Recommendations of the Tree Advisory Committee

Submitted to the

Environmental Advisory Board

Purpose: The Environmental Advisory Board at its February 13, 2018 meeting formed the Tree Advisory Committee. The committee's purpose is to advise the EAB on strategies to protect and increase tree canopy throughout the Town, preserving and enhancing the values and benefits that Cary's urban forest provide to the Town's citizens.

Town of Cary, North Carolina

June 2019

Recommendations of the Tree Advisory Committee
June 2019

Table of Contents

I. The Value of Trees

Trees have significant value in urban environments, including economic, social, and ecological benefits. Trees are a vital part of Cary's aesthetic and environmental health. The Cary Community Plan articulates the benefits of trees to the Town of Cary (see for example, Chapter 8 Serve – Policies 5, 6, and 9). They enhance property values. Trees improve public health and air quality. They absorb carbon dioxide, inexpensively treat and manage stormwater, and enhance open space and wildlife habitat. They provide energy savings by reducing temperatures during warm weather. They serve as an attractive and effective transitional buffer between land uses and reduce noise pollution.

More specifically:

- Trees help intercept, store, and filter nutrients (nitrates and phosphates) and contaminants (heavy metals, pesticides) from rainwater. This reduces urban runoff and the amount of sediment, pollutants, and organic matter that enter streams.
- Urban forests can reduce annual stormwater runoff by 2 – 7 percent, and a mature tree can store 50 to 100 gallons of water during large storms (Fazio, Arbor Day Foundation).
- Trees clean the air by absorbing carbon dioxide, sulfur dioxide, nitrous oxides and other pollutants, they shade cars, parking lots and other hard surfaces, and mitigate ozone emissions from vehicles.
- One large tree can provide a day's supply of oxygen for up to four people.
- Living in environments with trees has been shown to enhance cognitive development in children (Wells, 2000).
- Surveys have reported that people believe that trees improve communities by making them feel calmer and improving their quality of life (Lohr, et.al., 2004).
- Hospital patients with views of trees had shorter postoperative hospital stays and took fewer potent analgesics when compared to patients without such views (Ulrich, 1984).
- A tree can absorb as much as 48 pounds of carbon dioxide per year and can sequester 1 ton of carbon dioxide by the time it reaches 40 years old (Evans, NC State University).
- Tree planting is one of the most cost-effective means of mitigating urban heat islands through both indirect cooling from **evapotranspiration** and is greater than the direct effect of shading. Mature tree canopy reduces air temperatures by about 5 – 10 degrees F (Dixon, et. al., 2007).
- Trees trap more of the sun's energy than any other group of organisms on earth. A 25-foot tree reduces annual heating and cooling costs of a typical residence by 8 to 12 percent (Foster, et. al., 2011).

- Studies have found general increases in residential property values of up to 35 percent associated with the presence of trees and vegetation on a property (Foster, et. al., 2011).
- Not only are trees essential for life, but as the longest living species on earth, they give us a link between the past, present and future.

These and other tree characteristics greatly improve our quality of life and have immense value. Therefore, we recommend that Cary's Land Development Ordinance (LDO) should be reviewed and revised to ensure that the development and design standards prioritize and protect trees in the Town.

II. Tree Canopy Cover

The Cary Community Plan calls for enhancing tree canopy. Accordingly, the Town should revise the LDO Chapter 7 Development and Design Standards, tree protection standards, to have a primary focus on increasing tree canopy and a secondary focus on preserving specific **champion trees**. There are advantages to saving mid-size trees and stands of smaller trees compared to saving individual trees based on size, as trees in the 'growing period' can provide more ecological services for a longer period than older trees. The use of tree canopy cover as a metric for tree preservation would more directly relate to the benefits trees provide while still allowing flexibility for different land uses and situations.

Unless careful management actions are taken, a community's tree canopy cover will decline over time as trees age and sites are developed and redeveloped. Nowak and Greenfield (2018) recently reported that metropolitan areas are experiencing a net loss of about 36 million trees nationwide every year. That amounts to about 175,000 acres of tree cover. For the Town of Cary, the volunteer community group "Keep the Canopy" has estimated that as much as 441 acres per year are graded or stripped of tree canopy cover.

The Town of Cary should set a long-range goal of increasing town-wide tree canopy cover from 46% in 2016 to 56% by 2050. This is a 30-year aspirational goal that will require conservation/preservation and planting.

