

Public Hearing Testimony From Simon Smith
On
Sketch Design for "Lystra Road Property"

January 16, 2007

Simon Smith
598 Jones Branch Rd
Chapel Hill, NC 27517
919-967-9057

Dear commissioners,

My name is Simon Smith and my wife Gretchen and I live at 598 Jones Branch Rd. Our property abuts the southeastern corner of the developer's Lystra Road property. I have been living at my present address for 11 years. I grew up in Chapel Hill and have lived almost my entire life in the greater Chapel Hill area. I urge you not to approve the developer's current sketch design for the following reasons:

1. The traffic situation along Lystra Road is going to become terrible by the year 2014 because of the construction of Briar Chapel. The Briar Chapel development is the proverbial 800 pound gorilla when it comes to traffic in North Chatham. With about 2400 homes, that one development is going to be dumping huge amounts of additional traffic on area roads. But where exactly is that traffic going to be heading. If one believes the Briar Chapel developer's traffic impact assessment (TIA) only 11% of peak hour traffic is going to use Lystra Road. I seriously question that figure of 11% because Lystra Road is the fastest way to reach such destinations as South Point Mall, I-40, RTP, northern Cary, and Raleigh. For ten years, I have been commuting to my job in northern Cary along Lystra road and Farrington road. This is the standard shortcut for people who live in my vicinity and work in RTP or northern Cary. I strongly suspect that the percentage of Briar Chapel morning traffic that will be traveling east along Lystra Road is going to be much higher than 11%.

The TIA submitted by the Lystra Road developer uses the Briar Chapel TIA as input. However, the Lystra Road developer's TIA deliberately underestimates traffic coming from the Briar Chapel development by using only 60% of the numbers from the Briar Chapel TIA. This was done because the Lystra Road developer expects to have build-out in 2011 while the Briar Chapel developer does not expect to have build-out until 2014. The board of commissioners must take into consideration the traffic situation not only in 2011 but also in 2014 and beyond. I encourage you to require that the Lystra Road TIA take into consideration all traffic expected to be generated by Briar Chapel. By considering only 60% of the Briar Chapel traffic, the Lystra Road TIA comes up with the amazing prediction that between 7:00 AM and 9:00 AM, only 56 cars will be added to Lystra Road from Briar Chapel. I am confident in saying that this number is ridiculously low. One of my coworkers lives in a neighborhood along Manns Chapel Road and he commutes to our company along Lystra Road. He told me that as he is driving to work, there are numerous other cars coming out of his neighborhood making the same journey down Lystra Road to I-40. When I told him about the Lystra Road developer's prediction that only 56 cars would be coming from 2400 homes in Briar Chapel, he laughed and said he thought the number would be ten times higher. I do not claim to be able to predict exactly how many cars will be traveling down Lystra Road from Briar Chapel, but I am confident in saying that it will certainly be a lot more than 56 cars, it will be many hundreds.

Some other flaws in the Lystra Road developer's TIA include:

- The TIA only observed traffic from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. This means it missed the key event of North Chatham Elementary school getting out between 2:30 PM and 2:45 PM.
- The TIA contains the flawed assumption that about 19% of morning rush hour traffic from Briar Chapel is going to turn right off Lystra Road onto Jack Bennett Road. This

will not happen. Virtually 100% of Briar Chapel traffic will continue on to the intersection with Farrington Point road.

- The TIA did not study at all the situation at the intersection of Lystra Road and Farrington Point Road. This intersection is poised to become a major rush-hour choke point by 2014.

Even given its shortcomings, the Lystra Road developer's TIA still reveals that by the year 2011, the traffic at the intersection of Lystra Road and Jack Bennett Road is going to be at a Level-of-Service (LOS) rating of F. This is the worst rating and is associated with bumper-to-bumper, stop-and-go traffic and long delays. This F rating applies even before the traffic from the Lystra Road Property is taken into consideration.

I strongly urge the commissioners not to approve any more developments in the Lystra Road area until an independent study of traffic in North Chatham in the year 2014 can be completed. I would like to read two sentences from the Chatham County Subdivision Regulations. The sentences I will read are found in the section titled "Purpose" on page 4. The section begins "This ordinance is adopted for the following purposes:". Paragraph D says "To insure an adequately planned street system and to avoid sharp curves, steep grades and hazardous intersections". Paragraph L says "To provide for the orderly safe flow of traffic and to avoid congestion and traffic hazards". Given the fact that the Briar Chapel development has already been approved, I do not see how approval of any more developments in the Lystra Road area is going to uphold the spirit of these two purposes for having subdivision regulations.

I have one final comment I would like to make while on the subject of traffic. Contrary to what a planning department staff member stated at the December planning board meeting, it is my understanding from reading the Chatham County Subdivision Regulations that for sketch design approval of major subdivisions the developer is required to provide an economic impact assessment and that part of such an assessment is a traffic study. I refer you to pages 38 and 39 of the Subdivision Regulations.

2. The southern portion of the developer's property has steep slopes and a bouldery surface, and the developer's design has some very steep roads and curves that will almost certainly require significant excavations to accommodate. The road that leads to the southeastern corner of the property begins downhill at a grade that I compute to be 17%. The NCDOT limit for such a road is 18%, so the developer's road is close to the limit. The road then curves around to the left. This curve will almost certainly require cutting into the hillside because otherwise one side of the road is going to be six feet higher than the other, which I strongly suspect is outside DOT limits. When I raised this concern at the planning board's meeting in December, a representative from the developer followed up to my comments with a response that they did not intend to do significant excavations or grading to accommodate the road but that they would build up one side of the road to make it level. I'm not exactly sure what kind of build up he was referring to, but generally when a road is constructed on a steep slope and it is not cut into the hillside, a substantial concrete and/or steel substructure is built to hold up the road in the presence of soil erosion. I am skeptical that such an investment in engineering and construction costs would be economically feasible for a road that serves only eight houses. I therefore stand by my original comment that significant grading and excavations will be required to accommodate this particular cul-de-sac.

3. The developer's design only provides a 25 foot buffer to adjacent property owners. While I am aware that this is the county mandated minimum, the Westfall development on Lystra Road granted at least a 50 foot undisturbed buffer to adjacent property owners. I think the Lystra Road Property sketch design should also be required to provide at least a 50 foot undisturbed buffer to adjacent property owners.
4. Like other property owners who will speak tonight, I too am very concerned about preserving the quality of the local environment, specifically the Herndon Creek Significant Natural Heritage Area and Jones Branch creek, which feeds into Herndon creek. I am not happy that the developer still has not modified their design to leave the Herndon Creek Significant Natural Heritage Area completely undisturbed. I will not go into greater detail on this subject because I know others are going to discuss it in more detail. However, I would like to add my voice to their concerns.

I appreciate your attention this evening. Again, I urge you not to approve the developer's sketch design in its present form. Thank you.

**Chatham County Board of Commissioners Meeting
January 16, 2007**

Lystra Road Subdivision Sketch Design Application

**Comments
by**

**Gretchen Smith
598 Jones Branch Road
Chapel Hill, NC 27517
919-967-9057**

My husband and I reside on 11 acres of land at 598 Jones Branch Road, adjacent to the southeast corner of the proposed "Lystra Road Subdivision". I have lived there for 22 years. As President of the Jones Branch Homeowners Association and adjacent property owner to the proposed "Lystra Road Subdivision", I still have concerns about the development even with the few changes the developer has made to the submitted application. I ask the Board of Commissioners to deny the application for sketch design as submitted, for the same reasons that were presented to the Planning Board on December 5, 2006 and January 2, 2007 and in letters dated January 7 to each Commissioner from myself and my husband.

Although recognizing that property owners have rights regarding development of their property, I believe development should be done in a responsible way that is compatible with the surrounding community and not in a way that is detrimental to water quality, the environment, adjacent property owners, or the community. I believe that is why we have ordinances and regulations, and why our government has both the authority and the responsibility to protect against those detrimental effects.

In the three Planning Board meetings I have attended recently, the message I keep hearing is that if the property is divided into one-acre lots, it meets Subdivision regulations and must be approved. When requests for Economic and Environmental Impact Assessments are brought up by adjacent property owners and a few Planning Board members, the message is that those assessments cannot be required for Sketch Design. I respectfully disagree, based on my review of the regulations.

I believe the *Chatham County Subdivision Regulations* give the Planning Board and the Board of Commissioners the authority and the responsibility to perform a "responsible review" of Subdivision requests that goes beyond just the fact that the proposed sketch design meets the one-acre lot requirement. Specifically, I would like to refer the Board to the following sections of the ordinance:

Page 4, Section 1.3 Purpose, particularly items A, B, D, E, H, K, and L

Page 28, Section 4.4.B Procedure for Major Subdivisions (1) Step 4 – 8, which states "The information required on a sketch design map is described in Section 5.1, Section 5.2 A, Section 5.2 B, and Section 5.2 C."

Pages 38-39, Section 5.2 Additional Sketch Design or Preliminary Plat Information, A. Impact Assessment, (1) Environmental and (2) Economic

Pages 44-45, Section 6.1 Suitability of the Land, A. Land Physically Unsuited for Subdivision

Pages 55-56, Section 6.5 Public Use and Service Areas, B. Easements, Dedications, and Reservations, C. Community Assets

A summary of my concerns include:

- Insufficient information provided by developers for a thorough and responsible review
- Insufficient time allowed for a thorough and responsible review
- Failure by the current developer to solicit or use input from adjacent property owners and other interested parties
- Unsuitability of the land for subdivision as proposed due to:
 - Herndon Creek Ravine Significant Natural Heritage Area (SNHA)
 - Number of wetlands and streams, including tributaries that drain into adjacent Jones Branch stream and parts of Herndon Creek located on adjacent properties
 - Steepness of topography in many areas

- Bouldery and extremely bouldery surface on significant portion of property
- Narrow, winding Lystra Road not designed for traffic generated by large developments
- Need for an Environmental Impact Assessment due to Herndon Creek Ravine SNHA, wetlands and streams within the Herndon Creek watershed
- Need for an independent Traffic Impact Analysis as part of an Economic Impact Assessment
- Need for permanent conservation protection of Herndon Creek Ravine SNHA and the Herndon Creek watershed
- Amount of area indicated as "unsuitable", bouldery and extremely bouldery on the Detailed Soil report, and potential for site disturbance
- No details regarding surface drip septic systems or their maintenance
- Insufficient undisturbed buffers for Herndon Creek Ravine SNHA, other streams and wetlands

More details about these concerns are contained in the attached documents. Thank you for the opportunity to present my concerns.

Attachments:

- Chatham County Subdivision Regulations, pages 4, 28, 38-39, 44-45, 55-56
- Letter dated January 7, 2007 from Gretchen Smith to Chatham County Board of Commissioners
- Presentation to December 5, 2006 Meeting of the Planning Board
- Letter dated March 17, 2006 from Kristen Sinclair with NC Natural Heritage Program
- Herndon Creek Conservation Project letter dated November 28, 2006
- Conservation in the Herndon Creek Watershed dated August 18, 2006
- North Carolina Wildlife Resources Commission's *Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality*

SECTION 1. GENERAL PROVISIONS

1.1 Title

This document shall be known; cited and referred to as the Chatham County Subdivision Regulations.

1.2 Authority

By the authority of Chapter 153-A Article 18 of the General Statutes of North Carolina the Chatham County Board of Commissioners does hereby exercise the powers and authority to regulate the subdivision of land within its territorial jurisdiction.

1.3 Purpose

This ordinance is adopted for the following purposes:

- A. To protect and provide for the public health, safety and general welfare of Chatham County.
- B. To provide for the orderly growth and efficient development of the County.
- C. To provide for the coordination of subdivision streets with existing and/or planned streets.
- D. To insure an adequately planned street system and to avoid sharp curves, steep grades and hazardous intersections.
- E. To provide for safe and adequate water and sewer systems, schools, parks and playgrounds.
- F. To provide for the dedication of right-of-ways for streets and utilities.
- G. To insure against flood damage.
- H. To facilitate an orderly system for the design and layout of land.
- I. To insure the proper legal description, and monumenting of land.
- J. To provide for the resubdivision of land.
- K. To avoid overcrowding of the land and extreme concentration of the population.
- L. To provide for the orderly safe flow of traffic and to avoid congestion and traffic hazards.

The minimum standards specified herein are adopted and shall be considered as achieving the purposes listed above.

