

Environmental Impact Assessment Chatham County Parcel 2177

Chatham County, North Carolina

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Executive Summary

The purpose of this Environmental Impact Assessment is to describe existing conditions and report any potential impacts associated with the proposed development of the Parcel 2177 property. The contents of this Environmental Impact Assessment follow the requirements of the Chatham County Subdivision Ordinance and an outline published by the Chatham County Planning Department. Information for this report was obtained from on-site field evaluations by WNR personnel, as well as by review of information published by various county, state, and federal government departments.

Parcel 2177 is a 131.384 acre parcel located approximately 6 miles south of Chapel Hill in northern Chatham County, just west of Hwy 15/501 and south of Manns Chapel Road. The proposed development will follow guidelines laid out under Chatham County's Conservation Subdivision classification. The project will include residential homes and at least 53 acres of Conservation Space, of which at least 42 acres will be retained as Natural Space.

This EIA includes the evaluation of potential direct, secondary, and cumulative impacts of the project to the surrounding area. This includes impacts to adjacent property owners; public utilities; topography; soils; land use; wetlands; public lands and scenic, recreational, and natural areas; areas of archaeological or historical value; air quality; noise levels; light levels; surface and groundwater resources; fish and aquatic habitats; wildlife and natural vegetation; and environment with respect to hazardous materials.

A summary of conclusions from the EIA are as follows:

- Parcel 2177 will fit into the trend of the surrounding community by providing needed housing but at a lower overall density than the maximum potentially allowed under current regulations. At least 40% of the parcel will be maintained as Conservation Space. As allowed by Section 7.7D(6) of the Subdivision Ordinance, the developer will seek authorization from the Chatham County Department of Environmental Quality to utilize portions of the Natural Space for reclaimed water (spray) infrastructure.
- The proposed development has significantly avoided and minimized impacts to jurisdictional streams and wetlands, riparian dispersal corridors and floodplains. This was achieved through adjusting road and lot alignments, reducing the total number of lots, using existing Briar Chapel Utilities, LLC. for wastewater treatment, and following the Chatham County Subdivision Ordinance guidelines for a Conservation Subdivision.
- Impacts to existing environmental conditions of the surrounding area will occur mostly during construction and be either temporary or very minimal. The development of the site will comply with erosion control, stormwater, floodplain and wetland regulations.

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1.0 Proposed Project Description and Need

The Parcel 2177 project will take place on a 131.384 acre tract in northern Chatham County. Adjoining properties include a Compact Community, the Twin Lakes Golf Course (an existing, public, 9-hole golf course), and forested land. A Conservation Subdivision with approximately +/- 129 lots is proposed for this site. The average lot size will be +/- 0.17 acre. Roads will connect to and through the existing and proposed phases of the Briar Chapel Community. The proposed subdivision will be served by Chatham County water and the existing publically regulated Briar Chapel Utilities, LLC. will provide wastewater treatment. A stormwater management plan will be submitted for approval. In accordance with the Chatham County Subdivision Ordinance guidelines for a Conservation Subdivision, of the 131.384 acres, at least 40% (>52.6 acres) will be preserved as Conservation Space. At least 80% of that Conservation Space will be Natural Space. A maximum of 8% of the site will be used for active Open Space. By meeting these standards, the amount of disturbed acreage will necessarily be in line with the conservation objectives of the conservation subdivision regulations. See Appendix D for proposed site plan details.

Chatham County's observed and predicted growth rate suggests the need for housing. Parcel 2177 site's general location near the Research Triangle, as well as its immediate proximity to Chapel Hill, Pittsboro, Apex, Cary and Durham, as well as RTP and the local universities, make it an ideal location. Other reasons this site was chosen for residential development are its convenient access to major roads including Hwy 64, Hwy 15/501, and I-40; and that the project will fit well into its community with similar land use that can make efficient use of existing utilities and access roads.

There are no other existing conservation subdivisions approved in accordance with the conservation subdivision regulations recently added to the Subdivision Ordinance. This conservation subdivision will satisfy the public objectives, goals and policy ideals that inspired the adoption of the conservation subdivision option. In addition, the conservation subdivision will likely include a trail network and will likely be connected to nearby trail systems within the adjacent compact community.

All buildings, with the possible exception of an amenity facility, will be residential in nature, comprised of square footage and heights that are consistent with the lot sizes and the nearby compact community. To the extent an amenity is constructed, the site plan will meet all County ordinances related to parking, lighting and signage.

2.0 Alternatives Analysis

Multiple alternatives were considered for this parcel. After considering more compact plans that produced as many as +/- 250 lots, it was decided that the low impact Conservation Subdivision would be the best choice alternative. The proposed alternative was chosen because it avoids impacts to environmentally sensitive area such as wetlands, riparian dispersal corridors, floodplains and streams

and leaves the largest percentage of natural space while still providing enough lots to make the project financially feasible.

Conventional Subdivision

The proposed alternative is better than a +/- 131 lot subdivision on well (or municipal water) and septic because it reduces the amount of land disturbance that is necessary for the sprawling development associated with septic fields, lessens the roadway area and decreases overall impervious surface. The selected alternative results in less overall impacts from clearing and road infrastructure to support large lots.

Compact Community

A Compact Community on the site could include up to approximately 250 lots. The proposed conservation subdivision has less of an impact on the overall environmental status of the tract because it reduces by almost half the overall density and preserves existing environmental conditions to a greater extent.

3.0 Existing Environment and Project Impacts

This section includes information on the existing environmental resources and conditions found on Parcel 2177 as well as any reasonably anticipated impacts. Environmental impacts from the proposed development have been avoided and minimized where possible and regulatory safeguards are in place. Description of the avoidance and minimization are discussed wherever applicable. The information within this report was gathered from multiple site visits by WNR staff as well as obtained from public records, GIS data, and online resources.

3.1.1. Geography

Parcel 2177 is located within the Piedmont physiographic province and is part of the Cape Fear River Basin. The site can be found along the western edge of the Farrington, N.C. 7.5 Minute USGS topographic quadrangle. See Figure 2 for the sites location on a USGS topographic map.

3.1.2. Geographic Setting/Geology

Parcel 2177 is part of the Carolina Slate Belt and includes Lower Paleozoic granite rocks (IPzg). No impacts to the geographic setting or geology are expected.

3.1.3. Topography

The site consists of moderate slopes to relatively flat floodplain areas. Most drainage onsite is northeastern. Elevation ranges from 460 feet down along Pokeberry Creek to 570 feet in the southwestern corner of the site. See Figure 4 for a detailed topographic map of the area.

Soil may be relocated within the site during construction and grading. Proper sediment and erosion control measures put into place prior to any major earth work.

3.1.4. FEMA Floodplains

Figure 5 depicts the studied extent of FEMA flood hazard areas, as per the NC Flood Mapping Program data, on and adjacent to the Parcel 2177 site. The project site is located on FEMA FIRM panel 9765J, effective February 2, 2007. Special flood hazard areas on the site include Zone AE within the 100-year floodplain and Zone X outside of the 100-year floodplain.

No impacts to the 100-year floodplain are anticipated. All designated floodplain areas on site are contained within the proposed Conservation Area.

3.2. Soils and Prime Farmlands

Figure 6 depicts the soil series located on Parcel 2177 as shown on the Chatham County Soil Survey. The site grading is expected to balance between cut and fill so there will be no impacts to off site soil resources. All grading will be conducted under an approved county erosion control plan and a final stormwater management plan will be implemented so that run-off is controlled. Contamination of soils is not expected and fuel containment areas will be utilized during site preparation.

Figure 7 specifically highlights prime farmland soils. Descriptions of select characteristics of these soil series follow. For additional information, the interested reader is referred to the Soil Survey of Chatham County, North Carolina (NRCS 2006).

VaB – Vance sandy loam, 2-6% slopes: Well drained, slow permeability, moderate shrink-swell potential, moderately suited for urban development due to shrink-swell potential, poorly suited for septic tanks due to restricted permeability. This series is considered to be prime farmland.

WdC – Wedowee sandy loam, 2-15% slopes, bouldery: Well drained, moderately permeable, low shrink-swell potential, moderately suited for urban development and septic tanks due to steepness of slopes, restricted permeability, and boulders. This series is not considered to be important farmland.

WeB – Wedowee sandy loam, 2-6% slopes: Well drained, moderately permeable, low shrink-swell potential, well suited for urban development, moderately suited for septic tanks due to restricted permeability. This series is considered to be prime farmland.

WeC – Wedowee sandy loam 6-10% slopes: Well drained, moderately permeable, low shrink-swell potential, moderately suited to urban development and septic tanks due to steep slopes and restricted permeability. This series is considered to be farmland of statewide importance.

WeD – Wedowee sandy loam 10-15% slopes: Well drained, moderately permeable, low shrink-swell potential, moderately suited to urban development and septic tanks due to steep slopes and restricted permeability. This series is considered to be farmland of statewide importance.

WeE – Wedowee sandy loam 15-25% slopes: Well drained, moderately permeable, low shrink-swell potential, poorly suited to urban development and septic tanks due to steepness of slopes. This series is not considered to be important farmland.

During construction, impacts to soils including excavation, fill, compaction and grading are anticipated. While disturbance to the soil has already occurred during previous land uses including logging, the proposed site plan has been specifically designed to minimize soil as well as stream and wetland impacts.

3.3. Land Use

Existing land use within and surrounding the site includes forested areas, residential development, and a public golf course. The Parcel 2177 site itself is all forested; it appears to have been managed for timber production for the last 50 years. The existing forestry resources are characterized by scrubby young growth and few merchantable trees exist on the site. Zoning and land use can be seen in Figure 8 and Figure 10.

The proposed plan will involve a change in approximately 60% of the current land use from forested to residential development. At least 32% of the site will remain forested and undisturbed. The remaining 8% will either be undisturbed or passively developed open space. Clearing and grading will occur only to the extent necessary to obtain the proposed plan. Some of the Natural Space may be used in the future for approved and permitted spray areas.

Parcel 2177 is currently zoned R-1. The property immediately adjoining the southern half of the property is zoned and permitted as CUP-CC. The parcels immediately adjacent to the north are zoned R-1. Zoning and local land use plans will need to be altered after this project is completed in order to classify the property as a Conservation Subdivision and record the associated Conservation Areas.

The proposed development is compatible with the adjacent residential development and the proposed conservation areas are consistent with the golf course in they inherently possess the capacity for recreational use, though recreation within the proposed conservation will be passive and natural.

3.4. Wetlands

A detailed wetland delineation was conducted in 2013 and is in the process of being approved by the US Army Corps of Engineers. The delineation included traversing the property, examining soils, vegetation and hydrology for areas or features that meet the criteria for jurisdictional streams or wetlands as defined in the USACE 1987 Wetland Delineation Manual and the Eastern Mountains and Piedmont

hydrology, hydric soils, and hydrophytic vegetation. Intermittent and perennial stream channels also met criteria as defined in the same manual that included indicators such as an OHWM, distinct bed and bank, channel substrate sorting, evidence of a high water table, and presence of macrobenthic invertebrates. The streams on site include low flow, first and second order, headwater channels and Pokeberry Creek. Pokeberry creek is a more significant third order channel with abutting riparian wetland. Wetlands onsite were identified as both Headwater and Bottomland Hardwood Forest wetland types as described in A Field Guide to North Carolina Wetlands. The primary function of the wetlands on site includes flood attenuation, pollutant removal, and wildlife habitat. Ephemeral channels which are also regulated by Chatham County, were also looked for during the delineation fieldwork. There are no crenulations, other than those delineated as regulated streams, that exhibit field characteristics of an ephemeral channel present on the site.

The vast majority of streams and wetlands on site will remain un-impacted and protected within buffers as required by Chatham County. These buffered areas are also contained within Conservation Areas as part of the Chatham County Conservation Subdivision development approach.

There are no anticipated permanent stream and wetland impacts. We do anticipate temporary impacts associated with utilities and the reuse irrigation transmission. The final locations will be determined at the construction drawing phase. These impacts will be reviewed and approved by Chatham County. In the event that minor impacts are necessary and the impacts fall beneath the threshold of 300 linear feet for streams and 0.5 acres for wetlands, the proposed activities will likely be permitted under a NWP 29 at the discretion of the US Army Corps of Engineers and NCDENR. Any buffered streams and wetlands will be preserved as a mitigation component for this project.

Secondary impacts to streams and wetlands on site could result from land disturbance and deforestation within the watershed as well as stormwater outflows from the proposed subdivision. Significant buffer and additional conservation areas surrounding the streams and wetlands onsite will minimize these potential secondary impacts. Additional site planning measures including an approved stormwater plan will eliminate or minimize impacts from storm water flows. See Figure 11 for the wetland delineation map and Appendix D for the proposed site plan map with marked buffers and conservation areas.

There are no plans to withdraw or divert any water from the wetlands or streams located on the site.

3.5. Public Lands, Scenic, and Recreational, and State Natural Areas

There are no designated public lands, scenic or recreational areas, or state natural areas within Parcel 2177. Bennett Mountain is the only Significant Natural Heritage Area as classified by the Natural Heritage Program within a 2 mile radius of the project area. Bennett Mountain is an 84 acre high quality example of a Dry-Mesic Oak-Hickory Forest community type. The Haw River which is regularly enjoyed by area paddlers is located approximately 3.5 miles southwest from the project area. Chapel Hill's 72 acre Southern Community Park is located approximately 3.5 northeast of the site. Other public lands

close to the site are Jordan Lake recreation area, and Jordan Game Lands which are both approximately 5 miles east of the site boundary. Because of the scale of the project, the physical distance as well as the existence of major roadways and existing development between the site and the public lands, no impacts to public lands and scenic, recreational, and state natural areas are anticipated. See Figure 13 for the location of these areas in relation to the project area.

