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*Environmental Impact Assessment*

**Briar Chapel  
Chatham Co, NC**

Prepared for  
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# Executive Summary

The purpose of this Environmental Impact Assessment (EIA) is to evaluate the potential environmental impacts associated with the proposed Briar Chapel compact community project in accordance with Chatham County's Compact Communities Ordinance. This EIA was performed in general accordance with the standards for performance for an Environmental Assessment developed to meet the requirements of the North Carolina Environmental Policy Act. This assessment was completed based on review of public documents and documents developed for Briar Chapel. Although CH2M Hill personnel did not walk the project site or perform field sampling, this report relies on and incorporates the findings of numerous other consultants who have evaluated various aspects of the site and the proposed development and have performed field testing and analysis.

The proposed Briar Chapel project (the Project) is a 1589-acre master planned community designed to meet the growing demand for residential housing in Chatham County. The Project will include residential homes; commercial and office space; community services such as a County school, charter school, library, fire station, and EMS station; and over 900 acres of open space. The Briar Chapel project site (the Site) is located approximately 5 miles south of Chapel Hill, North Carolina. The majority of the Site is bounded to the south by Andrew's Store Road (SR 1528), by US 15-501 to the east, and by Mann's Chapel Road (SR 1532) to the north and west. The location provides easy access to other areas within the Triangle. Additional parcels are located south of Andrew's Store Road and on both sides of US 15-501 near its intersection with Andrew's Store Road.

The EIA included a review of the potential direct, secondary, and cumulative impacts of the Project throughout the study area in general accordance with requirements of an Environmental Assessment. This included potential impacts on topography; soils; land use; wetlands; important agricultural lands; scenic, recreational, and state natural areas; areas of archaeological or historical value; air quality; noise levels; water resources (surface and groundwater); forest resources; shellfish or fish and their habitats; wildlife and natural vegetation; and introduction of toxic substances. The major conclusions of the EIA are as follows:

- Briar Chapel is the only site within Chatham County that lies within the area designated for a Compact Community within the Compact Communities Ordinance (Section 6.1, D).
- Although there will be some environmental impacts associated with the Project, there are many practices and measures being undertaken to mitigate the impacts, and in our opinion, the impacts are not significant, particularly when compared with overall County resources.
- The compact community site design meets goals established in Chatham County's Land Use Plan which indicates that the benefits and burdens of growth be shared, that growth consist of a mix of development types, and that development be guided to suitable locations. The compact community design at the Site preserves 50 percent of the area as open space, includes residential and commercial development, and provides schools, parks, and other civic infrastructure.

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## 1.0 Introduction

One of the fundamental policies described in Chatham County's Land Use Development Plan (Chatham Co. website) is balanced growth. The plan states that growth within the County is welcomed, but growth should be accomplished in a manner that meets the following:

- Benefits and burdens of growth are shared
- Growth consists of a mix of development
- Development is guided to suitable locations.

The plan also indicates that compact communities that include a mix of land use activities and preserve larger amounts of open space are encouraged. The land use plan then identifies 28 square miles along the US Highway 15-501 corridor, the US 421 corridor, and Farrington Road where compact communities may be developed. Other areas are designated as resource protection areas, economic development centers, towns, agricultural and rural development areas, and natural conservation areas.

Chatham County's Compact Communities Ordinance further limits the locations where compact communities can be developed. According to the Ordinance, Section 6.1 D, the Project Site is the only area in the County that complies with these requirements because it is located within the portion of Northeast Chatham County that is bounded by U.S. 15-501 on the east, Andrews Store Road on the south, and Mann's Chapel Road on the west and north; and/or within 1,700 feet of U.S. 15-501 on its eastern side, and is south of the U.S. 15-501 intersection with Andrews Store Road; and/or within one-half mile of Andrews Store Road on its southern side, and is east of the intersection with Andrews Store road and Mann's Chapel road, and is west of the intersection of Andrews Store Road and U.S. 15-501.

The proposed Briar Chapel Development that is the subject of this document is located within the area designated for compact communities in the Chatham County land use plan and Compact Communities Ordinance. Briar Chapel has been designed as a compact community as defined by Chatham County's Compact Communities Ordinance. The land in the proposed development area is currently zoned as RA-40; the land must be rezoned in order for the development to proceed as planned. As part of the application for rezoning and the Conditional Use permit, Newland Communities, the community's developer, is required to prepare an environmental impact assessment (EIA) in accordance with Section 11 of the Compact Communities Ordinance. The ordinance indicates that Chatham County shall provide the study parameters and the criteria to be used.

The Chatham County Planning Department provided the following guidance regarding the study parameters and criteria that should be considered during development of the EIA (Megginson, 2004)

- The parameters reviewed should include those listed in the NC Department of Administration's Environmental Assessment Guidelines. Parameters include topography; soils; land use; wetlands; prime agricultural farmland; public lands and scenic, recreational and state natural areas; archaeological and historic resources; air quality; noise; forest resources; shellfish and fish; and wildlife and natural vegetation. Guidance provided for describing the existing environment and impacts should be followed.
- The document should include the impacts to the Bennett Mountain Significant Natural Heritage Area.
- The document should address the loss of habitat and its impact on birds and wildlife.
- The document should compare the impacts from the proposed development to the impacts that would occur under a traditional development approach.
- The document should examine the impacts on the existing wetlands created by beavers.
- The document should describe the stormwater controls that are being implemented.

The remainder of this document describes the Briar Chapel project site, the existing environmental conditions, the environmental impacts and the mitigative practices proposed to protect the environment.

## **1.1 Scope and Limitations**

CH2M HILL developed this EIA based on documents developed for the Briar Chapel development and public documents obtained from Chatham County, and state and federal agencies. According to the Code of Federal Regulations regarding the National Environmental Policy Act of 1969, the purpose of environmental documents is to provide a description of potential environmental impacts and to discuss reasonable alternatives that will avoid or minimize impacts. CH2M HILL did not walk the Site nor conduct any studies or sampling on any portion of the Site. This document serves to identify the potential environmental impacts and outlines mitigation that has been proposed for the Site based on professional opinion. It was assumed that the development would proceed in accordance with all applicable local, state and federal regulations. No warranty is expressed or implied in this document.

## **2.0 Proposed Project Description**

The proposed Briar Chapel project (the Project) is a 1589-acre master planned community designed to meet the growing demand for residential housing in Chatham County. The Project will include residential homes; commercial and office space; community services such as a County school, charter school, library, fire station, and EMS station; and over 900 acres of open space. Briar Chapel project site (the Site) is located approximately 5 miles south of Chapel Hill, North Carolina. The majority of the Site is bounded to the south by Andrew's Store Road (SR 1528), by US 15-501 to the east, and by Mann's Chapel Road (SR 1532) to the north and west. The location provides easy access to other areas within the Triangle. Additional parcels are located south of Andrew's Store Road and on both sides of US 15-501 near its intersection

with Andrew's Store Road. Figures 1 and 2 show maps of the Site's neighborhood, and Table 1 provides a summary of the Site.

The Site is depicted on the Bynum and Farrington, NC USGS topographic quadrangle maps shown in Figure 3. The Site is located within the upper Cape Fear River Basin in DWQ's subbasin 030604 and in USGS Hydrologic Unit Code 0303002. Two named perennial streams, Pokeberry Creek and Wilkinson Creek, flow across portions of the Site. Each of these creeks drains to the Haw River. The portion of the Site that lies east of US Highway 15-501 drains to an unnamed tributary to Bush Creek which drains to Jordan Lake.

**Table 1: Briar Chapel Site Data**

<b>Briar Chapel Site Data</b>	
<b><u>General</u></b>	
Area	1,589.36 Acres
Total Units	2,389
Density	1.50 Units/Acres
Net Density	6.64 Units/Acre
ROW Area	152.20 Acres
<b><u>Retail/Office</u></b>	<b>522,000 SF</b>
Village Center	12,000 SF, 1.05 Acres (Retail/Office; Excluding Library)
Town Center	200,000 SF, 42.50 Acres (Retail) 270,000 SF, 64.63 Acres (Office)
Village Market	40,000 SF, 10.67 Acres (Retail/Office)
<b><u>Schools</u></b>	
County School	21.5 Acres
Charter School	18.6 Acres
<b><u>Open Space</u></b>	<b>± 900 Acres (Includes Improved Recreation Areas)</b>
Stream Buffers	248 Acres in the form of 100 foot buffers around perennial streams, 50 foot buffers around intermittent streams, and 30 to 50 foot buffers around ephemeral streams
Spray Area	450 Acres
Storm Pond Area	30 Acres
Water Reclamation Ponds Area	~15.5 Acres
County Park (Two Soccer Fields, Three Ball Fields, One Football Field)	66.2 Acres
Other (Includes Improved Recreation	119.8 Acres



<b>Briar Chapel Site Data</b>	
Area Within School Sites)	
<b><u>Recreation/Community Centers</u></b>	(2)
Recreation Center	
Community Center	
<b><u>Additional Briar Chapel Land Donations</u></b>	
Water Reclamation Plant	5 Acres
EMS	0.53 Acres
Fire Station	1.45 Acres
Library	0.58 Acres
<b><u>Briar Chapel Lot Type Counts</u></b>	
Apartment	80
Condominium	60
Townhouse	372
32' Lots	188
40' Lots	169
50' Lots	266
60' Lots	333
70' Lots	472
80' Lots	241
90' Lots	208
<b><i>Total</i></b>	<b><i>2,389</i></b>

Careful consideration has gone into the site plan in order to minimize impacts to surface waters and wetlands. Nearly 50% of the property between Andrew's Store Road and Mann's Chapel Road will be preserved as open space in the form of recreational areas, riparian areas, wetlands, and forest. In addition, there is open space that will be used as spray areas to reuse wastewater generated on site. A minimum of 100-foot riparian buffers will be utilized along perennial streams, 50-foot buffers along intermittent streams, and between 30-foot and 50-foot buffers along ephemeral streams to minimize impacts to surface waters. In addition, the Project will provide for a minimum of 50-foot buffers of undisturbed vegetation around the perimeter of the Site to maintain the aesthetic integrity of the Site. The proposed impervious surface coverage for the Project is 21%, which is less than the overall maximum built-upon or impervious area for a

compact community value of 24% of the total project in accordance with the Chatham County Compact Community Ordinance, Section 6.4. Wastewater will be treated at a new community water reclamation facility that will be equipped with tertiary treatment processes and discharge to a storage and spray irrigation system.

## **3.0 Purpose and Need**

Chatham County's population growth rate is expected to be approximately 20% during the next decade increasing the population from 49,588 to 59,336 citizens. The County's ideal location for accessibility to the Research Triangle Region (Chapel Hill, Durham, Raleigh, Research Triangle Park) and the Piedmont Triad (High Point, Winston-Salem, Greensboro) is the primary factor for the County's healthy growth in population and economic status. Given the projected demographic growth of the County and the proximity to major business and research centers, the demand for quality community living is also expected to increase. The proposed Briar Chapel community will address this need for housing in the area while preserving the environmental and aesthetic health and integrity of the County's rural backdrop. It is located in an area designated as a Compact Community Development Area in the County's land use plan and Compact Communities Ordinance, and its proximity to US 15-501 provides easy access to other communities in the Triangle region.

## **4.0 Alternatives Analysis**

This section outlines alternatives to the proposed project.

### **4.1 No Action Alternative**

Under the no action alternative, a new residential subdivision would not be built. Since Chatham County is growing and given the proximity of the proposed Site to Chapel Hill and the Research Triangle Park, it is likely that much of the Site would be developed with single family homes that would obtain water from wells and provide onsite wastewater treatment. Developing the area lot-by-lot would not achieve Chatham County's land use planning goals as effectively as developing the area as a compact community. Chatham County's land use plan specifically states that the County wants to achieve balanced growth in which the burdens of growth are shared and development is guided to suitable locations. One of the County's land use policies is to encourage compact communities as growth occurs. With lot-by-lot development, the burdens of growth are not shared; with a Compact Community, new development also includes infrastructure such as schools, libraries, parks, and emergency services that serve community functions.

When a Compact Community is developed, there are additional regulations that must be followed that are not required for single-family lots. For example, Compact Communities have detailed stormwater management plans and are required to have a written plan for erosion and sediment control. These items would not be required on an individual lot basis.

## **4.2 No Development Alternative**

Under this alternative, the land at the Briar Chapel site remains in its current use – largely forested and undeveloped with some agricultural use, and the impacts discussed in Section 5 would not occur. Given the proximity of the land to Chapel Hill and the fact that the property borders US 15-501 which provides easy access to other Triangle communities, it is unlikely that the land would remain undeveloped. The land is currently zoned as RA-40, and may be developed into single family lots under the current zoning. Leaving the land as undeveloped does not meet the needs of the community; Chatham County has designated the project area as the only location within the County where a Compact Community can be developed. Even prior to development of the Compact Communities Ordinance, the County's land use plan included more intensive development along the US 15-501 and US 64 corridors. Based on the land use plan and Compact Communities Ordinance, the County would like to see this area have more intensive development.

## **4.3 Alternative Sites**

Briar Chapel is the only site within Chatham County that lies within the area designated for a Compact Community within the Compact Communities Ordinance (Section 6.1, D). Ideally, a planned unit development should have adequate size (600 acres and larger) and offer its residents a potable water supply and ready access to major transportation corridors. The Site should have suitable soils and vegetative cover for the disposal of treated wastewater. It has been determined that this site location meets these criteria.

The Site borders US Highway 15-501, which provides residents easy access to other communities in the area. Chapel Hill is only five miles from Briar Chapel. It is also sited near Fearington Village, a mixed-use community that can provide the residents of Briar Chapel additional restaurants and shops within walking and biking distance. The Briar Chapel Site is large enough to provide large variation in housing price and type, a viable commercial center, and community services such as parks, schools, and community centers.

## **5.0 Current and Predicted Environmental Characteristics of Project Area**

The Project will be developed in accordance with the Chatham County Compact Communities Ordinance. It is further assumed that all applicable local, state, and federal regulations will be

followed as the Site is developed and maintained. The following topics describe the existing and affected environment of the Site and the surrounding area.

## **5.1 Topography**

### **5.1.1 Existing Conditions**

The Project Site is located in the central piedmont physiographic region and has a consistently rolling terrain with moderately steep slopes. The topography of the Site varies from a high elevation of approximately 556 feet above mean sea level (MSL) to a low of approximately 395 feet MSL where Pokeberry Stream exits the property. Figure 4 shows a map identifying the existing slopes on the Site. Approximately 58 percent of the Site has slopes less than 10 percent, 24.7 percent has slopes between 10 and 15 percent, and 17.3 percent of the Site has slopes that exceed 15 percent.

The Site is located in the Carolina Slate Belt, which consists of metamorphic rocks derived from metamudstone and metaargillite. The bedding is thin to thick with plane and axial-planar cleavage common (USGS 1985). The Site overlies a pluton of granite that intruded into the Carolina Slate Belt. Therefore, many resistant boulders can be seen along ridges, hilltops, and one stream throughout the Site. The John R. McAdams Company, Inc. identified areas that contain large areas of exposed boulders (named Boulder Fields in this document) in order to incorporate them into the master plan design when possible.

Pokeberry Creek is designated as Zone A according to the Flood Insurance Rate Map found on the County's website (Figure 5). Zone A is the 100 year flood plain that is approximated; detailed hydraulic analyses are not performed in these zones, and thus base flood elevations do not exist.

### **5.1.2 Environmental Impacts**

During and after construction the existing topography on site will be altered from land clearing and grading activities associated with development of the master planned community. At this time, a grading plan is not available, but it appears that significant amount of soil will be moved which will alter topography. However, Figure 6 illustrates that, with a few limited exceptions, the proposed site plan avoids the steepest slopes. Most of these steep slopes are located within the riparian buffer area that is being protected. There is an area directly west of Bennett Mountain where houses will be built on the hillside overlooking the wetland area along Pokeberry Creek. There are other areas approximately 0.5 mile south of this Site, a small area in the northeastern portion of the Site, and two areas at the western end of the Site that have steeper slopes. Based on a review of Figure 6, it appears that approximately 30 lots may be built on sites that have existing slopes in excess of 15 percent. Boulder Fields were incorporated into the master plan design in open space areas when possible.

Development will not occur within the floodplain as required by Chatham County's Flood Damage Prevention Ordinance.

### 5.1.3 Conclusion

During and after construction the existing topography on site will be altered to some extent. Any development within the Piedmont of North Carolina would likely alter topography. The proposed site plan avoids the steepest slopes and the floodplain. The Project makes up approximately 0.36 percent of the County; when viewed on a Countywide basis, the Project will not significantly impact topography.

## 5.2 Soils

### 5.2.1 Existing Environment

Soil and Environmental Consultants (S&EC) completed the *Briar Chapel Soils Report* in April 2004 that details the findings of the Site's soil evaluation (Notebook Appendix I). Figure 7 shows a map identifying the different types of soils on the Site. Soils on the Site are primarily sandy loams of several soil series, including Chewacla, Wehadkee, Helena, Wedowee, and Vance. These are soils composed of a mixture of mostly sand with some clay, silt, and organic matter.

The somewhat poorly-drained to poorly-drained alluvial soils are the Chewacla and Wehadkee soil series. These floodplain soils are very deep, have moderate permeability with native vegetation comprised of water-tolerant hardwoods. When cleared, these soils can be used for the cultivation of corn, small grains, and hay.

Helena soils are very deep, slowly permeable, moderately well-drained sandy loams found on gently sloping to sloping uplands. They are formed in residuum of basic to acidic bedrock. This soil series is often used for pasture and crops such as tobacco, corn, soybeans, small grains, and vegetables.

The Wedowee soils are very deep, moderately permeable, well-drained sandy loams that are formed in residuum on gentle to steep slopes. The primary native vegetations found on these soils are Pine-Oak communities. These Wedowee soils are suitable for growing crops such as cotton, corn, tobacco, and hay.

The Vance soils are well-drained sandy loams found on ridges and side slopes. They are formed in forested areas from acid crystalline rock and are slowly permeable. The water table remains below the solum.

The relative amounts of the various soil amounts on the Project Site are summarized in Table 2.

**Table 2: Relative Amount of Soil Types on Project Site**

<b>Soil Type</b>	<b>Percentage of Site</b>
3A&5A - Chewacla and Wehadkee	4.74
37B - Wedowee Sandy Loam (2-6% slopes)	18.18
37C&57C - Wedowee Sandy Loam (6-10% slopes)	21.25
37D - Wedowee Sandy Loam (2-6% slopes)	15.10
37E - Wedowee Sandy Loam (15-25% slopes)	8.17
39C - Wedowee Sandy Loam (15-35% slopes)	11.11
39E - Wedowee Sandy Loam (15-35% slopes)	13.98
51B - Helena Sandy Loam (2-6% slopes)	2.47
51C - Helena Sandy Loam (6-10 percent slopes)	0.73
57B - Vance Sandy Loam (2-6 percent slopes)	4.28

## 5.2.2 Environmental Impacts

The clearing and grading for the proposed Site will result in soil disturbance. At this time, a grading plan is not available. During grading, soil will be moved; in some areas, it will be removed, while in other areas it will be replaced. Thus, the location of soil types may change. During clearing and grading, some soils will be eroded, but the impacts from this will be minimized by following an approved site plan that conforms to the requirements of the North Carolina Sedimentation Pollution Control Act of 1973. (More information is provided in the water resources section). Finally, by using heavy equipment on the Site, soils will be compacted. No contamination of soils is expected from the development.

