

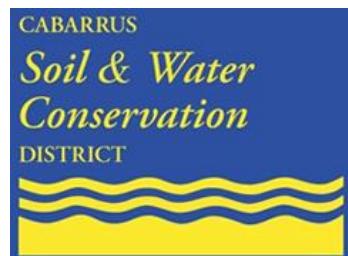
**Cabarrus County**

**Natural Resources Conservation Design Guide**

*A guide for local governments to encourage context sensitive development that conserves valuable natural resources in Cabarrus County.*

Created by the Cabarrus Soil and Water Conservation District with support from  
the North Carolina Wildlife Resources Commission  
Partners for Green Growth Program

A product of the  
Green Growth Toolbox





Schweinitz's Sunflower

*Helianthus schweinitzii*

Photo: Laura Robinson

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## Introduction

Cabarrus County has experienced rapid residential growth during the past few years. Potential for sustained growth have led to concerns about direct and cumulative impacts of development on the natural resources of Cabarrus County and the greater Metrolina Region. Habitat fragmentation, water quality issues due to increased storm water runoff and encroachment on agricultural operations are primary concerns as urban growth continues. One major concern is water quality. 150 miles of monitored stream miles in the county are considered impaired. Non-point source pollution from stormwater run-off is a principal contributor to impairment. In the 2016 Community Survey opinion poll conducted by Cabarrus County, residents listed ‘water quality and the environment,’ ‘pace of growth,’ and ‘open space’ among their top ten concerns that they want local officials to address. Poll respondents also ranked ‘protection of water quality and the environment’ and ‘pace of growth’ second and fourth, respectively, among aspects of living in Cabarrus County that should be priorities for investment to raise the County’s overall satisfaction rating.<sup>1</sup> Recent efforts by many jurisdictions to encourage growth in and near town centers and in walkable, mixed use communities is a positive trend towards protecting open space and the environment, however a large percentage of residential growth is still occurring on the urban/rural fringe. The design of these developments is of great importance and will determine future impacts.

In response to these challenges, the Cabarrus Soil & Water Conservation District (CSWCD) sought a grant from the North Carolina Wildlife Resources Commission (NCWRC) to move forward with an effort to create a Natural Resources Conservation Design Guide (NR-CDG). The purpose of the NR-CDG is to provide local governments a tool to facilitate context sensitive residential development that conserves valued natural resources in Cabarrus County. Model ordinance language was developed through adaption of the Model Natural Resources Conservation Ordinance, developed through a partnership between the NCWRC and the Nicholas Institute for Environmental Policy Solutions at Duke University. Utilizing the model language in this document as a guide, local governments can amend current zoning regulations (as well as subdivision and other land development regulations). More importantly, by using the same model language as guidance, the County and municipalities are more likely to adopt a common set of standards. When applied consistently, these standards can effectively conserve natural resources across jurisdictional lines, the political boundaries that natural systems do not acknowledge.

This document was developed by the Cabarrus Soil & Water Conservation District with funding from the NC Wildlife Resources Commission’s Partners for Green Growth cost-share program. The Cabarrus Soil and Water Conservation District encourages the informed and responsible stewardship of the land and all of its natural resources. Customized local programs assist and educate landowners, land users, responsible institutions, students, and various groups in the community with understanding, planning, application, and maintenance of sound conservation and land use practices. This effort is a continuation of the CSWCD’s history of providing technical assistance to local governments and private landowners to conserve natural resources, reduce erosion, and protect water quality. Two consultant firms, LandDesign and Nealon Planning, also assisted with this planning effort.

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<sup>1</sup> Cabarrus Soil and Water Conservation District

The planning process that led to the development of the NR-CDG included a review of existing local plans and ordinances. This review was meant to develop an understanding of current efforts to protect natural resources through policies and regulations. Some of the more effective policies and regulations in place have informed the creation of the NR-CDG.

The process also included meetings with local government representatives and natural resource agencies stakeholders. Meetings were conducted to identify priority natural resources and to help develop recommendations for a Model Overlay District. A list of stakeholders that participated in this process is provided in Appendix A. Their input at meetings was reinforced by their responses to a short survey, the results of which are provided in Appendix B. A map of the natural resource priorities is provided in the Natural Resource Priorities section of this document, and it serves as resource tool to be utilized by local governments as well as developers as a starting point in delineating open space to be set aside in future development.

## Study Area & Development Trends

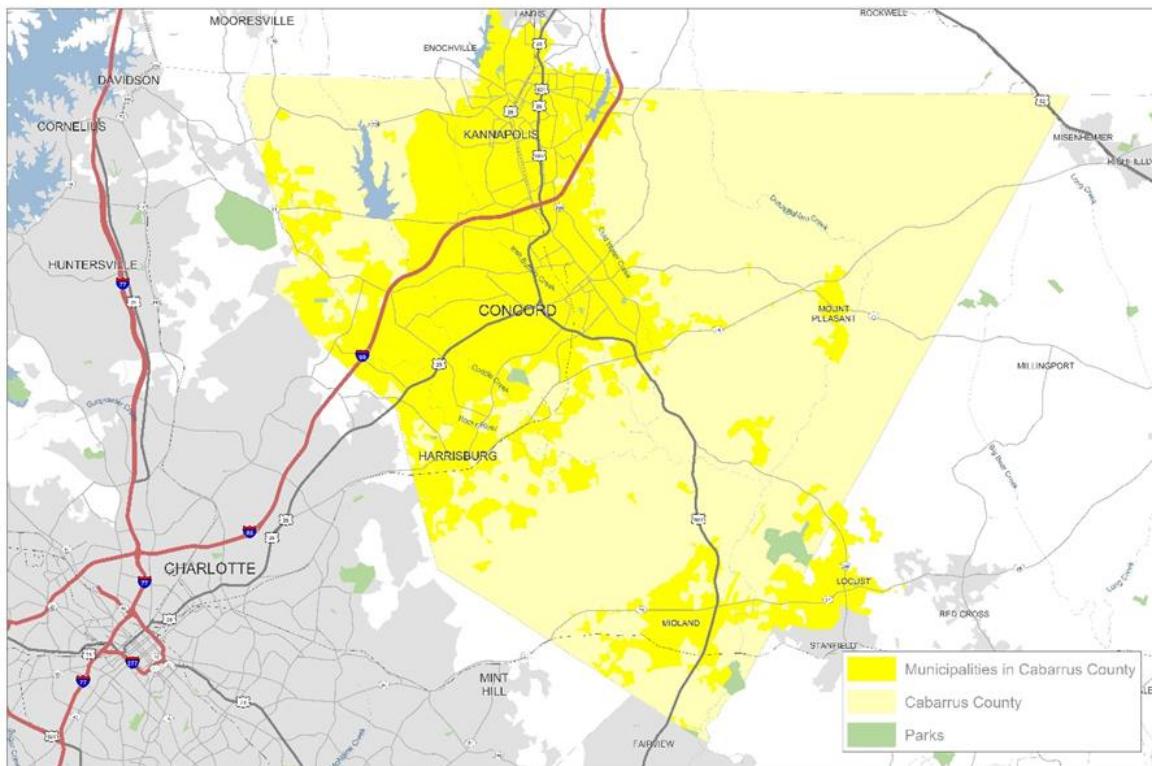


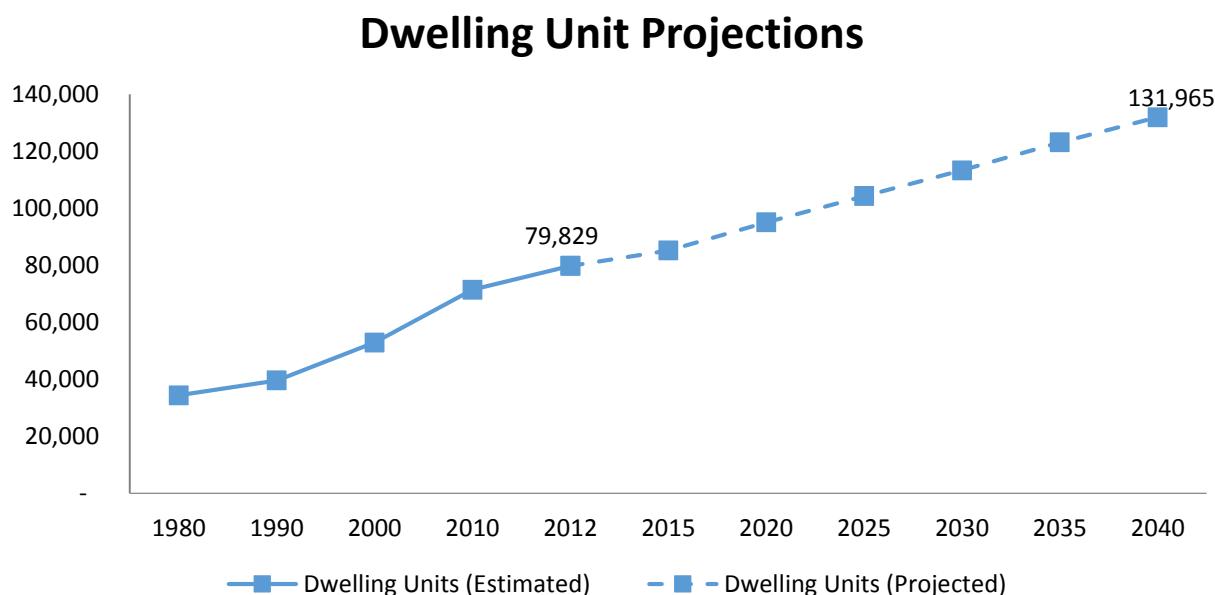
Figure 1: Study Area Map

Cabarrus County is located northeast of Charlotte and Mecklenburg County and is bisected by I-85, US 29, US 601, NC 49, and NC 24-27. Six municipalities are located in the county. These include Concord, Kannapolis, Harrisburg, Midland, Mount Pleasant and Locust. It is the 12<sup>th</sup> largest county in North Carolina with a population of 191,060 people<sup>2</sup>. Cabarrus County's proximity to Uptown Charlotte, high quality of life, and relatively low cost of living has led it to become the 11<sup>th</sup> fastest growing county

<sup>2</sup> NC Office of State Budget and Management 2014 Estimates Figure Error! Main Document Only.: Study Area Map

in North Carolina. Between 2010 and 2014 the county grew by 12,878 people (growth rate of 7.2%)<sup>2</sup>. Studies indicate that growth trends are likely to continue. The county is projected to grow by 65% between 2012 and 2040<sup>3</sup>. This could mean demand for as many as 32,000 new housing units.

