

**IVEY-FERGUSON BANK PARCEL
PROPOSED NUTRIENT OFFSET
RESTORATION AREA**
ORANGE COUNTY, NORTH CAROLINA

BANK PARCEL DEVELOPMENT PACKAGE

MAM-09020

September 2010

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1.0 Project Location and Description

Located near the intersection of Carl Durham Road and Old Greensboro Road (SR 1005) in Orange County, North Carolina (**Figure 1**) is the proposed nutrient mitigation bank currently known as the Ivey-Ferguson Bank Parcel (Bank Parcel). The Bank Parcel is comprised of five (5) parcels of land, of which, three (3) parcels of land (PIN Numbers: 9758027026, 9758022055, and 9758034637) are located at the northwestern quadrant of the intersection of Carl Durham Road and Old Greensboro Road. The remaining parcel of land (PIN Number: 9758034637) is located on east side of Carl Durham Road, approximately 0.30 miles north of the intersection of Carl Durham Road and Old Greensboro Road. There is one (1) parcel of land (PIN Number: 9758337836) located on the north side of Old Greensboro Road, approximately 0.35 miles east of the intersection of Carl Durham Road and Old Greensboro Road. The purpose of this Bank Parcel is to improve water quality within the B. Everett Jordan Lake watershed by providing off-site mitigation for development (both existing and proposed) requiring nutrient offsets.

The proposed Bank Parcel is located within the Upper New Hope Arm of the B. Everett Jordan Lake watershed, inside of 14-digit USGS HUC 03030002060070. Stormwater runoff from this site drains into an unnamed tributary of Phils Creek (Stream Index #16-41-2-2-(0.3), which drains into University Lake approximately 3.4 miles downstream. According to the N.C. Division of Water Quality Basinwide Information Management System (BIMS), Phils Creek is classified as WS-II; HQW, NSW in this location. Overall, the five (5) parcels of land comprising the Bank Parcel total approximately 229 acres, with the proposed nutrient offset restoration area of approximately 11.8 acres (**Figure 2**). Please note the parcel and parcel area information listed above is measured from Orange County GIS records. The actual area of the proposed nutrient offset restoration will be finalized upon completion of the survey of the conservation easement within the Bank Parcel.

This Bank Parcel shall be established under the terms and conditions of the Cape Fear Basin Riparian Buffer and Nutrient Mitigation Umbrella Bank (Bank) made and entered into by Earthmark North Carolina, LLC [(EM) formerly known as Mid-Atlantic Mitigation, LLC], acting as the Bank Sponsor, and the North Carolina Department of Environment and Natural Resources - Division of Water Quality (DWQ).

2.0 Project Area - Existing Conditions

2.1 Geologic & Soil Characteristics

Based upon review of the United States Geological Survey (USGS) White Cross, North Carolina Quadrangle, the proposed Bank Parcel is located in the headwaters of Phils Creek with elevations ranging from \pm 470-feet to \pm 580-feet. Topographic relief and surface drainage is generally northeast for the parcels along Carl Durham Road and northwest for the parcel along Old Greensboro Road (**Figure 3**).

The Bank Parcel is located within the Piedmont Physiographic Province of North Carolina, specifically within the Carolina Slate Belt ecoregion. A review of the Ecoregions of North Carolina and South Carolina (Griffith *et al.*, 2002) shows the geology in the area of the property is comprised of “mineral-rich metavolcanic and metasedimentary rocks with slately cleavage,” which is finer grained and less metamorphosed than other eco-regions within the Piedmont. It is also common for streams to dry up, along with low yielding wells.

The Soil Survey of Orange County, North Carolina (Soil Conservation Service, 1977) lists the soils within the property as from the Appling-Helena Association. As stated in the soil survey, these soils can be generally classified as “gently sloping and sloping, well-drained and moderately well-drained soils that have a surface layer of sandy loam and a subsoil of

sandy clay loam, clay, or sandy clay; on uplands.” As described by the online USDA NRCS Official Soil Series Descriptions (OSD), the specific soils within the project area (**Figure 4**) are shown below in Table 1:

Table 1. Mapped Soils within the Ivey-Ferguson Bank Parcel

Soil Type	Hydrologic Soil Group	General Description
Appling (ApB & ApC)	HSG B	The series consists of well drained, moderately permeable soils on ridges and side slopes of the Piedmont uplands. They are deep to saprolite and very deep to bedrock. Based on the classifications for this site, the slopes will range from 2 to 10 percent.
Congaree (Cp)	HSG B	The Congaree series consists of well drained, moderately permeable soils that formed in loamy alluvium and are on flood plains or at the base of slopes in the Piedmont. Based on the classifications for this site, the slopes will range from 0 to 2 percent.
Enon (EnC)	HSG C	The Enon series consists of very deep, well drained, slowly permeable soils on ridgetops and side slopes in the Piedmont. Based on the classifications for this site, the slopes will range from 2 to 6 percent.
Lignum (Lg)	HSG C	Soils of the Lignum series are moderately well drained, slowly permeable soils that formed in the residuum weathered from Carolina slate. Based on the classifications for this site, the slopes will range from 0 to 3 percent.
Wedowee (WmE)	HSG B	The Wedowee series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered from felsic igneous and metamorphic rocks of the Piedmont uplands. Based on the classifications for this site, the slopes will range from 8 to 15 percent.