4.4 B. Procedure for Major Subdivisions (Steps 4-29)

- (1) Step 4 - 8 (#39). The sketch design review is required on proposed subdivisions with new roads, but is optional on other subdivisions. The information required on a sketch design map is described in Section 5.1, Section 5.2 A, Section 5.2 B, and Section 5.2 C. (#19) The required number of copies of the information required shall be submitted to the Planning Board staff for review by the Planning Board. (#22) The administrative fee for the subdivision is due at this time. The sketch design map shall be submitted to the Planning Board staff not less than twenty-three (23) days prior to the day on which approval is requested. (#15I) (#23) Following the Planning Board review and action the sketch design map shall be submitted for review and action by the Board of County Commissioners. The required number of sketch design plans shall be submitted to the Planning Board staff for review by the Board of County Commissioners. (#22) When structures of greater than 50 years in age or having historical significance are on the property or within 100 feet of the development property on adjacent property then the developer shall contact the Chatham County Historical Association prior to submittal for sketch subdivision approval. (#21)
- (2) Step 9 (#39). The information required on a preliminary plat is described in Section 5.1 and 5.2. The required number of copies of the information described in Section 5.1 and in Section 5.2 shall be submitted to the Planning Board Staff. (#22) The standards and design requirements for subdivision plats are specified in Section 6 of these regulations. (#5) A subdivision plat with proposed new roads shall be submitted to the Planning Board staff not less than twenty-three (23) days prior to the day on which approval is requested. (#23) A preliminary subdivision plat with no proposed improvements shall be submitted to the Planning Board staff not less than twenty-three (23) days prior to the day on which approval is requested. (#23) The Planning Board staff shall review the plat to be sure it meets the specifications of these regulations. An on-site inspection may be made of the subdivision at that time by the Planning Board staff. (#15I)
- (3) Step 10 (#39). The subdivider is responsible for having the site and the preliminary plat reviewed and signed by a certified/licensed soil scientist concerning the reasonableness of the design. The plat submitted shall exhibit a statement of reasonable design or be accompanied by a letter from the Division of Environmental Management (DEM) signifying approval (issuance of a discharge permit and permit to construct). (#19)
- (4) Step 11 - 12 (#39). Where new public roads are proposed the plat shall be reviewed and approved by the Division of Highways of the North Carolina Department of Transportation. Where new roads are proposed, road names shall be submitted to the County Emergency Operations Center for approval prior to submittal for preliminary subdivision approval. (#21)
- (5) Step 13 (#39). When the development improvements may involve the

- (5) The approximate location of all boundary lines of the property.
- (6) Approximate total acreage of land to be subdivided in Chatham County, and other county if applicable.
- (7) Approximate lineal feet of the proposed street.
- (8) The approximate location of existing and plated streets, easements, water bodies, water courses (including sinkholes, dry stream beds, and pond overflow streams), buildings (including mobile homes), railroads, parks, cemeteries, bridges, sewers, water mains, culverts, lands subject to flood and other pertinent features.
- (9) The location and width of all existing and proposed street right-of-ways and easements, and other public ways, and water hazard areas, where applicable. (#9)
- (10) The approximate location, dimensions, and acreage of all proposed or existing lots. (#15A)
- (11) The approximate location, dimensions and acreage of all property proposed to be set aside for a park or playground use, or other public or private reservation, with designation of the purpose thereof, and conditions, if any, of the dedication or reservation.
- (12) Names of all streets (#21) existing and proposed.
- (13) A notation on the use of any lots proposed for a use other than single family residential.
- (14) All lots in each subdivision shall be consecutively numbered.
- (15) A notation specifying that a public water system is not presently available to the subdivision.
- (16) A time schedule of development for subdivisions of more than 50 lots. (#16F)
- (17) The approximate location of structures of approximately 50 years old or having historical significance on the development property or within 100 feet of the development property on adjacent land. (#21)

5.2 Additional Sketch Design or Preliminary Plat Information (#9)

A. Impact Assessment

(1) Environmental

Pursuant to Chapter 113A of the North Carolina General Statutes, the Planning Board may require the subdivider to submit an environmental impact statement with the preliminary plat if the development exceeds two acres in area, and if the Board deems it necessary for responsible review due to the nature of the land to be subdivided, or peculiarities in the proposed layout.

The environmental impact assessment shall address the following areas:

- a. The environmental impact of the proposed action;
- b. Any significant adverse environmental effects which cannot be avoided should the proposal be implemented;
- c. Mitigation measures proposed to minimize the impact;
- d. Alternatives to the proposed action;
- e. The relationship between the short-term uses of the environment involved in the proposed action and the maintenance and enhancement of long-term productivity; and
- f. Any irreversible and irretrievable environmental changes which would be involved in the proposed action should it be implemented.

(2) Economic

Developers of subdivisions consisting of more than fifty (50) lots or dwelling units may be required to submit an economic impact assessment compiled by the developer with assistance from the Planning Board staff. The impact assessment shall address the probable effects of the development in terms of the following area:

- a. Approximate schedule of occupancy of the subdivision.
- b. Attendance to public schools; number of children by age
- c. Increases in vehicular traffic; number of automobiles
- d. Changes in the number of legal residents; increase in population
- e. Provisions of housing for persons of low and moderate income
- f. Increases in public service costs; schools, police protection, maintenance of roads, etc.
- g. Projected demands on public utilities
- h. Changes in property tax revenues
- i. Increased demand for refuse disposal service
- j. Harmony with the character of surroundings

(3) Where potential negative impacts have been identified, it shall be the responsibility of the subdivider to provide plans and methods of how such impacts may be alleviated or minimized to the satisfaction of the Board of County Commissioners. (#15Q)

(4) The failure to provide reasonably adequate or accurate information under any item specified shall be cause for disapproval of the preliminary plat.

B. Topographic Map

A topographic map with contours at vertical intervals of not more than five (5) feet, at the same scale as the preliminary plat, for all major subdivisions unless not deemed necessary by staff. Staff may require a topographic map for other subdivisions if necessary for adequate review. United States Geological Survey quadrangle sheets may be adapted to meet this requirement. The date and method of preparing the topographic survey shall be stated.

C. Soils Evaluation

A soils evaluation shall be performed by a certified/licensed soil scientist or persons approved by the Health Department to perform such evaluations or investigations. Such evaluations shall be performed unless a central sewage disposal system is proposed. A soils map showing the location of suitable soils and a letter of explanation shall be submitted. (19)

D. Drainage Plan and Erosion Control Plan

For all subdivisions with new roads the developer shall submit a drainage plan and an erosion control plan which provides information as specified in the regulations of the Soil Erosion and Sedimentation Control Program of the Division of Environmental Health of the Chatham County Public Health Department. (#39)

SECTION 6. REQUIREMENTS AND MINIMUM STANDARDS FOR IMPROVEMENTS,
RESERVATIONS, AND DESIGN

6.1 Suitability of the Land

A. Land Physically Unsuitable for Subdivision

Land which the Board of County Commissioners has found to be unsuitable for development: (#15Q)

- (1) Because of flooding, bad drainage, steep slopes, rock formations, and other such features which may endanger health, life, or property, aggravate erosion, or increase flood hazard or
- (2) Which other public agencies concerned have investigated and found in the best interest of the public not suitable for the type of platting and development proposed, may not be approved for subdivision unless adequate methods are formulated by the developer for meeting the problems created by subdivision of such land. Such land within any plat shall be set aside for such uses as shall not produce unsatisfactory living conditions.

B. Land Subject to Flood

Land within any floodway shall not be platted for residential occupancy or other building site and shall not be raised by fill. Other land subject to flood may be platted for residential use only if filled to such height as will secure a flood-free site based on data submitted by the subdivider and prepared by competent engineers, provided such use or fill does not endanger health, life, or property or restrict the flow of water or increase flood heights. To prevent such hazards, fill material should be taken from between the stream bank and the area to be filled. In applying these provisions, land subject to flood shall be defined as follows:

- (1) Land lying within the Special Flood Hazard Area as indicated on the most current Flood Insurance Rate Map Chatham County, North Carolina Unincorporated Areas as referenced in the Chatham County Flood Damage Prevention Ordinance (#39) or best available data. The maps are available for review at the Chatham County Planning Department. Land within a flood hazard area boundary shall not be considered a portion of the lot when calculating minimum lot area. (#31)
- (2) Areas included in the floodway shall be considered those shown on the floodway map for unincorporated areas of Chatham County, North Carolina prepared by the Federal Emergency Management Agency or best available data. The areas shown in the floodway shall not be included when calculating the lot area. (#31)

C. Water Hazard Setback (#8)

To help lessen the constant potential of water pollution from septic fields, sedimentation and storm water runoff and to maintain the scenic character of the county's waterways, the following areas shall be considered within the water hazard setback where neither buildings or septic systems shall be situated.

Roads that run parallel to rivers and streams specified below shall not have right-of-ways within the water hazard setback. Roads shall cross rivers and streams at angles that approximate right angles as closely as possible to minimize stream disturbance. The water hazard setback shall not be included when calculating the minimum useable lot area.

- (1) Along Deep River, Cape Fear River, Rocky River, Haw River and New Hope River or B. Everett Jordan Lake the water hazard setback shall extend one hundred (100) feet landward from the edge of the bank at normal pool level. A one-hundred (100) foot setback shall apply on each side (200 foot total) of all continuously flowing and intermittent streams as shown on the most recent U. S. Geological Survey maps within a distance of 2,500 feet from the bank of the rivers listed above. The land area within this water hazard setback shall not be included when calculating the minimum area requirement of three acres for lots having frontage along the rivers of the county. (#27)
- (2) The above shall be required unless the subdivider demonstrates that a lesser distance (but not less than fifty (50) feet) is adequate to maintain the scenic character of the waterway and to guard against stream pollution. Evidence may be based on topography, soils, geology, and other pertinent information and shall be prepared by a registered engineer, architect or other persons approved by the Board of County Commissioners. (#15Q)
- (3) Along tributaries of the above mentioned rivers and other continuously flowing streams, and intermittent streams as designated on the most recent USGS quadrangle maps for a distance of 2,500 feet from the specified rivers, the water hazard setback shall extend fifty (50) feet landward from the edge of the bank.
- (4) The above shall be required unless the subdivider demonstrates that a lesser distance (but not less than twenty-five (25) feet) is adequate to maintain the scenic character of the waterway and guard against stream pollution. Evidence may be based on topography, soils, geology and other pertinent information and shall be prepared by a registered engineer, architect, or other persons approved by the Board of County Commissioners. (#15Q)

The approximate location of the water hazard setback shall be marked with wooden stakes prior to preliminary approval.

B. Easements, Dedications, and Reservations

All easements, dedications and reservations shall be shown on the plat with notes stating their purpose.

(1) Utility Easements

Easements shall be provided for utilities along lot lines where necessary to provide utilities to every plated lot. The subdivider and the utility companies shall agree on the width of easements needed. Easements for subsurface sewage disposal systems shall be staked prior to preliminary approval and shall be designated on the final plat as a utility easement and described by bearings and distances and acreage.

(2) Pedestrian Easements

In such cases and at such locations as the Board of County Commissioners deems advisable, easements along side of rear lot lines not exceeding twenty (20) feet in width may be required for pedestrian or bicycle traffic to and from schools, neighborhood parks, and other public places. (#15Q)

(3) Drainage Easements

In cases in which a subdivision is traversed by a stream or drainage channel there shall be provided if requested a storm water easement of such width along each side of the stream as the Board of County Commissioners deems necessary for the purpose of widening, deepening, protecting, relocation, or otherwise improving such drainage easement. (#15Q) Other drainage easements may be required for the proper drainage of all lots.

(4) Sight Distance Easements at Intersections

Triangular sight distance easements at all street intersections shall be shown in dashed lines and so noted on the final plat. These easements will remain free of all structures, trees, shrubbery, driveways, and signs, except utility poles, fire hydrants, and traffic control signs. Sight distance easements shall be in accordance with the requirements of the State Division of Highways.

(5) Dedication of Waterways

Lakes, ponds, creeks, and similar areas will be accepted by the County for maintenance only if sufficient land is dedicated as a public recreation area or park or if such area constitutes a necessary part of the drainage control system. The suitability of such dedicated areas shall be evaluated by the Planning Board prior to being considered for acceptance by the Board of Commissioners.