Figure 2: Projected Growth



### Natural Resource Priorities

Cabarrus County is located in the Piedmont of North Carolina and primarily drains to the Rocky River, which runs from the northwest to the southeast of the county on its way to the Pee Dee River. Terrain ranges from flat to rather steep. The steepest slopes are located in the northwest and central parts of the county along the Rocky River, along the riparian slopes of Cold Water Creek east of Concord and Kannapolis, and on the ridges in the eastern part of the county along Dutch Buffalo Creek. The majority of the county has been disturbed in some way through farming, logging, grazing, mining and urban growth. Despite over two hundred years of anthropogenic change, vestiges of Cabarrus County's natural heritage remain intact.

At project initiation the full range of natural resources were mapped and presented to the stakeholders. These included the 28 Natural Heritage Natural Areas located in the county (See Appendix C for Map and Table) and the following resources:

- **Natural Heritage Natural Areas:** A site (terrestrial and aquatic) of special biodiversity significance due to the presence of rare species, unique natural communities, important animal assemblages, or other ecological features (data from the North Carolina Natural Heritage Program).
- **Natural Heritage Element Occurrences:** Known locations of rare plants, animals, natural communities, and animal assemblages (data from the North Carolina Natural Heritage Program).

<sup>2</sup> WSACC Water and Sewer Master Plan

- **Steep Slopes:** Areas that are highly susceptible to erosion, land slippage, and subsidence if disturbed. Such disturbance can harm water quality (areas with greater than 15% slope were derived from 2 ft. contours provided by Cabarrus County).
- **Heron Colonies:** A place where herons gather together over many generations for nesting and raising young (dataset provided by NCWRC).
- **Managed Areas:** Properties and easements where conservation of biodiversity and ecosystem function are among the goals of the land management programs (data from the North Carolina Natural Heritage Program).
- **High Quality Fish Habitat:** Dutch Buffalo Creek is noted for its exceptional water quality and high quality fish habitat (dataset provided by NCWRC).
- **Floodplain:** An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding (data provided by the Federal Emergency Management Agency).
- **High Quality Waters and Outstanding Resource Waters:** Surface waters that are rated excellent based on biological and physical/chemical characteristics through Division of Energy, Mineral and Land Resources monitoring or special studies (data from NCDEQ).
- **Forest Cover:** Areas of forest cover derived from 2015 USDA CropScape data.
- **Native Forests Over 50 Acres:** Areas of native forests over 50 acres in size (dataset provided by NCWRC).
- **Biodiversity and Wildlife Habitat Assessment:** a GIS-based analysis that shows the state's conservation priorities for aquatic and terrestrial species and habitats, and landscape connectivity (data from the North Carolina Natural Heritage Program Conservation Planning Tool).

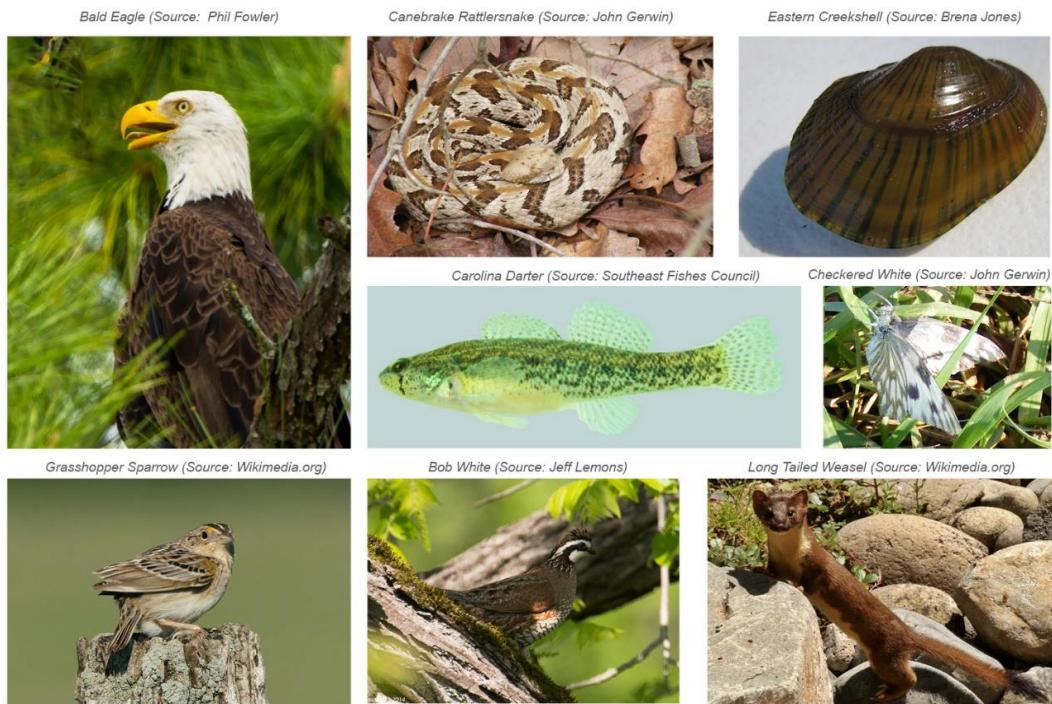
Input was gathered at the first meeting regarding natural resource priorities. This information combined with the responses to a survey the stakeholders were asked to complete prior to the second meeting was used to prioritize areas for conservation. These Primary and Secondary Conservation Areas are identified in Figure 12. Methodology used for mapping these resources is included in Figure 13. Note that Primary and Secondary Conservation Areas are explained in more detail in the NR-CDG in Section 4 and also include priority natural communities that may not be mapped.

## [Cabarrus County's Wildlife](#)

### *Aquatic Species*

Many plant and wildlife species have very specific habitat requirements, and when those habitats become destroyed or degraded, the populations of these species begins to decline. In Cabarrus County, there are two aquatic species, Carolina Darter and Carolina Creekshell, that are considered 'Federal Species of Concern (FSC)' by the US Fish and Wildlife Service; this means that if these populations continue to decline across the nation they could be listed as 'threatened' or 'endangered' by the federal government. In addition to these FSC, there are an additional eight other freshwater species that are considered rare, threatened, or endangered at the state level. These species have documented population declines in NC, but they may be doing ok in other states, so they are not a concern at the federal level. For a full list of species of conservation concern, see Appendix C.

Freshwater mussels, like the Carolina Creekshell, are important indicators of stream health. Increased development and urbanization, and poorly managed agriculture practices have impacted aquatic systems with point and nonpoint source inputs. Impoundments on major rivers and tributaries, such as dams on the Pee Dee River such as Blewett Falls Lake and smaller dams for local water supply, such as Coddle Creek Reservoir drastically alter the hydrologic regime of many North Carolina waterways and



*Figure 3: Rare Species in Cabarrus County (Sources: Phil Fowler, John Gerwin, Brenna Jones, Southeast Fishes Council, Jeff Lemons, Wikimedia.org)*

result in habitat fragmentation, blockage of fish migration routes, and physical habitat alterations. Nonpoint source pollution and the effects of dams and impoundments are the leading historic and current threats to freshwater fish, crayfish, and mollusks.<sup>4</sup>

#### *Terrestrial Species*

Fortunately, there are no terrestrial wildlife species in Cabarrus County that are on the watch list of the federal government, however, there are species that are known to be rare and/or of conservation concern in North Carolina. Three bird species of conservation concern, loggerhead shrike, grasshopper sparrow, and willow flycatcher, are species that rely on early successional habitat (this includes grasslands and shrublands). This habitat was once associated primarily with openings created by natural disturbances such as storms, floods, or fire. Since this open habitat relies on disturbance in order to be maintained, early successional communities are characteristically transient, constantly emerging across the landscape. In the Piedmont, early successional habitats are often found associated with agricultural or forestry activities and can contain a diverse assemblage of plants. Many rare plants found in Cabarrus County are associated with the Piedmont Prairies; Suther Prairie, owned by the Cabarrus SWCD, is a good example of this habitat type. Unfortunately, suppression of wildfires and lack of controlled burning

<sup>4</sup> NC Wildlife Resources Commission. 2015. NC Wildlife Action Plan.

eliminates an important source of early successional habitat creation and maintenance within many forested habitats. Fallow or unmowed areas are seen by many as “messy” and “weedy,” and an indicator of a lack of caring or effort by a landowner. This widespread public perception is partially responsible for early successional habitats being reduced in habitat quality or eliminated. Early successional cover in powerline rights-of-way and roadsides is often adversely affected by too frequent mowing. Reduced frequency of mowing and other habitat management practices can allow these areas to provide important pollinator habitat and wildlife habitat.<sup>5</sup>

There are also reptile species occurring in Cabarrus County, such as the timber rattlesnake and the northern scarlet snake, that are considered rare and are of conservation concern. Both of these snakes are associated with mixed pine and hardwood forests, which were once the most common natural community type in the Piedmont ecoregion, occurring over most of the uplands. Many of the problems impacting oak and mixed hardwood/pine forests, including fire suppression and even-aged forest management, result in a loss of habitat complexity and associated wildlife niches.<sup>6</sup> Some native forest stands are being replaced by even-aged pine plantations, resulting in decreased habitat value for forest species, like northern scarlet snake, timber rattlesnake, and the long-tailed weasel. Some communities have adopted guidelines to prevent clear-cutting of tracts ahead of major development, in order to protect the tree canopy and maintain more complex forest structure.

For a complete list of species of conservation concern and their associated habitats, see Appendix C.

#### [Priority Natural Communities<sup>7</sup>](#)

Rare and threatened plant and animal species rely on specific habitat types for their survival. Protection of the natural communities will help ensure the long-term conservation of the many plant and animal species that rely on them. The following is a list of natural communities in Cabarrus County that are noted as priorities for conservation in the NC Wildlife Action Plan (<http://www.ncwildlife.org/plan>). The Natural Heritage Inventory titled, “An Inventory of the Significant Natural Areas of Cabarrus County, North Carolina (2002) was also consulted to identify specific habitat types present in the study area.