There is a development area west of Bennett Mountain where houses are located on steep slope areas with significant elevation differences. Selective clearing (removal of minimal trees) will occur in order to remove only the trees necessary to build individual homes which will minimize the soil disturbed and minimize the amount of cleared land. Good engineering and construction practices should be followed in this area and potential similar areas to avoid erosion and slope instability. Clearing/mulching/seeding will be completed lot-by-lot to minimize the amount and time of soil exposure (Barron, 2004).

## 5.2.3 Conclusion

The proposed land clearing and grading work on the Site will result in soil disturbance and compaction. Mass importing of offsite fill material should not be required due to the size of the Site. Measures that comply with the North Carolina Sedimentation Pollution Control Act of 1973 will be taken to minimize erosion. In the development area west of Bennett Mountain, selective clearing and mulching/seeding is planned on a lot-by-lot basis to minimize the time of soil exposure. Mulching/seeding is planned directly after land is cleared on these sites. Based on our understanding of the proposed development plan, the proposed grading operations are not atypical for this geographic area. Environmental impacts should not be significant if grading and erosion control activities are performed in accordance with state regulations and good construction practices.

## 5.3 Land Use

### 5.3.1 Existing Environment

Site-specific studies of various land-use types available for the Site were used to estimate land in various categories where possible. These studies included an analysis of land cover provided by Braham and Braham (2001, 2002) and a wetlands inventory completed by S&EC (2000, 2003). The Braham study did not cover the entire Site tract; a portion of the Site north of Andrews Store Road was not included along with some smaller tracts on the southeast portion of the Site (approximately 112 acres of the site). For this portion of the Site, the 2002 aerial photos available from the Chatham County website were used to estimate land use percentages which includes some agricultural land. Since the 2002 aerial photos indicated that the Site is largely forested with the exception of the right-of-way area and agricultural land already accounted for, these additional acreages have been noted as forested. Table 3 summarizes the existing land use of the Site, and Figure 8 shows an aerial photograph illustrating the existing land use.

**Table 3: Existing Land Use on Briar Chapel Site**

<b>Land Use Category</b>	<b>Total Acres</b>	<b>Percentage of Site</b>
Forest	1401	88
Wetland	61	4
Agriculture	31	2
Developed	96	6
Project Site Total	1589	100

A brief description of these land use categories on the Site follows.

#### 5.3.1.1 Forest Land

Based on Braham and Braham (2001) and assuming that these forest types are distributed in the unaccounted for land in the same proportion, forestland within Briar Chapel property is composed of 4 basic types: Oak-Hickory (38 percent), Mesic Mixed Hardwood (4 percent), Bottomland Hardwood (5 percent) and Loblolly Pine (53 percent). More information concerning each of these forest types is found in the section entitled Wildlife and Natural Vegetation. The principal recent disturbance of forestland was wind throw from Hurricane Fran in 1996.

Evidence of past timber harvesting (i.e. stumps and lack of old-growth) can be seen throughout the Site. It appears that selective logging occurred due to the heterogeneity of the existing tree age classes on the Site. There are also areas with compacted soil and barbed wire on trees, which implies that portions of the tract were in pasture. Surrounding properties are primarily used for residential and commercial development with some agricultural areas interspersed.

#### 5.3.1.2 Developed Land

Developed land within Briar Chapel is limited to an electrical powerline right-of-way of about 74 acres and a buried gas pipeline right-of-way of about 4 acres, as visible on Figure 8. In addition, land surrounding the farm houses not in agricultural use was included in this category.

Both rights-of-way provide early successional habitat for plants and animals and forest edge across the land they bisect.

#### **5.3.1.3 Agriculture**

Agricultural land is found in the southern portion of the Site on either side of Andrews Store Road.

#### **5.3.1.4 Wetlands**

A Piedmont/Mountain Semipermanent Impoundment occurs in two locations, one along Pokeberry Creek that occupies about 16 acres, and one along Wilkinson Creek that occupies about 12 acres. These two impoundments were created when beavers constructed mud and stick dams across each creek. The impoundments are a complex mosaic of open water and marshy-brushy vegetation that grades upslope and upstream into the adjacent forest community (Braham and Braham, 2001).

S&EC personnel conducted detailed wetland delineations of the Site in November 2000, January, February and March 2003. Wetland types on-site were identified as bottomland hardwood and emergent wetlands. More information regarding wetlands onsite is provided in the Wetlands section.

### **5.3.2 Environmental Impacts**

Existing land use will be modified from predominantly silvicultural land to a residential mixed-use community. The change in land use from current conditions on the Site will be fairly substantial; approximately 359.90 acres of the Site will be in the form of residential development, and approximately 118.85 acres of the Site will be in commercial development. Since the riparian buffers (248 acres) and project boundary buffers (226 acres) are preserved as natural forest, the area will result in 30 percent forested land. This number is likely low, as natural areas will be preserved in the planned parks, near schools, and around residential areas. The larger lots on the Site will be cleared individually as homes are developed rather than in a mass method. This method of development also serves to protect the amount of trees in the area. As described in the Forest Resources section, the older growth trees identified during the Braham and Braham (2001) survey will be preserved onsite.

The Project has been designed with large amounts of open space in the form of recreational areas, riparian buffers, ponds, and wetlands. These riparian corridors will be 100 feet wide on either side of perennial streams, and 50 feet wide on either side of intermittent streams. Buffers will also be preserved along ephemeral streams. These riparian corridors will serve to link the preserved forested area within the Site to forested areas outside the Site. Finally, the project is providing a 66-acre park for other County residents to enjoy as open space. Areas described as open space on the development plan will be deeded to the Homeowners Association, and restrictive covenants will be placed on the open space areas.



### 5.3.3 Conclusion

While the change in land use is significant for the Site, the change is not as dramatic if development occurred in a more traditional manner. In a traditional subdivision, each lot would be at least 40,000 square feet in size, and the footprint of the development would be more widespread. In contrast, in a compact community, the overall project density cannot exceed that allowed by zoning, but individual lots are smaller. Thus, by developing in a compact way, fewer trees are cut, and more open space is preserved. With the exception of Bennett Mountain which is largely being preserved, the site does not include unique forested features. In addition, the Site comprises only 1,589 acres out of approximately 437,000 acres in Chatham County. The County is largely forested, and the impacts to land use on the Site are insignificant in the context of the County as a whole. This issue is further described in Section 6.0 *Secondary and Cumulative Impacts*. Based on our review of the current land use plan, the Project will have no significant adverse impacts on future land use in the County.

## 5.4 Wetlands

### 5.4.1 Existing Environment

Section 404 of the Clean Water Act (CWA) requires the regulation of discharges into “waters of the United States.” Within North Carolina, the U.S. Army Corps of Engineers (COE) is responsible for the implementation, permitting, and enforcement of provisions of the CWA, although the U.S. Environmental Protection Agency is the principal administrative agency. The COE regulatory program is defined within 33 CFR 320-330.

Water bodies such as rivers, lakes and streams are subject to jurisdictional consideration under the Section 404 regulations. Wetlands have been described as:

Those areas that are inundated or saturated by groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas [33 CFR 328.3(b) (1986)].

The three parameters that are indicative of a jurisdictional wetland include the presence of a hydric soil, hydrophytic vegetation, and wetland hydrology. Wetlands and vegetated riparian areas are valuable because they preserve biological diversity, protect wildlife, provide natural open spaces, protect water quality, stabilize stream banks, control erosion, and prevent flooding damage.

S&EC personnel conducted a detailed wetland delineation of the Site in November 2000, January, February and March 2003. A total of 61.4 acres of wetlands are located on the Site (Figure 9). Wetland types on-site were identified as bottomland hardwood and emergent wetlands. Beavers have impounded areas on both Wilkinson and Pokeberry Creeks and formed wetlands in these areas. The majority of the wetlands on the project site are contained within the proposed riparian buffers as shown on Figure 9.

## **5.4.2 Environmental Impacts**

Based on preliminary evaluation of the wetlands delineation and the site plan, less than one acre of wetlands will be impacted by the road crossings (Hamak and Sanchez, 2004), and the beaver impoundments will not be impacted. The stream crossing north of Bennett Mountain will not impact wetlands as the bridge will extend over the creek and wetland area at that crossing (Sanchez, 2004). There are 11 stream crossings; the total length of stream impacted by these crossings is approximately 1949 feet (S&EC, 2004; Sanchez, 2004). The main road into the development will include a bridge since that crossing would result in more significant impacts to wetlands. The impacts from utility lines have not been quantified at this time; these impacts will be noted during the wetlands permitting process. An individual permit for the stream impacts will be obtained from COE. Mitigation of these wetlands and stream impacts will be carried out in accordance with North Carolina Division of Water Quality (DWQ) and COE rules. A potential mitigation site for the stream crossings has been identified by Newland, and verbal confirmation was received from COE that it would meet the requirements of DWQ and COE rules (Barron, 2004). Thus, Briar Chapel will mitigate all stream crossing impacts; wetlands impacts will be mitigated by either preserving wetlands elsewhere or making a payment to the North Carolina Wetland Restoration Program to offset the impacts.

## **5.4.3 Conclusion**

Based on our opinion, the Project will have no significant adverse impacts on wetlands. The Project design avoids most of the wetlands on the Site, and the impacts from roads and building will be limited to less than one acre (Hamak and Sanchez, 2004). This is a small amount of impacted wetlands for a 1589 acre site, and the impacts are insignificant. Utility infrastructure may cause additional impacts, and this will be noted during the wetland permitting process. The stream impacts, while more extensive, are not significant in the context of the Site as a whole and will be fully offset by required mitigation.

# **5.5 Important Agricultural Lands**

## **5.5.1 Existing Environment**

Important Farmlands within North Carolina are organized into three categories including Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. Criteria established to determine these classifications were published January 31, 1978 in the Federal Register and amended on June 17, 1994. The North Carolina NRCS State Soils Staff developed the criteria for farmland of statewide importance in 1988. The specific definitions for all three categories are located in Attachment 1.

All areas containing the Chewacla and Wehadkee soil series have been determined to be Prime Farmland only if they are drained and protected from flooding or not frequently flooded during the growing season. Within the Site, alluvial Chewacla and Wehadkee soils are found along stream channels. These soils currently are not used by farming, and instead function as part of forested riparian buffer zones along the stream channels.

Helena sandy loam soils within the Site range in slope from 2 to 10%. Those soils under 6% are considered Prime Farmland and those between 6 and 10% are Farmland of Statewide Importance. Only small pockets of these soils are present within the Site.

The majority of the Site is mapped as the Wedowee soil type. Those areas with slopes under 6% are considered Prime Farmland and comprise approximately half of the total acreage, with a concentration in the center of the Site. Areas with slopes between 6 and 15% are considered Farmland of Statewide Importance. Steep slopes above 15% percent are also mapped as Wedowee, but are not considered significant for farmland uses. In addition, a large area in the western portion of the Site is mapped as Wedowee sandy loam, bouldery. The boulders limit the use of the soil for agricultural use so this type is not listed.

Small pockets of Vance soils are found along the perimeter of the Site. These soils range in slope from 2 to 6% and are considered Prime Farmland.

In total, approximately two-thirds of the Site is considered Prime Farmland or of Farmland of Statewide Importance. Other soils with slopes making them susceptible to erosion are not considered ideal for farming.

### **5.5.2 Environmental Impacts**

The Site has not been used for crop production in recent years. The Site is primarily wooded and would not likely be converted to agricultural uses in the future. Because the property is not currently being farmed and has not been farmed for many years, direct impacts to important Agricultural Lands are not significant.

### **5.5.3 Conclusion**

In our opinion, the Project will have no significant impacts on Important Agricultural Lands as the land is currently not being farmed, and it is unlikely that it would be converted to agricultural land given the growth in Chatham County.

## **5.6 Scenic, Recreational, and State Natural Areas**

### **5.6.1 Existing Environment**

There are no designated scenic or recreational areas on the Site. Bennett Mountain is a Significant Natural Heritage Area (SNHA) as classified by the Natural Heritage Program (NHP). According to NHP records, Bennett Mountain is probably the best example of Dry-mesic Oak Hickory Forest in Chatham County. The Haw River Aquatic Habitat is another SNHA that has national significance. This area extends upstream to the Terrells Creek confluence and extends downstream to just north of Robeson Creek, and is approximately three miles outside the Project Area. This portion of the Haw River provides habitat for the federally endangered Cape Fear Shiner (see Fish and Shellfish Resources Section). In addition, the regionally significant Duke Forest Haw River Levees and Bluffs are approximately 3 miles downstream of the project

boundaries. Descriptions of the Bennett Mountain and Duke Forest/Haw River Levees are available from the Natural Heritage Program and are provided in Attachment 2.

The *Triangle GreenPrint Regional Open Space Assessment* identifies Griffins Crossroads as an important forest resource area. The northwestern portion of Griffins Crossroads extends into Briar Chapel, but this portion of Griffins Crossroads is already impacted by US 15-501.

### **5.6.2 Environmental Impacts**

The primary portion of the Bennett Mountain SNHA is being preserved on the Site. The road leading into the development passes to the west of Bennett Mountain and east of Pokeberry Creek. According to NHP information, this area is a secondary area for protection of Bennett Mountain. The roads in the site were aligned in several ways; the selected roadway alternative minimized impacts to wetlands and other ecological features. The land application system described in the water resources section will use Bennett Mountain as a backup site for land application of treated effluent. No clearing will occur on Bennett Mountain for the land application system, and it should be used infrequently as an application site (Ashness, 2004).

As described in the water resources section, water quality is being protected onsite. Therefore the project should not impact the downstream aquatic SNHAs. It is our opinion that the project will have no significant direct impacts on state natural areas.

Since the portion of Griffins Crossroads that is onsite is already impacted by US 15-501, Briar Chapel will have no significant impact on this forest resource.

A positive environmental impact of the Project is the establishment of a 66-acre County park. This facility will provide natural areas and recreational opportunities to area residents.

### **5.6.3 Conclusion**

Based on our review of public documents, the Project will have no significant impacts on designated scenic, recreational, or natural areas. In fact, the establishment of the 66-acre County park will increase the area residents' access to natural areas.

## **5.7 Areas of Archaeological or Historical Value**

### **5.7.1 Existing Environment**

Cultural Resources are protected by law under Chapter 70 of the North Carolina General Statutes and Section 106 of the National Historic Preservation Act of 1966. Section 106 requires federal agencies with jurisdiction over a proposed action to account for any sites eligible for inclusion on the National Register of Historic Places. For Briar Chapel, the US Army Corps of Engineers has authority over wetland permitting; information regarding the wetland permit area will be submitted to the State Historic Preservation Office (SHPO) in Raleigh. SHPO will be contacted if archaeological artifacts are uncovered during the construction.

On March 15, 2004, S&EC personnel searched the files at the SHPO office for historical sites located on the Site. Two historic records were found in the search. A historic house is located just south of 15/501 north of Fearrington Village, and a cemetery is due north of the intersection of Parker Herndon Road (SR 1526) and Andrews Store Road. Several other cemeteries and a stone wall and cistern have been found onsite. Figure 11 shows a map with the historic structures and cemetery located on the Site.

### 5.7.2 Environmental Impacts

Most of the historic resources on the Site shown on Figure 11 will be preserved. In some cases, development will occur around them. For the cemetery noted as site 19 on the map, a park will be built around the cemetery site. The historic house (Figure 12), noted as site number 3, will be relocated if the house is determined to be structurally sound enough to make relocation feasible (Barron, 2004). SHPO will be contacted prior to moving any structures. There is one other house on the property, noted as site number 1. Verbal communication from the Chatham County Historical Association noted that this house is not in a condition to be relocated. The house will be dismantled and any historically significant architectural details will be saved. Other components of the structure will be salvaged for reuse where possible (Barron, 2004). The only structure that will be eliminated is the cistern denoted as site number 14 (Hamak, 2004). This feature is a deep rock-lined well that is a safety hazard (Figure 12).

**Figure 12 – Historic House and Cistern Structure**



### 5.7.3 Conclusion

Most of the historic resources on the Site shown on Figure 11 will be preserved, and it is our opinion that the Project will have no impacts on areas of significant archeological or historical value.

## **5.8 Air Quality**

### **5.8.1 Existing Environment**

The main air quality issue in Chatham County is ozone pollution. Ozone is a highly reactive form of oxygen; high in the atmosphere, it protects the Earth from harmful solar radiation. When it is formed near the ground, ozone can damage trees and crops and is unhealthy to breathe. Ozone is not directly emitted, but is formed when sunlight reacts with volatile organic compounds (VOCs) and nitrogen oxides (NOx). According to the NC Air Awareness program, NOx is the limiting factor on the formation of ozone in North Carolina because of the abundance of naturally occurring VOCs from trees, which cannot be controlled. In North Carolina urban areas, more than 60% of NOx emissions are from automobiles.

Currently, the majority of Chatham County is in attainment status with respect to National Ambient Air Quality Standards. However, the northeastern portion of Chatham County, the site of the Briar Chapel project, is in non-attainment status with the 8-hour federal air quality standard for ozone (0.08 ppm) along with Wake County, Orange County, Durham County and the northwestern half of Johnston County (Division of Air Quality website). There is one ozone monitoring station in Chatham County at Pittsboro, and it recorded one exceedance of the 8-hour standard in 2003.

The Air Quality Index is a tool to evaluate levels of ozone, particles, and other pollutants in the air. The air quality index is used to assess potential impacts to human health. The 2003 AQI values for the Raleigh/Durham area were generally “Good” to “Moderate” with 7 days “Unhealthy for Sensitive Groups” and 1 day “Unhealthy.”

### **5.8.2 Environmental Impacts**

Air quality may be impacted both during construction and after construction is completed. During the construction phase of the Project, machinery utilized will produce emissions resulting from the combustion of petroleum products, much like emissions from previous timber harvesting activities. Construction specifications for the Project will require mechanical equipment to meet emissions standards established by the State of North Carolina for the equipment utilized. During development, open burning may occur. Any burning will be conducted under controlled conditions with the appropriate permits from the local authorities if applicable.