(6) Community Service Facilities - Solid Waste Collection and/or Recycling Sites

The developer may be required to provide land suitable for solid waste collection and/or recycling sites. In lieu of land the developer may provide funds to the county for the acquisition of said land. The amount of land or funds provided

shall be based on a formula approved by the Board of County Commissioners. Said formula may take into consideration the number of lots in the development, the availability of other sites in close proximity to the development, the recommendation of the county director of solid waste and other appropriate factors. (#11)

C. Community Assets

In all subdivisions due regard may be shown for all natural features such as large trees and water courses and for historical spots and similar community assets which, if preserved will add attractiveness and value to the property.

6.6 Zoning or Other Regulations

No final plat of land within the force and effect of an existing zoning regulation shall be approved unless it conforms to such regulations.

Wherever there is a discrepancy between minimum standards or dimensions noted herein and those contained in the zoning regulations or other agencies regulations the more stringent standards shall apply.

Gretchen Smith
598 Jones Branch Road
Chapel Hill, NC 27517

January 7, 2007

Dear Commissioner:

My husband and I are adjacent property owners to the Lystra Road Subdivision Sketch Design request scheduled for the January 16 Board of Commissioners meeting. Although not required for a subdivision Sketch Design application, I would like to ask the Board of Commissioners to hold a Public Hearing on the Lystra Road Subdivision so that adjacent property owners have the opportunity to voice our concerns to you about the proposed subdivision.

The property now referred to as the "Lystra Road Subdivision" was originally submitted for a Conditional Use Permit for a Planned Unit Development under the name "Lystra Gardens" in March 2006. After a Public Hearing on March 20, the developer withdrew their application on March 29, 2006. An application for Subdivision Sketch Design was submitted for the same property under the new name "Lystra Road Subdivision" by a different developer in November 2006. Here is a brief summary of my concerns about this Sketch Design application as submitted:

- Insufficient information provided by the developers for a thorough and responsible review of the application by the County and the public
- Lack of incorporation of many suggestions provided to the previous developer, other than no longer using wastewater treatment spray fields in the current Sketch Design
- Unsuitability of the property for subdivision as proposed, based on pages 44-45 of the *Chatham County Subdivision Regulations*
- Amount of area indicated as "unsuitable" and adverse effects of soil disturbance as indicated in the *Detailed Soil/Site Evaluation Report*, and use of drip septic systems for some lots
- Need for both Environmental and Economic Impact Assessments in order to perform a responsible review, based on page 28 Section 4.4.B.1 "information required on a sketch design map is described in Section 5.1, Section 5.2 A, Section 5.2 B, and Section 5.2 C" and also in Section 5.2 "Additional Sketch Design or Preliminary Plat Information" on pages 38-39 of the *Chatham County Subdivision Regulations*
- Insufficient protection for conservation of the wetlands and streams of both the Herndon Creek Ravine Significant Natural Heritage Area and the Herndon Creek watershed area in general, based on pages 55-56 of the *Chatham County Subdivision Regulations*

I ask that the Board of Commissioners hold a Public Hearing prior to voting on this Lystra Road Subdivision Sketch Design application so that concerns about the proposed subdivision can be more fully explained, and to not approve the Sketch Design application as submitted.

Respectfully,

Gretchen Smith
919-967-9057

To: Chatham County Planning Board
Chatham County Board of Commissioners
From: Gretchen Smith, Adjacent Property Owner and President of Jones Branch Homeowners Association
Date: December 3, 2006
Subject: December 5 Meeting Agenda Regarding Sketch Design of "Lystra Road Subdivision"

My husband and I reside at 598 Jones Branch Road, adjacent to the southeast corner of the proposed "Lystra Road Subdivision". As an adjacent property owner to the proposed "Lystra Road Subdivision", I have concerns about the application and ask the Planning Board and Board of Commissioners not to approve the application for sketch design approval as submitted.

The subdivision sketch design phase of the current process requires only limited information from the applicant: Plat with topo of property, one-page application with complete adjacent owner addresses, Soil Scientist Report and soil map, confirmation from Chatham County Historical Association, and notice of meeting mailed to adjacent property owners 14 days prior to meeting. My concerns about the current process for subdivision sketch design phase are:

1. There is insufficient information provided by the developers for a thorough and responsible review of the application by the County or the public on the proposed development's environmental and economic impact to the County and the surrounding community. Sketch design approval is the crucial first step on the road to final development, and once sketch design approval has been obtained it may be difficult if not impossible to turn back the clock. A crucial first step such as sketch design should warrant more information than provided in this "Lystra Road Subdivision" application.
2. Fourteen days notice to adjacent property owners is insufficient time for adequately reviewing application documents and providing public input, especially when the developers are permitted to continue to add and/or revise documents up until the day of the meeting. Public hearings should be required for subdivision sketch design approval because it ensures that adjacent property owners and other interested parties are provided with the opportunity to express their opinions and concerns.

Suggestions were provided (see attached letters dated **June 5 and August 9**) to Garon Reeves with W.R. Henderson & Associates regarding the previous "Lystra Gardens" application. The only suggestion the current sketch design application appears to include is the "no use of spray fields or wastewater treatment spray irrigation systems." Because the latest application is confusing as to who are and are not involved in this development, it is unclear as to whether any of these suggestions have been shared with the new participants or were taken into consideration during sketch design planning. The concerns prompting the suggestions still exist, but there is very little information in the new application indicating how these concerns will be addressed and no one has solicited adjacent property owners' input since August.

Suitability of the Land for Subdivision

Page 44 of the *Chatham County Subdivision Regulations* discusses the suitability of the land for subdivision and the circumstances in which the land may be physically unsuitable for subdivision. I believe this property is unsuitable for subdivision as proposed, due to the following reasons:

1. Proximity to, and in some areas inclusion within, the Herndon Creek Ravine Significant Natural Heritage Area designated by the North Carolina Natural Heritage Program (see attached letter from **Kristen Sinclair, County Inventory Manager**).

2. Number of wetlands and streams located on the property, including unnamed tributaries that drain into Jones Branch stream and Herndon Creek on adjacent properties.
3. Steepness of topography in many areas of the property.
4. Bouldery and extremely bouldery surface on a significant portion of the property.
5. Sites located on the property that should be reviewed by the Office of State Archaeology as possible burial sites.
6. Narrow, winding rural road not designed for traffic generated by large developments.

Environmental and Economic Impact Assessment

Page 38 of the *Chatham County Subdivision Regulations* discusses “Additional Sketch Design or Preliminary Plat Information” that may be required if deemed “necessary for responsible review due to the nature of the land to be subdivided, or peculiarities in the proposed layout.” I believe both Environmental and Economic Impact Assessments should be required for the reasons stated above in order to perform a responsible review of this sketch design application. I would like to invite the Planning Department staff, Planning Board, and Board of Commissioners on a tour of the property as a part of this review, in order to fully understand and appreciate first-hand the special nature of the land and peculiarities in the proposed layout.

Conservation Easements

Pages 55 and 56 of the *Chatham County Subdivision Regulations* discuss easements, dedications, and reservations and community assets. I would like to request that conservation easements with a qualified land trust or government agency, rather than a Homeowners Association, be used to permanently protect areas within and adjacent to the Herndon Creek Ravine Significant Natural Heritage Area and Jones Branch stream, since it feeds into Herndon Creek. When asked about conservation easements at an August community input meeting, Garon Reeves with H.R. Henderson & Associates stated that they would be willing to consider conservation easements. The North Carolina Ecosystem Enhancement Program (EEP) has expressed interest in accepting donation of conservation easements along stream buffers (see attached **Herndon Creek Conservation Project**), and Garon Reeves has given permission for EEP to perform a site assessment. The Chatham Soil and Water Conservation District is also qualified to accept conservation easements of both streams and uplands. Homeowners associations do not have the resources or expertise needed for ongoing management of conservation easements, and homeowners’ restrictive covenants can typically be changed by a majority vote of the homeowners. Thus, that method of conservation is less desirable than conservation easements held with a qualified land trust or government agency.

Soil Evaluation and Drip Septic Systems

One of the concerns about the application is the amount of area indicated as “unsuitable” on the *Detailed Soil Evaluation for Subsurface Septic* map dated October 2006. The *Detailed Soil/Site Evaluation* report describes the “majority of soils on this site” as having a “bouldery to extremely bouldery surface . . . The potential exists for site disturbance during the removal of these boulders . . . A lot with initially adequate useable soil area may be rendered unusable as a result of improper site planning and/or disturbance.” A related concern are the discrepancies in areas indicated as “unsuitable” from the “Loose” *Preliminary Soil/Site Suitability Sketch* dated January 2004 for the old Lystra Gardens application and the *Detailed Soil Evaluation for Subsurface Septic* sketch dated October 2006 for the Lystra Road Subdivision application. Particularly along the southern and southeastern area of the property, there appear to be more areas indicated as “unsuitable” in the older sketch than in the new one. Although the older sketch is labeled preliminary while the newer one is labeled detailed, an explanation would be helpful as to why formerly unsuitable soil is now determined to be suitable. There are

also no details provided regarding the surface drip septic systems indicated for a number of the lots on the *Sketch Plan*, such as whether any clearing of natural trees/vegetation is involved and what measures would be put in place to prevent potential runoff to adjacent property or streams.

Wetlands and Streams

Another concern about the application is protection for the wetlands and streams not only on the Lystra Road Subdivision property, but also for Herndon Creek and Jones Branch stream and the unnamed tributaries that feed into them. The *Wetland & Stream Delineation Report for Lystra Gardens* lists at least four unnamed tributaries to Jones Branch and describes them as having “important aquatic function.” Kristen Sinclair, County Inventory Manager with the North Carolina Natural Heritage Program, recommended “a natural wooded buffer of at least 300 ft. be preserved along Herndon Creek”. I ask that any development be required to have the 300-foot buffer recommended by the state agency responsible for designating Herndon Creek Ravine as a Significant Natural Heritage Area, instead of the 100-foot buffer mentioned in the letter from Jacquelyn Presley with North Carolina Wildlife Resources Commission. I am concerned that a 200-foot “no build” area shown by the developer will not be adequate protection, because “no build” does not also guarantee no clearing of land, no septic systems, and no use of fertilizers or pesticides. Otherwise, I support the other recommendations made by Jacquelyn Presley in her letter and urge that they be required of the developer. I would also urge requirement of at least 100-foot native forested buffers along each side of all perennial streams and at least 50-foot native forested buffers along each side of all intermittent streams and wetlands as recommended in the North Carolina Wildlife Resources Commission’s *Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality* published August 2002 (see attached NCWRC report). This report also recommends “use of conservation easements, public ownership, or deed restrictions to ensure the perpetual conservation of buffer areas.”

Attachments:

Letter from Kristen Sinclair, County Inventory Manager with NC Natural Heritage Program
Herndon Creek Conservation Project

June 5, 2006 letter from Gretchen Smith to Garon Reeves

August 9, 2006 letter from Gretchen Smith to Garon Reeves

North Carolina Wildlife Resources Commission’s *Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality*



North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary

March 17, 2006

Mr. Keith Megginson
Planning Director, Chatham County Planning Department
P.O. Box 54
Pittsboro, NC 27312

Subject: Comments on Conditional Use Permit for a Planned Unit Development-- **Lystra Gardens**

Dear Mr. Megginson,

The North Carolina Natural Heritage Program is writing to express concern regarding the proposed Conditional Use Permit for the **Lystra Gardens** subdivision.

The attached map shows the location of three natural areas and six element occurrences tracked by the North Carolina Natural Heritage Program located in the vicinity of the proposed development. One of these natural areas, *Herndon Creek Ravine*, falls within the area proposed for development. Within Section 4 of the applicant's proposal, the applicant states that "The property does not abut any major wildlife areas, as identified in the Inventory of the Natural Areas and Wildlife Habitats of Chatham County, North Carolina". This statement is misleading and incorrect, because the property does abut a natural area as identified in the inventory. As indicated in the application, the developer has taken no measures to reduce the impact of the proposed subdivision on the *Herndon Creek Ravine* natural area. One option would be to cluster the 30 acres of protected open space within and along the natural area, where it would have the greatest ecological value.

Although our maps do not show occurrences of tracked species or natural communities within the project area, it does not necessarily mean that they are not present. It may simply mean that the full tract was not surveyed during the inventory. The close proximity of rare plant and animal species to the site suggests the possibility for these species to occur within the project area. We highly recommend that a current botanical and zoological field survey of the 140 acre tract accompany this proposal.

Finally, we recommend that a natural wooded buffer of at least 300 ft. be preserved along Herndon Creek to protect the ecological integrity of the ravine, provide a corridor for wildlife, and limit the impact of nutrient and chemical loading to the creek and, ultimately, to Jordan Lake.