#### [Floodplains | Priority Level: High](#)

Floodplains are forested communities associated with freshwater systems of various conditions and sizes. In large floodplains, the forest canopy contains a good mixture of bottomland and moisture tolerant plant species. In small floodplains, the relief and size of the fluvial landforms (levees, sloughs, and ridges) that differentiate the communities in large floodplains become smaller. Specific Inland Floodplain natural communities that are described in the Cabarrus County NHI include Piedmont Alluvial Forest, Piedmont Bottomland Forest, and Piedmont Levee Forest.

#### [Upland Pools & Depressions | Priority Level: High](#)

Small, isolated wetlands, such as upland pools and depressions, are important areas of diversity for plants and animals, especially specialized amphibians that require these habitats for breeding. Typically, they include shallow depressions which hold water in wetter parts of the year. Many are ephemeral, drying during some part of the year (often in summer), but are flooded long enough into the

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<sup>5</sup> NC Wildlife Resources Commission. 2015. NC Wildlife Action Plan.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

growing season to contain wetland vegetation that contrasts with the surrounding uplands. The Cabarrus County NHI describes this habitat type as the Upland Depression Swamp Forest. Three larger examples of this habitat type are mentioned in the NHI, although many smaller examples exist in the county.

#### *Upland Seepages | Priority Level: High*

Upland seepages are wetlands that occur on sloping uplands. They are generally fairly small and contrast sharply with adjacent communities. They are fed by groundwater seepage and their soils are saturated for much of the year, but they are seldom, if ever, flooded. This Natural Community is described in the Cabarrus County NHI as a Low Elevation Seep.

#### *Early Successional Communities | Priority Level: Medium*

Early successional uplands are dominated by herbaceous vegetation and/or shrub cover because most trees have been removed, either through natural means or by human activity. This natural community includes disturbed roadsides and old fallow farm fields. These habitats provide food and cover for wildlife but need to be maintained by mowing, grazing, or burning to be conserved.

#### *Low Elevation Flatrocks, Cliffs & Rock Outcrops | Priority Level: High*

This includes natural communities that are too rocky to support a closed tree canopy. Rock outcrops typically are very dry, but seepage zones are often present and may support wetland vegetation. The Granitic Flatrock natural community noted in the NHI is a very special habitat that is home to over 15 endemic plant species.

#### *Oak & Mixed Hardwood/Pine Forests | Priority Level: Medium*

Oak and mixed hardwood/pine forests were once the most common natural community type in the Piedmont ecoregion, occurring over most of the uplands. Specific Oak & Mixed Hardwood/Pine Forest habitat types mentioned in the NHI include the Basic Oak-Hickory Forest, Dry Oak-Hickory Forest, Dry-Mesic Oak-Hickory Forest, Mesic Mixed Hardwood Forest, Piedmont Monadnock Forest, and Xeric Hardpan Forest.

#### *Headwaters/Small Creek Communities | Priority Level: High*

The headwater stream and small creek community includes intermittent and ephemeral streams and make up the largest proportion of drainage reaches in the landscape. Headwater streams are very important as they influence water quality and quantity.

#### *Rivers | Priority Level: High*

Biodiversity increases significantly in rivers; larger and more diverse fish and mussel assemblages are found as compared to headwater streams. They may have fragmented habitats due to dams and other similar structures.

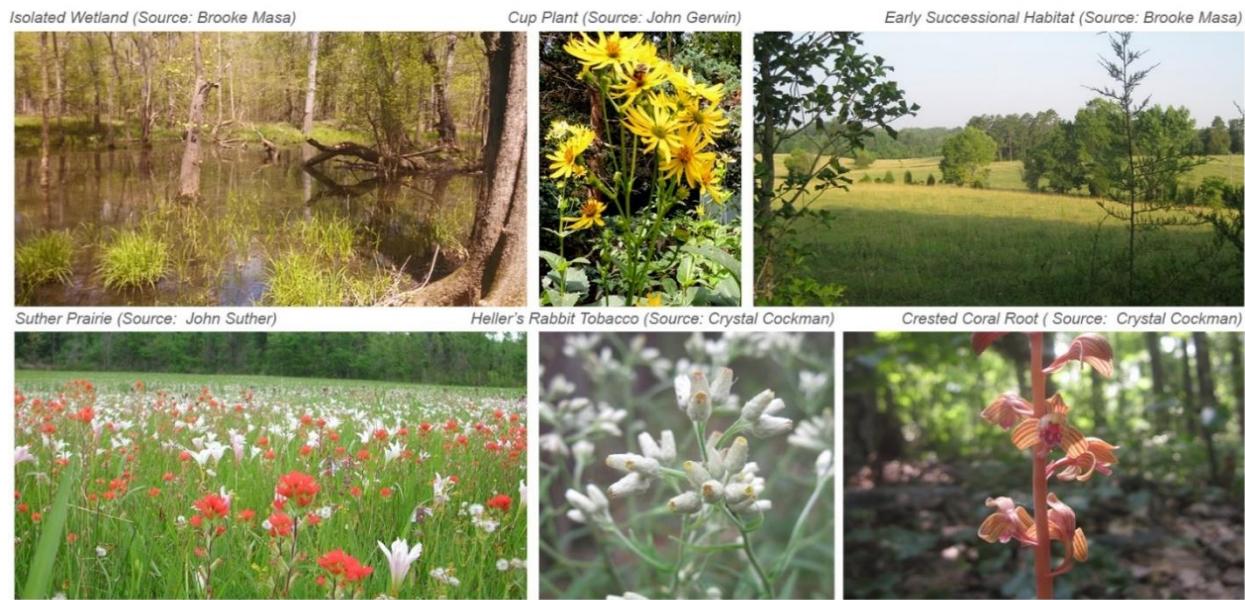


Figure 4: Rare Flora and Habitats (Sources: NCWRC, Crystal Cockman, John Suther)

## General Conservation Recommendations

The Policy Framework and Conservation Design Guidance in the following sections builds on information in the Green Growth Toolbox (<http://www.ncwildlife.org/greengrowth>) by providing guidance on how local communities in Cabarrus County can best conserve natural resources. Regardless if the recommendations in the Conservation Design Guide are adopted in full or in-part, local governments should follow the steps below to “green” their ordinances and regulations:

- **Protect natural areas** that provide important multiple benefits, such as clean water, wildlife habitat, areas for passive recreation, farmlands, and scenic views. Protection methods include: conservation easements, fee simple acquisition for natural area parks, development design, incentives and ordinances that limit development in sensitive areas.
- **Buffer natural areas** from human impacts, including housing developments. Buffer protected lands by encouraging properties near to protected lands be continued to be used as farms, timberlands, or conservation design developments.
- **Prioritize open space types.** Designating Primary and Secondary Conservation Areas (see Section 4) and Figure 12) and/or conducting small area planning efforts that focus on prioritizing systems of connected open space can create a “greenprint” for future development.
- **Zoning:** Zone areas with the most important habitats and wildlife corridors for agricultural uses and very low overall densities. Establishing a low base density around protected lands provides more incentive to do conservation design development when a density bonus is provided.

*Establishing a low base density around protected lands provides more incentive to do conservation design development when a density bonus is provided.*



**Wild Blue Indigo**

*Baptisia australis*

Photo: Crystal Cockman

## Policy Framework

The Policy Framework was developed based on input from local government and natural resource agency stakeholders. Input included a survey that lead to the establishment of goals and objectives that make up the Framework. The Framework was meant to guide the creation of the Cabarrus County Natural Resources Conservation Design Guide (NR-CDG) and customize an approach that would address the most pressing issues in Cabarrus County.

### 1. Conserve valued natural resources (prioritized)

- OBJ: Emphasize importance of water / water quality
- OBJ: Conserve habitats (aquatic and terrestrial resources)
- *Note: to a lesser extent, the following were also named: greenway connections, open space, farmland, floodplains, slopes, air*

### 2. Minimize threats, including:

- OBJ: Address residential growth and related development activities
  - Developed area (result: fragmentation, agriculture loss, open space loss, utilization of floodplain)
  - Mass grading (result: forest loss, erosion)
  - Soil and erosion control and impervious area (result: stormwater run-off)
- OBJ: Address invasive species / promote native plant species (i.e., pollinator habitat)

Remove all invasive species from list of landscaping plants. Encourage the use of native plants.

### 3. Facilitate conservation by private sector (encourage, incentivize)

- OBJ: Successful implementation – make this an easy choice (this should not be harder or more expensive than conventional)

### 4. Align regulations across jurisdictional boundaries

- OBJ: Consistency (for ease of administration and adherence to standards)
- OBJ: Ensure effectiveness (natural systems are “blind” to boundaries)

### 5. Mitigate impacts (real and perceived)

- OBJ: Minimize economic impacts or deterrents to development (highest and best use of land/return on investment, property values, attracting private investment)
- OBJ: Ensure results are better than or equal to conventional development in terms of
  - Cost to provide infrastructure and services
  - Environmental quality
  - Aesthetics / community character
  - Traffic (Depending on incentives used)

### 6. Raise awareness / appreciation

- OBJ: Raise awareness of resources and needs



**Rock Outcrop**

# Conservation Design Guidance

## Overview

The model language that follows is a guide for local communities that desire to preserve the most valuable natural resources while accommodating growth and development. This document includes guidance for local governments to establish a new regulatory framework for conservation design in residential development. The language provided is most appropriate for a zoning ordinance, however, it may be utilized to inform decisions about local development standards. The ordinance language is meant to be customized based on the needs of individual jurisdictions. Explanatory notes are provided to give context to recommendations and ordinance language.

In general, the recommendation is that local governments in Cabarrus County should provide a mechanism with incentives to concentrate development on portions of parcels while preserving large portions of the property as open space that protects natural resources while providing an amenity to residents. Local ordinances or subdivision regulations should include a Conservation Design option that is completely voluntary, but attractive due to the flexibility provided. Ideally a variant of this ordinance would be adopted (or existing ordinances would be modified to accomplish similar goals) in each jurisdiction in Cabarrus County. This would provide a framework for preserving large, landscape level habitat connections and priority open space types, while simultaneously preserving property rights and allowing well designed growth.