Automobile activity will increase after construction as a result of development. However, North Carolina has taken very aggressive steps in regulating emissions from mobile sources in order to bring all of Chatham County and the rest of the Triangle area back into full attainment by 2009, notwithstanding projected increases in vehicle miles traveled. Full inspection and maintenance requirements on motor vehicles took effect in Chatham County on January 1, 2004 even though EPA does not require them. The expected reductions in mobile source emissions from these aggressive emissions requirements, not required under any federal law, may offset any automobile activity increase associated with the Project. In addition, including commercial

shopping areas, restaurants, schools, parks and other civic areas within the development, and using a site design that makes the community walkable will minimize the number of short trips that residents need to make which will help minimize air quality impacts.

Odor is another potential air quality issue. In regard to air quality issues associated with the reclamation facility, there will be two possible primary sources of odor: influent and sludge. The incoming pipes will discharge the wastewater from the long force mains. These pipes may release odor due to the long length of retention of the wastewater. In this case, odor can be reduced by the injection or input of chemicals at the pump station. This injection has proven successful in the past in reducing odors from pipeline wastes. In regard to sludge, there is the potential for odor to be generated when the stored sludge is stabilized prior to removal by a sludge contractor. There are several operation conditions that might be incorporated to reduce or eliminate this odor generation as described on page 5 of the Briar Chapel Water Reclamation Facility Report included in the Project Notebook Appendix L.

### **5.8.3 Conclusion**

Given the steps that are being taken to bring Chatham County into attainment of the ozone standard and the expected time required for full build-out of the development, the project is not expected to have a significant adverse impact on air quality.

## **5.9 Noise Levels**

### **5.9.1 Existing Environment**

This region of the county is predominantly rural and the majority of the noise producing activities are directly related to localized farming and logging operations; therefore the noise generated on site is primarily the result of the operation of heavy tillage equipment and automobiles. Other potential, temporary sources of noise include equipment associated with road maintenance efforts performed by the NC DOT or its associated sub-contractors. Currently, noise levels are low on-site. In the past, noise levels were somewhat higher during timber harvesting.

### **5.9.2 Environmental Impacts**

Noise levels are expected to increase during the construction phase of the project. Increased noise levels will be as a result of commonly used mechanical equipment that will be utilized to grade the Site, road construction and building construction. Construction is normally limited to daylight hours when loud noises are more tolerable. Every reasonable effort will be made to minimize construction noise. Immediately following completion of the project, noise levels will be similar to other residential areas. The preserved open space on the property will help reduce this noise to surrounding areas.

### **5.9.3 Conclusion**

The Project will result in increased noise around the Site as any new development on a forested site will. The Project has been designed with forested boundary buffers which will mitigate the noise from the development. It is our opinion that there will be no significant impacts on noise associated with this proposed project.

## **5.10 Water Resources (Surface and Groundwater)**

### **5.10.1 Surface Water**

#### **5.10.1.1 Existing Environment**

The Site is located in the upper Cape Fear River Basin in DWQ subbasin 030604 and in USGS Hydrologic Unit Code 03030002. The Site contains a number of unnamed tributaries that eventually flow either to Pokeberry Creek or Wilkinson Creek. In addition, the project area east of US Highway 15-501 drains to an unnamed tributary to Bush Creek, which flows into Jordan Lake, a multipurpose Corps of Engineers Reservoir that provides drinking water to citizens in western Wake County and Eastern Chatham County. Pokeberry Creek and Wilkinson Creek flow into the Haw River upstream of Jordan Lake. The distance from the Site boundary to the Haw River is 5 miles, and the distance from the confluence of Pokeberry Creek and the Haw to Jordan Lake is approximately 5.4 miles. The distance from the Site boundary on Wilkinson Creek to the Haw River is 4 miles, with an additional distance of 7.7 miles to Jordan Lake. All creeks on the Site are classified as WS-IV waters by DWQ. WS-IV classified waters are protected as water supplies which are generally in moderately to highly developed watersheds; point source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211, and local programs to control non-point source and stormwater discharge of pollution are required.

According to the DWQ's Cape Fear River Basinwide Water Quality Management Plan (2000), Pokeberry Creek supports a biological community which indicates that the creek is supporting its designated uses. Data collected during the winter in 1993 at SR 1711 resulted in a Good-Fair water quality rating. Data collected during the winter in 1998 at the same site resulted in a Good water quality rating. Data collected in 2003 at the same location resulted in a Good-Fair water quality rating (Herring, 2004).

The Haw River is impounded by B. Everett Jordan Dam. In 1983, the Jordan Lake watershed was classified as nutrient sensitive waters (NSW) based on the potential for nutrient overenrichment in the lake. A WASP model was recently developed to examine productivity in the lake. In addition, water quality sampling shows periodic excursions of the 40 ug/l criteria for chlorophyll *a*. Based on the modeling results and data, DWQ is considering including the Haw River arm on the state's 303(d) list of impaired waters. Examination of the draft 2004 impaired waters list indicated that the Haw River is not listed for nutrient enrichment.



### 5.10.1.2 Environmental Impacts

Water quality could be impacted by the Project in three ways. First, during construction, sediment could enter the waterways. Secondly, after construction is completed, stormwater runoff may impact the streams. Finally, the land application system could impact downstream surface water quality. Each of these is explored further below.

Grading and construction activities associated with the Project may temporarily increase siltation on and immediately downstream of the Site. During rain storms, erosion from a cleared site will be much higher than erosion from a forested site. The North Carolina Sedimentation Pollution Control Act of 1973 requires that a plan to control erosion and sedimentation be developed for any activity that disturbs one acre of land or more. This plan must include control measures that will prevent sediment impacts to water quality. Practices must be installed that will control sedimentation from the peak runoff generated by the 10-year storm.

One of the best methods to control sediment loading from construction sites is to minimize the time that land is exposed. Data collected by NCSU researchers at a site on the I-540 beltline indicate that mulching and seeding reduce erosion rates by approximately 95 percent. The State law requires that permanent ground cover be established within 15 working days from when grading is completed. The Project will meet or exceed that requirement. Another effective method to minimize the time that bare soil is exposed is to develop the Site in phases. The Briar Chapel development will be completed in phases. In addition, to the extent practical, entire areas of home sites will not be cleared at a given time; rather lots will be cleared individually as houses are built which will minimize the amount of land cleared and greatly reduce the amount of time that soil is bare. Finally, the riparian buffers that will be maintained on site will serve as a last line of defense in case one of the BMPs fails. By following the site plan and grading plan, implementing and maintaining BMPs to control sedimentation for the 10-year storm, completing the development in phases, and protecting the riparian buffers, the impacts to water quality during construction will be minimized and will not be significant.

Following construction, stormwater runoff from the development could impact water quality in two ways. First, stormwater runoff contains pollutants. For example, fertilizers and pesticides applied to the commercial and residential landscaping and oil that leaks from automobiles can run off into surface water during storms. This stormwater will be captured and treated through 37 stormwater BMPs as described in the *Briar Chapel Storm Water Management Plan* (Project Notebook Appendix H). These stormwater structures will be constructed outside of riparian buffer areas and wetlands. The stormwater control structures will be designed to meet 85 percent TSS removal and 25 percent total nitrogen removed in incoming runoff. In general, practices that remove TSS will also remove a large percentage of the total phosphorus as inorganic phosphorus will bind to the soil particles. The stormwater design included runoff from property offsite that drains to Briar Chapel.

The second way that post-construction runoff can impact water quality is through changed hydrology. As land is developed, there is more area that is impervious. With increased imperviousness, less rainfall infiltrates the soil, which results in a greater amount of rainfall

flowing directly to surface waters. This creates higher stormflows within the streams that causes higher instream erosion, which impairs aquatic habitat and reduces aquatic diversity. Low impact development practices which serve to mimic pre-development hydrology are being applied at the Briar Chapel Site. By clustering development in a smaller portion of the Site and preserving 50 percent of the Site as open space, imperviousness will be minimized and the pre-development hydrology will be preserved to a greater extent.

Other low impact development practices will also be implemented. For example, the Site has been broken up to drain to 37 identified stormwater management facilities that will each treat stormwater locally. The stormwater treatment facilities are being designed such that they control both peak flowrates and the one inch runoff volume. The peak flowrate for the one-year, 24-hour storm event after development will not exceed the pre-development condition (for commercial areas draining directly to offsite residential areas, the peak flow will be controlled for the one-, two-, five-, ten- and 25-year, 24-hour storm events). Runoff volume will be controlled such that the first inch of stormwater generated will be captured and released or infiltrated over a two to five day period.

Approximately 25 percent of the built-upon area of the Site will not drain to one of the 37 identified stormwater management facilities. Runoff from these areas will be collected in cisterns, treated in bioretention areas, infiltration trenches, hydrodynamic separators, or released to grassed swales. Each of these low-impact development practices helps maintain the pre-development hydrology. Finally wastewater will be treated through a water reclamation facility which will have backup power generation to avoid the discharge of untreated waste during power outages. The wastewater will be land applied without discharge, and the soil will serve to further filter any pollutants from the wastewater. DWQ prefers land application as a disposal method over discharge to surface waters.

Chlorine will be used as a disinfection method prior to filtration to ensure compliance with the 14 colonies/100 ml fecal coliform limit that will apply to the permit to ensure protection of public health. After filtration, the total residual chlorine level is estimated to be approximately 0.5 mg/l, a level lower than that found in drinking water. This water will then be stored in a pond for up to 110 days where much of this remaining chlorine will dissipate (Fleming, 2004).

The wastewater collection system will avoid riparian buffers to the maximum extent practicable. The spray irrigation system will avoid riparian buffer areas, and will be at least 30 feet from any ephemeral channels. The loading rates used to calculate the land needed for the spray application system were conservative to avoid applying effluent when the soils are somewhat saturated. The 110 day storage pond will also ensure that effluent is not applied under marginal conditions to avoid runoff to surface waters. The biosolids generated onsite will be hauled to a permitted facility offsite for disposal.

The downstream waters of the Haw River and Jordan Lake should not be impacted by the development. Again, the project is being designed to minimize environmental impacts, and BMPs are being used to protect the water resources on site from the impacts of stormwater runoff (both in terms of quantity and quality). In addition, there is some stream distance for any

pollutants to attenuate (4 miles on Wilkinson and 5 miles on Pokeberry Creek). Any runoff from the Site will need to travel an additional 5.4 to 7.7 miles to Jordan Lake. The Cary water supply intake is an additional 4.8 miles upstream on the New Hope Creek arm of Jordan Lake. While water from the Haw does move upstream on New Hope Creek, the amount of runoff from the development Site will be negligible based on the BMPs being used to attenuate and treat stormwater runoff onsite and the distance between the Site and these important water resources.

The Briar Chapel Community will be served by public water provided by Chatham County and will be designed in accordance with the Chatham County Public Works Water System Specifications and Details. The potable water use of the development will be minimized by including low water use fixtures in all buildings. In addition, the spray irrigation system described below will minimize the use of potable water for irrigation of public areas.

### **5.10.1.3 Conclusion**

Any new development which increases imperviousness has the potential to impact surface water quality. This Project has been designed to minimize the impacts to water quality by preserving a large amount of open space, implementing erosion and sediment control practices, incorporating stormwater treatment facilities that will minimize and treat runoff, and managing the wastewater system. Based on our review of the Project documents, it is our opinion that the impacts to surface water will not be significant. The impacts to surface water quantity will also be insignificant.

## **5.10.2 Groundwater**

### **5.10.2.1 Existing Environment**

The Piedmont of North Carolina is underlain by crystalline-rock aquifers. These aquifers are lined by dense, almost impermeable bedrock that yields water from fractures and secondary porosity. Recharge predominantly occurs along the inter-stream areas through porous regolith and fractures in the bedrock. The majority of groundwater moves laterally and enters depressions in the landscape such as stream channels. According to USGS gathered data, well yields in crystalline-rock aquifers are very low, approximately 18 gallons per minute. Solum thickness has a direct correlation to groundwater storage, generally, the thicker the overlying regolith the greater the volume of water storage potential and subsequent well recharge/discharge capacity. Typically, groundwater recharge is greater in valleys and depressional areas due to the thicker regolith, and proximity to fracture zones in the bedrock. Groundwater quality is generally suitable for drinking and other uses, but iron, manganese, and sulfate can occur at undesirable levels (USGS 2001).

Most observable changes in groundwater quality are related to land use and waste disposal patterns. Underground storage tanks, waste lagoons and disposal landfills are commonly responsible for point source contamination. However, more dispersed contamination by non-point sources is increasing and is manifested by petroleum, pesticide and biological

contamination. No land uses commonly associated with groundwater contamination were encountered during the field inspections of this Site.

#### **5.10.2.2 Environmental Impacts**

The main potential source of impacts to groundwater quality is the land application of wastewater generated on the Site. The Soil Water and Environment Group completed the *Agronomist Report* in April 2004 (Project Notebook Appendix J). The wastewater from Briar Chapel will be treated to State water reuse standards and used to irrigate sprayfields and greenways. The State of North Carolina Division of Water Quality (DWQ) does not require a treatment process for the removal of nutrients such as phosphorus or nitrogen in their operating limitations. Using land application of the treated wastewater as a disposal system will further reduce nutrient loads. As the treated reuse water is irrigated, the trees and vegetation take up the available nutrients, specifically nitrogen and phosphorus, contained within the irrigated water. The study recommends that the Site receiving reused water be a combination of forage and forestland that assimilates hydraulic and nutrient loading from the wastewater treatment facility. After the plants use the nutrients for growth, the soil filters the remaining nutrients while improving water quality going into the groundwater table.

Eagle Resources completed the *Hydrogeologic Study* for the Project in April 2004 (Project Notebook Appendix K). The study objective was to provide information on the occurrence and movement of groundwater beneath and in the vicinity of the planned sprayfields to assess the potential for development of shallow water table conditions. The study recommended that the sprayfields be reconfigured to avoid potential adverse impacts to the groundwater, and this has been incorporated into the design. Irrigation will be conducted on those sprayfield areas with a depth to the water table that exceeds 4 feet under conditions with high natural groundwater recharge (January to April) and where 50% of the irrigation rate is recharge. This approach is very conservative as the North Carolina nondischarge rules (15A NCAC 2H .0200) only require the water table beneath sprayfields to be greater than 1 foot, and if between 3 feet and 1 foot, that a demonstration be made that ground water quality will not be adversely affected. With proper site management, and hydraulic and nutrient loading management, the site receiving reused water will work towards protecting groundwater and ultimately the surface waters entering the Cape Fear River Basin. Planned monitoring of the reclaimed water and soil testing will help ensure that groundwater quality is protected.

#### **5.10.2.3 Conclusion**

Based on the Hydrogeologic study and the conservative design described in that report, it is our opinion that there will be no significant impacts to groundwater.

### **5.11 Forest Resources**

#### **5.11.1 Existing Conditions**

As shown in the Land Use Section, forestland occupies 88 percent of the Site. According to Division of Forest Resources (2004), the site is well suited for timber production with medium volume potential. According to Braham and Braham (2001), the forestland within Briar Chapel

property is composed of 4 basic types: Oak-Hickory (438 acres), Mesic Mixed Hardwood (27 acres), Bottomland Hardwood (37 acres) and Loblolly Pine (557 acres). Distribution and composition of the plant communities on and immediately adjacent to the Site reflects the landscape variations in topography, soils, hydrology, and past or present land use practices. The plant communities observed within the property were limited due to intense past silvicultural practices, topography, and soils. Figure 12 shows a map identifying the vegetation of the Site. Description of the four types of forestland and examples of the species present on those areas are presented as follows:

Dry Oak Hickory Forest and Dry Mesic Oak Hickory Forest occupy 38% of the property. The Dry Oak Hickory Forest occupies the drier topography where soils are thin, water inputs are limited to rainfall and strong sunlight and winds create high exposure. The soils are less dry in the Dry Mesic Oak Hickory Forest with more rainfall and subsoil percolation. The Dry Oak Hickory Forest contains more post oak (*Quercus stellata*) and scarlet oak (*Quercus coccinea*) while the Dry Mesic Oak Hickory contains more black oak (*Quercus velutina*) and southern red oak (*Quercus falcata*).

Mesic Mixed Hardwood Forest occupies 2% of the Briar Chapel property. The higher quality oak and pine has been logged while increasing the proportion of poorly formed trees. Some of the species found in the upper canopy of the Mesic Mixed Hardwood forest are yellow poplar (*Liriodendron tulipifera*), northern red oak (*Quercus rubra*), sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), white oak (*Quercus alba*), american beech (*Fagus grandifolia*), red maple (*Acer rubrum*), white ash (*Fraxinus americana*), sassafras (*Sassafras albidum*), blackgum (*Nyssa sylvatica*), Pignut hickory (*Carya glabra*), mockernut hickory (*Carya tomentosa*) and scattered black walnut (*Juglans nigra*). The lower canopy contains red mulberry (*Morus rubra*), umbrella magnolia (*Magnolia tripetala*), flowering dogwood (*Cornus florida*), persimmon (*Diospyros virginiana*), winged elm (*Ulmus alata*), sourwood (*Oxydendrum arboreum*), and muscledwood (*Carpinus caroliniana*).

The Mountain/Piedmont Bottomland Forest occupies about 3% of Briar Chapel. Most of this type of forest is well drained with some scattered wetlands. This community is completely forested with the presence of some pockets that have been cleared and farmed. The current community is dominated by sweetgum (*Liquidambar styraciflua*), river birch (*Betula nigra*), yellow poplar (*Liriodendron tulipifera*) and loblolly pine (*Pinus taeda*).

The Loblolly Pine Forest covers 48% of the forestland. This community covers land previously heavily disturbed or cleared for farming. This land is dominated by loblolly pine (*Pinus taeda*), sharing the land with sweetgum (*Liquidambar styraciflua*), yellow poplar (*Liriodendron tulipifera*), shortleaf pine (*Pinus echinata*) and Virginia pine (*Pinus virginiana*).

Braham and Braham (2001) also examined the project area for old growth communities. They defined old growth as any stand that (1) was not initiated following agriculture or intensive logging, (2) contains at least 3 distinct age classes, (3) contains canopy gaps distributed

throughout the stand, and (4) contains at least a few individuals that are near the maximum size for the species given the site conditions. Stands lacking only the last criteria were termed older growth. Based on these definitions and the analysis, there are no old growth forested areas on the property. Bennett Mountain, a Dry-Mesic Oak Hickory Community, qualified as older growth. Braham and Braham (2001) also identified an area as Boulder Canyon which they classified as an older growth Mesic Mixed Hardwood Forest.

