Developing Tree Protection Ordinances in North Carolina

A Guide to Local Ordinance Creation

Developed by the Nicholas Institute for Environmental Policy Solutions for (and with guidance from) the Urban & Community Forestry Program of the North Carolina Forest Service and the North Carolina Wildlife Resources Commission.

Funding for this project was provided in part through the Urban & Community Forestry Program of the North Carolina Forest Service, Department of Agriculture and Consumer Services, in cooperation with the USDA Forest Service, Southern Region.

The North Carolina Forest Service is an equal opportunity employer. Its programs, activities and employment practices are available to all people regardless of race, color, religion, sex, age, national origin, disabilities, or political affiliation.

Introduction

Trees provide a great number of community benefits include enhancing property values and aesthetics, inexpensively treating and managing stormwater and air quality, providing wildlife habitat and energy savings. Tree ordinances are the regulatory tool that communities use to protect tree resources. These regulations range from street tree ordinances that regulate the planting and maintenance of trees along public rights-of-way to comprehensive tree protection ordinances that require the maintenance and protection of trees on public and private property. The model ordinance language in this resource is of the latter variety and addresses the conservation and protection of trees on public and private land from the direct and cumulative impacts of development and redevelopment. As such, it is most appropriate for areas that are urbanizing and/or experiencing new development.

This model ordinance is not designed to be adopted without significant modification as it offers a variety of policy mechanisms to achieve tree canopy protection. The drafters and contributors wanted to present communities with the maximum amount of flexibility. Local governments will need to evaluate the options for protecting tree canopy and decide which best suites their community's needs. Also, if a local government chooses to incorporate the provisions of this ordinance into a comprehensive land use regulation ordinance, these provisions should be reviewed, amended, or omitted as may be necessary to ensure consistency, avoid redundancy, retain any provisions specifically related to project review and to ensure the ordinance is adopted, implemented, and enforced pursuant to appropriate local government authority.

Explanatory Note: Throughout this model ordinance, comments from the drafters of this ordinance are set out in boxes such as this. These comments should be removed before the ordinance is adopted; they are not part of the ordinance language itself.

Optional provisions are provided throughout and are intended to address the diverse and differing needs of local governments. Optional provisions, or provisions that should be tailored to the locality's needs, are discussed in the comments and delineated by brackets like {these}.

The **bold underlined text** serves as a prompt for local governments to customize the text or insert local government names.

Defined terms are shown in italics.

Background

Ordinances addressing trees are important for municipalities as they set standards for the management of trees, as well as for the planning for trees. Two of the main types of ordinances for trees are *Street Tree Ordinances* and *Tree Protection Ordinances*. As some communities move towards Unified Development Ordinances (UDOs) these trees ordinances may be incorporated into the UDOs.

Street tree ordinances typically cover the planting, pruning, and removal of trees within public rights-of-way. They can also contain provisions governing the maintenance or removal of private trees which pose a hazard to the public. Ordinances with tree planting requirements, such as those requiring tree planting in public or private parking lots, can fall under this heading.

Tree protection ordinances are focused on providing protection for individual and stands of trees. Addressing trees on private and developing property, they usually require that a permit be obtained before protected trees can be removed, encroached upon, or in some cases, pruned. Trees falling within this requirement will have a prescribed set of characteristics. The degree of documentation prior to removal and replacement after removal are defined. They may also be called Tree Conservation Ordinances.

All ordinances should be developed for the needs of the specific community. Utilizing un-edited language, taken from other municipalities, is not advised as each municipality has its own concerns and priorities. Ordinances, or clauses, that are not specifically adapted for local use may have unintended impact when administered along with other local ordinances.

For any community looking to develop a tree ordinance "Guidelines for Developing and Evaluation Tree Ordinances" is a recommended resource.

Why Communities Need a Tree Protection Ordinance

North Carolina continues to experience rapid population growth, with the increasing development pressures on its communities. This Tree Protection OrdinanceTool has been developed with references to North Carolina statutes to provide assistance to municipalities, guiding them through ordinance development. For communities without sufficient staff, a Tree Board could assist in reviewing and making recommendations to their local government.

A municipality with beautiful and well maintained trees does not happen by accident. A codified set of guidelines, rules and regulations in an ordinance is a key to success in maintaining tree cover along streets, in parks, parking lots and other areas in a municipality.

Benefits of a Tree Protection Ordinance

Trees have long been a significant part of the character of North Carolina communities, within and surrounding them. As development continues, forested areas and working lands are converted to housing and all the grey infrastructure needed to support the homes and the people. Within communities, street and road widening, in-fill development and other improvements, impact street and private trees. A Tree Protection Ordinance allows a community to define its own priorities for mixing population growth with sustaining viable forested areas. This kind of ordinance:

- creates a framework for the municipality to monitor tree removal and protect trees or areas deemed to be of value to the community.
- can create an income stream to help finance tree planting, tree maintenance and staff.
- helps educate residents and developers about trees and the practices that affect them.

Limits to the Tree Protection Ordinance Tool

The focus of this Tree Protection Tool is trees impacted during and after development (including in-fill development). It does not address tree protection on private property that is not under development. Requiring Tree Permits for all tree removals within a municipality is becoming more common within Tree Protection Ordinances. It can be used to increase the awareness of trees and further supports the benefits, as noted above.

Tree Protection on Properties Not Under Development

Many municipalities, across the US, regulate tree removal and tree protection on all property, whether under development or not, in order to manage/maintain the character of the community. Whether:

- using a number of different types of permits, ensuring standardized decisions and reassured residents (Lake Oswego, OR)
- specifying the basis for removal requests within the ordinance (Dorchester County, SC; p7)
- developing a written standard for interpretation of the ordinance (Delmar, CA)
- using the permit application itself to communicate the standards (Tacoma Park, MD and Pflugerville, TX)
- using graphics to spell out the standards (Austin, TX)

The majority of municipalities with Tree Protection Ordinances use an application form:

- Austin, TX
- Sarasota County, FL
- Hillsborough County, FL
- Brookhaven, GA

Community Involvement When Developing Ordinances

There are benefits to including local stakeholders when developing a tree-related ordinance. While this can add time to the process, it can develop buy-in from the community, and identify the needs of the community as well as its priorities or goals. It is rare for ordinances to fully predict every possible issue that could arise in the future but having a structure in place and a way to assess its success is the first step to define the terms of development in your community.

Tree Protection and Forestry

Tree preservation ordinances cannot interfere with the legitimate practice of forestry. However, some municipalities may require standards be met, in order to confirm that tree cutting on a property is for the harvest and re-planting of trees, as is appropriate for working lands. Such steps have been taken where municipalities have experienced challenges enforcing tree protection during the development process, where tree removal for forestry was swiftly followed by a submission for development. Matthews, NC addresses the issue of by-passing tree protection requirements in their Tree Ordinance in §99.10, referencing local ordinances governing the development of land and the permit or approval requirements. The ordinance includes penalties such as fines and lengthy delays in approving development plans.

Updates

Remember that any ordinance can become outdated as circumstances change and a community develops. Ordinances should be reviewed periodically to ensure that they 1) are being followed, 2) are still relevant to the municipality, 3) do not overlook changes, 4) are not outdated with fees, fines etc. Atlanta, GA published fact sheet for its residents regarding the need for updating its 2001 Tree Protection Ordinance.

Table of Contents

Introduction 2

Background 3

Section I. General Provisions 8
- **A. Short Title** 8
- **B. Authority** 8
- **C. Effective Date** 8
- **D. Purposes and Goals** 8
- **E. Relationship to Other Laws, Regulations, and Ordinances** 9
- **F. Interpretation** 9
- **G. Severability** 10

Section II. Applicability 11
- **A. General** 11
- **B. Permits** 11
- **C. Exemptions** 12
- **D. Emergencies** 12
- **E. Non-Liability of [Insert Local Government Name Here]** 12

Tree Protection and Replacement 13

Section III. Tree Protection Standards 17
- **A. Minimum Tree Canopy Requirements** 17
- **B. Tree Preservation Requirements** 17
- **C. Modifications** 18
- **D. Incentives for Increasing Area in Single-Family Residential** 19
- **E. Implementation of Standards** 19
  - 1. Demonstration of Compliance 19
  - 2. Methods of Compliance 19

Tree Protection Zones (TPZ) 22

Section IV. Tree Protection Plans 25
- **A. Activities Requiring a Tree Protection Plan** 25
- **B. Tree Protection Plan Requirements** 25
  - 1. Site information 25
  - 2. Management plans 26
- **C. Implementation of Physical Protection Required** 26
  - 1. Pre-construction conference. 26
  - 2. Tree protection procedures and guidelines. 26
  - 3. On-site supervision. 26
  - 4. Protective barriers. 27
  - 5. Restrictions within the Protected Areas. 27
- **D. Enforcement** 28

Section V. Administration **28**
- **A. Designation of Decision-Making Entity** **28**
- **B. Tree Advisory Commission** **28**
- **C. Fees** **29**
- **D. Penalties** **29**

Section VI. Definitions **30**

Appendix A Defining Regulated Trees **33**

Appendix B Protected Areas and Quality **35**

Section I. General Provisions

A. Short Title

This ordinance shall be known as the **[insert local government name here]**'s Tree Protection Ordinance. It is referred to herein as "this ordinance."