Sincerely,

Kristen Sinclair, County Inventory Manager
Natural Heritage Program

Enclosure
KES/kes

1601 Mail Service Center, Raleigh, North Carolina 27699-1601
Phone: 919-733-4984 \ FAX: 919-715-3060 \ Internet: www.enr.state.nc.us/ENR/

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One
North Carolina
Naturally

Significant Natural Heritage Areas
North Carolina Natural Heritage Program
March 2006

Lystra Gardens
Planned Unit
Development

Boothe Hill

Herndon-Creek Ravine

Bush Creek Marshes

1000 0 1000 2000 Feet





THE HERNDON CREEK CONSERVATION PROJECT

November 28, 2006

Dear Neighbors:

Did you know your property is located within or nearby a Significant Natural Heritage Area as designated by the North Carolina Natural Heritage Program (NHP)? Significant Natural Heritage Areas (SNHAs) are areas that "include those plants and animals which are so rare or the natural communities which are so significant that they merit special consideration as land-use decisions are made."

Both the Herndon Creek Ravine and Boothe Hill SNHAs occur between Lystra and Jack Bennett Roads, and drain to Herndon Creek, which drains to Bush Creek, and then to Jordan Lake (see attached map). The Herndon Creek watershed is one of the last watersheds draining to the northwestern arm of Jordan Lake that has not been negatively affected by residential and commercial development east of US 15-501 – yet.

We are deeply concerned about the potential detrimental effects of future development in the Herndon Creek watershed and would like to protect the beauty and quality of this area through a project involving permanent conservation easements. That is why we are contacting neighbors who own property within the Herndon Creek watershed. Why should you consider donating a conservation easement, and what are some of the advantages you may not know about? These include:

1. The landowner still owns the property and is not restricted from selling or willing their property.
2. You do not have to grant public access to your land if you do not wish to do so.
3. Terms of the conservation easement are flexible. They are worked out between the landowner and the agency accepting the easement.
4. There are potential federal and state tax benefits to you for the donation.

The Jones Branch neighborhood requested the North Carolina Ecosystem Enhancement Program (EEP) to perform a site feasibility assessment for donation of permanent conservation easements for tax credits. EEP specialists made an initial site visit to the Jones Branch portion of the area and are interested in our project for their High Quality Preservation program. EEP is interested in accepting donations of stream buffers throughout the Herndon Creek watershed because of the integrity of the streams here. If you have land that contains perennial or intermittent streams within this watershed, you may be eligible to donate up to 300 feet of stream buffer to EEP (they accept a minimum of 50 feet). If you would like to read more about conservation easements and tax benefits, please visit these links:

<http://www.nceep.net/business/landowner/ease-faqs.pdf>
<http://www.enr.state.nc.us/conservation/taxcredit/>

In order to perform a more thorough site feasibility assessment of the Herndon Creek watershed area, EEP asked that we get signatures from all property owners granting permission to perform a site feasibility assessment on their property. Your signature is not a final commitment to donating a conservation easement – we realize you may need more information before taking that final step. However, we would like your signature agreeing to a site feasibility assessment and hope that you are willing to consider donation of a permanent conservation easement.

Please contact us and let us know your interest in the Herndon Creek Conservation Project! We will be following up with you in the next week via phone, and are looking forward to talking with you further about your participation in this exciting project.

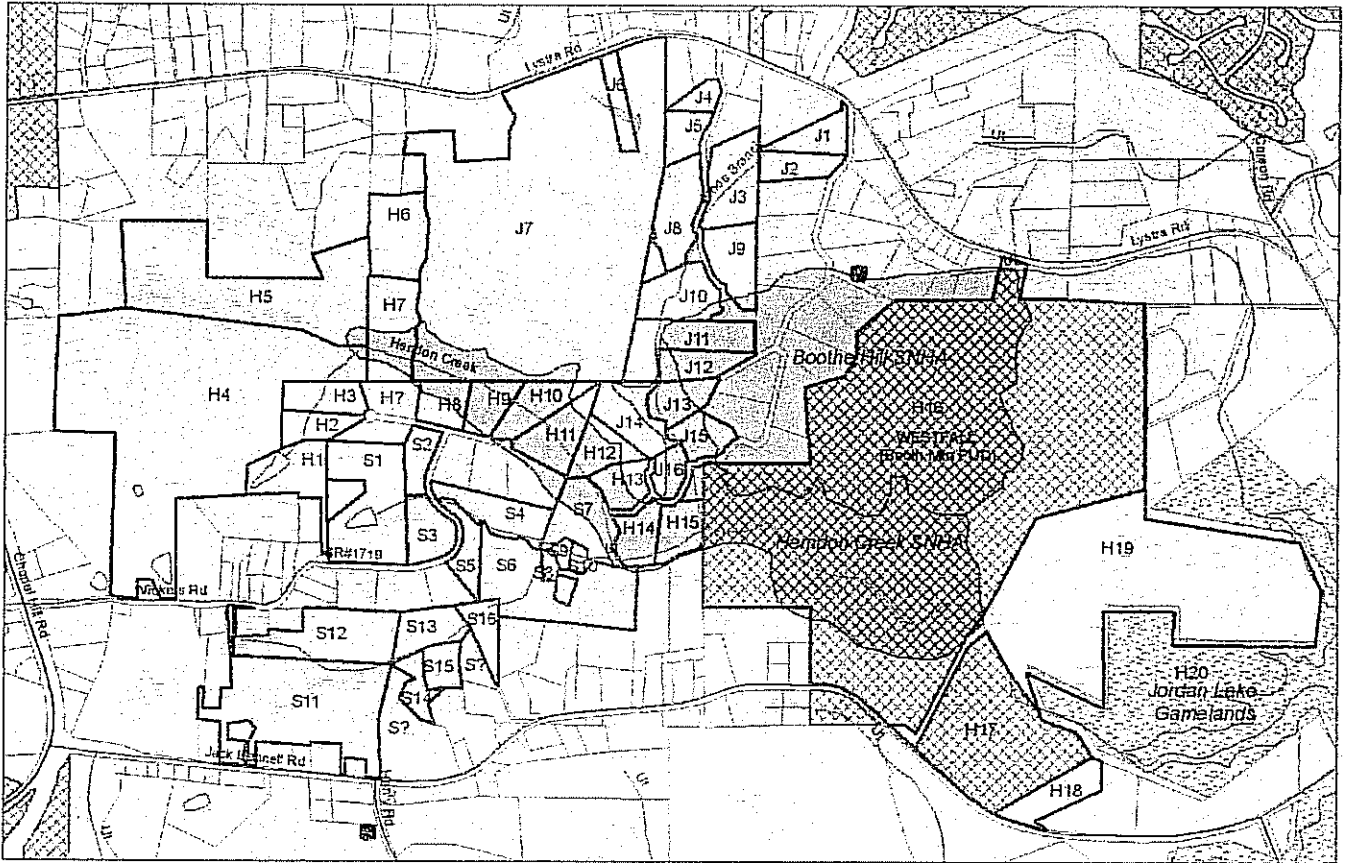
Your neighbors,

Gretchen Smith
598 Jones Branch Rd
Chapel Hill, NC 27517
967-9057

Allison Weakley
311 Boothe Hill Rd
Chapel Hill, NC 27517
942-9731
aweaklev@earthlink.net

 THE HERNDON CREEK CONSERVATION PROJECT

Map of the Herndon Creek watershed in northeastern Chatham County, showing the Herndon Creek Ravine and Boothe Hill Significant Natural Heritage Areas (SNHAs), the Westfall (Booth Mountain) development, and the Jordan Lake Gamelands (US Army Corps of Engineers).



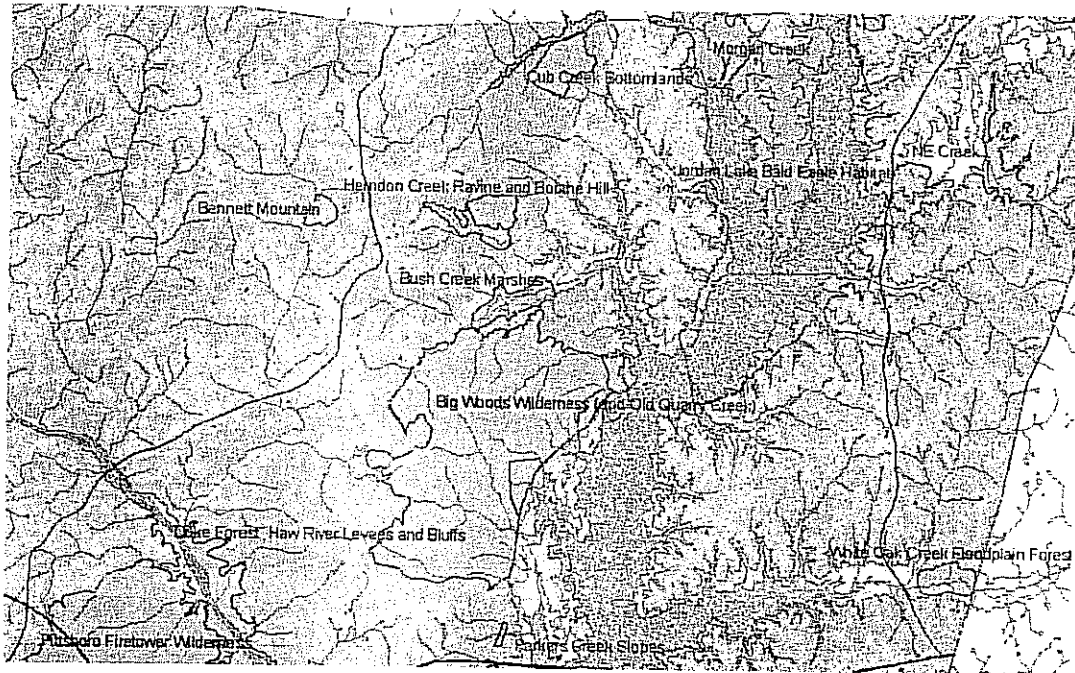
Parcels draining to the watershed via intermittent and perennial streams are highlighted in blue; parcel identification refers to subwatershed location (H = Herndon Creek, S = southern tributary of Herndon Creek, J = Jones Branch). NHP element occurrences for rare plant species are shown as red squares.

CONSERVATION in the HERNDON CREEK WATERSHED
Herndon Creek Ravine and Boothe Hill Significant Natural Heritage Areas (SNHAs)
By Allison E. Weakley, Biologist
18 August 2006

LOCATION

The **Herndon Creek Ravine and Boothe Hill Significant Natural Heritage Areas (SNHAs)** are located in northeastern Chatham County, south of Lystra Road and north of Jack Bennett Road (Hall and Boyer 1992; see Figure 1 below). These two SNHAs drain to Herndon Creek, which drains to Bush Creek and then to Jordan Lake.

Figure 1. Overview of NW arm of Jordan Lake, showing SNHAs (shaded green).

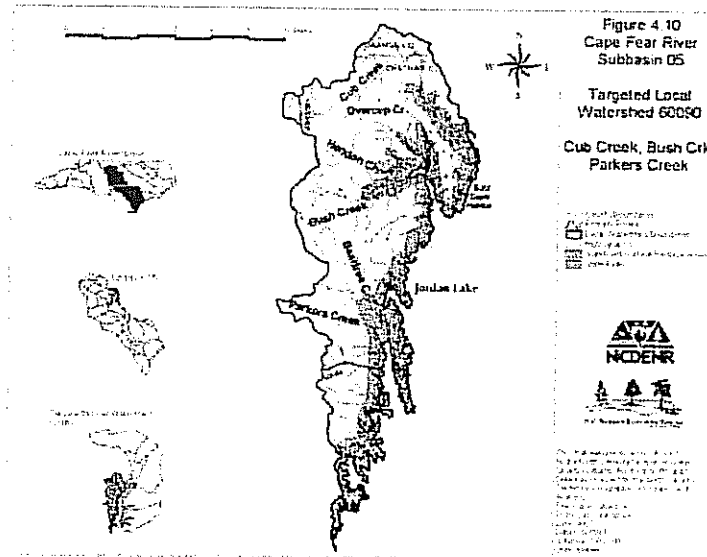


The Bush Creek Marshes SNHA and Jordan Lake Game Land are located just downslope and downstream of Herndon Creek Ravine and Boothe Hill SNHAs (LeGrand 1999). The Big Woods Wilderness SNHA, including Old Quarry Creek, occurs just south of the Bush Creek Marshes SNHA; Jordan Lake Bald Eagle Habitat and Cub Creek Bottomlands are to the north and northeast, and Bennett Mountain SNHA is to the west (see Figure 1).