3.6. Areas of Archaeological or Historical Value

A review of online records through the North Carolina State Historic Preservation Office was conducted in January 2014. A written request has also been submitted to NCSHPO, but no response has been received yet.

No historic structures are documented by SHPO within the proposed site and none were observed. A recent ALTA survey revealed no structures. Eight existing off-site structures are documented by SHPO within a 1 mile buffer of the site property boundary. These structures have been recorded, but do not have a historic designation. See Figure 14 for a map of structures near the Parcel 2177 site that are documented by SHPO.

Recorded structures within the 1 mile buffer of the Parcel 2177 site include:

- CH0296 – Hutchinson-Dollar-Oakley House
- CH0318 – Log House
- CH0514 – Isiah and Elizabeth Cole House
- CH0284 – Mann’s Chapel
- CH0317 – Bryant Hackney House
- CH0285 – Donas Norwood Farm
- CH0308 – Dr. Alexander Norwood House
- CH0311 – Norwood-Mann Farm Complex

No impacts to areas of archaeological or historical value are anticipated.

3.7. Air Quality

The Air Quality index (AQI) is used to evaluate levels of ozone, particles, and other pollutants in the air. This index is primarily for the purpose of assessing potential impacts to human health. The 2012 EPA air quality summary report for Raleigh-Durham-Chapel Hill shows 249 days within the “Good” range (<50), 112 days within the “Moderate” range (51-100), 4 days within the “Unhealthy for Sensitive Groups” (101-150), and 1 day within the “Unhealthy” range (151-200). According to 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.

Simply because of its small scale, the proposed development of a +/- 129 lot Conservation Subdivision should result in minimal Impacts to ambient air quality if any at all. Burning of brush may occur during construction. There will be no open burning after the development is complete.

3.8. Noise Levels

Noise levels on site are low and consist primarily of overhead airplanes, distant road noise, and distant construction noise. Activities related to farming, logging, and NC DOT road maintenance are also sources for temporary noise. Noise levels during the proposed development activities will be typical for the type of logging, earthwork, grading, and building construction that is planned. Construction will be limited to daylight hours. Every reasonable effort will be made to minimize construction noise. The undisturbed Conservation Areas surrounding the construction areas will help reduce the noise to surrounding areas. After construction noise levels will return to their current low levels.

3.9. Light Levels

The proposed plan will increase the residential density. The impact will be that produced from +/- 129 units of additional home lighting. The anticipated impact will be minimal. All lighting will meet the requirements of the Chatham County Zoning Ordinance.

3.10. Water Resources

3.10.1. Surface Water

Parcel 2177 is located within the Cape Fear River Basin. See Figure 16 for a hydrologic map of the site and surrounding area. Most of the topography and surface waters on site drain and flow northeast into Pokeberry Creek which flows into the Haw River, which joins the Deep River at the Lee County Line to form the Cape Fear River. Within a few very small areas along the southwest border of the parcel, the topography drains southwest eventually forming unnamed tributaries off property that feed into Wilkinson Creek which also flows into the Haw River approximately 2 miles upstream of the Pokeberry Creek/Haw River confluence.

There are no anticipated permanent stream and wetland impacts. We do anticipate temporary impacts associated with utilities and the reuse irrigation transmission. Permanent impacts were avoided through careful planning and layout of roads and lots, maintaining protective stream buffers, and Conserving Natural Areas that surround the streams, wetlands and buffers.

The potential for secondary impacts will exist during the initial land disturbance and construction. This impact potential will be minimized first through implementation of an approved sediment and erosion control plan. This plan will include BMPs that are designed to handle peak runoff generated by a 10-year storm. The maintenance of these BMPS will also be carefully monitored in accordance with state and local regulations. Another practice that will be done to minimize sedimentation will be immediate

mulching and seeding of disturbed areas. The state requirement of mulch and seed 15 working days after grading is completed will be met or in most cases exceeded.

Another potential for secondary impacts to surface water will come after construction in the form of stormwater runoff. The introduction of impervious surfaces to watersheds increases stormflows. Without proper protection these increased flows can cause erosion. To reduce this risk, stormwater structures will be designed and installed to handle the increased flows.

In addition to increased stormflows, post construction runoff also has the potential to introduce pollutants such as fertilizers and pesticides from landscaping or oil from automobiles. The stormwater structures will be designed to remove 85% Total Suspended Solids (TSS) and 25% total nitrogen. Often, practices that remove TSS, also reduce the percentage of total phosphorus as inorganic phosphorus will bind to soil particles.

A final aspect of the site design that will minimize surface water impacts are the undisturbed stream buffers and surrounding Conservation Areas. Buffers around the streams and wetlands on site will range from 50 feet to over 100 feet. These buffers will provide significant protection to the existing uses surface waters on site.

Because of the erosion and sediment control practices that are planned for the project and the protection and preservation of riparian buffers and surrounding forested areas, the impacts to surface water will not be significant.

3.10.2. Ground Water

No land uses commonly associated with groundwater contamination were observed during site visits to Parcel 2177 property. Drinking water for Parcel 2177 will be provided by Chatham County Public Works and no groundwater wells will be needed. Wastewater treatment will be provided by the existing Briar Chapel Utilities. Reuse spray application may be integrated on the property with applicable County and State permits. No impacts to groundwater are anticipated.

3.11. Fish and Aquatic Habitats

The fish and aquatic habitat for Parcel 2177 includes Pokeberry Creek, its unnamed tributaries, and their adjacent wetlands. Pokeberry Creek is the primary perennial stream and the most significant aquatic habitat on site. While no complete fish survey has been conducted, species observed or expected to exist within Pokeberry Creek have been recorded. See Appendix B for a complete list of observed and understood anticipated aquatic species located on the Parcel 2177 site. See the Jurisdictional Stream and Wetland Map (Figure 11) for all potential habitat locations.

No direct impacts to aquatic habitats are anticipated. The potential for secondary impacts will be minimized through site planning, the sediment and erosion plan and practices as described in section

3.10.1, protected stream buffers, and more than 40% of the total acreage of the site being designated as Conservation Areas.

3.12. Wildlife and Natural Vegetation

The wildlife and natural vegetation of Parcel 2177 was determined from on-site field reconnaissance by WNR staff and research of North Carolina Heritage Program (NHP) records. The site consists primarily of mixed mesic forest that has been previously logged or disturbed. Soil quality is poor so many trees exhibit slow or stunted growth. Small first order to second order streams are present with small abutting riparian wetlands. The northeast corner of the property contains Pokeberry Creek, a more substantial riparian wetland, and bottomland forest.

3.12.1. Natural communities

Mesic Mixed Hardwood Forest

This community type occurs over the vast majority of the site. The canopy of the mesic mixed hardwood forest on site is generally composed of Tulip Poplar, Sweet Gum, Red Maple, Mockernut Hickory, Northern Red Oak, Southern Red Oak, Willow Oak, Loblolly Pine and Virginia Pine. The understory includes Sourwood, American Holly, Eastern Red Cedar, Blueberry, and Farkleberry. The herbaceous layer is generally sparse but includes areas of Christmas Fern, Dwarf Rattlesnake Plantain, Stiltgrass, and Field Blackberry. See Appendix B for a complete list of plant species.

Piedmont Bottomland Forest

This community type is found in the northeast corner of the property surrounding Pokeberry Creek. Red Maple, Tulip Poplar, Sweet Gum and River Birch dominate the canopy in this area. The shrub canopy is sparse, and the herbaceous is mostly wetland vegetation as it ties into the large riparian wetland surrounding Pokeberry Creek. There is a quick abrupt topographical break back into the Mesic Mixed Hardwood Community immediately outside of the Pokeberry Creek Floodplain.

Very small pockets of land containing more Loblolly and Virginia Pine were found in locations such as along a section of an old dirt road and sections along the property line. None of these areas were large enough to exhibit signs of a quantifiably different natural community.

3.12.2. Endangered and Threatened Species

Research was conducted to identify all federally listed threatened and endangered species documented by the NC Natural Heritage Program that occur within a 2 mile radius of the project. The only elemental occurrence that was identified within the 2 mile radius was a Natural Community in the vicinity of Bennett Mountain (EO_ID 25454). The search was expanded to the entire Bynum and Farrington Quadrangles. See Appendix G for maps and tables from the search. The tables describe each species, ranking and their habitat. The two federally ranked species of concern for these quadrangles that could

apply to this project are the Bald Eagle (*Haliaeetus leucocephalus*) and the Cape Fear Shiner (*Notropis mekistocholes*).

No impact to Bald Eagle (*Haliaeetus leucocephalus*) is anticipated because the Parcel 2177 property does not meet the habitat needs for this species. The Parcel 2177 property does not consist of mature forest, nor is it immediately adjacent to any large bodies of water. No impact to Cape Fear Shiner (*Notropis mekistocholes*) is anticipated because the size, flow, and nature of the water features on site do not match the typical habitat for this fish. According to US Fish and Wildlife Service, "Cape Fear Shiner is generally associated with gravel, cobble and boulder substrates." Designated Critical Habitat Areas for Cape Fear Shiner in this region are sections of the Rocky River, Deep River, Bear Creek and Fork Creek. The substrate of Pokeberry Creek, which is the only substantial perennial channel on site (approximately 4 feet wide and with pools approximately 1 foot deep) on site, is mostly sand and muck with some fine gravel. Also, no direct impacts to this water feature are proposed.

3.12.3. Wildlife

The Parcel 2177 site supports many species of mammals, birds, reptiles and amphibians, as well as several species of fish and aquatic and terrestrial invertebrates. During site visits, an abundant population of White-tailed deer (*Odocoileus virginianus*) and Wild Turkey (*Meleagris gallopavo*) were observed. Please refer to the species list provided in Appendix B for a list of wildlife observed on the Parcel 2177 site.

The Parcel 2177 site provides marginal quality habitat for a variety of wildlife species. Hard mast species, including oaks and hickories, as well as soft mass trees and shrubs such as persimmon provide food for mammals and birds. The predominantly deciduous overstory produces a thick layer of leaf litter which supports various detritivores, decomposers, insects, and arachnids. These, in turn, provide food for small insectivorous mammals, reptiles and amphibians. The leaf layer also provides humidity for woodland species of amphibians, and refuge for small reptile and mammal species. Larger debris, including fallen rotting logs and piles of large rocks relict from previous human activity on the site provide refuge for larger reptiles such as Black Rat Snakes (*Elaphe obsoleta*), Copperheads (*Agkistrodon contortrix*), and rodents. The mature forest trees and sporadically dense shrubs on the site support nests of both large raptors and Neotropical migrant songbirds. Edges between forest and previously cleared areas provide opportunities for reptiles to thermo-regulate. The site's active floodplains support turtles, fish, amphibians, and other aquatic invertebrates.

Anticipated impacts to wildlife habitat include will mainly consist of reduction of habitat. No specific habitat communities will be eliminated from the property, only reduced in size. Riparian dispersal corridors will remain intact through undisturbed buffers and the surrounding conservation areas.

3.12.4. Invasive Species

Invasive species observed onsite include Russian Olive (*Elaeagnus angustifolia*), Japanese Honeysuckle (*Lonicera japonica*), and Japanese Stiltgrass (*Microstegium vimineum*). The presence of each of these species is relatively minimal with Russian Olive being the most prolific of the invasives.

3.12.5. Forest Resources

The site is currently completely forested. Few merchantable trees are present on the site. These specimens are believed to be remnant seed trees that were not harvested during the last timber rotation. Only what is necessary for the planned development will be cleared. At least 40% of the property will be preserved as Conservation Area. This minimizes impacts to forest resources and protects them in perpetuity.

3.13. Hazardous Materials

There are no known existing contaminated areas on site that will require mitigation. The only potential for hazardous materials from this project will come from gasoline and diesel fuels used for construction equipment. All construction is proposed to take place within upland areas away from any surface water. Fuel storage containment areas will be established during the clearing and grading of the site. After construction is complete, the proposed residential development will create no additional hazardous materials issues.

