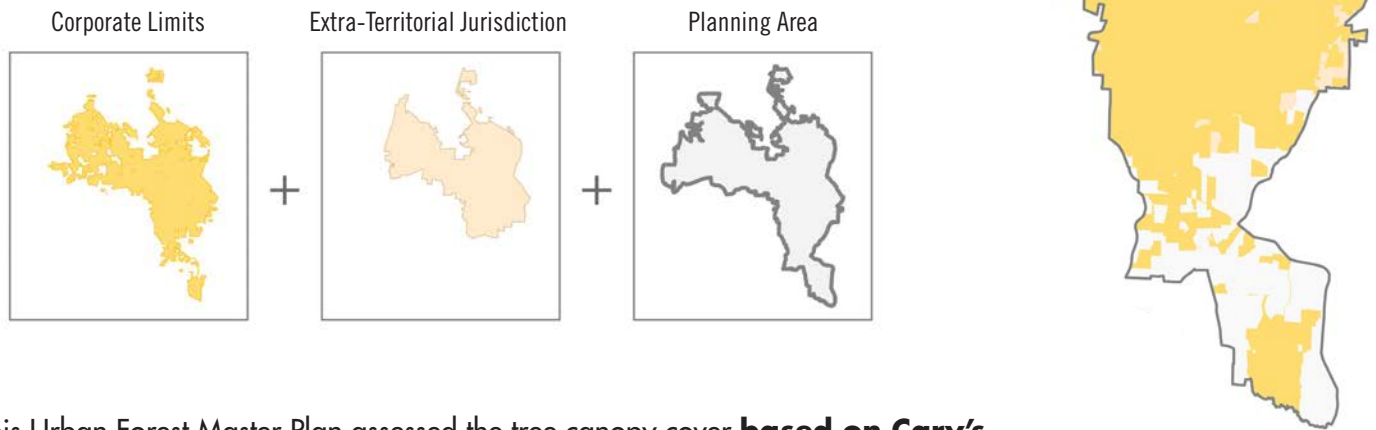
The municipality of Cary stretches across three counties, borders seven jurisdictions, and provides public services to areas which it does not directly regulate. Over time, Cary's legislative boundaries and geographical influence shift due to rezonings, partnerships and policy decisions. Because of this complexity, there are different ways of defining Cary, through areas called "geographies."

Geographies describe different legislative and physical areas of Cary, and are used to provide different types of analysis. The three main geographies of Cary are:

- *Cary's Corporate Limits (CL)*: Land that is within Cary's municipal limits. The CL changes over time due to annexations.
- *Cary's Extra-territorial Jurisdiction (ETJ)*: Land not located within Cary Corporate Limits, but where Cary still maintains regulatory authority over land development and building construction. The ETJ changes over time due to annexations and policy changes.
- *Cary's Planning Area (PA)*: Also called Cary's Land Use Planning Boundary, this is land located within areas of various Cary's plans, partnerships, and policy influences. Per agreements with neighboring jurisdictions, Cary will not extend beyond this boundary.

## Cary, NC Areas Shown (2023)

- Corporate Limits
- Extra Territorial Jurisdiction
- Planning Area



This Urban Forest Master Plan assessed the tree canopy cover **based on Cary's Planning Area (PA)**. This geography was chosen because it does not change over time and is the maximum extent of Cary's influence. The consistency in the area the PA covers allows Cary to accurately track changes in land cover over the years. The UFMP looked at changes in tree canopy cover within the PA from 2010-2020. This boundary provides consistent information about what is happening to Cary's trees, and where different types of programs should be focused.

## PURPOSE AND GOALS

In 2021, Cary's Council identified the need for a strategic plan to manage the future of Cary's trees and forests. Council authorized a new position for an Urban Forester, and funded development of a 10-year Urban Forest Master Plan (UFMP). The purpose of the UFMP is to identify key policies and strategies Cary can use to align urban forestry stewardship, open space management, and development with the goals of the Imagine Cary Community Plan. Through a robust planning process, the UFMP plan identified four guiding principles and three primary goals for Cary's trees and forests. Successfully implementing the long-term strategies and actions within this plan will require strategic programming and partnerships with citizens, community groups, and businesses across Cary.

**Open Space:** Land areas which encompass open space may include natural land, wildlife habitat, wetlands, stream buffers, greenway corridors, outdoor recreation, contiguous forests, areas of environmental and community significance, working lands, and urban and suburban greenspace.

# PLANNING PROCESS

In 2022, Cary engaged two nationally respected experts to provide support in creating the Urban Forest Master Plan. Plan-It Geo provided technical analysis and Urban Canopy Works facilitated public outreach and developed the plan, strategies, and action steps. Both companies have worked extensively in North Carolina’s social, political, and ecological environments. Cary also employed the Board-Certified Master Arborist company, City Leaf Works, to provide subject matter expertise.

## STAKEHOLDER ENGAGEMENT

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Stakeholder engagement provided essential and foundational information for the formation of the Urban Forest Master Plan. Feedback was gathered through a professional and stakeholder workshop; a “Community Voices Tree Summit” open house; interviews with elected officials, community members, and industry professionals; the Tree Advisory Committee report; input from the Environmental Advisory Board; and extensive collaboration and draft review by an interdisciplinary Cary staff workgroup. Observations gathered from this process included perceptions about biggest challenges facing the urban forest, what is being done well, and potential systemic improvements. These collective perspectives and opinions contributed to the framework of the UFMP and generated guiding principles, goals, and strategies.

### Themes Heard from Engagement

Through the hundreds of comments and conversations surrounding trees in Cary, a number of themes emerged detailing what the community values and wants for the future. These themes are briefly described below:

Theme #1: More knowledge and awareness is needed.

Theme #2: Better management is needed for existing trees.

Theme #3: More tree protection and planting requirements are needed.

Theme #4: Native trees and their impact on human and wildlife are important in Cary.

Theme #5: As most canopy is on private land, effective solutions will require partnerships.

Theme #6: Prioritize adding canopy in corridors and key areas:

6a. where shade is needed to keep Cary walkable, and

6b. to ensure all residents have equitable access to the benefits trees provide.

## ROLE OF LEADERSHIP

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In addition to using ordinances to preserve and grow forests during development, Council supports the active management of Cary's public lands. In 1976 the State of North Carolina established Hemlock Bluffs, and through 1986 and 1988 land donations to Cary, Hemlock Bluffs Nature Preserve was created. Cary supports the unique management required to maintain the regionally unique wildlife and trees that exist within the preserve. This support includes funding specialized treatments for the hemlocks, permitting controlled burns, and fostering long term relationships with the State and non-profits. In 2022, Cary initiated development of a management plan for White Oak Creek, an exceptional lowland forest located along the White Oak Greenway Cary. These two management plans represent Council's forward-thinking stewardship of Cary's urban forests and natural lands.

In addition to integrating trees across programs, Cary also provides focused leadership on the overall maintenance and stewardship of forests and trees. In 2021, Cary launched the *My Tree, Our Tree* campaign, which has given thousands of trees to citizens for private land plantings. Cary initiated arboriculture training for staff, resulting in many landscape staff becoming ISA Certified Arborists.

Additionally, Council funds special projects to reforest parks, increase trees along greenways, and create unique spaces like the food forest at Carpenter Park and the award-winning Diablo Disc Golf Course in the New Hope Forest. This consistent leadership sets the stage for the Urban Forest Master Plan to foster a resilient, sustainable, and healthy urban forest.

## ANALYSIS OF DATA AND REGULATORY SYSTEMS

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Cary's urban canopy was analyzed across its Planning Area in 2010 and 2020. Additionally, Cary data was parsed into several different types of areas for analysis, including watersheds, private property parcels, census blocks, and public versus private land.

The Planning team assessed how Cary currently manages and regulates trees and forests. All tree and forest related policies, ordinances, and internal operational practices were reviewed for intent and effectiveness. The UFMP provides a summary of findings and how they relate to the recommended policies and actions that support Cary's continued environmental leadership and the goals in the Imagine Cary Community Plan.

# BENEFITS OF TREES

Trees are more than just beautiful - they are living infrastructure that support a high quality of life. Trees improve all aspects of human lives, increasing mental and physical health, improving the safety and quality of our community, and supporting biodiversity and a healthy climate. Trees provide many benefits to Cary. They create and support resilient, biodiverse ecosystems, provide habitat for wildlife, and provide food, medicine, and shelter for people and other wild creatures. While the benefits of trees are too numerous to name, here are a few of the most significant ways trees support a healthy, thriving community.

## Trees are Key to Human and Environmental Health



*Where trees are planted matters! Planting trees in strategic locations can increase the benefits trees bring to the Cary community.*

**Trees reduce flooding.** Trees help reduce the impacts of flooding by catching rainwater on their leaves, branches, and trunks. Their roots absorb water and help turn the soil into a giant sponge which can absorb rainwater. Trees also take up massive amounts of water, with large trees consuming as much as an Olympic swimming pool worth of water each year. Forests create an even bigger impact by filtering, cleaning, and storing water during rainstorms to help protect the people living downstream.

**Trees cool the air.** Trees lower temperatures in our community by as much as 10 degrees. Trees cool the air directly through shading and indirectly through evapotranspiration. Using their leaves, trees shade people and pavement, reducing heat during the day and keeping temperatures cooler at night. Trees also act as giant air conditioners through evapotranspiration. They take water from the ground and evaporate it into the atmosphere, directly cooling the surrounding air.

**Trees clean the air.** Trees act as giant filters by removing pollutants and particulates from the air. Cars and industry generate harmful gasses such as nitrogen dioxide and sulfur dioxide, which lead to ozone, a pollutant very damaging to human lungs. Trees remove these harmful gasses by absorbing them into their leaves. In addition to removing chemicals, trees help clean the air of dust, dirt, ash, and smoke. These small particles settle on tree leaves and are washed away. By removing chemical and physical pollution, trees create cleaner, healthier air.

**Trees slow climate change.** Changes in our climate - increasing weather variability, heat waves, and intense storms - are happening due to increases in greenhouse gas (GHG) emissions, which trap heat in our atmosphere. CO<sup>2</sup> is the most prevalent form of GHGs. Through a process called carbon sequestration, trees draw carbon dioxide from the atmosphere through a process called photosynthesis. Plants use photosynthesis to produce various carbon-based sugars necessary for tree functioning and to make wood for growth. Every part of a tree stores carbon, from the trunks, branches, leaves, and roots. Older trees store more carbon than younger trees, and older forests store more carbon than younger forests. Each tree does its part to sequester and store carbon.



**Trees improve physical health.** Living near trees and greenspace improves human health, reducing incidents of asthma, diabetes, strokes, heart attacks and dementia, lowering blood pressure, improving maternal outcomes, and increasing baby weights. They do this in a variety of ways, including promoting more physical activity by providing space for recreation and creating an appealing outdoor environment. Studies show a direct relationship between tree cover and social interactions. Residents not only come outdoors more often when there is tree cover, but they stay outdoors longer, forming greater relationships with neighbors which can encourage more physical activity outdoors through neighborhood bike rides or walk clubs.