2.2 Vegetative Communities

Vegetative communities within the Bank Parcel for those parcels located along Carl Durham Road are primarily pasture land. Pasture land areas are subject to periodic mowing, crop production (i.e. hay production), and cattle grazing. Pasture vegetation is a mixture of grasses and herbaceous species. The dominant grasses tend to be Johnson grass (*Sorghum halepense*), bermuda grass (*Cynodon dactylon*) and various fescue species (*Festuca* sp.). There are some locations along the unnamed tributaries in which there is a forest fringe. Due to historic agricultural activities surrounding the unnamed tributaries, these fringe forested areas have been impacted by cattle grazing, and as a result, are fairly immature. Based on the remaining vegetative assemblages, the forest fringe areas are generally characterized as Piedmont Bottomland Forest, according to the North Carolina Natural Heritage Program (NHP) classification system (Schafale and Weakley, 1990). There is an abundance of early succession species such as loblolly pine (*Pinus taeda*), sweet gum (*Liquidambar styraciflua*), and red maple (*Acer rubrum*). Most notable is the presence of non-native invasive species

such as multiflora rose (*Rosa multiflora*) and Chinese privet (*Ligustrum sinense*), which are indicative of a disturbed forest community. Typical dominant tree species within the Bank Parcel include various oak species (*Quercus* spp.), river birch (*Betula nigra*), sycamore (*Plantanus occidentalis*), American elm (*Ulmus americana*), American beech (*Fagus grandifolia*), tulip poplar (*Liriodendron tulipifera*), various hickory species (*Carya* spp.), loblolly pine, red maple, sweet gum. Dominant groundcover and secondary canopy layer species consist of common greenbriar (*Smilax rotundifolia*), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), American holly (*Ilex opaca*), red cedar (*Juniperus virginiana*), various viburnum species (*Viburnum* spp.), Christmas fern (*Polystichium acrostichoides*), Indian wood-oats (*Chasmanthium latifolium*), New York fern (*Thelypteris noveboracensis*), and netted chain fern (*Woodwardia aerolata*).

Vegetative communities within the Bank Parcel for the parcel located along Old Greensboro Road can be grouped into two distinct vegetative communities. These two vegetative communities can be generally characterized as a Piedmont Alluvial Forest, according to the NHP classification system and pasture land. Pasture land areas are subject to periodic mowing, crop production (i.e. hay production), and cattle grazing. Pasture vegetation is a mixture of grasses and herbaceous species. The dominant grasses tend to be Johnson grass, bermuda grass and various fescue species. Adjacent to the pasture land areas are Piedmont Alluvial Forest communities. The fringe of these communities have been disturbed due historic clearing activities and/or cattle grazing. As a result, there are non-native invasive species such as multiflora rose and Chinese privet located within the fringe of these communities. Dominant species noted within these communities include various oak species, black walnut (*Juglans nigra*), river birch, American elm, American beech, tulip poplar, various hickory species, loblolly pine, red maple, and sweet gum. Dominant groundcover and secondary canopy layer species consist of common greenbriar, poison ivy, Virginia creeper, American holly, spicebush (*Lindera benzoin*), fetterbush (*Leucothoe recurva*), Christmas fern, Indian wood-oats, and rattlesnake fern (*Botrychium virginianum*).

2.3 Threatened and Endangered Species

Some populations of plants and animals are declining because of natural forces or their inability to coexist with human activity. Plants and animals with Threatened or Endangered status are protected under the Endangered Species Act (ESA) of 1973 (16 US 1531 et seq.). According to the U.S. Fish and Wildlife Service (USFWS) web page (<http://www.fws.gov/nc-es/es/countyfr.html>); accessed September 3, 2010) the following species are listed as having federal protection in Orange County: red-cockaded woodpecker (*Picoides borealis*), Michaux's sumac (*Rhus michauxii*), and smooth coneflower (*Echinacea laevigata*). The bald eagle (*Haliaeetus leucocephalus*) is also listed as occurring in Orange County and is protected under the Bald and Golden Eagle Protection Act (BGPA) of 2008 (16 US 668-668c).

EcoEngineering conducted field surveys by walking transects within the Bank Parcel area. The objective of the field surveys was to determine the presence of federally Threatened or Endangered species within the Bank Parcel area. There were no federally Threatened or Endangered species observed during the field surveys. A bald eagle was observed on the Bank Parcel; however, there were no bald eagle nests observed within the Bank Parcel. The proposed activities associated with the development of the Bank Parcel do not include clearing activities. The inherent work does not result in habitat destruction or modification for the above listed federally Threatened or Endangered species, or the bald eagle. Therefore, it is reasonable to conclude the proposed work will have No Effect on Threatened and Endangered species, or the bald eagle.

3.0 Proposed Nutrient Offset Restoration Plan

Pasture lands located outside forested areas within the Bank Parcel area will be ripped and scarified prior to vegetation planting activities. The established microtopography on leveled surfaces will promote diffuse flow and surface water storage. In addition, subsurface hardpans will be eliminated to promote vegetation growth/survival and to increase groundwater recharge rates. Grasses may be treated with herbicide to reduce competition with planted species. Where necessary, invasive species will also be treated with herbicide to ensure they do not become dominant within the Bank Parcel, or hinder the establishment, growth and survival of planted vegetation. Cattle grazing will not be permitted within the Bank Parcel; and therefore, fencing will be erected as necessary to prevent cattle access.

The proposed riparian planting plan will be developed by integrating native plant species observed within the Bank Parcel area, in addition to selected species known to inhabit the Piedmont Alluvial Forest community type as described in Classification of the Natural Communities of North Carolina (Schafale and Weakley, 1990) and procedures outlined in Guidelines for Riparian Buffer Restoration (NCEEP 2004) to institute species diversity. The restored riparian zone will be planted with bare root seedlings or containerized material. Bare root seedlings, or containerized material, will be planted during the fall or early spring seasons. During the following fall, supplemental shrub and tree species will be planted if survival rates of previously planted seedlings are below target densities as determined in late summer (August-September).

The planting plan will consist of individual hardwood tree and shrub species as listed in the table below. The goal is to plant 436 to 681 trees and shrubs per acre, with an approximate 8-foot to 10-foot spacing. Plant composition will consist of at a minimum of at least six (6) of the tree species and three (3) of the shrub species list.