4.0 State and Federal Permits Required

The following permits will be obtained for this project:

- Stormwater - Chatham County
- Sediment/Erosion Control – Chatham County
- Nationwide Permit – US Army Corps of Engineers
- Water Distribution – Chatham County
- Sanitary Sewer – NCDENR

Appendix A

Figures

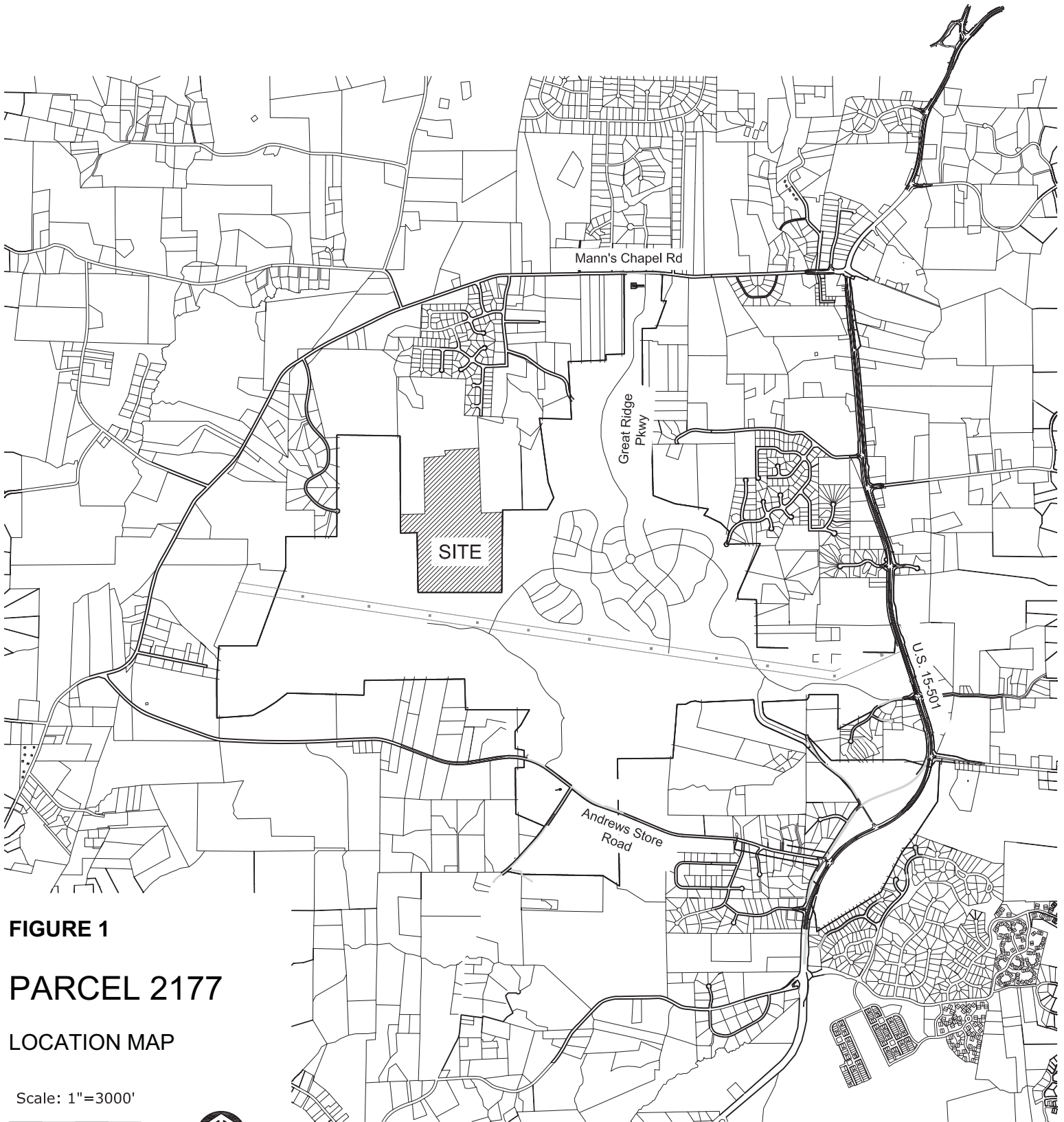
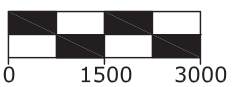


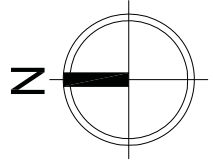
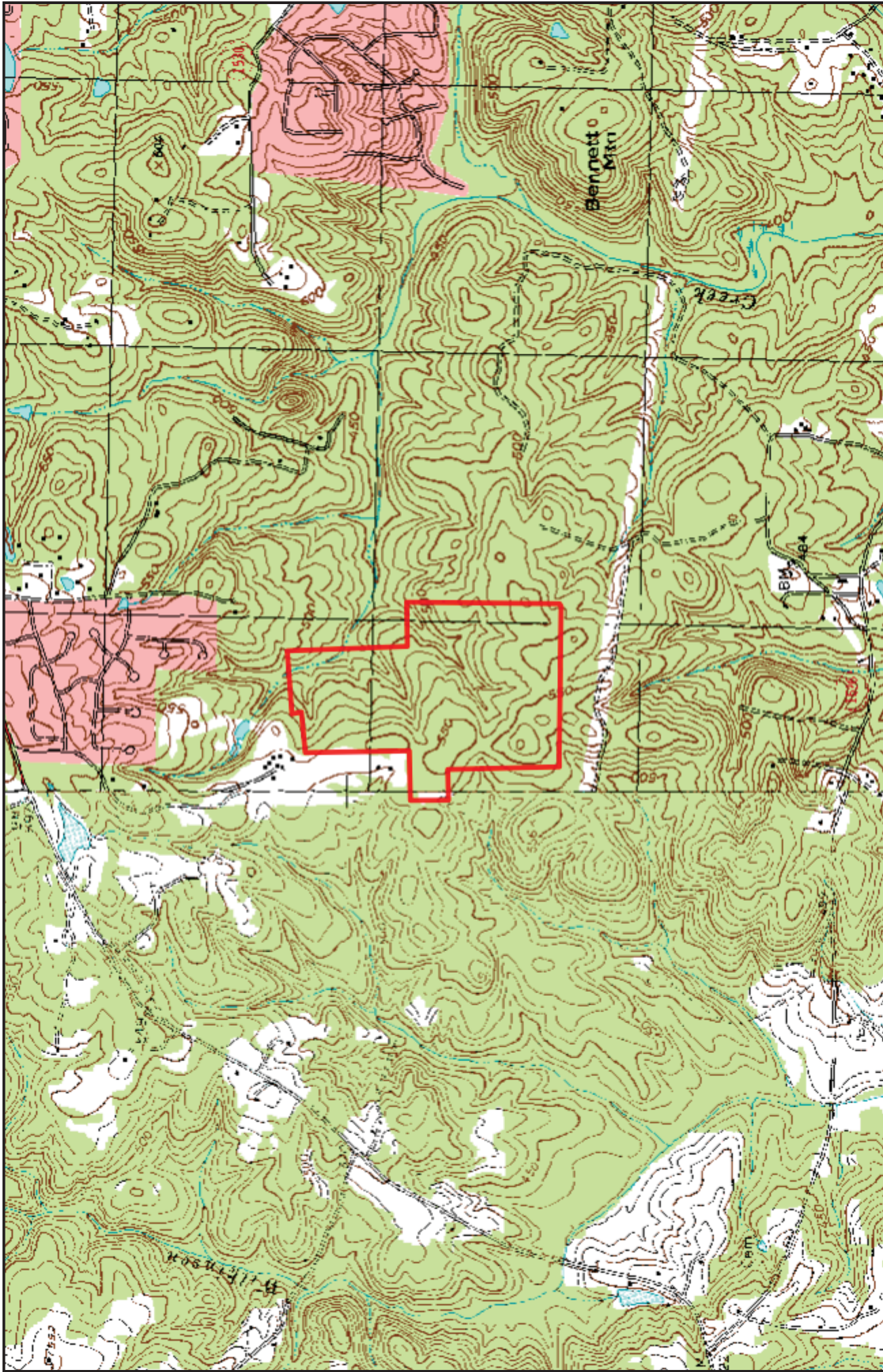
FIGURE 1

PARCEL 2177

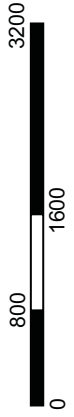
LOCATION MAP

Scale: 1"=3000'





Scale: 1" = 1600'



Source: Chatham County GIS
Farrington and Bynum Quadrangles

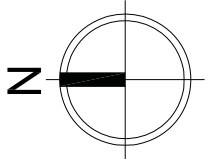
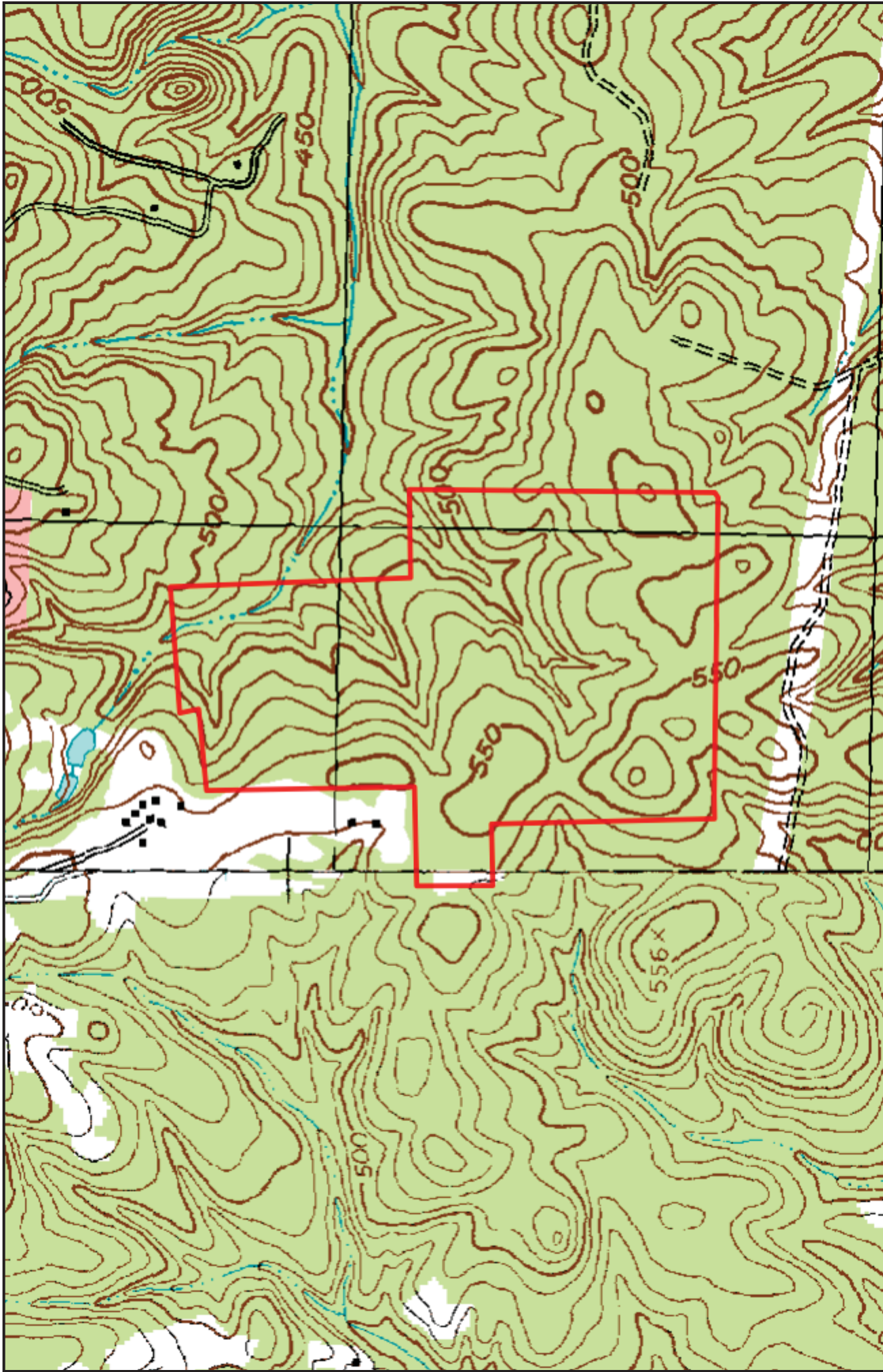
Figure 2a
USGS Vicinity Map

Parcel 2177
Chatham County, NC

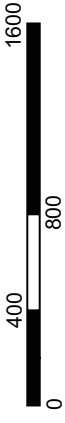


Wetland and Natural Resource Consultants





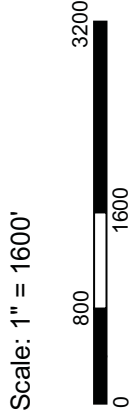
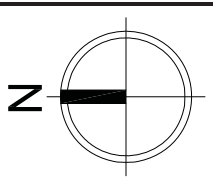
Scale: 1" = 800'