**Trees improve mental health.** Trees help people live longer, happier lives. People living, working, and playing near trees have better mental health with higher rates of happiness, and lower rates of anxiety and depression. Children who go to schools surrounded by trees have higher test scores, higher self-esteem, and experience less bullying. Neighborhoods with more trees experience less violent crime (regardless of income or race), have higher property values, and a higher feeling of community cohesion.

**Trees make communities more livable.** Trees create a sense of place and make streets and sidewalks cooler, cleaner, and safer. Tree-lined streets support vitality by encouraging more walking, playing, and shopping. Trees increase patronage at shops and restaurants and make parks more accessible year-round. Trees increase community cohesiveness, helping provide a high quality of life.





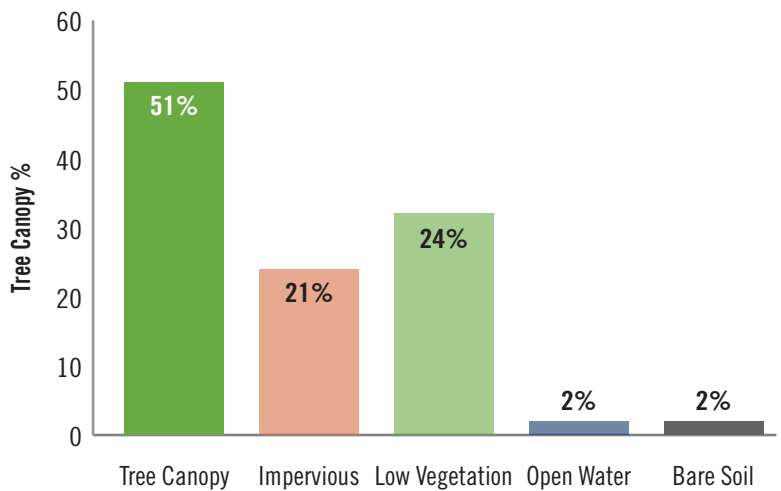
# CARY'S EXISTING URBAN FOREST

Leadership and citizen engagement is only the first step of the discovery process in developing a long-range strategic plan. The next step in the process combines data analysis and reviews existing town operations. Existing and available tree data (tree canopy and public tree inventory data) was reviewed in conjunction with an evaluation of Cary's forestry operations to plant, maintain and manage public trees, while also regulating and incentivizing trees on private property.

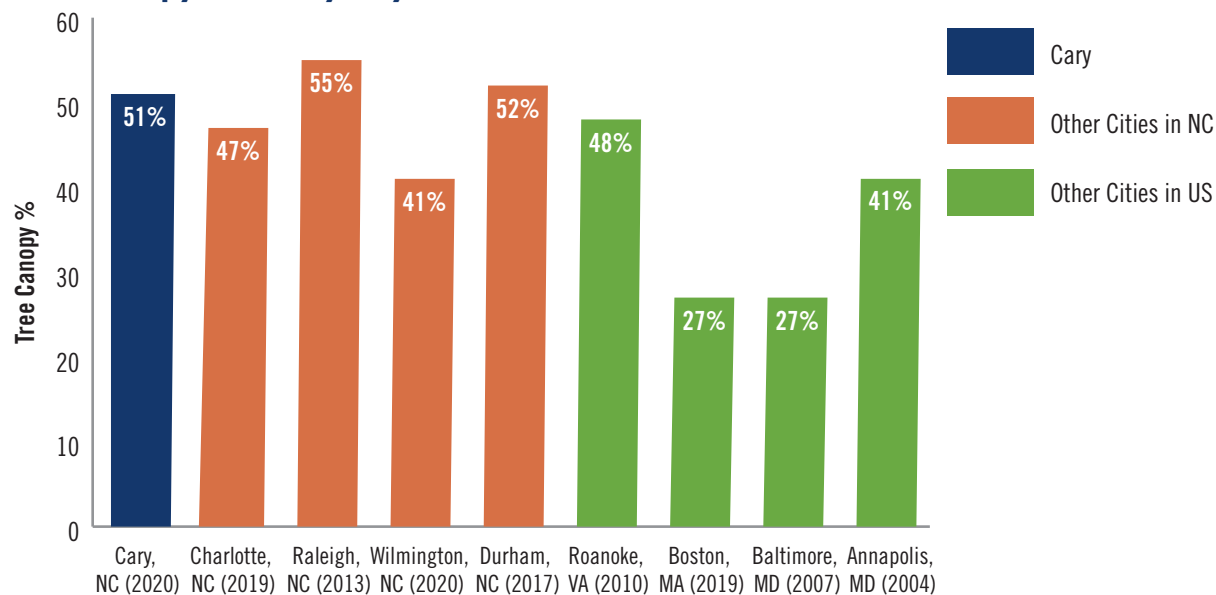
## TREE CANOPY COVER

Urban tree canopy cover measures the layers of leaves, branches, and stems of trees covering the land as viewed from above. Canopy cover includes both trees growing in the forest and landscape, as well as the branches that arch over roads and buildings. As of 2020, the tree canopy covers about 51% of Cary's planning area, contributing significantly to the town's high quality of life. Cary's tree canopy cover is in line with other North Carolina cities that have assessed their canopy cover and is significantly higher than many cities outside of the state.

Cary Land Cover (2020)



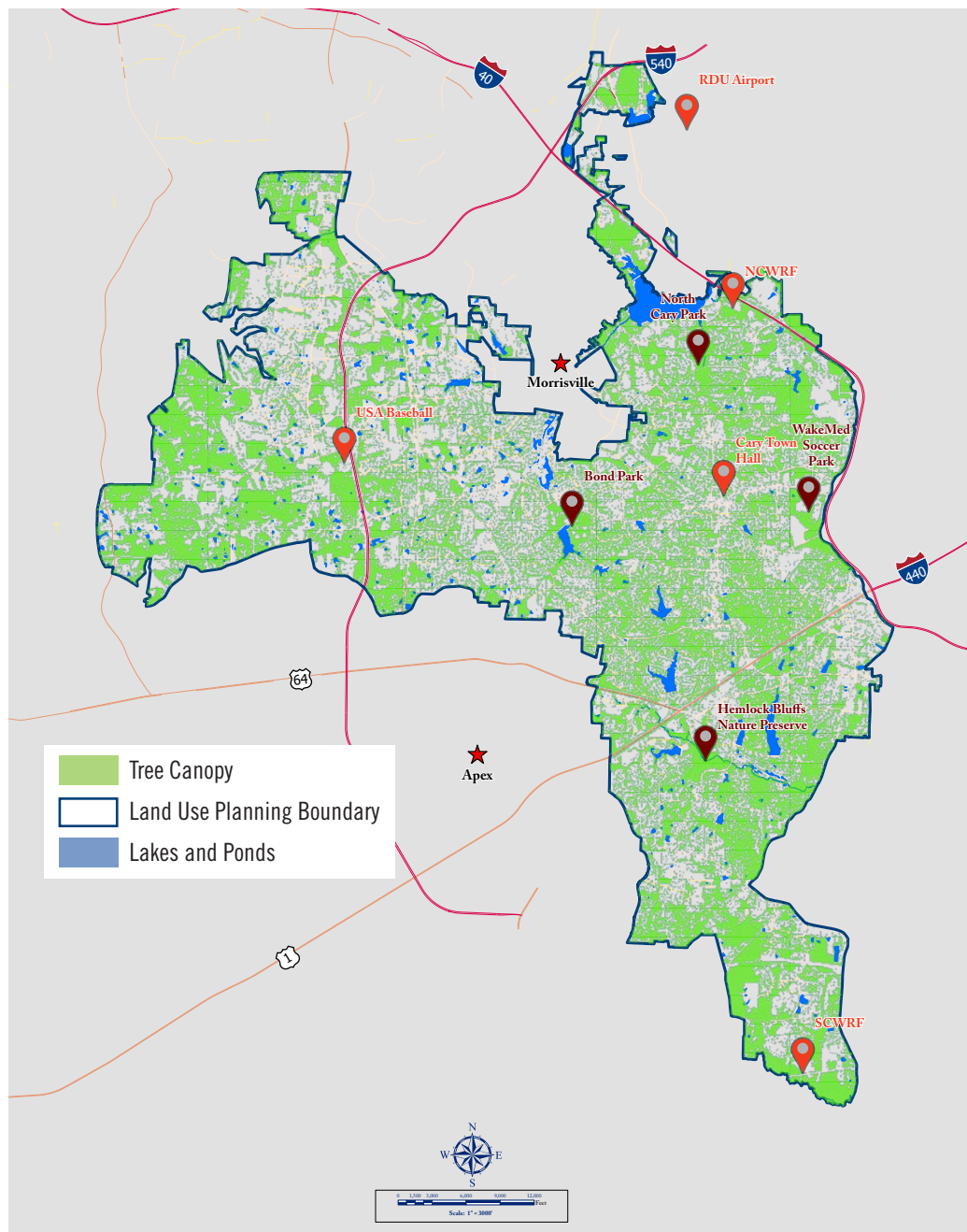
## Tree Canopy Cover by City



Cary's urban tree canopy can be assessed at finer scales and over time, to analyze where trees are being removed or added across a municipality and determine trends and opportunities. Tracking tree canopy over time can help managers know where to put resources into growing new parts of Cary's urban forest, and where resources are needed to steward the current forest.

When looking at the planning jurisdiction of Cary, between 2011-2020 Cary's tree canopy cover has remained approximately 51%, with little overall shift in net amount.