Herndon Creek, along with Cub Creek to the north, and Bush Creek, Beartree Creek, and Parker's Creek to the south, form the northwestern arm of Jordan Lake. This watershed lies almost entirely east of US 15-501, west of Jordan Lake, and north of US64, and was designated a Targeted Local Watershed (#60090) by NC Department of Environment and Natural Resources in 2001 (see Figure 2, next page).

(see next page)

Figure 2. Targeted Local Watershed (subwatershed #60090) (NC DENR 2001; map from http://www.nceep.net/images/Cub_Creek.pdf).



BIOLOGICAL SIGNIFICANCE

The Boothe Hill SNHA is comprised of approximately 152 acres that stretches from Jones Branch on its western boundary, across the peak of Boothe Hill, and down the steep eastern slope; it is bordered to the south by the Herndon Creek Ravine SNHA. Boothe Hill is a monadnock that sits on the edge of the division between the Carolina Slate Belt and Triassic Basin. The drop from the rolling Piedmont terrain into the Basin is sudden and particularly prominent along Lystra Road just north of Boothe Hill and along Jack Bennett Road further south. This escarpment resembles the true Fall Line separating the Piedmont from the Coastal Plain, in that it marks an abrupt divide between resistant crystalline rocks and softer, more easily eroded sedimentary formations (Hall and Boyer 1992). Strong stream-cutting action is responsible for the many highly scenic ravines caused by this divide, and Herndon Creek Ravine is noted as one of the best examples of this in Chatham County. The area centered around Boothe Hill and Edwards Ridge (the site of the Governor's Club) is the most prominent and largest granitic pluton formation in Chatham County (Hall and Boyer 1992).

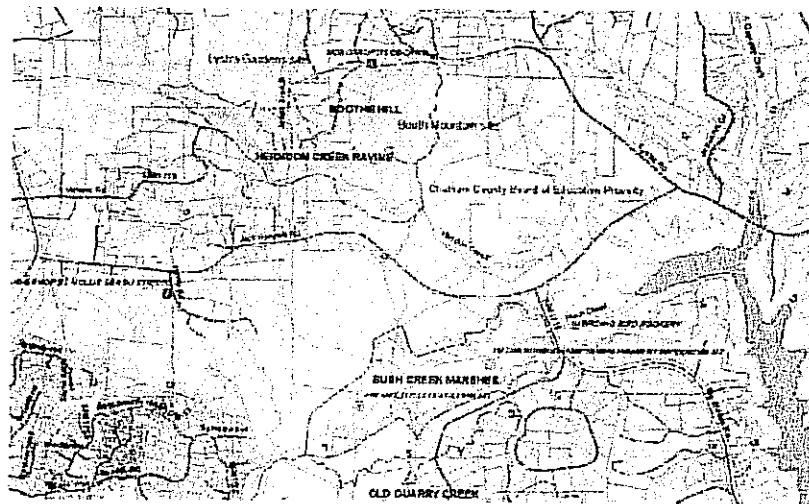
The Herndon Creek Ravine SNHA is comprised of approximately 143 acres (of which 56 is considered the "primary area") and encompasses most of the creek itself (short of the headwaters which are surrounded by residential development, and the broad floodplain further downstream). This is one of the deepest ravines in the County and it possesses one of the most extensive north-facing slopes (Hall and Boyer 1992). As streams flowing from the Carolina Slate Belt to the west cut east down into the Triassic Basin, a number of them have formed steep river slopes with microclimates that support biological relics from the last glacial period 10,000 years ago. These steep north-facing ravines contain the coolest and most mesic of upland habitats; in Chatham County, these sites are primarily clustered around the Triassic Basin where there is a steep elevational drop (Hall and Boyer 1992).

Although no state- or federally-listed species are currently known to occur on the slopes of Herndon Creek Ravine (no survey has been conducted), the montane-like conditions harbor species typically not found in other habitats in this area, and the scenic ravine supports a diverse array of wildflowers in the spring. Hall and Boyer (1992) noted that several large seeps are

known to occur along the base of the steep slopes of Herndon Creek Ravine, and that these seeps could provide habitat for the Four-toed salamanders (*Hemidactylium scutatum*) and Thorey's grayback dragonflies (*Trachopteryx thoreyi*).

Herndon Creek Ravine and Boothe Hill SNHAs serve as a major wildlife habitat areas in Chatham County (Hall and Boyer 1992). The mature uplands of the Boothe Hill area and their proximity to Jordan Lake via Herndon Creek provide important nesting and foraging habitat for area-sensitive species such as pileated and hairy woodpeckers, great horned and barred owls, wild turkey, box turtles, and bobcats (Bent 1938, 1961; Bock and Lepthien 1975; Conner et al. 1975; Schroeder 1983; Schafale and Weakley 1990; Cornell Laboratory of Ornithology 2001). Many of these species depend on mast-producing vegetation in proximity to wetlands. These sites are just upslope and upstream of Bush Creek Marshes SNHA, which provides important habitat for waterfowl and migratory birds. A Bald Eagle nesting site is known to occur within this SNHA, as is a Wading Bird Rookery (see Figure 3).

Figure 3. Map showing proximity of Herndon Creek and Boothe Hill SNHAs to Bush Creek SNHA, Big Wood Wilderness SNHA, and Jordan Lake.



As stated by Hall and Boyer (1992) in the Inventory of Natural Areas and Wildlife Habitat of Chatham County, North Carolina, the SNHAs identified as important wildlife habitat areas represent the last strongholds in Chatham for such area-sensitive species. Herndon Creek functions as an important wildlife corridor that connects the mature upland forests of Boothe Hill and the surrounding area to the lowlands of Jordan Lake, ensuring these uplands are contiguous with the Jordan Lake gamelands just downslope (Figure 3). Herndon Creek Ravine SNHA is one of the deepest ravines in the County and possesses one of the most extensive north-facing slopes, and the forests of the Boothe Hill area supports one of the last remaining mature upland forests in Chatham County (Hall and Boyer 1992).

In addition to providing high-quality wildlife habitat, these SNHAs help protect water quality in Herndon Creek and Jordan Lake. Other major wildlife sites in the NW Jordan Lake area are currently experiencing sediment problems and loss of integrity of these sites to development. Water quality monitoring at the confluence of Herndon Creek and Jones Branch by volunteers and staff of the Haw River Assembly has shown that Herndon Creek currently has excellent water quality.

The Herndon Creek watershed is one of the last watersheds that drain to the northwestern arm of Jordan Lake that has not been negatively impacted by residential and commercial development

east of US15-501, and is part of a Targeted Local Watershed identified by NC DWQ that includes Cub Creek, Herndon Creek, Bush Creek, Beartree Creek, and Parkers Creek.

A rare species has also been recently discovered adjacent to the Boothe Hill SNHA. Sweet pinesap (*Monotropsis odorata*) was found on the Weakleys' property in 2002 (see Figures 3 and 4).

BOUNDARY REVISIONS PROPOSED TO SNHAS

Field work conducted in Spring 2006 on the large tract north of the existing Herndon Creek SNHA (with permission of the future developer of the site) and west of the Boothe Hill SNHA by Alan S. Weakley and Allison E. Weakley, both botanists/ecologists with considerable experience in assessing high-quality sites, revealed that high-quality mature forest, seeps and springs, and other wetlands, including a marginal wetland and small upland depression pond, occurred north of the Herndon Creek SNHA boundary that was drawn in 1992.

Sweet pinesap (*Monotropsis odorata*) may also occur on the Lystra Gardens site, as indicated by its presence in mature Oak-Hickory forests of the Boothe Hill neighborhood (as discussed above; see also A.S. Weakley 2006). Sweet Pinesap is a Federal Species of Concern and State-listed (SR-T) plant species. *Monotropsis odorata* has a limited distribution and is rare throughout its range, and loss of forested habitat is a threat to this species (Southern Appalachian Species Viability Project 2002). This species is very rare in North Carolina, with fewer than 100 populations in the State, and especially rare in the NC Piedmont (Franklin and Finnegan 2006).

The Weakleys have proposed to the NC Natural Heritage Program that the boundaries for the Herndon Creek Ravine and Boothe Hill SNHAs be redrawn to include these discoveries (see Figure 4).

Figure 4. Proposed new boundary for the Herndon Creek Ravine SNHAs to include mature upland forest, seeps and other wetlands important to maintain integrity of site.



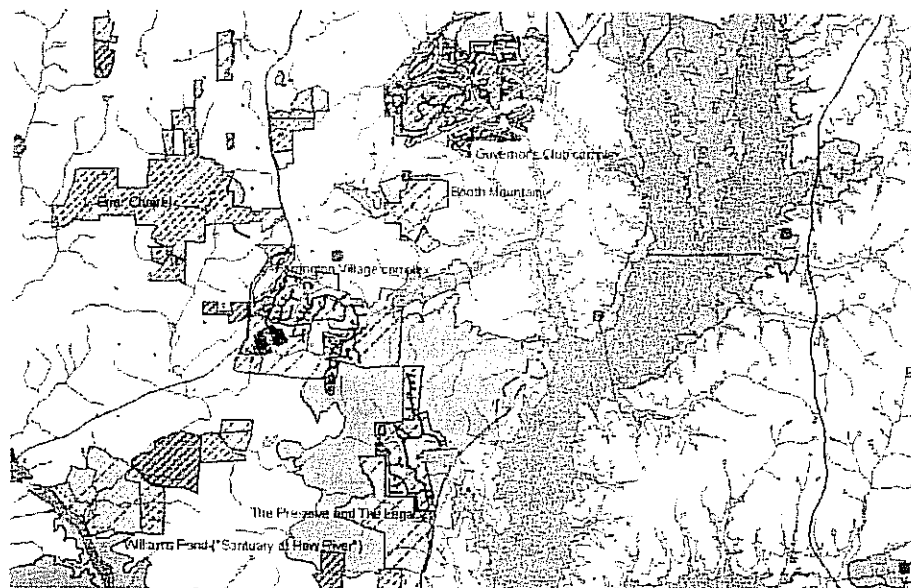
The proposed new boundary encompasses the mature, high-quality forest south of the powerline right-of-way on the site, and connects the upland depression, seeps, and other wetlands on the eastern portion of the site. The inclusion of these areas is important to the integrity of this area for important wildlife habitat, and helps buffer the steep slopes found on the eastern and southern portions of this site to protect water quality in Jones Branch and Herndon Creek. Many steep ephemeral channels and seeps drain the site on the east to Jones Branch and tributaries of Jones Branch, including seeps originating in the uplands, suggesting this site has a high water table. Several small wetlands occur in the uplands as well.

CURRENT PROTECTION OF THESE SITES

Hall and Boyer (1992) recommended that the landowners within the Herndon Creek Ravine and Boothe Hill SNHAs be alerted to the significance of the upland forest their property contains, especially its value for wildlife, and that covenants between landowners or zoning for large lots only would help preserve the integrity of these sites, as would the use of selective cutting of timber.

Natural areas that serve as important wildlife habitat in northeastern Chatham are under increasing development pressure. In the past several years, residential development has begun significantly negatively impacting many of the designated SNHAs (see Figure 5).

Figure 5. Recent development in northeastern Chatham County and its impact on SNHAs.