B. Authority

This ordinance is adopted pursuant to N.C. Const. art XIV, sec 5 and **[insert appropriate county authority, e.g., N.C. Gen. Stat. § 153A-121 and § 153A-340 (2011) or municipal authority, N.C. Gen. Stat. §160A-174 and §160A-174 (2011) here]**.

Explanatory Note: Some jurisdictions may wish to incorporate this ordinance into a land use or unified development ordinance and thus may want to add reference to statutory authority for planning and regulation of development (N.C. Gen. Stat. §153A-18 and §160A-19). Jurisdictions should evaluate this ordinance in conjunction with other ordinances, such as open space, stormwater regulations, natural resource overlays, etc., to ensure consistent application of all land use regulations. In addition, when adopting this ordinance as part of land use regulations, local governments should follow the standards for adopting or amending ordinances found in N.C. Gen. Stat. §153A-323 (for counties) and §160A-364 (for municipalities) and all other applicable requirements.

C. Effective Date

This ordinance takes effect on **[insert date here]**.

D. Purposes and Goals

Explanatory Note: This subsection is designed to help communities identify relevant purposes and goals. The following list is illustrative only and some objectives may be redundant or may not capture the full needs of a particular local government. The local government should evaluate all benefits, including secondary benefits, of adopting a tree protection ordinance and revise, amend or re-organize this list accordingly.

The purpose of this ordinance is to preserve, protect, maintain and increase tree canopy to protect the public health, safety, and welfare and enhance the quality of life within **[insert local government name here]**. Protection of tree canopy is intended to:

1. **{**Minimize the cost of constructing and maintaining engineered stormwater drainage systems by facilitating natural drainage patterns and infiltration of stormwater runoff.
2. Moderate temperature and promote energy conservation.
3. Emphasize the importance of trees and vegetation as both visual and physical buffers.
4. Promote carbon dioxide absorption and oxygen production.

5. Reduce the harmful effects of wind, heat, noise, and the glare of motor vehicle lights.
6. Improve surface drainage and aquifer recharge.
7. Prevent soil erosion while promoting soil stabilization and enrichment.
8. Provide shade.
9. Reduce water pollution.
10. Conserve natural resources and maintain tree canopy.
11. Provide wildlife habitat by reducing forest fragmentation.
12. Encourage the protection and planting of native trees.
13. Require the preservation and planting of trees on site to maintain and enlarge the tree canopy cover across **[insert local government name here]**.
14. Protect, facilitate, and enhance the aesthetic qualities of the community to ensure that tree removal does not reduce property values.**}**

E. Relationship to Other Laws, Regulations, and Ordinances

1. The regulations contained in this ordinance are not intended to be substituted for other general zoning district provisions, but should be considered as additional requirements to be met by applicants prior to project approval. This ordinance is intended to provide the **[insert local government name here]** with additional review and regulation to specify how land use and development, permitted by the **[insert local government name here]'s** primary zoning districts, affects tree canopy coverage in **[insert local government name here]**.

2. This ordinance is not intended to modify or repeal any other ordinance, rule, regulation or other provision of law. The requirements of this ordinance are in addition to the requirements of any other ordinance, rule, regulation, or other provision of law. Where any provision of this ordinance imposes restrictions different from those imposed by another ordinance, rule, regulation, or other provision of law, whichever is more restrictive or imposes higher protective standards for human or environmental health, safety, and welfare shall control.

F. Interpretation

1. Meaning and intent – All provisions, terms, phrases, and expressions contained in this ordinance shall be construed according to the general and specific purposes set forth in this ordinance. If a different or more specific meaning is given for a term defined elsewhere in **[insert name of local government's code of ordinances here]**, the meaning and application of the term in this ordinance shall control for purposes of application to this ordinance. Any term not defined herein or elsewhere in **[insert name of local government's code of ordinances here]** shall be defined as it is defined in Webster's New

International Dictionary most recent edition, unless the result does not effectuate the intent of the governing bodies, leads to absurd or illogical results, or is inconsistent with the surrounding textual context.

2. Text controls in the event of conflict – In the event of a conflict or inconsistency between the text of this ordinance and any heading, caption, figure, illustration, table, or map, the text shall control.

3. References to statutes, regulations, and documents – Whenever reference is made to a resolution, ordinance, statute, regulation, manual, or document, it shall be construed as a reference to the most recent edition of such that has been finalized and published with due provision for notice and comment, unless otherwise specifically stated.

4. Usage
   a. Mandatory and discretionary terms – The words "shall," "must," and "will" are mandatory in nature, establishing an obligation or duty to comply with the particular provision. The words "may" and "should" are permissive in nature.

   b. Conjunctions – Unless the context clearly indicates the contrary, conjunctions shall be interpreted as follows: The word "and" indicates that all connected items, conditions, provisions, and events apply. The word "or" indicates that one or more of the connected items, conditions, provisions, or events apply.

   c. Tense, plurals, and gender – Words used in the present tense include the future tense. Words used in the singular number include the plural number and the plural number includes the singular number, unless the context of the particular usage clearly indicates otherwise. Words used in a particular gender include all other genders and vice versa.

G. Severability

If the provisions of any section, subsection, paragraph, subdivision, or clause of this ordinance are adjudged invalid by a court of competent jurisdiction, such judgment shall not affect or invalidate the remainder of any section, subsection, paragraph, subdivision, or clause of this ordinance.

Section II. Applicability

A. General

This ordinance applies to all developers and/or owners of real property in the **[insert local government name here]**'s zoning jurisdiction. Beginning with and subsequent to its effective date, the provisions of this ordinance apply to all *development* that requires a development approval in **[insert local government name here]**'s zoning jurisdiction, unless the development is expressly exempted by law, or as provided herein.

Explanatory Note: Most activities that require formal project review, or even a building permit, are obvious choices for applicable activities because some degree of review of these activities is expected at the local level. Local governments should also consider how to coordinate tree protection plan review and approval with other land use project reviews. For example, local governments that administer their own sedimentation and erosion control program should ensure that tree protection plans are in place and approved prior to sedimentation and erosion control plan approval.

B. Permits

No *person* shall cut, remove, or relocate any *regulated trees* on any public or private property within the **[insert local government name here]**, unless **{**a tree protection plan has been approved OR a valid tree permit has been issued by **[insert local government name here]}** pursuant to the provisions of this ordinance.

1. *Persons* requesting to do any removal of trees subject to this ordinance, or any of the activities prohibited by this ordinance, shall secure a permit for such activities from **[insert relevant local government approval agency here]** before the activities commence. For purposes of this ordinance, a *tree protection plan* approved by **[insert relevant local government approval agency here]** constitutes a permit.

2. The **[insert relevant local government approval agency here]** shall have the authority to review all requests for permits and to grant or deny permits or attach reasonable conditions to the permits.

3. Individual permits will not be required for local and state department of transportation projects so long as the tree protection requirements in this ordinance are included in the project plans.

C. Exemptions

Explanatory Note: This model ordinance does not identify specific exemptions because local governments have different needs, capacities for review and enforcement, and authority. Local governments should evaluate specific types of activities to be exempted.

Many local governments exempt single- and two-family development that is not a part of a larger plan of development and on lots of a certain size (e.g., one acre or less in lot size) or with disturbances under a certain threshold (e.g., 5,000 square feet or less). For example, Alachua County's (FL) Unified Land Development Code provides that "[r]esidential lots two acres or less in gross size shall be exempt from the provisions of [tree protection requirements], provided that no champion or heritage trees shall be removed" (Alachua County, Florida, Unified Land Development Code § 406.11(a)). Another option is to incorporate any exempt activity in the Applicability section of the ordinance as the Chapel Hill Tree Protection Ordinance does, which provides that their ordinance applies to "[a]ll work impacting trees on lots designated for single- and two-family residential use where total land disturbance exceeds 5,000 square feet" (Chapel Hill, North Carolina, Land Use Management Ordinance § 5.7.1(c)(1)).