Table 2. Plant List

Scientific Name	Common Name
Trees	
<i>Fraxinus pennsylvanica</i>	green ash
<i>Platanus occidentalis</i>	sycamore
<i>Quercus pagoda</i>	cherrybark oak
<i>Betula nigra</i>	river birch
<i>Quercus nigra</i>	water oak
<i>Quercus lyrata</i>	overcup oak
<i>Quercus michauxii</i>	swamp chestnut oak
<i>Quercus phellos</i>	willow oak
<i>Quercus laurifolia</i>	laurel oak
<i>Ulmus americana</i>	American Elm
<i>Liriodendron tulipifera</i>	tulip poplar
Small Trees and Shrubs	
<i>Cornus florida</i>	flowering dogwood
<i>Myrica cerifera</i>	wax myrtle
<i>Aesculus sylvatica</i>	painted buckeye
<i>Ilex opaca</i>	American holly
<i>Carpinus caroliniana</i>	ironwood
<i>Magnolia virginiana</i>	sweet bay
<i>Aronia arbutifolia</i>	red chokeberry

* Species composition may be adjusted based on local availability.

Temporary and permanent native herbaceous seed will be applied simultaneously to existing pasture land areas located outside forested areas within the Bank Parcel area. Temporary seed will provide cover until the permanent seed applied becomes established. Temporary cover will consist of millet (*Echinochloa crusgalli*), annual rye grain (*Secale cereale*), and crimson clover (*Trifolium incarnatum*). Permanent ground cover will consist of switchgrass (*Panicum virgatum*), deertongue (*Panicum clandestinum*), black-eyed susan (*Rudbeckia hirta*), and riverbank wildrye (*Elymus riparius*).

4.0 Monitoring and Maintenance Plan

The Bank Parcel site will be monitored for five (5) consecutive years or until the required success criteria has been met as determined by DWQ. Monitoring activities will begin immediately following the completion of planting in order to alleviate any potential problems as they occur. Supplemental planting and additional site modifications will be implemented if necessary. Planting will likely occur in the Fall of 2010; therefore, the riparian restoration will be monitored the following growing season, projected to be the Summer of 2011. Monitoring activities will follow the terms and conditions of the Cape Fear Basin Riparian Buffer and Nutrient Mitigation Umbrella Bank (Bank) made and entered into by EM, acting as the Bank Sponsor, and DWQ.

Vegetation will be monitored annually for five (5) consecutive years after the first full growing season. A monitoring report will be submitted annually to DWQ no later than December 31 of each monitoring year describing the conditions of the Bank Parcel and relating those conditions to the success criteria.

The Bank Parcel site will contain approximately 9 vegetative monitoring plots, with the total area not exceeding two (2) percent of the proposed nutrient offset restoration area. The plots will be monitored in accordance with the CVS-EEP Protocol for Recording Vegetation (CVS-EEP, v4.2). Ten (10) by ten (10) meter square plots will be permanently established following completion of the planting phase and at least two opposing corners will be permanently installed and surveyed for future use. The plant species, density, survival rates, and the cause of mortality, if identifiable, will be recorded within each plot. Vegetation plots will be sampled and reported annually. The primary focus of the vegetative monitoring will be solely on the tree and shrub stratum, although herbaceous species encountered may also be recorded.

The target density for the nutrient offset restoration area is a minimum of 320 trees and shrubs per acre at the end of the five (5) year monitoring period. Vegetation monitoring will occur between August and October. A determination will be made regarding the success of the project following the collection and evaluation of ecological and physical monitoring data, photographs, and site observations.

5.0 Nutrient Offset Mitigation Potential

The Ivey-Ferguson Bank Parcel will provide nutrient mitigation credits for development impacts within the Upper New Hope Arm of the B. Everett Jordan Lake watershed (i.e. the service area). It is expected to provide land of varying widths along approximately 2,700 ft of stream within the Bank Parcel boundary. Approximately 12 acres of the 14 acres will be used to generate nutrient offset credits for nitrogen and phosphorus. The exact amount of nutrient offset mitigation potential (currently based on 2,273 lbs of nitrogen/ac and 146.4 lbs of phosphorus/ac of riparian buffer restoration) will be finalized upon completion of the survey of the conservation easement within the Bank Parcel and will be included in the Bank Ledger.

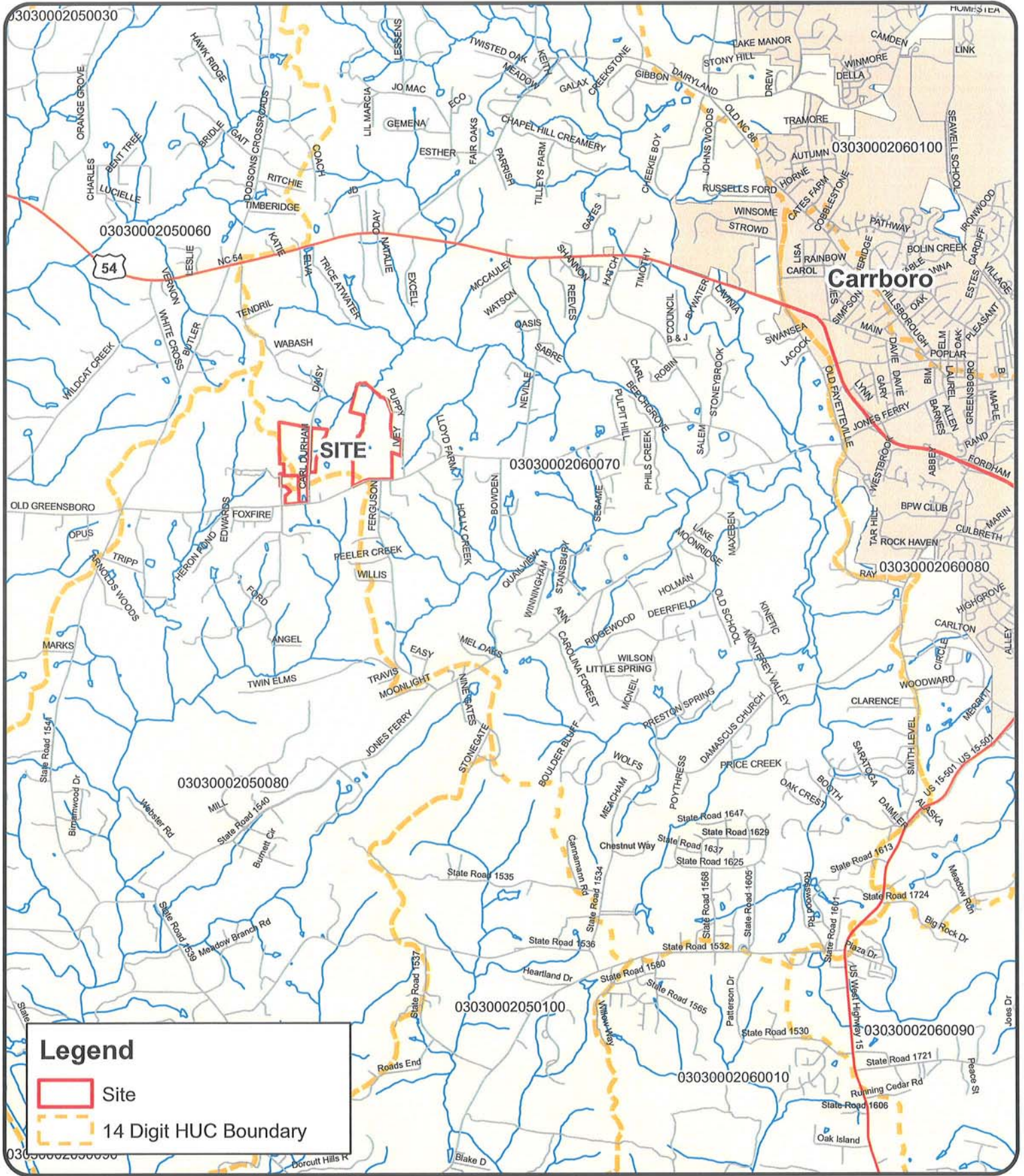
Please note this Bank Parcel is not intended to function for buffer mitigation impacts. It will only be used for nutrient offsets.