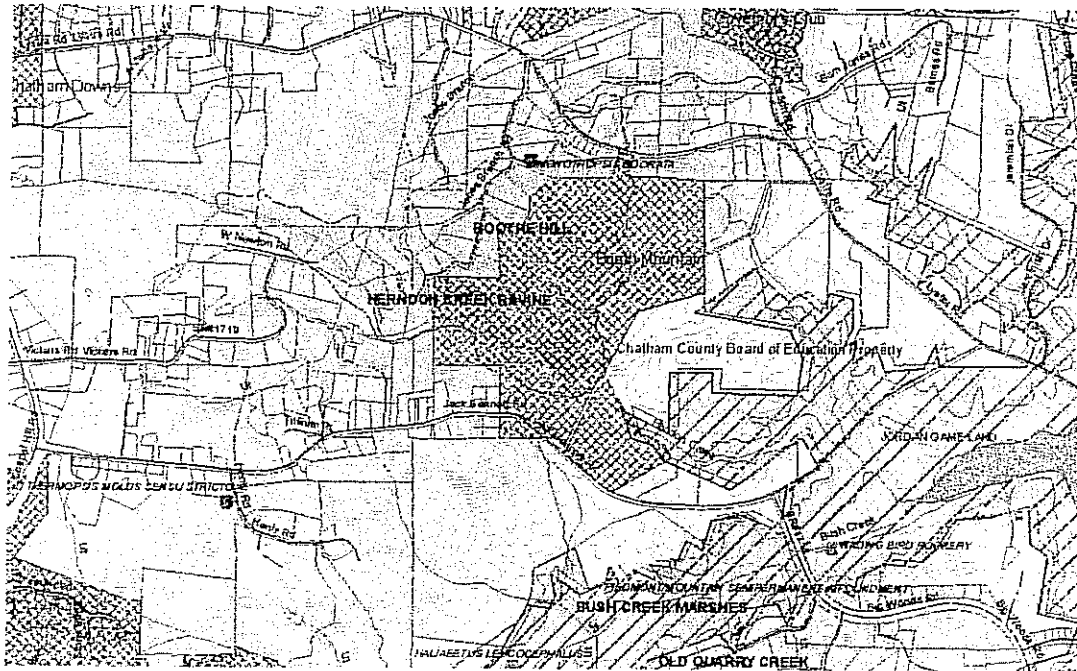


Since the Herndon Creek and Boothe Hill SNHAs were first designated, there has been some low impact residential development within the Herndon Creek watershed, but most of the watershed is composed of large lots, including those within the Boothe Hill, Jones Branch, and Newman Road neighborhoods where the minimum lot size is approximately 5 - 10 acres. The Boothe Hill and Jones Branch neighborhoods both have restrictive covenants that help maintain the neighborhoods as heavily wooded and with low impact on streams.

Currently much of the Herndon Creek Ravine and Boothe Hill SNHAs are comprised of large lot development that has retained the mature forests, and the many of the landowners recognize the significance of these sites and are willing to donate conservation easements to show their commitment to protecting these SNHAs in perpetuity.

However, two major residential developments, one of which has already been approved by Chatham County (Booth Mountain - 294 acres), and another which is in the early planning stages but due to go before the County for Conditional Use Permit (Lystra Gardens - 144 acres), stand to negatively impact these SNHAs unless efforts can be taken to protect portions of the sites deemed most important for the integrity of these SNHAs. Booth Mountain will impact portions of both these SNHAs, and the Lystra Gardens development could impact a portion of the Herndon Creek SNHA (see Figure 6).

Figure 6. Herndon Creek Ravine and Boothe Hill SNHAs, and their proximity to the Bush Creek Marshes SNHA and Jordan Lake, in northeastern Chatham County. [Map shows land protected as Jordan Game Land (shaded blue with diagonal stripes), SNHA boundaries (shaded green), parcels, rare species (red, brown and purple squares), and streams and wetlands.]



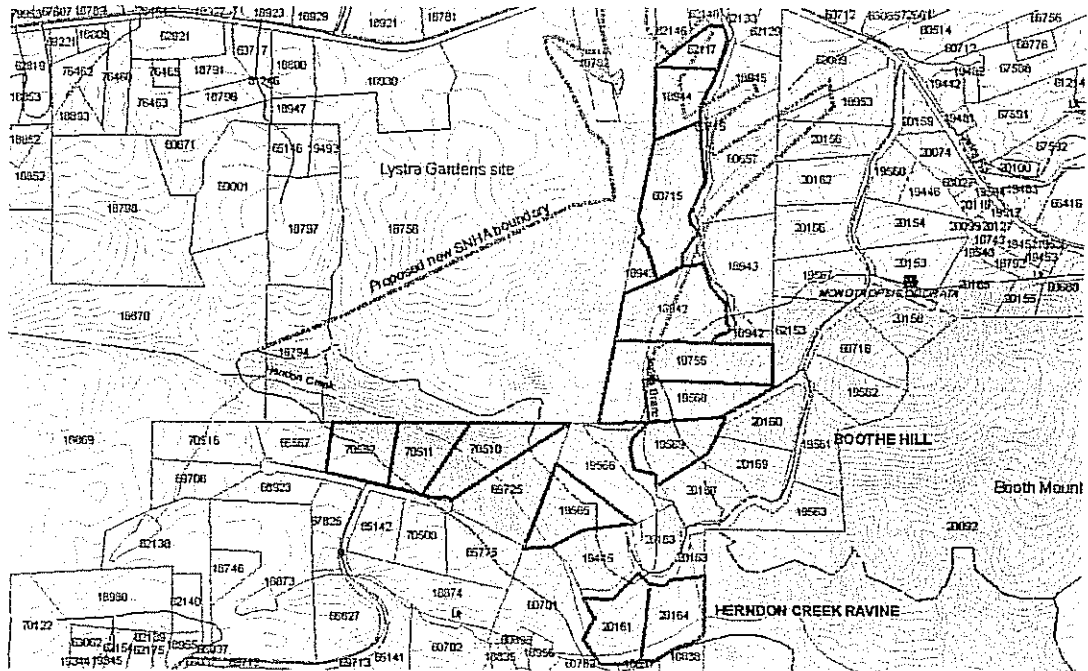
The developer of the Booth Mountain site, MacGregor Development Company, is required by an approved Chatham County Conditional Use Permit issued by Chatham County maintain a 200 foot undisturbed buffer along Herndon Creek, and to create an easement for a trail from the southern portion of the development to the property owned by the Chatham County Board of Education that will be used as a school site. In conjunction with interests of other landowners in this area, perhaps MacGregor could be convinced to also donate a conservation easement along Herndon Creek to connect the uplands to the school site as well.

LANDOWNERS INTERESTED IN PURSUING CONSERVATION EASEMENTS

Conservation easements held by a third party for properties within the Herndon Creek and Boothe Hill SNHAs, and within the Herndon Creek watershed in general, could go a long way toward protecting the integrity of these sites as important wildlife habitat and the water quality of Herndon Creek.

As of 17 August 2006, the following landowners have expressed great interest in pursuing conservation easements to help preserve the integrity of the Herndon Creek SNHA and the water quality of Jones Branch and Herndon Creek (see Figure 7 below):

Figure 7. Map of parcels within and adjacent to the Herndon Creek Ravine SNHA. [Red outline indicates parcels owned by landowners in the area who are interested in pursuing permanent conservation options (see parcel/landowner information below).]



JONES BRANCH NEIGHBORHOOD

(Contact: Gretchen Smith, President of Homeowner's Association)

Parcel # 18942

John and Kathleen Emerick
424 Jones Branch Rd
960-0105

Parcel # 18944

John and Leah Gutekunst
136 Jones Branch Rd
942-7923

Parcel # 62117

John and Robyn Phillips
102 Jones Branch Rd
942-7099

Parcel # 18755

Gretchen and Simon Smith
598 Jones Branch Rd
967-9057

Parcel # 60715
Cuyler and Farrah VonWald
314 Jones Branch Rd
928-9653

BOOTHE HILL NEIGHBORHOOD

Parcels # 19568 & 19569
Jennie DeLoach
484 Boothe Hill Road
942-5539

Parcel #19565
Peter and Shelley Theye
1065 Boothe Hill Road
967-5681

Parcels #20161 and 20164
Chuck Anderson and Nancy Easterling
921 Boothe Hill Road
967-4091

NEWMAN ROAD NEIGHBORHOOD

Parcels # 70552, 70511 & 70510
Marina (Cosi) Long and Robin Dennis
50 West Newman Road
933-6905

LYSTRA GARDENS SITE

The developer of the Lystra Gardens site, Garon Reeves from WR Henderson and Associates in Raleigh, expressed interest in protecting the Herndon Creek Ravine SNHA on their property during a community meeting held on 2 August 2006.

His contact information is:

Parcel # 18756
Garon Reeves
W.R. Henderson and Associates
919.845.0105 (office)
919.349.7948 (cell)
garon_reeves@wrhenderson.com

Gretchen Smith, President of the Jones Branch Homeowners Association, will be meeting with NC EEP on Thursday, 24 August 2006, to discuss possibilities for the involvement of EEP in assisting with conservation easements in the Herndon Creek watershed. Other neighbors within the Herndon Creek watershed are also likely to be interested in pursuing conservation options and should be contacted.

POTENTIAL FOR OPEN SPACE CONNECTIONS TO FORM GREENWAYS

Connections of open space along Herndon Creek could protect wildlife habitat and water quality, and could also create opportunities for passive, low impact recreation in an area of Chatham

County where residential development is resulting in higher populations of people who need options for recreation. Herndon Creek could certainly serve as a protected greenway if approached proactively. The potential for connectedness should be seriously evaluated as conservation easement options are explored.

For example, the Herndon Creek Ravine and Boothe Hill SNHAs are adjacent to land owned by Chatham County (for a potential school site) at the foot of Boothe Hill proper, and the County may also be interested in the connections of open space formed by adjacent properties. North Chatham School is located near and downslope from these sites as well, and connection of these open spaces could create a great opportunity for recreation and nature education. As mentioned earlier, the County has required the developer of Booth Mountain to provide an easement for a trail from that development to the proposed school site owned by the County.

Several large parcels remain undeveloped between Jordan Lake and US 15-501, and opportunities to link the Jordan Lake gamelands, the Boothe Hill and Herndon Creek SNHAs, west to the Bennett Mountain SNHA should be explored. Connections along Herndon Creek could form an important, protected greenway in northeastern Chatham that spans from US15-501 to Jordan Lake.

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June 5, 2006

Garon Reeves
W R Henderson & Associates
8366 Six Forks Road, Suite 203
Raleigh, NC 27615

Dear Mr. Reeves:

As owners of property adjacent to the "old Mae Evans property on Lystra Road", the Jones Branch Road homeowners are very concerned about what happens to this property since it will have a direct effect on our quality of life and water quality. Therefore, we would like to make the following suggestions including, but not limited to:

1. Concentrate everything in the center of the property and leave at least 400 feet of undisturbed natural vegetative buffers around the entire perimeter, with no clearing.
2. Lots and roads within the property would not cover more than 50% of the development. The remaining areas are left undisturbed in their natural, vegetative state.
3. Allow interested adjacent property owners the opportunity to purchase "development rights" to areas adjacent to their property.
4. Minimum lot size of five acres, or reconfigure lot size-layout so viewshed of existing homes on adjacent property is preserved even in winter. Developer should place large earth-tone targets at varying distances from adjacent existing houses to see how far into existing woodland the houses in development must be placed to achieve 100% visual screening year-round, even in winter.
5. Prohibit exterior lighting and windows on the side of homes facing towards adjacent property owners' homes, and require that exterior lights on other sides of homes in development be shielded to prevent light-trespass onto adjacent property.
6. Adhere to *Chatham County Lighting Ordinance* (draft).
7. Follow requirements for widths and uses described in *Section 9.1 Riparian Buffers* in the *Chatham County Compact Communities Ordinance*, including:
 - a. at least 100 feet buffers along all perennial streams
 - b. at least 50 feet along all intermittent streams
 - c. at least 50 feet along all ephemeral streams
8. Follow the recommendation by Kristen Sinclair of the North Carolina Natural Heritage Program that "a natural wooded buffer of at least 300 ft. be preserved along Herndon Creek".
9. No direct filling impact to wetlands.
10. Install measures to calm (slow) traffic on Lystra Road.
11. Only single-family detached homes and no townhouses or duplexes.
12. Do an Environmental Impact Assessment (EIA) with peer review. The EIA must follow State Environmental Policy Act (SEPA) guidelines, and include secondary and cumulative impacts.
13. No use of spray fields or wastewater treatment spray irrigation systems. Any septic and wastewater treatment areas should not be included in "open space". A detailed wastewater plan should be submitted with the application to the County. Any septic and wastewater treatment system should exceed minimum standards.
14. Development should have restrictive covenants that include:
 - a. Adherence to *Chatham County Lighting Ordinance* (draft).

- b. Restrictions to prevent noise pollution, including no use of sound amplifying equipment out of doors, and no operation of power equipment out of doors prior to 7:00 AM or after 9:00 PM. Restrictions should exceed those in the *Chatham County Noise Ordinance*.
 - c. No clear cutting of buffers and no more than 50% of each lot can be cleared.
 - d. No use of plant species that are on the NC Botanical Gardens (NCBG) list of invasive plant species. Covenants should prohibit the use of plants known to be invasive in this area, as posted on the NCBG web site (Plants to Avoid in the Southeastern United States: <http://ncbg.unc.edu/pages/74/>) and/or on the NC Native Plant Society web site (Invasive Species in NC: www.ncwildflower.org/invasives/invasives.htm).
 - e. Restrictions on use of pesticides and fertilizers to prevent contamination of ground water and streams.
 - f. No use of any motorized off-road vehicles anywhere on the property.
15. Buffers/open space are placed in a conservation easement with a land trust or government agency, not just the Homeowners' Association.