D. Emergencies

In an emergency such as a wind storm, ice storm, or other disaster, the provisions of this ordinance **{may be waived/are waived}** during the emergency period if compliance would impede the rescue of life or property from immediate danger or the repair of utilities. Any emergency work shall follow as closely as possible the standards outline herein. This shall not be interpreted to be a general waiver of the intent of this chapter.

Explanatory Note: Local governments should decide whether the waiver is automatic in the event of an emergency or is permissive in the event of an emergency and adapt this language accordingly. Some communities require that a property owner or their authorized agency file a permit application after the fact as soon as possible after the emergency concludes (see e.g., Alachua County, Florida, Unified Land Development Code § 406.12(e)).

E. Non-Liability of [Insert Local Government Name Here]

Nothing in this ordinance shall be deemed to impose any liability for damages or a duty of care and maintenance upon the **[insert local government name here]** or upon any of its officers or employees. Persons in possession of any property shall have a duty to keep the trees upon the property and under their control in a safe, healthy condition. Any person who feels a tree located on property possessed, owned or controlled by them is a danger to the safety of themselves, others or structural improvements on-site or off-site shall have an obligation to secure the area around the tree or support the tree, as appropriate to safeguard both persons and improvements from harm.

Tree Protection and Replacement

Tree Protection by Area or by Canopy Coverage

In some situations, the mapping and protection of individual or clusters of trees may not meet the needs (or all of the needs) of the municipality. Some communities use minimum canopy requirements to ensure retention of larger undisturbed areas which may also link to existing green space or provide linkages between green spaces. This is a feature that larger municipalities, or municipalities undergoing rapid development, may include. The standards can be based on zoning or land-use, which may be best suited for larger developed communities, or can be a single, community-wide percentage.

The use of a minimum canopy coverage requires that the municipality knows what its existing canopy coverage is, in order to set realistic and achievable goals. A tree canopy assessment uses GIS mapping to map and calculate canopy coverage. This can also provide a baseline of information to track change in canopy coverage over time. But, even without a GIS tree canopy assessment, minimum canopy requirements can be established for developments or even for individual building lots. An example of tree protection by area, using minimum canopy percentage requirements can be found in the Fayetttville, NC UDO. Not only does this Unified Development Ordinance establish minimum coverage (and exceptions), it also addresses buffers, easements and wetlands, as well as native and invasive plants. The City of Winston-Salem's UDO has a Landscaping & Tree Preservation Check List that lists the requirements for using individual and stands of trees to meet their Tree Save Area (TSA) requirements.

One challenge to the minimum canopy approach, is ensuring a degree of connectivity between these areas of protected trees. But the planning efforts are worth it. The benefits of treed areas, and the resiliency and health of the areas and the people and wildlife using them, increase with size. And, as development continues, these green areas will form a significant part of the community's character, especially where the removal of invasive, non-native trees and shrubs are in the tree canopy standards.

Developing Standards for Replacement Trees

It is important to establish a standard for calculating the number of trees, species and minimum size that must be planted to replace a tree that must be removed. For large developments the use of density or canopy coverage, to determine replacement requirements may be most appropriate. For smaller development or lots, and for "protected trees" (as described in ***Appendix A: Defining Regulated Trees***), replacement standards may address the removal of the individual trees. Where planting for canopy cover and landscaping is required, only native tree species should be planted.

1. **Tree Canopy Replacement**

   This option allows for a broad approach that does not require the mapping of all individual trees on a site, only the protected trees by diameter. However, a tree plan must show the mapped protected tree locations and extent of the tree canopy cover.

The canopy replacement method establishes the number of trees required for the type or size of property developed. As an example, the Tree Protection and Replacement Ordinance for Forsyth County, GA, Section 2.11, establishes site density (# trees per acre) and includes the calculations for the method in Appendix B. It also specifically addresses its significant tree replacement requirements (its protected trees) in Section 2.12 and the methods and standards for those trees in Appendix C.

In spite of the example of Forsyth County, it is advised that all specifications, lists and calculations be maintained in a separate document from the ordinance itself (Tree Manual, Master Tree Plan, etc.) By referencing a separate document in the ordinance, any practical changes that are necessary over time can be addressed separately and should not require a full ordinance revision. This can make the updating process a bit easier as evidenced by the extensive Tree Technical Manual for Palo Alto, CA .

Smyrna, GA also has a document called Technical Standards and Best Management Practices where the canopy replacement requirements are explained and described. This municipality uses the diameter calculation for a total number of DBH inches per acre in Section 1.

Some municipalities use "coverage deficit" to calculate the number of trees, but smaller communities may find that a simpler method for calculation would be easier to communicate to their residents and monitor by their staff.

The general benefit of using canopy as a basis for replacement encourages the retention of smaller and grouped trees – which have a better chance of long-term survival and site contribution than larger, more mature trees which, even with root zone protection, will be more impacted by site disturbance and root loss. Desired species and condition of such groups must be clearly defined to avoid the retention of poor tree choices.

Bonus credit for retained trees and for connecting green spaces can also encourage tree retention rather than tree removal during development (e.g. Forsyth County, Section 2.12).

2. Individual Tree Replacement – this is not specifically addressed in this Guide but is advised for communities to include in a Trees section of their UDO, in a Landscape Ordinance or a stand-alone Tree Ordinance.

This option should be included to address the removal of protected trees, as defined in your ordinance. It is also important for municipalities with infill development or that require tree removal permits by residents. It is important to ensure that tree removals are appropriately replaced by species and sizes that benefit the community, and these should be native species as much as possible. Clarifying the standards should cover:

- Number: a 1:1 requirement may be the easiest method to calculate the number of trees to be planted but does not account for removing a large tree and replacing it with a small tree.
- Species: removing a large maturing tree and replanting a small maturing tree would result in the overall loss of aesthetic and environmental and economic benefits (e.g. cut down an oak and plant a dogwood).
- Minimum Size: establishing a single size requirement for replacement trees, like 3" caliper, may be the easiest method but such a tree would be too large/heavy (~650 lbs.) to handle if the ordinance impacts individual homeowners removing trees (see Tree Protection Ordinances fact sheet). Requiring larger trees to replant in replacement of large trees removals (an increasing scale for replacement size) is another approach, but larger trees are substantially more expensive to purchase, move and handle, plant and support. In addition, larger trees take longer to recover from planting shock.

Therefore, it is advisable for municipalities to establish standards that address the various situations that the ordinance addresses in a way that meets the needs of their community and is appropriate to the circumstances.

- The number of trees required to be replanted (or mitigated by payment in lieu) should correlate to the DBH of the protected tree.
  - Homewood, AL - has a simple formula in Section 8 of their Tree Conservation Ordinance.
  - Winter Springs, FL - Tree Replacement Standards use the size of the tree removed to identify the number and type of replacement trees.
  - Bloomfield, MI - tree replacement requirements in Section 7 address protected trees, landmark trees, and includes specific requirements for conifers.
  - Forsyth County, GA - uses their density calculation method to determine how many inches of diameter need to be planted.
  - Arlington, VA - Tree Replacement Guidelines use a calculation based on the International Society of Arboriculture.
  - Palo Alto, CA - canopy diameter determines replacement size as described in Section 3.20.C

- The acceptable species to replant should be based on the tree species list created by the municipality. While it may be desirable to require that a protected tree be replaced with the same species, some developments may not have suitable space for the tree when mature and payment-in-lieu may be necessary. In other cases, replacing a removed tree with the same species might not contribute to sufficient species diversity.

- Establishing a minimum diameter that is acceptable to be planted typically varies from 2.5"-3". Some municipalities reduce the minimum size to 2" for residential removals. Other municipalities may allow larger trees to be planted to reduce the overall number of trees, however, larger trees are more

difficult to establish and additional oversight and performance bonds may be necessary.

Promoting Tree Retention

It is important to emphasize that where the costs and inconvenience of protecting trees exists, many developers may choose to plant or make payment-in-lieu of planting. Having substantial incentives, as well as mitigation requirements, for retaining appropriate existing trees can contribute to finding solutions to preserve trees on-site.

Desirable tree diameter, health, species and size or groupings can be given credits against tree replacement requirements. Fayetteville, NC's UDO has an example, while other municipalities may rely on a more simplified statement, at least in the early days of their ordinance, as in this example from Grants Pass, OR: "The area of the canopy for a dominant or co-dominant tree of any species retained within a development shall be credited as double the area calculation for that species towards the overall canopy goal of the project. If the tree retained is subsequently removed from the property for any reason then the parcel or lot must have two trees of equal or greater canopy potential planted." Just remember to define any such terms in the ordinance.

