BIOLOGICAL RESOURCES SURVEY OF THE GREENE TRACT
ORANGE REGIONAL LANDFILL
ORANGE COUNTY, NORTH CAROLINA

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1.0. Introduction and Scope.

The Greene Tract is a 169 acre parcel owned by the Orange Regional Landfill, a partnership comprised of the Town of Chapel Hill, Town of Carrboro, and Orange County (Figure 1). The property is located 3.4 miles NNW of downtown Chapel Hill, in Chapel Hill Township, southeastern Orange County. Southern Railway forms the eastern border of the property. The surrounding roads include NC-86 (Airport Road) to the east, SR-1777 (Homestead Road) to the south, SR-1729 (Rogers Road) to the west, and SR-1727 (Eubanks Road) to the north, but none of these roads is adjacent to the Greene Tract. Access to the property is from the eastern end of Purefoy Drive, west of the Greene Tract, or the north end of Merin Road, south of the Greene Tract.

RJG&A biologists Gerald Pottern and Christopher Hopper conducted an ecological inventory of the Greene Tract during February 2000 to document significant natural resources on or adjacent to the Greene Tract, including wetlands, floodplains, streams, natural habitats, fish and wildlife, and protected plant and animal species that could be affected by future development. It is intended as a planning tool for assessing environmental constraints that may affect future use and development of the property.

This ecological inventory has been prepared in a format suitable for incorporation into an Environmental Assessment (EA), Environmental Impact Statement (EIS), or Section 404/401 Permit application, should one be required for any future project on the site.

2.0. Geology and Topography.

Geologically, the Greene Tract is in the Carolina Slate Belt of the Piedmont physiographic province (N.C. Division of Land Resources, 1985). The underlying rock is mapped as felsic metavolcanic rock (CZfv) and metamorphosed granitic rock (CZg). White to tan quartzite fragments and boulders are common on the soil surface over much of the site. Elevations on the Greene Tract range from 500 feet above mean sea level at the northwest and southwest corners of the site to 570 feet in the east-central portion of the site, as illustrated on the USGS topographic quadrangle of Chapel Hill, N.C.

The Greene Tract has surface drainage into three different streams, all in the New Hope River (Cape Fear River) basin (Figure 1). The northern 40 percent of the property is drained by a headwater tributary of Old Field Creek, which flows northward into New Hope Creek. The southern 60 percent of the property is drained by a tributary of Bolin Creek (50 percent), which flows southwestward, and a tributary of Booker Creek (10 percent), which flows southeastward. Bolin Creek and Booker Creek join four miles southeast of the Greene Tract to form Little Creek. Little Creek and New Hope Creek flow into the northern end of B. Everett Jordan Lake southeast of Chapel Hill.

3.0. Soils.

Appling sandy loam (ApB and ApC) is the predominant soil over two-thirds of the Greene Tract (114 acres), as mapped in the Soil Survey of Orange County (Figure 2; Dunn, 1977). Helena sandy loam (HeB) covers one-fourth of the Greene Tract (42 acres) in a broad valley with numerous small streams in the southern portion of the site. Cecil fine sandy loam

(CfC), Georgeville silt loam (GeB and GeC), and Tatum silt loam (TaD) occur along the northern edge of the Greene Tract, where each occupies three to five acres (two to three percent of the total property). Wedowee sandy loam (WmD) occurs in a narrow one acre strip (less than one percent) along the northeast edge of the property. All are acidic soils, with pH values ranging from 4.5 to 6.0. The Appling, Cecil, Georgeville, and Tatum series are well drained soils with moderate permeability and few if any hydric inclusions. Helena soils are moderately well drained, slowly permeable, and commonly have hydric inclusions. Hydric soil is one of three criteria that define jurisdictional wetlands (section 4.0).

Site indices for timber production on these soils are summarized in Table 1, based on Dunn (1977). Soil suitability ratings for sanitary facilities, buildings, road construction, and recreational uses are summarized in Table 2. The Appling, Cecil, and Georgeville soil series have moderate to severe limitations for septic absorption fields due to slow percolation rates and clayey texture. All three series are rated fair to poor for use as landfill cover soil due to their clayey texture, and fair as roadbed fill due to their low strength. They have slight to moderate limitations for low density residential development, light-duty roads, and low-intensity recreational uses, but moderate to severe limitations for high-density residential or commercial development. The Helena series has high shrink-swell potential, slow percolation, low strength, and is too clayey for most uses. It is poorly suited for septic absorption, landfill cover soil, buildings, roads, or construction fill material, and moderately suitable for recreational uses (camping, picnic areas, playgrounds, and trails) provided that a more permeable soil (or sewer) is available nearby for sanitary waste disposal (Dunn, 1977).

4.0. Vegetation Communities.

RJG&A surveyed and mapped vegetation communities on the Greene Tract during February 2000 using soil maps, topographic maps, aerial photography, and a Trimble ProXR GPS unit. Seven community types were identified during the field survey. Four of these, alluvial forest, low-elevation seep, mesic mixed hardwood forest, and dry-mesic oak/hickory forest are natural community types recognized by the N.C. Natural Heritage Program (Schafale and Weakley, 1990). Vegetation communities are mapped in Figure 3, with alluvial forest and low-elevation seep combined (ALF), and mesic mixed hardwood forest and dry-mesic oak/hickory forest combined (UPH). The remaining three community types are unnatural or non-persistent: pine forest (PIN), mixed hardwood/pine forest (MHP), and mowed utility right-of-way (MOW). Following the wildlife habitat rating categories used by Ludington et al. (1997) and Wiley et al. (1999), pine forests have 50 to 100 percent pines in the canopy layer, mixed hardwood/pine forests have 10 to 50 percent pines, and hardwood forests have 0 to 10 percent pines.

Alluvial forests occur along most streams on the Greene Tract, with numerous small seeps at heads of streams and along floodplain edges (section 4.1). Mesic mixed hardwood forests occur on lower slopes adjacent to alluvial forests, and dry-mesic oak/hickory forests occur farther upslope (section 4.2). Pine forests and mixed hardwood/pine forests occur on disturbed areas that formerly supported mesic mixed hardwood or dry-mesic oak/hickory forest, but the hardwoods were cut and pines either planted or colonized naturally (section 4.3). Mowed utility right-of-way occurs beneath the powerline traversing the northeast edge of the site (section 4.4).

Common plant species in each community type are listed in the following sections. Because the survey was conducted during winter, some herbaceous and small woody plant species were undetectable or unidentifiable. A spring or summer survey would probably reveal greater plant species richness in the groudcover strata of all communities.

4.1. Alluvial Forests and Seeps.

Narrow corridors of alluvial forest (ALF) occur along most stream segments on the Greene Tract. The dominant canopy trees include red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), willow oak (*Quercus phellos*), white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and loblolly pine (*Pinus taeda*), the latter especially common in the Bolin Creek drainage. Common understory trees and shrubs include musclewood (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), tag alder (*Alnus serrulata*), black gum (*Nyssa sylvatica*), and Chinese privet (*Ligustrum sinense*). Less common trees and shrubs in some alluvial forest stands include sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), black walnut (*Juglans nigra*), sugarberry (*Celtis laevigata*), sugar maple (*Acer barbatum*), spicebush (*Lindera benzoin*), wild azalea (*Rhododendron periclymenoides*), black haw (*Viburnum prunifolium*), possum haw (*Ilex decidua*), silky dogwood (*Cornus amomum*), elderberry (*Sambucus canadensis*), and Russian olive (*Elaeagnus umbellata*). The vine and groundcover layers include greenbrier (*Smilax rotundifolia*), Japanese honeysuckle (*Lonicera japonica*), poison ivy (*Toxicodendron radicans*), trumpet creeper (*Campsis radicans*), muscadine grape (*Vitis rotundifolia*), strawberry bush (*Euonymus americanus*), sedges (*Carex* spp.), soft rush (*Juncus effusus*), Nepalese grass (*Microstegium vimineum*), Christmas fern (*Polystichum acrostichoides*), false nettle (*Boehmeria cylindrica*), and goldenrods (*Solidago* spp.).

Low-elevation seeps occur at the heads of most streams on the Greene Tract and along the edges of floodplains where shallow ravines drain adjacent uplands. Vegetation in seeps is generally similar to the surrounding alluvial or mesic forests, which may be hardwood or mixed pine and hardwood, but seeps have a more diverse groundcover layer including sphagnum moss (*Sphagnum* spp.), jack-in-the pulpit (*Arisaema triphyllum*), netted chainfern (*Woodwardia areolata*), clearweed (*Pilea pumila*), jewelweed (*Impatiens capensis*), cardinal flower (*Lobelia cardinalis*), and false pimpernel (*Lindernia dubia*). The higher plant density and diversity in seeps is attributable to their relatively stable hydrologic, thermal, and nutrient regimes, and lack of scouring flows, as compared with stream floodplains.

The alluvial forests and seeps in the Old Field Creek and Booker Creek basins are relatively undisturbed and have a high diversity of hardwoods and groundcover plants. Those in the Bolin Creek basin are now dominated by loblolly pine, but the hardwoods will eventually displace the pines if this area is left undisturbed. Groundcover vegetation beneath the pines is sparse due to heavy shading, but will probably become denser and more diverse, especially in seeps, as succession to hardwood forest allows greater light penetration.

4.2. Upland Mesic to Dry Hardwood Forests.

Two types of upland hardwood forests occur on the Greene Tract: mesic mixed hardwood forest and dry-mesic oak/hickory forest. Many of the dominant plant species are

common to both community types, but occur in different proportions. The boundary between these two communities on the Greene Tract is indistinct in most areas, due in part to timber harvesting and other forest management practices.

Mesic mixed hardwood forest occurs on lower slopes adjacent to streams, floodplains, and seeps, mainly in the north-central and southeastern portions of the Greene Tract. It was probably the predominant community type in much of the low area mapped as Helena sandy loam in the southern portion of the Greene Tract prior to clearcutting and planting with pines. Mesic mixed hardwood forest normally grades upslope into dry-mesic oak/hickory forest on upper slopes and ridges. Dry-mesic oak/hickory forest was probably the most extensive community type on the Greene Tract prior to clearcutting. A few stands persist in the north-central and eastern portions of the Greene Tract, but most areas that historically supported this community are now pine forest or mixed hardwood/pine forest. If left undisturbed, most pine-dominated areas will gradually return to mesic mixed hardwood forest or dry-mesic oak/hickory forest through natural succession.

Dominant canopy trees in mesic mixed hardwood stands on the property include northern red oak (*Quercus rubra*), southern red oak (*Q. falcata*), white oak (*Q. alba*), post oak (*Q. stellata*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), bitternut hickory (*Carya cordiformis*), sourwood (*Oxydendron arboreum*), and loblolly pine (*Pinus taeda*). Understory trees and shrubs include flowering dogwood (*Cornus florida*), musclewood (*Carpinus caroliniana*), beech (*Fagus grandifolia*), American holly (*Ilex opaca*), winged elm (*Ulmus alata*), sugar maple (*Acer barbatum*), black cherry (*Prunus serotina*), and red mulberry (*Morus rubra*). The vine and groundcover layers include greenbriers (*Smilax rotundifolia* and *S. glauca*), Japanese honeysuckle (*Lonicera japonica*), muscadine grape (*Vitis rotundifolia*), lowbush blueberry (*Vaccinium tenellum*), Christmas fern (*Polystichum acrostichoides*), ebony spleenwort (*Asplenium platyneuron*), running-pine clubmoss (*Lycopodium flabelliforme*), goldenrods (*Solidago* spp.), wild ginger (*Hexastylis arifolia* and *H. minor*), cranefly orchid (*Tipularia discolor*), rattlesnake orchid (*Goodyera pubescens*), and spotted wintergreen (*Chimaphila maculata*).

Dry-mesic oak hickory forests contain many of the same plant species as mesic mixed hardwood forests, but in different proportions. Northern red oak, beech, musclewood, American holly, sugar maple, and red mulberry are less common in dry-mesic oak hickory forests than in mesic mixed hardwood forests. Southern red oak, post oak, pignut hickory, and sourwood are generally more abundant in this drier community. Trees and shrubs found almost exclusively in dry-mesic oak hickory forests on the Greene Tract include blackjack oak (*Quercus marilandica*), black oak (*Q. velutina*), scarlet oak (*Q. coccinea*), chestnut oak (*Q. montana*), white ash (*Fraxinus americana*), red cedar (*Juniperus virginiana*) shortleaf pine (*Pinus echinata*), and highbush blueberry (*Vaccinium stamineum*). Vines and groundcover are sparse, mostly limited greenbriers, Japanese honeysuckle, lowbush blueberry, cranefly orchid, spotted wintergreen, and reindeer lichen (*Cladonia* spp.).

4.3. Upland Pine and Hardwood/Pine Forests.

Upland pine forests (50 to 100 percent pine in the canopy) and mixed hardwood/pine forests (10 to 50 percent pine in the canopy) on the Greene Tract are dominated by loblolly pines (*Pinus taeda*), which were probably planted 50 to 80 years ago. On mesic soils, loblolly

pine is virtually the only pine species in pine or hardwood/pine forests, whereas some stands on drier soils also include Virginia pine (*Pinus virginiana*) and shortleaf pine (*Pinus echinata*), which probably colonized naturally. Other common trees in the canopy and understory of pine and hardwood/pine forests include sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), red cedar (*Juniperus virginiana*), red maple (*Acer rubrum*), southern red oak (*Quercus falcata*), northern red oak (*Quercus rubra*), white oak (*Q. alba*), scarlet oak (*Q. coccinea*), blackjack oak (*Q. marilandica*), black cherry (*Prunus serotina*), black gum (*Nyssa sylvatica*), and winged elm (*Ulmus alata*). Vines and groundcover are generally sparse due to shading by the pines, with species similar to those listed in section 4.2 for dry-mesic oak/hickory forests.