III. Native and Locally Adapted Plants and Plant Material

Native plants are crucial for preserving biodiversity. Butterflies, birds and small animals depend on native plants for food and habitat. Because native plants are already adapted to the regional climate, they require little maintenance once established.

The Community Appearance Manual (currently used as a supplement to the LDO) should be updated, particularly the listing of trees and plant material that developers can choose in their site plans. Only **native plants that are well adapted** to the Piedmont region should be allowed. The current list in the Manual contains several non-native plants.

Rather than maintaining a separate list of recommended species that will become outdated as climate or pest ranges change, the Town should consider referencing an existing credible source of plants native to the Southeast region (e.g., NC DOT, NC Agricultural Extension Service, NC Forest Service, NC Native Plant Society, or Audubon Society).

IV. Town Management of Tree Infrastructure

Several towns and cities in North Carolina (e.g., Charlotte, Wake Forest, and Hickory) and across the country (e.g., Cleveland OH, Portland OR, and Athens GA) have developed detailed urban forest master plans that define their vision, goals and actions to protect and enhance the value of trees to their community. The Town of Cary should do the same. Development of a Cary Urban Forest Master Plan (UFMP) should include an initial assessment that accurately defines the current extent of tree canopy and identifies areas that should be targeted for tree canopy enhancement and areas to prioritize for tree preservation.

Based on the assessment, the UFMP should identify short and long-term goals, prioritize actions, identify performance measures and a process to evaluate progress, and determine what resources are needed to ensure success. The effort also should involve broad community engagement (e.g., public information sessions, town service departments, chamber of commerce, county government, universities, schools, HOAs, utilities, etc.).

An Urban Forester position should be established on Town staff with appropriate support and resources. The initial responsibility for this position should be leading the development of the Urban Forest Master Plan for the Town of Cary.

V. Regulatory and Guidance Documents

Chapter 7 of the LDO should be revised to:

- Align with the goals and objectives in the Cary Community Plan.
- Support responsible tree planting and tree canopy protection in higher density urban settings.
- Include **open space** requirements that relate to increasing tree canopy for new **greenfield and infill development**.
- Include incentives for tree retention and conservation. Such incentives could include allowing higher housing density; credit for exceeding landscaping requirements; allowing greater building heights; reducing parking requirements; or expedited project reviews. Incentives should be proportional to the maximum amount of tree canopy cover that is preserved.
- Prohibit clear cutting unless the developer documents in detail that no other option is possible.
- A tree survey should be required at the early stages of development (e.g., rezoning or pre-submittal application). Additionally, the Town should have the authority to require tree surveys to be re-verified to ensure they reflect current site conditions if they were conducted more than one-year prior to final consideration for development approval.

The LDO should be revised with broad input from a diverse set of stakeholders.

The Cary Appearance Manual should be revised to emphasize plantings that are native, non-invasive, locally adapted, and provide appropriate species diversity.

<u>Suggested Elements of a Tree Ordinance</u>

1. The ordinance purpose and intent should include a strong statement of tree values and benefits.

2. The requirements for tree protection should be in terms of canopy cover instead of individual champion trees.

3. Minimum tree canopy cover requirements for new development and redevelopment projects should be differentiated by zoning district or land use classification. An example of this approach is provided in the table below. However, the final required canopy percentage values should be based on an analysis of the ecosystem services that would be provided and the effectiveness in achieving the Town's long-range tree canopy cover goal(s).

Zoning District	Summary Description	Minimum Canopy %
R-80	Residential District; Low density, Minimum lot size 80,000 sq. ft.	55 – 60
R-40	Residential District; Large lot residential, Minimum lot size 40,000 sq. ft.	50 – 55
R-20	Residential District; Low density residential, Minimum lot size 20,000 sq. ft.	45 – 50
R-12	Residential District; Single family dwellings, Minimum lot size 12,000 sq. ft.	40 – 45
R-8	Residential District; Single family dwellings, Minimum lot size 8,000 sq. ft.	35 – 40
TR	Residential District; Transitional, medium density, infill development < 10 acres, Minimum lot size 5,000 sq. ft.	35 – 40
RMF	Residential District; Multi-family dwellings, patio homes	35 – 40
RR	Resource/Recreational District; Parks, open spaces	40 – 60
OI	Office & Institutional District; Offices, community institutions	35 – 40
GC	General Commercial District; Uses providing goods and services	25 – 30

4. The ordinance should state that canopy requirements are to be met first by tree conservation, then by planting. The ordinance should include a mechanism to implement the preference for tree conservation over replacement. Two potential mechanisms that could be considered are:

    - Option A: Mandate that the required total tree canopy be met with a certain percentage of conserved tree canopy (e.g., minimum canopy requirement is 60%, of which a minimum 40% must be met through conservation). The proportion of tree canopy conservation that would be required would be based on lot size and/or land use.