### **5.11.2 Environmental Impacts**

Existing land use will be modified from silvicultural land to a residential mixed used community, and the land will be lost to timber production. However, the most important features are being preserved: riparian corridors and Bennett Mountain. The Project has been designed with large amounts of open space in the form of recreational areas, riparian buffers, ponds, and wetlands. These riparian corridors will be:

- At least one hundred (100) feet along all perennial streams;
- At least fifty (50) feet along all intermittent streams;
- At least fifty (50) feet along all ephemeral streams shown on the Soil Survey maps and having a drainage area of more than twenty-five (25) acres;
- At least thirty (30) feet along all ephemeral streams shown on the Soil Survey maps and having a drainage area of between ten (10) acres and twenty-five (25) acres.

These riparian corridors will serve to link the preserved forested area within the Site to forested areas outside the Site. If one assumes that only the riparian buffers (248 acres) and project boundary buffers (226 acres) are preserved as forest, 30 percent of the Site will remain in forested land. This number is low, as Bennett Mountain is being preserved, Boulder Canyon is being preserved (Hamak and Sanchez, 2004), and natural areas will be preserved in the planned parks, near schools, and around residential areas. The unimproved open space areas will be deeded to the Homeowners Association, and restrictive covenants will outline how the open space areas may be used (Barron, 2004). Conversation with John R. McAdams personnel indicated that in areas with larger lots, the roads will be installed, but each lot will be cleared individually, when possible, which will help preserve trees (Hamak, 2004). In addition, other open space areas may contain a forested environment. Finally, the project is providing a 66-acre park for other County residents to enjoy as open space.

### **5.11.3 Conclusion**

While forested land will be reduced on site, much of the forested land will be preserved as open space. Using a conservative assumption that only riparian buffers and project boundary buffers will be forested, forest land will decrease from 88 percent to 30 percent. Since lots will be cleared individually to the maximum extent practical, the change will not be as dramatic as it would if the entire development was mass graded as often occurs.

Given that the Site comprises only approximately 0.36 percent of Chatham County's land area. The change in forested land will be insignificant in the context of the County as a whole.

## 5.12 Shellfish or Fish and Their Habitats

### 5.12.1 Existing Environment

Pokeberry and Wilkinson Creeks are the primary perennial streams on-site. Fish habitats are isolated to Pokeberry and Wilkinson Creeks and their associated tributaries. Fish species present within these water bodies are typical of the Piedmont region and include species such as sunfish, creek chub, and brim. Braham and Braham reported seeing small fish in the creeks, but were unable to identify them. While no mussel survey is available on the streams, it is likely that *Elliptio* species are common in the creeks.

The Cape Fear Shiner (*Notropis mekistocholas*), a federally endangered species, has been documented within the Haw River in the vicinity of Jordan Lake. Drainage from the Site ultimately flows into Pokeberry and Wilkinson Creeks before entering the Haw River to Jordan Lake.

The Cape Fear Shiner is generally found in streams with gravel, cobble and boulder substrate with low sediment loads (USFWS, 1988). Braham and Braham (2001) examined the streams on the Briar Chapel property to determine if there was suitable habitat for the Cape Fear Shiner onsite. Their report indicates that suitable habitat does not exist; the streams on the project property have narrow bottoms with sandy, pebbly, or leaf detritus bottoms. In addition, the presence of beaver ponds on the Site act as a barrier for migration of this listed species.

### 5.12.2 Environmental Impacts

During construction, erosion will occur at a higher rate than when the land is forested. An erosion and sediment control plan will be developed in accordance with the Sedimentation Pollution Control Act as described in the Soils Section. Practices will be implemented as part of this plan to minimize the time that soil is exposed by phasing the construction and expeditiously establishing ground cover when grading is completed. In addition, best management practices, designed to protect against a 10-year storm event, will be installed to capture any sediment that is eroded. The extensive riparian buffer system that is planned for the Site will serve as a last line of defense in case one of the erosion control devices fails. Finally, most of development avoids areas that have slopes that exceed 15 percent.

Road crossings are being planned to allow passage of aquatic organisms. Currently one bridge is being planned to minimize stream and wetland impacts. Other crossings will include either bottomless culverts or will have the culvert bottoms buried at least one foot (Sanchez, 2004). These practices will minimize any environmental impacts to aquatic organisms.

### 5.12.3 Conclusion

As described above and in the water resources section, appropriate action is being taken to minimize the impacts of sedimentation. By minimizing the time that soil is exposed, erosion is

minimized. Sedimentation control devices are being developed to prevent sediment from reaching streams. Proper design, inspection and maintenance of these BMP structures will ensure failure does not occur. The large beaver impoundment/wetland areas on Wilkinson and Pokeberry Creek will remove some of the sediment that may result in the event of BMP failure. These practices will ensure that sediment generated onsite will not impact the Cape Fear Shiner downstream on the Haw River.

## 5.13 Wildlife and Natural Vegetation

### 5.13.1 Existing Environment

The Site exhibits a sporadically located, heterogeneous mix of plant community types. These plant communities were generated through natural succession and were most likely manipulated by past and existing land uses. Examples of manipulation include but are not limited to land clearing for agricultural purposes, selective timber harvesting, fire suppression, utility easements, and road construction and maintenance. The Site and the immediate vicinity contain several dirt trails and roads, ditches, wetlands areas, beaver ponds, stream channels, power and gas rights-of-way, and forested riparian areas. This interspersion of habitat types has a direct correlation to the wildlife population dynamics and the species diversity. Wildlife habitat located in the vicinity includes upland mixed pine/hardwood forest, mixed hardwood forest, forested wetlands and riparian areas, beaver impoundments, and stream channels.

The following wildlife and natural vegetation were found in the Site based on the land use categories discussed by Braham and Braham (2001)

#### Piedmont/Mountain Semipermanent Impoundment

Beaver (*Castor canadensis*) activity has resulted in several ponds and associated emergent wetlands along Pokeberry and Wilkinson Creeks. Woody vegetation along pond margins includes black willow (*Salix nigra*), elderberry (*Sambucus canadensis*), and black chokeberry (*Aronia melanocarpa*). Emergent herbaceous vegetation include cattail (*Typha latifolia*), waterlily (*Nymphaea* spp.), rush (*Juncus effuses*), and bulrush (*Scirpus cyperinus*). At Briar Chapel, this community contained various wildlife associated with water including various turtles (most likely *Chrysemys*), frogs [spring peeper (*Hyla crucifer*), upland chorus frog (*Pseudacris feriarum*), bullfrog (*Rana catesbeiana*), northern cricket frog (*Acris crepitans*)], eastern newt (*Notophthalmus viridescens*), wood duck (*Aix sponsa*), red-winged blackbird (*Agelaius phoeniceus*), belted kingfisher (*Megaceryle alcyon*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*) and osprey (*Pandion haliaetus*).

Dry Oak-Hickory Forest and Dry-Mesic Oak-Hickory Forest. The Dry Oak Hickory forest community is located on the upper slopes and ridges on the Site. Common shrubs are blueberries (*Vaccinium vacillans*, *Vaccinium corymbosum*) and maple-leaf viburnum (*Viburnum acerifolium*). The herb layer is relatively non-diverse with common species such as spotted wintergreen (*Chimaphila maculata*), crane fly orchid (*Tipularia discolor*), and hearts-a-burstin (*Euonymus americana*). The Dry Oak-Hickory Forest generally grades



into this community type further downslope. The shrub and herb layer is slightly more diverse containing additional species such as *Viburnum rafinesquianum*, Christmas fern (*Polystichum acrostichoides*), and rattlesnake plantain (*Goodyera pubescens*). White tail deer use this community for foraging and browsing for berries, grapes and sprouts on trees, and refuge. Other wildlife found in this area include: gray squirrel (*Sciurus carolinensis*), anole (*Anolis carolinensis*), ground shrink (*Scincella lateralis*), birds [cardinal (*Cardinal cardinalis*), rufus-sided towhee (*Pipilo erythrophthalmus*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Parus carolinensis*), white-breasted nuthatch, pine warbler, ovenbird, and downy woodpecker (*Picoides pubescens*)].

Bennett Mountain is one of the best examples of the Dry-Mesic Oak History forests in Chatham County according to information available from the Natural Heritage Program. NHP's description of Bennett Mountain indicates that wild turkeys (*Meleagris gallopavo*) live at the Site. According to NHP, preservation of this flock will require that adjoining tracts of land remain as forested.

#### Mesic Mixed Hardwood Forest (Piedmont Subtype)

This community type occurs on a small portion of the Site along protected north-facing slopes that have a higher moisture regime and nutrient content. The shrub layer is somewhat diverse with species such as *Viburnum rafinesquianum*, hazelnut (*Corylus americana*) and blueberries. The herb layer is also quite diverse with species such as beech drops (*Epifagus virginiana*), bluets (*Houstonia caerulea*), spotted wintergreen, heartleaf (*Hexastylis arifolia*), crane fly orchid, grapefern (*Botrychium virginianum*), foamflower (*Tiarella cordifolia*), and liverleaf (*Hepatica americana*). Wildlife species use the Mesic Mixed Hardwood community in conjunction with adjacent communities, hence there is not specific wildlife that can be assigned to the Mesic Mixed Hardwood Forest community alone.

#### Piedmont/Mountain Bottomland Forest

This community type occupies the floodplains surrounding the larger streams within the Site. The canopy is comprised of tulip poplar, sweetgum, American elm (*Ulmus americana*), river birch (*Betula nigra*), and red maple (*Acer rubrum*). The subcanopy is composed of American Holly and musclewood (*Carpinus caroliniana*). Due to recent disturbance in this community, autumn olive (*Eleagnus umbellata*) has invaded the shrub layer a great deal. In addition, another exotic, *Microstegium vimenea*, comprises much of the herb layer. Other herbaceous species include crane fly orchid, hearts-a-burstin, Christmas fern, greenbrier (*Smilax rotundifolia*), netted chain fern (*Woodwardia areolata*), bedstraw (*Galium tinctoria*), and Japanese honeysuckle (*Lonicera japonica*). Braham and Braham did not report any amphibians in this area, but it is likely they exist in this floodplain habitat.

#### Loblolly Pine Forest

This is the predominant community within Briar Chapel. It is dominated almost exclusively with loblolly pine with minor subcanopy contributions of sweetgum, tulip poplar, red maple,

red cedar, and various other opportunistic species. The shrub and herb layer is very sparse with blueberries, spotted wintergreen, and running pine (*Lycopodium flabelliforme*).

#### Early Successional Fields

This artificial community occupies the two easements on the Site. The powerline right-of-way is maintained and thus weedy species including exotics occupy the easement. Species observed include horseweed (*Erigeron canadensis*), purple top (*Tridens flavus*), plume grass (*Erianthus contortus*), Panicum spp., rabbit tobacco (*Gnaphalium obtusifolium*), young red cedar, broomsedge (*Andropogon virginicus*), woolly mullein (*Verbascum thapsus*), smooth sumac (*Rhus glabra*), and Tree-of-Heaven (*Ailanthus altissima*). The pipeline is also maintained and contains mostly grasses such as fescue (*Festuca elatior*).

#### Artificial Impoundment

One farm pond approximately 1 acre in size exists on the property. The pond shoreline has common rush (*Juncus effusus*). The bank contained red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), hazel alder (*Alnus serrulata*), black cherry (*Prunus serotina*), black willow (*Salix nigra*) and swamp rose (*Rosa palustris*). Canada geese (*Branta canadensis*) and raccoon tracks (*Procyon lotor*) were observed.

#### Pastureland

The pastureland on the property contains a forage grass. There were numerous white-tailed deer tracks (*Odocoileus virginicus*). The American robin (*Turdus migratorius*) and common grackles (*Quiscalus quiscula*) were observed.

The Natural Heritage Program database lists several rare, threatened and endangered species in Chatham County (Attachment 3). Braham and Braham (2001) examined the Site for potential habitat for several federally protected species: harperella, red-cockaded woodpecker, bald eagle, and Cape Fear shiner (described above). Harperella is a semi-aquatic annual plant that is found in Chatham County. In North Carolina, the plant is always found along swift-flowing rivers in sun or shade in rock crevices or on gravel bars that are swept clear of other vegetation during spring floods. No suitable habitat was found on site. In addition, the researchers noted that the two large beaver dams have permanently flooded any potential suitable habitat.

The red-cockaded woodpecker (RCW) nests in older-growth pine trees, and prefers longleaf pine, but will use other pines that are of sufficient size and age. The RCW will also nest in mixed stands as long as 50 percent of the stand is pine. Braham and Braham (2001) found 560 acres of marginal habitat for the RCW on the Briar Chapel Site. In 2002, they performed a helicopter survey for RCW within the Briar Chapel Site and all land within a one mile radius. No evidence of RCW were observed. In addition, no evidence of RCW nests were observed during the vegetation survey. Braham and Braham also requested information from local residents on whether they had seen RCW. Two respondents noted yes, but descriptions of the birds did not match the RCW, and the biologists believe they actually observed pileated woodpeckers and flickers. E-mail accounts from knowledgeable bird watchers noted no RCW sightings. Thus Braham and Braham concluded that no RCW exists near the Briar Chapel site.

### **5.13.2 Environmental Impacts**

Portions of the existing vegetation will be removed or modified during construction. The development will result in a reduction in the population levels of common bird and wildlife species. Species that require large forested tracts will be impacted the most. However, over 50 percent of the Site will remain in open space. After development, vegetative areas such as forested buffers, greenways, and public parks will be maintained throughout the life of the project. In addition, many of the home sites will be cleared individually rather than through mass clearing which will protect more trees (Hamak, 2004). Bennett Mountain will be preserved as well as the area east of it. Riparian corridors and greenways will also connect forested areas. Braham and Braham (2001) report that development of streamsidess usually impacts more species because species richness is often greater. However, these areas will be protected through riparian buffers.

### **5.13.3 Conclusion**

Developing the Site as a compact community results in the Site having 50 percent open space which helps mitigate impacts to the flora and fauna of the community. The most species-rich areas will occur along streams (Braham and Braham, 2001), and these areas will be protected in the form of riparian buffers. In addition, the project site is only 0.34 percent of the County, and impacts to habitat are insignificant when examined on a regional basis. Since no habitat for federally protected species exists on the Site, no impacts to these species will occur.

## **5.14 Introduction of Toxic Substances**

### **5.14.1 Existing Environment**

The only potential toxic substances that may presently impact the Site are herbicides and pesticides that may be used on the agricultural land at the southern end of the Site.

### **5.14.2 Environmental Impacts**

During construction, there is the potential for accidental spills of fuels such as gasoline or diesel from the mechanical equipment. All re-fueling will occur in designated upland areas, as far as feasible from surface waters. Spills that may occur will be contained immediately by certified personnel and disposed of appropriately. Other toxics such as paints and varnishes will be used during construction. Any appropriate requirements (including the Material Safety Data Sheet) will be followed for storage and disposal of any substance that can be considered toxic. After development, automobiles and other mechanized equipment and chemicals used to maintain landscaping will be the major potential sources of toxic substances on the Site. Automobiles may leak oil and grease. Herbicides and pesticides may be used by homeowners to maintain their landscaping; they may also be applied to landscaping in the open space areas. To minimize potential impacts from the development site, the agronomist's report which outlines which chemicals can be used and their proper application rates and timing will be provided to the Homeowners Association (Barron, 2004). Any runoff associated with the Site will be treated in one of the 37 stormwater BMPs or bioretention areas. While these BMPs are not designed

specifically for removal of toxic substances, they will remove any substances that bind to soil. The land application system will use a combination of chlorine and ultraviolet disinfection methods. By using the ultraviolet disinfection, use of chlorine and accidental spills that may occur will be minimized.

At this time, the types of commercial development are unknown. There are certain types of commercial development such as gas stations that have toxic chemicals onsite. State and local regulations will be followed to ensure that environmental risk is minimized.

### **5.14.3 Conclusions**

Overall, the impacts from toxic substances should be minimal. Toxic impacts associated with residential development are normally insignificant. There are mitigative measures in place to treat the stormwater that runs off. Therefore, it is our opinion that no significant impacts from toxic substances will occur.

## **6.0 Secondary and Cumulative Impacts**

Secondary Impacts are defined in 15A NCAC 1C.0101(d)(4) as “caused by and result from the proposed activity although they are later in time or further removed in distance, but they are still reasonably foreseeable.” The Project will not increase additional residential development. The Project may increase the likelihood of some additional commercial activity, but it cannot be attributed directly to the Project given the current growth trends in Chatham County. The compact community concept provides retail and other commercial services in the development, which will serve to minimize additional commercial development and growth. There are no significant secondary impacts associated with the proposed development.

Cumulative impacts are defined in 15A NCAC 1C .0101(d)(2) as “resulting from the incremental impact of the proposed activity when added to other past, present, and reasonably foreseeable future activities regardless of what entities undertake such other activities.” In order to estimate the cumulative impacts of the Project, data were obtained from Chatham County concerning the number of Planned Unit Developments that have been permitted within the County. In the past five years, four PUDs were permitted with a total acreage of 2270 acres and 1801 dwelling units. If one assumes that a similar number of residential developments will occur over the next five years, an additional 2500 acres of land will be developed as residential mixed-use communities. When compared to the land area of Chatham County as a whole (683 square miles, US Census Bureau website), this equates to 0.57 percent of the County land that will be transformed from rural land to residential/commercial. Even allowing for a greater level of growth, results in one to two percent of the land changing. This is not a significant portion of the County.

A similar impact occurs when population projections are used. Over the next ten years, it is estimated that Chatham County will grow by 10,000 people or 20 percent. The current average household size is 2.47 persons in Chatham County. Assuming this percentage continues, this results in a need for approximately 4050 new residences in the next ten years or approximately 2000 residences in the next five years. This is similar to the number of dwelling units permitted

by PUDs in the past five years. This will not result in significant impacts to the County as a whole.

US Highway 15-501 is currently being widened. This widening may cause additional growth in the area. Even if the widening of US 15-501 spurred growth at a rate higher than anticipated by Chatham County, there would still be insignificant changes to Chatham County's landscape as a whole.

The cumulative impacts to the environment will also be lower from compact community site designs. These site designs maximize the amount of open space and reduce impervious surfaces. This results in greater levels of forestland and habitat being preserved. Lower impervious surfaces will also result in lower levels of stormwater runoff. Much of the open space that remains is in the form of wetlands and riparian buffers which serve to filter pollutants and provide habitat.

## 7.0 Mitigative Measures

Some impacts to environmental resources will occur at all development sites. As described above, there are several types of practices that will mitigate these environmental impacts at Briar Chapel. First, the Site is designed as a compact community that results in higher density development over a smaller footprint than would occur under a traditional site design. By concentrating the development, larger amounts of open space are preserved. The preserved open space will be deeded to the Home Owners Association, and restrictive covenants will be placed on the open space that limits development on it.

As part of this open space, the Briar Chapel community includes 100-foot riparian buffers along perennial streams, 50-foot buffers on intermittent streams, and 30 to 50 foot buffers along ephemeral streams. Riparian buffers help protect water quality by filtering pollutants, stabilizing streambanks, and moderating stream temperature. They are effective in helping to control sediment loading as well as controlling stormwater runoff volume. In addition, buffers can provide ecological functions by protecting wetlands, providing food and habitat for aquatic and streamside organisms, and by providing wildlife corridors. Finally, riparian buffers can help protect floodplains and downstream property.