Other approaches to incentives or credits that support retention of native trees or connectivity to existing green space make it more cost effective for the developer to retain trees.

- Forsyth County, GA allows any saved significant tree to be credited at 4x the unit value of Table A in Appendix B.
- Grants Pass, OR provides several types of incentives in Section 11.070.
- Fairhope, AL allows up to 7 trees to be credited for 1 preserved tree in Section 13.

More discussion of Tree Protection Ordinances in NC and incentives can be found in the NC Cooperative Extension publication: Protecting and Retaining Trees: a Guide for Municipalities and Counties in NC.

When Protected Trees Are Removed

While zoning, a UDO, or other ordinance may require canopy coverage, protected individual trees may still end up being removed since there are times where, even with careful tree mapping and site development planning, trees that fall under the defined protection of the ordinance require removal. When these situations inevitably occur, the ordinance must address the mitigation for necessary removals, such as species, number and diameter of replacement trees and fee schedule. These also must be mitigation and penalties for illegal removals established.

For specific information about on mitigation and "protected trees" refer to Guidelines for Developing and Evaluation Tree Ordinances. Specifically, Mitigating for Tree Loss

Section III. Tree Protection Standards

A. Minimum Tree Canopy Requirements

The **[insert local government name here]** desires to protect, preserve, and maintain the maximum *tree canopy* cover across all land uses in its jurisdiction. The following minimum tree coverage percentages are required within zoning lot boundaries exclusive of public rights-of-way:

Explanatory Note: This section sets out the minimum standards for tree protection by type of land use. Local governments may coordinate these standards with the specific zoning districts and land uses in the local government's zoning ordinances or adopt a jurisdiction-wide minimum tree canopy standard. Local governments should also conduct a tree canopy assessment for their jurisdiction and decide upon appropriate minimum canopy coverage percentages. Communities have two options for maintaining minimum tree canopy (discussed in more detail below):

- a minimum canopy coverage standard, or
- a tree save area that is based on tree diameter.

For communities that wish to prioritize protection of habitat and prevent forest fragmentation, local governments may wish to incorporate requirements that tree canopy and tree save areas be contiguous with existing canopy or other landscape features such as floodplains and stream buffers on site as well as on surrounding properties.

B. Tree Preservation Requirements

Regulated trees for the purposes of this section include **{***specimen trees, and trees of __ inches or more in diameter at breast height***}***.*

Explanatory Note: Identifying the characteristics of individual trees, defined as having value to the community, is necessary advised. ***See Appendix A: "Defining Regulated Trees".***

To the maximum extent practicable, *regulated trees* and *significant tree stands* **{***and associated native vegetation within the significant tree stands***}** shall be preserved and incorporated into site design.

Once a tree protection plan has been approved, no regulated tree shall be removed unless **[insert relevant local government approval agent here]** determines that there is no reasonable way the property can be otherwise developed, improved or properly maintained, and the tree itself retained.

Explanatory Note: Some examples of canopy protection approaches are included below.

Minimum Tree Canopy Percentage
The Alachua County (FL) Unified Land Development Code uses a jurisdiction-wide tree canopy protection standard of twenty (20) percent existing tree canopy on-site at the time of application for a permit. In addition, development plans must be designed such that the thirty (30) percent or more of the site will be under mature tree canopy within twenty (20) years (Alachua County, Florida, Unified Land Development Code § 406.12(a)(3)-(4)).

Minimum Tree Canopy Percentage continued
The Chapel Hill (NC) Tree Protection Ordinance coordinates its minimum tree canopy standards by land use and requires removal of non-native, invasive species (Chapel Hill, North Carolina, Land Use Management Ordinance § 5.7.2):

Land Use/District	Minimum Canopy Coverage
Multi-Family	30%
Commercial	30%
Institutional	40%
Mixed Use, Other	40%

Tree Save Areas
The City of Charlotte designates portions of commercial and residential sites as tree save and tree protection areas. For commercial development, a "minimum of fifteen (15) percent of the overall site must be preserved as a tree save area." For single-family residential development, a tree save area of ten (10) percent must be saved whenever the existing canopy is at least ten (10) percent of the site. If the site has less than ten (10) percent but more then five (5) percent tree canopy, then five (5) percent of the site must be preserved for tree save areas. Within tree save areas, no tree of two (2) inches caliper or greater can be removed or even pruned without a tree removal permit. (Charlotte, NC, City Code § 21.94 – 21.95).

C. Modifications

Explanatory Note: Local governments may wish to include a procedure for allowing modifications to the tree protection standards when other legitimate local government purposes and goals may conflict with tree canopy protection. Such circumstances may include transportation, affordable housing, stormwater management, character of the community, LEED standards, daylighting of streams, etc. As an example, the City of Charlotte allows its standards to be modified for transit station areas, designated mixed-use centers, and other similar land uses as long as replanting occurs on-site to meet the tree protection requirements, living green roofs are installed and maintained in perpetuity, or off-site mitigation or payment in lieu is undertaken (Charlotte, NC, City Code § 21.94(b)).

If a local government decides to provide for modifications, a process should be set out. The following language has been adapted from the City of Charlotte, to consider for the modification process:

{If strict compliance with the standards of this chapter conflict with existing federal or state statutory or regulatory requirements, or when planting is required by this ordinance and the site design, topography, natural vegetation, or other special considerations exist relative to the proposed development, the developer may submit a specific alternate plan for planting to the **[insert local government name here]** for consideration. This plan must meet the purposes and standards of this ordinance, but may suggest measures other than those in section III.E and section IV of this ordinance. In addition, if the developer seeks a modification of planting requirements based upon a contention that the planting required by this ordinance would pose a threat to health and safety due to a conflict with existing federal or state statutory or regulatory requirements, a modification will only be considered upon receipt of a written explanation of the alleged conflict created by the planting requirement and a copy of the statute or regulation that creates the conflict. The **[insert local government name here]** shall review the alternate proposal and advise the applicant of the disposition of the request within fifteen (15) working days of submission by the applicant.**}** (Charlotte, NC, City Code § 21.121)

D. Incentives for Increasing Area in Single-Family Residential

Incentives for increasing the *tree canopy* protection area are designed to enhance the **[insert local government name here]**'s tree canopy in residential settings, improve overall quality of life in larger residential areas, encourage open space and wooded site protection, and discourage removal of all trees on site before and during construction of single-family development. Incentives include:

> Explanatory Note: Local governments may wish to include incentives for single-family residential development that may include reduced yards, density bonuses, reduced lot sizes. These incentives are tied to lot sizes and setback requirements and thus will be different for each community. For an example of incentives, local governments may refer to the City of Charlotte's (NC) Tree Protection Ordinance (Charlotte, North Carolina, City Code § 21-94).

E. Implementation of Standards

The highest priority for all development and redevelopment projects shall be to maintain existing tree canopy. If the existing *tree canopy* is insufficient to meet the required canopy protection, planting new trees on site to reach the required percentage area is preferred. Mitigation by fee in lieu payment shall be used when providing canopy on-site is not practicable.

> Explanatory Note: Though the retention of existing trees is preferred, not every tree can, or should, always be retained. When such trees must be removed, requirements should be in place to replace the lost functions of the removed trees. Local governments should provide for mitigation measures where it is impractical or impossible to maintain the existing trees. Mitigation measures can range from on-site tactics (e.g., replanting) and off-site tactics (e.g., the use of in-lieu fees). For more information about how to choose mitigation measures to suit community needs, see the "Mitigating for tree loss" section of International Society of Arboriculture's Guidelines for Developing and Evaluating Tree Ordinances.

1. Demonstration of Compliance

Compliance with tree protection standards is demonstrated by the following:

a. Approval and implementation of a *tree protection plan* that complies with the provisions of this ordinance;
b. Approval and implementation of a planting plan prepared in accordance with the standards set out in ANSI A300 Tree Care Operations: Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance;
c. Maintenance of protected and planted trees; and
d. Tree mitigation payments as provided in section **[insert section number here]** of this ordinance.