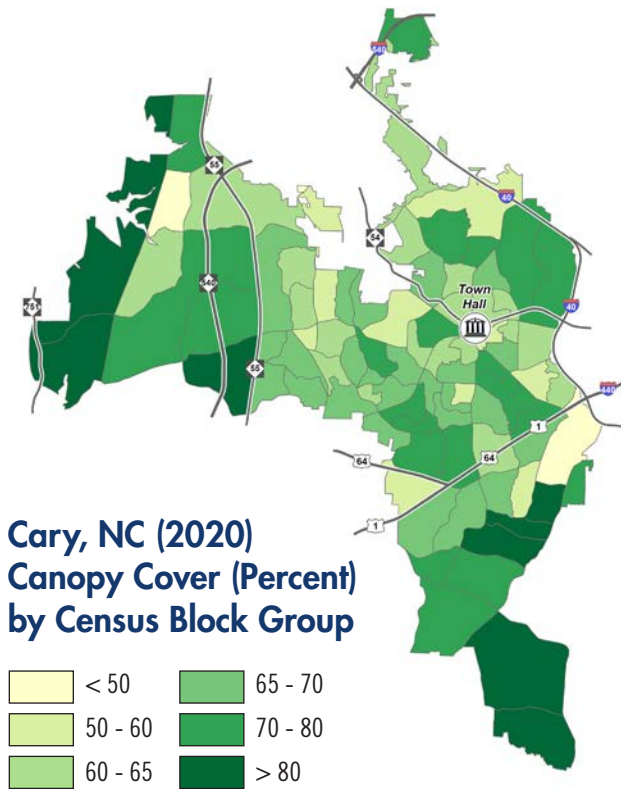
## Tree Canopy Cover Data Collected by PlanIt Geo in 2021



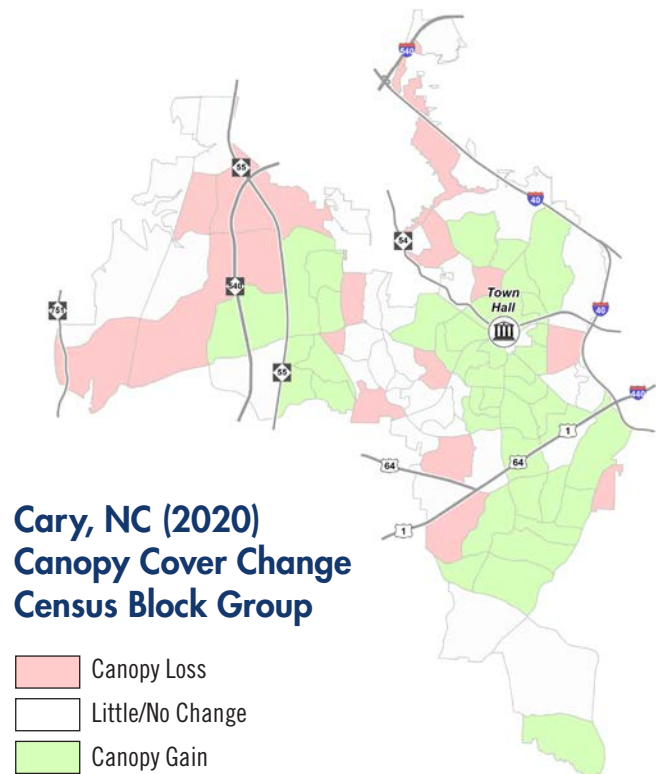
## EXAMINING CARY TREE CANOPY IN SMALLER SEGMENTS

These maps show where tree canopy has changed over time within different census blocks and watersheds. Because these are large areas, losses of canopy in one place are often made up with canopy growth in other places. Many areas in Cary have less than two percent growth or loss, so are labeled as “little or no change.” Areas with canopy loss greater than two percent are labeled as “canopy loss” and those with more than two percent gain are labeled as “canopy gain.” As a robust tree canopy provides many benefits, knowing areas of net canopy gain or loss can help managers target programs to grow or manage the tree canopy.

As of 2020

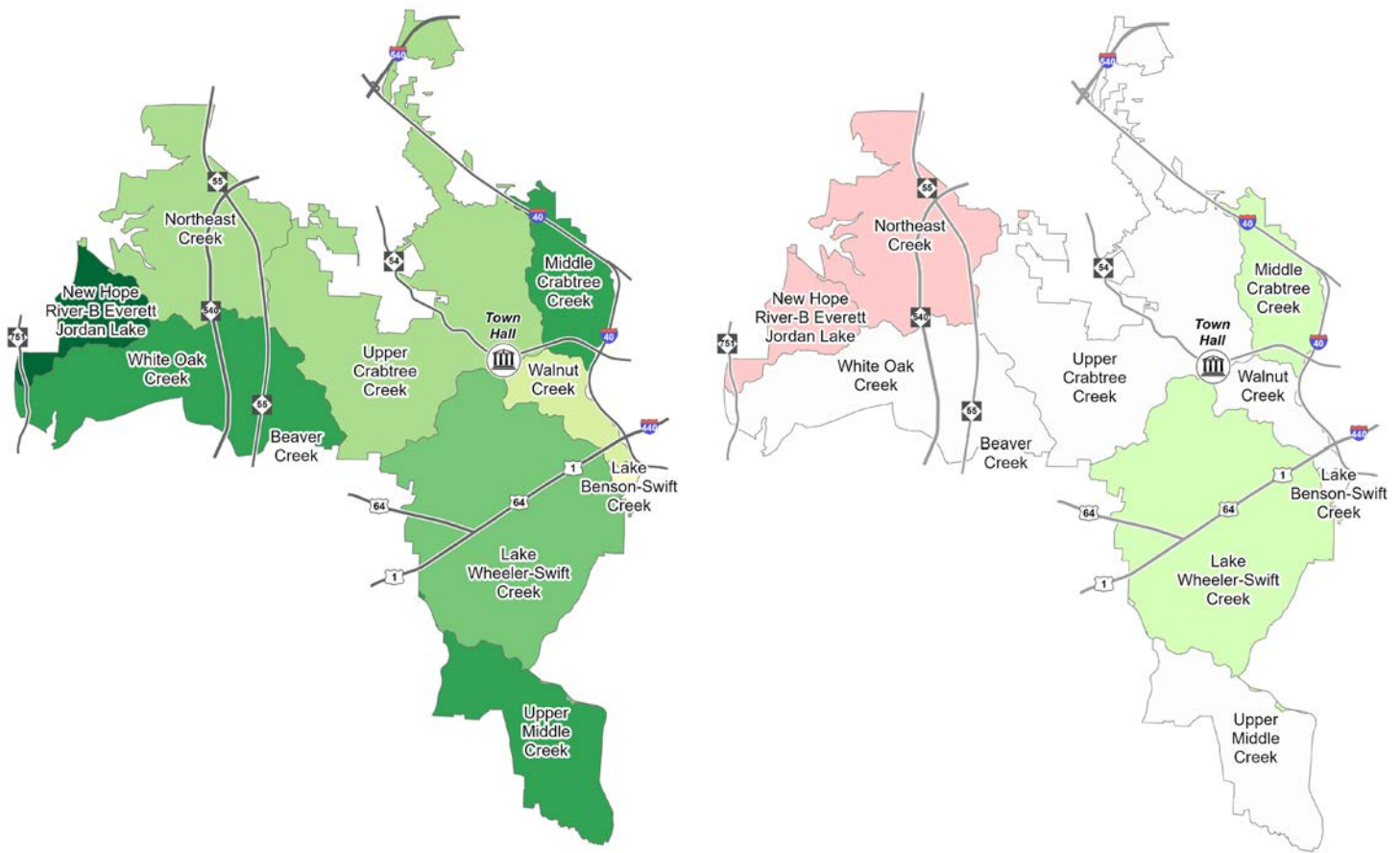


Change Over Time

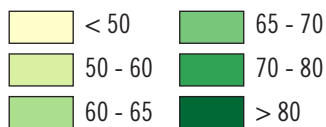


The changes in canopy shown in the maps above are believed to be associated with growth and development in Cary, but further analysis of the change factors is needed to fully understand the underlying factors affecting canopy change in Cary.

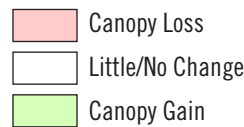
Generally, gains in tree canopy can come from results of tree and stream buffer protection measures, changes in land use, natural tree growth, tree planting, and naturalization of an area over time. Losses in tree canopy can come from natural tree mortality, development, removal of trees by private landowners, and tree loss due to storms, droughts, and pests or disease outbreaks.



**Cary, NC (2020)  
Watershed Canopy Cover (Percent)**



**Cary, NC (2020)  
Canopy Cover Change Watersheds**

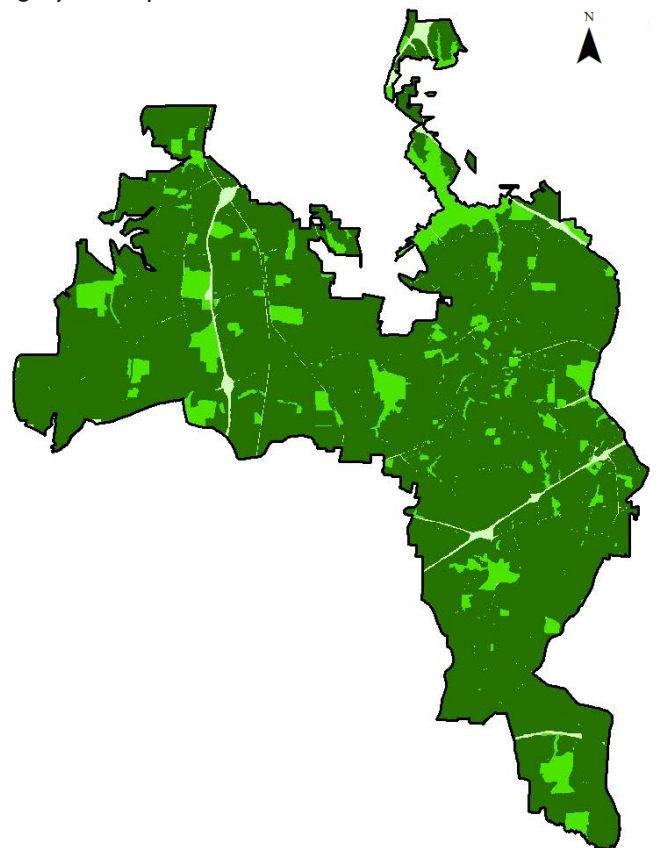
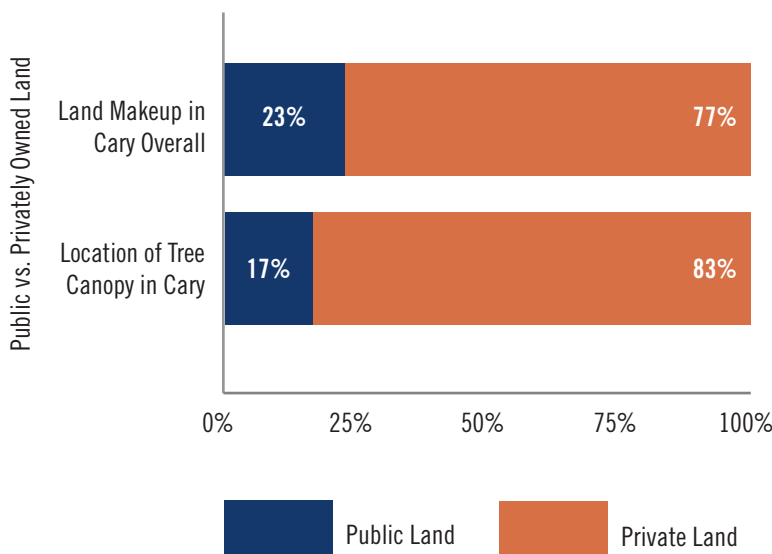


## CANOPY AND LAND OWNERSHIP

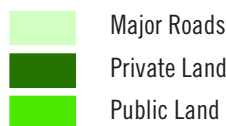
When it comes to managing the urban forest, who owns the land matters. Cary has direct control over its publicly-owned land and can work in partnership with other government agencies to manage public trees. Privately-owned land is in the hands of private owners who are able to manage their property (including trees) as they see fit, often without the influence of Cary's ability to regulate. Knowing how much of Cary's land is privately owned helps Cary develop programs that support citizens, groups, and businesses plant and care for trees on their property. Together, all plantings benefit the entire community.