In addition, virtually all of the existing wetlands are being preserved. Wetlands help preserve biological diversity, protect wildlife, protect water quality by filtering pollutants, and prevent flooding. There are several stream crossings on site, and an estimated 1949 feet of streams will be impacted. These stream impacts will be mitigated by restoration elsewhere, and a mitigation site that the Corps of Engineers has verbally approved has been located. The limited wetland impacts will be mitigated through preservation or restoration elsewhere or through offset payments as required by COE and DWQ.

Preserving larger amounts of open space helps maintain the overall level of imperviousness within a watershed. As imperviousness increases in a watershed, less water infiltrates the soil during storm events, and higher amounts of overland runoff occur. This results in higher stream flows during storms that can cause streambank erosion, habitat degradation, and lower biotic diversity in the aquatic ecosystem. By minimizing the amount of imperviousness, stormwater runoff volume decreases which helps protect water quality and the downstream water supply.

Open space preservation serves other ecological functions such as providing high quality habitat to allow for greater species diversity. For example, in Briar Chapel, the Significant Natural Heritage Area at Bennett Mountain is being preserved. The network of riparian corridors links areas of open space. To the maximum extent practicable, the lots on the Site will be individually cleared as the homes are built. In general, homes that are on lots that are on 60 feet or greater can be individually cleared depending on soils, topography and other factors. This method of development protects a larger number of trees and helps link wildlife areas.

In addition to using open space preservation to minimize stormwater runoff, Briar Chapel is using other low impact development techniques to help mimic the pre-development hydrograph.

The Site has been broken up to drain 37 identified stormwater management facilities that will each treat stormwater locally. The stormwater treatment facilities are being designed such that they control both peak flowrates and the 1-inch runoff volume. The peak flowrate for the one-year, 24-hour storm event after development will not exceed the pre-development condition (for commercial areas draining directly to offsite residential areas, the peak flow will be controlled for the one-, five-, ten- and 25-year, 24-hour storm events). Runoff volume will be controlled such that the first inch of stormwater generated will be captured and released or infiltrated over a two- to five- day period.

Approximately 25 percent of the built-upon area of the Site will not drain to one of the 37 identified stormwater management facilities. Runoff from these areas will be collected in cisterns, treated in bioretention areas, infiltration trenches, hydrodynamic separators, or released to grassed swales. Each of these practices helps maintain the pre-development hydrology.

These stormwater BMPs will also provide water quality treatment of stormwater runoff. As rainfall runs across land surfaces, it may pick up sediment, nutrients, and other pollutants. The stormwater BMPs are being designed to remove 85 percent of the total suspended solids (TSS) and at least 25 percent of the total nitrogen coming to them.

During construction, erosion and sedimentation may occur during rain events. Soil erodes from all land types, including forested land. However, erosion rates are much higher from construction sites. A sediment and erosion control plan will be developed and implemented. This plan will indicate that the Project is being developed in phases. By developing the Project in phases, the time that land is cleared is minimized which reduces the erosion and sedimentation rates. In accordance with the Sedimentation Pollution Control Act, best management practices will be installed that capture any sediment that erodes from the site under the peak flow rate that will occur for all storms up to the 10-year event.

Finally, a state-of-the-art reclamation facility that will be used to treat and dispose of wastewater generated on the Site through land application will be built. After the wastewater is applied, the soil will further filter pollutants including nutrients. Monitoring of the effluent and soil will occur at the land application sites.

## 8.0 State and Federal Permits

The following permits will be required for the project:

- Erosion and Sediment Control Plan Approval
- 404 Permit
- 401 Water Quality Certification
- Nondischarge permit
- Pump and Haul Permit

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## **Figures**

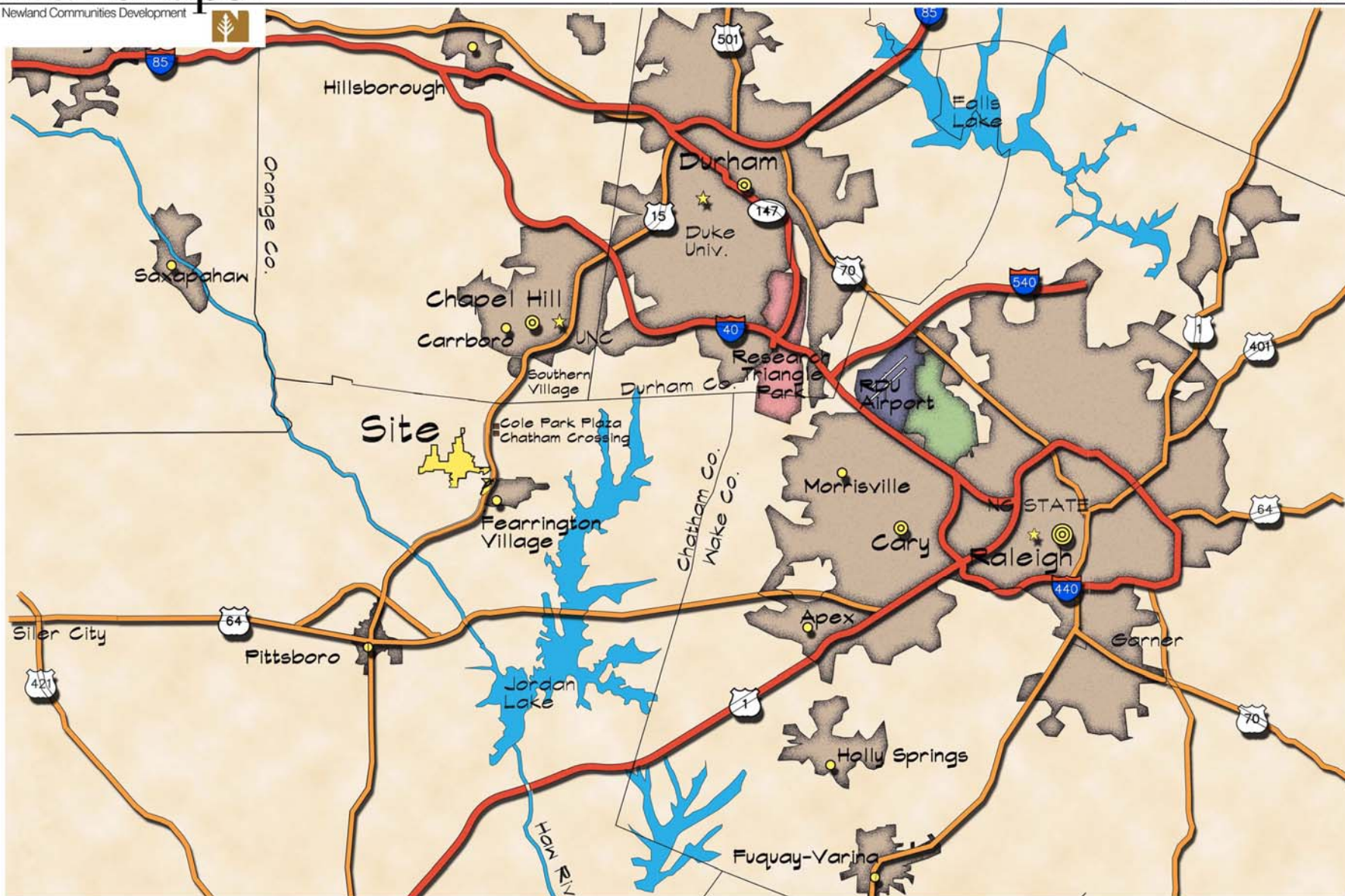
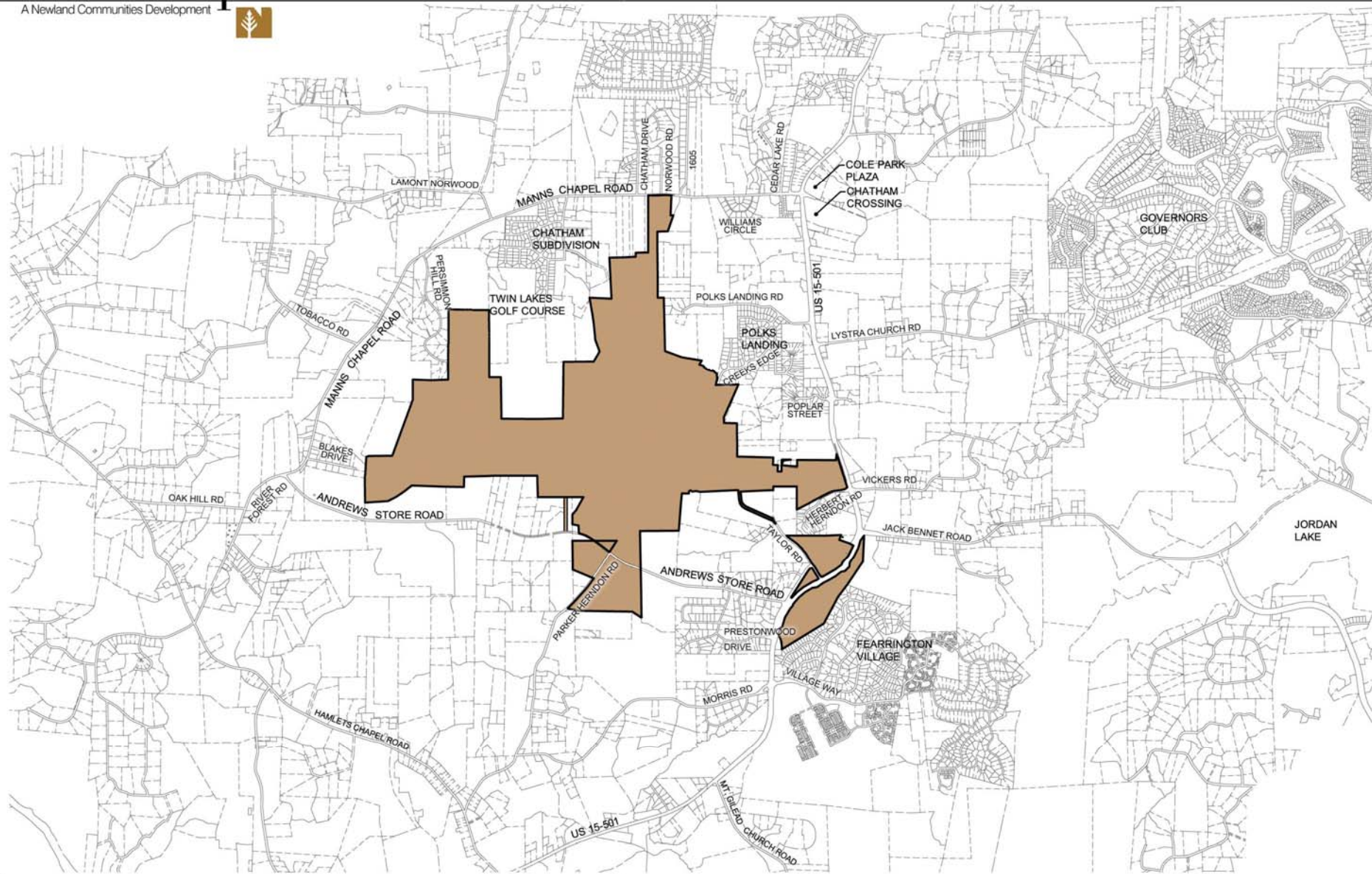






FIGURE 2: PROJECT AREA MAP

1"=3000'





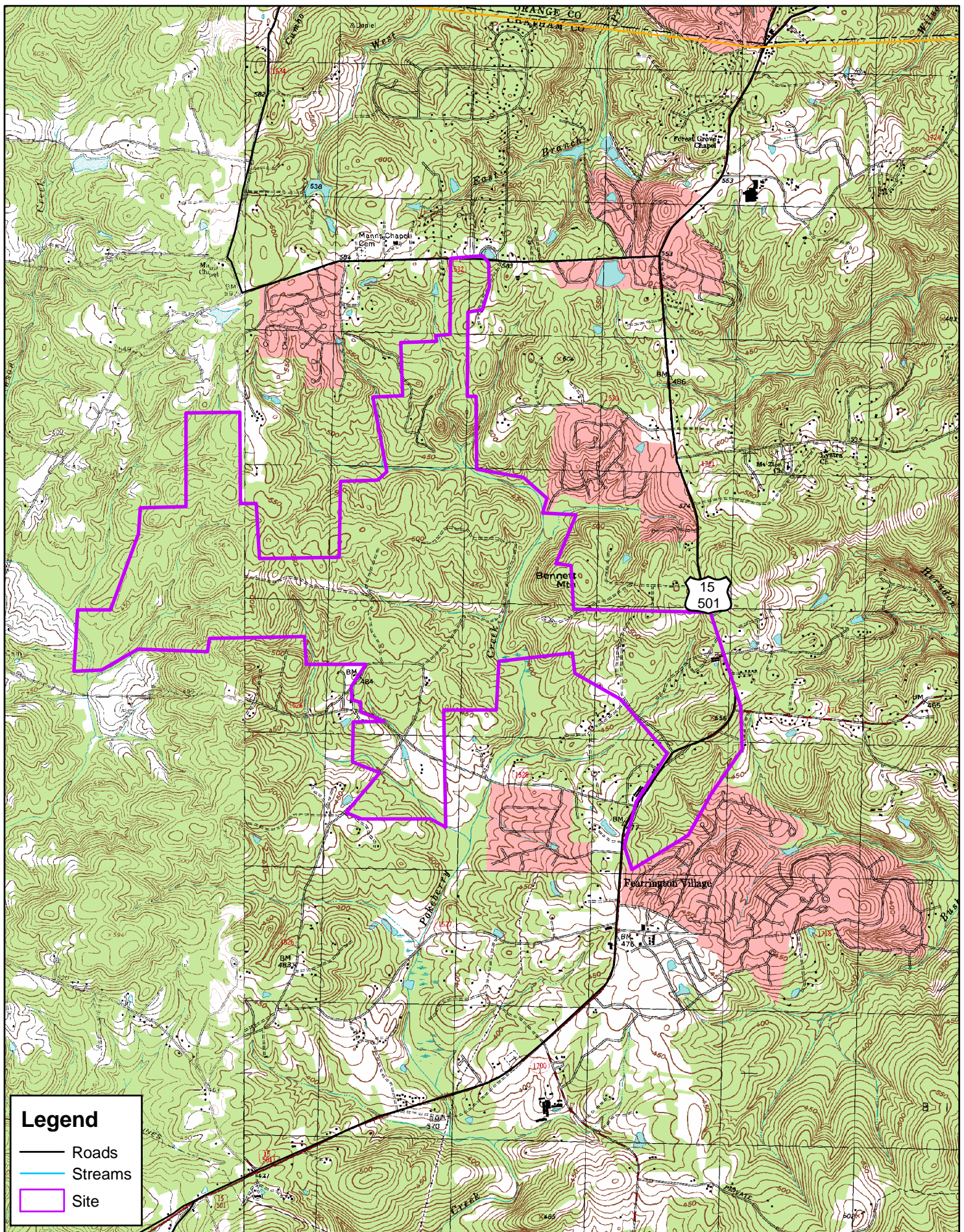
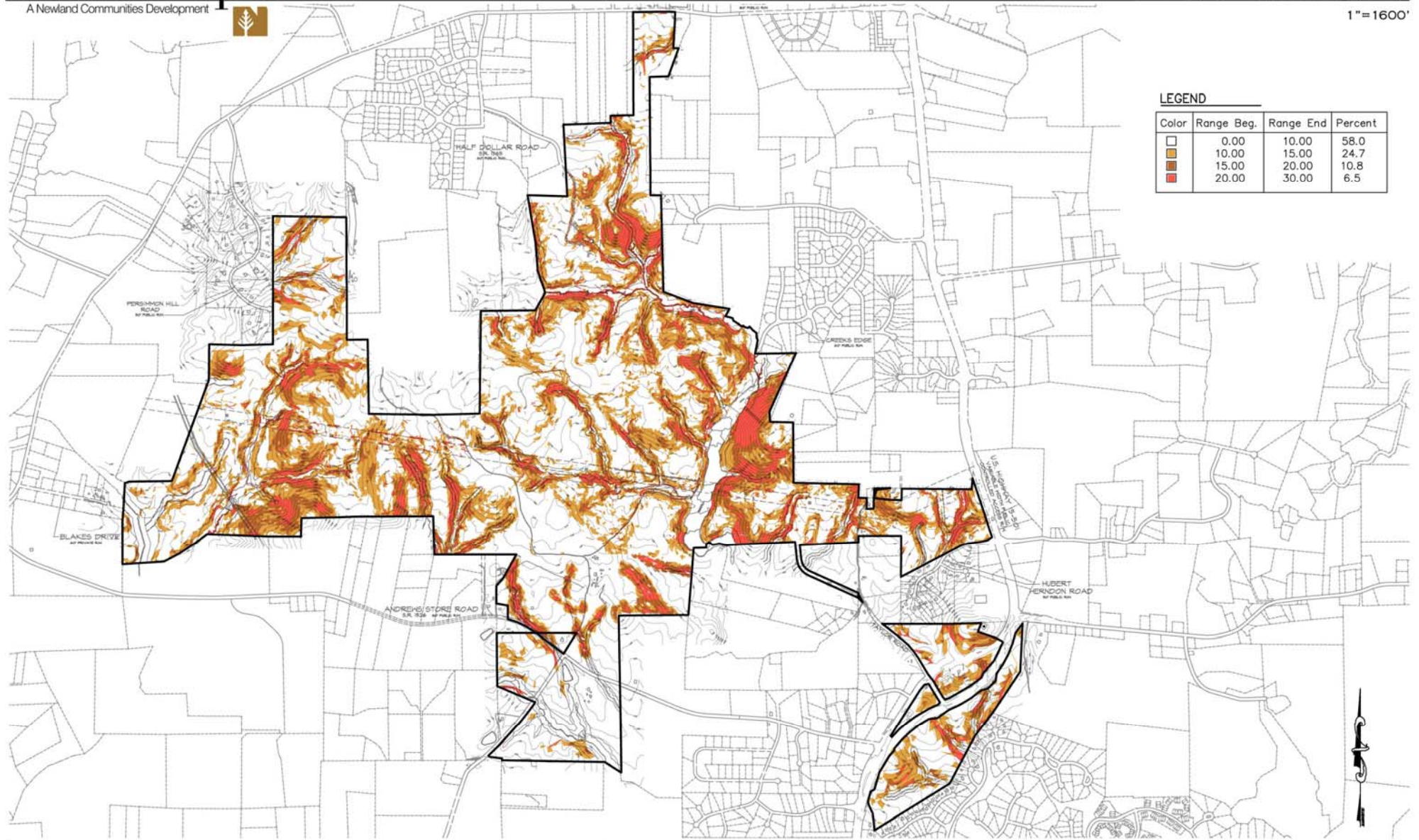