Upland pine and hardwood/pine forests were probably mesic mixed hardwood or dry-mesic oak/hickory forests originally, and have become pine-dominated due to forest management practices. Pine-dominated forests in Orange County are generally a non-persistent successional stage (except on certain rocky sites with shallow soils), and most will naturally revert to hardwood forests if left undisturbed (Schafale and Weakley, 1990; Sather and Hall, 1988).

4.4. Mowed Utility Right-of-Way.

The powerline right-of-way traversing the northeast edge of the Greene Tract had been recently mowed prior to our field survey, and most of the vegetation was unidentifiable. Sapling stumps and plant remains that could be identified include loblolly pine, Virginia pine, sweetgum, southern red oak, lowbush blueberry, blackberries (*Rubus* spp.), Japaneses honeysuckle, goldenrods, and fescue (*Festuca* spp.) and other non-native turf grasses. Adjacent forests on both sides of the powerline are dominated by loblolly pine. Aerial photographs in the Orange County soil survey (Dunn, 1977) taken in 1972 indicate that the right-of-way was pine forest prior to powerline construction. Originally it probably supported dry-mesic oak/hickory forest, as indicated by the understory trees, shrubs, and groundcover in the adjacent pine forests.

5.0. Jurisdictional Wetlands and Streams.

RJG&A surveyed the Greene Tract for jurisdictional wetlands during February 2000 using the COE Wetlands Delineation Manual (Environmental Laboratory, 1987) and supplementary technical literature for hydrophytic vegetation, hydric soils, and hydrology indicators. Non-wetland streams were identified based on N.C. Division of Water Quality criteria and field indicators. Jurisdictional boundaries of wetlands and streams were located using a Trimble ProXR GPS unit with sub-meter accuracy, which is generally acceptable to COE and DWQ for Section 404/401 permitting in lieu of a traditional land survey. Figure 4 is a GPS-generated map of all jurisdictional wetlands and streams on the property. Larger scale close-up maps of individual wetlands and wetland determination data forms required for Section 404/401 permitting are included in Appendix A.

All streams on the Greene Tract originate from seeps on the property; none flows onto the property from off site. The approximate drainage basin area of each stream where it leaves the property is as follows: Old Field Creek tributary (northern drainage) = 66 acres; Bolin Creek tributary (southwestern drainage) = 85 acres; Booker Creek tributary

(southeastern drainage) = 18 acres. Nearly all discernable channels and seeps were carrying flow during the February field survey, including visits conducted several days after the most recent rainfall. Consequently, they are either intermittent or perennial streams according to N.C. Division of Water Quality criteria, and are jurisdictional waters. Ephemeral (stormwater) channels flow only for short periods following rainfall events, and are not jurisdictional waters. Because our survey was during a generally wet month, we could not determine the points at which each channel changes from intermittent to perennial.

Most streams on the Greene Tract are moderately sinuous, with floodplains ranging from 15 to 150 feet wide. Where the channels are well defined, their bank-to-bank width varies from 2 to 8 feet wide. Most stream segments are shallow and not deeply entrenched, with stable, well-vegetated banks. Silt, sand, gravel, and leaves comprise the substratum, with the proportion of gravel increasing downstream. Seeps and very small channels that carry minimal flow have predominantly silt and leaves in the substratum. Many seeps and some stream segments have braided, diffuse channels that form broad wetlands across their floodplains. Due to the nearly complete forest cover on the Greene Tract, channel erosion is minimal and water clarity is high in all streams.

Jurisdictional wetlands occur in alluvial forests and seeps along portions of all three stream systems on the Greene Tract. Wetlands in the southern portion of the property (Bolin Creek and Booker Creek tributaries) occur in areas mapped as Helena sandy loam. Wetlands in the northern portion of the property (Old Field Creek tributaries) occur in areas mapped as Tatum silt loam and Appling sandy loam. These wetlands occur in unmapped hydric inclusions within otherwise non-hydric soils. In some areas with prolonged seepage, hydric soils extend upslope several feet above the floodplain. Vegetation in alluvial forest and seep wetlands is described in section 4.1. Table 4 summarizes the important ecological characteristics of each wetland.

All streams and associated wetlands on the Greene Tract are "above headwaters" according to COE definition; i.e., less than 5.0 cubic feet per second average annual flow. Filling or draining in headwater streams, headwater wetlands, and isolated wetlands may be permitted under COE Nationwide Permit 26 and its corresponding DWQ General Water Quality Certification 3108. None of the streams or wetlands on the property is designated Oustanding Resource Waters, High Quality Waters, High Quality Wetlands, Primary Nursery Area, Mountain or Piedmont Bog, Trout Waters, or any other special use that would restrict Nationwide Permit applicability. Maximum wetland acreage and stream length limits, mitigation thresholds, and other specific conditions of Nationwide Permit 26 and General Certification 3108 are summarized in Appendix B. Depending on the types of development proposed for the site, other Nationwide or General Permits may also be applicable.

6.0. Floodplains.

In a geomorphic sense, small floodplains exist along most stream segments on the Greene tract, and are mapped as alluvial forest (ALF) in Figure 3. However, they occur on soils mapped as Appling, Helena, or Tatum series, none of which is designated a floodplain soil (Dunn, 1977). Flooding frequency (Table 14 in the Soil Survey) is listed as "none" for all soils mapped on the property. All streams on the Greene Tract have very small drainage basin areas; the Bolin Creek tributary is the largest with 85 acres. Consequently, these streams are

unlikley to carry dangerously high stormflows, are not subject to federal or state regulation as flood hazard areas.

Floodplains mapped by the Federal Emergency Management Administration (FEMA) along Bolin Creek, Old Field Creek, and Booker Creek do not extend upstream onto the Greene Tract. The nearest downstream floodplains mapped by FEMA are 1,700 feet north of the Greene Tract on Old Field Creek, 3,500 feet southwest of the Greene Tract on the unnamed Bolin Creek tributary, and more than 5,000 feet southeast of the Greene Tract on Booker Creek. A floodplain assesment of the Greene Tract by civil engineer Steve McEvoy, P.E., is attached as Appendix C.

Floodplain encroachment will not be a concern for development of the Greene Tract. However, Orange County or Chapel Hill may require stormwater detention structures for new development on the property to minimize downstream flooding and erosion damage due to the cumulative effects of increased impervious surface area. Orange County participates in the federal Flood Insurance Program and adopted a Flood Damage Prevention Ordinance in 1981 (Orange County Planning, 1997).

7.0. Water Quality.

7.1. Surface Water Usage Classifications.

The N.C. Division of Water Quality (DWQ) classifies surface waters based on their "existing or contemplated best usage." The primary classification system distinguishes three basic usage categories: waters used for municipal water supply and food processing (Classes WS-I through WS-V), waters used for frequent swimming (Class B), and waters used for neither of these purposes (Class C). Class C uses include maintenance of aquatic life, fishing, wildlife habitat, secondary recreation (limited body contact), wastewater assimilation, and agriculture. Class C uses carry minimum standards that apply to all surface waters. Class WS and Class B waters carry additional standards to protect human health. Water Supply Critical Areas (CA) assigned by DWQ extend 0.5 mile upstream of run-of-river water intakes or 0.5 mile upstream of the normal pool elevation for reservoir intakes. Local governments may extend the CA for added protection.

Supplemental DWQ classifications include NSW for nutrient-sensitive waters where nuisance algal blooms are likely, Tr for trout waters which require low temperatures and high dissolved oxygen, Sw for swamp waters which have naturally low pH and low dissolved oxygen, ORW for outstanding resource waters with special recreational or ecological significance, and HQW for high quality waters which have excellent water quality based on physical, chemical, and biological measurements. The supplemental classifications may apply to waters of any primary classification. All WS-I and WS-II waters automatically receive the HQW designation. Waters designated by the N.C. Wildlife Resources Commission (WRC) as critical habitat for protected species may also be designated HQW.

Old Field Creek, Bolin Creek, and their tributaries on and adjacent to the Greene Tract are designated Class C-NSW waters. Booker Creek and its tributaries upstream of Eastwood Lake, including the intermittent stream in the southeastern corner of the Greene Tract, are designated Class B-NSW waters. The segments of Bolin Creek, Booker Creek, Little Creek, and New Hope Creek south and east of Chapel Hill are designated Class WS-IV-NSW to

protect water quality in Jordan Lake. New development in these WS-IV-NSW watersheds is subject to either Orange County, Durham County, or Chapel Hill Water Supply Watershed Protection Ordinances. The Greene Tract and adjacent lands are not subject to any Water Supply Watershed Protection Ordinance. None of the streams in the Little Creek or New Hope Creek basins is designated HQW. Morgan Creek and its tributaries upstream of University Lake, which are not affected by the Greene Tract, comprise the only HQW waters in the New Hope River basin.

7.2. Existing Water Quality.

Based on physical, chemical and biological monitoring from 1989 to 1993, the upper reaches of New Hope Creek and Bolin Creek north of Chapel Hill showed good to excellent water quality and were rated fully supporting their designated Class C-NSW uses (N.C. Division of Water Quality, 1996). Their lower reaches, including New Hope Creek downstream of US-15-501 in Durham County, Bolin Creek downstream of Airport Road in Chapel Hill, and Little Creek east of Chapel Hill were rated good-fair, fair, or poor, and partially supporting their designated Class C-NSW and WS-IV-NSW uses due to a combination of point source discharges and non-point source pollution. These streams have low base flows due to geology, soil conditions, and urbanization of their watersheds, and during dry weather, their flow is predominantly treated wastewater. Old Field Creek, Booker Creek, and Eastwood Lake were not rated. Benthic macroinvertebrate (benthos) monitoring data from the New Hope River basin (Cape Fear River sub-basins 03-06-05 and 03-06-06) are summarized in Table 3. No fish community samples were reported by DWQ for New Hope Creek, Bolin Creek, or Booker Creek.

No DWQ data or ratings are available for the streams on or adjacent to the Greene Tract. RJG&A observed clear water, well-vegetated banks, minimal erosion, minimal algal growth, and benthos indicative of healthy conditions in most streams on the site. Minnows, frog tadpoles, and salamander larvae were observed in some streams. The only stream on the site showing evidence of degradation was the westernmost south-flowing tributary of Bolin Creek, which had foam, a grayish film on the bottom, and few benthos. We suspect either graywater discharge from homes at the east end of Purefoy Drive or outdoor washing activities as the source of this pollution.

Jordan Lake was rated support threatened in 1996 due to excessive nutrient loading from wastewater discharges and stormwater runoff. The entire Jordan Lake watershed was designated NSW in December 1983, two years after the lake was filled. Of 97 fissue tissue samples collected by DWQ in the New Hope River arm of Jordan Lake between 1982 and 1990 and analyzed for heavy metal and organic contamination, mercury exceeded EPA screening criteria or FDA limits for fish consumption in three samples. None of the other pollutants measured exceeded their corresponding health standards.

7.3. Water Quality Protection Strategies.

The Land Use Element of the Orange County Comprehensive Plan designates Resource Protection Areas (RPA) along major stream corridors in the County. However, most small headwater streams including those on the Greene Tract do not have a designated RPA. The Orange County Zoning Ordinance does not include a specific Zoning District for RPAs, and

does not require buffers of natural vegetation or other water quality protection measures in riparian RPAs outside of protected water supply watersheds. However, vegetated buffers along Class C streams are required for certain types of development under the Zoning Ordinance, or may be may be imposed as a condition during Environmental Assessment review under either the N.C. Environmental Policy Act or the Orange County Environmental Impact Ordinance.

Following designation of the Jordan Lake watershed as nutrient-sensitive waters (NSW) in 1983, DWQ initiated and continues to develop a nutrient management strategy in accordance with the latest data and management tools. The NSW strategy includes stringent nutrient limits and removal requirements for point source dischargers, urban stormwater management, and Best Management Practices to reduce agricultural runoff. Preservation of existing riparian buffers has not yet been imposed, as required in the Neuse River and Tar River basins, but is under consideration. Water supply watershed protection rules, including development density and stormwater management requirements, apply to that portion of the Jordan Lake watershed within five miles of the normal reservoir pool elevation (216 feet above mean sea level). Four counties (Chatham, Durham, Orange, and Wake) and several municipalities have jurisdiction over portions of this WS-IV-NSW watershed. The Jordan Lake Critical Area (CA) extends 0.5 mile beyond the normal reservoir pool, and does not extend into Orange County.

8.0. Fish and Wildlife.

8.1. Aquatic Communities.

The majority of seeps and headwater streams on the Greene Tract are too small and shallow to support fish, but provide important habitat for invertebrates and amphibians. Predominant benthic macroinvertebrates observed include isopods (Isopoda), amphipods (Amphipoda), crayfish (Astacidae), mayflies (Ephemeroptera), midges (Chironomidae), dragonflies and damselflies (Odonata), and caddisflies (Trichoptera). Common amphibians in flowing seeps and streams include southern two-lined salamander (*Eurycea cirrigera*), three-lined salamander (*Eurycea guttolineata*), dusky salamnader (*Desmognathus fuscus*), northern cricket frog (*Acris crepitans*), green frog (*Rana clamitans*), and leopard frog (*Rana utricularia*). Amphibians that prefer still water, including the marbled salamander (*Ambystoma opacum*), spotted salamander (*Ambystoma maculatum*), spring peeper (*Pseudacris crucifer*), and upland chorus frog (*Pseudacris triseriata*), were observed in ponded seeps in the southeastern portion of the site (wetlands DA and EB). The American toad (*Bufo americanus*), Fowler's toad (*Bufo woodhousei*), and gray treefrog (*Hyla chrysoscelis*) probably breed in these pools later in the year.