    - Option B: Allocate full credit for meeting canopy requirements through tree conservation and partial credit for replacement plantings (e.g., a 0.75X factor could be applied to the projected canopy when mature for a planted tree that replaces a removed tree). This approach would recognize the reduced present value of a planted tree compared to the removed tree.

5. Where tree conservation and planting cannot meet the requirement, payment in lieu of planting should be required, which should go into a tree fund for the Town to plant trees in alternate locations (e.g., sensitive areas benefiting from the installation of green infrastructure) or other tree conservation activities (e.g., efforts to mitigate tree pests and educational programs).

6. The ordinance should establish and define the roles of an urban forester and town arborist positions. We recommend the urban forester be responsible for

overall development and implementation of an urban forest master plan; and town arborists be closely involved in plan review, approval and inspections.

7. The ordinance should include section(s) on technical standards for tree planting, maintenance, and removal, possibly incorporating by reference recognized standards (e.g., ANSI A300 and American Standard for Nursery Stock ANSI Z60.1 for tree care and management).

8. As previously mentioned, the Town should update the Community Appearance Manual to serve as a handbook supplementing the Tree ordinance and to help developers interpret and implement the ordinance requirements. The handbook should identify, or list permitted (i.e., native) and/or prohibited plant species. Such lists would be easier to update in a manual than if they were listed in the ordinance.

9. The ordinance should establish a category of individual “protected” trees to include, for example, legacy, heritage, specimen, landmark, or champion trees.

10. Incentives should be identified to encourage development designs that provide linkages between green spaces and/or connectivity between areas of protected trees and vegetation.

11. The Town should continue and strengthen the excellent practice of having pre-development / pre-construction meetings with developers. Such meetings should be a required part of the tree removal / replacement permit process.

12. The ordinance should detail the required elements and content of tree protection plans and site maps (clearly indicating tree-save areas and proposed tree removals) submitted with development applications. These documents upon approval by the Town should constitute the permit for any tree planting or removals.

13. Permit enforcement should include the ability to issue stop work orders and withhold certificate of occupancy. Town arborists should have sufficient authority to take appropriate enforcement actions.

14. The ordinance should require inspections at defined intervals (e.g., 1, 3, and 5 years) post-development to ensure both conserved and planted trees are properly preserved and maintained.

15. The ordinance should allow non-native, invasive species to be removed without permit.

VI. Ongoing Assessment and Monitoring

The Town of Cary's tree canopy cover percentage (46%) was last measured in 2016 using the computer modeling tool iTree Canopy developed by the U.S. Department of Agriculture. This measure should be re-validated using reliable methodology on a periodic basis (e.g., at least every 5 years). The purpose would be to provide comparative benchmarks and to guide the setting of future canopy cover goals and ongoing objectives.

A tree inventory should be conducted in selected areas (e.g., Town Center, and along major thoroughfares and rights-of-way) to provide the ability to monitor tree health and maintenance requirements.

The inventory should be kept in a database that also includes "protected trees" that are maintained on the Town's managed or public lands. Such protected trees could be defined as existing trees that are significant based on a) their historical or civic importance, b) noteworthy in size (DBH) based on species or c) having unique aesthetic prominence on a site.

VII. Initiatives to Protect and Increase Tree Canopy Cover

As Cary continues to develop, tree conservation will become more important. As new development becomes high density, greater priority must be given to trees to continue to increase our tree canopy, sequester carbon, cool the local environment, and provide recreation and improve the quality of life. By increasing the Town's tree canopy cover through urban forest protection, restoration, and afforestation, and raising public awareness, the benefits of trees can be achieved.

Forest Protection. The Town of Cary should protect and manage existing forests as a critical part of the town's infrastructure, as vital as the built environment. To that end, clear cutting should be prohibited in development projects, and additional forested park land should be acquired for passive recreation. Where appropriate, the use of conservation easements should be considered to prevent further fragmentation of currently forested land.