*Local governments should provide a mechanism with incentives to concentrate development on portions of parcels while preserving large portions of the property for natural resources, especially in the rural areas.*

The focus of the recommendations set forth in this document is the preservation of high quality natural resources on the urban-rural fringe. As identified in Appendix D: Conservation Design Target Areas, the standards are not meant to be applied in developed areas, unless high priority natural resources are present, such as streams and wetlands. Following this guideline will help communities achieve a more centralized growth pattern and preserve quality natural areas where they remain.

## Use of this Document

Local ordinances vary in structure, but in general, the Model Ordinance Language is provided as guidance for Cabarrus County and its municipalities choosing to encourage better conservation and management of valued natural resources of the county while permitting development of new residential

neighborhoods. Model ordinance language was developed by tailoring the Model Natural Resources Conservation Ordinance, developed through a partnership between the NCWRC and the Nicholas Institute for Environmental Policy Solutions at Duke University, to the needs of Cabarrus County identified through the stakeholder process. The Model is written with the assumption that most local governments will adopt an overlay district, which will be incorporated into

*NCWRC biologists are available, at no cost, to assist communities in developing conservation-friendly plans, policies, and ordinances.*

*For more information, see: [ncwildlife.org/greengrowth](http://ncwildlife.org/greengrowth)*

the Zoning Ordinance and delineated in the corresponding Official Zoning Map. However, the objectives of the district can be accomplished through four types of regulations, as follows:

- **Zoning Ordinance** – A local government considering an amendment of the zoning ordinance to include a Natural Resource Conservation Overlay District should examine the content of this Model and, as part of a public process, determine whether the language provided herein could be incorporated as presented or would need to be customized to support the goals and policies of the jurisdiction.
- **Subdivision Regulations** – The standards set forth in this Model may be used, instead, as a guide to establish a Conservation Design Option in the subdivision regulations if the local government intends to allow this option by right in all residential districts or any subdivision.
- **Unified Development Ordinance** - In a Unified Development Ordinance (UDO), or comparable set of combined regulations, the components of this Model may be separated and inserted into the appropriate section of the ordinance. Just as a local government might customize this text prior to amending the Zoning Ordinance, a local government considering an amendment to a UDO should determine whether customization of one or more provisions is appropriate.
- **Natural Resource Conservation Ordinance** – A local government may choose to adopt a stand-alone ordinance. While customizing this Model language for use in such an ordinance, consideration of its relationship to—and potential conflicts with—other ordinances, such as a local tree protection ordinance, is encouraged.

## Model Ordinance Language

### 1) Purpose and Intent

The purpose of the Natural Resource Conservation Overlay District is to conserve and maintain significant natural resources and the ecological connections between them while accommodating new residential development. This aim can be achieved through adopting voluntary requirements that are incentivized with a density bonus and the reduction of time taken for development approvals. It is the intent of this district to achieve the following local objectives:

- Protect and improve water quality
- Maintain the natural storage capacity of floodplains
- Protect wetlands
- Conserve habitats (aquatic and terrestrial)
- Maintain indigenous vegetation and tree canopy
- Reduce soil erosion issues associated with stormwater runoff, particularly on steep slopes
- Preserve agricultural lands

Explanatory Note: As mentioned above, an overlay district is one option for encouraging conservation design. If an overlay district is adopted, then each jurisdiction should develop a purpose and intent statement that acknowledges local policy. Other text examples of findings of fact and purpose statements can be found in the N.C. Model Natural Resources Conservation Ordinance at:  
[http://www.ncwildlife.org/Portals/0/Conserving/documents/GGT/A%20Model%20Natural%20Resources%20Conservation%20Ordinance%20for%20North%20Carolina%20Communities\\_7.2015.pdf](http://www.ncwildlife.org/Portals/0/Conserving/documents/GGT/A%20Model%20Natural%20Resources%20Conservation%20Ordinance%20for%20North%20Carolina%20Communities_7.2015.pdf)

For a stand-alone ordinance, the same resource material should be reviewed for guidance regarding language for Title, Authority, and Effective Date sections.

## 2) Applicability

- a) The NR-CDG applies to the area delineated on the Official Zoning Map as the “Natural Resource Conservation District Overlay District.” For properties within this district that are also zoned for single family detached residential uses, development of residential subdivisions in accordance with the standards set forth herein is permitted by right for any project site that is 25 acres or more and will have public water and sewer service provided to all homes within the development.

Explanatory Notes: There are many options for applicability that should be determined at the local level. The Conservation Design Target Area Map provided in Appendix D: depicts priority resource conservation areas identified during the planning process. It should be used as a resource map, as each jurisdiction will need to confirm areas for inclusion in an overlay district, or create an alternative, prior to amending their Official Zoning Map. Some jurisdictions may elect to allow a Conservation Design Option on smaller parcels if they meet certain criteria.

## 3) Review and Approval

- a) Subject to subdivision review and approval process (varies by jurisdiction)

Explanatory Note: It is assumed that development review is typically conducted by a technical review committee that includes staff and/or members of an appointed board. An attempt should be made to involve local environmental experts, committees or agency representatives where appropriate. This should be balanced with the need for a simple process for the benefit of applicants and staff resources.

- b) Submission Requirements

**Site Analysis Map:** In addition to other plans required for subdivision review and approval, each applicant shall be required to submit a Site Analysis Map. Potential open space areas should be identified on the Site Analysis Map.

- c) **Delineation of Open Space:** See Section 4) for qualifying open space. Applicants shall use the following methods to delineate potential conservation areas on the Site Analysis Map:

- Available GIS data provided by the County, a municipality within the County, or by reputable state sources, and approved for the purpose of delineating qualifying open space may be used. Conservation Areas delineated using approved GIS data shall be field verified by a qualified professional licensed in North Carolina (i.e., Professional Engineer, Landscape Architect, or Biologist) prior to approval of final plat.
- Applicant may choose to delineate site features that qualify as open space. Site features for which no approved GIS data is available but are identified as qualifying open space and included in the Conservation Areas delineated on the Site Analysis Map shall be field verified by a qualified professional licensed in North Carolina (i.e., Professional Engineer, Landscape Architect, or Biologist) and included on a survey prepared by a Professional Surveyor licensed in North Carolina. Such survey shall be submitted with the Site Analysis Map.

Use the **Natural Heritage Data Explorer** (<https://ncnhde.natureserve.org/>) to identify important natural areas. Require the use of the conservation data in initial site plans so that development can be arranged to prevent impacts in the early planning stages.

**Explanatory Note:** The process of delineating Open Space should be as easy as possible for applicants. The above language allows applicants to utilize available data, ideally provided by the County or jurisdiction. For some features, site delineation is essential, however, unless a field survey is required by existing local, state or federal regulations (i.e., for endangered species) it should be optional.

#### 4) Open Space Required

- a) Applicants seeking approval under the Conservation Design Option of the NR-CDG as specified herein, at least forty (40%) percent of the total land area of the property should be set aside as protected Open Space.

**Explanatory Note:** Each jurisdiction may determine minimum percentage based on lot size (i.e. sliding scale).

- b) Open Space shall be comprised of one or more of three types of land: Primary Conservation Areas (PCA), Secondary Conservation Areas (SCA), or Tertiary Conservation Areas (TCA). The applicant may choose which types of features and the total area of each to be counted toward meeting this requirement. In delineating the 40%, applicant shall first delineate lands that are one or more of the PCA types. If all such PCA lands do not constitute 40% of the project site, lands that consist of one or more of the SCA types shall be delineated. If all such PCA and SCA lands do not constitute 40% of the project site, lands that consist of one or more of the TCA types shall be delineated. If all three types have been delineated and the open space area is less than 40%, applicant shall delineate additional land to be included on the Open Space to meet the minimum 40% requirement.

- Primary conservation areas shall be comprised of one or more of the following:<sup>8</sup>
  - Land within riparian buffers, wetland buffers and floodplains
    - 100ft riparian buffers on perennial streams (USGS blue-line streams)
    - 50ft riparian buffers on intermittent streams and drainage-ways that drain more than 10 acres<sup>9</sup>
    - Wetlands and wetland buffers of 50ft (measured from edge of wetland, not USGS blue-line stream)<sup>10</sup>
    - Floodplain (areas within the 100-year floodplain)
  - A maximum of 50% of the Required Open Space shall be comprised of floodplain, wetlands, stream buffers or other regulated features.

Floodplains provide valuable natural services such as water storage and filtration and providing habitat for animals. Buildings constructed in the floodplain are at a high risk of damage. By filling the floodplain, properties downhill are also impacted.

**Explanatory Note:** Maximum percentage of regulated features that can be counted toward Required Open Space can vary based on type of feature.

- Non-regulated isolated wetlands and depressions that accommodate ephemeral pools<sup>11</sup>
- Natural Heritage Natural Areas (NHNAs) as defined by the Natural Heritage Program database
- Areas within Natural Heritage Element Occurrences (NHEOs) as defined by the polygon data available from the North Carolina Natural Heritage Program
- Areas identified by the Biodiversity and Wildlife Habitat Assessment (BWHA) of the North Carolina Natural Heritage Program Conservation Planning Tool (<http://portal.ncdenr.org/web/cpt/>)
- High priority natural communities verified by a site survey (identified earlier in this document)
- Secondary conservation areas shall be comprised of one or more of the following:
  - Additional riparian buffers on USGS streams (up to 300ft)
  - Five hundred year (500) floodplain
  - Upland buffers of wetlands and seeps (up to 750ft radius)
  - Adjacency to NHNAs, NHEOs, or managed areas (up to within 500ft)
    - Note Managed Areas includes public and private open space that is permanently preserved through easement, acquisition, or other reservation. Managed Areas are

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<sup>8</sup> Many of the habitats and conservation thresholds identified in this section were developed from a review of the scientific literature, see

<http://www.ncwildlife.org/Portals/0/Conserving/documents/ConservingTerrestrialHabitatsandSpecies.pdf> for more information.

<sup>9</sup> Many natural resources are not inventoried at the county level. Discretion should be given to the Planning Director to determine the requirements needed to prove the existence of these features.

<sup>10</sup> Wetland buffers counting toward Primary Open Space should not be bisected by a street unless a wildlife underpass is included in the design of the roadway.

currently inventoried, but private open space is not currently inventoried at the county level and is likely to change.