The lower reaches of Old Field Creek in the northwestern portion of the Greene Tract and the Bolin Creek tributary in the southwestern portion of the property have sufficient flow and depth to support a few fish species. Rosyside dace (*Clinostomus funduloides*) and creek chub (*Semotilus atromaculatus*) were the only fishes collected or observed during the field survey. Other fishes likely to occur in these streams include bluehead chub (*Nocomis leptocephalus*), eastern mosquitofish (*Gambusia holbrooki*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), and tesselated darter (*Etheostoma olmstedi*), based on collections in similar small streams in the New Hope River basin.

Other semi-aquatic wildlife observed or likely to occur in seeps and streams on the Greene Tract include northern water snake (*Nerodia sipedon*), snapping turtle (*Chelydra serpentina*), musk turtle (*Sternotherus odoratus*), mud turtle (*Kinosternon subrubrum*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), great blue heron (*Ardea herodias*), and green heron (*Butorides virescens*). Ducks, kingfishers, pond turtles, otters, and other animals that require larger streams, extensive open water, or sun exposure are unlikley to occur on the Greene Tract.

8.2. Terrestrial Communities.

Upland hardwood and mixed hardwood/pine forests support diverse animal communities. Typical amphibians and reptiles include the spotted salamander (*Ambystoma maculatum*), slimy salamander (*Plethodon glutinosus*), gray treefrog (*Hyla chrysoscelis*), American toad (*Bufo americanus)*, box turtle (*Terrapene carolina*), five-lined skink (*Eumeces fasciatus*), fence lizard (*Sceloporus undulatus*), black rat snake (*Elaphe obsoleta*), black racer (*Coluber constrictor*), garter snake (*Thamnophis sirtalis*), copperhead (*Agkistrodon contortrix*), and kingsnakes (*Lampropeltis* spp.). Birds of upland Piedmont forests include sharp-shinned hawk (*Accipiter striatus*), downy woodpecker (*Picoides pubescens*), sapsucker (*Sphyrapicus varius*), ruby-crowned kinglet (*Regulus calendula*), many warblers (Parulidae), and many finch and sparrow species (Fringillidae). Upland forest mammals likely to occur on the Greene Tract include the raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), white-footed mouse (*Peromyscus leucopus*), red bat (*Lasiurus borealis*), evening bat (*Nycticeius humeralis*), short-tailed shrew (*Blarina carolinensis*), southern flying squirrel (*Glaucomys volans*), woodchuck (*Marmota monax*), white-tailed deer (*Odocoileus virginianus*), and possibly bobcat (*Felis rufus*).

Alluvial forests have generally higher productivity and support more diverse animal communities than upland forest types. However, those on the Greene Tract are limited by their narrow width and few floodplain pools. Most of the upland forest animals listed above also occur in alluvial forests. In addition to upland species and the semi-aquatic wildlife listed in section 8.1, alluvial forests on the property may support the rough green snake (*Opheodrys aestiva*), ringneck snake (*Diadophus punctatus*), ribbon snake (*Thamnophis sauritus*), yellow-billed cuckoo (*Coccyzus americanus*), barred owl (*Strix varia*), wood thrush (*Hylocichla mustelina*), red-shouldered hawk (*Buteo lineatus*), woodcock (*Scolopax minor)*, gray fox (*Urocyon cinereoargenteus*), golden mouse (*Ochrotomys nuttalli*), and silver-haired bat (*Lasionycteris noctivagans*).

9.0. Protected Species.

The N.C. Natural Heritage Program (NHP) has records of 57 rare species known from Orange County, of which 19 are federally or state protected as endangered, threatened, or special concern. The remaining 38 species are either federally designated "species of concern" (formerly C2 species) or state designated "significantly rare" or "candidate" species, and are not protected. The protected species are listed with their corresponding federal and state protection status and habitat requirements in Table 5. Diagnostic features, habitat requirements, locations of previous sightings near the survey area, and seasonal limitations for conducting surveys were compiled from Amoroso (1999), Adams et al. (1990), LeGrand and Hall (1999), Martof et al. (1980), Radford et al. (1968), Menhinick and Braswell (1997),

Potter et al. (1980), NHP records, and personal communication with agency biologists. Searches were made for these species during February and March 2000 where potential habitat occurs on or immediately adjacent to the Greene Tract.

9.1. Cooper's Hawk (*Accipiter cooperi*).

Cooper's hawk (state special concern) requires extensive forests, including those along river corridors, and often forages in adjacent fields for birds, rodents, and grasshoppers. It is a fairly common winter resident in the Piedmont and Coastal Plain, including Orange County, but most adults migrate to the mountains or to northern states during spring to breed (Potter et al., 1980). No nesting or roosting sites have been reported within one mile the Greene Tract (NHP records). Suitable winter habitat occurs throughout the Greene Tract. No Cooper's hawk was observed during the field survey, but non-breeding birds are likely to occur on the property.

9.2. Black Vulture (*Coragyps atratus*).

The black vulture (state special concern) is a permanent resident in the Piedmont. It nests in living or dead hollow trees, ledges or crevices on bluffs, or in abandoned buildings, usually in extensive forested areas (Potter et al., 1980). It forages in open areas for large animal carcasses such as deer and cattle, usually ignoring small animals which the more common turkey vulture (*Cathartes aura*) scavenges. Foraging habitat is abundant in Orange County, but suitable nesting sites are a limiting resource.

Mixed flocks of black vultures and turkey vultures were observed over the Greene Tract and the adjacent landfill during every site visit. A wing with attached shoulder bones of a black vulture was found on February 18 at the mouth of an animal burrow (probably fox or raccoon) in the north-central portion of the Greene Tract. On March 6, a pair of black vultures was observed near the southeast corner of the Neville Tract. The pair was first seen flying up from the ground near two abandoned wooden 3-room buildings as the observer approached. They landed in a large oak above the sheds, and watched silently for at least ten minutes while the observer examined the sheds and surrounding area. Black vultures apparently roost on the Greene Tract and, judging from the behavior observed, probably nest in either or both of the sheds on the Neville Tract.

9.3. Carolina Darter (*Etheostoma collis*).

The Carolina darter (state special concern) inhabits slow runs and backwater areas near the banks of small to medium size, clear streams with sand, mud, or cobble substrata, usually with root mats or deposits of silt and leaves where it forages for small insects, crustaceans, and worms (Menhinick and Braswell, 1997). In Orange County it is known from the Eno River and tributaries (Neuse River basin) in northern Orange County and Cane Creek (Haw River basin) in southwestern Orange County. There are no records of this fish from the New Hope River basin.

The Old Field Creek tributary in the northwest corner of the Greene Tract and the Bolin Creek tributary in the southwest corner of the property may provide marginally suitable habitat

for the Carolina darter, but are smaller streams than those where this fish is usually found. RJG&A sampled suitable habitats (undercut banks, root mats, pools, leaf deposits) in these two stream segments with a 1/8 inch mesh dipnet on February 6, and did not collect any Carolina darters. We also sampled Old Field Creek at NC-86 one mile downstream of the Greene Tract, and did not find Carolina darters. It is unlikely that this fish occurs on or close downstream of the Greene Tract.

9.4. Four-toed Salamander (*Hemidactylium scutatum*).

The four-toed salamander (state special concern) lives in moist woods near fish-free seeps, floodplain pools, or upland depression pools in which they lay eggs usually under moss mats at the edge of the water (Martof et al., 1980). Adults are rarely encountered except when breeding or guarding nests during March to early April. The larvae are about one inch long or smaller when they transform in June and become terrestrial. The nearest known populations are at Meadow Flats northwest of the Greene Tract and the Oosting Natural Area northeast of the Greene Tract; both sites are owned by Duke University.

Several seeps and pools on the Greene Tract appear to provide suitable habitat for the four-toed salamander, especially wetlands CA, DA, EB, and EF (Figure 4). RJG&A searched for adults and eggs under moss clumps and among logs, rocks, and leaves at the edges of suitable seeps and pools on March 6, but no four-toed salamander was found. According to Dr. Stephen Hall of NHP, mid-March to early April is the best time to survey for brooding adults, thus our survey may have been too early. Considering the proximity of known populations and difficulty of locating this cryptic species, we cannot rule out its possible presence.

9.5. Neuse River Waterdog (*Necturus lewisii*).

The Neuse River waterdog (state special concern) is endemic to medium and large streams in the Tar and Neuse River basins. During cool weather it hides in piles of woody debris and leaves in slow flowing backwaters (Martof et al., 1980). During warm seasons it is less frequently encountered, but apparently forages throughout the stream, including in riffles. It does not occur in the Cape Fear River basin or in small headwater streams. No suitable habitat occurs on or downstream of the Greene Tract.

9.6. Red-cockaded Woodpecker (*Picoides borealis*).

The red-cockaded woodpecker (federally and state endangered) lives in a group comprising one breeding pair and up to seven young male offspring that help defend their nesting parents and care for their youngest siblings (Hooper et al., 1980). Usually each bird has its own roosting cavity in a live pine tree, which is occupied all year. Only live pine trees greater than 60 years old are suitable for nesting and roosting cavities. Longleaf pine (*Pinus palustris*) is preferred, but occasionally other pine species are used. Sap flow around the cavity is crucial for deterring squirrels, rat snakes, and competing cavity-nesting birds. Each cavity requires a year or more to complete, and the group continuously excavates new cavities. When a tree dies or sap flow diminishes, the cavity is abandoned.

The group's cluster of cavity trees may be within an extensive pine forest or in a residential area, golf course, or mixed hardwood/pine forest adjacent to extensive pine forest. The farthest cavity trees in a cluster may be 1,500 feet apart. Frequently burned or mowed sites are preferred, and the cavity trees must not have climbing vines or adjacent understory trees. The red-cockaded woodpecker also requires extensive pine forest greater than 30 years old for foraging. Foraging is usually within 0.5 mile of the cavity cluster area, and the birds seldom traverse non-foraging areas (e.g. fields, hardwood forests, lakes, urban areas) greater than 330 feet across. As a general rule, each colony requires a pine basal area of about 8,500 square feet, equivalent to 125 acres of densely stocked pine forest in which 75% of the basal area is comprised of trees 10 inches or greater in diameter at breast height (dbh).

According to NHP, no red-cockaded woodpecker colonies have been reported during the past 50 years in Orange County or adjacent counties. Much of the Greene Tract contains pine or mixed pine/hardwood forest, including a few areas with open understory, and may provide marginally suitable foraging and nesting habitat. Additional pine forest is contiguous with the Greene Tract to the east and south. RJG&A looked for red-cockaded woodpecker cavities and start holes in mature pines on the Greene Tract and found none. No off-site survey was conducted. Based on the lack of recent sightings in the Piedmont, lack of longleaf pine, and excessive understory encroachment in most stands, it is unlikley that red-cockaded woodpeckers occur on or near the Greene Tract.

9.7. River Mussels (8 species).

Eight state protected mussel species known from Orange County are the triangle floater (*Alasmidonta undulata*), brook floater (*Alasmidonta varicosa*), Atlantic pigtoe (*Fusconaia masoni*), yellow lampmussel (*Lampsilis cariosa*), eastern lampmussel (*Lampsilis radiata*), green floater (*Lasmigona subviridis*), squawfoot mussel (*Strophitus undulatus*), and Savannah lilliput (*Toxolasma pullus*). However, only the Savannah lilliput is known from the New Hope River basin, and only in Morgan Creek (University Lake). The other protected mussel species are known to occur in the Eno River and Little River in northern Orange County or in the Haw River basin in western Orange County.

All streams on the Greene Tract are too small to suppport river mussels, and no mussels of any species were observed during the field survey. None of these protected mussel species is likely to occur on or close downstream of the property.

9.8. Prairie Blue Wild Indigo (*Baptisia minor*).

Prairie blue wild indigo (state threatened) occurs in open woods or glades associated with diabase dikes or sills, usually on circumneutral or mafic soils. The showy violet flowers bloom between April and August (Radford et al., 1968; Amoroso, 1999).

Diabase dikes are located approximately two miles east and two miles west of the Greene Tract, but no diabase or other basic or mafic rocks, or soils derived from them, are mapped on or immediately adjacent to the site (Dunn, 1977; N.C. Division of Land Resources, 1985). NHP has no record of this plant within one mile of the Greene Tract. No plant community indicative of basic or mafic soils was encountered during the field survey, and no suitable habitat for prairie blue wild indigo exists on the Greene Tract.

9.9. Smooth Coneflower (*Echinacea laevigata*).

The smooth coneflower (federally and state endangered) occurs in open woodlands or glades, usually on circumneutral or mafic soils associated with diabase dikes or sills (Radford et al., 1968; Amoroso, 1999). The drooping pink rays and brownish-purple disc flowers bloom from late May through July.

Diabase dikes are located approximately two miles east and two miles west of the Greene Tract, but no diabase or other basic or mafic rocks, or soils derived from them, are mapped on or immediately adjacent to the site (Dunn, 1977; N.C. Division of Land Resources, 1985). Sites in southeastern Orange County where the smooth coneflower was historically reported have been cleared and the coneflowers destroyed; the species is now presumed extirpated from the county (Sather and Hall, 1988). NHP has no record of this plant within one mile of the Greene Tract, and no plant community indicative of basic or mafic soils was encountered during the field survey.

9.10. Small Whorled Pogonia (*Isotria medeoloides*).

The small whorled pogonia (federally threatened, state endangered) is a perennial deciduous orchid with a single stem and whorl of drooping, pale gray-green leaves, and small, yellow-green flowers produced from the center of the whorl during May or June (Radford et al., 1968). This orchid may grow and flower intermittently every few years, remaining dormant and undetectable during other years. In North Carolina it occurs in rich, mesic to dry-mesic hardwood or mixed hardwood/white pine forests in several mountain counties, Orange County in the Piedmont, and Harnett and Cumberland Counties in the Sandhills (Amoroso, 1999). The only Orange County record is from the Meadow Flats area of Duke Forest, where no specimen has been seen since 1971 (Orange County Planning, 1988).