Figure 3  
USGS Quadrangle Maps-Bynum and Farrington  
Briar Chapel Development  
Chatham County







APPROXIMATE SCALE IN FEET

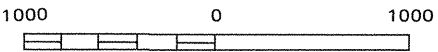


FIGURE 5: FLOODPLAINS

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP

CHATHAM COUNTY,  
NORTH CAROLINA  
(UNINCORPORATED AREAS)

PANEL 55 OF 225

COMMUNITY—PANEL NUMBER:  
370299 0055 B  
EFFECTIVE DATE:  
JULY 16, 1991



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)

JOINS PANEL 0050



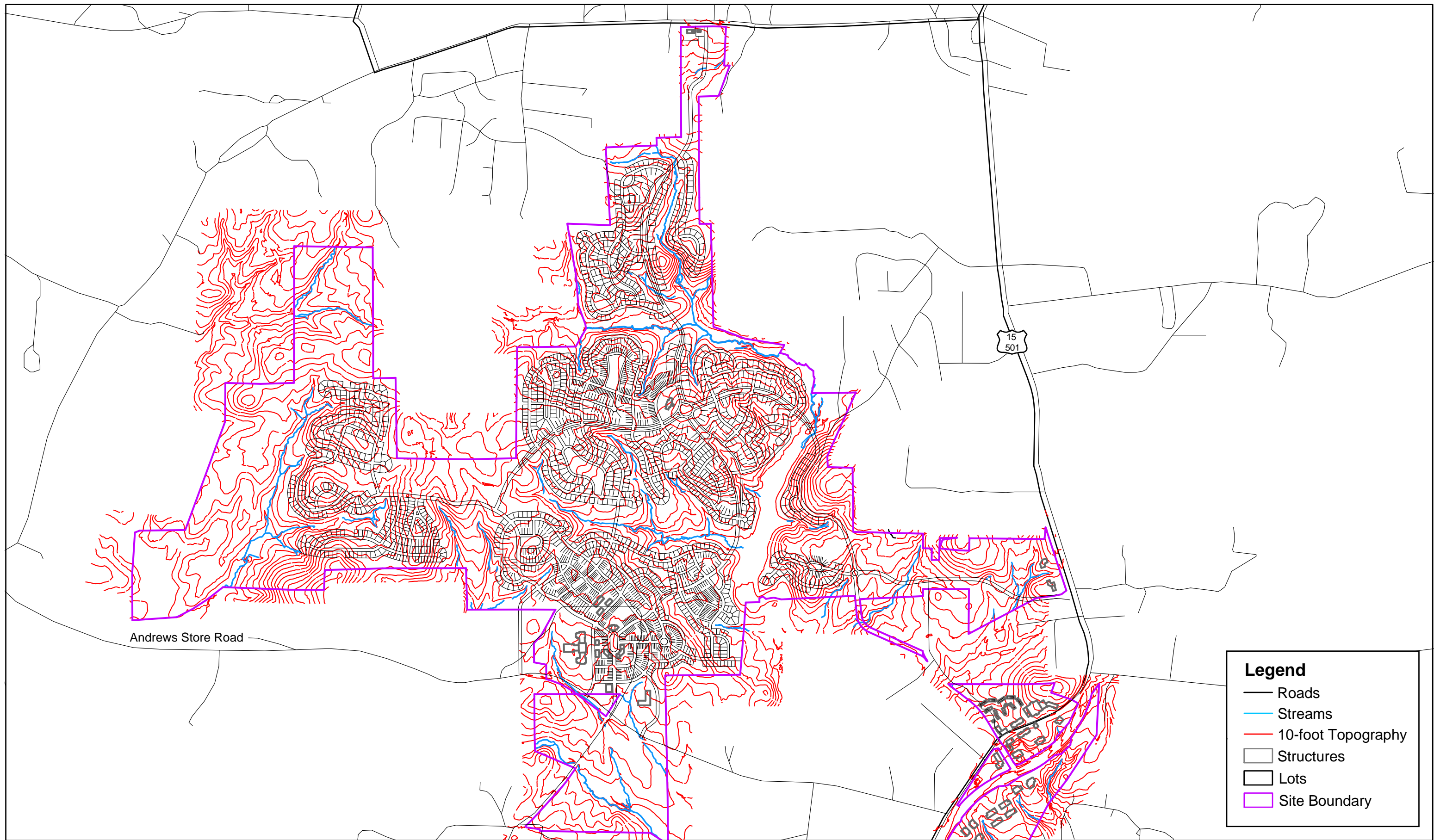


Figure 6: Topography and Site Plan  
Briar Chapel Development  
Chatham County



CH2MHILL

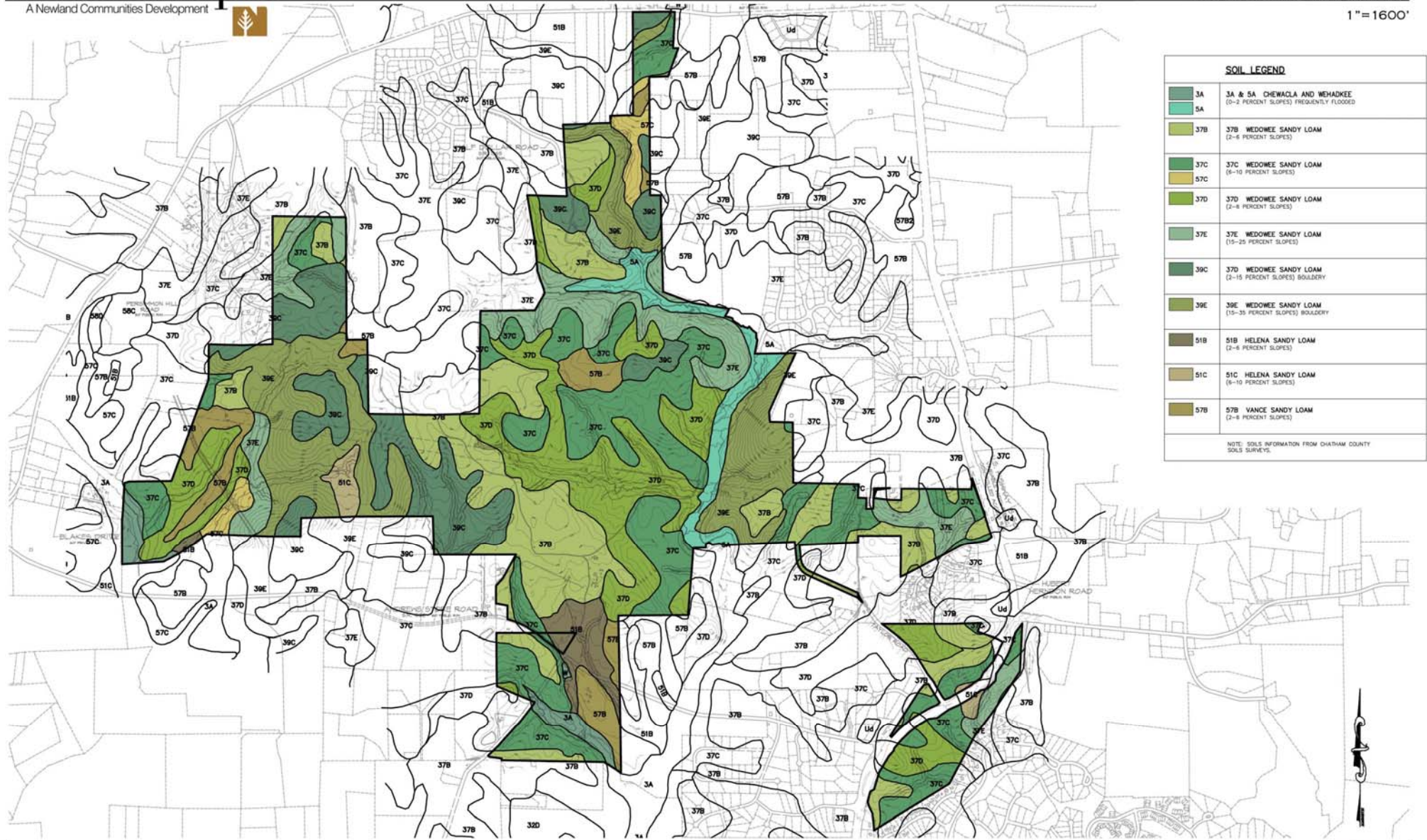
0.25 0.125 0 0.25 Miles



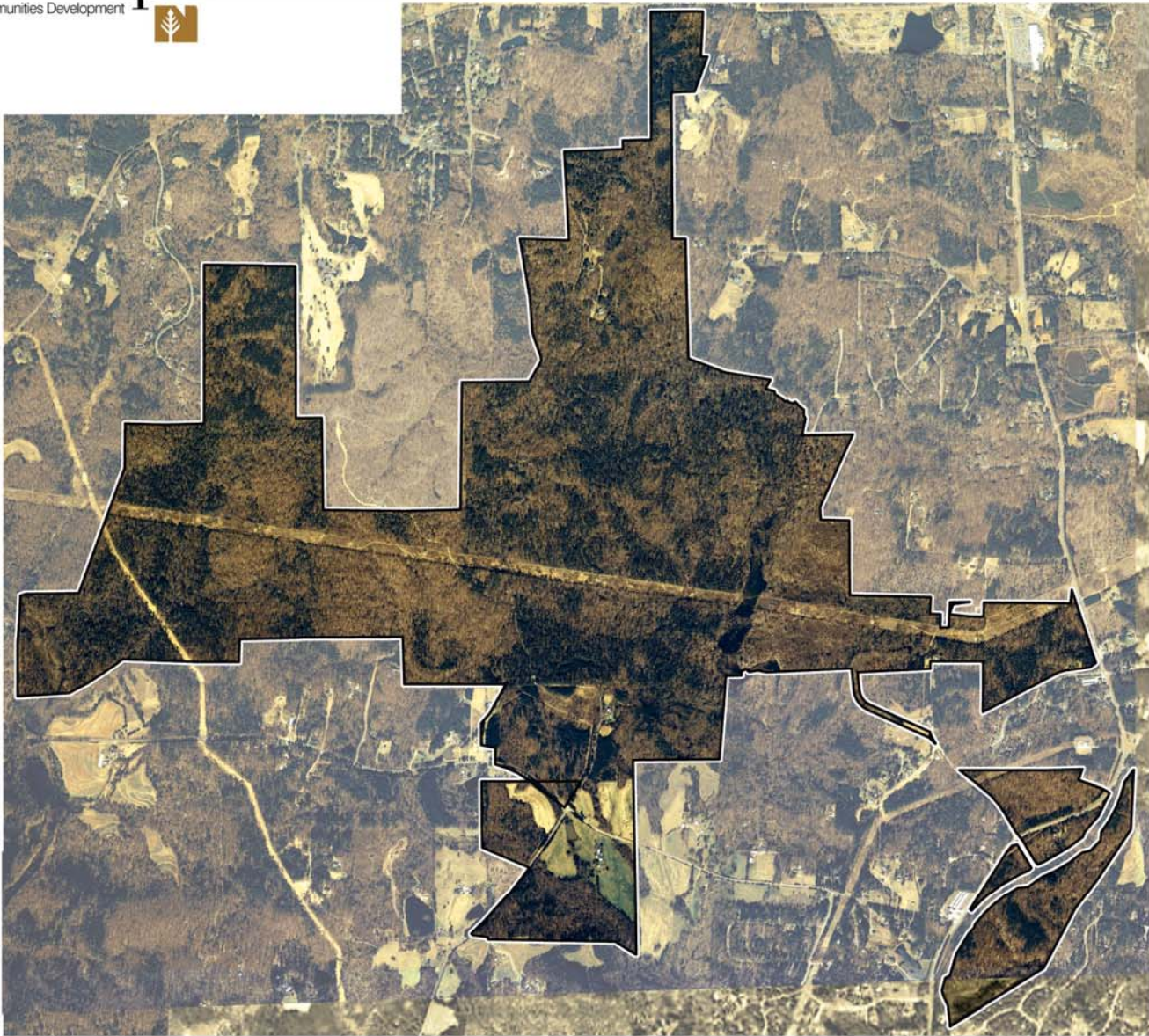


FIGURE 7: SOILS ANALYSIS

1"=1600'









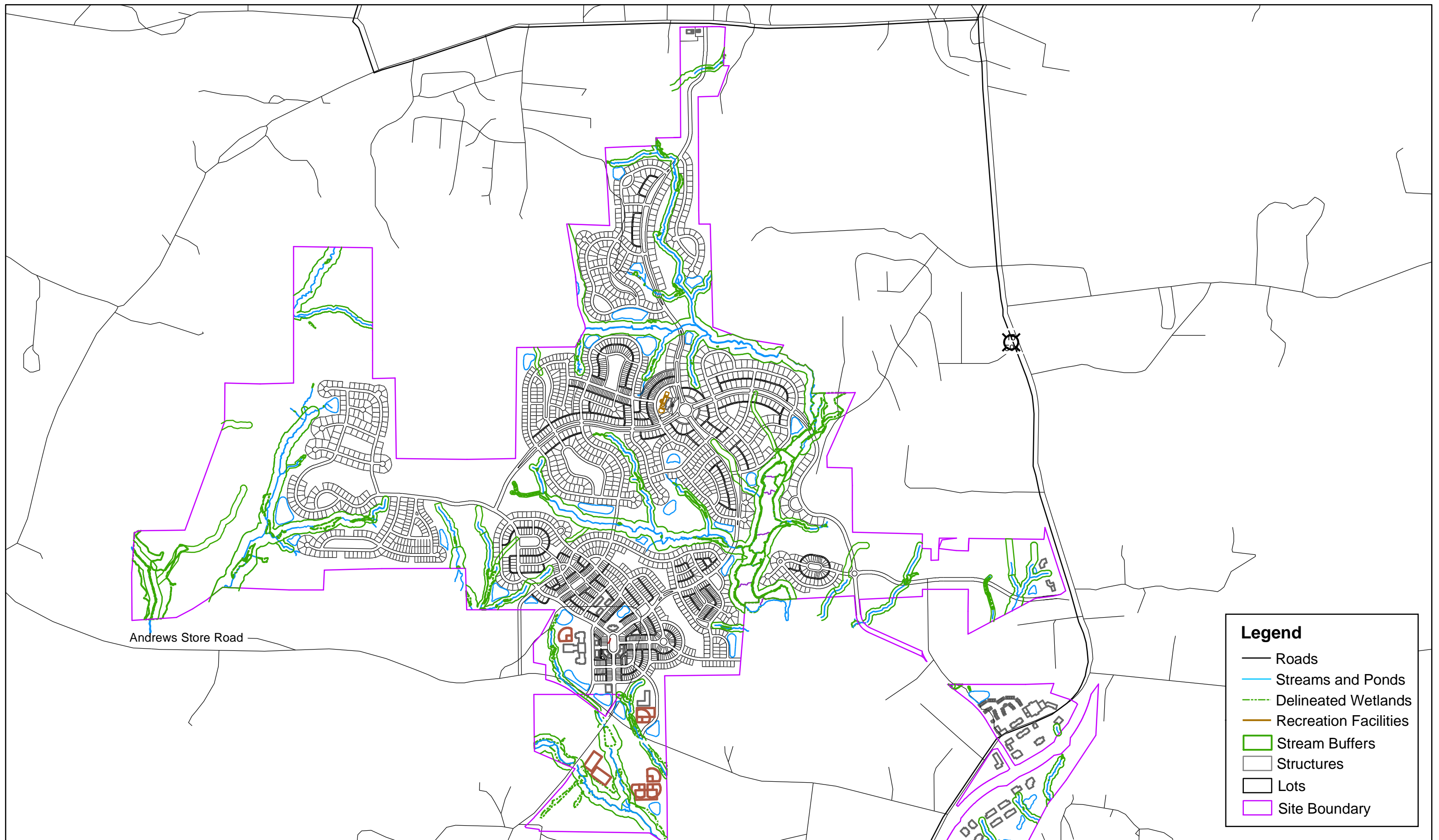
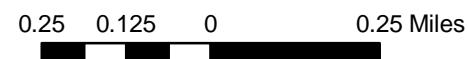