- Mature forest of at least one contiguous acre (not mapped<sup>11</sup>)
- Unfragmented forested areas that comprise all or a portion of forest blocks of 50 acres or more (portions of the forest block may be outside of the parcel)
- Wildlife corridors that average at least 150 ft. in width and connect areas of significant habitat which may include NHNAs, NHEOs, wetlands, floodplain, areas identified by the Biodiversity and Wildlife Habitat Assessment of the NC Department of Environment and Natural Resources Conservation Planning Tool, or other features)<sup>11</sup>
- Steep Slopes of greater than ten percent (10%)<sup>12</sup>
- A two hundred (200) foot-wide protection area around rock outcrops and abandoned mine shafts<sup>1113</sup>
- Prime Farmland with conditions<sup>14</sup>
- Working cropland, pasture and timberlands (enrolled in Present Use Value (PUV) program) and a 200ft buffer (shown on map) or A 200 buffer along project site boundary where project site adjoins working cropland, pasture or timberlands enrolled in Present Use Value (PUV) program (need clarification)
- Sensitive soils:
  - Soils included in the Cabarrus County Zoning Ordinance: "Soils with "Severe" limitations for development due to drainage problems, including but not limited to, Armenia loam (Ar) Altavista sandy loam (AaB), Chewacla sandy loam (Ch), Iredell loam (IdA), Sedgefield sandy loam (SfB) and Wedhadkee (We)"<sup>11</sup>
- Medium priority natural communities (identified earlier in the NR-CDG)
- Tertiary Conservation Areas (can be counted toward Open Space Requirement if all Primary and Secondary conservation areas are already included in the Open Space areas)
  - Undeveloped land and tree save areas.
  - Heritage trees (existing healthy individual trees greater than 12 inches DBH)
  - Farmland of statewide importance<sup>14</sup>
  - Agricultural uses and pollinator gardens
  - Land with cultural or historic significance (i.e. contributes to a rural view from a public roadway)

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<sup>11</sup> Many natural resources are not inventoried at the county level. Discretion should be given to the jurisdiction and in some cases, the Planning Director to determine the requirements needed to prove the existence of these features. Requiring field verification for all features may be a hurdle that makes the NR-CDG an unattractive option. Reliance on available data and technical assistance from other county departments is appropriate. For instance mature forest may be verifiable based on historical aerials provided by the Cabarrus County GIS Department.

<sup>12</sup> Source for this threshold is a local precedent. The Town of Midland allows land which exceeds 10% slope to count toward open space requirements.

<sup>13</sup> Abandoned mine shafts should be gated in a way to prevent human access but will still allow them to function as hibernacula for bats. Consult NCWRC biologists for more information.

<sup>14</sup> Prime farmland and farmland of statewide importance (as defined by NRCS soil data) should only be counted toward Secondary or Tertiary Conservation Areas if a minimum of five (5) contiguous acres are set aside and a management plan is in place to keep farmland in crops or pasture or to maintain by mowing periodically (i.e. once a year) to preserve potential for farming activities. This has an added benefit of maintaining habitat diversity.

- Conservation lots
  - Up to 50% of the land area in conservation lots (residential lots greater than 5 acres) can be counted toward open space requirement (Note: these can account for no more than 20% of the total Open Space Requirement)<sup>15</sup>

**Explanatory Note: Mapping Primary and Secondary Conservation Areas**

A map of lands that potentially meet the criteria for PCAs and SCAs is included in the Appendix as Figure 12. Methodology utilized to create the map is included in Appendix C: Natural Resource Maps and Information as Figure 12. This map and the data should be made available to local governments and applicants to provide a starting point for creating the Site Analysis Map.

## 5) Configuration of Open Space

- a) Concept and Preliminary Subdivision Plan shall demonstrate adherence to the following design criteria:
- Open space shall be located adjacent to existing protected areas or high value natural resources where possible.
  - At least sixty percent (60%) of the required open space within the site shall be contiguous. For the purposes of this section, contiguous open space shall include any open space bisected by a residential street except where noted in Section 7).
  - The minimum width of any required open space shall be 50 feet. Exceptions may be granted for trails, perimeter buffers and medians when the purpose of the open space meets the intent of this ordinance.
  - Roadway rights of way are not included in the calculation of minimum open space requirement.
  - Open space and surrounding development should be designed to provide lots with convenient access to the open space (i.e., pedestrian walkways and crossings where appropriate).
  - No lot within the subdivision shall be further than  $\frac{1}{4}$  mile from the required open space.

**Connect sensitive natural areas through the use of riparian and upland corridors. Natural area set-asides in conservation developments should be connected to existing natural areas on adjacent properties.**

## 6) Permitted Uses of Open Space

- These types of disturbances/uses are allowed in open space areas:
  - Greenways/trails

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<sup>15</sup> Note: A conservation easement may be needed to limit impervious cover limit, tree clearing / grading limitations (i.e. 50% of site), and/or further subdivision

- Passive Recreation Areas, including nature play areas and pocket parks.<sup>16</sup>
- Above ground utility infrastructure (provided area does not exceed 50% of required open space)
- Easements for drainage, access, and underground utilities.
- Water bodies (provided total surface area does not exceed 50% of the required open space)
- Agricultural uses
- Community and/or pollinator gardens
- Storm water management facilities designed to function as an amenity and to look like natural areas
- Maintenance or restoration activities
- Disturbance or construction activity may occur inside the open space when construction is done in such a way as to protect significant resources with approval of the Planning Director.

## 7) Other Design Criteria

- Streets and Utilities
  - Attempts should be made to minimize stream crossings while balancing the need to anticipate future connectivity with adjacent parcels.
  - When crossing streams and open space street and utility crossings should be designed to minimize impacts and fragmentation.
  - Curbing shall have a 1:4 slope to allow passage of small animals.
  - Bridges should be used for all permanent roadway crossings of streams and associated wetlands. If a culvert must be used, it shall be designed to allow passage of aquatic organisms by burying the culvert in the stream bottom or bank to a minimum depth of one (1) foot. Stream relocation or widening shall be avoided; however, where required state-of-the-art natural channel design and construction techniques shall be used.
  - Sewer lines, water lines and other utility infrastructure shall not be constructed within 100ft of perennial and intermittent streams to the maximum extent practical.
  - All utility crossings shall be minimized. The directional bore stream crossing method (installation of utilities beneath the riverbed avoiding impacts to the stream and buffer) shall be used for utility crossings wherever practical, and the open stream crossing method shall only be used when water level is low and stream flow is minimal.
- Landscaping
  - Non-native invasive species shall not be planted for any purpose.
  - Street trees shall be native tree species.
  - Flowering, fruit-bearing and mast producing native species are preferred for use as yard trees.
- Low Impact Development techniques and Firewise design principles should be utilized throughout the development.<sup>17</sup>

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<sup>16</sup> Impervious surface limitations may be needed to not preclude the purpose of the open space requirement or interfere with natural resource function

<sup>17</sup> For more information on Low Impact Development techniques download the LID Guidebook from NC State University at [www.ces.ncsu.edu/depts/agecon/WECO/lid/documents/NC\\_LID\\_Guidebook.pdf](http://www.ces.ncsu.edu/depts/agecon/WECO/lid/documents/NC_LID_Guidebook.pdf). For more

- Fences and walls, provided the location and design of such structures are not in conflict with other applicable regulations, POA covenants and restrictions, or NR-CDG objectives.

**Explanatory Note:** Low Impact Development techniques that are suitable for Cabarrus County can be identified by each local jurisdiction and should be appropriate for the site to be developed.

## 8) Ownership and Maintenance of Open Space

- No portion of the required Open Space shall be part of an individual building lot unless an easement is established and/or deed restrictions are recorded.
- All open space shall be permanently restricted from further subdivision.
- Open Space may be owned or administered by any of the following methods:
  - Fee simple dedication or dedication of a conservation easement to a local government entity (i.e., Cabarrus Soil and Water Conservation District), Cabarrus County, the State of North Carolina or a non-profit land conservancy that is capable of, and willing to accept responsibility for managing and maintaining the land for its intended conservation purposes. In Cabarrus County, the Cabarrus Soil and Water Conservation is the designated as the lead government agency to administer a conservation easement program.
  - Ownership by a property owners association if specific development restrictions and maintenance requirements are included as part of bylaws or restrictive covenants.
  - Ownership by a private landowner, provided an easement is established and on record with Cabarrus County prior to the approval of a plat or issuance of a building permit for a vertical structure. Alternatively, deed restrictions, covenants, or other legal instruments approved by the permitting jurisdiction can be utilized. In any of these cases, the private landowner will be responsible for maintenance of the land for its intended conservation purposes.
- Open space areas should be maintained in their natural condition or to serve other permitted uses. Additional permitted modifications may include:
  - Reforestation
  - Forest management
  - Agriculture
  - Landscaping of perimeter, arterial buffers, medians and Recreation Areas
  - Stream restoration
  - Understory clearing
  - Periodic mowing or burning of meadows for maintaining wildlife habitat
- An open space management plan is required. Ideally, this plan is prepared by a qualified biologist (i.e., a certified wildlife biologist<sup>18</sup>) identifying maintenance and/or habitat management activities employed to maintain significant resource areas, including specific habitat management implementation activities, schedules and assignment of responsibility.

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information on Firewise design see Safer from the Start, A Guide to Firewise-Friendly Developments at <http://www.firewise.org>.

<sup>18</sup> NC Wildlife Resources Commission staff are available to develop habitat management plans

**Explanatory Note:** The filing of a management plan and monitoring is up to each jurisdiction depending on staff capacity to administer this provision.

## 9) Public Access to Open Space

- a) Public access to open space shall be provided only if such open space is to be dedicated and therefore owned and maintained by a local government, the State of North Carolina, or other public entity.

## 10) Dimensional Standards

- a) Minimum lot size
  - o Minimum lot size for attached is 4,000 sqft
  - o Minimum lot size for detached is 6,000 sqft

**Explanatory Note:** Exact dimensional standards should be decided at a local level. Emphasis of dimensional and density standards should be on gross density calculations. This allows for flexibility in development design, whereas large minimum lot sizes limit the ways open space can be integrated in a creative way.