Because the habitat requirements for small whorled pogonia in the Piedmont are poorly known, it is difficult to assess whether suitable habitat is present on the Greene Tract. Mesic slopes adjacent to seeps are probably the most likely sites where this orchid might occur. The pine dominated areas are probably too disturbed from previous land uses, and the small whorled pogonia is apparently poor at recolonizing disturbed sites. Based on the lack of recent Piedmont records, the small whorled pogonia is unlikley to occur on the Greene Tract, but the survey was conducted out of season for this plant and we cannot rule out its possible presence.

9.11. Michaux's Sumac (*Rhus michauxii*).

Michaux's sumac (federally and state endangered) is a clonal perennial shrub which grows in dry, open woodlands and forest edges in the Piedmont and Sandhills regions of N.C. In the Piedmont it is usually associated with clayey soils derived from mafic or basic rocks. NHP has no records of Michaux's sumac within one mile of the Greene Tract.

The Greene Tract is densely forested except for a powerline right-of-way across the northeastern portion of the property. This right-of-way was also densely forested prior to powerline construction during the 1980s, and it is unlikley that Michaux's sumac could have colonized this corridor during the past two decades because no nearby population is known.

No basic or mafic soils are mapped on the Greene Tract. Based on the lack of suitable soils and closed canopy, it is unlikely that Michaux's sumac occurs on the Greene Tract.

10.0. Landscape Ecology of the Greene Tract.

The Greene Tract lies within one mile of two significant natural areas (designated by NHP), both in Duke Forest (Sather and Hall, 1988). The 175-acre Henry J. Oosting Natural Area, located 4,000 feet northeast of Greene Tract, contains high quality alluvial forest, seeps, rich mesic hardwood slopes, one state-protected species, and several unprotected rare species. This Natural Area includes a segment of Old Field Creek downstream of the Greene Tract, the Orange County Landfill, and new development along I-40 and NC-86, and is affected by stormwater runoff from those sites. The Duke Forest Blackwood Division, located 3,000 feet northwest of the Greene Tract, includes 166 acres designated as significant natural areas. It contains mature upland and bottomland forests, upland depression swamp, and rare plant and animal species.

These two natural areas are part of the New Hope Creek corridor, for which an Open Space Master Plan was developed as a joint project of Orange County, Chapel Hill, Durham County, and the City of Durham (Orange County Planning, 1997). The Land Use Element of the Orange County Comprehensive Plan includes the New Hope Creek corridor in its county-wide map of areas designated for protection as wildlife corridors (Figure 5). Although the Greene Tract is not in this corridor, its proximity to two major arms of the corridor make it a natural bridge, at least for birds and bats, between the Duke Forest Blackwood Division and the Oosting Natural Area.

The Greene Tract and some adjacent lands are mapped as "prime forest" by Ludington et al. (1997), which they define as hardwood forest or mixed hardwood/pine forest (up to 50 percent pine) with a mostly closed canopy, covering at least 40 acres, and undisturbed or slightly disturbed. Slightly disturbed is defined as one or two houses, small clearings, or unpaved roads. In 1988 Orange County had 90,000 acres of prime forest (1/3 of the County), of which 25,000 acres was undisturbed hardwood forest. The prime forest map unit containing the Greene Tract is depicted as isolated from other prime forest tracts by approximately 2,300 feet, and it is not connected via buffers with other prime forest tracts.

Wiley et al. (1999) rate the wildlife habitat value of Orange County forests by their intrinsic value (size, maturity, disturbance, edginess, stream presence, and significant features) and their contextual value (proximity and connection to other habitats). The forest map unit containing the Greene Tract was rated intermediate in both intrinsic value and contextual value. It is one of few tracts close to Chapel Hill, other than UNC and Duke Forest lands, included on the final map of "Areas with Highest Ratings."

The Greene Tract is not designated critical habitat for any federal or state endangered or threatened species, and is not the subject of any species recovery plan.

11.0 Summary and Conclusion.

The most ecologically valuable portions of the Greene Tract, based on Ludington et al. (1997), Wiley et al. (1999), Sather and Hall (1988), and our field observations are the

hardwood forests in the northern and eastern portions of the property. The least ecologically valuable land is the pine forest in the western and southern portions of the site, although forested buffers around all streams and wetlands in this areas should be preserved if possible.

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Table 1. Site Indices of Soils for Timber Production on the Greene Tract.

	Soil Series				
Tree Species	Appling	Cecil	Georgeville	Helena	Tatum
Loblolly Pine	81	80	81	80	89
Shortleaf Pine	65	69	63	63	65
Virginia Pine	74	73	--	--	68
N. Red Oak	--	82	--	--	--
S. Red Oak	76	--	67	--	72
Scarlet Oak	68	80	70	--	--
White Oak	71	--	69	69	--
Post Oak	--	65	--	--	--
Black Oak	--	66	--	--	--
Tulip Poplar	90	--	--	87	89

The site index is the average height (in feet) of dominant and co-dominant canopy trees at age 50 years. Source: Soil Survey of Orange County (Dunn, 1977).

Table 2. Suitability and Limitations of Predominant Soils on the Greene Tract.

Soil Use	Appling ApB, ApC	Cecil CfC	Georgeville GeB, GeC	Helena HeB
Sanitary Facilities				
Septic absorption	moderate; percs slowly	moderate; percs slowly	moderate; percs slowly	severe; percs slowly
Trench landfill	moderate; too clayey	severe; too clayey	moderate; too clayey	severe; too clayey
Area landfill	slight to moderate	moderate; slope	slight to moderate	slight
Cover soil for landfill	fair; too clayey	fair; too clayey	poor; too clayey	poor; too clayey
Building Site Development				
Shallow excavation	moderate; too clayey	moderate; too clayey	moderate; too clayey	severe; too clayey
Dwellings	slight to moderate	moderate; slope	slight to moderate	severe; shrink-swell
Small commercial buildings	moderate to severe; slope	severe; slope	moderate to severe; slope	severe; shrink-swell
Roads	slight to moderate	moderate; low strength	moderate; low strength	severe; shrink-swell
Construction Materials				
Roadbed fill	fair; low strength	fair; low strength	fair; low strength	poor; shrink-swell & low strength
Recreational Development				
Camping and picnic areas	slight to moderate	moderate; slope	slight to moderate	moderate; percs slowly & wetness
Playgrounds	moderate to severe; slope	severe; slope	moderate to severe; slope	moderate; percs slowly
Trails	slight	slight	slight	moderate; wetness

Table 3. DWQ Benthic Macroinvertebrate (Benthos) Monitoring Data from the New Hope River Basin in Orange, Durham, and Chatham Counties, N.C.

Subbasin 05

Site	Old/New DWQ #	Index #	Date	S/EPT S	BI/BIEPT	Bioclass
New Hope Cr, SR 1734, Orange	-/B-1	16-41-1-(0.5)	3/93	94/29	4.94/3.84	Good
New Hope Cr, SR 2220, Durham	66/B-2	16-41-1-(11.5)	3/87	53/14	6.70/5.71	Fair
New Hope Cr, I-40, Durham	20/B-3	16-41-1-(11.5)	10/85	49/10	7.56/6.07	Fair
New Hope Cr, SR 1107, Durham	21/B-4	16-41-1-(11.5)	10/85	32/5	7.56/6.65	Poor
UT New Hope Cr, SR 1716, Chatham	25/B-5	16-41-(3.5)	7/93	-/10	-/6.30	NR
			2/93	-/21	-/3.91	Good-Fair
			4/86	79/29	4.94/4.05	Good
Third Fork Cr, NC 751, Durham	22/B-6	16-41-1-12-(2)	2/93	39/8	7.78/6.64	Poor
			4/85	40/3	8.10.6.83	Poor
Northeast Cr, SR 1102, Durham	64/B-7	16-41-1-17-(0.7)	2/93	58/9	6.91/6.04	Fair
			3/87	29/3	7.71/6.50	Poor
Northeast Cr, SR 1100, Durham	24,65/B-8	16-41-1-17-(0.7)	2/93	35/7	6.99/5.83	Fair
			3/87	27/0	7.96/-	Poor
			12/86	-/4	-/6.39	Poor
			4/85	62/7	7.38/6.08	Fair
Northeast Cr, SR 1731, Chatham	-/B-9	16-41-1-17-(0.7)	7/93	46/8	7.10/6.30 *	Fair
			12/86	-/8	-/5.94	Fair
Burdens Cr, SR 1945, Durham	23/B-10	16-41-1-17-1-(0.7)	4/86	60/10	6.96/5.41	Fair
Cub Cr, SR 1008, Chatham	-/B-11	16-41-2-10-(0.5)	12/86	-/14	-/5.44	Fair
White Oak Cr, NC 751, Chatham	-/B-12	16-41-6-3.5)	2/93	-/13	-/4.82	Fair

Subbasin 06

Site	Old/New DWQ #	Index #	Date	S/EPT S	BI/BIEPT	Bioclass
Little Cr, Pinehurst Dr, Orange	-/B-1	16-41-1-15-(0.5)	2/93	37/7	7.12/4.69	Fair
Bolin Cr, SR 1777, Orange	-/B-2	16-41-1-15-1-(0.5)	4/93	-/24	-/4.46	Good
Bolin Cr, Village Rd, Orange	-/B-3	16-41-1-15-1-(0.5)	4/93	-/24	-/3.89	Good
Bolin Cr, E Franklin St, Orange	27/B-4	16-41-1-15-1-(4)	2/93	32/8	6.50/5.34	Fair
			4/86	89/28	6.08/4.27	Good-Fair
Morgan Cr, NC 54, Orange	26/B-5	16-41-2-(1)	7/93	61/21	4.91/3.47	Good**
			2/93	91/36	4.44/3.23	Excell
			4/85	109/32	5.70/4.65	Good
Morgan Cr, Botanical Trail, Orange	-/B-6	16-41-2-(5.5)	4/93	-/16	-/4.94	Fair
			2/93	71/26	6.00/4.63	Good-Fair
Morgan Cr, ab OWASA, Orange	83/B-7	16-41-2-(5.5)	9/90	63/8	7.15/6.35	Fair
			7/88	82/13	6.91/6.29	Fair
Morgan Cr, be OWASA, Orange	84/B-8	16-41-2-(5.5)	2/93	42/7	7.08/4.93	Fair
			9/90	66/8	7.46/5.85	Fair
			7/88	52/4	7.80/7.11	Poor
Morgan Cr, SR 1726, Chatham	I/B-9	16-41-2-(5.5)	7/93	38/7	6.88/6.53	Fair
			7/90	54/8	7.16/6.47	Fair
			7/87	35/6	6.81/6.29	Fair
			4/85	40/4	7.71/5.67	Poor
			8/84	50/10	7.06/5.88	Fair
Pritchards Mill Cr, Damascus Rd, Orange	-/B-10	16-41-2-3-(2)	4/93	-/22	-/4.30	Good-Fair
Meeting of Waters Cr, Laurel Hill Rd, Orange	-/B-11	16-41-2-7	4/93	-/2	-/7.28	Poor

* Small Stream Criteria

** rating affected by very low flow

Table 4. Characteristics of Jurisdictional Wetlands on the Greene Tract.

Wetland Flags (Figure 4)	Predominant Vegetation	Wetland Acres	Stream Included	Off-stream Ponding
CA	ALH/seep	0.395	yes	yes
CB	APH/seep	0.114	yes	no
CC	ALH/seep	0.011	no	no
CD	ALH/seep	0.740*m	yes	yes
CE	ALH	0.107	yes	no
CF	APH/seep	0.225	yes	no
DA	ALH/seep	1.115	yes	no
DB	APH/seep	0.602	yes	no
DC/DE	APH/seep	0.580*	yes	yes
EA	APH/seep	0.252	yes	no
EB	ALH/seep	1.098	yes	yes
EC	APH/seep	0.049	no	no
ED	APH/seep	0.044	yes	no
EE	APH/seep	0.149	yes	no
EF	APH/seep	0.380	yes	yes

m = Mosaic of wetlands and non-wetlands.
* = Wetland extends off site; acreage reported is on the Greene Tract.
ALH = alluvial hardwood forest; APH = alluvial mixed pine/hardwood forest.
Ponding: yes = adequate for amphibian breeding; no = inadequate for amphibian breeding.

Table 5. Federal and State Protected Species Known from Orange County and Probability of Occurrence in the Project Area.

Common Name *Scientific Name*	State Status	Federal Status	Preferred Habitat in Orange County	Likelihood of occurrence on or adjacent to the Greene Tract
Animals				
Cooper's hawk *Accipiter cooperi*	SC	--	extensive forests, especially floodplains	2
Black vulture * *Corygyps atratus*	SC	--	hollow trees, rock crevices, old buildings (nesting)	3
Carolina darter *Etheostoma collis*	SC	--	small-med streams, silt/leaves over gravel/cobble	1
Four-toed salamander *Hemidactylium scutatum*	SC	--	boggy seeps & pools with moss, no fish	2
Neuse River waterdog *Necturus lewisii*	SC	--	medium-large Neuse basin streams with logs, leaves, or rocks for cover	0
Red-cockaded woodpecker * *Picoides borealis*	E	E	extensive pine forest with open understory	1
Triangle floater *Alasmidonta undulata*	T	--	silty sand to coarse sand; slow current	0
Brook floater *Alasmidonta varicosa*	T	FSC	coarse sand, gravel; moderate current	0
Alewife floater * *Anadonta implicata*	SC	--	sand/gravel; fast to moderate current	0
Atlantic pigtoe *Fusconaia masoni*	T	FSC	coarse sand, gravel; moderate current	0
Yellow lampmussel *Lampsilis cariosa*	T	FSC	sand, gravel, cobble; slow to moderate current	0
Eastern lampmussel *Lampsilis radiata*	SC	--	sand, gravel, cobble; slow to moderate current	0
Green floater *Lasmigona subviridis*	E	FSC	sand, gravel; slow to moderate current	0
Squawfoot mussel *Strophitus undulatus*	T	--	silt, sand, gravel; slow to moderate current	0
Savannah lilliput *Toxolasma pullus*	T	FSC	silt, fine sand, slow current, streams & lakes	0

Table 5, continued.