Most of Cary's land is privately owned, which means public/private partnerships will be essential in managing Cary's trees. Not only is 77% of Cary's land owned by private individuals and companies, 83% of Cary's tree canopy is privately owned as well. Public lands such as parks, schools, and road right of ways account for 23% of Cary's land and contain 16% of Cary's trees. This difference in land ownership is common nationwide and underscores the importance of working with private landowners such as citizens, community groups, businesses, and faith communities to nurture and grow tree canopy. It will be essential for private landowners to provide the majority of tree canopy stewardship, with Cary leading by example and finding creative ways to support private landowners.

### Cary, NC Land Ownership (2023)



### Cary, NC Land Ownership (2023)



## Tree Canopy % Change Based on Land Ownership

Cary Planning Area from 2011 to 2020					
Land Ownership	2011		2020		Change
	Acres	%	Acres	%	Net gain/loss in acres
Private	22,557	55%	22,517	55%	-40
Public	4,441	36%	4,531	37%	+90
All Cary	26,998	51%	27,048	51%	+50

While the overall amount of canopy cover across Cary has stayed the same, there has been a shift in the location of trees. For example, canopy cover has grown on publicly owned lands such as parks and schools, while it has declined on privately owned land, particularly in newly-developed areas. This is important knowledge to have, as it impacts where we need to focus our work, efforts, resources, and targeted programming.



## POLICIES AND REGULATIONS

Cary has worked to ensure tree preservation and planting is integrated into development projects as Cary continues to densify. There is a comprehensive, stringent set of policies and codes regulating planting, maintenance, and protection of public and private trees. Chapter 8 in the Imagine Cary Community Plan contains several policies relating to trees and natural areas, while codes concerning these items are found within Cary's Land Development Ordinance (LDO), Cary's Community Appearance Manual (CAM), and Cary's Standard Specifications and Details. In 2021, Cary updated tree related regulations within all three documents, including updating the tree plantings species list by eliminating invasive species and increasing the number of recommended native species adapted to climate change.

Cary is renowned for its wide, vegetated buffers, assessment, and protection of Champion Trees, and robust planting standards.

- All development goes through a rigorous multi-disciplinary review process, which includes tree protection, planting, and care compliance.
- Preservation of existing native and mature landscape is a priority, as shown by Cary's unique treatment of "Champion Trees."
- Cary has stringent regulations in place that help protect forested areas within the 100-year floodplain and within 100 feet of streams. These regulations, unique in the state, preserve large swaths of lowland forests.
- New plantings are primarily required in locations that benefit overall site health and design, as landscape plans are reviewed by Cary staff and required to integrate specific quantities and species of upper-story trees, under-story trees, and shrubs that correspond with the buffer type and land use. Cary's tree planting specification includes best practices from ANSI A300 Tree, Shrub, and other Woody Plant Management, such as adequate soil volume, proper planting, and no staking.
- Cary is also unique as it has put in place a Conservation Residential Overlay District which provides developers a way to develop more densely in exchange for ecologically sustainable practices, protection of open space, and restoration of natural systems wherever possible.





Together, these regulations protect and enhance Cary's tree canopy while promoting long-term environmental vitality. While Cary's LDO is progressive, especially given the constraints of State law, there are a variety of actions that could be taken to improve the tree and natural resource requirements of the LDO and to allow it to be more proactive and responsive to ecological and economic changes to remain a leader in urban forestry at the state, region and national level. It is also important to note that strengthening or amending urban forest regulations is challenging in any municipality in the State of North Carolina because of the "Dillon Rule". The rule dictates that municipalities can only exercise powers expressly granted by the state.

### **What is a "Champion Tree"?**

Cary's regulations define Champion Trees as healthy trees measuring a minimum 32 caliper inches for upper story hardwoods, 40 caliper inches for pines, and 12 caliper inches for certain ornamental trees such as dogwoods. Development is required to design around Champions and their Critical Root Zones (CRZ). Champions are protected during the construction process through specific tree protection fencing. If Champion Tree removal is necessary to accommodate critical infrastructure, Cary's LDO requires replacement tree planting.

## Learn More About Cary Regulations

Systems in place to protect trees in Cary can be found in multiple documents used by the Town of Cary. They can be found in the documents below, all available on the Town of Cary website.

### Cary's Land Development Ordinance

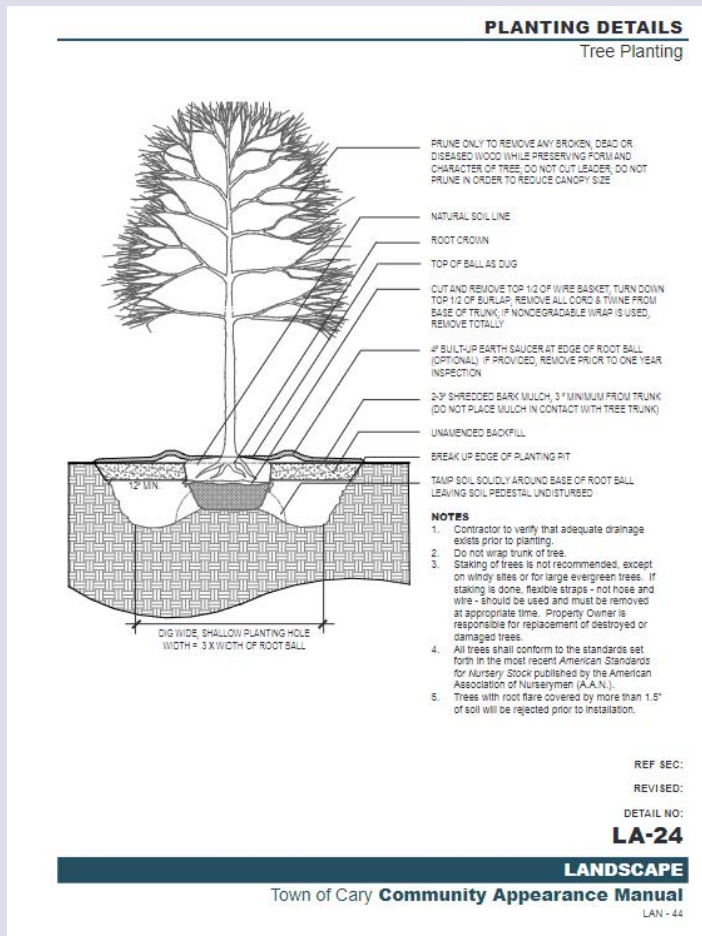
- Section 7.2.3 Describes the tree planting and preservation required in buffers during Development.
- Section 7.2.5 Describes required tree protection, including Champion Trees.

### Cary's Community Appearance Manual

- LA23 shows tree protection standards.
- LA24 shows tree planting techniques.

### Cary's Standard Specifications and Details

- Plant Materials Index describes which trees and plants are recommended versus prohibited during development.





## PUBLIC TREE MANAGEMENT

Cary has many active programs to manage trees on public land and support the stewardship of trees on private land. Cary has been a TreeCityUSA certified municipality since 1980, making it one of the earliest adopters of the program. It has established specialized management of unique forested areas, such as Hemlock Bluffs Nature Preserve, and continues this commitment with the creation of the White Oak Creek Conservation Management Plan and the newly reforested Downtown Cary Park.

In 2021, Cary implemented a policy of training and certifying its public works landscape staff as arborists to enhance the technical knowledge and skills of its field crews. It also established active planting programs, installing hundreds of trees on Cary owned properties each year. These plantings span from reforesting turf grass areas within public utilities to establishing food forests in public parks.

Additionally, Cary runs a variety of public education and outreach programs to encourage appropriate care of privately owned trees. Cary's annual Arbor Day Celebration includes education and outreach, while Cary's biannual *My Tree, Our Tree* campaign distributes more than 2,000 native trees to citizens each year and provides training on how to install and manage young trees.

In line with Cary's culture, multiple departments execute urban forest management and environmental enhancement tasks. This decentralized local government system fosters government accountability and increases the level of staff and citizen participation in decisions affecting the community. However, this type of system, as it relates to trees, may also result in focusing on only one part of the urban forest at any one time and can contribute to, leading to a lack of a comprehensive strategy. It can also create duplication or gaps in service and other inconsistencies. This approach underscores the importance of a comprehensive strategy.

Cary has internal policies and procedures in place that departments and staff follow and implement to manage and protect public trees. However, Cary does not have any specifically related to public tree management. These policies and procedures need to be more fully developed, consolidated, and formalized. This will allow for consistency between departments and more efficient enforcement.

### Urban Forestry Programs in Cary

There are a variety of programs in place to engage citizens and promote good tree management in Cary. These include:

#### **My Tree, Our Tree**

This program distributes free native trees to citizens to plant in their own yards to help grow the canopy of Cary.

#### **Annual Arbor Day Celebration**

This annual festival includes tree identification walks, planting demonstrations, and Q&A with arborists.

#### **Tree Talks**

These are quarterly lunch and learn sessions on tree related topics.

#### **Cary Garden for Wildlife**

Cary promotes native gardens throughout Cary in partnership with the National Wildlife Federation's Community Wildlife Habitat Program.

#### **Public Reforestation**

Tree planting projects on Cary facilities to increase tree canopy and native trees by reducing turf grass and other heavily maintained (non-ecological) spaces.

## PRIVATE TREE MANAGEMENT AND PARTNERSHIPS

Many Cary citizens take an active interest in the town's tree management and there are several organized environmental groups that work independently and in partnership to promote Cary's trees and forests. Examples of these groups include the Triangle Land Conservancy, The Cary Tree Archive, Keep the Canopy, Trees for the Triangle, Sierra Club, Wake County Audubon and Wake County Master Gardeners. These groups help promote land conservation and stewardship of the community's valuable urban forest and provide an opportunity for progress through partnerships in coming years.

### Partner Groups in Cary

Cary hosts a variety of citizens groups that engage on topics surrounding trees and forests. Some examples include:

#### The Cary Tree Archive

Turned an unused homeowner association open space area along a greenway into a forest filled with notable trees and plants.

#### Keep the Canopy

Advocates for increased civic protection and planting of trees.

#### Wake County Audubon

Advocates for native trees to support birds and other pollinators.

#### Trees for the Triangle

Plants trees on public and private land across the area.

#### Triangle Land Conservancy

Protects forests and natural areas in the region.

#### Stoneybrook Garden Club

Promotes gardening and garden care.