Figure 9: Wetlands and Hydrology  
 Briar Chapel Development  
 Chatham County



CH2MHILL



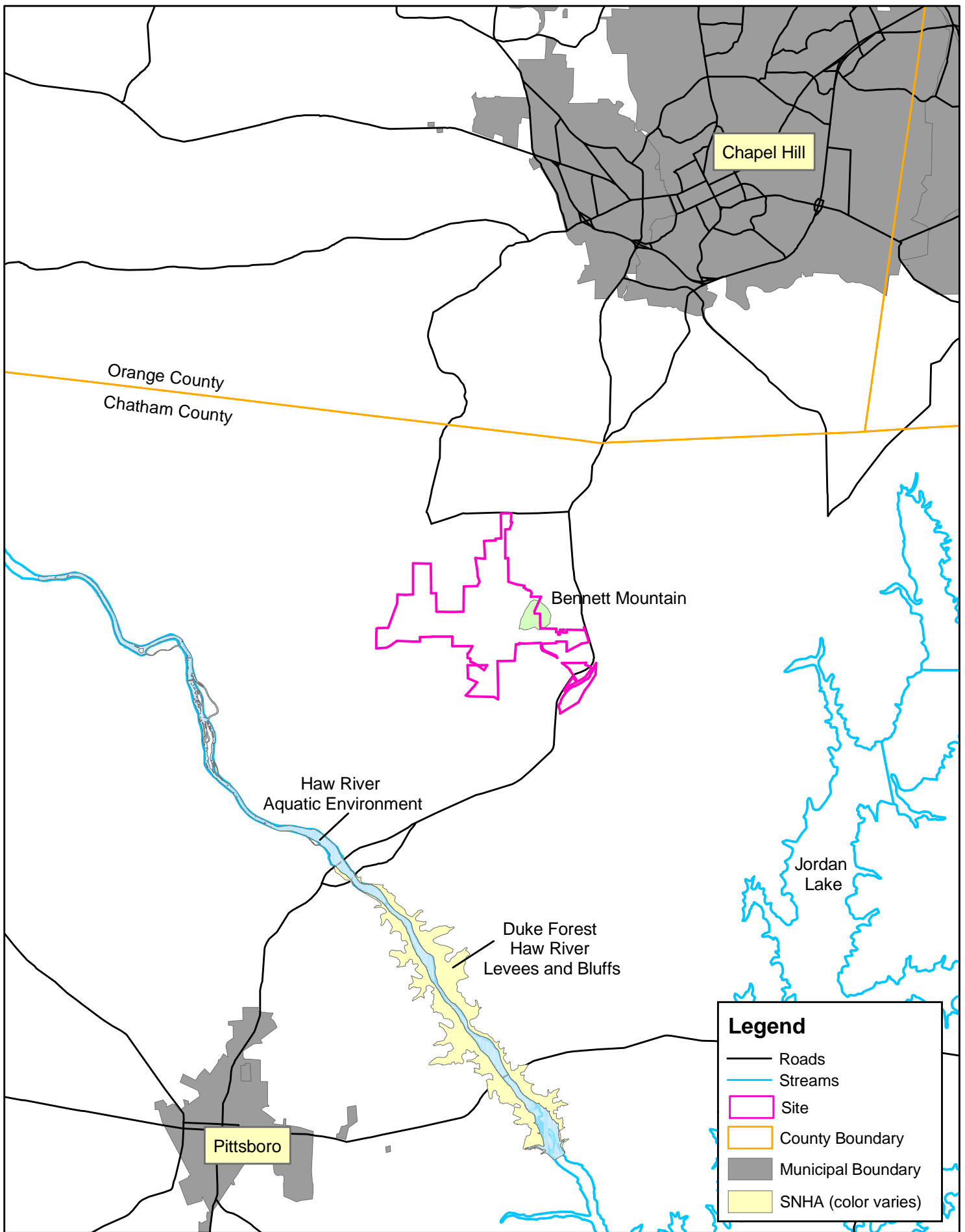
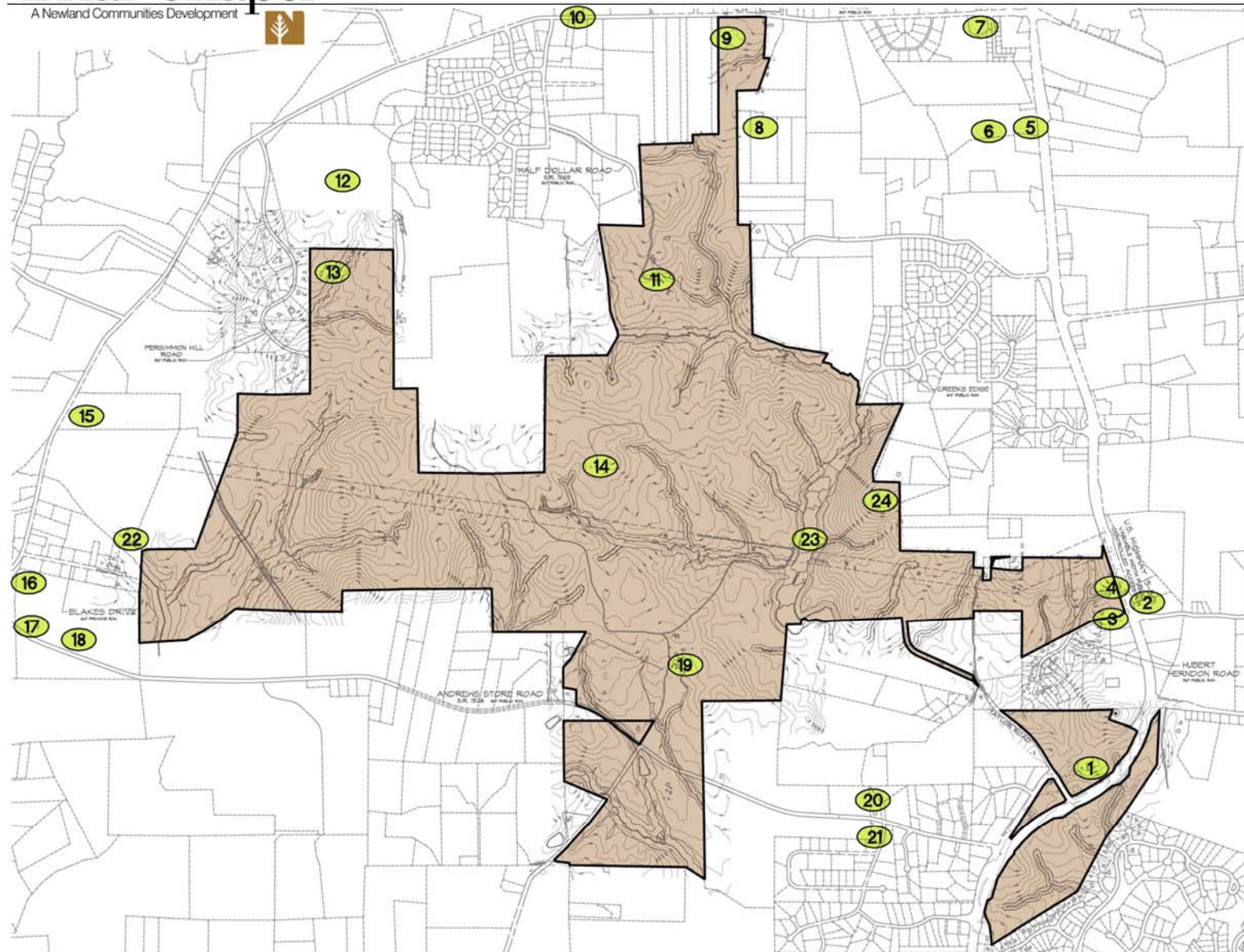


Figure 10: Locations of SNHAs  
Briar Chapel Development  
Chatham County



LEGEND

1. HISTORIC STRUCTURE (HOUSE)
2. HISTORIC STRUCTURE (HOUSE)
3. HISTORIC STRUCTURE (HOUSE)
4. SINGLE GRAVE SITE
5. HISTORIC STRUCTURE (HOUSE)
6. CEMETERY (DOLLAR)
7. HISTORIC STRUCTURE (HOUSE)
8. HISTORIC STRUCTURE (HOUSE)
9. SINGLE GRAVE SITE
10. CEMETERY
11. CEMETERY (BLAKES)
12. HISTORIC STRUCTURE (HOUSE)
13. CEMETERY (NORWOOD)
14. STONE WALL / CISTERN
15. HISTORIC STRUCTURE (TOBACCO SHED)
16. HISTORIC STRUCTURE (HOUSE)
17. HISTORIC STRUCTURE (HOUSE)
18. CEMETERY (FARRAR)
19. CEMETERY
20. CEMETERY (DURHAM)
21. CEMETERY (DURHAM SLAVE)
22. WILKENSON CREEK
23. POKEBERRY CREEK
24. BENNET MOUNTAIN







**FIGURE 13: VEGETATION**

1"=1600'

**LEGEND**

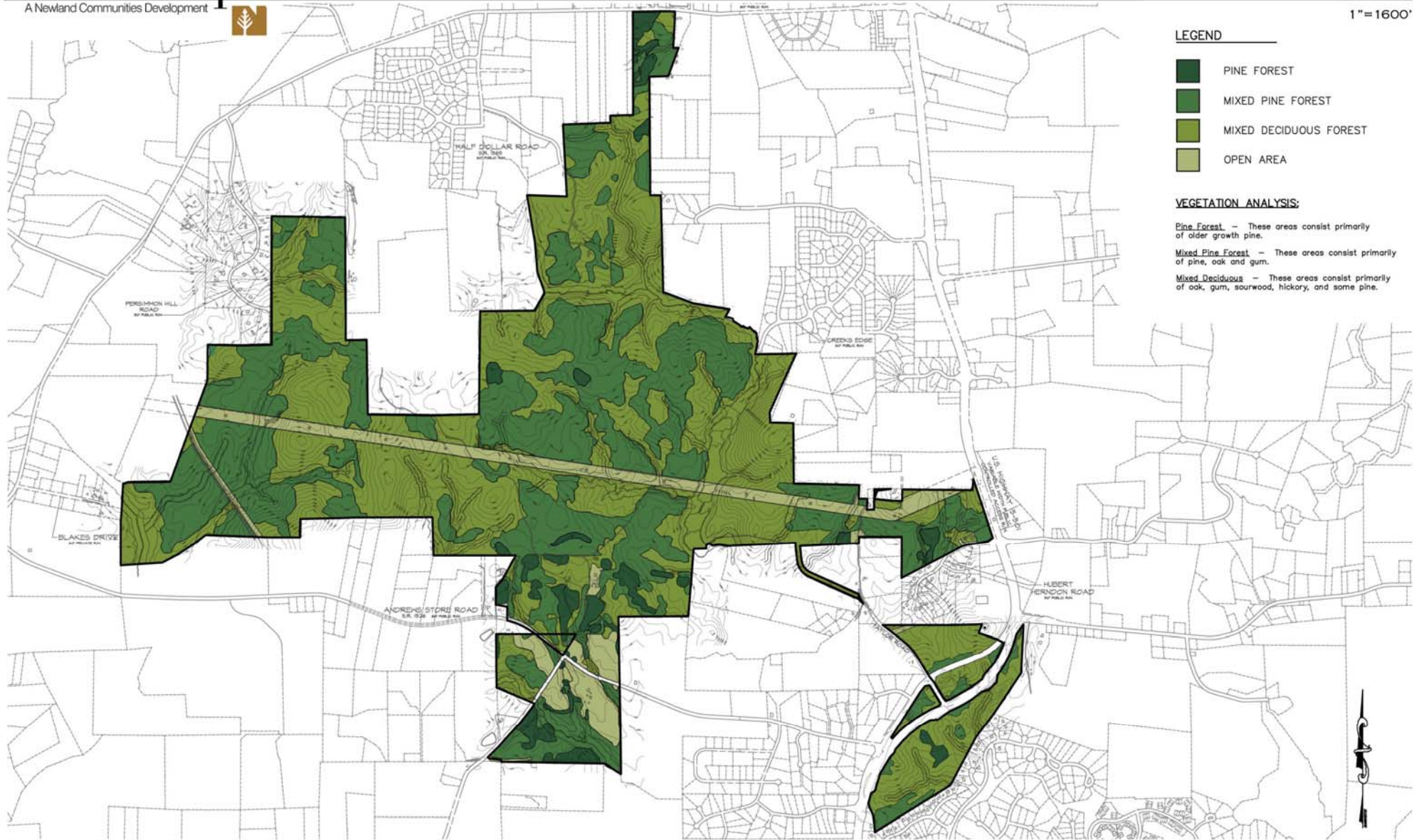
- PINE FOREST
- MIXED PINE FOREST
- MIXED DECIDUOUS FOREST
- OPEN AREA

**VEGETATION ANALYSIS:**

**Pine Forest.** - These areas consist primarily of older growth pine.

**Mixed Pine Forest.** - These areas consist primarily of pine, oak and gum.

**Mixed Deciduous.** - These areas consist primarily of oak, gum, sourwood, hickory, and some pine.



# **Attachment 1**

## **Farmland Descriptions**

## IMPORTANT FARMLANDS OF NORTH CAROLINA

**IMPORTANT FARMLANDS OF NORTH CAROLINA  
MAY 1998****Introduction**

This listing consists of soil map units used in North Carolina that meet the requirements for important farmlands. Three categories of important farmlands are recognized in North Carolina-prime, unique, and statewide. Criteria used for prime and unique farmlands were published January 31, 1978 in the Federal Register and amended in June 17, 1994. These criteria are also in in General Manual, Title 310-Land Use, section 403.3 and Section 622 of the Natural Resources Conservation Service (NRCS) National Soil Survey Handbook (Title 430). Criteria for farmland of statewide importance were developed in 1988 by the North Carolina NRCS State Soils Staff in consultation with soil survey cooperators, resource conservationists, and key soil survey customers.

This listing cancels and supercedes all prior listings including prime farmland lists in soil surveys that were published prior to 1998.

**Prime Farmland**

In general, all soils with slopes between 0 and 8 percent that are in capability classes I and II, and some that are in capability class III meet the requirements for prime farmland. Soils that flood an somewhat poorly drained, poorly drained, and very poorly drained soils meet the requirements for prime farmland under certain conditions if the following requirements are met:

1. The soils are drained and the drainage system is adequate to maintain the water table at a sufficient depth during the growing season to allow cultivated crops common to the area to be grown.

2. The soils are protected or not frequently flooded during the growing season.

Excluded from prime farmland are soils that fall into the following categories:

1. Cobbly, stony, or bouldery soils.

2. Soils having adverse physical or chemical properties that restrict crop yields such as shallowness to bedrock, fragipans, low available water capacity, etc.

3. Wet soils (somewhat poorly drained, poorly drained, and very poorly drained) that are in clayey families.

4. Severely eroded phases.

5. Sandy phases of soils in a coarse-loamy family.

6. Soils with slopes that exceed 8 percent.

**Unique Farmland**

In general, soils that have a special set of properties that are unique for producing certain high-value crops meet the requirements for unique farmland. In North Carolina soils on which blueberries are produced meet these requirements. In this listing drained phases of the Leon, Lynn and Murville series



**IMPORTANT FARMLANDS OF NORTH CAROLINA**

are examples of soils in this category.

**Farmland of Statewide Importance**

General, soils that do not quite meet the requirements for prime farmland fall into this category. This could be due to steepness of slope, permeability, susceptibility to erosion, low available water capacity, or some other soil property.

The following criteria were selected to help define farmland of statewide importance in North Carolina:

1. Slopes shall not exceed 15 percent.
2. Stony, very stony, extremely stony, very cobbly, and bouldery phases are excluded.
3. Severely eroded phases are excluded.
4. Wet soils that have very slow permeability (  $< 0.06$  in/hr ) are excluded.
5. Somewhat poorly drained, poorly drained, and very poorly drained soils that are not drained are excluded.
6. Soil that are frequently flooded during the growing season are excluded.
7. Soils that are droughty, 3 inches or less available water capacity to a limiting layer or 40 inch depth, are excluded from this category.
8. Rocky phases or soils that have rock outcrop in the map unit name are excluded from this category.

**Legend for Abbreviations**

**P1** - All areas are prime farmland.

**P2** - Only drained areas are prime farmland.

**P3** - Only areas protected or not frequently flooded during the growing season are prime farmland

**P5** - Only drained areas that are either protected from flooding or not frequently flooded during the growing season are prime farmland.

**S1** - All areas are farmland of statewide importance.

**S2** - Only drained areas are farmland of statewide importance.

**U2** - Only drained areas are unique farmland.

## **Attachment 2**

### **SHNA Area Descriptions**

**SITE NAME:** Bennett Mountain

**SIGNIFICANCE:** County

**INTEGRITY:** Good

**THREATS:** High — residential development and timbering

**PROTECTION STATUS:** None

**JURISDICTION:** Baldwin Township

**OWNERSHIP:** Private

#### **SUMMARY OF SIGNIFICANT FEATURES:**

1. The forest at this site is probably the best example of Dry-mesic Oak-Hickory Forest in Chatham County.
2. As indicated by the presence of wild turkeys, this tract has a fairly high wildlife value.

#### **GENERAL SITE DESCRIPTION:**

Bennett Mountain is a western outlier of the granitic pluton that forms Edwards Mountain and Boothe Hill. Although the top of the hill is fairly flat, the abundance of large boulders has largely protected this site from both agriculture and residential development, although a few houses are now scattered around its margins. The forest on the summit has also escaped recent timbering and is in excellent condition. The largest individual trees observed were a white oak (Quercus alba) 60 cm in diameter, and a rock chestnut oak (Q. prinus) 43 cm in diameter. The average diameter is only 30 cm., however, indicating that selective cutting has probably been practiced in the past.

Although geologically similar to Edwards Ridge, Bennetts Mountain does not possess the Piedmont Monadnock Forest characteristic of inselbergs; rock chestnut oak is present but not dominant. The communities instead are more typical of those that were once widespread over most of the piedmont. The summit is occupied by Dry-mesic Oak-Hickory Forest; white oak is dominant in a canopy of seven species of oaks (Quercus spp.), some hickories (Carya tomentosa, C. glabra), and a few scattered loblolly pines (Pinus taeda) and sourwoods (Oxydendrum arboreum). This community has an open aspect with a light scattering of blueberries (Vaccinium vacillans, V. tennellum) and grape vines (Vitis rotundifolia).

The forest on the summit grades into more xeric and more mesic communities on the slopes, thereby encompassing the standard range of moisture variants of piedmont hardwood forests. In the steep ravine on the western side of Bennett Mountain the forest grades into mesic<sup>+</sup> mixed hardwoods, dominated by beech (Fagus grandifolia) and red oak (Quercus rubra).

Ferns demonstrate the moisture gradient, ranging from royal fern (Osmunda regalis) and netted chain fern (Woodwardia areolata) in the ravine bottom to ebony spleenwort (Asplenium platyneuron) and Christmas fern (Polystichum acrosticoides) higher on the slopes. On the extreme southern flank of the summit the forest grades into dry oak-hickory forest, where in addition to white oak, the dominant trees are post oak (Quercus stellata), blackjack oak (Q. marilandica), black oak (Q. velutina), and pignut hickory (Carya glabra). Numerous red cedars (Juniperus virginiana) and persimmons (Diospyros virginiana) are present in the subcanopy, and the shrub layer is composed of both viburnums and heaths. The herbaceous growth in this open, stunted forest is generally quite sparse, but the boulder-strewn ground is covered with lichens.

The presence of wild turkey (Meleagris gallopavo) at this site is explained partly by the abundance of mature mast-producing hardwoods, particularly the oaks and beeches. This species additionally requires extensive tracts of forest, as does the pileated woodpecker (Dryocopus pileatus) also observed here; although the woodlands of Bennetts Mountain are limited in extent, they are contiguous with surrounding forests, and are connected to the Jordan Lake gamelands via the bottomlands along Pokeberry Creek. Other indicator species of animals observed on Bennetts Mountain include the white-breasted nuthatch (Sitta carolinensis), a rare species in Chatham County, and the white-lipped forest snail (Triodopsis albolabris), both of which require old-growth hardwoods. The yellow-breasted vireo (Vireo flavifrons) and summer tanager (Piranga rubra) are two of the more typical birds inhabiting dry, open upland forests.

Scenically, this area is one of the most attractive uplands remaining in Chatham County. The large, lichen-covered boulders and the mature hardwoods combine to make this a pleasant place to walk, as is indicated by several foot-trails that wind over the summit.

#### CONSERVATION RECOMMENDATIONS:

The landowners are aware of the natural and scenic values of this site. Preservation of the mature forest can be accomplished by registration of the site as a state natural area, through acquisition of a conservation easement, or by the use of least disruptive forms of forest management, such as selective harvest in place of clear-cutting. Preservation of the flock of turkeys and other wide-ranging wildlife will further require that adjoining tracts of land also be left in a forested, undeveloped state.