Common Name *Scientific Name*	State Status	Federal Status	Preferred Habitat in Orange County	Likelihood of occurrence on or adjacent to the Greene Tract
Plants				
Prairie blue wild indigo * *Baptisia minor*	T	--	open woods, basic/mafic soils, diabase glades	0
Smooth coneflower * *Echinacea laevigata*	E-SC	E	open woods, basic/mafic soils, diabase glades	0
Small whorled pogonia * *Isotria medeoloides*	E	T	rich mesic to dry-mesic hardwood or pine/hardwood	2
Michaux's sumac * *Rhus michauxii*	E-SC	E	open woods & edges on basic/mafic soils	0

Status: E = Endangered; T = Threatened; SC = Special Concern
FSC = Federal Species of Concern (not protected)

* Old or Obscure Records -- no extant populations are known in Orange County.

0 -- Species unlikely to occur because of lack of suitable habitat.
1 -- Species not found during reasonable surveys of suitable habitat; species apparently not present.
2 -- Suitable habitat present; not surveyed or surveys inconclusive; species may be present.
3 -- Suitable habitat present and species occurrence documented by RJG&A, NHP, or others.

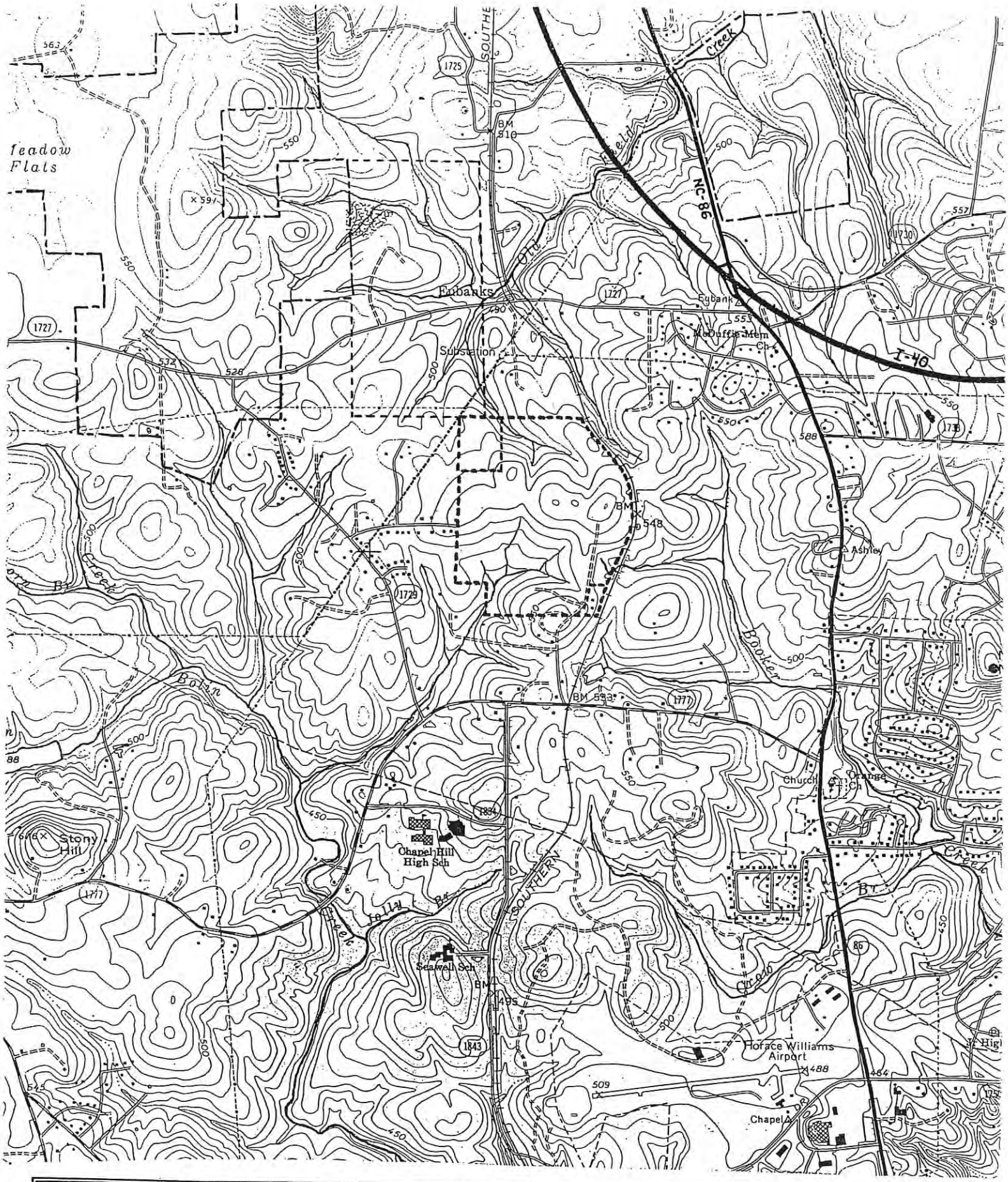


Figure 1. Location and Topography of the Greene Tract, Orange County, N.C.

SCALE: 1 inch = 2,000 feet

Robert J. Goldstein & Associates, Inc.
ENVIRONMENTAL CONSULTANTS
8480 Garvey Drive
Raleigh, North Carolina 27616-3175
(919) 872-1174

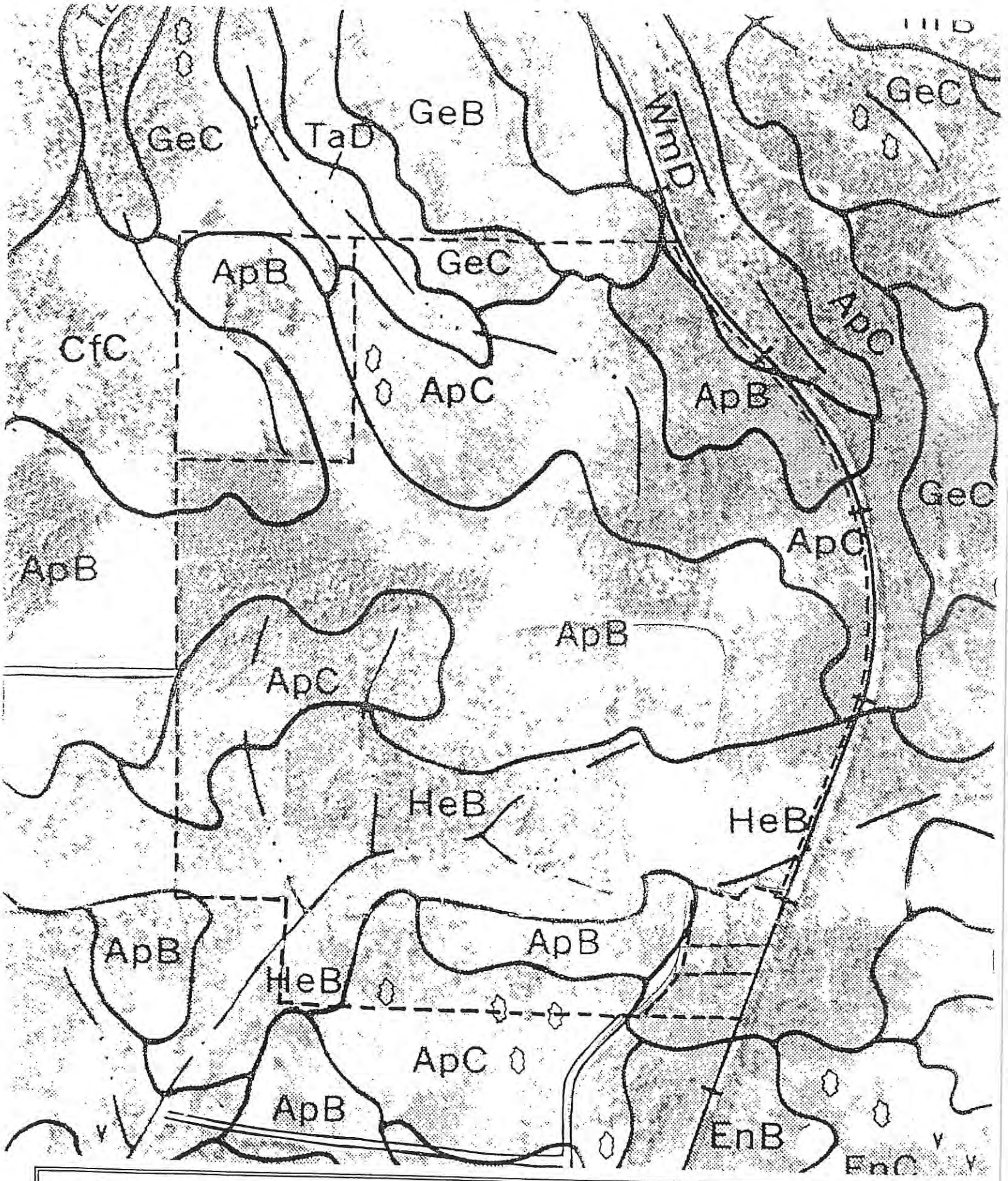


Figure 2. Soil Map of the Greene Tract, Orange County, N.C.

SCALE: 1 inch = 500 feet

Robert J. Goldstein & Associates, Inc.
ENVIRONMENTAL CONSULTANTS
8480 Garvey Drive
Raleigh, North Carolina 27616-3175
(919) 872-1174

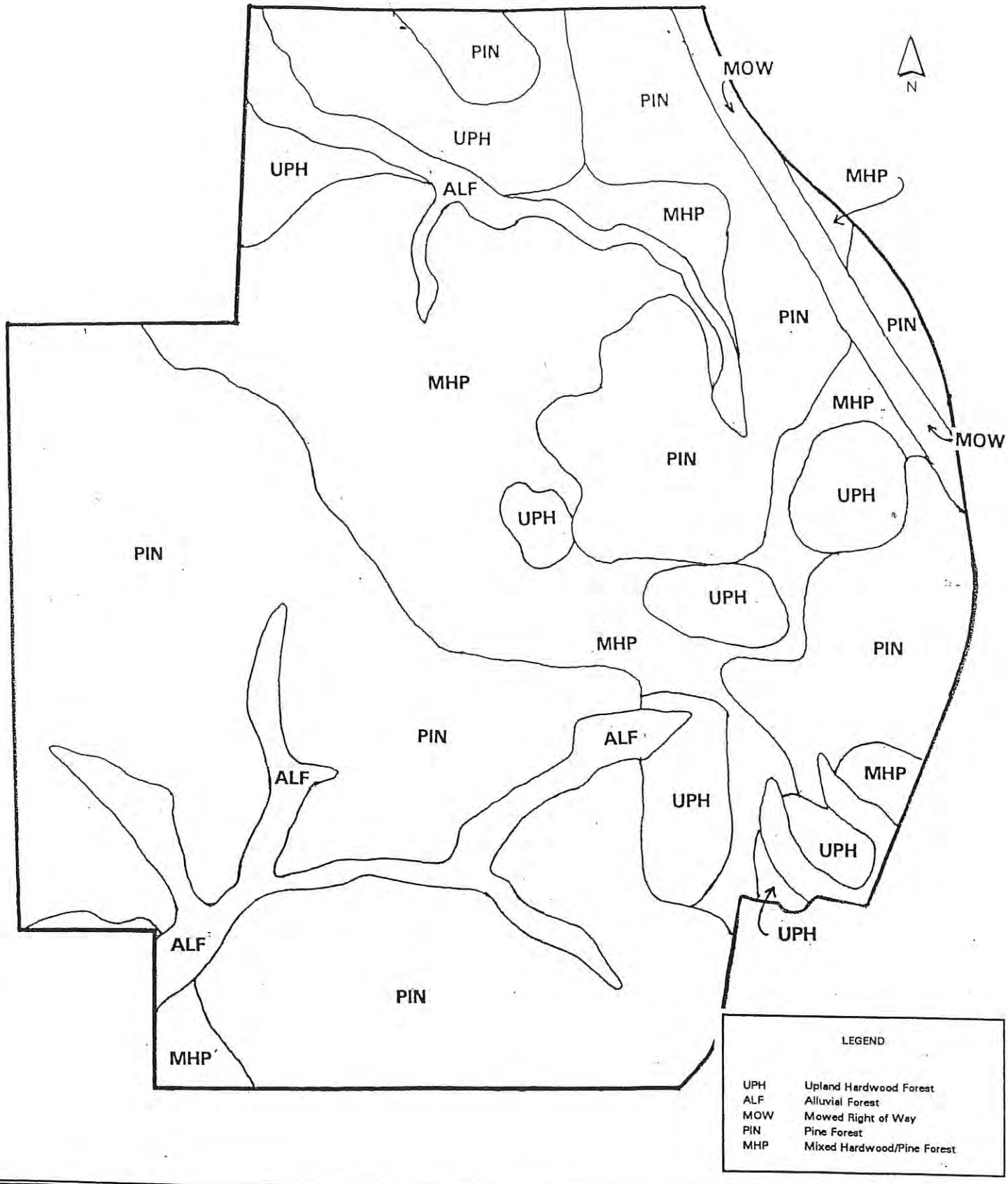


Figure 3. Vegetation Communities on the Greene Tract, Orange County, N.C.