#### Project Pando

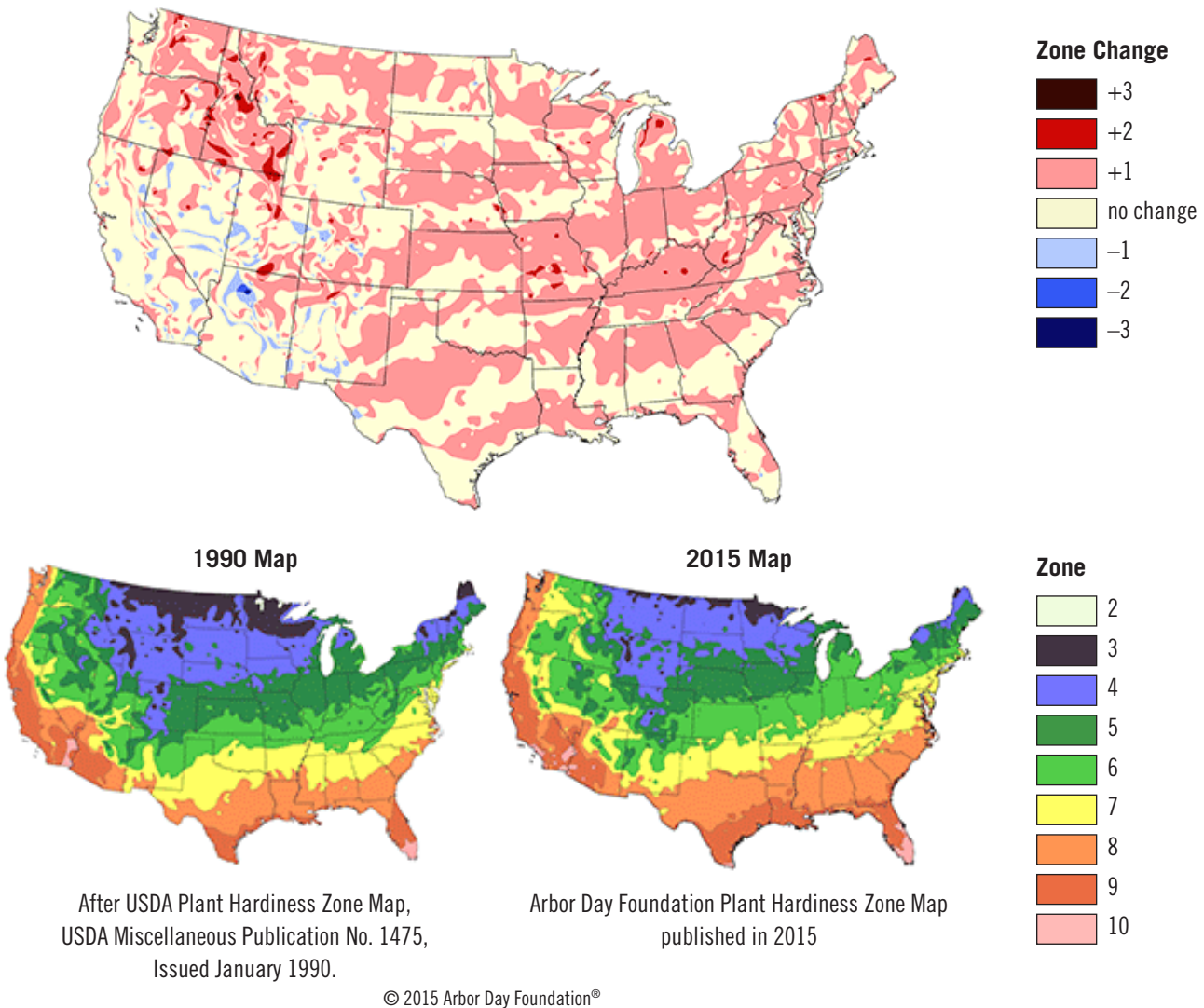
Promotes tree planting and tree genetic diversity through tree giveaways.

# CLIMATE CHANGE, POPULATION GROWTH, DEVELOPMENT PATTERNS

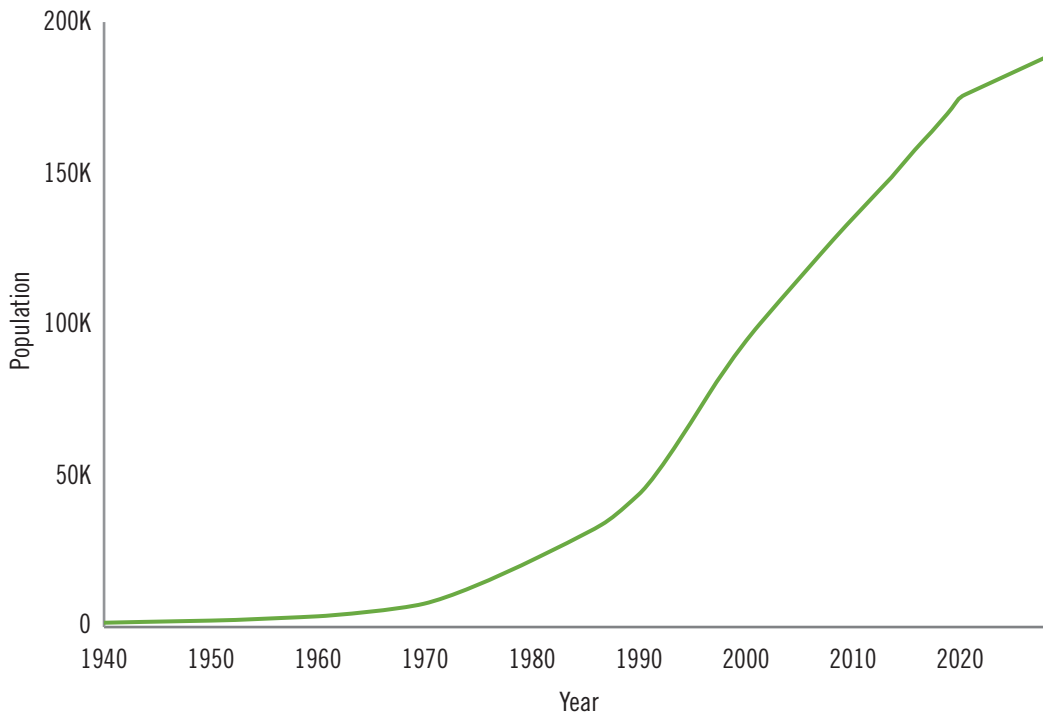
The physical environment surrounding Cary's trees and forests changes as the town grows and redevelops. Increasing population and urbanization, combined with climate change, alters the physical, environmental, and social context of Cary's trees and forests. Furthermore, an increase in impervious surfaces associated with development has a significant impact on temperature and stormwater management. Cary's transition from a primarily suburban community to denser, new urbanism represents opportunity for strategic infrastructure investments, particularly utilizing trees, forests and nature. Understanding how the physical environment is changing is essential in fostering a sustainable, resilient, and healthy tree canopy.

Changes in climate are documented in a variety of ways, and particular to trees are documented through Hardiness Zones. Between 1990 and 2015, changes in hardiness zones were documented throughout the United States, including North Carolina and Cary. These hardiness zones depict a shift in zones due to impacts of climate change.

## Differences Between 1990 USDA Hardiness Zones and 2015 Arborday.org Hardiness Zones



## Cary, North Carolina Population 2023 180,227



Climate change impacts all aspects of the environment, causing and amplifying stress on current trees and requiring the introduction of new, climate-adapted species to encourage healthy trees and forests. Trees which are growing here now are experiencing much higher temperatures than those historically grown here. In many cases, those growing now are experiencing higher temperatures than they are adapted to withstanding. Constantly warmer temperatures impact the ability of trees to thrive in many ways. Warmer temperatures reduce trees' ability to harvest energy from the sun (photosynthesize), amplify drought stress, and increases vulnerability to pests (both by reducing the ability of trees to fight off pests and by increasing the type, amount, and voraciousness of pests).

Climate change also impacts rain in Cary. Seasonal rain patterns have been altered, with fewer, more intense rainstorms replacing gentle rains that enable rainwater to soak into the ground. Fast flowing, intense rain becomes stormwater runoff, reducing its ability to be soaked into the ground where it becomes available for trees to access. Climate change also increases the frequency and impact of extreme weather events, exposing trees to more flooding, hurricanes, extreme droughts and extreme heat. The changes in weather patterns, paired with shifting of growing zones, means future environmental conditions will be different from conditions Cary's trees and forest experience today.

In addition to climate change, development patterns in Cary are in flux. Since World War II, humans have increasingly moved from rural to urban and suburban areas, altering the landscapes to accommodate needed infrastructure such as housing, roads, and utilities. Although some of this movement is into city centers, much of it was into car-centric suburbs, with low density housing. The Triangle region of North Carolina, in particular, has grown dramatically in population. From 2010-2020, Cary' population increased 29% (from 135,243 to 174,721, US Census Bureau) transforming fields and forests, requiring construction of housing, offices, and other infrastructure to support the new population. These infrastructure projects increase impervious surfaces, such as buildings, roads, and sidewalks. Impervious surfaces impact trees by reducing the amount of soil and water available to roots and increasing air temperature, particularly at night. The increase of population, and the housing, offices and industry that supports it, can also fragment forests, making them more susceptible to invasion by aggressive non-native species, reducing biodiversity and increasing their vulnerability to climate change.



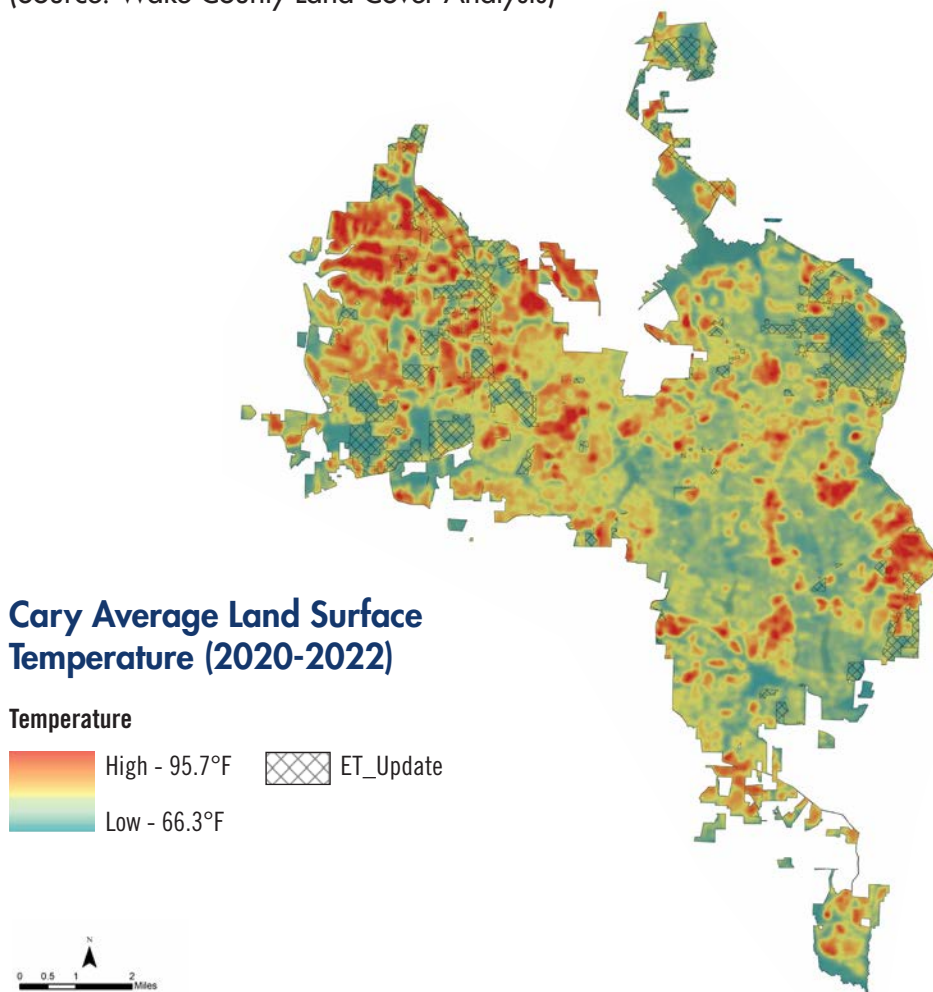


Recent development has moved away from car-centric suburban into new-urban practices. During larger development projects, new urban forests and open spaces are created, which provide recreational access, act as “heat sinks,” and reduce flooding in surrounding areas. During redevelopment, higher density housing is paired with larger open spaces and parks, creating and preserving intact forested areas. In very dense areas, urban design techniques help trees by creating integrated green spaces using new technology, such as structural soil and suspended paver systems. These systems create large areas of below ground soil volumes, increasing the amount of soil and water available to street trees, helping them grow large even when they are surrounded by pavement and pavers. Densification, paired with deliberate planning and technology, will create new opportunities to integrate trees into the areas that citizens live, work and play in Cary.