Forest Restoration. The Town of Cary should identify land areas that have been converted from forest (e.g., cleared for agricultural purposes) and develop private – public partnerships to plant native trees. When possible, trees with short life spans (e.g., Bradford Pear and Leyland Cypress) should be replaced with longer life species. Additional areas can be targeted for tree planting based on opportunities for green infrastructure benefits such as stormwater management and sediment and soil erosion control.

Afforestation. The Town of Cary should identify opportunities for creating new forested areas by planting trees or perennial biomass in areas that were not historically forested. Such areas can include degraded pasture lands, eroding slopes, industrial or abandoned lots, and highway and street medians.

Public education. A public information and education program should be developed to inform our citizens on the proper care and management of trees on private property and on property managed by neighborhood Homeowners Associations. Information should be included on the many benefits and ecosystem services that trees provide to the community to help elevate the importance of forest conservation and tree maintenance on private lands.

Tree Preservation Approaches Aligned with Future Land Use Planning. The goals and approaches for enhancing tree canopy should reflect the predominant characteristics of different areas of the Town. The Downtown area and Destination Centers will need approaches to enhance urban tree canopy and streetscapes, while other areas with less density or that are rural in character provide unique opportunities for tree preservation. As development in Cary transitions from large development tracts to redevelopment and infill development, the Town should encourage innovative ways of incorporating new green space, such as green infrastructure and pocket parks.

Private – Public Partnerships. Opportunities should be explored to develop a private – public partnership to plant trees in Cary. The goal and purpose of the program should be to maintain and increase the canopy cover across all areas of the Town. Further, efforts should be made to coordinate and launch cooperative initiatives with neighboring municipalities, such as Raleigh, Apex, Morrisville, and Holly Springs.

Developer Recognition Program. The Town should consider establishing a recognition program for developers who demonstrate innovation or go “above and beyond” the minimum requirements for tree canopy preservation in their site designs.

Tree Installation on Streetscapes. As trees are added or replaced on streetscapes, the installation should ensure their health and longevity. This includes planting trees

with proper spacing, and adequate quality and volume of soil for their size when mature. Healthy soils are necessary for healthy trees and native vegetation. Degraded soils will require expensive maintenance and replanting which serves little purpose.

Preventing Tree Injury During Construction. The Tree Advisory committee was informed of incidents where individual trees or tree-save areas were damaged during grading, trenching, and other construction activities. While the committee has not verified these incidents, they appear to be caused by inattention or lack of understanding by contractors working on behalf of developers, NC DOT, utilities, or others. Focused efforts should be made to ensure that the scope of work and pre-construction meetings for any land disturbing activity emphasize the need to protect critical root zones and tree protection fencing and prevent damage from soil compaction. These construction activities should be subject to appropriate inspections and enforcement.

VIII. Acknowledgments and Closing Thoughts

The Tree Advisory Committee met monthly over the course of the past 14 months. The Committee extends its appreciation to all who participated in meetings to share their ideas and perspectives, including several Town staff (Emily Barrett, Rob Wilson, Kevin Hales, Kevin Steed, Sandi Bailey, Danna Widmar), Andrew Saunders (Sustainability Officer, Athens-Clarke Co, Georgia), Rachel Weber (Dogwood Alliance), and Richard Wilson and George McDowell (Keep the Canopy).

These recommendations represent the thoughts and considerations of the committee members themselves -- all citizen volunteers. Any specific actions and requirements based on these recommendations should involve individuals knowledgeable in the appropriate technical disciplines, driven by relevant data, and based on sound science.

Finally, the recommendations should be considered as initial steps toward a long-term commitment to build sustainable programs that preserve and enhance the values and benefits that Cary's urban forests provide to the Town's citizens. Without long-term efforts, Cary's urban forest and tree canopy will decline, and decades will be required to see any progress from recovery efforts. The value of trees to our Town are central to what makes Cary an attractive place to live, raise families, work, and play.

