

RES Cape Fear Umbrella Mitigation Bank

PROSPECTUS

Cape Fear River Basin
HUC 03030002



Prepared by: Resource Environmental Solutions, LLC

Bank Sponsor: Environmental Banc & Exchange, LLC
302 Jefferson Street, Suite 110
Raleigh, NC 27605
919-209-1056



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1 INTRODUCTION

1.1 Project Description

Environmental Banc & Exchange, LLC (“EBX”), a wholly owned subsidiary of Resource Environmental Solutions, is pleased to propose the RES Cape Fear Umbrella Mitigation Bank (the “Bank”). The proposed umbrella structure of the Bank is designed to initially permit two mitigation sites, and establish the umbrella banking instrument for future mitigation sites. The first two sites are Dairyland and Cloud and Banner, and are identified as having potential to help meet the compensatory mitigation requirement for stream and/or wetland impacts in hydrologic unit 03030002 of the Cape Fear River Basin.

1.1.1 Dairyland

The Dairyland Stream Mitigation Project is located in Hillsborough, NC and contains two parcels totaling 31-acres of conservation easement in southwestern Orange County, NC. Hudson Branch and two unnamed tributaries (including two ponds) begin at the northern part of the project area, cross Dairyland Road, and drain south to Watery Fork. The project area exhibits diminished hydrology and habitat value as a result of past and on-going agricultural activities and ditching.

The proposed site involves the restoration and enhancement of Hudson Branch, Watery Fork, and two unnamed tributaries (UT) that have been disturbed by agricultural activities and historic cattle grazing. The conceptual design presents 7,725 linear feet of stream mitigation generating 5,330 Stream Mitigation Units (SMU). In addition to the stream restoration, the Dairyland project is proposing to provide up to 13.74 acres of nutrient offset mitigation through the NC Division of Water Resources (NCDWR) Jordan Lake Watershed Riparian Buffer Mitigation program.

1.1.2 Cloud and Banner

The Cloud and Banner Stream Mitigation Project is located in Mebane, NC and contains one parcel totaling 56.45 acres of conservation easement in eastern Alamance County, NC. The main hydrologic features include Back Creek and four UTs to Back Creek. The project area exhibits diminished habitat value as a result of past agricultural activities, ditching, and hydrologic alterations. Several pockets of disturbed wetlands occur on site, which are mostly characterized by herbaceous vegetation.

The proposed site involves the restoration and enhancement of Back Creek and unnamed tributaries that have been disturbed by agricultural activities and historic cattle grazing. The conceptual design presents 7,432 linear feet of stream mitigation generating 4,801 SMUs, and 11.95 acres of wetland mitigation generating 3.54 Wetland Mitigation Units (WMUs).

1.2 Project Location

The Dairyland Site is located in Orange County approximately eight miles southwest of Hillsborough, NC (**Figure 1**). The GPS coordinates of the site are 35.979167°N and -79.1875°W. To access the Site from the county seat of Hillsborough, travel south approximately 8.1 miles on Orange Grove Road, and turn left onto Dairyland Road.

The Cloud & Banner Site is located in Alamance County approximately three miles north of Mebane, NC (**Figure 1**). The GPS coordinates of the site are 36.1408337°N and -79.268611°W. To access the Site from the city of Mebane, travel north approximately 3 miles on North NC Highway 119.

1.3 Service Area

The Umbrella Bank will provide mitigation credits to offset unavoidable impacts to stream resources within the Cape Fear 02 River Basin (8-digit USGS HUC 03030002).

The Dairyland Site is located within the Haw River Basin and Jordan Lake Watershed (8-digit USGS HUC 03030002, 14-digit USGS 03030002050030). The project drainage area is primarily characterized by agriculture, forests, and low-intensity residential areas. Land use at the site is characterized by row crop production, pasture, and disturbed forest. Riparian zones are primarily composed of herbaceous vegetation and scattered trees located adjacent to site streams.

The Cloud and Banner Site is located within the Haw River Basin and Jordan Lake Watershed (8-digit USGS HUC 03030002, 14-digit USGS 03030002030070). The project drainage area is primarily characterized by agriculture, forests, and low-intensity residential areas. Land use at the site is characterized by recently abandoned pasture, hayfields, and disturbed forest.