6.0 References

- Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafle, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B., 2002, Ecoregions of North Carolina and south Carolina, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,00).
- Lee Michael T., Peet Robert K., Roberts Steven D., and Wentworth Thomas R., 2008. CVS-EEP Protocol for Recording Vegetation Level 1-2 Plot Sampling Only. Version 4.2
- North Carolina Ecosystem Enhancement Program (NCEEP) 2004. *Guidelines for Riparian Buffer Restoration*. Available at internet site: <http://www.nceep.net/news/reports/buffers.pdf>. Accessed September, 2010.
- Schafale MP and AS Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment and Natural Resources. Raleigh, North Carolina.
- United States Department of Agriculture, Natural Resources Conservation Service. *Official Soil Series Description (OSD) with Series Extent Mapping Capabilities*. Available at internet site: <http://soils.usda.gov/technical/classification/osd/index.html>. Accessed September, 2010.
- United States Department of Agriculture, Soil Conservation Service. Soil Survey of Orange County, North Carolina, 1977.
- United States Geological Survey, 7.5 Minute, Topographic Map of the White Cross, North Carolina Quadrangle, 1981.

APPENDIX A

Site Maps

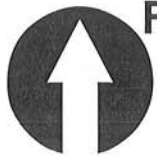


Legend

 Site

 14 Digit HUC Boundary

FIGURE 1 - SITE LOCATION MAP



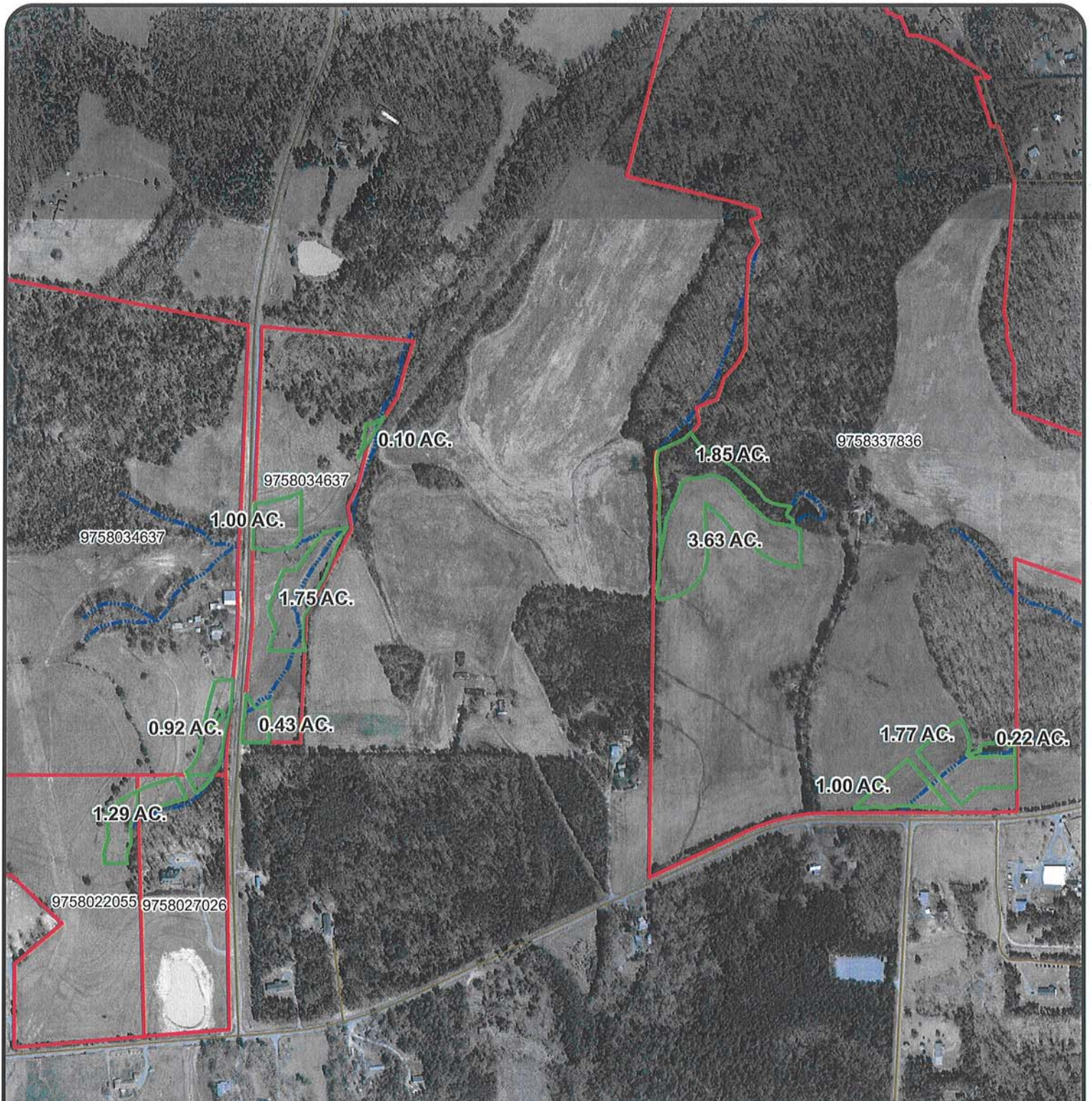
0 0.5 1 2 Miles

1 inch equals 1 miles



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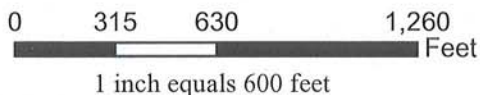
Note

A) Bank Parcel will only be used for nutrient offset mitigation. Bank Parcel is not intended to function for buffer mitigation impacts.
 B) The exact amount of nutrient offset mitigation potential will be finalized upon completion of the survey of the conservation easement.

Legend

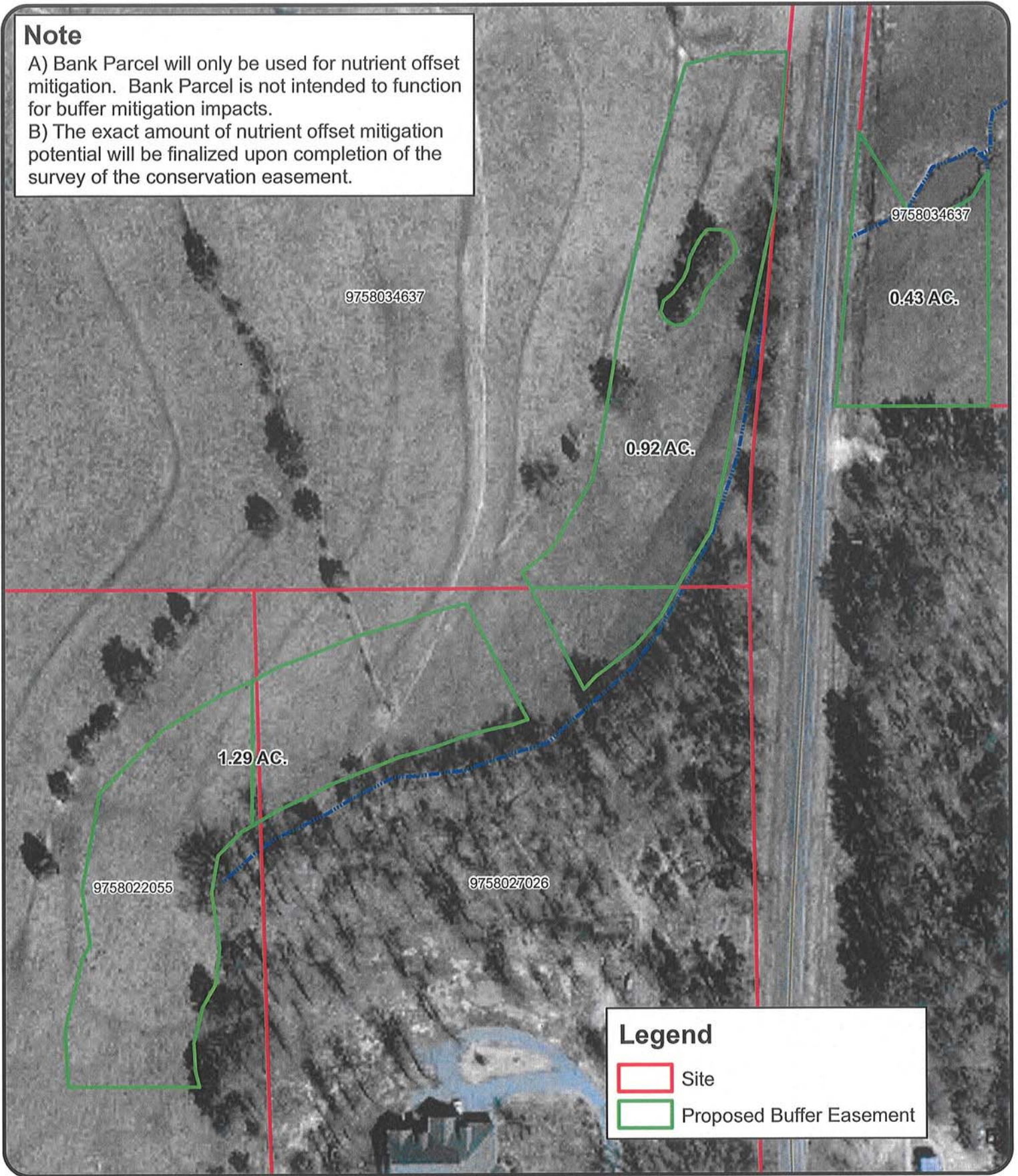
- Site
- Proposed Buffer Easement

FIGURE 2 - PROPOSED NUTRIENT OFFSET RESTORATION AREA

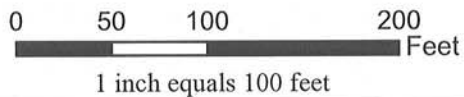


Note

A) Bank Parcel will only be used for nutrient offset mitigation. Bank Parcel is not intended to function for buffer mitigation impacts.
B) The exact amount of nutrient offset mitigation potential will be finalized upon completion of the survey of the conservation easement.