## 11) Permitted Density and Density Bonus

- a) Permitted Density
  - o Gross density based on underlying zoning district
    - o Lot size to gross density method (total site area / minimum lot size)
    - o For example, if gross project acreage is 100 acres and minimum lot size of zoning district is 40,000 square feet, permitted density is 109 units.
  - o Density Bonus
    - o A 10% increase in the number of permitted dwelling units with every 10% additional open space area set aside.

**Explanatory Note:** Additional incentives should be evaluated at the jurisdiction level prior to adoption of a NR-CDG. These incentives should be based on local conservation goals. Incentives could include the following:

- Additional density bonus for stream restoration activities (i.e. 5% for every 500ft of stream restored)
- Modifications to street requirements (i.e. allowance of swale sections or other low impact development techniques that are appropriate for the site and density of the proposed development)
- Flexibility on required pedestrian facilities (i.e. a multi-use path on one side of the road in lieu of sidewalks)
- Headwater streets (narrow streets) allowed if they meet the following criteria:
  - Streets serve as the primary access of less than 50 homes
  - 16ft width if serving less than 10 homes
  - 20ft width if serving less than 50 homes

## 12) Definitions

- a) Mature forest: A forest consisting of greater than 25% hardwood trees native to the region estimated to be over 50 years old or greater than twenty (20) inch diameter to indicate "mature" trees (this will vary based on tree species and habitat).
- b) Conservation Lot: A large parcel (>5 acres) within a Conservation Subdivision that includes a significant amount of natural assets worthy of protection. Ideally a conservation easement or design guidelines would include limitations on further subdivision, impervious cover, fencing, etc.

## 13) Resources

- a) NC Natural Heritage Program Data Explorer (<https://ncnhde.natureserve.org/>)
- b) Green Growth Toolbox (<http://ncwildlife.org/greengrowth>)
- c) NC Model Natural Resources Conservation Ordinance (<http://www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox/Greening-Ordinances>)
- d) Model Piedmont Conservation Ordinance and Incentives Guide for the Piedmont, created by the Cape Fear Council of Governments (<http://www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox/Greening-Ordinances>)
- e) NC LID Guidebook (<http://www.ces.ncsu.edu/depts/agecon/WECO/lidguidebook/>)
- f) Safer from the Start, A Guide to Firewise-Friendly Developments (<http://firewise.org>)
- g) NC Wildlife Friendly Development (<http://www.ncwildcertify.org/>)



Canada Red Lily

*Lilium canadense*

Photo: John Suther

## Appendix A: Participating Stakeholders

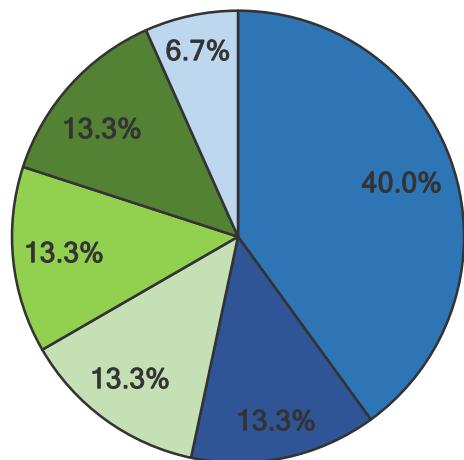
Figure 5: Participating Stakeholders

NAME	ORGANIZATION
Alicia Vasto	Land Trust for Central NC
Autumn Michael	Davidson Lands Conservancy
Brooke Massa	NC Wildlife Resources Commission
Clay Furches	Davidson Lands Conservancy
Crystal Cockman	Land Trust for Central NC
Dennis Testerman	Cabarrus Soil & Water Conservation District
Kassie Watts	Midland
Erin Burris	Mount Pleasant
Glenda Steel	Concord Wildlife Alliance
J Franklin	NC Forest Service
Jan Fowler	Mecklenburg Audubon
Jason Earliwine	Cabarrus County
Josh Langen	Kannapolis
Josh Watkins	Harrisburg
Ken Kneidel	Mecklenburg Audubon
Kevin Ashley	Concord
Laura Domingo	County Resident
Lisa Tompkins	NC Native Plant Society--Piedmont Chapter
Lynn Tesh	Concord Wildlife Alliance
Mandy Smith-Thompson	Concord
Margaret Pearson	Concord
Mary Eash	NC Forest Service
Nancy Carter	Mecklenburg Soil & Water Conservation District
Rob Watson	Concord Wildlife Alliance
Scott Efird	Locust
Sean Bloom	Catawba Lands Conservancy/Carolina Thread Trail
Susie Morris	Cabarrus County Planning & Development Services
Jake Petrosky	LandDesign (Consultant Team)
Meg Nealon	Nealon Planning (Consultant Team)

## Appendix B: Stakeholder Feedback

Figure 6: Stakeholder Feedback on Natural Resource Priorities

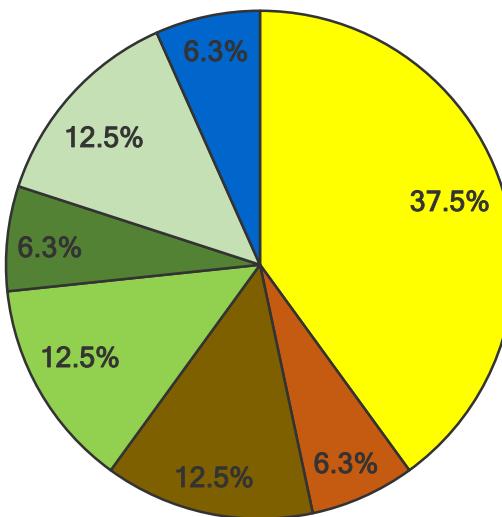
**Key Natural Resources: What are key natural resources that need to be protected in your jurisdiction (select 3 priorities).**



- Water quality - water bodies (lakes, ponds, rivers, creeks, etc.) and groundwater
- Streams, perennial and intermittent
- Agricultural lands, prime farmland soils, and/or soils of statewide importance
- State-designated Natural Heritage Sites
- Existing, mature, native forests
- Floodplain

Figure 7: Stakeholder Feedback on Threats to Natural Resources

**Threats: What are the largest threats to the natural resources in your jurisdiction (select 3):**



- Residential growth
- Poor site design
- Mass grading
- Forest loss
- Land / habitat fragmentation
- Loss of agricultural lands
- Stormwater run-off