2. Methods of Compliance

Compliance with the tree protection standards shall be accomplished by the following methods:

a. Protection of existing *tree canopy*. The extent of existing tree canopy retained at the time of permit application shall be documented by survey and evaluated by a *Certified Arborist* as to the health of the trees and their ability to provide long-term benefits.
b. Tree canopy deficit. If the existing *tree canopy* is less than the minimum standards required herein or not able to provide long-term benefits, the required minimum canopy coverage shall be established by planting new trees. The *tree canopy* deficit shall be determined by subtracting the area of retained tree canopy as shown on the *tree protection plan* from the minimum area of canopy coverage required.
c. Relocation of regulated trees. A regulated tree may be relocated in a manner to ensure survivability if there is no reasonable alternative that allows incorporation of the tree into the site design, as determined by the project's *Certified Arborist* in consultation with **[insert relevant local government official here]**. The developer and/or owner of the property shall provide all practical means (including irrigation, mulch, etc.) to ensure survival of a relocated tree. If a relocated tree does not survive within a period of two years, it shall be replaced according to the provisions of this ordinance.
d. Planting and replacement of canopy. If a regulated tree cannot be retained or relocated or if trees must be planted to make up a tree canopy deficit, the developer and/or owner of the real property shall install trees subject to the following:

Explanatory Note: Local governments should decide on replacement standards that are appropriate for their community. Standards for replacement of canopy can be done on a tree per tree basis, an inch per inch basis tied to the diameter at breast height, or a sliding scale. The City of Durham (NC) uses a sliding scale much like the one shown below (Durham, North Carolina, Unified Development Ordinance § 8.3(E)). Alachua County (FL) Unified Land Development Code uses a set diameter at breast height requirement (Alachua County, Florida, Unified Land Development Code § 406.13(b)).

i. One (1 tree per 500 square feet} for a small canopy tree, One (1) tree per 800 square feet} for a medium canopy tree, and One (1) tree per 1200 square feet} for a large canopy tree of tree canopy coverage deficit shall be planted in accordance with an approved planting plan.
ii. Trees planted to complete the canopy coverage requirements shall be planted no less than twenty (20) feet from any other proposed or existing small or medium mature canopy tree and forty (40) feet from any other proposed or existing large mature canopy tree. Tree plantings should also comply with all applicable landscape design standards regarding setbacks from curbs, fire hydrants, pavement, sidewalks, and similar infrastructure as set out in **[insert local government landscape design standards title here]**.
iii. All required plantings shown on an approved planting plan shall be prepared, installed, and maintained according to ANSI A300 Tree Care Operations: Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance **{**and a performance bond**}** must be placed with the

[insert local government name here] in order to satisfy compliance with the requirements of this ordinance.

Explanatory Note: Local governments may, at their discretion, require that developers submit a performance bond to the town manager or other appropriate local government official along with some form of surety, cash escrow, letter of credit, or other financial arrangement prior to the approval of the tree protection plan to ensure that the plan is followed as required.

iv. Replacement tree *caliper* shall be a minimum of two and one-half (2.5) inches at installation. All trees must comply with the American Standard for Nursery Stock, ANSI Z60.1–2004, published by the American Nursery and Landscape Association.

Explanatory Note: Local governments may choose to refer to their existing landscaping standards and specifications for the installation and maintenance standards for tree plantings. If local governments choose to adopt or adapt the above language, it should be fully reviewed to ensure consistency with community landscape standards.

e. Maintenance of *tree canopy*. The property owner is responsible for assuring that the site in its entirety will continue to meet minimum tree canopy coverage after issuance of a Certificate of Occupancy.

f. Mitigation by fee. If an applicant chooses not to plant replacement trees, payments shall be made to **[insert local government name here]**'s Tree Mitigation Fund.

   i. The payment amount shall be based on the average cost of the purchase, installation, and maintenance for [**insert term here**] of a replacement trees based on the tree planting standards in this ordinance or the actual cost of removing and replanting regulated trees.

   ii. The primary objective of the Tree Mitigation Fund is to use payments for the installation and maintenance of trees on public property. The **[insert name of local government here]** shall also use all such payments for the cost associated with the implementation of this ordinance, for **[local government]** sponsored tree management programs, and for the study, inventory, maintenance, or treatment of public trees requiring the services of a *Certified Arborist* or other qualified consultant.

Explanatory Note: When replacement trees need to be planted off-site due to some on-site limitations, local governments can choose to administer a replanting program of its own through the use of in-lieu fees paid by the developer or property owner, which go into a local government fund for replanting trees. For examples of payment structures, see the City of Charlotte, NC Tree Ordinance Guidelines Payment in lieu, the City of Portland, OR Citywide Tree Policy Review and Regulatory Improvement Project § 11.15.010, or the City of Folsom, CA Tree Removal Mitigation Rate Table.

Tree Protection Zones (TPZ)

Ordinances must establish the requirements and standards for Tree Protection Plans, whether within the ordinance itself or in a supporting document that is referenced within the ordinance.

However, as stated in "Tree Protection and Replacement" on page 14, "it is advised that all specifications, lists and calculations be maintained in a separate document from the ordinance itself (Tree Manual, Master Tree Plan, etc.), as evidenced by the extensive Tree Technical Manual for Palo Alto, CA." Other examples include:

- Decatur, GA, which identifies its Administrative Standards within the Tree Canopy Conservation Ordinance.
- Ventura County, CA, hosts its information on a comprehensive webpage: Tree Permits and the Tree Protection Ordinance
- Alternatively, Duluth, GA, is an example of specifications being included within the ordinance itself: Buffer, Landscape and Tree Ordinance in Sections 5.11 and 5.12 and appendices.

The benefit of having a separate document is the flexibility to update the standards or processes (such as updated Best Management Practices, improved signage requirements, fee changes, protected species or approved species for planting, etc.) without going through a formal ordinance amendment. This approach may be a less complicated update method for some municipalities.

In addition, a local government may choose to differentiate between the required plan details for a commercial or large-scale project versus a single lot infill project. In their Tree Preservation, Section 12.16.040.A.5, Folsom, CA, defines owner-occupant as "any owner residing in a constructed single-family residence" and notes exceptions to plan requirements. No matter what an ordinance requires, establishing tree protection plan standards, and monitoring subsequent compliance, is essential.

Maintaining language that allows the local government, or its representative, to use discretion for specific situations is vital, as this can help avoid requirements that, in very specific situations, may be impractical, expensive or onerous. As an example, a city with extensive in-fill development typically approved demolition before the site plans were approved, meaning no trees could be damaged or removed. Building the municipally-specified TPZ fencing was expensive and often temporary due to the general condition and maintenance history of many of the trees. With specific language, the city's urban forester could exercise discretion, allowing the temporary use of metal construction fencing, placed in the proper location around the trees, during the demolition stage. Since the sites were fenced to limit access, any additional sections required were easier to install, remove and rent for the applicant.

Specifications

The standards should state how the protected or critical root zone is determined (and mapped) and state the standards for constructing the tree protection barriers. Diagrams, examples and other requirements should be clearly defined. Documents from Georgia and California, referenced above, include standards for construction material and installation, TPZ shape, signage size and placement, and standards for other protective materials or methods. [NOTE: Despite what may be included in some cited examples, rebar and orange snow fencing, or silt fencing, are truly unsuitable TPZ fencing materials due to their flexibility and movability.]

The standards for the protection of shared ownership, and off-site trees on adjacent properties, that could be affected should be specified as well and are typically to the same standards as on-site trees. Written agreement from, and restitution to, an off-site tree owner may also be required. The Tree Conservation Ordinance for Fairfax County, VA, refers to off-site trees in Section 12: 504.1B, 506.1B and 507.2C.

Mapping

The plan must include a map of the site with the tree protection areas identified, as well as individual trees which are regulated by the ordinance. Accurate mapping is important because it:

- establishes the basis for planning, protection and mitigation;
- ensures that the site design and the tree protection zones will not conflict once the site disturbance has commenced;
- allows for clear communication and monitoring before, during and after the project, by the municipality, or its designated representative.

Accuracy is essential in mapping protected tree locations and Tree Save Areas (TSA). Where the design is complicated or tight, even an error of a few feet in a tree location or Tree Protection Zone (TPZ) can result in conflicts with the approved plan and require additional tree removal and reduce required on-site tree retention. Standards for mitigation and fines can address the loss, but it cannot restore the protected tree to the original location. Local governments may choose to include language that allows discretion in applying an escalating mitigation fee or performance bond to address situations of multiple (same site), or repeated (multiple site), mis-mapping, as well as requiring a new map submitted by the applicant, even requiring the use of an external, local government-approved, consultant. Such provisions shift the responsibility from the local government to catch every possible instance in the planning stage and places it on the developer who is responsible for submitting accurate information.

An example of an acceptable plan should also be provided.