**FIGURE 2A - PROPOSED NUTRIENT
OFFSET RESTORATION AREA**

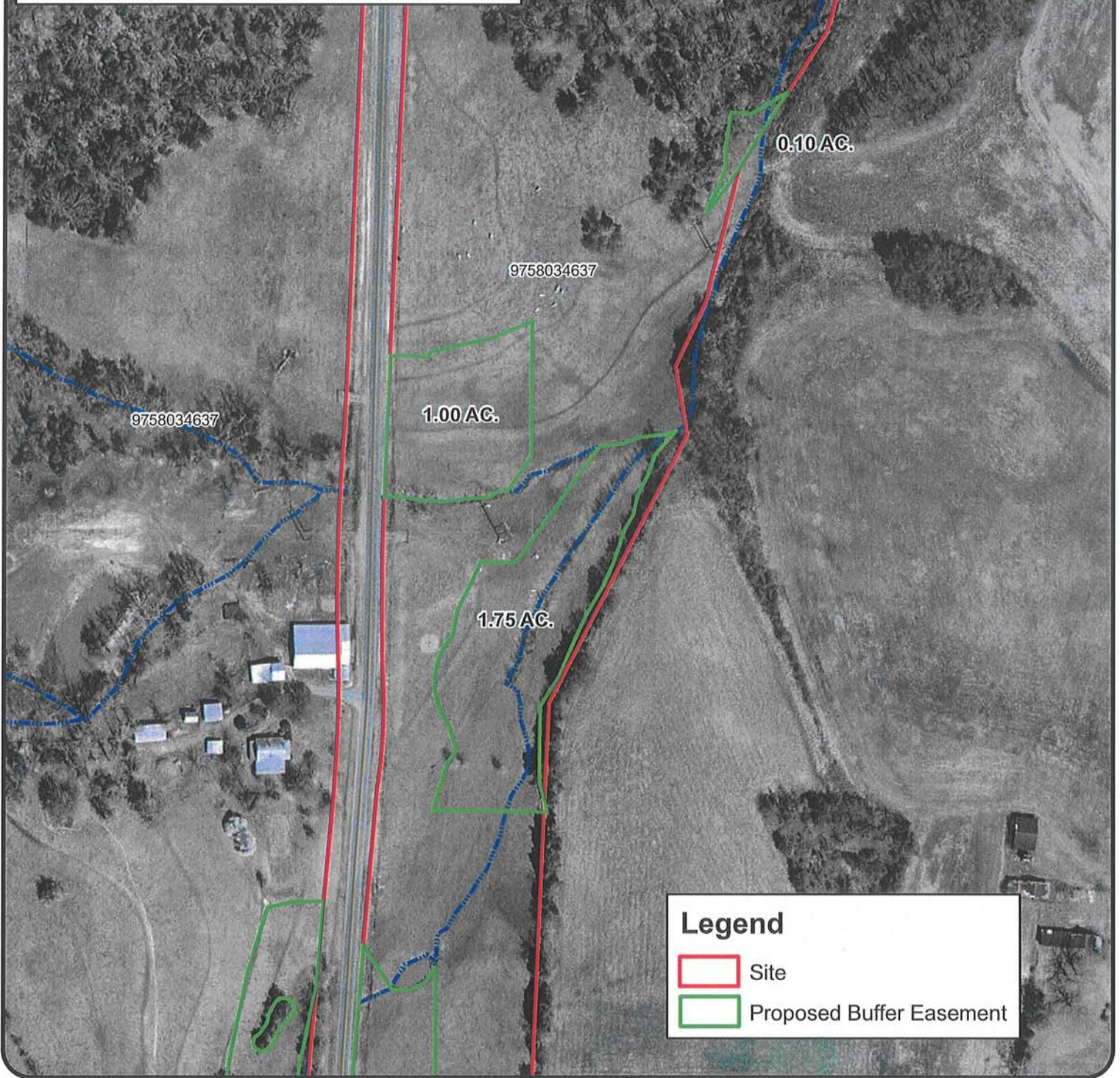


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Note

A) Bank Parcel will only be used for nutrient offset mitigation. Bank Parcel is not intended to function for buffer mitigation impacts.

B) The exact amount of nutrient offset mitigation potential will be finalized upon completion of the survey of the conservation easement.