1.4 Identified Watershed Needs

The North Carolina Division of Mitigation Services (DMS) develops River Basin Restoration Priorities (RBRP) to guide its restoration activities within each of the state's 54 cataloging units. The Cape Fear is one of four river basins entirely contained within North Carolina's borders. The 2009 Cape Fear River Basin RBRP identified several restoration needs for the entire Cape Fear River Basin, as well as for HUC 03030002, specifically. The Haw River is the major river in the HUC 03030002; this river and its tributaries flow to B. Everett Jordan Lake, a drinking water supply. This supply has been designated a Nutrient Sensitive Water and NCDWR has developed a set of rules to reduce non-point source pollution. Goals include promoting nutrient and sediment reduction in agricultural and urban areas by restoring and preserving streams, wetlands, and riparian buffers.

The proposed Bank is designed to help meet these goals. The projects will address stressors identified in the watershed through nutrient removal, sediment removal, runoff filtration, and improved aquatic and terrestrial habitat. These project goals will be achieved through stream enhancement and restoration.

1.5 Purpose and Objectives

The purpose of the proposed Bank is to generate compensatory mitigation credits for inclusion in the RES Cape Fear Umbrella Mitigation Bank in the Cape Fear River Basin.

The project goals address stressors identified in the watershed, and include the following:

- Nutrient removal,
- Sediment removal,
- Invasive species removal,
- Filtration of runoff, and
- Improved aquatic and terrestrial habitat.

The project goals will be addressed through the following project objectives:

- Elimination and control of exotic invasive species,
- Restoration of riparian forested stream buffers,
- Stabilization of eroding stream banks due to lack of vegetation,
- Addition of large woody debris such as log vanes, log weirs, and root wads

- Restoration of appropriate pattern, dimension, and profile in stream channels.
- Restoration of bottomland hardwood habitats, and
- Enhancement of hydrology in existing wetlands.

1.6 Technical Feasibility

The technical feasibility of the bank is assured due to RES' extensive experience with stream and wetland restoration and enhancement in North Carolina and throughout the Southeast. Examples of EBX's success with stream restoration and enhancement include Neu-Con Umbrella Mitigation Bank sites: specifically, the Marston, Nahunta, and Westbrook sites. The absence of fatal flaws such as hydrologic trespass, and the absence of threatened and endangered species and their habitats mean the project is unlikely to be impeded by resource issues, or by objections from landowners.

1.7 Site Ownership

The land required for the construction, management, and stewardship of these mitigation projects includes portions of the parcels listed in **Table 1**. The Cloud and Banner Site will be a fee simple purchase.

Table 1.

Bank Site	Landowner	PIN	County	Deed Book & Page Number	Parcel Acreage	Protected Acreage
Dairyland	Susan Snipes Nichols & Karen Snipes Sexton	9841407922	Orange	6064/122	176.85	22.73
Dairyland	Susan Snipes Nichols & Karen Snipes Sexton	9840590356	Orange	6064/122	101.44	8.23
Cloud and Banner	Colonel Land, LLC	9827-00-2518	Alamance	3447/752	85.14	56.45

2 QUALIFICATIONS

2.1 Bank Sponsor

Both Sites shall be established under the terms and conditions of the RES Cape Fear Umbrella Mitigation Bank made and entered into by Environmental Banc & Exchange, LLC (EBX), acting as the Bank Sponsor.

Company Name: Environmental Banc & Exchange, LLC
 Company Address: 302 Jefferson Street, Suite 110, Raleigh, NC 27605
 Contact Name: Daniel Ingram
 Telephone: (919) 209-1056
 Email: dingram@res.us

2.2 Bank Sponsor Qualifications

Resource Environmental Solutions, LLC (RES) was founded in February 2007 and grew organically from its roots restoring Louisiana wetlands to deliver mitigation solutions across Louisiana, Texas, Pennsylvania,

West Virginia, Maryland, Virginia, North Carolina and South Carolina. In December 2014, RES acquired industry pioneer Environmental Banc & Exchange, LLC (EBX), expanding the RES knowledge base and geographic and technical delivery capabilities.

RES develops and supplies ecological offsets to help public and private sector clients obtain required permits for unavoidable, project-related impacts to wetlands, streams, and habitats. RES helps clients proactively manage risk from operations in environmentally sensitive areas by providing proactive impact analyses, streamlining permitting processes, and limiting liability and regulatory exposure.