The TPZ must have a standard method to calculate the critical root zone area to be protected. Whether the TPZ is a standard distance from the trunk of the tree, or based solely on a calculation based on trunk diameter, it must be specific, easy to communicate, and easy to apply and monitor. While the desired minimum rule-of-thumb is to protect everything within the drip-line of the tree, a diameter-based calculation is more appropriate, especially where conifers or other narrow-crowned trees are being protected. 1.25 feet per inch of diameter is a common industry standard.

- Some municipalities use 1.25 foot radius per inch of diameter, while others use 1.25 for younger, healthy trees and 1.5 for older or stressed trees – an example can be found in Preserving Trees in Construction Sites, page 7.
- Another option is to use 1.5 for new areas and 1.25 for in-fill.
- Sharing critical root zones can help limit area lost for development, since the tree's roots co-exist in the same area.
- Some municipalities consider a minimum distance from the trunk or dripline, and a calculated distance, and may prefer whichever value is larger.

More discussion of Tree Protection Ordinances in NC and incentives can be found in the NC Cooperative Extension publications: Protecting and Retaining Trees: a Guide for Municipalities and Counties in NC and Construction and Tree Protection.

Section IV. Tree Protection Plans

A. Activities Requiring a Tree Protection Plan

All applications for a development approval shall include a *tree protection plan* that complies with the standards of this ordinance. The approval of a *tree protection plan* shall require an enforceable restriction on property usage that runs with the land to ensure that future activities maintain the site consistent with the approved project plans.

Work limited to the removal of trees may require a *tree protection plan* and shall conform to the required tree replacement and mitigation standards in **{**Section III.D.2 above**}**.

Explanatory note: In addition to recognizing the importance of retaining and using native trees and shrubs, dead and deteriorating trees often provide valuable wildlife habitat. Local governments are encouraged to retain significant portions of dead trees as wildlife snags. Local governments should consider ways to reduce the threats to human life and property. Hazardous snags should be cut to a height as close to 10 feet as is deemed safe to remove the falling hazard.

For more information about wildlife considerations, see ***Appendix B "Protected Areas and Quality."***

B. Tree Protection Plan Requirements

Tree protection plans shall be developed by persons proposing to impact *tree canopy* within the **[insert local government name here]**'s zoning jurisdiction.

Tree protection plans shall be prepared by a *Certified Arborist* and shall include the following:

1. Site information

a. A location plan and boundary line survey of the property.

b. Location, extent, and calculation of the initial *tree canopy* based on tree survey data.

c. The size, location, and species of *regulated trees* and or type of *significant tree stands*.

d. Areas where trees, vegetation, and soils are to be protected and preserved and areas where trees, vegetation, and soils are to be removed or modified. This includes indicating proposed grading, utilities, and improvements as well as access, staging, and storage areas. The plan shall graphically identify each tree to be saved or removed.

e. The *critical root zones* of all existing *regulated tree* species within or overlapping the disturbed area including those trees on adjacent properties with root areas that would be impacted by construction, and the placement of tree, vegetation, and soil protection measures that will be used before, during, and after all construction activities to promote the survival and/or retention of such elements.

f. The area of the property with tree canopy coverage to be protected, if subject to the minimum tree protection standards.

g. An evaluation of the health and structural stability of trees including their ability to provide long-term benefits post construction.

h. The location of tree protection fencing required with detail of the fencing construction and a note indicating that a pre-construction meeting with **[insert relevant local government approval agency or official here (e.g., Urban Forester or other similar official)]** will be scheduled prior to commencing work on the site.

Explanatory note: Local governments may choose to develop their own guidelines and specifications. For examples of local government-specific guidelines, see the City of Santa Monica (CA)'s guidelines on Designing for Mandatory Tree Protection During Construction and City of Toronto's Tree Protection Policy and Specifications for Construction Near Trees.

2. Management plans

Management plans are for physical protection of tree canopy on, and adjacent to, the site during land disturbing activities. Management plans shall include all tree, vegetation, and soil protection measures that will be used before, during, and after all construction activities to promote the survival and/or retention of such elements.

Explanatory note: For communities that wish to prioritize habitat functions, local governments may wish to modify this language to encourage or require the retention of native tree species and the removal of invasive, non-native tree species.

C. Implementation of Physical Protection Required

1. Pre-construction conference.

Prior to commencing any activity requiring a development approval, a pre-construction conference with **[insert relevant local government approval agency or official here]** shall take place to review procedures for protection and management of all protected elements identified on the tree protection plan.

2. Tree protection procedures and guidelines.

Tree protection procedures must follow the guidelines in the current ANSI A300 Standards for Tree Care Operations, ANSI Z133 Safety Standards, industry best management practices and administrative standards developed by **[insert local government approval agency here]**.

3. On-site supervision.

{For all development activities regulated under this ordinance, a *Certified Arborist* shall be present on the development site at all times when activities that may damage or disturb soil and adjacent elements occur, such as clearing, grubbing, excavating, grading, trenching, and moving of soil; removing, installing, or

maintaining landscape elements and protection devices; or delivering, transporting, or placing construction materials and equipment on site, in the immediate vicinity of the tree protection areas.**}**

Explanatory note: Local governments should consider the type of onsite supervision that would best suit development activities in their communities. Some communities may wish to require that a Certified Arborist be onsite as suggested in the language included below. Others may find that having a training program for developers to designate their own tree protection supervisors is more workable for their community 's needs. For an example of this type of on-site supervision requirement, see the Town of Chapel Hill's Tree Protection Ordinance, which provides:

{[T]he following on-site supervision is required:

i. The applicant shall designate as Landscape Protection Supervisors one or more persons who have completed instruction in landscape protection procedures with the Town.

ii. It shall be the duty of the Landscape Protection Supervisor to ensure the protection of new or existing landscape elements, as defined in the Landscape Protection Plan. The approved Landscape Protection Supervisor shall supervise all site work to assure that development activity conforms to provisions of the approved Landscape Protection Plan. At least one identified Landscape Protection Supervisor shall be present on the development site at all times when activity that could damage or disturb soil and adjacent landscape elements occurs such as: clearing and grubbing; any excavation, grading, trenching or moving of soil; removal, installation, or maintenance of all landscape elements and landscape protection devices; or delivery, transporting, and placement of construction materials and equipment on site. (Chapel Hill, North Carolina, Land Use Management Ordinance § 5.7.3(c)(4)).**}**

4. Protective barriers.

Fences or other equally protective barriers as determined by **[insert relevant local government approval agency here]** shall be used to protect areas identified on an approved tree protection plan as to limit access to the protected area, prevent the compaction of soil and the destruction or damage of the trees. Prior to any development activity, the installation of the protective barrier shall be approved by **[insert relevant local government approval agency here]**. The protective barriers shall not be relocated or moved temporarily without the written approval of **[insert relevant local government approval agency here]** and shall remain in place until all development activity is completed and approved.

5. Restrictions within the Protected Areas.

The following activities are prohibited within the protected area inside of fences: parking of vehicles or equipment; storage of building materials, refuse, or excavated soil; use of tree trunks as a backstop, winch support, anchorage, power pole, sign post, or other similar function.

D. Enforcement

[Insert relevant local government approval agency here] shall have sites subject to this ordinance inspected **[insert frequency here]** to assure that work is conforming to the approved tree protection plan and the provisions of this ordinance.

Explanatory Note: Local governments should decide how frequently sites will be inspected based on the capacity of their officials to do so.

Section V. Administration

A. Designation of Decision-Making Entity

The **[insert relevant local government agent]** shall be designated by **[insert local government name here]** to administer and enforce this ordinance.

Explanatory Note: The person designated here will need to have the relevant expertise to carry out the provisions of this ordinance. Many communities have Urban Foresters or City Arborists who carry out these duties. It may, however, be necessary for some communities to contract out this position to another local government or to a private entity or to designate the "Director of Public Works or his/her representative".

B. Tree Advisory Commission

Explanatory Note: Tree advisory commissions are a way to involve the public in tree protection efforts and use the expertise of citizens with technical backgrounds in forestry, landscape architecture, etc. to advise local governments on their programming. Tree advisory commissions could be delegated the responsibility to develop, recommend and/or review protected tree lists and other guidance documents for a community. Tree advisory commissions can also carry out public outreach and education efforts about tree protection standards and programs.

Local governments should decide whether to include a tree advisory commission in their local program and amend the language provided here according to their needs. The functions of the commission will vary according to each local government's needs. If the local government chooses to create such a commission, the Administration section of this ordinance should be reviewed fully for opportunities to designate responsibilities to the tree advisory commission where appropriate.