**FIGURE 2B - PROPOSED NUTRIENT
OFFSET RESTORATION AREA**



0 100 200 400
Feet

1 inch equals 200 feet

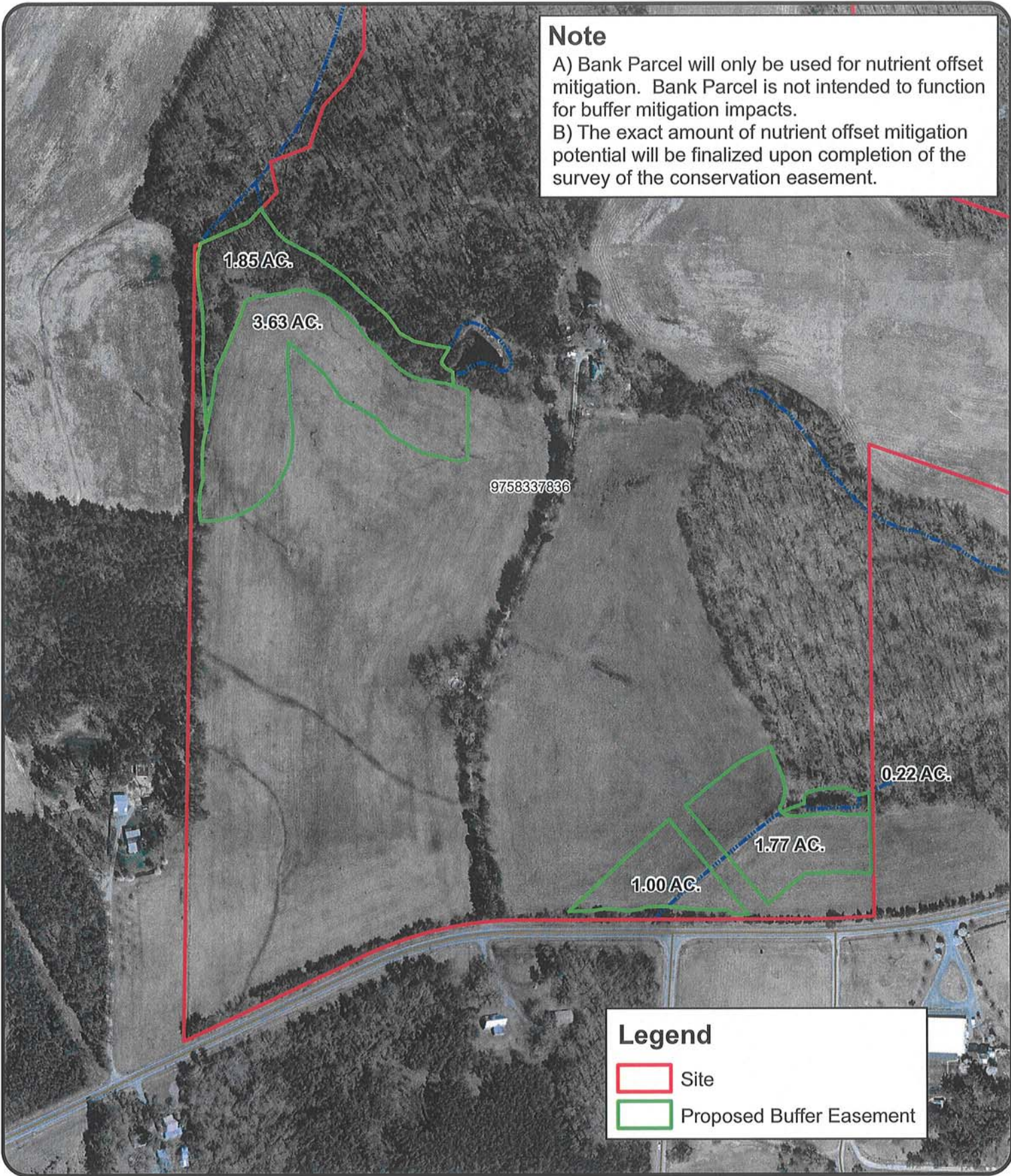


EcoEngineering

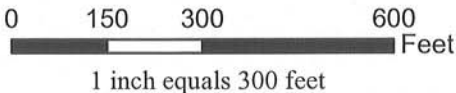
A division of The John R. McAdams Company, Inc.

Note

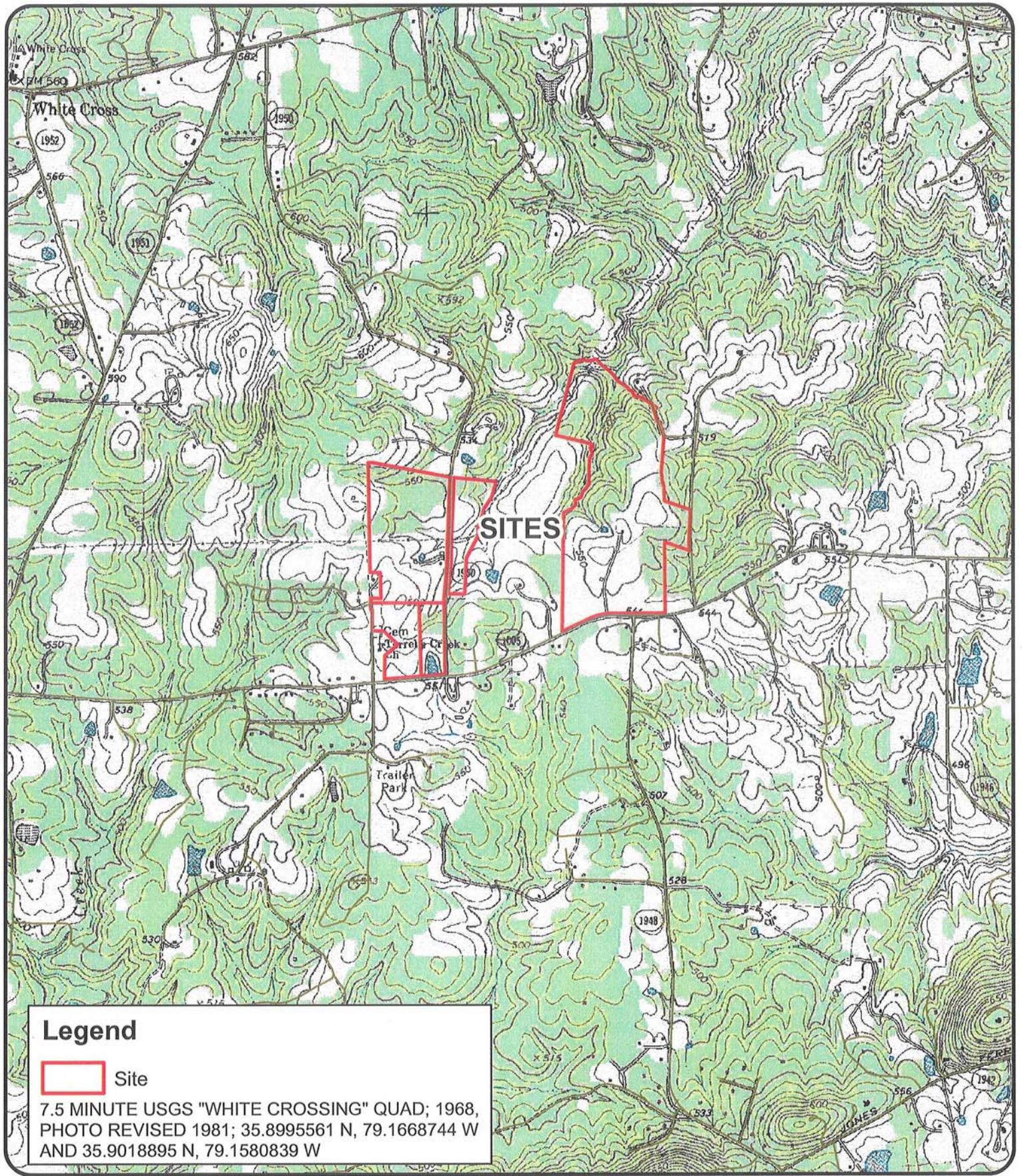
A) Bank Parcel will only be used for nutrient offset mitigation. Bank Parcel is not intended to function for buffer mitigation impacts.
B) The exact amount of nutrient offset mitigation potential will be finalized upon completion of the survey of the conservation easement.