- RES is the premier provider of ecological offset solutions in the US
- RES founded in 2007 / EBX founded in 1997
- 110 mitigation sites permitted/in process
- Conservation easements protecting roughly 400 sites
- 32,000 restored wetland acres
- 4,000 acres of custom mitigation solutions
- 155 miles of stream restoration
- Reduced over 240 tons of nutrients
- Rehabilitated and preserved over 3,700 acres of endangered species habitats

In North Carolina, RES and its affiliated companies have won over \$70 million in mitigation contracts with North Carolina state agencies. With a regional office in Raleigh staffed with full-time professionals, RES has the ability to carry out existing projects, as well as secure and carry out new projects and banks in the State. A few representative projects implemented by RES are presented below.

Neu-Con Umbrella Mitigation Bank (North Carolina): One of the first approved wetland and stream banks in North Carolina. The service area of the Bank is the entire Neuse River Basin. The Bank was established in April 2001. Initial contract: 22,964 linear feet of stream mitigation units (SMU) sold to North Carolina DOT based on credits produced from 3 stream restoration sites (initiated November 2000; sold all credits in November 2000; design initiated December 2001; construction completed on all sites Spring 2005; monitoring completed on all sites in Fall 2009). Additional sites added starting in 2008.

Chesapeake Wetland Mitigation Bank (City of Chesapeake, Virginia): 545-acre wetland mitigation bank in the Lower James Watershed in Virginia. The service territory of the Bank includes HUCs 02080206 and 02080208. The Bank was established in July 2009. The remainder of the 1,156-acre property will be sold to the Great Dismal Wildlife Refuge (MBI finalized Spring 2009; construction completed Spring 2011; in the monitoring phase).

Conoconnara Swamp Site (Halifax County, North Carolina): 87.0 WMU of wetland restoration and 5,050 SMU of stream restoration (initiated July 2005; construction completed Spring 2007; monitoring completed Fall 2011).

2.3 Consultant

The Designer for the Sites will be W.K. Dickson & Co., Inc (WK Dickson).

Company Name:	W.K. Dickson & Co., Inc.
Company Address:	720 Corporate Center Drive, Raleigh, NC 27607
Contact Name:	Scott Sigmon
Telephone:	(919) 782-0495
Email:	ssigmon@wkdickson.com

2.4 Consultant Qualifications

For more than 80 years, WK Dickson has been providing engineering and consulting services throughout the southeastern United States. WK Dickson is an innovative, diversified organization of 108 professionals serving the total planning and design needs of their clients. WK Dickson has built a reputation of superior client satisfaction, technical competence, innovation, and integrity.

WK Dickson has over ten years of experience with regional stream and wetland mitigation programs. They have participated in a variety of projects related to stream and wetland assessments and mitigation. WK Dickson also has project experience with NC buffer rules, buffer mitigation, and nutrient uptake mitigation. In total, WK Dickson has completed over 16 stream and wetland mitigation projects in North Carolina, and is currently implementing and designing mitigation projects in North Carolina, South Carolina, and Virginia.

3 EXISTING CONDITIONS

3.1 Dairyland

3.1.1 Existing Jurisdictional Waters of the U.S.

Detailed wetland delineation has not been performed. The site will be delineated and approved by the U.S. Army Corps of Engineers (USACE) during the decision phase of the project. The stream channels were classified using NCDWR Resources methodology.

3.1.2 Soil Survey

3.1.2.1 General Soil Characteristics

The Bank Parcel is located within the Piedmont Physiographic region, specifically within the Carolina Slate Belt Ecoregion. The geology of the area is comprised of “mineral rich metavolcanic and metasedimentary rocks,” which is finer grained and less metamorphosed than other ecoregions within the Piedmont. The Soil Survey of Orange County, North Carolina (USDA, 1977) lists the soils within the property from the Georgeville-Herndon-Tatum Association.

3.1.2.2 Site Mapped Soil Series

The Orange County Soil Survey shows three mapping units across the project site. Map units include five soil series (**Figure 3**). The soil series found on the site are described below and summarized in **Table 2**.