**Heat Sink:** Heat sinks refer to any element that absorbs, stores and dissipates heat, or reflects and redirects heat.

Understanding the future environment of trees is essential to fostering the forest of the future. Climate change, development, densification, and population growth all will alter the types of forest and trees that will thrive in Cary and provide an entirely new context for current and future trees.

This map shows areas of high heat (in red) across Cary, helping managers understand where trees can be particularly helpful in reducing the heat island effect. (Source: Wake County Land Cover Analysis)



# THE PATH FORWARD

Managing and caring for trees in an urban area is a complex endeavor. Combining the needs and desires of residents, disruptions due to population growth and densification, concerns for public safety and liability issues, physical aspects of trees, stresses from climate change, and the expectation for all these issues to be resolved at the same time is a considerable challenge.

Cary is a rapidly expanding community located in one of the fastest growing regions in the United States. While about one third of Cary's land mass is protected open space, over 90% of the land area is currently developed, being redeveloped, or under a near future development plan. Additionally, climate change is rapidly impacting the natural environment, increasing temperatures, intensifying rainfall, and altering general growing conditions. Considering climate change and Cary's changing development patterns, the Urban Forest Master Plan provides a road map to foster Cary's urban forest while maintaining the community's high quality of life.

# GOALS AND GUIDING PRINCIPLES

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Cary celebrates its trees and urban forest, valuing the many benefits they provide Cary's citizens. The Urban Forest Master Plan is founded on **three urban forest goals**, governed by a set of **four guiding principles**. The guiding principles define the values and standards held by the community, which provide a context for all urban forestry efforts in Cary, and for the urban forest goals, strategies and actions that follow.

## Three Goals:

### Steward and Grow Cary's Trees and Tree Canopy

Cary will nurture existing trees and forests, while planning to maintain and expand tree canopy coverage. Particular care will be given to the growth and expansion of tree canopy where it is needed most (i.e. improving walkability, connecting fragmented forests, rebuilding canopy after losses) and where it reflects the character and needs of individual neighborhoods.

What it means:

- Plant, maintain, and manage Cary's current tree canopy.
- Gather and organize information about Cary's current tree canopy to make data-based decisions and plans for current and future trees and forests.
- Strategically grow Cary's tree canopy in targeted locations such as transit corridor, areas of high heat, locations of canopy loss, and places where vulnerable people live, work and play.
- Grow and refine operational management of Cary's publicly owned trees and forests.

### Improve the Quality of Cary's Trees and Forests

Along with increasing the *quantity* of tree coverage, increasing the *quality* of tree canopy is critical for ensuring that it is resilient in the face of climate change, sustainable and long-lasting, and will serve the functional and aesthetic needs of both the community and the environment.

What it means:

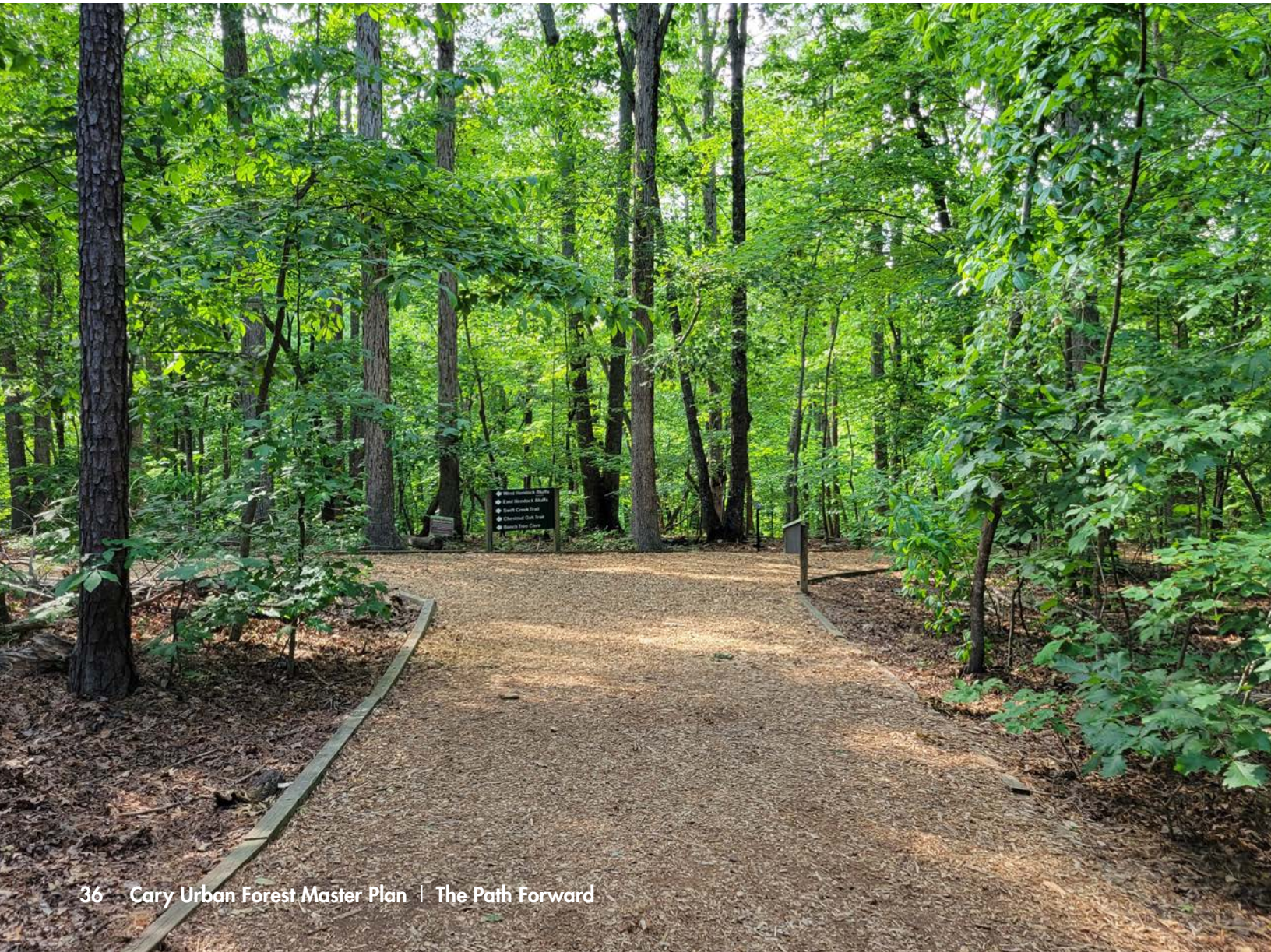
- Increase the sustainability, resilience, and beauty of Cary's trees and forests.
- Increase the environmental, functional, and aesthetic benefits trees provide.
- Increase native plant species and decrease non-native, invasive plant species.
- Improve the quality of tree planting, emphasizing species that are resilient in the face of climate change and are adapted to future climatic conditions.

## Promote a Community-wide, Shared Commitment to a Healthy Urban Forest

This work will require residents, businesses, institutions, and Cary leadership and staff to each do their part on their own properties and neighborhoods. Partnerships and engagement that are thoughtful and measurable will be key to making real and long-lasting progress.

What it means:

- Promote urban forest goals and policies that enhance the character of neighborhoods and address the different needs and characteristics of public and privately owned land.
- Foster partnerships with private landowners, businesses, and community groups.
- Facilitate programs, information, and outreach to support Cary's citizens' active management and growth of privately owned trees and forests.



## **Four Guiding Principles:**

### **Cary values healthy and diverse ecosystems which support healthy citizens and communities.**

What it means:

- A healthy and diverse ecosystem is sustainable and resilient. It provides abundant and beneficial services to those who live within it and depend on it.
- Healthy ecosystems clean the air and water, build soils, regulate climate, store carbon, provide healthy living conditions, foster wildlife, enhance recreational opportunities, and support the economy.
- Cary recognizes the role healthy ecosystems play in human health and well-being, as well as their contribution to creating a high quality of life.

### **Success requires partnerships and community-wide efforts.**

What it means:

- The majority of Cary's land is privately owned (77%), and the majority of Cary's tree canopy (83%) is privately owned as well.
- Private landowners and tree managers are essential partners in tree planting and maintenance.
- Cary provides leadership in tree and tree canopy management, both through leading by example as well as by facilitating training and partnerships with its citizens, organizations across Cary, as well as neighboring municipalities.

### **Increasing knowledge about trees and tree canopy is essential.**

What it means:

- Many Cary citizens are unaware of the benefits trees provide to them and their community, and the role their property plays in improved urban forest health.
- Increasing knowledge and understanding of trees will encourage appropriate tree planting, care, and retention.
- Education and outreach will be an essential component of all urban forestry programs.

### **Tree benefits should be provided to all residents.**

What it means:

- All Cary residents, with a variety of lifestyles, ages, cultures, and incomes benefit from living within tree-filled communities with access to the services trees and healthy ecosystems provide.
- Urban forestry initiatives will take into account and celebrate the many different aspects of diversity in goals, strategies, and actions.

# STRATEGIES

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The ten strategies that follow are aimed at meeting the three overarching goals of increasing the stewardship, quality, and shared commitment of Cary's urban forest, within the context of the guiding principles. These goals have been developed based on Cary's existing conditions and environment, the desires of the community, and regional and national best practices in urban forest management.

## STRATEGY 1: ENHANCE URBAN FORESTRY INFORMATION AND DATA

While this report provided high-level analysis on Cary's trees and forests, there is more data to be gathered. Gathering and standardizing data allows managers to ensure tree management is efficient and data-driven and supports the creation and goals of long-term plans.

### Action Steps

- Complete and manage a public tree inventory.
- Perform cyclical canopy cover analysis to track canopy change over time.
- Assess canopy by land use to understand causes for canopy change and prioritize opportunities for planning and preservation.
- Perform soil assessments across Cary's open space, facilities, streets and street medians to determine urban soil conditions and develop amendment strategies for enhancing tree growth conditions.
- Create a public facing program to engage citizens in tree-based information, supporting and activating citizen scientists.
- Gather data and learn more about the make-up of the entire urban forest in Cary, public and private land combined, through a sampling project (ie. iTree ECO or other similar tool).