## Appendix C: Natural Resource Maps and Information

Figure 8: Natural Heritage Natural Areas and Element Occurrences Map

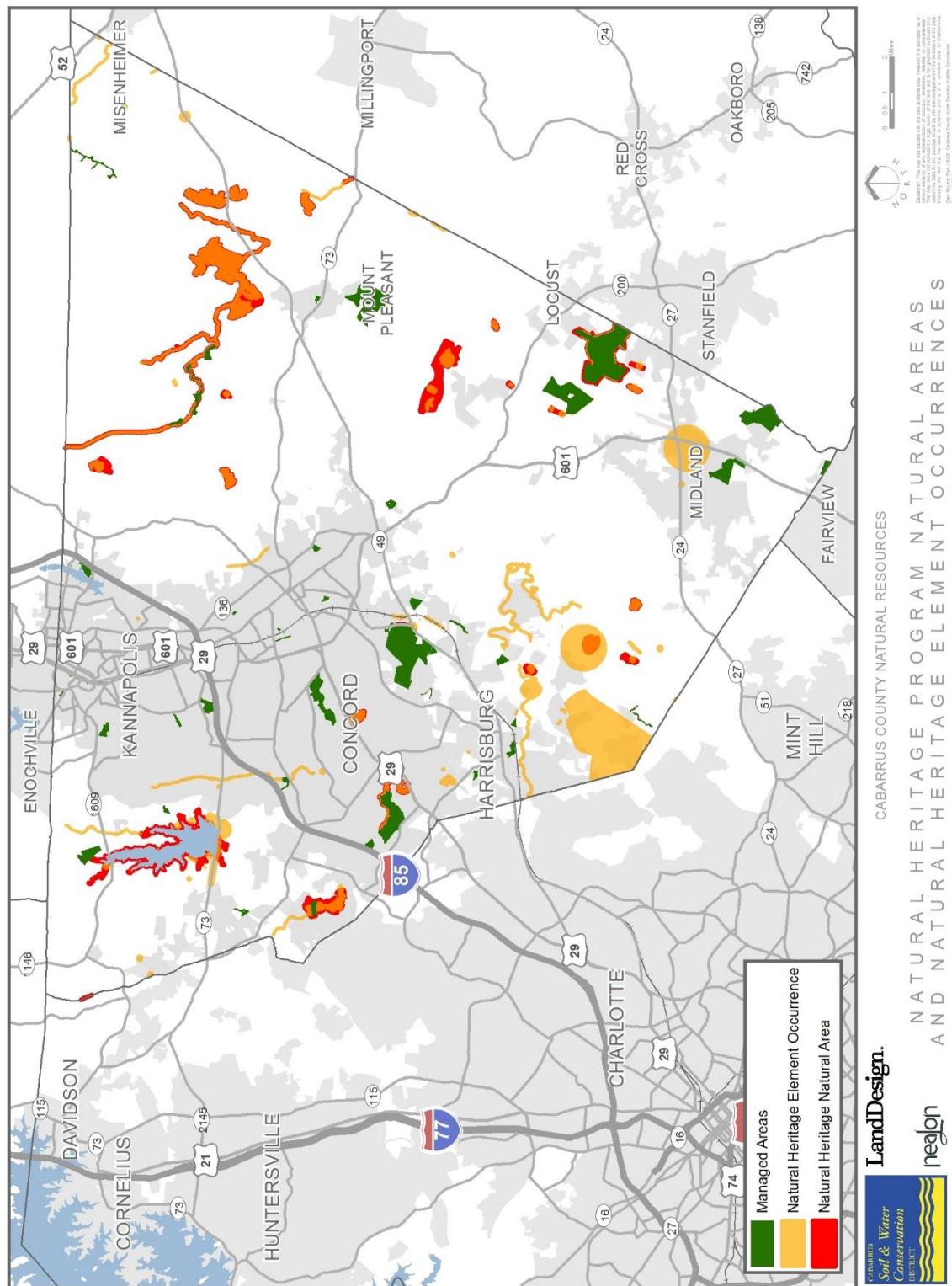


Figure 9: Natural Heritage Natural Areas in Cabarrus County

ID	Natural Area Name	ACRES	OWNER	TOP_RATING
1	Back Creek Gabbro Hill	29	PRV	Moderate
2	Blackwelder Hill Rare Plant Site	27	PRV	General
3	Brackett Bluff	61	LOCAL	General
4	Butcher Branch Forest	51	PRV	General
5	Charity Church Hardwood Forest	337	PRV	General
6	Clarke Creek Heron Rookery	236	LTCNC, PRV	Moderate
7	Coddle Creek Reservoir Rare Plant Sites	1,286	LOCAL	General
8	Concord Ring Dike/Jackson School Natural Area	16	NCDPS	Moderate
9	Dutch Buffalo Creek Dam	514	PRV	General
10	Georgeville Sunflower Site	5	PRV	Moderate
11	Hartsell Road Mesic Forest	15	PRV	Very High
12	Jesse Slagle Knoll	29	PRV	Moderate
13	Lentz Harness Shop Road Upland Depression	53	PRV	General
14	Lower Butcher Branch Depression Swamps	180	PRV	General
15	McLaughlin Road Basic Forest	40	PRV	General
16	Miami Church Hill Rare Plant Site	435	PRV	General
17	Mount Pleasant Road Roadside	7	NCDOT	Very High
18	New Testament Baptist Church Knoll and Seep	77	PRV	General
19	Old Bell Mission Church Forest	49	PRV	General
20	Pine Bluff Church Road Roadside	8	PRV	Moderate
21	Reed Gold Mine Forests	831	NCDNCR	General
22	Reedy Creek Knoll and Beaver Pond	81	PRV	Moderate
23	Rocky River Corridor	156	PRV	General
24	Stephens Church Forest	11	PRV	General
25	Suther Prairie	6	CSWCD	Very High
26	Walker Road Hardpan Forest	12	PRV	Moderate
27	YAD/Big Bear Creek Aquatic Habitat	73	PW	Moderate
28	YAD/Dutch Buffalo Creek Aquatic Habitat	67	PW	Moderate

Figure 10. Wildlife Species of Conservation Concern, by Priority Natural Community, in Cabarrus County

Floodplains	
<b>Amphibians</b>	
<i>Plethodon glutinosus</i>	Northern Slimy Salamander
<b>Birds</b>	
<i>Empidonax virescens</i>	Acadian Flycatcher
<i>Euphagus carolinus</i>	Rusty Blackbird
<i>Haliaeetus leucocephalus</i>	Bald Eagle
<i>Melanerpes erythrocephalus</i>	Red-Headed Woodpecker
<i>Parkesia motacilla</i>	Louisiana Waterthrush
<i>Protonotaria citrea</i>	Prothonotary Warbler
<i>Setophaga dominica</i>	Yellow-Throated Warbler
<i>Geothlypis formosa</i>	Kentucky Warbler
Early Successional Community	
<b>Reptiles</b>	
<i>Terrapene carolina carolina</i>	Eastern Box Turtle
<i>Ophisaurus attenuatus longicaudus</i>	Slender Glass Lizard
<i>Lampropeltis calligaster rhombomaculata</i>	Mole Kingsnake
<b>Birds</b>	
<i>Colinus virginianus</i>	Northern Bobwhite
<i>Dolichonyx oryzivorus</i>	Bobolink
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Setophaga discolor</i>	Prairie Warbler
<i>Tyto alba</i>	Barn Owl
Upland Pools, Depressions, Upland Seepages, Wetlands	
<b>Amphibians</b>	
<i>Hemidactylum scutatum</i>	Four-Toed Salamander
Low Elevation Flatrocks, Cliffs & Rock Outcrops	
<b>Reptiles</b>	
<i>Lampropeltis calligaster rhombomaculata</i>	Mole Kingsnake
<i>Cemophora coccinea copei</i>	Northern Scarlet Snake
<i>Crotalus horridus</i>	Timber Rattlesnake
<i>Lampropeltis triangulum elapsoides</i>	Scarlet Kingsnake
Oak & Mixed Hardwood/Pine Forests	
<b>Mammals</b>	
<i>Mustela frenata</i>	Long-tailed Weasel
<b>Birds</b>	
<i>Catharus guttatus</i>	Hermit Thrush
<i>Melanerpes erythrocephalus</i>	Red-Headed Woodpecker
<i>Setophaga dominica</i>	Yellow-Throated Warbler

<i>Sitta pusilla</i>	Brown-Headed Nuthatch
Headwaters, Small Creeks, & Rivers	
Reptiles	
<i>Thamnophis sauritus sauritus</i>	Eastern Ribbon Snake
<i>Regina septemvittata</i>	Queen Snake
Birds	
<i>Anas rubripes</i>	American Black Duck
<i>Anas strepera</i>	Gadwall
Mussels	
<i>Elliptio producta</i>	Atlantic Spike
<i>Lampsilis radiata</i>	Eastern Lampmussel
<i>Lasmigona decorata</i>	Carolina Heelsplitter
<i>Strophitus undulatus</i>	Creeper
<i>Villosa constricta</i>	Notched Rainbow
<i>Villosa delumbis</i>	Eastern Creekshell
<i>Villosa vaughaniana</i>	Carolina Creekshell
Fish	
<i>Etheostoma collis</i>	Carolina Darter