Source: Chatham County GIS
Bynum and Farrington Quadrangles

Figure 2b
USGS Close Up Map
Parcel 2177
Chatham County, NC

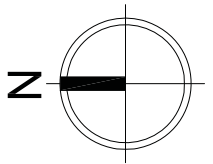




Source: Chatham County GIS

Figure 3a
Aerial Map - Vicinity
Parcel 2177
Chatham County, NC





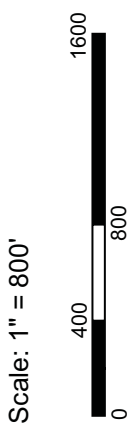
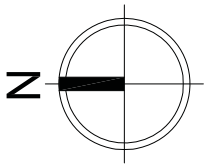
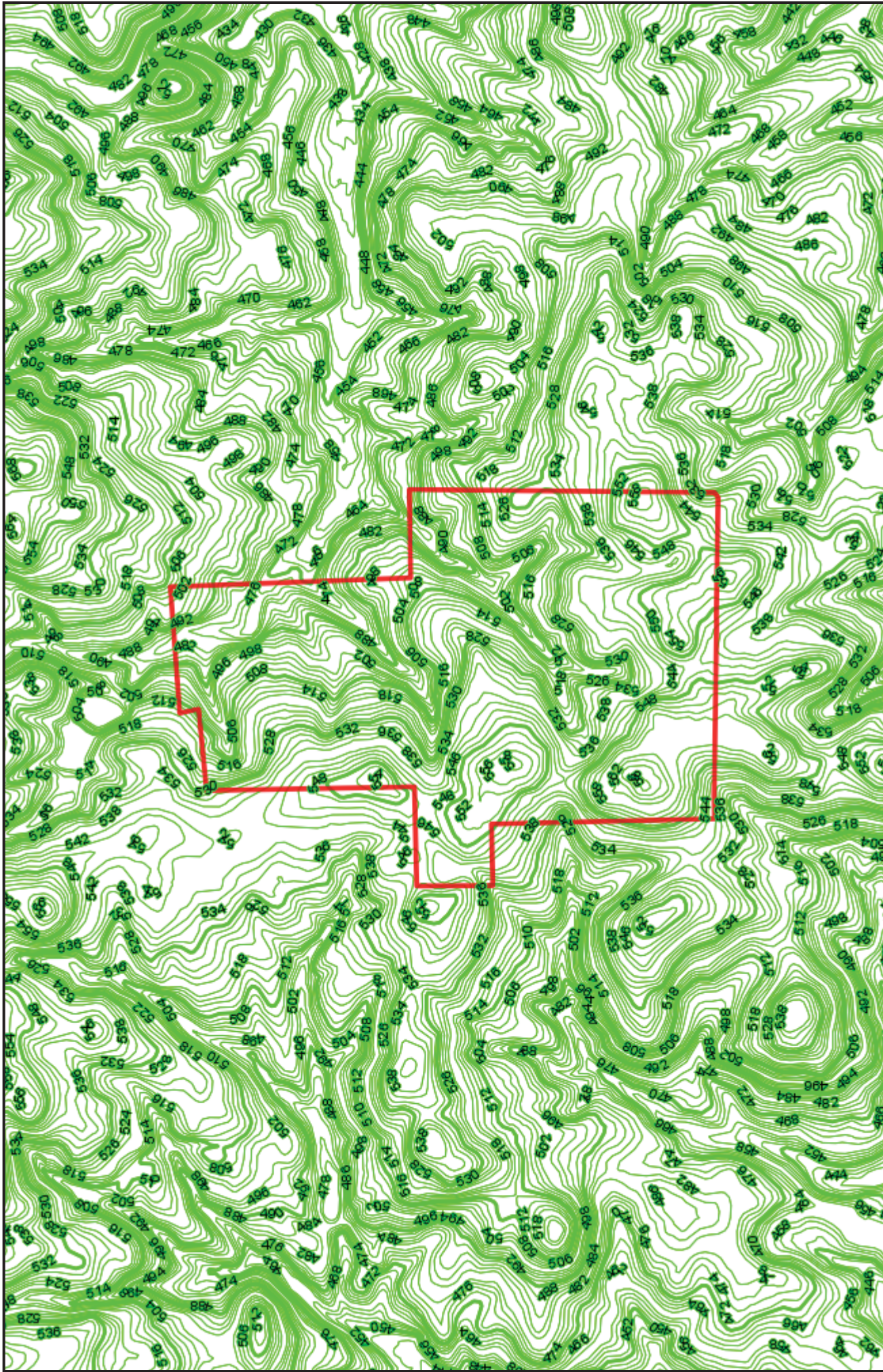
Scale: 1" = 800'



Source: Chatham County GIS

Figure 3b
Aerial Map - Close Up
Parcel 2177
Chatham County, NC





Scale: 1" = 800'

Source: Chatham County GIS

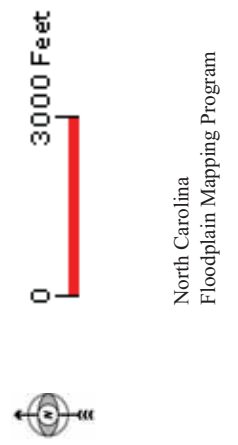
Figure 4
Topographic Map
Parcel 2177
Chatham County, NC



Parcel 2177

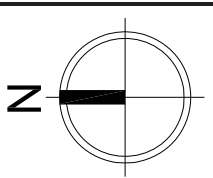
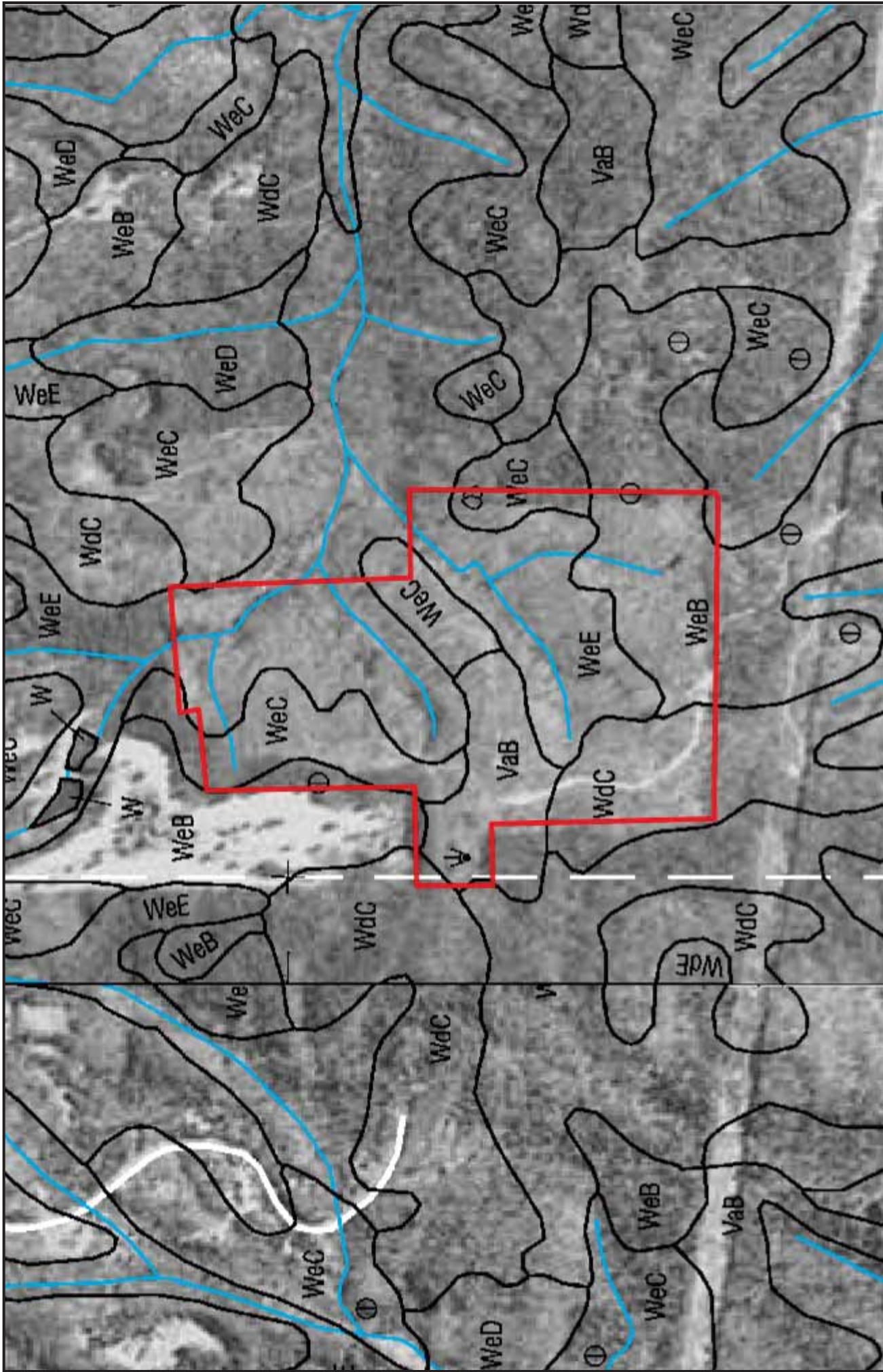


FIGURE 5
PARCEL 2177
FEMA FLOOD MAP



- ★ Major Cities
- + Benchmarks
- DFIRM Grid
- Rivers and Streams
- Transects (Coastal)
- County Boundaries
- Coastal Barrier Resource Systems
- Roads
- NC Highway
- US Highway
- Interstate Highway
- Political Areas
- Extraterritorial Jurisdictions
- Coastal Sounds
- 100yr Flooding - Floodway (AE)
- 100yr Flooding - Has BFE's (AE)
- 100yr Flooding - No BFE's (A)
- 100yr Flooding - Velocity Zone
- 500yr Flooding (Shaded X)
- Base Flood Elevation (Symbol)
- Cross Sections

North Carolina
 Floodplain Mapping Program

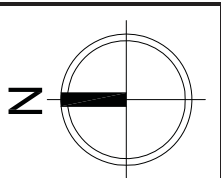
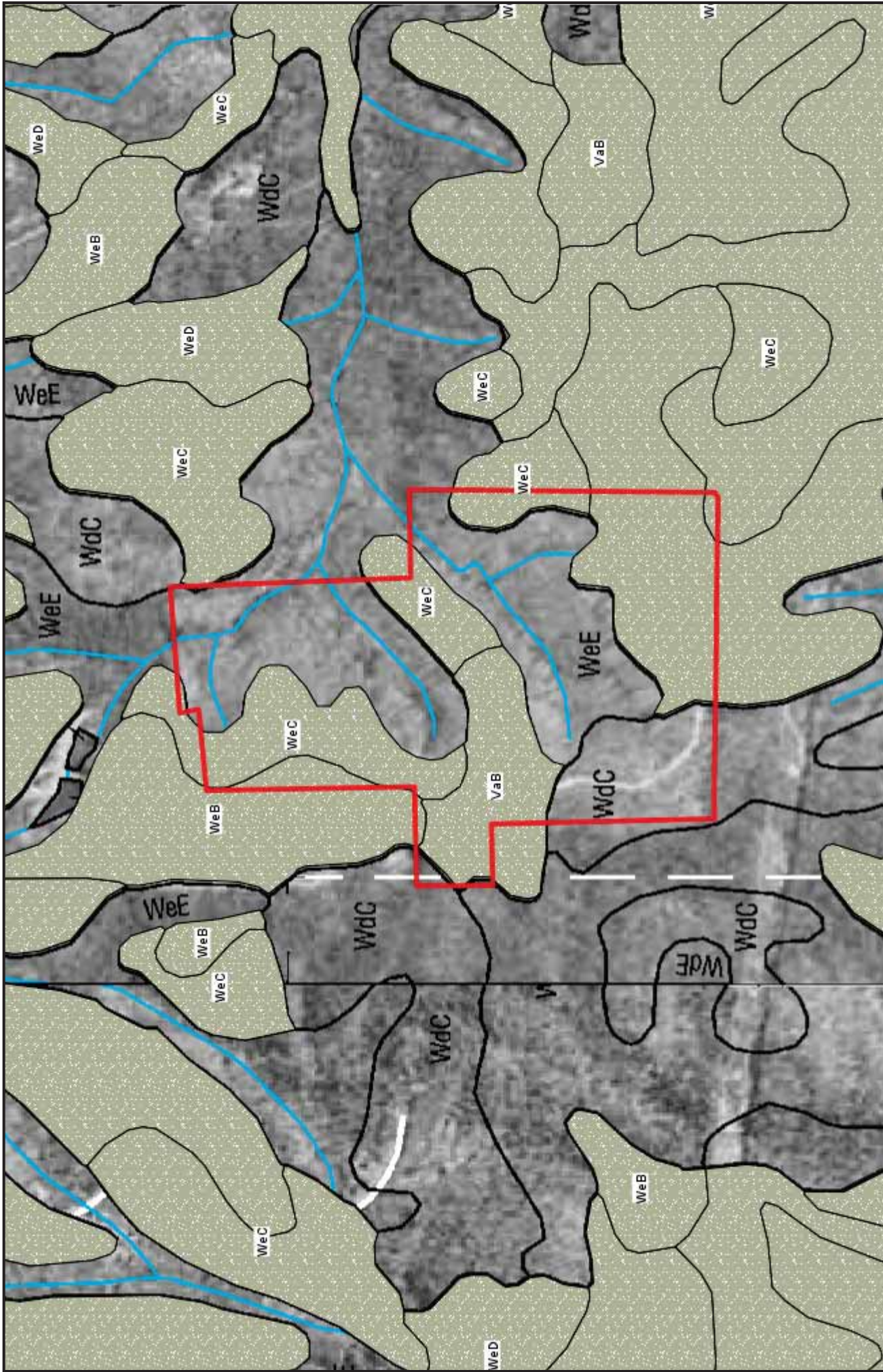


Scale: 1" = 800'

Source: Chatham County GIS
NRCS Soils Map

Figure 6
Soils Map
Parcel 2177
Chatham County, NC

Wetland and Natural Resource Consultants



Scale: 1" = 800'