Table 2. Mapped Soil Series

Map Unit Symbol	Map Unit Name	Drainage Class	Hydric Status	Hydrologic Soil Group
Ch	Chewacla loam	Somewhat poorly drained	Not Hydric	B/D
HrB	Herndon silt loam, 2 to 6% slopes	Well drained	Not Hydric	B
HrC	Herndon silt loam, 6 to 10% slopes	Well drained	Not Hydric	B
GeB	Georgeville silt loam, 2 to 6 percent slopes	Well drained	Not Hydric	B
GeC	Georgeville silt loam, 6 to 10 percent slopes	Well drained	Not Hydric	B

3.1.3 Endangered/Threatened Species

Plants and animals with a federal classification of endangered or threatened are protected under provisions of Sections 7 and 9 of the Endangered Species Act of 1973, as amended. The US Fish and Wildlife Service (USFWS) database (updated 6 April 2016) lists three endangered species for Orange County, North Carolina: dwarf wedgemussel (*Alasmidonta heterodon*), smooth coneflower (*Echinacea laevigata*), and Michaux's sumac (*Rhus michauxii*) (**Table 3**). The Bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act (BGPA) and prohibits take of bald and golden eagles. No protected species or potential habitat for protected species was observed during preliminary site evaluations.

In addition to the USFWS database, the NC Natural Heritage Program (NHP) GIS database was consulted to determine whether previously cataloged occurrences of protected species were mapped within two miles of the project site. Results from NHP indicate that there are no known occurrences of state threatened or endangered species within a two-mile radius of the project area. Based on initial site investigations, no impacts to state protected species are anticipated as a result of the proposed project.

The proposed project offers some potential to improve or create suitable habitat for several Federal Species of Concern. Habitat may be improved or created for species that require riverine habitat by improving water quality, in-stream and near-stream forage, and providing stable conditions not subject to regular maintenance. The decision phase of the project will include USFWS coordination to confirm these findings.

Table 3. Federally Protected Species in Orange County

Common Name	Scientific name	Federal Status	Habitat Present	Record Status
Vertebrate:				
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGPA	No	Current
Invertebrate:				
Dwarf wedgemussel	<i>Alasmidonta heterodon</i>)	E	No	Current
Vascular Plant:				
Michaux's Sumac	<i>Rhus Michauxii</i>	E	No	Current
Smooth coneflower	<i>Echinacea laevigata</i>	E	No	Current

E = Endangered; BGPA = Bald and Golden Eagle Protection Act

3.1.4 Vegetation

The Dairyland Site is characterized primarily by agricultural land, including row crops, pasture and some patches of disturbed riparian forest. Fields are dominated by corn and soybeans. Vegetation around the ponds and the unbuffered stream reaches (HB1, HB2, HB3, and UT2) is primarily composed of herbaceous vegetation and scattered trees. In general, these riparian zones are disturbed due to regular land management activities related to row-crop production. Tree species include red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), American sycamore (*Platanus occidentalis*), black locust (*Robinia pseudoacacia*), willow oak (*Quercus phellos*), and sourwood (*Oxydendron arboreum*). The vegetation along reaches UT1, WF1, and WF2 have a more developed tree stratum along the banks. Exotic species, including Chinese privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*) are also present throughout, especially along UT1.

3.1.5 Cultural Resources

Cultural resources include historic and archeological resources located in or near the project area. RES completed a preliminary survey of cultural resources to determine potential project impacts. A review of the North Carolina State Historic Preservation Office (SHPO) GIS Web Service database revealed three historic sites within a half mile of the proposed project area (Cane Creek Church and Cemetery, Reynolds-Snipes House, and Snipes House). The proposed project will not have any adverse effects to historical structures or viewsheds. In addition, the majority of the site has historically been disturbed due to agricultural practices and channel modifications.

RES will submit a request to the NC State Historic Preservation Office (SHPO) to search records to determine the presence of any areas of architectural, historic, or archaeological significance that may be affected by the Dairyland Mitigation Site.

3.1.6 Constraints

There are no major constraints to construction of the Site. The Site is readily accessible from Dairyland Road and Orange Grove Road. There are two existing crossings at Dairyland Road and the restoration design will also include two stream crossings. There is currently a gas easement that runs through the property south of Dairyland Road that will be excluded from the conservation easement. Inspection of the FEMA Flood Insurance Rate Map indicates that a portion of Watery Fork and associated floodplains are located within a Zone AE flood area, but no portion of the project is located within a FEMA floodway. A hydrologic analysis will be completed on the existing and proposed conditions of this reach. It is not anticipated that a No-Rise or a Conditional Letter of Map Revision (CLOMR) will need to be prepared for the site (**Figure 5**).