*Figure 11: Natural Resources*

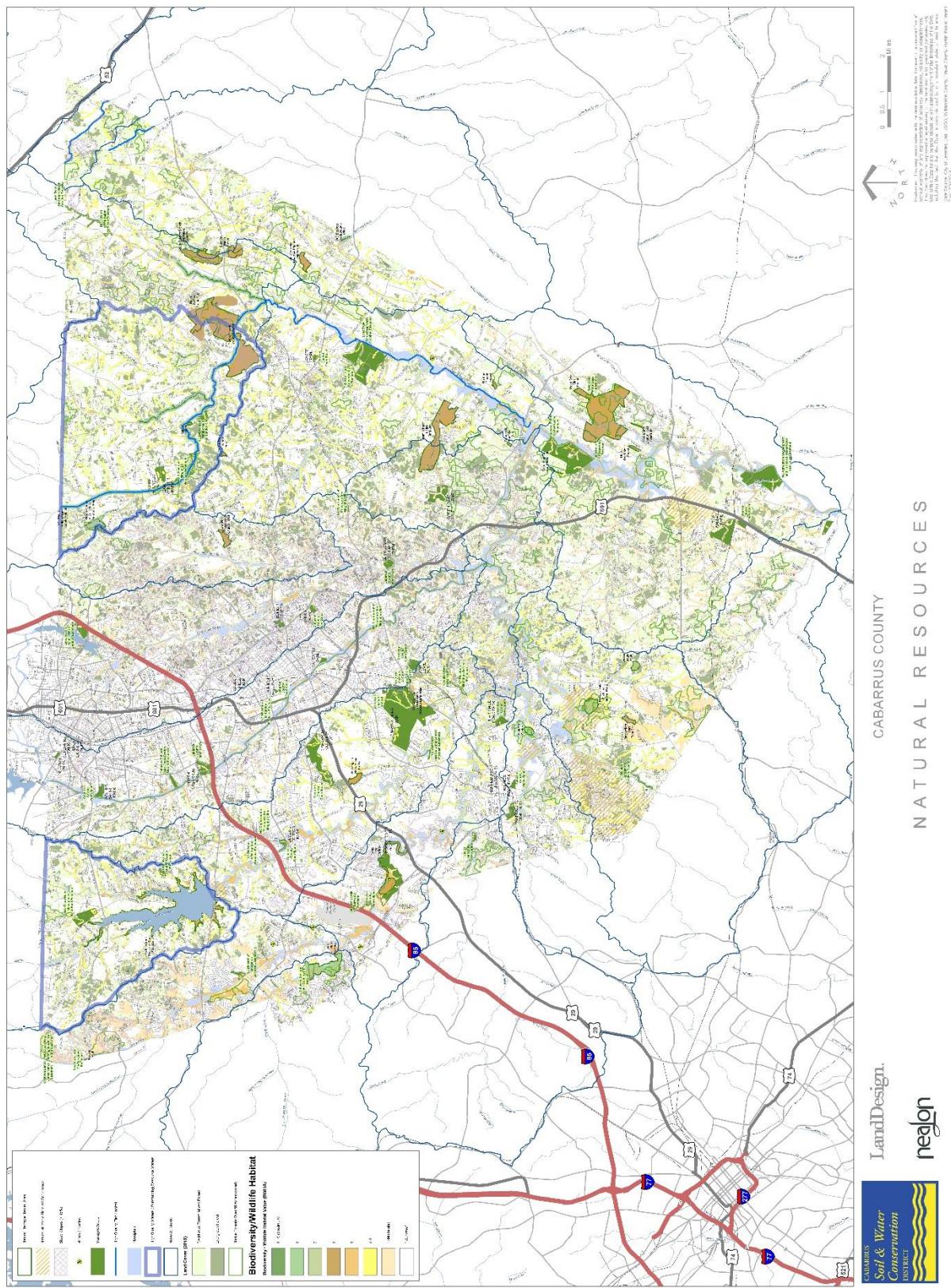


Figure 12: Primary and Secondary Conservation Areas

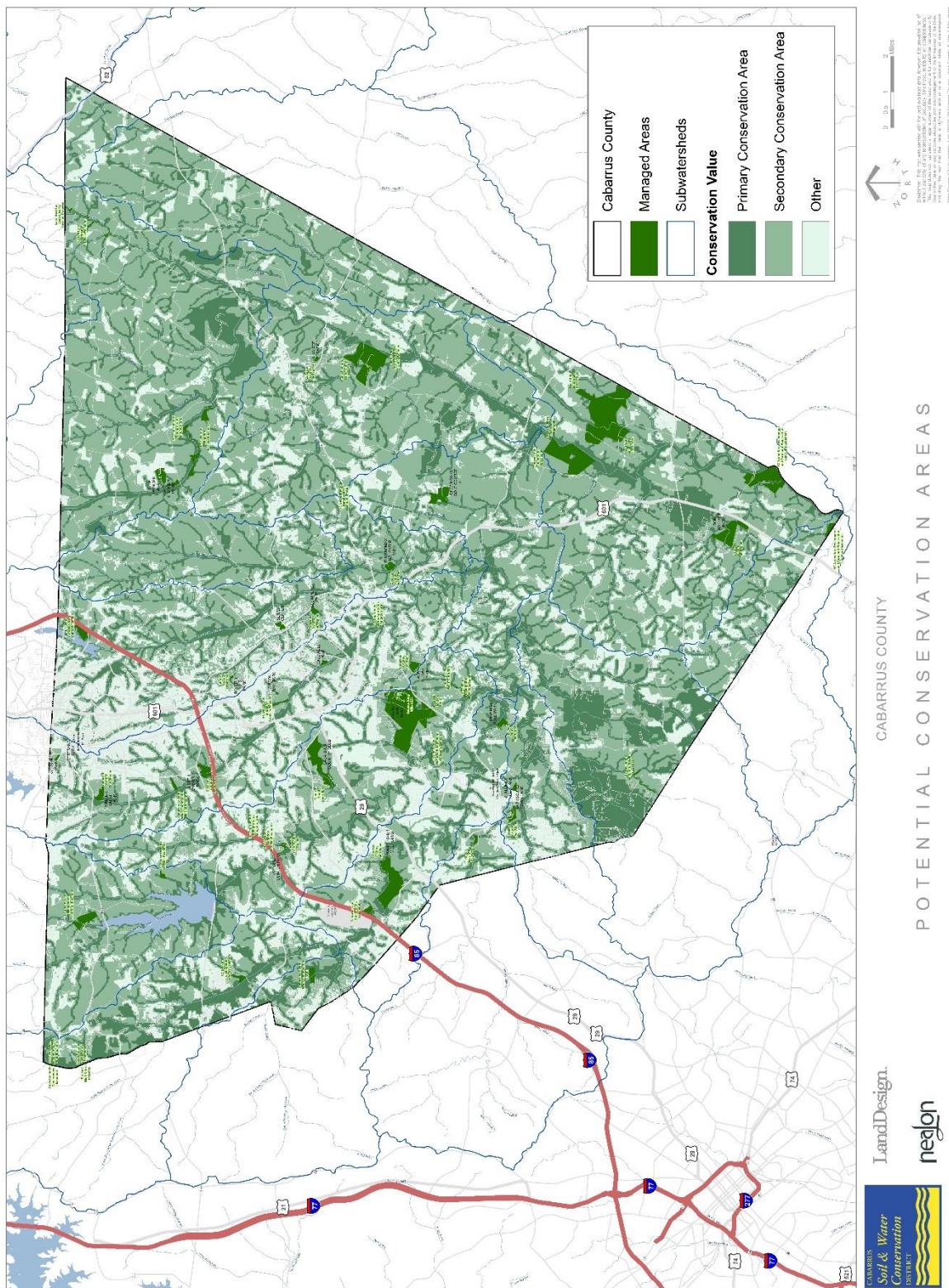


Figure 13: Methodology Used to Map Primary and Secondary Conservation Areas

<b>Objective: Determine lands valuable for conservation (Primary and Secondary Conservation Areas)</b>				
<b>Resources shown on draft Primary and Secondary Conservation Areas Map</b>				
<b>Subobjective #</b>	<b>Description</b>	<b>Methodology</b>	<b>Primary Conservation Areas</b>	<b>Secondary Conservation Areas</b>
Subobjective 1.1	Lands with high concentrations of high value for biodiversity and wildlife	All areas with values >0 included as PCAs.	All areas with values >0 included as PCAs.	None
Subobjective 1.2	Lands proximal to Natural Heritage Element Occurrences	Euclidean distance calculated, reclassified	Areas within NHEO polygons	Areas within 500ft of NHEO polygons
Subobjective 1.3	Identify lands proximal to Natural Heritage Natural Areas	Euclidean distance calculated, reclassified	Areas within NHNA polygons	Areas within 500ft of NHNA polygons
Subobjective 1.4	Identify lands proximal to Managed Areas	Euclidean distance calculated, reclassified		Areas within 500ft of managed area polygons
Subobjective 1.5	Identify lands in riparian areas	Identify streams (USGS 24k), calculate euclidean distance, reclass	Areas within 100ft of USGS streams	Areas from 100-300ft of USGS streams
Subobjective 1.6	Identify lands proximal to wetlands	Identify wetlands (NWI and Small Known Wetlands provided by WRC), calculate euclidean distance, reclassify	Areas within 50ft of wetlands*	Areas within 50-750ft of wetlands*
Subobjective 1.7	Identify lands on steep slopes	2ft contours processed to 50ft DEM, percent slope calculated, selected slopes over 10%, reclassified to 1 value		Slopes > 10%
Subobjective 1.8	Identify lands in floodplains	Defined by FEMA (2012 Data)	Areas within 100 year floodplain	Areas within 500 year floodplain
Subobjective 1.9	Identify lands part of large tracts of native forest cover	Native forest >50 acres provided by NCWRC		Forested areas within the polygon
Subobjective 1.10	Working cropland, pasture and timberland	PUV Parcels identified based on tax parcel data (select where "DeferredVa" in (' ', '0'), buffer by 200ft, convert to raster		Parcels enrolled in the Present Use Value (PUV) program and buffers of 200ft

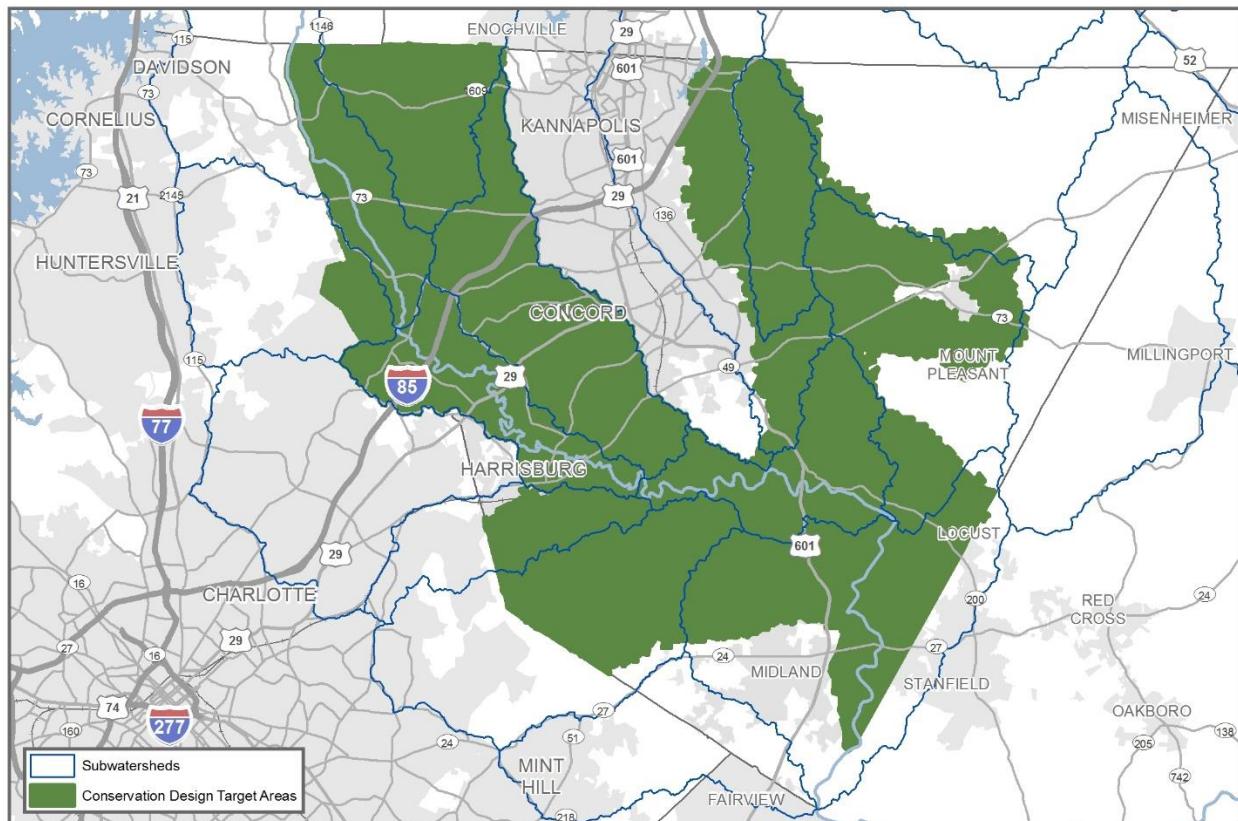
## Appendix D: Conservation Design Target Areas

Some jurisdictions may want to define particular areas where the NR-CDG can apply. It is recommended that communities target conservation standards for development in the rural-urban fringe area, where there are still opportunities to protect an intact, connected ecosystems. Two Conservation Target Area maps were developed as a result of input provided for the NR-CDG planning process and is included as Figure 14. Once Primary and Secondary Conservation Areas have been defined, Geographic Information Systems (GIS) tools and other methods can be utilized to determine parcels or sub-watershed catchments that have a concentration of valuable natural resources.

### Overall Target Areas

- The areas on Figure 14 were defined based on selecting areas on the urban/rural fringe on the edge of established developed areas. This primarily included areas with future land use plans that dictated density at 0.5 to 3 dwelling units per acre with potential access to utilities.
- Edits were made to this polygon based on input from stakeholders and analysis of Primary and Secondary Conservation Areas (See Section 4). This included the addition of the Rocky River subwatersheds to the north and east of Harrisburg, the Coddle Creek subwatershed and part of the Muddy Creek watershed east of Midland.
- This resulted in 60% of the parcels with over 1 acre of mapped Primary or Secondary Conservation Areas being included in the Target Area polygon.

Figure 14: Conservation Design Target Areas



## Parcel Level Target Areas

- The areas on Figure 15 were defined based on selecting parcels within the Overall Target Areas (Figure 14) that were over 25 acres and had over 1 acre of Primary or Secondary Conservation Areas on the property. For more information on Primary and Secondary Conservation Areas see Section 4).

Figure 15: Conservation Design Parcel Level Target Areas