Source: Chatham County GIS
NRCS Soils Map

Figure 7
Prime Farmland Soils Map
 Parcel 2177
 Chatham County, NC

WNR
 Wetland and Natural Resource Consultants

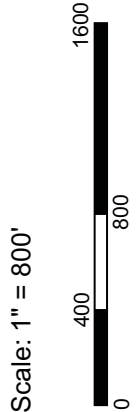
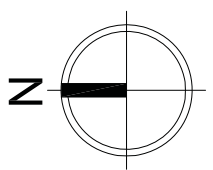
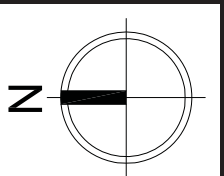
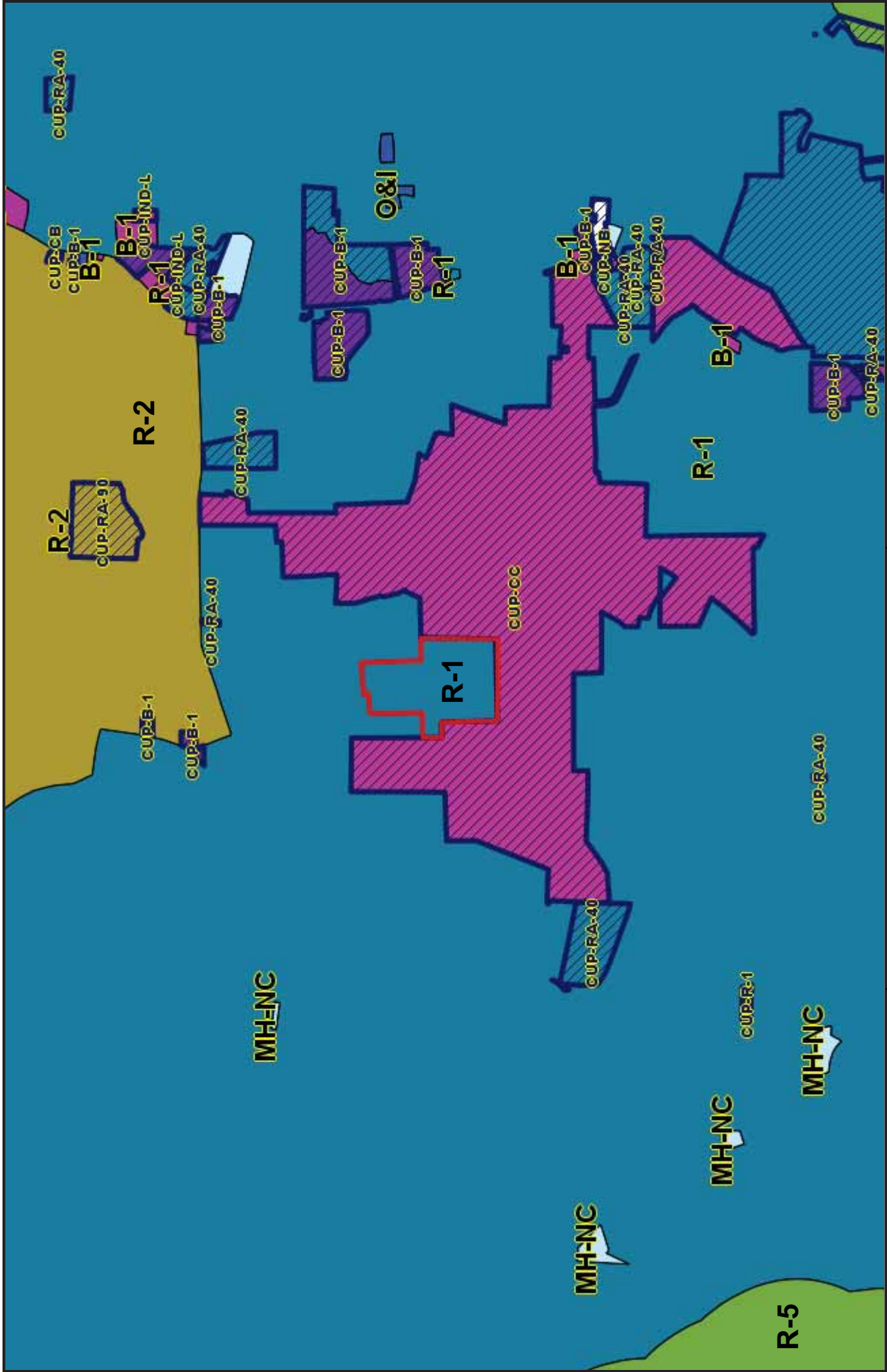


Figure 8
Existing Land Use Map
 Parcel 2177
 Chatham County, NC





Scale: 1" = 3200'

Source: Chatham County GIS

Figure 10
Zoning Map
 Parcel 2177
 Chatham County, NC

WNR
 Wetland and Natural Resource Consultants

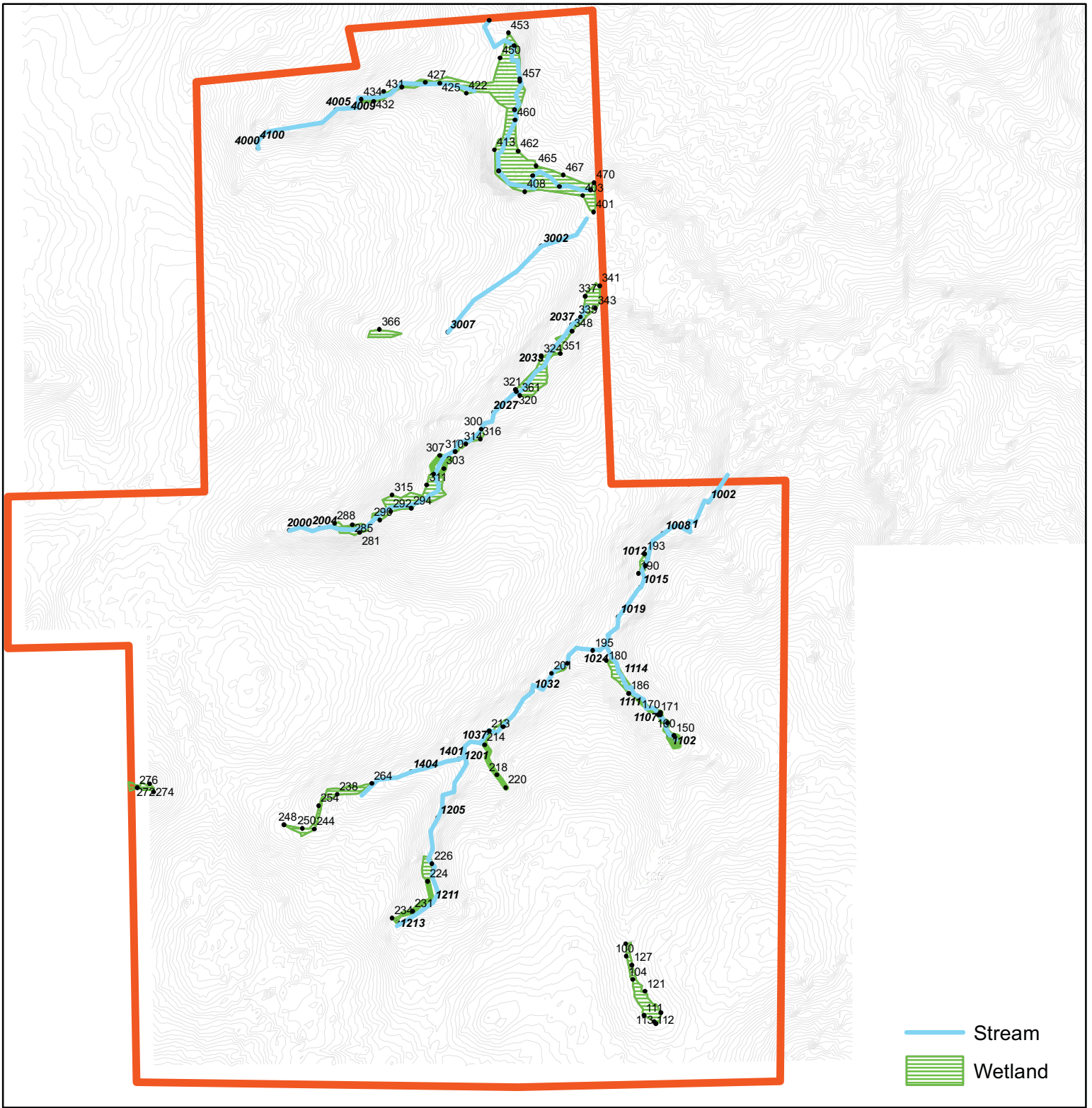
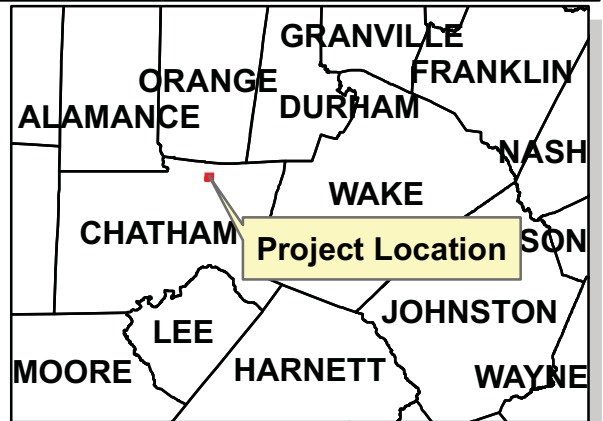






Figure 11
Jurisdictional Streams and Wetlands Map

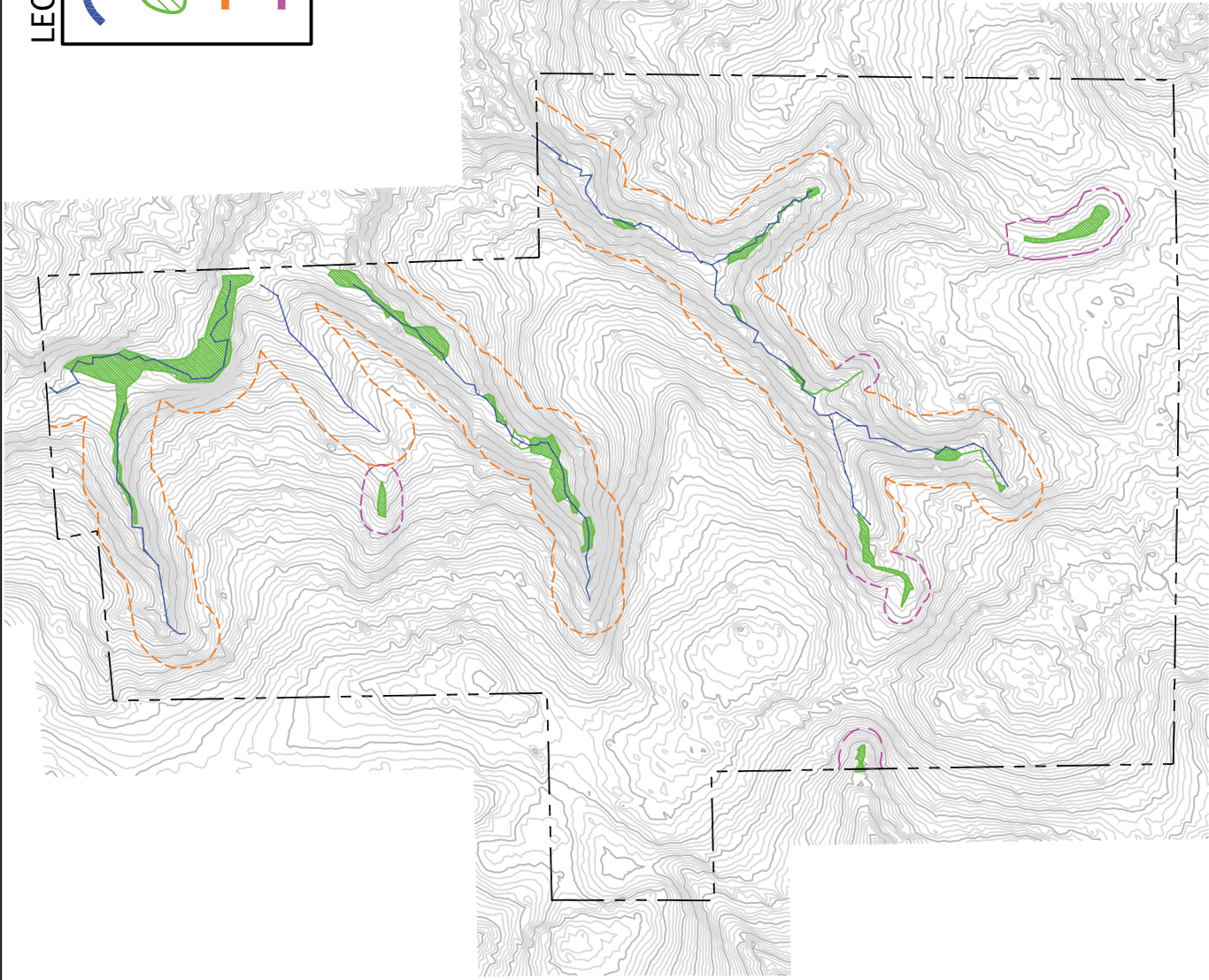
Parcel 2177
 Chatham County, NC



Overview Location

LEGEND:

-  : Jurisdictional Stream(s)
-  : Jurisdictional Wetland(s)
-  : 100 ft. Buffer
-  : 50 ft. Buffer