IX. The EAB's Tree Advisory Committee Members

Caitlin Burke

Scott Merkle (Chair)

Shweta Nanekar (Vice Chair)

Christina Trexler

X. Glossary

Champion tree – generally, individual trees which are exceptional examples of their species because of their enormous size, great age, rarity or historical significance. Within the Cary Land Development Ordinance (at 7.2.5.A.5) a *large champion tree* means any upperstory hardwood champion tree forty (40) caliper inches and larger or any understory champion tree fifteen (15) caliper inches and larger. A small *champion tree* means any upperstory champion tree less than forty (40) caliper inches or any understory champion tree less than fifteen (15) caliper inches.

Evapotranspiration - the sum of evaporation and plant transpiration from the Earth's land and ocean surface to the atmosphere. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and waterbodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapor through stomata in its leaves. Evapotranspiration is an important part of the water cycle. An element (such as a tree) that contributes to evapotranspiration can be called an evapotranspirator (Wikipedia).

Greenfield Development refers to the real estate development of land not previously used for residential, commercial or industrial purpose. ***Infill Development*** refers to the development of vacant parcels within previously built areas. The term implies that existing land is mostly built-out and what is being built is in effect "filling in" the gaps. Typically, these areas are already served by public infrastructure, such as transportation, water, wastewater, and other utilities. ***Redevelopment*** describes converting an existing built property into another use. Ideally, redevelopment aims for better use of the property that provides an economic return to the community.

Native Plants - The Federal Native Plant Conservation Committee (Plant Conservation Alliance) offers the following widely accepted definition: "A native plant species is one that occurs naturally in a particular region, ecosystem and/or habitat without direct or indirect human actions." ***Adapted plants*** are those that were not originally part of the natural ecosystem but have evolved to a point

where the physical conditions such as soil, climate and geology are conducive for healthy growth. ***Invasive plants*** are species characterized by quick and aggressive growth, often displacing native plants. They create a source of unhealthy competition for local plant species.

Open Space is any open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public. Open space includes land that is partly or completely covered with grass, trees, shrubs, or other vegetation (EPA). In the Cary LDO (7.2.5.A.5) open space means all buffers, streetscapes, or floodplains; open space required through rezoning conditions; permanent tree protection areas; designated community gathering spaces; bonus open space for conservation residential subdivisions; and other non-regulated permanent open space.

XI. References

1. Benefits of Trees and Urban Forests. Alliance for Community Trees (2011)

2. Berland A. et al. The role of trees in urban stormwater management. Landscape and Urban Planning 162:167–177 (2017)

3. Developing Tree Protection Ordinances in North Carolina - A Guide to Local Ordinance Creation. Nicholas Institute for Environmental Policy Solutions, the Urban & Community Forestry Program of the North Carolina Forest Service and the North Carolina Wildlife Resources Commission (2017)

4. Dixon, K. and Wolf, K. Benefits and Risks of Urban Roadside Landscape: Finding a Livable, Balanced Response. 3rd Urban Street Symposium, Seattle, Washington (2007)

5. Evans, E. Tree Facts, Department of Horticultural Science, College of Agriculture and Life Sciences, NC State University (https://projects.ncsu.edu/project/treesofstrength/treefact.htm)

6. Fazio, J. How Trees Can Retain Stormwater Runoff. Tree City USA Bulletin 55, Arbor Day Foundation

7. Foster, J., Lowe, A. and Winkelman, S. The Value of Green Infrastructure for Urban Climate Adaptation. Rep. Center for Clean Air Policy (2011).

8. i-Tree Canopy Assessment Project - Town of Cary, Bartlett Inventory Solutions, Charlotte, NC (2016)

9. Lohr, V., et. al. “How urban residents rate and rank the benefits and problems associated with trees in cities: Journal of Arboriculture 30.1:28-35 (2004).

10. Nowak and Greenfield, Declining urban and community tree cover in the United States., Urban Forestry & Urban Greening, Vol 32: 32-55 (2018)

11. Protecting and Retaining Trees **-** A guide for municipalities and counties in North Carolina, NC State University Cooperative Extension (2008)

12. Stormwater to Street Trees: Engineering Urban Forests for Stormwater Management**.** U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, Nonpoint Source Control Branch (4503T), EPA 841-B-13-001 (2013)

13. The Sustainable Urban Forest - A Step-by-Step Approach, US Forest Service and Davey Institute (2016)

14. Ulrich, R. View through a Window May Influence Recovery from Surgery. Science 224.4647: 420-421 (1984)

15. Wells, N. At home with nature: Effects of “greenness” on children’s cognitive functioning. Environment and Behavior 32(6): 775-795 (2000