**FIGURE 2C - PROPOSED NUTRIENT
OFFSET RESTORATION AREA**



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Legend

 Site

7.5 MINUTE USGS "WHITE CROSSING" QUAD; 1968,
 PHOTO REVISED 1981; 35.8995561 N, 79.1668744 W
 AND 35.9018895 N, 79.1580839 W

**FIGURE 3 - USGS QUAD
 - WHITE CROSS**



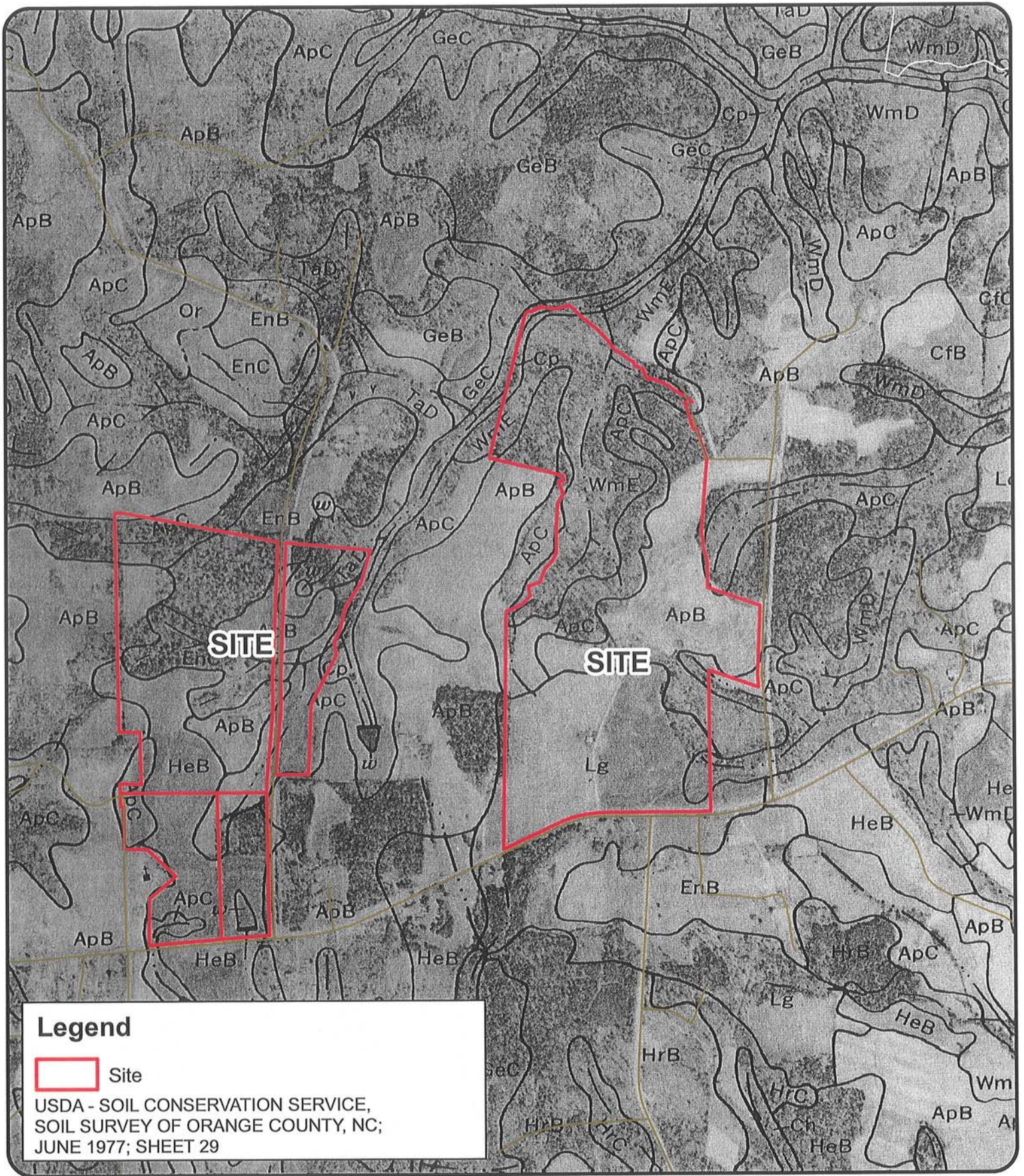
0 1,000 2,000 4,000 Feet

1 inch equals 2,000 feet



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**FIGURE 4 - ORANGE COUNTY
SOILS SURVEY**



0 500 1,000 2,000 Feet
1 inch equals 1,000 feet



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APPENDIX B
Site Photographs



Photo 1: Existing conditions facing east on PIN # 9758034637 within the southwestern corner of parcel (August 13, 2009).



Photo 2: Existing conditions facing southwest on PIN # 9758034637 within the central portion of parcel (August 13, 2009).



Photo 3: Existing conditions facing southwest on PIN # 9758022055 within the northeastern section of parcel (August 13, 2009).



Photo 4: Existing conditions facing east on PIN # 9758027026 within the northwestern section of parcel (August 13, 2009).



Photo 5: Existing conditions facing north on PIN # 9758034637 within the southeastern section of parcel (August 13, 2009).



Photo 6: Existing conditions facing west on PIN # 9758337836 within the western section of parcel adjacent to existing forest (August 13, 2009).