SCALE: 1 inch = 400 feet

Robert J. Goldstein & Associates, Inc.
ENVIRONMENTAL CONSULTANTS
8480 Garvey Drive
Raleigh, North Carolina 27616-3175
(919) 872-1174

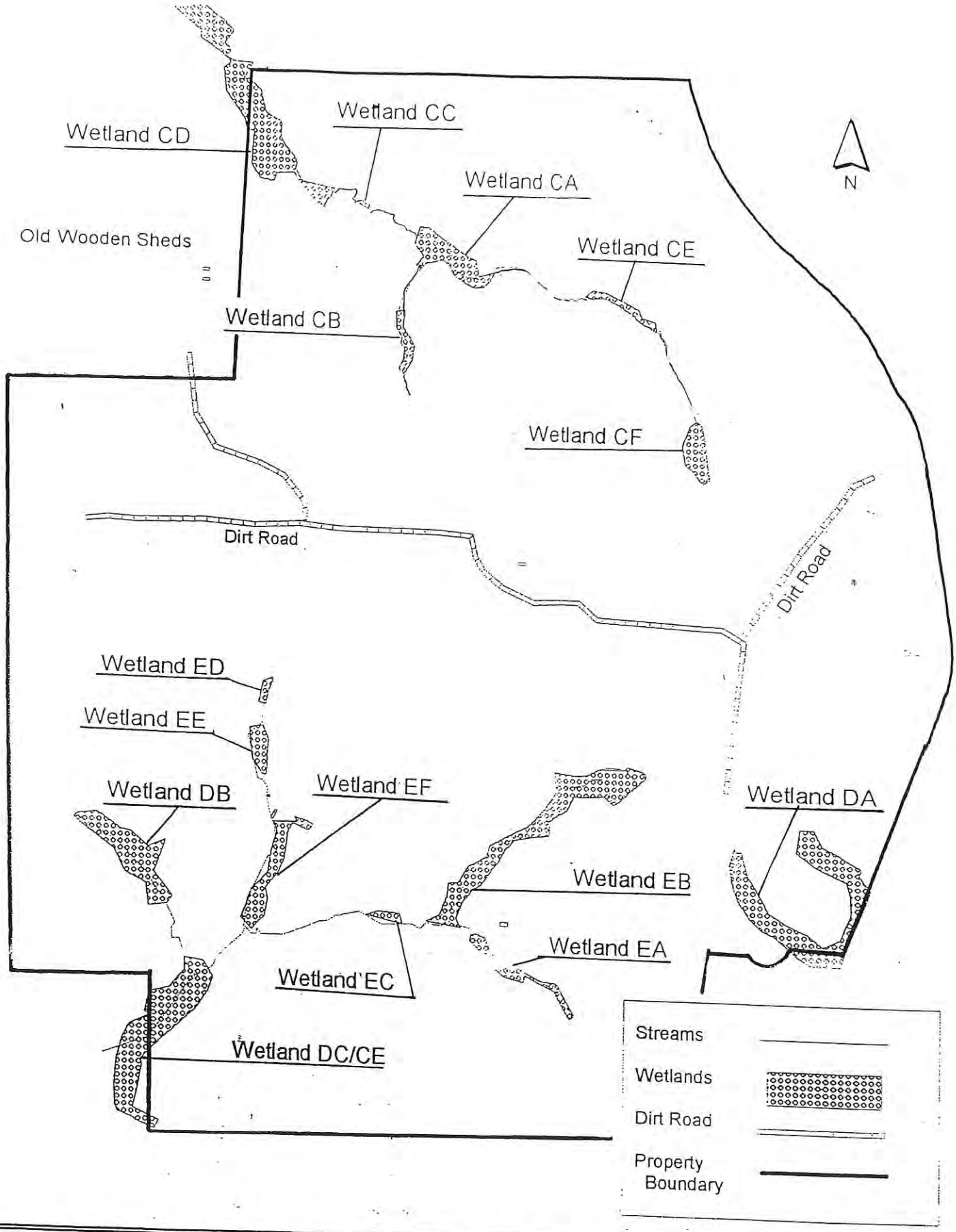


Figure 4. Streams and Wetlands on the Greene Tract, Orange County, N.C.

SCALE: 1 inch = 400 feet

Robert J. Goldstein & Associates, Inc.
ENVIRONMENTAL CONSULTANTS
8480 Garvey Drive
Raleigh, North Carolina 27616-3175
(919) 872-1174

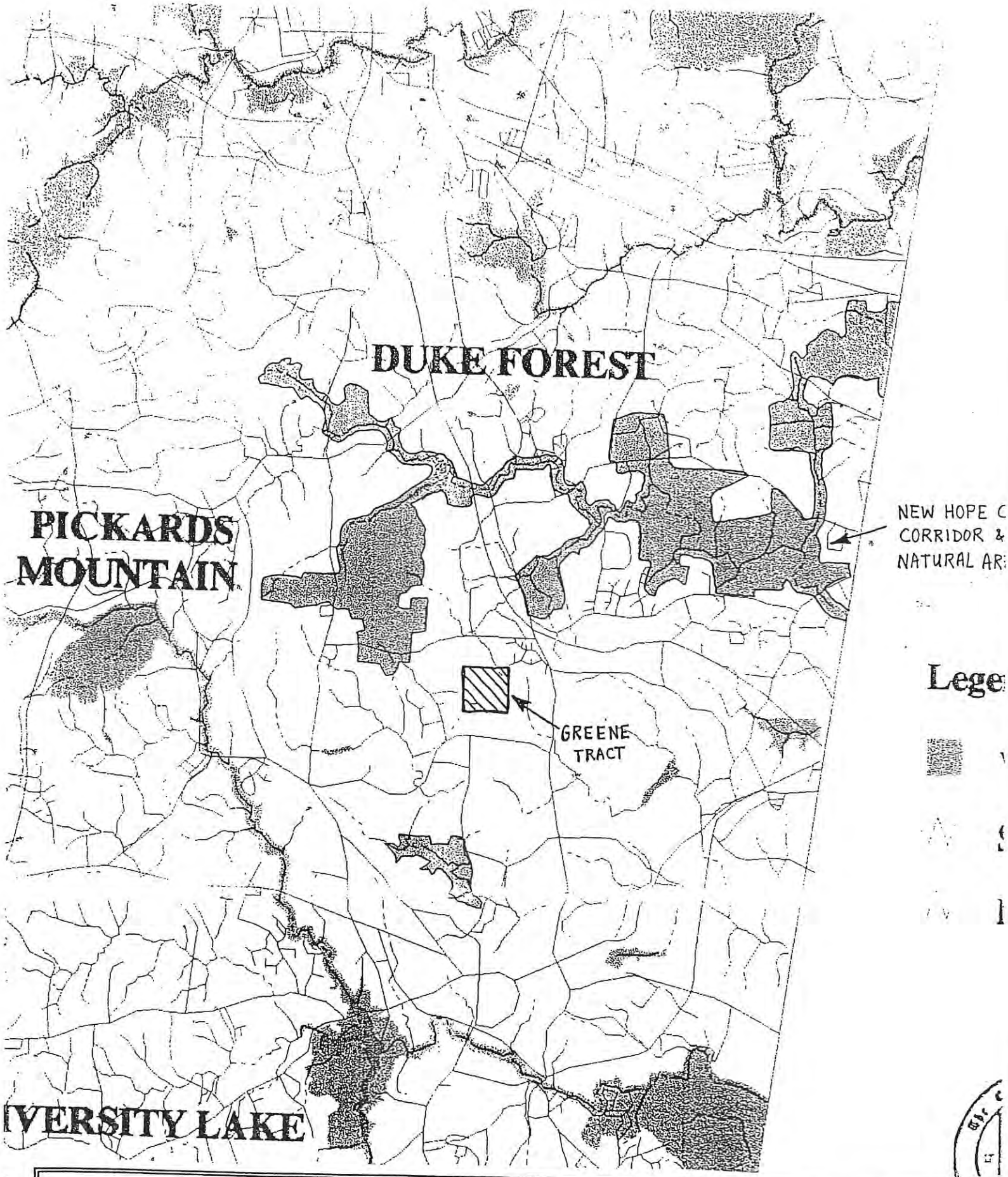
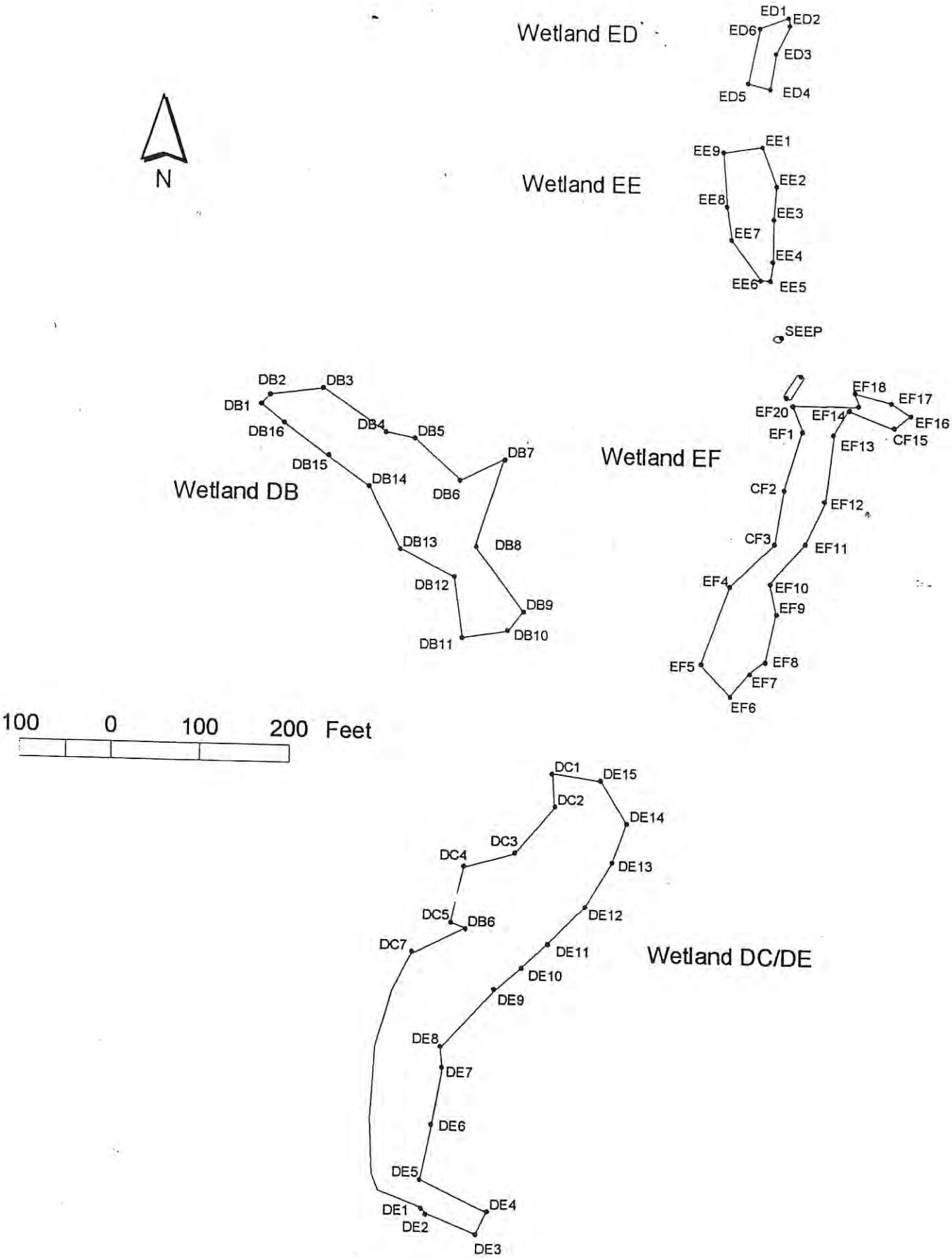


Figure 5. New Hope Creek Wildlife Corridor, Including Significant Natural Areas, Orange County, N.C.

SCALE: 1 inch = 7,600 feet

Robert J. Goldstein & Associates, Inc.
ENVIRONMENTAL CONSULTANTS
8480 Garvey Drive
Raleigh, North Carolina 27616-3175
(919) 872-1174