WNR
Wetland and Natural Resource Consultants

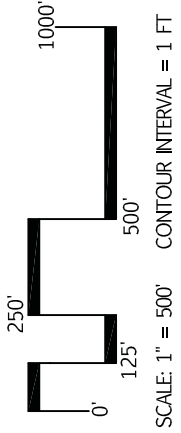
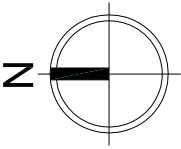


Figure 12
Chatham County Buffer Map
Parcel 2177
Chatham County, NC



Natural Heritage Program Map Viewer

(Data last updated on January 8, 2014)

[Help and Definition \(http://portal.ncdenr.org/c/document_library/get_file?uuid=3da6baa6-9263-4e0a-80f5-78d62a3b4741&groupId=61587 \)](http://portal.ncdenr.org/c/document_library/get_file?uuid=3da6baa6-9263-4e0a-80f5-78d62a3b4741&groupId=61587)

Search Radius:

Enter an Address

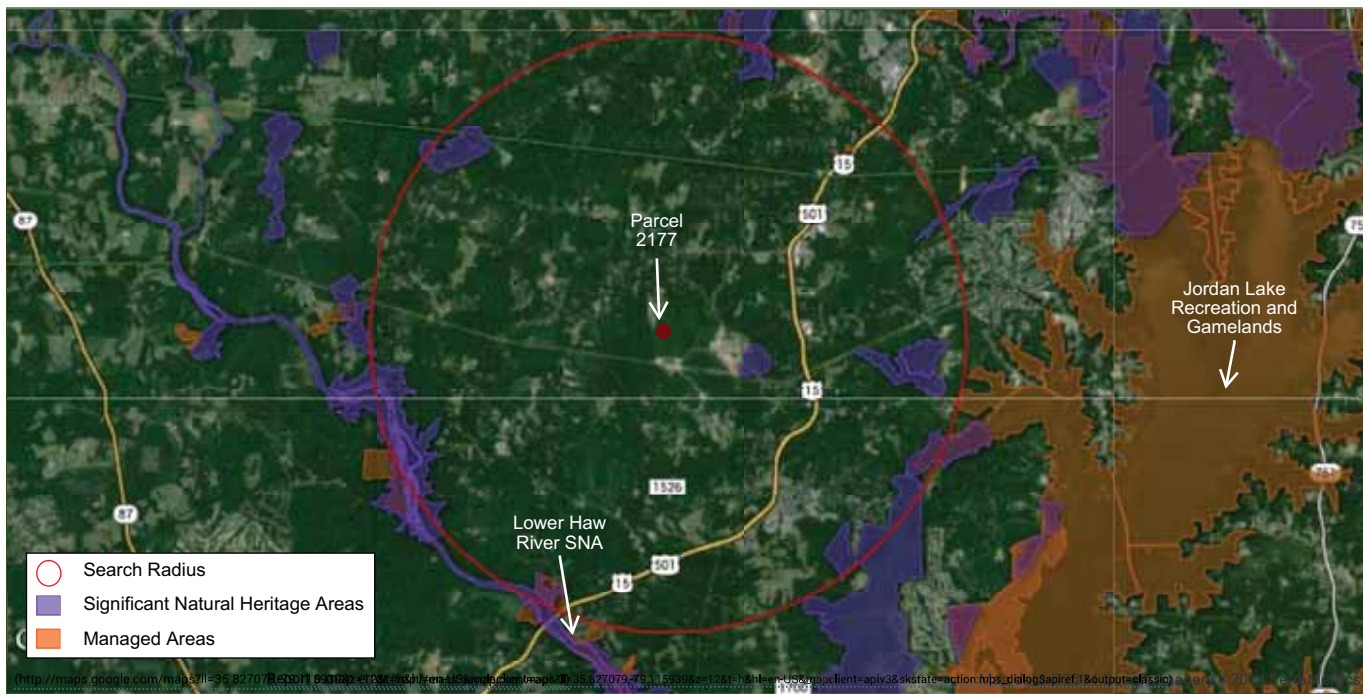
OR

Latitude and Longitude

(decimal degrees)

OR

just click a map location below...



Show Legend

SHOW RESULTS FOR: Significant Natural Heritage Areas Managed Areas

Show entries per page

Filter search results:

Managed Area Name	Acres	Owner	Owner Type
B. Everett Jordan Dam and Lake	176.08	US Army Corps of Engineers	Federal
B. Everett Jordan Dam and Lake	149.95	US Army Corps of Engineers	Federal
Chatham County Open Space	23.92	Chatham County: multiple local government	Local Government
Lower Haw River State Natural Area	85.76	NC DENR, Division of Parks and Recreation	State
Lower Haw River State Natural Area DNP	49.86	NC DENR, Division of Parks and Recreation	State
Orange County Water and Sewer Authority Property	4.38	Orange County Water and Sewer Authority	Local Government
Orange County Water and Sewer Authority Property	0.76	Orange County Water and Sewer Authority	Local Government
Triangle Land Conservancy Easement	181.7	Triangle Land Conservancy	Private

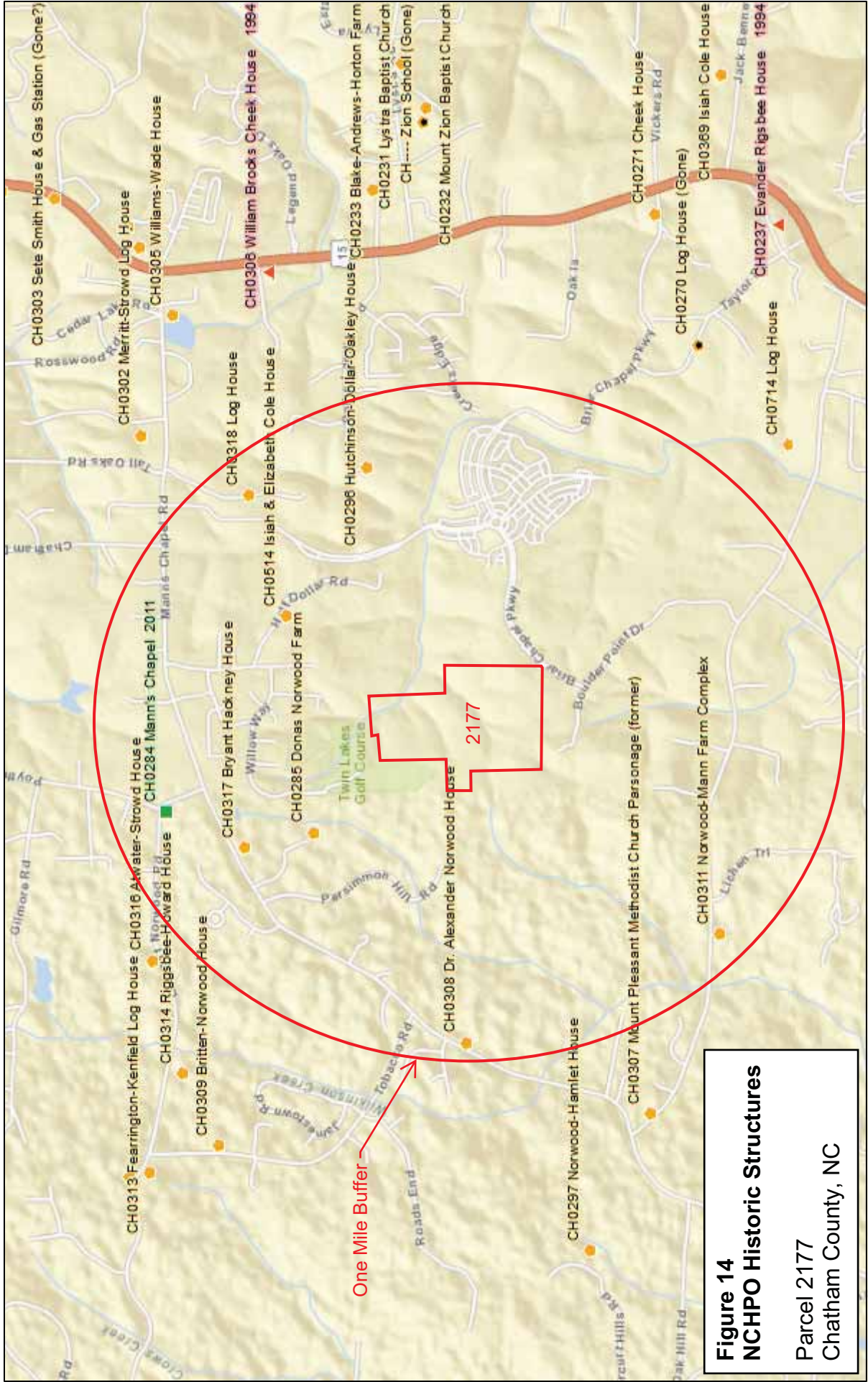
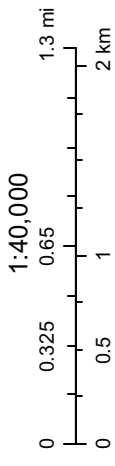


Figure 14
NCHPO Historic Structures
 Parcel 2177
 Chatham County, NC



- NR Individual Listing
- NR Listing, Gone
- ◆ Surveyed Only
- ◆ Surveyed Only, Gone
- Study List Individual Entry
- ▲ Determined Eligible

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013



Legend:

-  Mesic Mixed Hardwood
-  Piedmont Bottomland
-  Larger Pine Presence

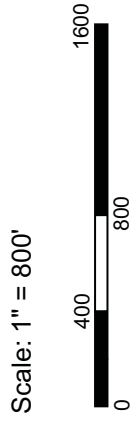
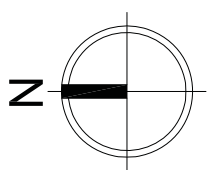
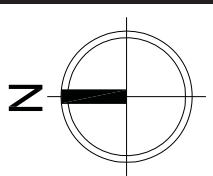
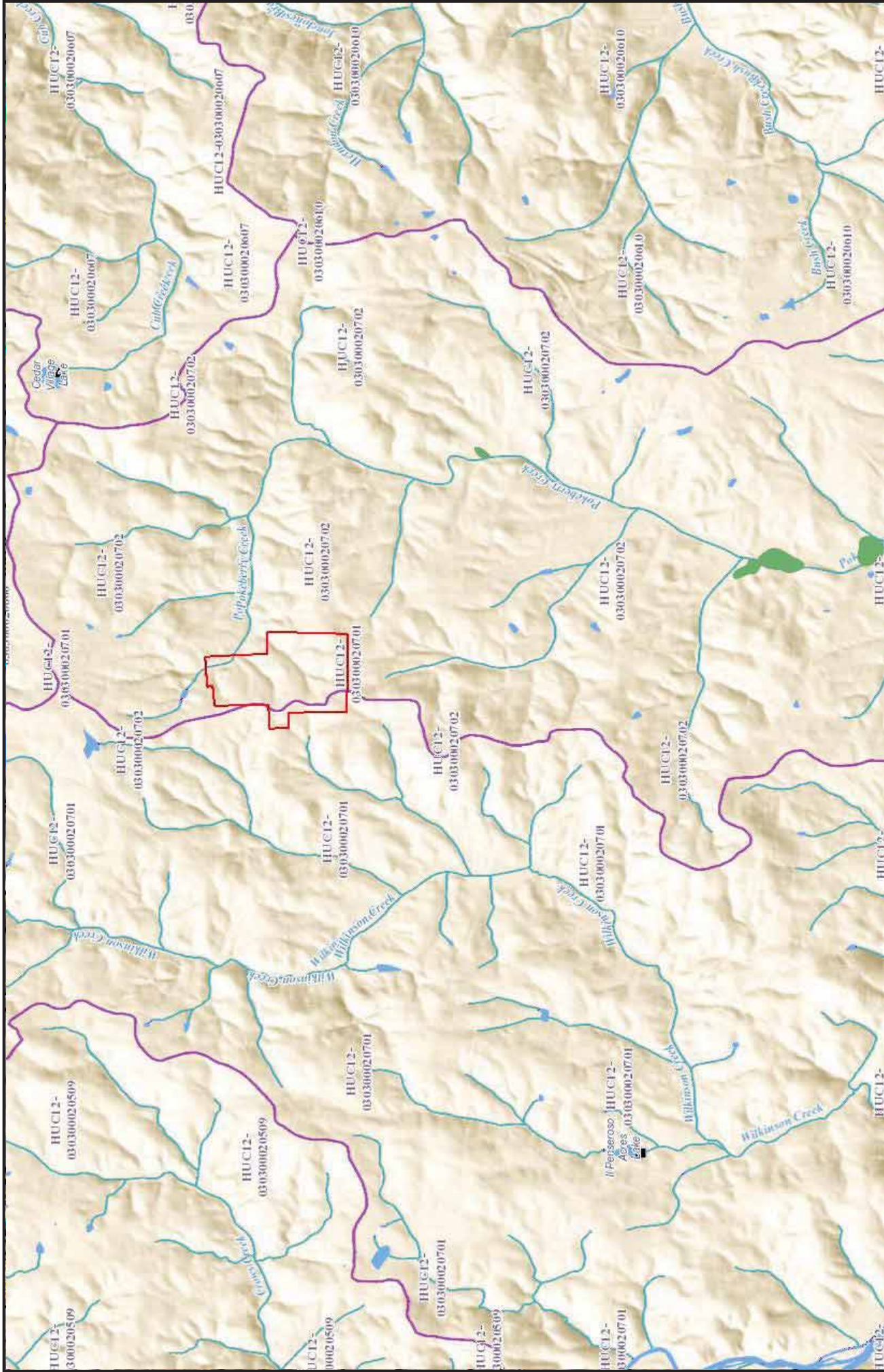