**SITE NAME:** Duke Forest/Haw River Levees and Slopes

**SIGNIFICANCE:** State

**INTEGRITY:** High to good

**THREATS:** High -- clearcutting of adjoining tracts; ORV trails

**PROTECTION STATUS:** Receives partial protection as a tract of the Duke Forest

**JURISDICTION:** Center, New Hope, and Baldwin Townships

**OWNERSHIP:** Duke University

### **SUMMARY OF SIGNIFICANT FEATURES:**

1. This is one of only two sites in the country where Septima's clubtail dragonfly (Gomphus septima) is known to occur; this species is a candidate for federal listing.
2. Along the levees occurs a large population of buttercup phacelia (Phacelia ranunculacea), a candidate for state listing.
3. A wide alluvial forest exists along one part of this tract; this area is noteworthy for the numerous oxbow pools and extensive patches of horsetail it contains.
4. The alluvial and riparian forests possess one of the richest avifaunas in the region; fifty species of breeding birds have been recorded, including 15 species of warblers. Other species indicative of the extensive nature and high quality of the forest include wild turkey (Meleagris gallopavo), pileated and hairy woodpeckers (Dryocopus pileatus and Picoides villosus).
5. In addition to its biological significance, this reach of the Haw River has high scenic values and is used intensively by local canoeists and kayakers.

### **GENERAL SITE DESCRIPTION:**

This reach of the Haw cuts deeply through some of the most rugged terrain in the county as it drops down from the uplands of the Slate Belt into the flat and now flooded expanse of the Triassic Basin. Along the river's edge, steep bluffs and rock outcrops alternate with areas of bottomland ranging in size from small pockets to expanses several hundred yards wide. The river itself contains extensive areas of rapids and numerous rocky islands, creating challenging whitewater conditions that lure canoeists and kayakers from throughout the piedmont.

The majority of the terrestrial vegetation in this natural area occurs on the steep slopes above the river. The predominant community is mesic mixed hardwood forest dominated by beech (Fagus grandifolia) red oak (Quercus rubra), black gum (Nyssa sylvatica), pignut hickory (Carya glabra) and sourwood (Oxydendrum arboreum). The variety of habitats provided by differing steepness, aspect and soil depth affords an impressive diversity of plant species. Basswood (Tilia floridana), storax (Styrax grandifolia) and mountain laurel (Kalmia latifolia)

appear on the rock outcrops with such herbs as blunt-lobed woodsia (Woodsia obtusa), resurrection fern (Polypodium polypodioides), crested iris (Iris cristata), foamflower (Tiarella cordifolia) and crag-jangle (Heuchera villosa). On the gentler ravine slopes are thickets of buckeye (Aesculus sylvatica), masses of maidenhair fern (Adiantum pedatum), and a long list of woodland wildflowers including two species of toothwort (Cardamine angustata, C. concatenata), Solomon's seal (Polygonatum biflorum), wild geranium (Geranium maculatum) and black cohosh (Cimicifuga racemosa).

A fairly mature alluvial forest occupies the largest floodplain area along this stretch of the river. Such bottomland species as swamp chestnut oak (Quercus michauxii), hackberry (Celtis laevigata), green ash (Fraxinus pennsylvanica), box elder (Acer negundo), and American elm (Ulmus americana) form the canopy; the subcanopy and shrub layers include pawpaw (Asimina triloba), hop hornbeam (Ostrya virginiana), and bladdernut (Staphylea trifolia). Numerous depressions afford habitat for wetland species such as buttonbush (Cephalanthus occidentalis) and lizard's tail (Saururus cernuus). This bottomland is particularly noteworthy for two herbs. Buttercup phacelia, a diminutive spring ephemeral extremely restricted in its range, is present here in a population of thousands. Horsetail, rare in the county, here forms dense stands bordering the pools.

The maturity and diversity of these riparian and slope forests favors a corresponding richness of fauna. The avian community is especially diverse: 50 species of breeding birds have been recorded, including 15 species of warblers. Particularly noteworthy are the large numbers of redstarts (Setophaga ruticilla), prothonotary (Protonotaria citrea), northern parula (Parula americana), and yellow-throated warblers (Dendroica dominica), all characteristic of large riparian forests. Woodcock (Scolopax minor), wood duck (Aix sponsa), Kentucky warblers (Oporornis formosus), and hooded warblers (Wilsonia citrina) likewise are characteristic of mature bottomland forests, while the presence of wild turkey (Meleagris gallopavo), pileated woodpeckers (Dryocopus pileatus), hairy woodpeckers (Picoides villosus), and barred owls (Strix varia) is indicative of the large size of this forest and its connection to adjoining woodlands.

Apart from the bald eagles (Haliaeetus leucocephalus) that occasionally forage up the river from Jordan Lake, the rarest animals that occur on this site are two species of invertebrates. An old record exists for the brook floater mussel (Alasmidonta varicosa), now proposed for threatened status in North Carolina, but the rarest species of all -- plant or animal -- may be Septima's clubtail dragonfly (Gomphus septima). This species had previously been known in North Carolina only in the Rocky River near the 15-501 bridge; its only other confirmed population in the world was at an Alabama site now destroyed by a reservoir.

**CONSERVATION RECOMMENDATIONS:**

Duke University should maintain this forest in its natural condition rather than manage it for timber. The Duke Forest tract is too narrow, however, to provide complete protection. A wider buffer strip is needed on the adjoining lands above the slopes; this might be most easily acquired by obtaining a conservation easement.

Other protection measures are required for the aquatic fauna, which have been severely impacted by water quality degradation. These measures will require basin-wide control of both point and non-point sources of pollution.





## **Attachment 3**

# **Rare, Threatened and Endangered Species in Chatham County**

**TABLE A-1**  
Chatham County Listed Species

Major Group	Scientific Name	Common Name	State Status	Federal Status	State Rank	County Status
Bird	<i>Aimophila aestivalis</i>	Bachman's Sparrow	SC	FSC	S3B,S2N	Current
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle	T	T (PD)	S3B,S3N	Current
Bird	<i>Lanius ludovicianus ludovicianus</i>	Loggerhead Shrike	SC	-	S3B,S3N	Current
Bird	<i>Phalacrocorax auritus</i>	Double-crested Cormorant	SR	-	S1B,S5N	Current
Bird	<i>Picoides borealis</i>	Red-cockaded Woodpecker	E	E	S2	Historic
Amphibian	<i>Hemidactylium scutatum</i>	Four-toed Salamander	SC	-	S3	Current
Fish	<i>Etheostoma collis</i> pop 2	Carolina Darter – eastern Piedmont Population	SC	FSC	S2	Current
Fish	<i>Moxostoma</i> sp 2	Carolina Redhorse	SR	FSC	S1	Current
Fish	<i>Notropis mekistocholas</i>	Cape Fear Shiner	E	E	S1	Current
Mollusk	<i>Alasmidonta undulata</i>	Triangle Floater	T	-	S2	Current
Mollusk	<i>Alasmidonta varicosa</i>	Brook Floater	E	FSC	S1	Current
Mollusk	<i>Fusconaia masoni</i>	Atlantic Pigtoe	E	FSC	S1	Historic
Mollusk	<i>Lampsilis cariosa</i>	Yellow Lampmussel	E	FSC	S1	Current
Mollusk	<i>Strophitus undulatus</i>	Creeper	T	-	S2S3	Current
Mollusk	<i>Villosa constricta</i>	Notched Rainbow	SC	-	S3	Current
Mollusk	<i>Villosa delumbis</i>	Eastern Creekshell	SR		S3	Current
Mollusk	<i>Villosa vaughaniana</i>	Carolina Creekshell	E	FSC	S2	Current
Crustacean	<i>Cambarus davidi</i>	Carolina Ladle Crayfish	SR	-	S2S3	Current
Insect	<i>Choroterpes basalis</i>	A mayfly	SR	-	S2	Current
Insect	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail	SR	-	S3	Obscure
Insect	<i>Gomphus quadricolor</i>	Rapids Clubtail	SR	-	S1S2	Historic

Major Group	Scientific Name	Common Name	State Status	Federal Status	State Rank	County Status
Insect	Gomphus septima	Septima's Clubtail	SR	FSC	S1S3	Current
Insect	Neurocorulia virginiensis	Cinnamon Shadowdragon	SR	-	S2S3	Historic
Insect	Tricorythodes robacki	A mayfly	SR	-	S1	Current
Vascular Plant	Allium cuthbertii	Striped Garlic	SR-T	-	S1	Obscure
Vascular Plant	Baptisia albens	Thin-pod White Wild Indigo	SR-P	-	S1	Historic
Vascular Plant	Collinsia tuberosa	Piedmont Horsebalm	SR-P	-	S1	Current
Vascular Plant	Dichanthelium annuum	a witch grass	SR-P	-	SH	Historic
Vascular Plant	Fothergilla major	Large Witch-alder	Sr-T	-	S2	Current
Vascular Plant	Hexastylis lewisii	Lewis's Heartleaf	SR-L	-	S3	Current
Vascular Plant	Isoetes virginica	Virginia Quillwort	SR-L	FSC	S1	Historic
Vascular Plant	Monotropa odorata	Sweet Pinesap	SR-T	FSC	S3	Current
Vascular Plant	Phacelia covillei	Buttercup Phacelia	SR-T	FSC	S2	Current
Vascular Plant	Porteranthus stipulatus	Indian Physic	SR-P	-	S2	Obscure
Vascular Plant	Ptilimnium nodosum	Harperella	E	E	S1	Current
Vascular Plant	Scutellaria nervosa	Veined Skullcap	SR-P	-	S1	Historic
Vascular Plant	Thermopsis mollis sensu stricto	Appalachian Golden-banner	SR-P	-	S2	Historic
Natural Community	Basic Mesic Forest (Piedmont Subtype)	-	-	-	S2	Current
Natural Community	Basic Oak-Hickory Forest	-	-	-	S3	Current
Natural Community	Dry Oak--Hickory Forest	-	-	-	S4	Current
Natural Community	Dry-Mesic Oak--Hickory Forest	-	-	-	S5	Current
Natural Community	Floodplain Pool	-	-	-	S2S3	Current
Natural Community	Hillside Seepage Bog	-	-	-	S2	Current

Major Group	Scientific Name	Common Name	State Status	Federal Status	State Rank	County Status
Natural Community	Mesic Mixed Hardwood Forest (Piedmont Subtype)	-	-	-	S4	Current
Natural Community	Piedmont Longleaf Pine Forest	-	-	-	S1	Current
Natural Community	Piedmont/Coastal Plain Heath Bluff	-	-	-	S3	Current
Natural Community	Piedmont/Low Mountain Alluvial Forest	-	-	-	S5	Current
Natural Community	Piedmont Mountain Bottomland Forest	-	-	-	S3?	Current
Natural Community	Piedmont/Mountain Levee Forest	-	-	-	S3?	Current
Natural Community	Piedmont/Mountain Semipermanent Impoundment	-	-	-	S4	Current
Natural Community	Piedmont/Mountain Swamp Forest	-	-	-	S1S2	Current
Natural Community	Rocky Bar and Shore	-	-	-	S5	Current
Natural Community	Upland Depression Swamp Forest	-	-	-	S3	Current
Natural Community	Upland Pool	-	-	-	S1	Current
Natural Community	Xeric Hardpan Forest	-	-	-	S3	Current
Special Habitat	Wading Bird Rookery	-	-	-	S3	Current

## **Attachment 4**

# **Responses to Comments on Briar Chapel Environmental Impact Assessment**

## **Response to Comments on Briar Chapel Environmental Impact Assessment**

### **Robert J. Goldstein & Associates, Inc – Peer Review**

1. Need to include an alternative where the property remains undeveloped.  
*This alternative has been added.*
2. It is unclear whether open space will be protected by conservation easement.  
*The open space will be turned over to the Homeowner Association, but will have restrictive covenants placed on it to protect it. This information has been added to the EA.*
3. The project has minor impacts when viewed in relationship to Chatham County, but cumulative impacts need to be addressed.  
*Cumulative impacts are addressed in Section 6.*
4. It appears that 16 intermittent streams are not buffered.  
*There was a mistake in Figure 9, and it has been replaced.*
5. Section 5.4.2 indicates that 1949 feet of streams will be impacted while Section 7.0 indicates that 2700 feet will be impacted.  
*Section 7.0 was based on older information. It has been corrected to show that 1949 feet of streams will be impacted.*
6. The EIA is unclear on whether the wetland impacts quantified in the EA are from buildings and roads only or from utility infrastructure as well.  
*The wetland impacts from utility lines are still unknown. The EIA has been clarified.*
7. The EIA does not give detailed descriptions of aquatic habitat and species.  
*The EIA was based on available survey data. No aquatic surveys have been performed, and SEPA guidelines do not require they be performed. Environmental documents are often developed using existing data. Braham and Braham did note fish in the creeks, but were unable to identify the species. Braham and Braham also noted that the creek habitats were not suitable for the Cape Fear shiner. This information is provided in the EIA.*
8. A survey should be done for Red Cockaded Woodpecker (RCW).  
*RCW have not been observed in Chatham County for over ten years. However, the Braham survey found some marginal habitat for the species. Thus, Braham and Braham performed a helicopter survey of the Briar Chapel property and all land within one mile of the Site. No evidence of RCW was seen during this survey or during the vegetation surveys. This finding agreed with information provided by knowledgeable bird watchers in the area. Further information is provided in Section 5.13 of the document.*

9. The EIA indicates that the Cape Fear shiner will be protected due to small size of Wilkinson and Pokeberry Creeks in relation to the Haw. This reasoning is flawed.

*The EIA has been clarified to show that the stormwater plan, erosion and sediment control devices, and good site design will protect the Cape Fear shiner.*

10. Bennett Mountain is being impacted as its area extends to Pokeberry Creek.

*The primary area of Bennett Mountain is being protected onsite. The main roadway into the development does cross between Bennett Mountain and Pokeberry Creek in the secondary portion of the habitat area, the section of habitat that is not as unique. Several road layouts were examined, but the selected design minimized impacts to wetlands and other environmental features.*

11. Griffins Crossroads is an important forest resource area that should be addressed in the EIA.

*The portion of Griffins Crossroads that extends into Briar Chapel is already impacted by US 15-501. This information has been added to the EIA.*

12. The wastewater plant and collection system should be shown.

*Final designs are unknown at this time. Impacts to riparian areas and wetlands will be minimized.*

13. Spraying on Bennett Mountain may impact the ecosystem.

*No clearing will occur on Bennett Mountain for the spray irrigation. Bennett Mountain is being used as a backup site for irrigation, and spraying there should be infrequent.*

14. The EIA should indicate whether stormwater control structures will impacts wetlands or riparian areas and clarify whether offsite runoff is controlled.

*The EIA has been updated to indicate that stormwater control structures are located outside of wetlands and riparian areas. The design of the structures considered offsite runoff. The EIA has been updated.*

15. The State Historic Preservation Office (SHPO) should be contacted to determine if a survey is needed.

*SHPO has indicated that the Army Corps of Engineers will determine the permit area. Based on the permit area, SHPO will determine whether an archaeological survey is needed.*

16. Further information regarding toxic substances should be provided in the EIA.

*Additional information has been added to Section 5.14.*

17. The EIA should indicate whether open burning will occur. In addition, if more than 750 parking spaces will be built, a Complex Air Source permit is needed. Finally, odor should be described.

*The EIA indicates that open burning may occur and if it does, it will comply with all regulations. There will be fewer than 750 parking spaces; the only potential source of odor relates to the wastewater treatment facility, and that is described in the EIA.*

18. A list of federal and state permits should be provided in the document.  
*This list has been added.*

### **Division of Forest Resources**

1. The EIA should acknowledge the loss of the Briar Chapel development forest land to timber production.  
*The loss has been noted in Section 5.11.*

### **Division of Water Quality**

1. A 401 water quality certification will be needed for the project.  
*This permit has been included in Section 8.0, State and Federal Permits.*

### **Wildlife Resources Commission**

1. Section 5.4.2 indicates that 1949 feet of streams will be impacted while Section 7.0 indicates that 2700 feet will be impacted.  
*Section 7.0 was based on older information. It has been corrected to show that 1949 feet of streams will be impacted.*
2. Bridges should be used where practicable. Where not practicable, culverts should be designed to allow passage of aquatic organisms.  
*One stream crossing is being bridged to minimize stream and wetland impacts. Other crossings are using bottomless culverts; all remaining crossings bury the culverts at least one foot to allow passage of aquatic organisms.*
3. Stormwater detention ponds should be placed in upland areas.  
*All stormwater control devices have been sited outside of riparian buffers and wetlands.*
4. WRC had several questions concerning the land application of wastewater. These include provisions to avoid spraying near streams and in riparian buffers, the use of chlorine as a disinfectant, whether there is backup power, and the disposal of biosolids. The agency also had concerns regarding the use of Bennett Mountain as a spray area.  
*The EIA has been updated to include more information on the wastewater treatment and disposal system (Section 5.10). The riparian buffer areas will not be sprayed, and no spraying will occur within 30 feet of ephemeral channels. Conservative loading rates have been used to estimate the amount of land needed to apply the wastewater generated, and a 110 day storage facility has been included in the plan to avoid spraying when soil conditions are marginal.*  
  
*Chlorine is proposed as a disinfectant in order to ensure compliance with the 14 colonies/100 ml fecal coliform limit that will be included in the permit to protect public health. Chlorination will occur before the effluent is filtered, and residual chlorine after filtration is expected to be approximately 0.5 mg/l which is less than what is found in drinking water. The effluent will then*



*go to a storage pond before it is land applied which will further dissipate any residual chlorine before it is land applied.*

*Backup power will be provided at the treatment plant. Biosolids will hauled offsite for disposal. No clearing will occur on Bennett Mountain for the spray irrigation. Bennett Mountain is being used as a backup site for irrigation, and spraying there should be infrequent.*

5. Due to concerns regarding the Cape Fear shiner, WRC recommends 200 foot native forested buffers and development should include stormwater controls to mimic the predevelopment hydrograph.

*The Cape Fear shiner is not located on the Briar Chapel property. Briar Chapel does include riparian buffers that were designed in accordance with the Compact Communities Ordinance. These buffers include 100 foot riparian corridors along perennial streams, 50 foot corridors along intermittent streams, 50 foot corridors along ephemeral channels that drain 25 or more acres, and 30 foot buffers along ephemeral channels that drain between 10 and 25 acres. Briar Chapel has designed stormwater control devices to control peak runoff. In addition, the stormwater design includes low impact development practices such as bioretention areas to help control stormwater runoff volume. These practices along with good erosion and sediment control practices will ensure that stream habitat within Pokeberry and Wilkinson Creeks is protected. If these streams are protected, the Haw River and Cape Fear shiner will be protected.*

## **Department of Transportation**

1. The EIA does not address traffic impacts.

*North Carolina Environmental Policy Act guidelines do not require that traffic be examined. Thus, traffic impacts were addressed in a separate document that is part of the Briar Chapel permit package.*

## **State Historic Preservation Office**

1. Once the Army Corps of Engineers has identified the wetland permit area, that information should be forwarded to SHPO to they can determine whether an archaeological survey may be needed.

*Comment noted.*