## STRATEGY 2: INCORPORATE THE URBAN FOREST INTO PLANNING EFFORTS AND DOCUMENTS

As a forward-thinking community, Cary provides citizens and experts many opportunities to shape the future of Cary through visionary planning. Trees are an essential part of many aspects of Cary's quality of life and can therefore be used to support the goals of different plans. Additionally, regularly updated Tree Management Plans will help guide day to day management of Cary's Urban Forest.

### Action Steps

- Integrate the urban forest guiding principles and goals into appropriate townwide plans.
- Create a multi-year operational management plan for public trees to be implemented by Cary staff. This includes:
  - A cyclical, proactive tree maintenance and planting program
  - A young tree care program for newly planted trees on public property
  - Plant health care and integrated pest management practices
- Create advanced, topic-specific urban forest management plans for public trees and woodlands to address:
  - Tree Risk management
  - Urban Forest Emergency and disaster response & recovery
  - Public Tree planting
  - Invasive Pests and Diseases



## **STRATEGY 3: STRENGTHEN POLICIES AND CODES TO PROTECT AND NURTURE TREES**

Cary has a comprehensive set of codes regarding the planting, maintenance, and protection of public and private trees. Additionally, Cary has many internal procedures that departments and staff follow and implement. As science, society, climate, and ecosystems change, Cary's codes and policies will evolve to address and formalize emerging best practices.

### **Action Steps**

- Develop and adopt urban forest policies to prioritize and incentivize tree protection and tree care before, during and after development.
- Reorganize and consolidate the existing public tree regulations in regulatory ordinances, including the Land Development Ordinance (LDO), Community Appearance Manual, and the Standards and Specification Manual.
  - Regularly review, refine, and update the LDO, Community Appearance Manual, and Standards and Specifications Manual, including administration, processes, and enforcement.
- Create systems to involve Cary's Urban Forester in the development and plan review processes to support tree preservation, species selection, new tree installation, and final turn over.
- Develop mechanism to require use of licensed NC Landscape Contractors and ISA Certified Arborists for tree installation and maintenance for new development.





## **STRATEGY 4: STRENGTHEN URBAN FORESTRY OVERSIGHT AND MAKE OPERATIONAL ENHANCEMENTS**

Cary's tree management structure is decentralized, allowing many different groups to engage with Cary's trees. Cary will formalize leadership and operational approaches to trees and the urban forest, and pursue and maintain certifications for tree and urban forestry management.

### **Action Steps**

- Maintain an Urban Forester position to provide policy guidance, training, planning, and development compliance support.
- Train existing staff in proper tree management, including installation, mulching, and care. Continue to train and certify ISA certified arborists through multiple departments.
- Determine capacity needs and fill gaps to implement strategies and actions outlined in this plan (new field staff, equipment, etc).
- Maintain the Tree City USA certification and achieve Society of Municipal Arborists accreditation.
- Operationalize, staff, and fund implementation of the annual work plan, which determines annual projects and priorities
- Continue to strengthen the relationship and coordination efforts with utility companies and document utility related procedures.

## **STRATEGY 5: IMPROVE PLANTING STRATEGIES**

Proper tree planting creates healthy, resilient trees. Additionally, creating an overall and long-term planting and replacement strategy supports long term canopy health. The combination of proper planting techniques and a long-term planting strategy will improve the quality and quantity of Cary's tree canopy.

### **Action Steps**

- Standardize tree species selection and planting practices within Cary and develop outreach efforts to engage citizens and the development industry.
- Develop a long-term planting and replacement strategy.
- Use plantings to maximize the quality of the future urban forest, considering:
  - Adaptability, diversity, and native ecosystems
  - Using trees to enhance the character of neighborhoods.
- Plant trees where the public needs are greatest, such as:
  - Schools and other public facilities
  - Along pedestrian corridors
  - Infill development, redevelopment or renovation projects.
  - Ensuring all residents have equitable access to trees and open space.



## **STRATEGY 6: PROMOTE AND CONSERVE NATIVE FOREST ECOSYSTEMS AND TREES**

The current forest cover in Cary consists of remnants of established hardwood forests, tracts of second and third successional forests, and landscape trees and shrubs on residential, park, and institutional properties. Across the region, native forest's plant and animal communities are threatened by climate change, invasive species, and pests. Enhancing and growing Cary's forests and creating robust connections between forest stands will increase the quality of the ecosystems making them more resilient to the challenges of climate change.

### **Action Steps**

- Promote active management of Cary's valuable public resources:
  - Continue to create site-specific forest management plans for key locations, including greenways, forests, and larger parks.
  - Continue active management of Hemlock Bluffs Nature Preserve and create active forest management plans for other high value forested areas.
  - Create afforestation or "micro-forest" planting plans for smaller spaces.
  - Create town policy to encourage protection, conservation, and management of ecological assets.
- Facilitate management and enhancement of private forest ecosystems and trees:
  - Develop and update sets of standards, plant lists, and specifications to make it easier for developers to properly restore/create desirable forest canopy.
  - Connect entities that want to improve their properties (ie. homeowner associations, schools, businesses) to allied organizations focused on resilient ecosystem management and protection.
  - Incentivize the restoration or creation of native/threatened ecosystems during land development.
  - Incentivize expanded buffers along stream corridors to increase the protection of forest lands in supply watersheds.
  - Promote conservation easements and land acquisition to protect natural and restored native forest ecosystems.
- Create community around high-quality native trees and forests:
  - Partner with local non-profits, businesses, or other groups to propagate and grow native trees/plants.
  - Encourage citizens and staff to compost and leave as much natural, organic material on their properties to promote soil health.
  - Promote the conservation of existing native and high-quality trees and tree groups throughout Cary.

## STRATEGY 7: EXPLORE OPPORTUNITIES TO INCREASE PARTNERSHIPS & COMMUNITY INVOLVEMENT

Like many municipalities, most of Cary's land and trees are privately-owned, therefore private landowners, businesses, and community groups play a critical role in managing and growing the urban forest. There are many active groups that provide good partnership for urban forestry management. Cary is a leader in facilitating partnerships and can continue to gather stakeholders to further facilitate collaborative programs.

### Action Steps

- Collaborate with the community and partners to:
  - Understand opportunities that are best suited for partnerships,
  - Provide technical expertise,
  - Provide homeowners support for tree care and preservation, and
  - Provide outreach and educational resources.
- Create a homeowner association (HOA) specific outreach program.
  - Explore other successful HOA programs in comparable and/or benchmark cities.
  - Assess the amount and location of land owned, controlled, and managed by HOAs.
  - Gather partners and develop a program best suited to Cary.
  - Create incentives for action; celebrate and promote HOAs successes.
- Foster research and scientific partnerships with the NC University system and other educational institutions.
- Develop campaigns and outreach efforts to work with the tree-service industry to advance good management services for trees and soil.



## **STRATEGY 8: ENGAGE AND EDUCATE ON THE VALUE OF TREES**

Educational campaigns increase urban forest management by teaching citizens about how to manage trees and the role trees play in solving problems and providing benefits. With greater information about the urban forest, citizens can better act to support its growth and longevity.

### **Action Steps**

- Cultivate further understanding of public perspectives and awareness as it pertains to trees and their value.
- Build multi-language outreach campaigns on the importance of trees.
- Provide regular educational opportunities about trees and proper tree management.
- Enhance Cary communications related to trees.

## **STRATEGY 9: SET THE STAGE FOR MORE ADVANCED PROGRAMS**

Cary's urban forestry program can innovate through forward thinking programs. These programs build on a traditional urban forest management plan by increasing the scope and diversity of urban forest uses. These advanced programs may be spearheaded by a community organization or directly led by the municipality.

### **Action Steps**

- Pilot an Urban Wood Reuse Program
- Consider an Urban Forest Carbon Credit Program
- Create Arborist Standards for Work in Cary

## **STRATEGY 10: INSTITUTE AN APPROACH FOR CONTINUOUS MEASUREMENT & REASSESSMENT**

This plan includes an assessment of Cary's urban forest as it stands today and as the community today envisions it for the future. However, the Cary of today will not be the Cary of 20 years from now. Long-term success requires flexibility and adaptive management. Like all Cary plans, the outcomes will be monitored and reassessed to build on lessons learned and maximize successes.

### **Action Steps**

- Incorporate UFMP's actions into Cary's reporting and tracking systems.
- Plan for periodic canopy cover updates.
- Create annual UFMP progress reports.
- Reassess urban forest overall health and growth, and action steps every five years.
- Update the UFMP every 10 years.



# IMPLEMENTATION

To aid in implementation, work from each strategy has been organized into a suggested 10-year timeline, along with lead and partner organizations involved in each action. The table below should be considered a guide to help accomplish the action steps, with the understanding that timeframes and partners/leads may be adjusted over time.

Ongoing –  
 Short Term First three years  
 Mid Term 3–6 years  
 Long Term 7–10 years

Strategy & Action Items	Priority Items	Approximate Timeline	Lead / Partners
<b>Strategy 1. Enhance Urban Forestry Information and Data</b>			
Action - Complete and manage a public tree inventory	x	Short-term	Town / Consultants; Universities; possible citizen science opportunity
Action - Perform cyclical canopy cover analysis to track canopy cover change over time		Mid-term	Wake County; Town (co-led)
Action - Assess canopy by land use to understand causes for canopy change and prioritize opportunities for planning and preservation		Mid-term	University; Town / Consultant
Action - Perform "soil assessments" across Cary's open space, facilities, streets, and street medians to determine urban soil conditions and develop amendment strategies for enhancing tree growth.		Short-term	Town / Consultants; Universities; possible citizen science opportunity
Action - Create a public facing program to engage citizens in tree-based information, supporting and activating citizen scientists	x	Short/Mid-term	Town
Action - Gather data and learn more about the make-up of the entire urban forest in Cary, public and private land combined, through a sampling project (ie. iTree ECO or similar tool)		Long-term	Nonprofit; University / Town
<b>Strategy 2. Incorporate the Urban Forest into Planning Efforts and Documents</b>			
Action - Integrate the urban forest guiding principles and goals into appropriate townwide plans.		Ongoing	Town (Planning Dept.)
Action - Create a multi-year operational management plan for public trees to be implemented by Cary staff. This includes: a cyclical, proactive tree maintenance and planting program; a young tree care program for newly planted trees on public property; plant health care and integrated pest management practices		Short/Mid-term	Town (Public Works Dept.)
Action - Create advanced, topic-specific urban forest management plans for public trees and woodlands to address: tree risk assessment, urban forest emergency and disaster response/rescovery, public tree planting and invasive pests and disease		Mid/Long-term	Town / Universities, Consultants
<b>Strategy 3. Strengthen Policies and Codes to Protect and Nurture Trees</b>			
Action - Develop and adopt an urban forest policy(ies) to prioritize and incentivize tree protection and tree care before, during and after development	x	Ongoing	Town (Planning and Public Works Depts.) / EAB (Tree Advisory Committee)
Action - Reorganize and consolidate the existing public tree regulations in regulatory ordinances, including LDO, Community Appearance Manual, and the Details and Specifications Manual		Mid-term	Town (Planning Dept.)/ EAB
Action - Create systems to involve Cary's Urban Forester in the development and plan review processes to support tree preservation, species selection, new tree installation, and final turn over		Short-term	Town (Planning and Public Works Depts.)
Action - Develop mechanism to require use of licensed NC Landscape Contractors and ISA Certified Arborists for tree installation and maintenance for new development		Mid-term	Town (Planning Dept.) / EAB (Tree Advisory Committee)