Figure 15
Natural Communities Map
 Parcel 2177
 Chatham County, NC





Scale: 1" = 3200'

0 3200 6400

Source: Chatham County GIS

Figure 16
Hydrologic Map
 Parcel 2177
 Chatham County, NC



.0311 CAPE FEAR RIVER BASIN

Name of Stream	Description	Class	Class	
			Date	Index No.
Terrells Creek (Ferrells Creek) (North Side Haw River)	From source to Haw River	WS-IV;NSW	08/03/92	16-32
Meadow Branch	From source to Terrells Creek	WS-IV;NSW	08/03/92	16-32-1
Crows Creek	From source to Terrells Creek	WS-IV;NSW	08/03/92	16-32-2
Dry Creek	From source to a point 0.3 mile downstream of Chatham County SR 1506	WS-V;NSW	08/11/09	16-34-(0.3)
Dry Creek	From a point 0.3 mile downstream of Chatham County SR 1506 to Haw River	WS-IV;NSW	08/03/92	16-34-(0.7)
Long Branch	From source to Dry Creek	WS-IV;NSW	08/03/92	16-34-1
Wilkinson Creek	From source to Haw River	WS-IV;NSW	08/03/92	16-35
Brooks Creek (Branch)	From source to Haw River	WS-IV,B;NSW	08/03/92	16-36
HAW RIVER	From a point 0.4 mile downstream of Brooks Branch to Pittsboro water supply intake (located 0.3 mile upstream of Pokeberry Creek)	WS-IV;NSW,CA	08/03/92	16-(36.3)
HAW RIVER	From Pittsboro water supply intake to a point 0.5 mile downstream of U.S. Hwy. 64	WS-IV;NSW	08/03/92	16-(36.7)
Pokeberry Creek	From source to Haw River	WS-IV;NSW	08/03/92	16-37
Ward Branch	From source to Pokeberry Creek	WS-IV;NSW	08/03/92	16-37-1
Williams Pond	Entire pond and connecting stream to Pokeberry Creek	WS-IV;NSW	08/03/92	16-37-2
HAW RIVER	From a point 0.5 mile downstream of U.S. Hwy. 64 to approximately 1.0 mile below U.S. Hwy. 64	WS-IV;NSW,CA	08/03/92	16-(37.3)
HAW RIVER (B. Everett Jordan Lake below normal pool elevation)	From approximately 1.0 mile below U.S. Hwy. 64 to dam at B. Everett Jordan Lake	WS-IV,B;NSW,CA	08/03/92	16-(37.5)
Robeson Creek	From source to a point 0.7 mile downstream of Chatham County SR 2159	WS-V;NSW	08/11/09	16-38-(1)
Hill Creek	From source to U.S. Hwy. 64	WS-V;NSW	08/11/09	16-38-2-(1)
Hill Creek	From U.S. Hwy. 64 to Robeson Creek	WS-IV;NSW	08/03/92	16-38-2-(2)
Robeson Creek	From a point 0.7 mile downstream of Chatham County SR 2159 to a point 0.3 mile upstream of mouth	WS-IV;NSW	08/03/92	16-38-(3)
Turkey Creek	From source to Robeson Creek	WS-IV;NSW	08/03/92	16-38-4

NC DENR NHP Two Mile Element Occurrence Map, USGS

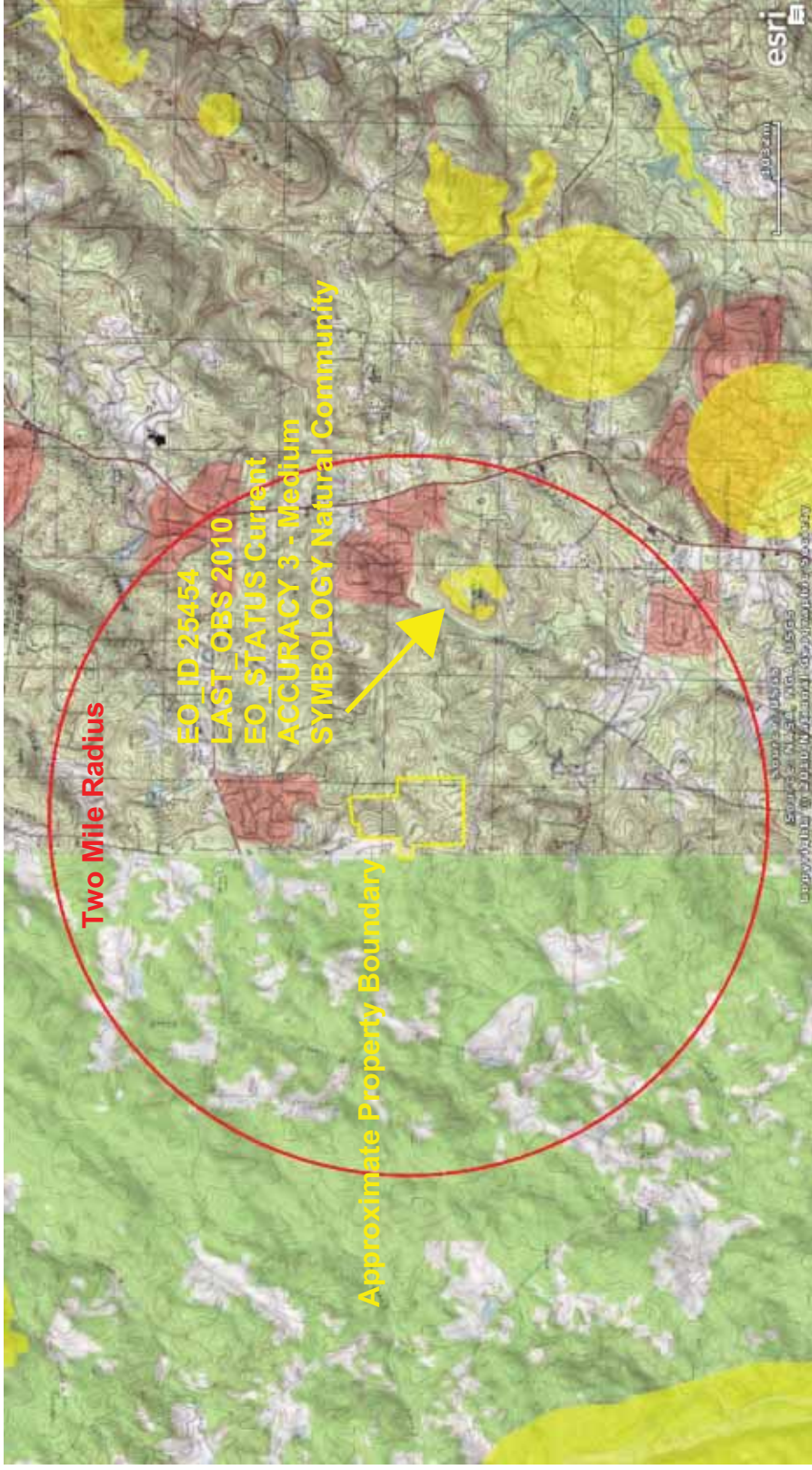


Figure 18a
NC NHP Elemental Occurrence Search - USGS

Parcel 2177
Chatham County, NC

NC DENR NHP Two Mile Element Occurrence Map, Aerial



Figure 18b
NC NHP Elemental Occurrence Search - Aerial

Parcel 2177
Chatham County, NC

Appendix B

Species List:

Plants and Animals Observed and Anticipated on Parcel 2177

Appendix B

Species List: Plants and Animals Commonly Observed and Anticipated on the Parcel 2177 site

Plants

Trees

- Red maple (*Acer rubrum*)
- River birch (*Betula nigra*)
- American hornbeam (*Carpinus caroliniana*)
- Mockernut Hickory (*Carya alba*)
- Flowering Dogwood (*Cornus florida*)
- American beech (*Fagus grandifolia*)
- Green ash (*Fraxinus pennsylvanica*)
- American Holly (*Ilex opaca*)
- Eastern Red-cedar (*Juniperus virginiana*)
- Tulip Poplar (*Liriodendron tulipifera*)
- Sweetgum (*Liquidambar styraciflua*)
- Sourwood (*Oxydendrum arboreum*)
- Loblolly pine (*Pinus taeda*)
- Virginia pine (*Pinus virginiana*)
- Black Cherry (*Prunus serotina*)
- White Oak (*Quercus alba*)
- Willow oak (*Quercus phellos*)
- Northern Red Oak (*Quercus rubra*)
- Black Oak (*Quercus velutina*)

Shrubs

- Devil's Walkingstick (*Aralia spinosa*)
- Russian olive (*Elaeagnus angustifolia*)
- Gallberry (*Ilex glabra*)
- Spicebush (*Lindera benzoin*)
- Staghorn sumac (*Rhus typhina*)
- Lowbush blueberry (*Vaccinium angustifolium*)
- Farkleberry (*Vaccinium arboreum*)
- Northern highbush blueberry (*Vaccinium corymbosum*)
- Southern arrowwood (*Viburnum dentatum*)

Vines

- Japanese honeysuckle (*Lonicera japonica*)
- Saw greenbrier (*Smilax bona-nox*)
- Common greenbrier (*Smilax rotundifolia*)
- Poison ivy (*Toxicodendron radicans*)
- Muscadine (*Vitis rotundifolia*)

Herbaceous

- False nettle (*Boehmeria cylindrical*)
- Dwarf rattlesnake plantain (*Goodyera repens*)
- Littlebrownjug (*Hexastylis arifolia*)
- Common rush (*Juncus effusus*)
- Cardinal flower (*Lobelia cardinalis*)
- Japanese stiltgrass (*Microstegium vimineum*)
- Partridge berry (*Mitchella repens*)
- Cinnamon fern (*Osmundastrum cinnamomeum*)
- Christmas fern (*Polystichum acrostichoides*)
- Brackenfern (*Pteridium aquilinum*)
- Field blackberry (*Rubus arvensis*)
- Crane fly orchid (*Tipularia discolor*)
- Southern woodland violet (*Viola hirsutula*)
- Netted chainfern (*Woodwardia areolata*)

Invertebrates (Cursory List)

- Luna Moth (*Actias luna*)
- Carolina Ladle Crayfish (*Cambarus davidi*) (NCNHP-SR)
- Rocky River Crayfish (*Cambarus hobbsorum*)
- Imperial Moth (*Eacles imperialis*)
- Mourning Cloak (butterfly) (*Nymphalis antiopa*)
- Cloudless sulphur (butterfly) (*Phoebis sennae*)
- Physid snails (*Physa cf. acuta*)
- Buckeye (butterfly) (*Precis coenia*)
- White River Crayfish (*Procambarus acutus*)
- American Bird Grasshopper (*Schistocerca americana*)
- Red Imported Fire Ant (*Solenopsis invicta*)
- Gray Hairstreak (butterfly) (*Strymon melinus*)
- Horse fly larvae (*Tabanus sp.*)
- Annual Cicada (*Tibicen sp.*)
- Crane fly larvae (*Tipula sp.*)

- Paper pondshell (mussel) (*Utterbackia imbecilis*)
- Red Admiral (butterfly) (*Vanessa atalanta*)
- Caddisfly larvae
- Various stonefly larvae
- Various mayfly larvae
- Various dragonfly larvae

Fish

- Creek chubsucker (*Erimyzon oblongus*)
- Mosquitofish (*Gambusia holbrooki*)
- Bluehead chub (*Nocomis leptocephalus*)
- Shiners (*Notropis sp.*) (cf. *alborus* and/or *procne*)
- Creek chub (*Semotilus atromaculatus*)

Amphibians and Reptiles

- Northern Cricket Frog (*Acris crepitans*)
- Spotted salamander (*Ambystoma maculatum*)
- Green Anole (*Anolis carolinensis*)
- American Toad (*Bufo americanus*)
- Worm Snake (*Carphophis amoenus*)
- Snapping Turtle (*Chelydra serpentina*)
- Black racer (*Coluber constrictor*)
- Northern Dusky Salamander (*Desmognathus fuscus*)
- Black Rat Snake (*Elaphe obsoleta*)
- Two-lined Salamander (*Eurycea cirrigera*)
- Eastern Mud Turtle (*Kinosternon subrubrum*)
- Redbelly Water Snake (*Nerodia erythrogaster*)
- Northern Water Snake (*Nerodia sipedon*)
- Eastern Newt (*Notophthalmus viridescens*)
- Upland Chorus Frog (*Pseudacris feriarum*)
- Spring Peeper (*Pseudacris crucifer*)
- Mud Salamander (*Pseudotriton montanus*)
- River Cooter (*Pseudemys concinna*)
- Bullfrog (*Rana catesbeiana*)
- Green Frog (*Rana clamitans*)
- Pickerel Frog (*Rana palustris*)
- Northern Fence Lizard (*Sceloporus hyacinthinus*)
- Ground Skink (*Scincella lateralis*)
- Eastern Box Turtle (*Terrapene carolina*)
- Yellow-bellied Slider (*Trachemys scripta*)