APPENDIX A. Wetland Maps and Wetland Determination Data Forms


Wetland ED
ED1
ED2
ED3
ED4
ED5
ED6
N
Wetland EE
EE1
EE2
EE3
EE4
EE5
EE6
EE7
EE8
EE9
SEEP
Wetland DB
DB1
DB2
DB3
DB4
DB5
DB6
DB7
DB8
DB9
DB10
DB11
DB12
DB13
DB14
DB15
DB16
Wetland EF
EF1
EF4
EF5
EF6
EF7
EF8
EF9
EF10
EF11
EF12
EF13
EF14
EF15
EF16
EF17
EF18
EF20
CF2
CF3
CF15
100 0 100 200 Feet
Wetland DC/DE
DC1
DC2
DC3
DC4
DC5
DC7
DB6
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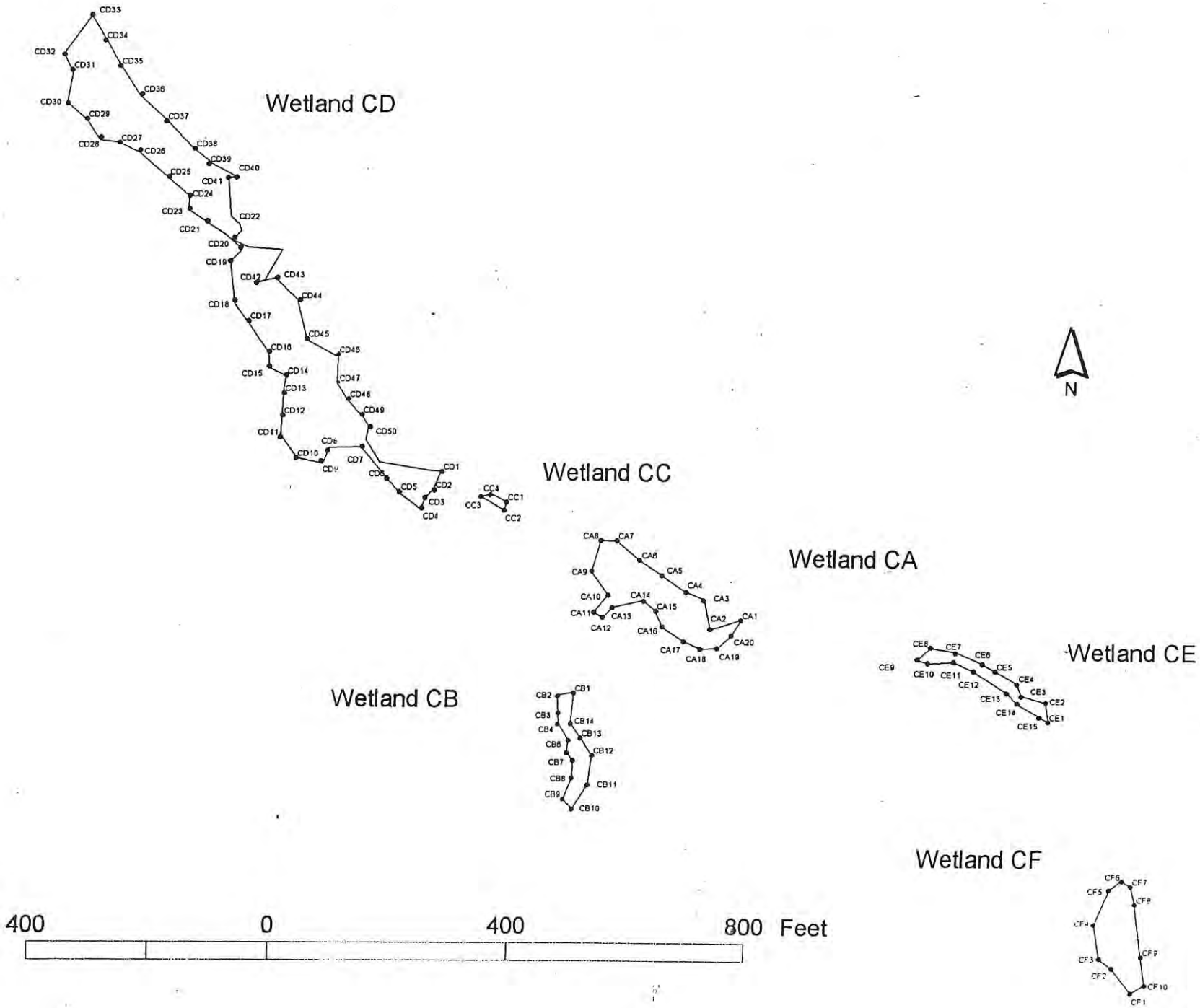
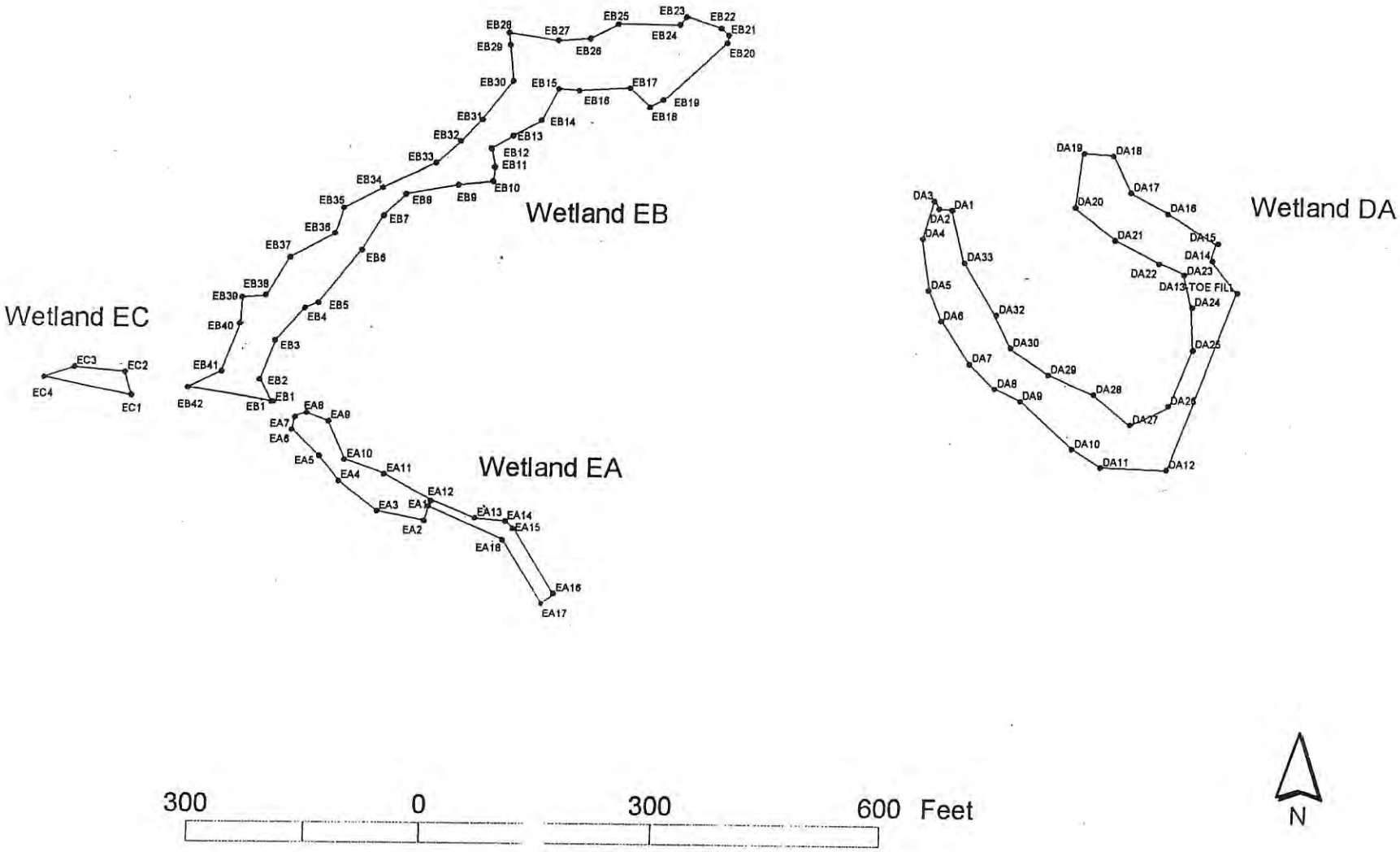
DE11
DE12
DE13
DE14
DE15


Wetland CD
Wetland CC
Wetland CA
Wetland CE
Wetland CB
Wetland CF
N
400
0
400
800 Feet


Wetland EC
EC1
EC2
EC3
EC4
Wetland EB
EB1
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EB8
EB9
EB10
EB11
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EB41
EB42
Wetland EA
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EA4
EA5
EA6
EA7
EA8
EA9
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EA11
EA12
EA13
EA14
EA15
EA16
EA17
EA18
Wetland DA
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DA2
DA3
DA4
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DA6
DA7
DA8
DA9
DA10
DA11
DA12
DA13
DA14
DA15
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DA18
DA19
DA20
DA21
DA22
DA23
DA24
DA25
DA26
DA27
DA28
DA29
DA30
DA32
DA33
TOE FILL
300
0
300
600 Feet
N

Wetland 1/11

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____
Applicant/Owner: Orange Regional LandFill
Date: 22-24 Feb 2000
Address: 306 N. Columbia St. Chapel Hill NC 27516-2113
Project/Site: Greene Tract
Location: E of Rogers Ln Between SR 1777 and SR 1727
Waterway: UT Bolin Creek
Investigator: Chris Hopper
R.J Goldstein + Assoc.
County: Orange
State: North Carolina

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Headwater Wetland Transect ID: Wetlands EB, EA, DB, EF Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pinus taeda	TREE	FAC	2. Juniperus virginiana	SHRUB	FACU-
3. Acer rubrum	TREE	FAC	4. Pinus taeda	SHRUB	FAC
5. Liquidambar styraciflua	TREE	FAC+	6. Juncus effusus	HERB	FACW+
7. Alnus serulata	SHRUB	FACW+	8. Microstegium vimineum	HERB	FAC+
9. Cornus amomum	SHRUB	FACW+	10. Boehmeria cylindrica	HERB	FACW+
11. Acer rubrum	SHRUB	FAC	12. Smilax rotundifolia	VINE	FAC
13. Liquidambar styraciflua	SHRUB	FAC+	14. Vitis aestivalis	VINE	FAC-

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) ___
Remarks:

SOILS
Map Unit Name
(Series and Phase): Helena Sandy loam
Taxonomy (Subgroup): thermic Aquic Hapludults
Drainage Class: Well
Field Observations Confirm Map Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		Gley 7/1 - 7/2			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

W 2/14

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.
Depth to Water in Pit: ___(in.
Depth to Saturated Soil: ___(in.

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
X	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
X	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____
Applicant/Owner: Orange Regional Landfill
Date: 22-24 Feb 2006
Address: 306 N. Columbia St. Chapel Hill NC 27516-2113
Project/Site: Greene Tract
Location: E of Rogers Ln Between SR 1777 and SR 1727
Waterway: LT Old Field Creek
Investigator: Chris Hopper
R.J. Goldstein + Assoc.
County: Orange
State: North Carolina

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Floodplain Mosaic Transect ID: Wetland CA Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Liriodendron tulipifera	TREE	FAC	2. Liquidambar styraciflua	SHRUB	FAC+
3. Acer rubrum	TREE	FAC	4. Juncus effusus	HERB	FACW+
5. Liquidambar styraciflua	TREE	FAC+	6. Microstegium vimineum	HERB	FAC+
7. Alnus serulata	SHRUB	FACW+	8. Carex lurida	HERB	OBL
9. Acer rubrum	SHRUB	FAC	10. Boehmeria cylindrica	HERB	FACW+
11. Lindera benzoin	SHRUB		12. Smilax rotundifolia	VINE	FAC
13. Liriodendron tulipifera	SHRUB	FAC	14. Vitis aestivalis	VINE	FAC-

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) ___
Remarks:

SOILS
Map Unit Name
(Series and Phase): Appling Sandy Loam
Drainage Class: Well
Taxonomy (Subgroup): thermic Typic Hapludults
Field Observations Confirm Map Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		5Y 7/1			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.
Depth to Water in Pit: ___(in.
Depth to Saturated Soil: ___(in.

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
X	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
X	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____
Applicant/Owner: Orange Regional Landfill
Date: 22-24 Feb 2000
Address: 300 N Columbia St Chapel Hill NC 27510-2113
Project/Site: Greene Tract
Location: E of Rogers Ln, Between SR 1777 and SR 1727
Waterway: UT Old Field Creek / UT Brain Creek
County: Orange
Investigator: Chris Hopper
R.J Goldstein + Assoc
State: North Carolina

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Floodplain Mosaic Transect ID: Wetland DC/DE, DA, EF Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	TREE	FAC	2. Juncus effusus	HERB	FACW +
3. Liquidambar styraciflua	TREE	FAC +	4. Carex lurida	HERB	OBL
5. Liriodendron tulipifera	TREE	FAC	6. Microstegium vimineum	HERB	FAC +
7. Pinus taeda	TREE	FAC	8. Boehmeria cylindrica	HERB	FACW +
9. Juniperus virginiana	SHRUB	FACU −	10. Botrychium dissectum	HERB	FAC
11. Acer rubrum	SHRUB	FAC	12. Smilax rotundifolia	VINE	FAC
13. Liriodendron tulipifera	SHRUB	FAC	14. Lonicera japonica	VINE	FAC −

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 0 %
Remarks:

SOILS
Map Unit Name
(Series and Phase): Helena Sandy Loam
Drainage Class: Well
Taxonomy (Subgroup): thermic Aquic Hapludults
Field Observations Confirm Map Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		5Y 6/1			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

W 6/14

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.)
Depth to Water in Pit: ___(in.)
Depth to Saturated Soil: ___(in.)

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
X	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____ Date: 22-24 Feb 2000
Applicant/Owner: Orange Regional Land Fund Project/Site: Greene Tract
Address: 310 N Columbia St, Chapel Hill NC 27514-2113
Location: E of Rogers Rd Between SR 1777 and 1727
Waterway: UT Bunn Creek County: Orange
Investigator: Chris Hopper State: North Carolina
R.J. Goldstein - Assoc.

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Ephemeral Wetland Transect ID: Wetland EC Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pinus taeda	Tree	FAC	2. Microstegium vimineum	Herb	FAC+
3. Liquidambar styraciflua	Tree	FAC+	4. Boehmeria cylindrica	Herb	FACW+
5. Liquidambar styraciflua	Shrub	FAC+	6. Smilax rotendifolia	Herb	FAC
7. Acer rubrum	Shrub	FAC	8. Toxicodendron radicans	Vine	FAC
9. Rhododendron periclymenoides	Shrub	FAC	10.		
11. Pinus taeda	Shrub	FAC	12.		
13. Juncus effusus	Herb	FAC+	14.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100%
Remarks:

SOILS
Map Unit Name
(Series and Phase): Helena Sandy Loam Drainage Class: Well
Taxonomy (Subgroup): Thermic Aquic Hapludults Field Observations Confirm Map Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc. Structure
10		10 YR 4/1			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

W 8/14

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.)
Depth to Water in Pit: ___(in.)
Depth to Saturated Soil: ___(in.)