<b>Strategy 4. Strengthen Urban Forestry Oversight and Make Operational Improvements</b>			
Action - Train existing staff in proper tree management, including installation, mulching and care. Continue to train and certify ISA certified arborists through multiple departments		Short-term	Town
Action - Maintain an Urban Forester position to provide policy guidance, training, planning, and development compliance support	x	Short-term	Town
Action - Determine capacity needs and fill gaps to implmenet strategies and actions outlined in this plan (new staff, equipment, etc.)	x	Short-term	Town
Action - Maintain the TreeCity USA certification and acheive Society of Muniiciapl Arborists accreditation		Ongoing	Town
Action - Operationalize, staff, and fund implementation of the annual work plan, which determines annual projects and priorities	x	Ongoing	Town
Action - Continue to strengthen the relationship and coordination efforts with utility companies and document utility related procedures		Ongoing	Town
<b>Strategy 5. Improve Planting Strategies</b>			
Action - Standardize tree species selection and planting practices within Cary and develop outreach efforts to engage citizens and the development industry		Short/Mid-term	Town / Partners co-led
Action - Develop a long-term planting and replacement strategy.		Short-term	Town / Partners co-led
Action - Use plantings to maximize the quality of the future urban forest, considering adaptibilityt, diversity, native ecosystems, and enhancing character of neighborhoods		Short/Mid-term	Town / Partners co-led
Action - Plant trees where the public needs are greatest, such as schools, pedestrian corridors, infill development, redevelopment		Mid-term	Town / Partners co-led
<b>Strategy 6. Promote and Conserve Native Forest Ecosystems and Trees</b>			
Action - Promote active management of Cary’s valuable public resource		Short/Mid-term	Town / NC Forest Service, Consultants
Action - Facilitate management and enhancement of private forest ecosystems and trees		Short/Mid-term	Town / Nonprofits
Action - Create community around high-quality native trees and forests		Short/Mid-term	Town / Nonprofits
<b>Strategy 7. Explore Opportunities to Increase Partnerships &amp; Community Involvement</b>			
Action - Collaborate with the community and partners to understand opportunities, provide technical expertise, provide homeowners support for tree care and preservations, and provide outreach and educational resources		Short-term	Town / Partners co-led
Action - Create a homeowner association (HOA) specific outreach program	x	Short-term	Town (EAB)
Action - Foster research and scientific partnerships with the NC University system and other educational institutions		Ongoing	Town / Nonprofits
Action - Develop campaigns and outreach efforts to work with the tree-service industry to advance good management services for trees and soil		Mid-term	Town / Nonprofits
<b>Strategy 8. Engage and Educate on the Value of Trees</b>			
Action - Cultivate further understanding of public perspectives and awareness as it pertains to trees and their value		Short-term	Town/Partners
Action - Build multi-language outreach campaigns on the importance of trees		Short-term	Town / Partners co-led
Action - Provide regular educational opportunities about trees and proper tree management	x	Short-term	Town
Action - Enhance Cary communications related to trees		Ongoing	Town
<b>Strategy 9: Set the Stage for More Advanced Programs</b>			
Action - Pilot an Urban Wood Reuse Program		Anytime	Nonprofits / Town
Action - Consider an Urban Forest Carbon Credit Program		Anytime	Town / Nonprofits, Consultants
Action - Create Arborist Standards for Work in Cary		Anytime	Nonprofits / Town



For the UFMP to be an effective tool in making trees a priority in Cary, it is vital that both its implementation and the conditions of Cary's urban forest are regularly monitored and assessed. Progress assessment helps to identify urban forestry successes that can be used in building momentum around trees while also identifying emerging opportunities and challenges that may need to be incorporated into plan updates.

Progress will be tracked by completing an urban canopy assessment every 5-10 years. This will provide regular data on how and why Cary's tree canopy is growing or shrinking and allow town staff to track the impact of existing programs and initiatives. Evaluating whether urban forestry management efforts are having a real impact on the ground involves tracking tree planting, tree care, tree watering, tree health, and other activities.

Cary will perform an assessment of the Indicators of a Sustainable Urban Forest to establish a baseline of where Cary's urban forest management is today. This assessment will be repeated every 3-5 years to highlight successes in implementation, identify improvement areas, new program priorities, and establish new recommendations and action steps. The Plan is designed to be a living document that is periodically reviewed and updated based on changing needs of Cary's trees, community priorities, and successes in plan implementation.

## IMAGINE CARY'S TREES OF THE FUTURE

Cary's trees create a high quality of life for those who come to Cary to live, work, and play. The Imagine Cary Community Plan affirms the importance of trees and forests to Cary's present and future, and the Urban Forest Master Plan supports this vision by providing guiding principles, goals, and strategies to steward and enhance Cary's trees and forests. The UFMP is based on data and built on a framework developed from the feedback of citizens, professionals, and engaged groups. This plan is a living document, meant to guide and enhance Cary's leadership in urban forestry. Through planting the trees of tomorrow today, imagine how wonderful Cary's trees will be in the future!



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Environmental Advisory Board

More reading:

<http://www.naturewithin.info/civic.html>

# APPENDICES

## WAKE COUNTY CANOPY ANALYSIS: COMPLEMENTARY METHODOLOGY

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Concurrent with the creation of Cary's 2023 Urban Forest Master Plan, Wake County conducted a complementary analysis called the "Wake County Land Cover Analysis and Tree Cover Assessment" (Wake County LCA). The goal of the Wake County LCA was to analyze land cover data with a particular focus on the tree canopy cover. The assessment analyzed Wake County as a whole and as individual municipalities such as Morrisville, Apex and Cary within the county.

The Wake County LCA is different and distinct from Cary's UFMP and provides additional data which Cary can use to create successful tree programs.

In order to maximize the effectiveness of these two documents, it is important to understand the differences between the analysis conducted by Cary's UFMP and Wake County's LCA. Here are several significant ways Wake County's LCA differs from Cary's UFMP:

**Difference 1: Study Goals:** Cary's Urban Forest Master Plan is a planning document designed to complement and support the Imagine Cary Community Plan. The UFMP provides goals and strategies informed by planning documents, community outreach, laws and policies, and data, taking a comprehensive view of Cary's trees and providing a long-term roadmap to meet goals. Conversely, Wake County's LCA is a data focused document that identifies the physical conditions of the land to provide information in many different ways. It notes where trees are found, where tree canopy has changed over time, and where there are opportunities to plant trees in the future. As a data document, the Wake County LCA complements Cary's UFMP by providing information that can be used to meet the goals set out in the UFMP and the Imagine Cary Community Plan in general.

**Difference 2: Methodology / Technical Approach:** Cary’s UFMP used only satellite data in order to perform the analysis. This is a standardized way of analyzing canopy cover because it allows for consistent comparison across the years as the same satellite equipment is used to take pictures over time. The Wake County LCA utilized a variety of sources, including satellite and aerial photography. While the satellite equipment is consistent, the actual camera used for aerial photography will change over the years, resulting in variation in the results between years. Both of these are valid methods, but because different equipment is being used, slightly different results are achieved. For example, Cary’s UFMP analysis showed a tree canopy cover of 51% in 2020 while the Wake County LCA shows 49%. The closeness of these results despite the use of different methodology confirms the accuracy of both findings.

**Difference 3: Area Studied:** As discussed above, the UFMP’s looked at trees across Cary’s Land Planning Area, defined as the furthest Cary can grow over time based on zoning, regulation and agreements. This includes rural and urban areas, and will not change, allowing Cary to do an apples-to-apples comparison overtime. Wake County’s LCA, on the other hand, looked at a political boundary called Cary’s Planning Jurisdiction, which is a combination of two different suburban and urban geographies which are commonly utilized across Wake County. This allowed the Wake County’s LCA to analyze the same “type” of boundary across different municipalities in Wake County. On the other hand, these boundaries change over time. As such, Cary’s Planning Jurisdiction, as defined by the Wake County’s LCA, changes size and shape due to zoning changes.

**Difference 4: Types of Data:** During the creation of Cary’s UFMP, many different types of information was gathered, including land cover data (where trees were and how that changed), social data (who engaged with trees and how) and legal data (what are the laws and policies governing trees). The Wake County LCA not only gathered physical data, but analyzed this data in more ways than Cary’s UFMP. For example, the Wake County LCA calculated the economic value of Cary’s trees, analyzed what areas of Cary were the hottest, and created maps outlining potential tree planting areas. Put together, these different data sets provide a rich resource for managing trees and meeting the goals of the UFMP and the Imagine Cary Community Plan.

It is fortunate that Cary has the resources provided by both the UFMP and Wake County’s LCA. By understanding how the Wake County LCA is similar and different to Cary’s UFMP, Cary is able to take a wider look at the data across the county in order to create more well-informed policy decisions and more successful tree programs.

## CARY EQUIPMENT NEEDS

Achieving a safe, well-maintained urban forest and public greenspaces is not possible without quality landscape and arboricultural equipment. Using quality tools, equipment, and vehicles will yield the high-quality output expected in Cary. Current trends in the green industry focus on equipment that increases productivity, is easy to operate, has longer service intervals resulting in less maintenance and down-time, allows staff to complete tasks faster with less fatigue, and is environmentally friendly.

The type and number of equipment and fleet needed by the urban forest and horticulture staff will be determined by the future number of staff and the priority and scope of work. For consideration, a general list of potential equipment needs by the urban forest management operational program is provided below. The list is not all-inclusive; and it is expected that existing and new equipment in the Town's fleet will be shared as needed.

Function	Ongoing Use	Occasional/Seasonal Use
Management/Administration	Vehicles, computers	
Tree Maintenance	Pick-up trucks, aerial lifts, dump body/box trucks, flatbed trucks, loaders, chippers, stump grinder, chainsaws, blowers, augers, climbing gear, air knife and compressor, hand tools, wifi/cellular enabled field computers	crane, wheeled or tracked spider lift, tub grinder, leaf sweeper, air knife and compressor, tree injection technology, resistograph, sprayers
Tree Planting	flatbed truck, water truck, hand tools, wifi/cellular enabled field computers, access to/sharing tree maintenance equipment.	Tree spade
Forest Management	All-terrain/utility vehicle, Bobcat and various attachments (i.e. forestry mulcher, grapples, bucket, pallet fork), backpack sprayers, wifi/cellular enabled field computers, access to/sharing tree maintenance equipment.	fire suppression equipment and materials
Horticulture Management	Seeders, wifi/cellular enabled field computers, access to/sharing tree maintenance equipment.	



# CARY URBAN FOREST MASTER PLAN 2023-2033