Sincerely,

Gretchen Smith, President
Jones Branch Homeowners' Association
598 Jones Branch Road

Smith, Gretchen

To: garon_reeves@wrhenderson.com
Cc: Allison Weakley (E-mail); gretchen_smith@bellsouth.net
Subject: Lystra Road Property



Suggestions
restrictive covena...

Garon, thank you for providing us the opportunity on the evening of August 2 to hear more about your plans for development of the property on Lystra Road. As we discussed that evening, I expressed a willingness to work with you on restrictive covenants for the development and am attaching a document to this e-mail with suggestions. These suggestions are based on restrictive covenants currently in place for Jones Branch Homeowners and suggestions I have received from other people. Please let me know if you have any questions or would like to discuss these further.

As you correctly pointed out that same evening when I asked about donating conservation easements, there are potentially significant tax credits available if you and your investors are willing to donate permanent conservation easements to a qualified land trust or government agency. Donation of permanent conservation easements on this property would be a wonderful gesture of goodwill and stewardship, and getting tax credits in return would be a win-win situation for all. Information on conservation tax credits is available at this web site link below, in case you do not already have this:

<http://www.enr.state.nc.us/conservationtaxcredit/>

Gretchen Smith
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Chapel Hill, NC 27517
919-967-9057 (home phone)
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August 9, 2006

Garon Reeves
W.R. Henderson & Associates
8366 Six Forks Road, Suite 203
Raleigh, NC 27615

Dear Garon:

We appreciate the opportunity you have given adjacent property owners to provide input into the development proposed for your property located on Lystra Road. These suggestions for restrictive covenants for the proposed Lystra Road development (aka "Lystra Gardens") are intended to enhance and protect the economic value, quality of life, quality of the environment in general and control for pollution of air and water resources in particular, and the aesthetic qualities and attractiveness of the area when viewed from adjacent lots and from the public and private roads. Suggestions for restrictive covenants include, but are not limited to, the following:

1. Owners of each separate lot should not clear nor permit to be cleared of the trees more than fifty percent (50%) of their respective lot.
2. No clear-cutting of buffers permitted.
3. Pets must be kept under control at all times so as not to constitute a nuisance, physical or auditory.
4. Prohibit exterior lighting and windows on the side of homes facing towards adjacent property owners' homes, and require that exterior lights on other sides of homes in development be shielded to prevent light-trespass onto adjacent property.
5. Individual homeowners and entire development should adhere to Chatham County's draft Lighting Ordinance.
6. Include restrictions to prevent noise pollution, including no use of sound amplifying equipment out of doors and no operation of power equipment out of doors prior to 7:00 Am or after 9:00 PM.
7. Prohibit use of plant species that are on the NC Botanical Gardens (NCBG) list of invasive plant species, as posted on the NCBG web site *Plants to Avoid in the Southeastern United States* found at <http://ncbg.unc.edu/pages/74/> and/or on the NC Native Plant Society web site *Invasive Species in NC* found at www.ncwildflower.org/invasives/invasives.htm.
8. Restrictions on use of pesticides and fertilizers to prevent contamination of ground water and streams. No persistent pesticides or herbicides, such as those containing hydrocarbons, should be used on any lot except those used for termite treatment.
9. No firearms should be discharged and no hunting allowed.
10. No use of any motorized off-road vehicles such as motorcycles, trail bikes, or ATV anywhere on the property except as may be reasonably required to get to and from the state road to the individual's home.
11. No open fires should be allowed without first obtaining a permit from the Forestry Service. All trash incinerators should have a spark guard attached.
12. No trash may be dumped within view of the common roads or dwellings on adjacent lots.

Please let me know if you have any questions or would like to discuss any of these suggestions.

Regards,

Gretchen Smith
President, Jones Branch Homeowners Association
598 Jones Branch Road
Chapel Hill, NC 27517



☒ *North Carolina Wildlife Resources Commission* ☒

Charles R. Fullwood, Executive Director

GUIDANCE MEMORANDUM TO ADDRESS AND MITIGATE SECONDARY AND
CUMULATIVE IMPACTS TO AQUATIC AND TERRESTRIAL WILDLIFE RESOURCES
AND WATER QUALITY
(August 2002)

which significant modifications or expansions are proposed. Incorporation of the measures that are outlined throughout the document by local governments will alleviate the concerns of the natural resource agencies and will provide for a smoother and more timely review of environmental documents and permits.

The recommendations presented in this document to avoid or mitigate these impacts are based on the best available science and were obtained by a synthesis of scientific information in journals, publications, reference books, and personal communication with professionals familiar with North Carolina aquatic species and other natural resources. However, the recommendations may be revised as more information becomes available about species' habitat requirements and measures necessary to protect aquatic and terrestrial habitat and water quality. It is envisioned that through the active participation and initiative of local governments in partnership with State resource and regulatory agencies, the concerns regarding impacts of significance will be alleviated and the review of environmental documents and permits will be more efficient and effective.

Recommendations include measures regarding:

- Forested buffers
- Stream and wetland resources
- Infrastructure locations
- Floodplains
- Impervious surfaces and stormwater treatment
- Erosion and sediment control

simultaneously work to maintain or improve water quality, protect aquatic habitat, permit economic expansion, and preserve the character of the land.

Introduction

Thousands of acres of land are developed each year in North Carolina, and this development consists of many individual and often unrelated projects. Without proper safeguards, the cumulative effects of land development can transform the landscape and negatively impact the environmental character and natural functions of the ecosystems. North Carolina projects a population increase of more than 3 million new individuals by the year 2020 (N. C. Progress Board 2001); therefore, it is imperative that coordinated measures be implemented to protect wildlife resources and their habitats. Most citizens want a clean environment and a healthy economy, therefore measures must be implemented statewide to allow economic growth without significant and irretrievable impacts to North Carolina's environment.

Some of the greatest impacts of development, both land-based and near-water development, occur on water quality in our streams and rivers. Many of our native species of aquatic organisms have become highly imperiled as a result. Approximately one-third of North American freshwater fish species (Williams et al. 1989) and 72% of freshwater mussel species (Williams et al. 1993) qualify for classification as "endangered", "threatened", or "special concern" at the federal level, and habitat loss is a primary culprit, particularly for mussels. In North Carolina, 21% of freshwater fishes and 53% of freshwater mussel species are designated endangered, threatened, or of special concern at the state level (LeGrand et al. 2001). The decline in freshwater species is a direct reflection of declining quality of our streams and rivers. Federally endangered and threatened species are particularly affected by secondary and cumulative impacts associated with urban development due to their sensitivity to slight habitat alterations. A high proportion of listed species occurs within areas of the state that are developing the most rapidly; some have lost major reaches of their habitats within the past few decades, others are in danger of being extirpated from entire river basins, and one species has been extirpated from the state, and thus is extinct (Carolina Elktoe, *Alasmidonta robusta*).

When development is conducted in an unplanned and amorphous or ambiguous pattern it can have more serious impacts on ecosystem function. Rapidly developing landscapes can result in stream degradation due to increases in stormwater runoff, sedimentation and other pollutants, and riparian habitat losses. Measures that may mitigate these impacts include preservation of forested stream buffers of appropriate size, reduction of impervious surfaces, and effective stormwater treatment.

The recommendations presented in this document to avoid or mitigate these impacts are based on the best available science and were obtained by a synthesis of scientific information in journals, publications, reference books, and personal communication with professionals familiar with North Carolina aquatic species and other natural resources. However, the recommendations may be revised as more information becomes available about species' habitat requirements and measures necessary to protect aquatic and terrestrial habitat and water quality.

General Mitigation Measures for All Watersheds (more extensive measures apply to watersheds that support federal endangered and threatened species)

Although riparian zones constitute a small percentage of the landscape, they frequently perform important ecological functions and contain a disproportionately high number of wildlife

headwaters (Vannote et al. 1980). In addition, headwater streams can significantly reduce nutrient export to rivers (Alexander et al. 2000; Peterson et al. 2001).

1. We recommend the maintenance or establishment of a minimum 100-foot native forested buffer along each side of perennial streams and 50-foot native forested buffer along each side of intermittent streams and wetlands throughout the present and future service areas or the entire municipal jurisdiction (EPA 2000; Stewart et al. 2000). We additionally encourage the implementation of buffers on ephemeral streams due to the important functions that they provide as headwater streams (Alexander et al. 2000; Peterson et al. 2001). Buffers should be measured horizontally from the edge of the stream bank (Knutson and Naef 1997), which may result in wider buffers on higher gradients, and must be provided over the entire length of stream, including headwater streams. Further, we recommend leaving 30% of the development area as greenspace, which would include buffers and wetlands and ensure that the greenspace is connected to natural resources.

Wide, contiguous riparian buffers have greater and more flexible potential than other options to maintain biological integrity (Horner et al. 1999) and could ameliorate many ecological issues related to land use and environmental quality (Naiman et al. 1993). As expansion of developed areas continues into the watershed, wildlife habitat can change, become fragmented, and even disappear. Riparian buffers provide travel corridors and habitat areas for wildlife displaced by development. In addition, riparian buffers serve to protect water quality by stabilizing stream banks, filtering capacity of stormwater runoff, and provide habitat for aquatic and fisheries resources.

2. We recommend that delineation of streams be conducted for the municipal service area according to U. S. Army Corps of Engineers (USACOE) or N. C. Division of Water Quality (NCDWQ) methodology. This information can be found at <http://h2o.enr.state.nc.us/newetlans/strmfrm.html> (accessed May 2002). U. S. Geological Survey (USGS) maps underestimate the extent of streams. Recent research has shown that USGS maps can underestimate total stream length in the Piedmont of North Carolina by 25 % (Gregory et al. in press).
3. We recommend that sewer lines, water lines, and other utility infrastructure be kept out of riparian buffer areas (Knutson and Naef 1997; and references therein). All utility crossings should be kept to a minimum, which includes careful routing design and the combination of utility crossings into the same right-of-way (provided there is not a safety issue). Discontiguous buffer segments can impair riparian functions disproportionate to the relative occurrence of the breaks in the buffer (May and Horner 2000; Van Sickle 2000), and multiple crossings can result in cumulative impacts. The directional bore (installation of utilities beneath the riverbed, avoiding impacts to the stream and buffer) stream crossing method should be used for utility crossings wherever practicable, and the open cut stream crossing method should only be used when water level is low and stream flow is minimal. Manholes or similar access structures should not be allowed within buffer areas. Stream crossings should be near perpendicular (75° to 105°) to stream flow and should be monitored at least every three months for maintenance needs during the first 24 months of the project and then annually thereafter. Sewer lines associated with crossing areas should be maintained and operated at all times to prevent the discharge to land or surface waters. We recommend a minimum 50–100 feet setback on all streams, lakes, and wetlands for these structures, which falls in line with the recommended buffer widths. In circumstances where minimum setbacks cannot be attained, sewer lines shall be constructed of ductile iron or other substance of equal durability. Further, pesticides

analysis of impervious surfaces to watershed classification based on water quality data, and they found that watersheds of unimpaired streams averaged 8% imperviousness, impacted streams averaged 11%, and degraded streams averaged 24% (<http://projects.ch2m.com/WakeCounty/>; accessed May 2002).

We also recommend that the local government provide for sufficient open space to effectively reduce impervious surface so that predevelopment hydrographic conditions are maintained, limit curb and gutter in new developments, and prevent direct discharges of stormwater into streams. To achieve no net change in the hydrology of the watershed, we recommend installation of grassed swales in place of curb and gutter and on-site stormwater management (i.e. bioretention areas or other attenuation measures). These designs often cost less to install (Kwon 2000) and significantly reduce environmental impacts from residential development. Information regarding financing stormwater management can be found at <http://stormwaterfinance.urbancenter.iupui.edu/> (accessed May 2002).

Many of these recommendations have been applied in Maryland to protect the Chesapeake Bay from water quality degradation (MDE 2000). Suggested examples to accomplish the <10% impervious goal are using conventional designs at a level of <10% imperviousness or using conservation clusters with higher densities, with dedicated open space and other stormwater control measures to mimic the hydrograph consistent with an impervious coverage of less than 10%. Reduction of road widths is one method to reduce overall impervious surface coverage. The N. C. Department of Transportation (NCDOT) has issued road guidelines that allow for the reduction in street widths when compared to standard secondary road guidelines. This material can be found at <http://www.doh.dot.state.nc.us/operations/tnd.pdf> (accessed May 2002). In addition, there are site planning practices that, when incorporated with the above mentioned road building guideline, can further reduce the amount of impervious surface within a site (see recommendations in the document Better Site Design (Center for Watershed Protection; <http://www.cwp.org/>; accessed May 2002).