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

W 9

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____
Applicant/Owner: Orange Regional Landfill
Date: 22 24 Feb 00
Address: 306 N Columbia St Chapel Hill NC 27516-2113
Project/Site: Greene Tract
Location: E of Rogers Ln Between SR 1777 and SR 1727
Waterway: UT old Field Creek / UT Bolin Creek
County: Orange
Investigator: Chris Hopper
R.J. Goldstein + Assoc.
State: North Carolina

Do Normal Circumstances exist on the site? Yes x No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No x
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Ephemeral Wetland Transect ID: Wetlands CE, CF, ED, CB Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pinus taeda	Tree	FAC	2. Rhododendron periclymenoides	Shrub	FAC
3. Liquidambar styraciflua	Tree	FAC+	4. Juncus effusus	Herb	FAC+
5. Acer rubrum	Tree	FAC	6. Microstegium vimineum	Herb	FAC+
7. Quercus alba	Tree	FACU	8. Boehmeria cylindrica	Herb	FACW+
9. Pinus taeda	Shrub	FAC	10. Carex lurida	Herb	OBL
11. Liquidambar styraciflua	Shrub	FAC+	12. Lonicera japonica	Vine	FAC-
13. Acer rubrum	Shrub	FAC	14. Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 86%
Remarks:

SOILS
Map Unit Name
(Series and Phase): Appling Sandy Loam
Drainage Class: Well
Taxonomy (Subgroup): thermic Typic Hapludults
Field Observations Confirm Map Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		10YR7/1 - 10YR6/2			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

W 10 14

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.)
Depth to Water in Pit: ___(in.)
Depth to Saturated Soil: ___(in.)

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
X	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

W 14/14

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____ Date: 22-24 Feb 00
Applicant/Owner: Orange Regional Landfill Project/Site: Greene Tract
Address: 306 N Columbia Street, Chapel Hill NC 27516-2113
Location: E of Rogers Ln, Between SR 1727 and SR 1777
Waterway: UT Old Field Creek County: Orange
Investigator: Chris Hopper State: North Carolina
R.J Goldstein + Assoc.

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Ephemeral Wetland Transect ID: Wetland CC Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	Tree	FAC	2.		
3. Nyssa sylvatica	Tree	FAC	4.		
5. Acer rubrum	Shrub	FAC	6.		
7. Microstegium vimineum	Herb	FAC+	8.		
9. Pinus taeda	Herb	Fac	10.		
11. Carex lurida	Herb	OBL	12.		
13. Smilax rotundifolia	Herb	FAC	14.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 100%
Remarks:

SOILS
Map Unit Name
(Series and Phase): Tatum silt loam
Taxonomy (Subgroup): thermic Typic Hapludults
Drainage Class: Well
Field Observations Confirm Map Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		5Y 7/2			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soil:
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

W 12/14

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.)
Depth to Water in Pit: ___(in.)
Depth to Saturated Soil: ___(in.)

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
X	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____ Date: 22-24 Feb 2000
Applicant/Owner: Orange Regional Landfill Project/Site: Green Tract
Address: 300 N. Columbia St. Chapel Hill NC. 27516-2113
Location: E of Rogers Ln. Between SR 1727 and SR 1777
Waterway: UT Old Field Creek County: Orange
Investigator: Chris Hopper State: North Carolina
R.J. Goldstein + Assoc.

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Floodplain Mosaic Transect ID: Wetland CD Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	TREE	FAC	2. Acer rubrum	SHRUB	FAC
3. Liriodendron tulipifera	TREE	FAC	4. Juncus effusus	HERB	FACW+
5. Pinus taeda	TREE	FAC	6. Microstegeum vimineum	HERB	FAC+
7. Liquidambar styraciflua	TREE	FAC+	8. Boehmeria cylindrica	HERB	FACW+
9. Alnus serulata	SHRUB	FACW+	10. Botrychium dissectum	HERB	FAC
11. Juniperus virginiana	SHRUB	FACU-	12. Toxicodendron radicans	VINE	FAC
13. Liquidambar styraciflua	SHRUB	FAC+	14. Smilax rotundifolia	VINE	FAC

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 93%
Remarks:

SOILS
Map Unit Name
(Series and Phase): Tatum silt loam Drainage Class: Well
Taxonomy (Subgroup): Thermic Typic Hapludults Field Observations Confirm Map Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		5Y 7/1			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

W 14/14

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.)
Depth to Water in Pit: ___(in.)
Depth to Saturated Soil: ___(in.)

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
X	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
X	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is this Sampling Point Within a Wetland? Yes X No ___

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Upland

Action ID. _____
Applicant/Owner: Orange Regional Landfill Date: 22-24 Feb 00
Address: 306 N Columbia St Chapel Hill NC 27516-2113 Project/Site: Greene Tract
Location: E of Rogers Ln Between SR 1777 and SR 1727
Waterway: UT Bolin Creek + UT Oldfield Creek County: Orange
Investigator: Chris Hopper State: North Carolina
R.J Goldstein + Assoc.

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Upland Hardwood Transect ID: Wetlands CA, CC, CD, DA Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Quercus alba	Tree	FACU	2. Ilex opaca	Shrub	FAC-
3. Quercus rubra	Tree	FACU-	4. Juniperus virginiana	Shrub	FACU-
5. Carya glabra	Tree	FACU	6. Hexastylis virginica	Herb	—
7. Liriodendron tulipifera	Tree	FAC	8. Tipularia discolor	Herb	FACU
9. Quercus rubra	Shrub	FACU-	10. Smilax rotundifolia	Vine	FAC
11. Cornus florida	Shrub	FACU	12.		
13. Liquidambar styraciflua	Shrub	FAC+	14.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 8%
Remarks:

One species has no indicator

SOILS
Map Unit Name
(Series and Phase): Appling Sandy Loam Drainage Class: Well
Taxonomy (Subgroup): thermic Typic Hapludults Field Observations Confirm Map Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		5Y 4/4			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.
Depth to Water in Pit: ___(in.
Depth to Saturated Soil: ___(in.

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is this Sampling Point Within a Wetland? Yes ___ No X

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____ Date: 22-24 Feb 00
Applicant/Owner: Orange Regional Landfill Project/Site: Greene Tract
Address: 306 N. Columbia St. Chapel Hill NC 27516-2113
Location: E of Rogers Ln, Between SR 1777 and SR 1727
Waterway: UT Bunn Creek + UT Old Field Creek County: Orange
Investigator: Chris Hopper State: North Carolina
R.J. Goldstein + Assoc.

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Upland Pine Transect ID: Wetlands EA, EB, EC, ED, EG, EF, DB Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pinus taeda	Tree	FAC	2. Juniperus virginiana	Shrub	FACU-
3. Pinus virginiana	Tree	—	4. Tipularia discolor	Herb	FACU
5. Pinus echinata	Tree	—	6. Smilax rotundifolia	Vine	FAC
7. Liquidambar styraciflua	Tree	FAC+	8.		
9. Pinus taeda	Shrub	FAC	10.		
11. Liquidambar styraciflu	Shrub	FAC+	12.		
13. Acer rubrum	Shrub	FAC	14.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 60%
Remarks:

Two species have no indicator

SOILS
Map Unit Name
(Series and Phase): Appling Sandy loam Drainage Class: Well
Taxonomy (Subgroup): thermic Typic Hapludults Field Observations Confirm Map Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
10		10 YR 4/3			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.)
Depth to Water in Pit: ___(in.)
Depth to Saturated Soil: ___(in.)

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is this Sampling Point Within a Wetland? Yes ___ No X

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Action ID. _____ Date: 22-24 Feb 04
Applicant/Owner: Orange Regional LandFill Project/Site: Greene Tract
Address: 306 N Columbia St. Chapel Hill NC 27516-2113
Location: E of Rogers Ln, Between SR 1777 and SR 1727
Waterway: UT Old Field Creek + UT Bolin Creek County: Orange
Investigator: Chris Hopper State: North Carolina
R.J. Goldstein + Assoc.

Do Normal Circumstances exist on the site? Yes X No ___
Is the site significantly disturbed (Atypical Situation)? Yes ___ No X
Is the area a potential Problem Area? (Explain on reverse) Yes ___ No ___
Community ID: Upland Pine/Hardwood Mix Transect ID: Wetlands CE, CB, CF, DC/CE Plot ID: ___

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Pinus taeda	Tree	FAC	2. Pinus taeda	Shrub	FAC
3. Quercus alba	Tree	FACU	4. Quercus alba	Shrub	FACU
5. Liriodendron tulipifera	Tree	FAC	6. Vaccinium corymbosum	Shrub	FACW
7. Acer rubrum	Tree	FAC	8. Tipularia discolor	Herb.	FACU
9. Quercus rubra	Tree	FACU-	10. Goodyera pubescens	Herb	—
11. Ilex opaca	Shrub	FAC-	12. Smilax rotundifolia	Vine	FAC
13. Cornus florida	Shrub	FACU	14. Toxicodendron radicans	Vine	FAC

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 50%
Remarks:
One species has no indicator

SOILS
Map Unit Name
(Series and Phase): Appling sandy loam Drainage Class: Well
Taxonomy (Subgroup): thermic Typic Hapludults Field Observations Confirm Map Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Conc Structure
		5Y 5/1			

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Sulfidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma Colors		Other (Explain in Remarks)

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___(in.
Depth to Water in Pit: ___(in.
Depth to Saturated Soil: ___(in.

Wetland Hydrology Indicators:

	Primary Indicators:		Secondary Indicators (2 or more required):
	Inundated		Oxidized Root Channels in Upper 12 Inches
	Saturated in Upper 12 Inches		Water-Stained Leaves
	Water Marks		Local Soil Survey Data
	Drift Lines		FAC-Neutral Test
	Sediment Deposits		Other (Explain in Remarks)
	Drainage Patterns in Wetlands		

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soils Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is this Sampling Point Within a Wetland? Yes ___ No X

Remarks:

APPENDIX B. Permit Conditions: NWP 26 and GWQC 3108, Headwaters and Isolated Wetlands.

COE NATIONWIDE CONDITIONS (11 Feb 1997)

- Total project impacts to waters/wetlands may not exceed 3 acres or 500 feet of stream channel.
- For impacts greater than 1/3 acre, Pre-Construction Notification (PCN) and COE approval required.
- For impacts not exceeding 1/3 acre, no PCN or approval is needed, but a report is required within 30 days after completion describing the project and type and acreage of impacts to waters/wetlands.
- For impacts to wetlands, a wetland delineation is required if PCN is required.
- Affected waters include areas filled, flooded, excavated, or drained by the project.
- The permitted discharge is part of a single and complete project.
- When combined with other NWPs, the waters affected by the entire project cannot exceed 3 acres.
- For real estate subdivided after 5 Oct 1984, a PCN is required if the project would cause the cumulative impact on all of the subdivided parcels to exceed 1/3 acre. The cumulative impact on all parcels permitted by NWPs cannot exceed 3 acres of waters or 500 feet of streams.

COE REGIONAL CONDITIONS

- PCN, statement of compliance with applicable conditions, and compensatory mitigtaion plan are required for use of any NWP in waters designated by the state as ORW, HQW, WS-I, WS-II, Trout, PNA, or wetlands contiguous to these waters.
- PCN, statement of compliance with all applicable conditions, and compensatory mitigtaion plan are required for use of any NWP in Mountain/Piedmont Bogs or waters/wetlands on Barrier Islands.
- PCN and statement of compliance with all applicable conditions are required when any NWP is used for construction of animal waste facilities.
- PCN and mitigation plan are required if more than 150 feet of a stream channel will be adversely affected (including flooding of a free-flowing stream).
- For use in a coastal AEC designated under CAMA, the required CAMA permit must be obtained and submitted to COE.

DWQ AND DCM CONDITIONS

- Impacts greater than 1/3 acre of wetlands or greater than 150 feet of intermittent or perennial streams requires a PCN and written concurrence from DWQ.
- Impacts less than 1/3 acre of wetlands and less than 150 feet of streams does not require a PCN provided that all other General Certification conditions are met.
- Impacts to any quantity of Unique Wetlands (UWL) requires a PCN and written concurrence.
- Sediment and erosion control practices which equal or exceed state standards must be utilized to prevent exceedences of turbidity standards.
- All sediment and erosion control measures placed in wetlands and waters shall be removed and the natural grade restored.
- Measures shall be taken to prevent fresh concrete from contacting waters until it has cured.
- If a NEPA or SEPA environmental document is required, this GWQC is not valid until a FONSI or ROD is issued and approved.
- Non-compliance or violation of any condition herein shall result in revocation of DWQ Certification for the project and may also result in criminal and/or civil penalties.
- DWQ may require an individual 401 certification for any project that has potential to significantly affect water quality.
- Not applicable for waste disposal or waste treatment facilities in the 20 coastal counties.

APPENDIX C. Engineer's Floodplain Assessment of the Greene Tract.

McEvoy Engineering Services, Inc.

March 7, 2000

Mr. Robert J. Goldstein
Robert J. Goldstein & Associates, Inc.
8480 Garvey Drive
Raleigh, N.C. 27616-3175

Re: Greene Tract
Orange County

Dear Bob:

I have reviewed the material you forwarded on March 1, 2000 concerning analysis of the subject tract as a proposed landfill. Specifically, you requested a floodplain assessment of the tract.

Generally accepted definitions of a "floodplain" include either areas mapped as flood prone for insurance purposes by FEMA (Federal Emergency Management Agency) or areas containing "flood hazard" soils as mapped by the former USDA Soil Conservation Service (now the USDA Natural Resources Conservation Service). I have noted that a significant ridge line bisects the tract on an east/west axis, forming the headwaters of Old Field Creek, Bolin Creek, and Booker Creek. Your staff has reported to me that no FEMA mapping exists on the subject tract. In addition, a review of the Orange County USDA-SCS soils map panel containing this tract, with the tract boundaries superimposed, indicates there are no flood hazard soils within the tract boundaries.

In light of these findings, I conclude that no significant floodplain exists on the subject tract.

Sincerely yours,

MCEVOY ENGINEERING SERVICES, INC.

Steve M. McEvoy, P.E
President

5510 Munford Road • P.O Box 30965 • Raleigh, N.C. 27622 • (919) 783-5303
Fax: (919) 783-5999