Tree City USA is a program that many communities use in establishing Tree Boards: http://www.arborday.org/programs/treecityusa. In North Carolina, the NC Forest Service can assist communities seeking TCUSA status and tree board establishment: http://ncforestservice.gov/Urban/Urban_Forestry.htm

a. The **[insert relevant local government board here]** may establish a Tree Advisory Commission. This Commission may from time to time make recommendations relative to trees and tree protection to the **[insert relevant local government agency or official here]** or their authorized representative and perform other duties as designated in this ordinance.

b. The Tree Advisory Commission shall be composed of **[insert number of commissioners here]**, appointed by **[insert relevant local government agency, board, or official here]**, subject to approval by **[insert relevant local government agency, board, or official here]**. Their terms of office shall be **[insert term here]** and until their successors are appointed and qualified. The commissioners shall serve without compensation, but all necessary expenses shall be paid by **[insert relevant local government agency here]**. A majority of the commissioners shall be residents of the **[insert local government name here]** and the following characteristics or attributes may serve as guidelines in making appointments to the Tree Advisory Commission:

   i. Citizens interested in trees as a major component of **[insert local government name here]**'s physical and aesthetic environment.

   ii. Arborists, horticulturalists, landscape architects and designers, or others with a technical background in a related field. At least **[insert number here]** members of the Commission shall have such a professional background.

   iii. **{**Other desired characteristics.**}**

C. Fees

The **[insert local government name here]** shall establish permit review fees as well as policies regarding refund of fees upon withdrawal of an application, and may amend and update the fees and policies from time to time.

Explanatory note: This section gives the local governing body the authority to establish fees to cover the costs of administering a tree protection program. This model ordinance does not identify specific fee structures because local governments have different needs. Most local governments adopting tree protection ordinances incorporate the costs for administration of their tree protection programs into their development approval fees. If local governments do incorporate the costs of administration into other approval fees, this section of the ordinance may not be necessary. However, any fee schedule should include amounts for repeat site visits where site remediation or maintenance of tree protection is required. For an example of a fee schedule, see the Town of Chapel Hill's (NC) Development Review Fee schedule.

D. Penalties

Explanatory note: This model ordinance does not identify specific penalties because local governments have different needs, capacities for review and enforcement, and authority. Penalties can be assessed by civil penalties, by requiring replacement of trees according to a replacement ratio, or both. If a local government chooses to use civil penalties, the penalties can be set as a flat fine or tied to the diameter of the tree on a sliding scale. For an example of this approach, see the City of Raleigh's Unified Development Ordinance (Raleigh, North Carolina, Unified Development Ordinance § 9.1.7), which includes a flat civil penalty of $1000 but increases it by $100 for each diameter inch above three (3) inches diameter when tree stumps are present.

Section VI. Definitions

Explanatory Note: Local governments should adjust the definitions to suit the needs and purpose of their ordinance.

1. *Caliper*: The diameter measurement of a tree's trunk taken six (6) inches above the ground for trees up to and including four (4) inches caliper size, and twelve (12) inches above the ground for trees exceeding four (4) inches caliper size.

2. *Certified Arborist*: A professional tree care specialist who maintains the designation of Certified Arborist as defined and governed by the International Society of Arboriculture (ISA). For the purposes of this ordinance, a certified arborist may also refer to a professional tree care specialist who maintains the designation of consulting arborist with the American Society of Consulting Arborists (ASCA).

3. *Critical root zone*:

{A circular area surrounding a tree, of which the center is the center of the tree trunk and the radius is the distance from outside of the trunk to any point **[insert desired standard here]** feet per inch of diameter at breast height (DBH) for disturbance tolerant species, **[insert desired standard here]** feet per inch DBH for moderately disturbance tolerant species, and **[insert desired standard here]** feet per inch of DBH for disturbance intolerant species, which points constitute the circumference of the critical root zone. The critical root zone shall extend to a depth of five (5) feet below surface ground level. The **[insert relevant local government approval agency or agent here]** may expand or partially retract the critical root zone depending on the tree species and site specific situations so as to improve the chances that the trees will not be damaged during construction and to permit construction to take place.**}**

Explanatory Note: There are several ways of determining the protective root zone and communities should consider which would work best for their particular needs. For more information on designating a protective root zone, see the current ANSI A300 Standards for Tree Care Operations, ANSI Z133 Safety Standards, the City of Santa Monica (CA)'s guidelines on Designing for Mandatory Tree Protection During Construction, and City of Toronto's Tree Protection Policy and Specifications for Construction Near Trees.

4. *Development*: The division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation, or enlargement of any building or other structure or facility, or any grading, soil removal or relocation, excavation or landfill, or any use or change in the use of any building or other structure or land or extension of the use of the land.

5. *Development approval*: any of the following approvals by the local government regardless of the form of approval, that are for the development of land:

a. Any approval of an erosion and sedimentation control plan granted by a local government or the state
b. Any building permit issued under Article 9 of Chapter 143 of the General Statutes
c. Any approval by a county of sketch plans, preliminary plats, plats regarding a subdivision of land, a site specific development plan or a phased development plan, a development permit, or a building permit under Article 18 of Chapter 153A of the General Statutes.
d. Any approval by a city of sketch plans, preliminary plats, plats regarding a subdivision of land, a site specific development plan or a phased development plan, a development permit, or a building permit under Article 19 of Chapter 160A of the General Statutes.

6. *Diameter breast height (DBH)*: The diameter of a tree's trunk measured in inches at four and a half feet above ground level.

7. *Disturbance area*: the area where vegetation clearing or land manipulation takes place for the purpose of development.

8. *Drip zone*: a vertical line running directly underneath the tips of a tree's outermost branches.

9. *Plat:* A map, chart, or plan of a tract or parcel of land which is to be or which has been subdivided.

10. *Person*: Includes, without limitation, individuals, firms, partnerships, joint ventures, trusts, trustees, estates, corporations, associations, and any other similar entities.

11. *Significant tree stands*: **{**an area of contiguous mature trees greater than **[insert desired square footage here, i.e. 5000]** square feet in size where over half of the canopy is provided by trees with a diameter at breast height greater than **[insert desired DBH here]** inches.**}**

12. Tree canopy: The combined area encompassing the drip zones of all canopy trees as evidenced by a tree survey.

13. *Tree, regulated*: **{***specimen trees* and any trees ___ inches or more diameter at breast height**}**.

14. *Tree, specimen*: **{**A tree which has been determined by **[insert local government name here]** to be of notable interest or significant value because of its age, size, species, condition, rarity or special historical or ecological significance, or uniqueness and is thus designated as an important community asset.**}**

Explanatory Note: Localities should decide which species of trees to preserve in their community and adapt these definitions appropriately. Many communities choose to prioritize the protection and replanting of native species. For an example of an ordinance that depends on native species and protects significant tree stands, see the Town of Chapel Hill's Tree Protection Ordinance (Chapel Hill, North Carolina, Land Use Management Ordinance § 5.7.6).

Some local governments have decided to protect heritage trees in addition to specimen trees and tie their definitions to the NC Champion Big Trees List (see, e.g., Charlotte, North Carolina, City Code § 21). Local governments that choose to follow this model should be aware that the list is very extensive.

Local governments should develop their own lists of tree species that they would like to include as specimen trees and/or lists of tree species they would like to discourage. Please note that this list may partially dictate which tree species qualify as rare or specimen trees. Resources to assist local governments with determining the best trees for their communities are available through the NC Botanical Gardens, the NC Urban Forest Council, and the NC Forest Service.

For more explanation about developing a tree species list, see ***Appendix A "Defining Regulated Trees."***

Appendix A Defining Regulated Trees

Determining what constitutes a *protected* or *regulated* tree(s) within a Tree Protection ordinance should be determined by each community, based on the tree species, history and character of the community. Trees within a significant stand or tree save area are addressed under this ordinance. But individual trees, that stand alone or are within stands that are not protected, are also addressed as needing protection due to their perceived value or significance to the community. Typically, protected trees will be native species having a specified minimum DBH and/or other desirable characteristics.

Protection of Individual Trees

In some communities, trees which have local historical or sentimental interest may be a priority. In other communities, retaining clusters of trees may be a concern. Or, commonly, a community may determine that native trees, which generally provide greater habitat values and historical character, are protected. These approaches typically deal with trees individually, and allow a community to develop permitting for tree removals for non-development reasons. [See Background, on page 3 of this document.]