Birds

- Wood Duck (*Aix sponsa*)
- Ruby-throated Hummingbird (*Archilochus colubris*)
- Tufted Titmouse (*Baeolophus bicolor*)
- Red-tailed Hawk (*Buteo jamaicensis*)
- Red-shouldered Hawk (*Buteo lineatus*)
- Cardinal (*Cardinalis cardinalis*)
- Northern Flicker (*Colaptes auratus*)
- Eastern Wood Pewee (*Contopus virens*)
- American Crow (*Corvus brachyrhynchos*)
- Blue Jay (*Cyanocitta cristata*)
- Pileated woodpecker (*Dryocopus pileatus*)
- Common Yellowthroat (*Geothlypis trichas*)
- Yellow-breasted Chat (*Icteria virens*)
- Red-bellied woodpecker (*Melanerpes carolinus*)
- Red-headed woodpecker (*Melanerpes erythrocephalus*)
- Wild Turkey (*Meleagris gallopavo*)
- Black and White Warbler (*Mniotilta varia*)
- Blue Grosbeak (*Passerina caerulea*)
- Downy Woodpecker (*Picoides pubescens*)
- Hairy Woodpecker (*Picoides villosus*)
- Summer Tanager (*Piranga rubra*)
- Carolina Chickadee (*Poecile atricapillus*)
- Northern Parula (*Setophaga americana*)
- Eastern Bluebird (*Sialia sialis*)
- Red-breasted Nuthatch (*Sitta canadensis*)
- Field Sparrow (*Spizella pusilla*)
- Barred Owl (*Strix varia*)
- Carolina Wren (*Thryothorus ludovicianus*)
- Yellow-throated Vireo (*Vireo flavifrons*)
- White-eyed Vireo (*Vireo griseus*)

Mammals

- Coyote (*Canis latrans*)
- Beaver (*Castor canadensis*)
- Opossum (*Didelphis virginiana*)
- White-tailed Deer (*Odocoileus virginianus*)
- Raccoon (*Procyon lotor*)
- Gray Squirrel (*Sciurus carolinensis*)

Appendix C

Site Photographs



Typical Mesic Mixed Hardwood Forest



Typical Mesic Mixed Hardwood Forest



Pine dominated area



Boulders along ridge in southwest corner of the property



Bottomland Forest, Pokeberry Creek and Wetland



Wetland in southeast corner of property (near flag 121)



Channel / Wetland Feature - Flag 353



Channel / Wetland Feature - Flag 347



Channel Feature - Flag 1005 - Looking upstream



Channel Feature - Flag 1005 - Looking downstream

Appendix D


Site Plan Details



Notes:

1. Current density calculations indicate 126 lots. Current plan shows +/-129. Final number of lots will be based on final density calculations derived from final determination by Corps of Engineers.
2. Any parking associated with the common area will be in accordance with the applicable County ordinance requirements.
3. Limited clearing may be necessary for certain utility crossings within buffered areas.
4. Total impervious surface projected to be less than 24% of total site acreage.
5. Conservation Acreage totals:
 - Total parcel acreage 131.384
 - Overall conservation area +/-53 ac
 - Approximate total natural space, at least +/-42 ac
 - Approximate contiguous/natural space +/-38 ac
 - Approximate conservation space within riparian buffers and floodplain, +/-31 ac

Legend:

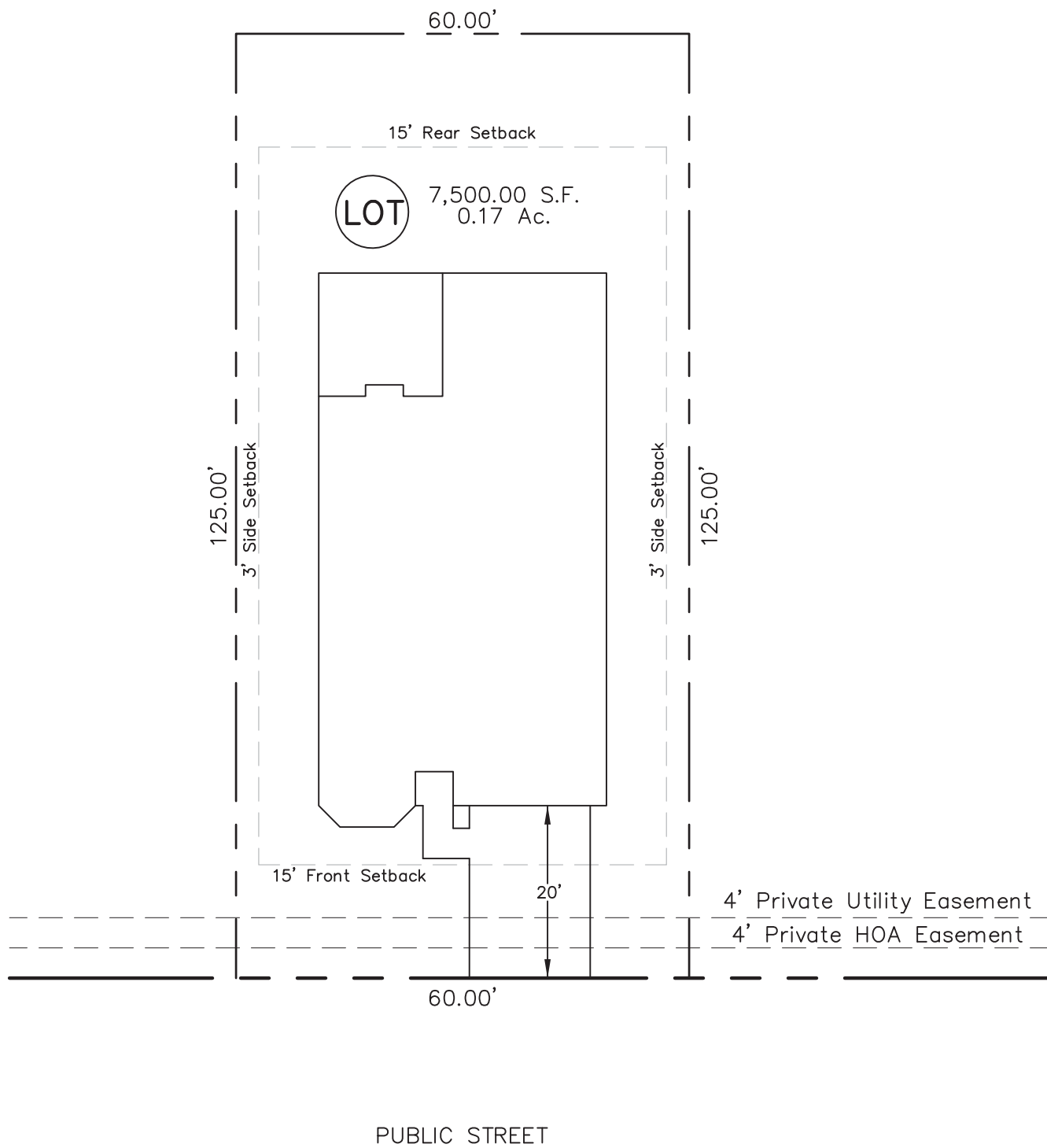
 Approximate Clearing/Grading Area

Conservation Area
+/- 53 Acres

Common Area
+/- 2.0 Acres




IMPERVIOUS SURFACE AREA	
DESCRIPTION	AREA
HOUSE w/ PORCH	+/-2,900 S.F.
PATIO/HVAC/MISC.	+/-300 S.F.
DRIVEWAY & WALKS	+/-425 S.F.
TOTAL (PROPOSED)=	+/-3,625 S.F.
TOTAL (ALLOWED)=	+/-3,800 S.F.



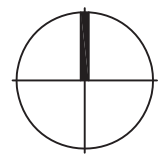
 **McKIM & CREED**
 1730 Varsity Drive, Suite 500
 Raleigh, North Carolina 27606
 O: 919.233.8091 F: 919.233.8031

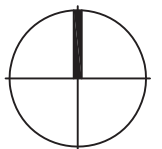
Parcel 2177

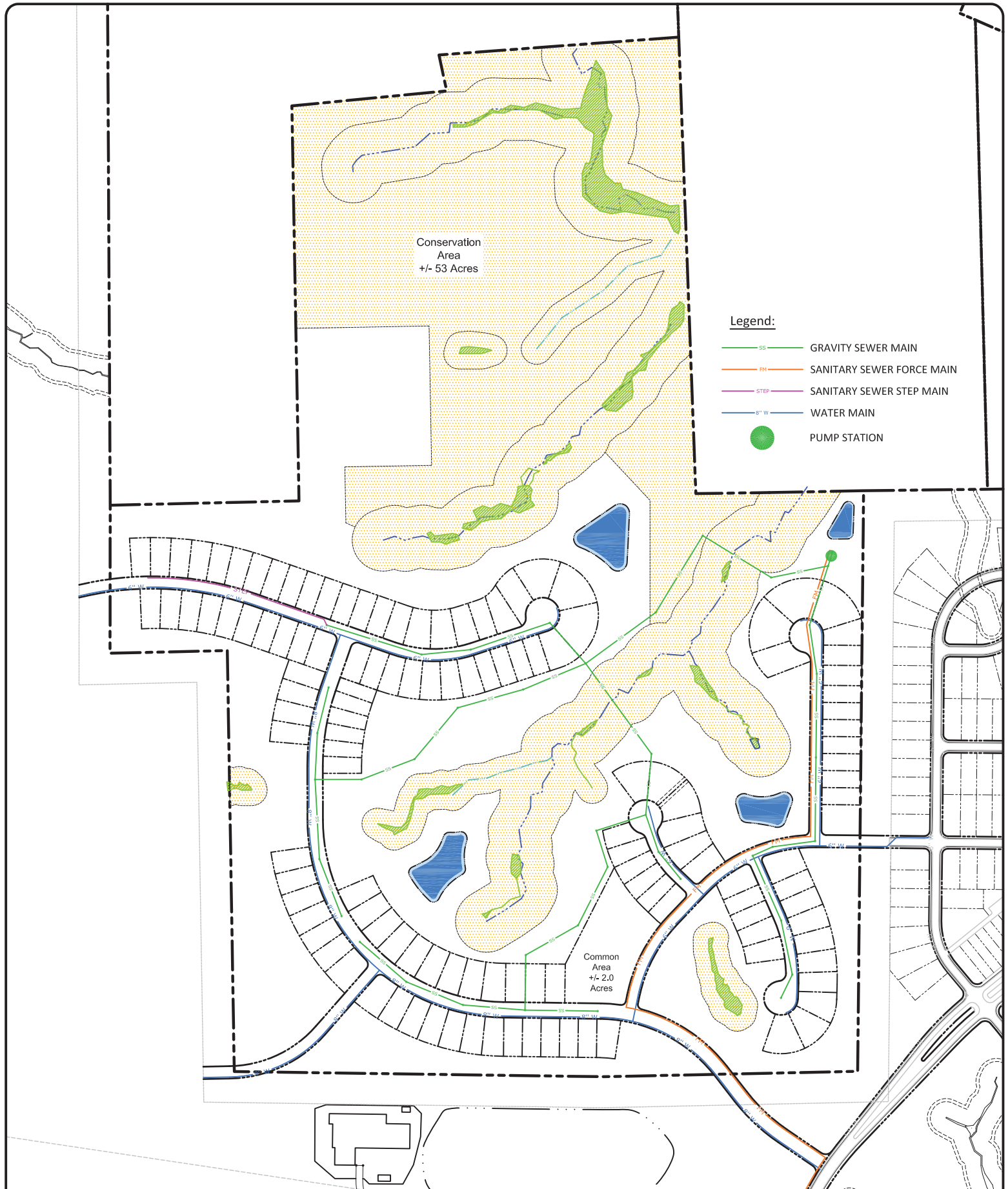
Typical Plot Plan

Scale: 1"=400'


Date:
 January 31, 2014







1730 Varsity Drive, Suite 500
Raleigh, North Carolina 27606
O: 919.233.8091 F: 919.233.8031

Parcel 2177

Utility Plan

Scale: 1"=400'



Date:
February 3, 2014



Base Density Calculation (Section I of Subdivision Ordinance)

131.384 AC	Acreage
<u>-30.7 AC</u>	Floodplain & Riparian Buffers
100.7 AC	Net Land Area Available (AC)

126.1 Lots ***Allowable**

*Divide Net Land Area Available by 0.918 AC units and Multiply by 1.15

(Note-the 1.15 multiplier is derived from the 10% Conservation Subdivision Bonus and the 5% Agricultural Preservation Bonus as described in Sections 7.7 and 7.7J of the Chatham County Subdivision Ordinance.)

Area Breakdown

Roads	7.47 AC
Lots	26.80 AC
Lot ISA	11.25 AC
Stormwater	1.47 AC
Conservation Area	53.00 AC

Conservation Subdivision Option

Total Acreage **131.38 AC**

Minimum Area in Conservation:	52.6 AC	(40%)
	42.0 AC	80% Required Natural Space
	10.5 AC	20% Developed (Impacted) Open Space
Area Provided in Conservation:	53.0 AC	(40.34%) Overall Conservation Area
	43 AC	Approximate total natural space
	40 AC	Approximate contiguous/natural space
	31 AC	Approximate conservation space within riparian buffers and floodplain