7. Use bridges for all permanent roadway crossings of streams and associated wetlands to eliminate the need to fill and culvert, where practicable. If culverts must be used, the culvert should be designed to allow passage of aquatic organisms. Generally, this means that the culvert or pipe invert is buried at least one foot below the natural streambed. If multiple cells are required, the second and/or third cells should be placed so that their bottoms are at stream bankfull stage. This will allow sufficient water depth in the culvert or pipe during normal flows to accommodate movements of aquatic organisms. If culverts are long and sufficient slope exists, baffle systems are recommended to trap gravel and provide resting areas for fish and other aquatic organisms. If multiple pipes or cells are used, at least one pipe or box should be designed to remain dry during normal flows to allow for wildlife passage. In addition, culverts or pipes should be situated so that no channel realignment or widening is required. Widening of the stream channel at the inlet or outlet of structures usually causes a decrease in water velocity causing sediment deposition that will require future maintenance. Finally, riprap should not be placed on the streambed.
8. We recommend that municipalities incorporate the elements listed below into their erosion and sediment control plans (see Brown and Caraco 2000 for additional information). Sediment is considered the most important cause of water pollution in the

1. Permits for new developments exceeding 6% imperviousness shall be required to include stormwater controls designed to replicate and maintain the hydrographic condition at the site prior to the change in landscape and at a minimum include provisions that satisfy WS II-HQW minimum standards (WSII-HQW waters as precedent; Schueler 1994; Arnold and Gibbons 1996; Doll et al. 2000; Mallin et al. 2000; May and Horner 2000; Stewart et al. 2000). This can be achieved through a variety of measures (see Item 6 above).
2. Insufficient information exists in the literature for the minimum buffer widths necessary to ensure the continued survival of federally endangered and threatened aquatic species. Therefore, the following minimum buffer recommendations are based on the best scientific information available and the opinion of biologists most familiar with the species in the state. The minimum recommended buffer widths may actually need to be more or less stringent; and therefore, recommended widths may be modified as more information becomes available. A 200-foot native, forested buffer on perennial streams and a 100-foot forested buffer on intermittent streams, or the full extent of the 100-year floodplain, shall be required for new developments. Detailed studies have resulted in recommendations of 200-foot buffers and wider for protection of priority habitats in the U. S. (Knutson and Naef 1997, and references therein; Martin et al. 2000; Richards and Hollingsworth 2000). If wooded buffers do not exist, then these areas shall be revegetated or allowed to naturally revegetate (so long as the area is pervious) to increase the functionality of a forested buffer. (Knutson and Naef 1997, and references therein; 200-foot buffers on Randleman Lake; 200-foot buffers associated with protection of aquatic endangered species habitats required for Buckhorn Reservoir Expansion Project in 1995 – City of Wilson).
3. Grassed swales shall be used in place of curb and gutter for new developments, except in areas with >5% slope. Check dams, level spreaders, and other associated best management practices shall be used to minimize the effect of stormwater runoff entering the riparian buffer areas. In areas where slopes exceed 5%, stormwater collected in piped conveyance systems shall be directed away from surface waters and best management practices shall be employed at both the intake and the outlet areas. Curbs and gutters may be used in combination with sidewalks in areas where clustering of uses increases the net local density to a level greater than 4 dwelling units per acre. This will separate the pedestrian portion of a street-scape from the automobile portion and will encourage greater pedestrian mobility within the cluster development (see recommendations in Pedestrian Facilities Users Guide at http://www.walkinginfo.org/insight/features_articles/userguide.htm; accessed May 2002). Clustering development away from riparian areas will also allow for greater stream protection.
4. We recommend that that direct discharges of stormwater to streams not be allowed. Effective energy dissipation at the pipe outlet shall be accomplished to prevent scour of the stream channel and buffer. Stream habitats are maintained most effectively when stormwater runoff is dispersed through a vegetated or grassed buffer zone prior to entering the riparian buffer. The ditching or piping of stormwater except when used in combination with grassed swales, level spreaders and check dams shall not be allowed in the riparian buffer. At no time should any mandated vegetated buffer zone be used for these engineered devices. In addition, the use of trees—particularly evergreen species—can be an effective component of an integrated stormwater management plan and can reduce the amount of surface water runoff by as much as 7% on a site due to interception, transpiration, and other processes (see

Maintenance of Rights-of-Ways

1. Insecticides and herbicides shall not be used within 200 feet of streams, floodplains, and associated wetlands (Knutson and Naef 1997; and references therein) except when needed to protect native flora and fauna from exotics and when using appropriately labeled products, such as biopesticides (<http://www.epa.gov/pesticides/biopesticides/>; accessed May 2002).
2. Native, forested plant communities shall be maintained within 200-foot buffer area of streams, floodplains, and associated wetlands. A closed canopy will be maintained over streams. Emphasis will be placed upon trimming trees, instead of tree removal, within 200 feet of streams, floodplains, and associated wetlands (Knutson and Naef 1997; and references therein).

Sediment and Erosion Control

1. In addition to the items listed under the general mitigation measures, locally enforced stringent erosion and sedimentation control requirements shall be developed and implemented for all construction. The development of these requirements shall be fully coordinated with the state and federal agencies involved in aquatic endangered species protection. These measures shall be state-of-the-science and significantly exceed state minimum requirements for sediment and erosion control. Local ordinances shall be developed to prevent "forestry exemptions" from turning into development opportunity without meeting the conditions identified in this memorandum.
2. Fill or buildings shall not be allowed in the 100-year floodplain (as described in previous sections).

Additional Recommendations for Federally Listed Species

1. The local government shall solicit assistance and concurrence from resource agencies such as NCDWQ, N. C. Division of Land Resources, NCWRC, N. C. Natural Heritage Program, and USFWS during the initial development and assessment of best management practices for stormwater management, sediment and erosion control, utility placement, etc.
2. Maps shall be developed of the anticipated construction lines of utilities associated with expanded service areas. This information shall become part of a Geographic Information System (GIS) database housed and maintained by the local government. Surveys or reviews will use maps and field determinations, when necessary, in conjunction with USACOE and NCDWQ delineation criteria for wetlands and waters. As infrastructure or development is planned or developed, field surveys should be conducted to assess impacts and means to avoid impacts. Field surveys (delineation) or intensive map reviews (including soil surveys, National Wetland Inventories (NWI) maps, USGS maps, watershed protection maps of all wetlands and waters) shall be completed and mapped with GIS technology. All GIS databases and associated files shall be provided to state and federal agencies upon request.

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Riparian habitat function	Perpendicular distance from stream in meters (feet in parentheses)	Source
Filter Sediment/Phosphorus	10(32)-20(65)	Aubertin and Patric 1974 <i>in</i> Osborne and Kovacic 1993 (WV)
	Nearly 50% of ¹³⁷ Cs labeled sediment moved over 100m(328) in riparian area	Cooper et al 1987 (NC)
	16(52)	Cooper and Gilliam 1987 <i>in</i> Osborne and Kovacic 1993
	6-18(20-59)	Daniels and Gilliam 1996 (NC)
	9(30) (grass filter)	Dillaha et al. 1989 (VA); Dillaha et al. 1988 (VA); Magette et al. 1989 (MD)
	9(29)	Haupt and Kidd 1965 <i>in</i> Osborne and Kovacic 1993 (ID)
	55(180)	Jordan et al. 1993 (MD)
	Most sediment deposited within 1 st 30(98) of buffer but extends 80(262) in riparian buffers	Lowrance et al. 1988 (GA)
	30(98) removed 75-80% from storm water in logged areas	Lynch et al. 1985
	28(92) for 81% efficiency	Mander et al. 1997 (Estonia)
	16(52) or 39(127) grass	Osborne and Kovacic 1993 (IL)
	19(62) trapped 90% of sediment	Peterjohn and Correll 1984 (MD)
	50(164) trapped 94% of sediment	Peterjohn and Correll 1984 (MD)
	50(164) for 84% total and 73% soluble P removal efficiency	Peterjohn and Correll 1984 (MD)
	15(49)-45(147)	Trimble and Sartz 1957 <i>in</i> Osborne and Kovacic 1993 (NH)
	30(100) recommended for trapping sediment	Wenger 1999
	17-20(56-66) or 28(92) to produce lowest simulated outputs	Williams et al. 2000 (GA)
21(69) for 67% total and 69% soluble P removal efficiency	Young et al. 1980 (MN)	
27(90) removed 93% sediment from feedlot; 23(75) removed only 33% from dairy farm runoff	Young et al. 1980 (MN); Horner and Mar 1982 <i>in</i> Castelle et al. 1994	

Riparian habitat function	Perpendicular distance from stream in meters (feet in parentheses)	Source
Food Resources	>30(100) particulate organic matter (POM)	Palik, et al. 2000 (Eastern U.S.)
Instream habitat and aquatic resources	73–275(240–902) semi-aquatic resources	Burke and Gibbons 1995 (SC)
	≥30(100) to minimize short-term logging impacts on streams	Davies and Nelson 1994 (Australia)
	15–30(50–100) for minimum maintenance	Johnson and Ryba 1992 <i>in</i> Knutson and Naef
	>30(100)	May and Horner 2000 (WA) ; Martin et al. 2000 (MI, VA) ; Stewart et al. 2000 (WI)
	>61(200)	Richards and Hollingsworth 2000 (Eastern U.S.)
	164(534) semi-aquatic resources	Semlitsch 1998 (multi state)

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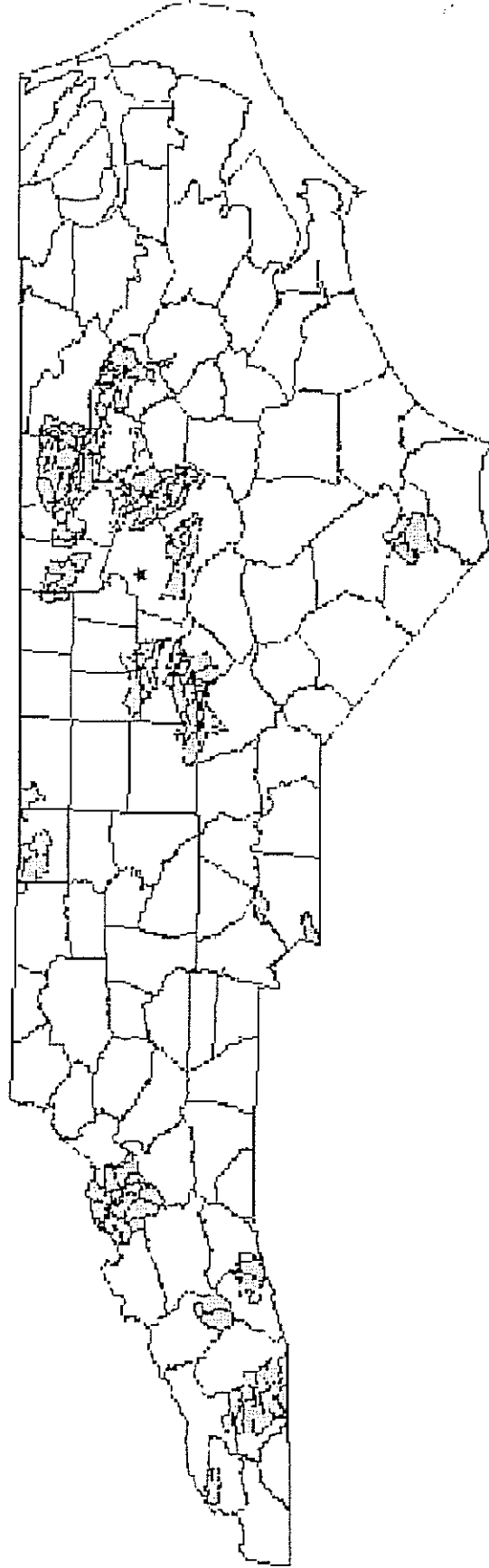
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Appendix B. N. C. Division of Water Quality designated 14 digit hydrologic unit code (HUC) drainage basins that support federally endangered and threatened species.
(July 2002: Map may be updated as more information is acquired)