It is important to identify the local priorities and the specific species and characteristics of regulated trees for each community. It can be tempting to have a broad definition to cover all the bases, but this can have the unexpected consequence of discouraging tree protection. So take the time to define the specific species and tree characteristics desired:

Some common pitfalls to broadly defining regulated trees:

1) All Native species: While native trees should make up the bulk of protected tree species, a complete list of all native trees is long and hard to manage. And consider:
    a) Not all species are created equal: there are fast-growing and slow-growing trees, repectively they also tend to be short-lived vs long-lived and weaker-wooded vs stronger-wooded. This means that a large tree could be at the end of its lifespan and not suitable for retention or a smaller tree could have good potential for a long and valuable life post-construction.
    b) Somes trees are more common than others: not only do some trees sprout and grow easily (e.g. loblolly pine or sweetgum) but some are not commonly planted nor readily available to purchase (e.g. hickories or persimmons).
2) All trees with a diameter greater than ___: Not all species can reach the same mature size, but they may contribute desirable character or habitat. Having specific size limits addresses species differences, for example: understory trees (sourwood, redbud, dogwood) could have a minimum diameter of 12"; longleaf pine, 18"; oaks 24", loblolly pine, 30", etc.
3) Historical, champion, specimen, significant: Local, state or national tree programs allow communities to celebrate their trees. When such lists also connect to "protected or regulated trees" some residents can be reluctant to include their trees

on such a list. Having this as the main determination for protection can hurt other tree efforts. The majority of such trees can typically be covered within species and size definitions.

Therefore, it is important that the local character, value and environment be considered when creating a regulated tree list. Trees can be added to or removed from the list in the future if needed and approved. NOTE: Trees on public property and trees which are planted as requirement of development may be considered as automatically regulated, but this should be stated specifically within the ordinance also.

The following ordinances show several approaches to specifying the characteristics for protected trees (note that native trees are a priority):

- Flower Mound, TX, in Section 94-6 lists its protected species by side: small, medium and large trees
- Ventura County, CA, has a very specific list of species in their Tree Protection FAQ.
- Eustis, FL, defines protected and speciman trees, as well as noxious, or undesirable species in their Tree Ordinance.
- Chamblee, GA, has a very brief list of species but also includes some flexibility to allow for discreation by the municipality and by the developer, on page 8 of its Administrative Guidelines.

In North Carolina, communities may want to include native coniferous trees recommended by the Audubon North Carolina Bird-Friendly Communities program, if the species are present locally. These species benefit native birds and other wildlife, and would be in addition to any native hardwood species listed. Your county NC Forest Service staff would be able to assist in this and in recommending a suitable minimum diameter:

Tree Species	**Common Name**
Taxodium distichum	Bald-cypress
Pinus echinata	Shortleaf Pine
Pinus strobus	Eastern White Pine
Tsuga canadensis	Eastern Hemlock
Tsuga caroliniana	Carolina Hemlock
Pinus taeda	Loblolly Pine
Pinus palustris	Longleaf Pine
Pinus serotina (*Pinus rigida* var. *serotina*)	Pond Pine
Chamaecyparis thyoides	Atlantic White Cedar

Appendix B Protected Areas and Quality

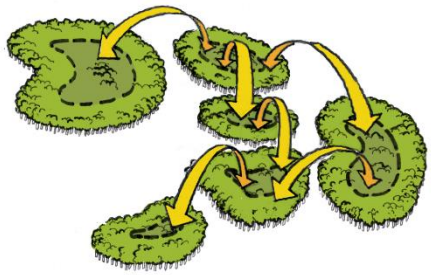
When establishing the requirements for protected areas, many local governments may wish to choose to emphasize the importance of native trees, shrubs and ground cover. Each community should determine the local importance and the priorities for protecting and managing natural areas.

For more information on determining local priorities and incorporating them into local zoning and ordinances see **Regulatory Strategies for Incorporating Green Infrastructure in North Carolina**. Specifically, Evaluating and Conserving Green Infrastructure Across the Landscape: A Practitioner's Guide, North Carolina Edition, NCFS, and the Green Growth Toolbox, NCWRC.

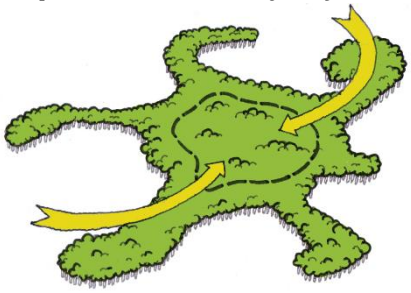
Plant Species

Given that native species support more wildlife habitat and biological diversity, protected areas can:

Provide connecting habitat between other natural areas or green space



Increase the size of a natural area or other green space when directly adjacent



Credit: Green Infrastructure Center, *www.gicinc.org*

Properly designed and managed, right-of-way buffers, greenways and other designed green space can help connect natural areas.

Minimal to no site disturbance for protected areas is essential. Natural vegetation should be retained. If small groups or individual trees are allowed to be mulched or other actions, the limitations to the disturbances should be established. The placement of sod within the critical root zone should be prohibited.

If invasive non-native species are present, control of the invasive species and the re-establishment of the native species may be necessary. For example, the Tree Conservation Ordinance for Fairfax County, VA, not only describes the desired stand characteristics but specifically requires the management of non-native species, 12-0404.1A, 12-0404.2B and 12-0404.2C and requires it to be addressed in the plan, 12-0509.3D. The ordinance also

provide incentives using increases credit for retained trees, based on specified benefits such as wildlife, 12-0510.3B(1)(b).

Local governments can do the same, or even work with adjacent communities, to develop a common set of priorities or prioritized areas that work across their local landscape, as in the example below.

Credit: Green Infrastructure Center, *www.gicinc.org*

Wildlife Species

Protecting rare or endangered species, flora or fauna, may at first seem challenging when developing the landscape. However, where natural areas are already required and incentivized, within a Tree Protection Ordinance, UDO or other zoning, rare or endangered species are simply part of the planning process since they typically exist in the natural areas and can help developers meet environmental permit requirements. Wetlands, riparian areas and forested lands have both trees and other vegetation and wildlife. And these are the areas that also provide the character and quality of life within a community. So, while rare or endangered species may seem like an additional limiting factor in site planning, they really increase the value and impact of protected areas, with the environment and habitat that benefits the greatest number of inhabitants, whether human, faunal or floral. The NCWRC's Green Growth Toolbox also provides information on integrating priority wildlife conservation into land use planning.

Retention of, and landscaping with, native plants is extremely important for native wildlife, especially for birds. Neighborhoods dominated by native plants have 40% more bird species than those dominated by non-native plants. In fact, many native bird species (96%) depend on native trees to provide beneficial insect prey to their young. Non-native trees provide virtually no insect food for native birds, while native trees support hundreds of species of beneficial insects

For more on the benefits of native plants visit the Going Native website developed by NCSU Cooperative Extension Service funded by the NC Forest Service Urban & Community Forestry Program.

For a list of NC native trees and shrubs and their characteristics see the Guide to Bird-Friendly Native Plants by NC Audubon, also funded by NCFS U&CF Program.

In North Carolina, planting with native species within a developed area provides a wide species selection, but an acceptable species list and tree condition should be specified, preferably within supporting management documentation, or within the ordinance if necessary. Many local governments specify the undesirable species as well, which tend to be faster growing and less expensive species commonly available from many tree nurseries, but which also tend to cause higher management and maintenance costs to the community over the long-term. [This is also one of the reasons that performance bonds should be substantial enough to discourage incorrect species selection or unacceptable condition from being installed in the landscape, particularly if it is necessary to mitigate such issues.]

Tree Snags and Downed-Logs are Habitat

Trees are not just habitat when they are alive, but also when they are dead. Many species of wildlife actually depend on dead standing or downed trees for insect food, for storing food and for cover, breeding habitat, and nesting cavities. However, in many cases standing dead trees can present a risk of failure that could injure or damage people of property, and are rightly removed. In the midst of low trafficked natural areas, however, dead trees (or a part of dead tree, called a snag) may be able to be retained (Snags and Downed Logs). Even the base of a snag can provide habitat benefits and, as such, retaining snags and cutting hazardous snags at a safe height as close to 10 feet as possible, should be considered.

The retention of snags is not a common occurrence in many communities, although they are addressed in many ordinances in the Pacific Northwest. But Fairfax County, VA includes clause 12-0403.6: "*Leaving Dead Trunks for Wildlife Benefits*. The main trunks of dead trees may be allowed to remain on sites where the Director determines that a "trunk snag" may provide habitat or other wildlife benefits and have little or no potential to cause personal injury or property damage, or to obstruct streams or other drainage." This allows discretion on the part of the municipality to make determinations where appropriate. By addressing mapping and monitoring, in the ordinance or specifications, the risk of failure can be mitigated.