3.2 Cloud and Banner

3.2.1 Existing Jurisdictional Waters of the U.S.

Detailed wetland delineation has not been performed. The site will be delineated and approved by the USACE during the decision phase of the project. The stream channels were classified using NCDWR methodology. Hydric soil areas within the proposed enhancement areas will be verified and mapped through auger borings by a licensed soil scientist.

3.2.2 Soil Survey

3.2.2.1 General Soil Characteristics

The Bank Parcel is located within the Piedmont Physiographic region, specifically within the Southern Outer Piedmont Ecoregion. The physiography of the ecoregion is mostly characterized by hills, ridges and irregular plains. Streams generally have a low to moderate gradient with cobble, gravel, and sandy substrates. The Soil Survey of Alamance County, North Carolina (USDA, 1977) lists the soils within the property from the Appling-Helena, Chewacla-Congaree, and Georgeville-Herndon Associations.

3.2.2.2 Site Mapped Soil Series

The Alamance County Soil Survey shows three mapping units across the project site. Map units include soil series (**Figure 7**). The soil series found on the site are described below and summarized in **Table 4**.

Table 4. Mapped Soil Series

Map Unit Symbol	Map Unit Name	Drainage Class	Hydric Status	Hydrologic Soil Group
AbB2, AbC2, AdD2	Appling	Well drained	Not Hydric	B
Cd	Chewacla	Somewhat poorly drained	Not Hydric	B/D
Cg	Congaree	Moderately well drained	Not Hydric	C
GaD, GbD3	Georgeville	Well drained	Not Hydric	B
HbC2	Helena Coarse Sandy Loam	Moderately well drained	Not Hydric	C
HcB2	Helena Sandy Loam	Moderately well drained	Not Hydric	D
Lc	Local alluvial land	Poorly drained	Hydric	D
Md	Mixed alluvial land	Well drained	Not Hydric	A
WbC, WbD, WbD2, WbE, WcD	Wilkes	Well drained	Not Hydric	D

3.2.3 Endangered/Threatened Species

Plants and animals with a federal classification of endangered or threatened are protected under provisions of Sections 7 and 9 of the Endangered Species Act of 1973, as amended. The US Fish and Wildlife Service (USFWS) database (updated 6 May 2016) lists no endangered species for Alamance County, North Carolina. The Bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act (BGPA) and prohibits take of bald and golden eagles (**Table 5**). No protected species or potential habitat for protected species was observed during preliminary site evaluations.

In addition to the USFWS database, the NC Natural Heritage Program (NHP) GIS database was consulted to determine whether previously cataloged occurrences of protected species were mapped within two miles of the project site. Results from NHP indicate that there are no known occurrences of state threatened or endangered species within a two-mile radius of the project area. Based on initial site investigations, no impacts to state protected species are anticipated as a result of the proposed project.

The proposed project offers some potential to improve or create suitable habitat for several Federal Species of Concern. Habitat may be improved or created for species that require riverine habitat by improving water quality, in-stream and near-stream forage, and providing stable conditions not subject to regular maintenance. The decision phase of the project will include USFWS coordination to confirm these findings.

Table 5. Federally Protected Species in Alamance County

Common Name	Scientific name	Federal Status	Habitat Present	Record Status
Vertebrate:				
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGPA	No	Current

BGPA = Bald and Golden Eagle Protection Act

3.2.4 Vegetation

The Cloud and Banner Site is characterized primarily by recently abandoned agriculture and disturbed riparian hardwood corridors. The riparian zones around Back Creek, UT2, UT3, and UT6 are primarily composed of sweetgum, boxelder (*Acer negundo*), tulip poplar, American sycamore, green ash (*Fraxinus pennsylvanica*), and black locust. Vegetation around UT1, UT4, UT5, and the wetland reestablishment areas are primarily pasture grasses and various sedge (*Carex sp.*) and rush (*Juncus sp.*) species. The wetland rehabilitation areas are generally composed of sedges, rushes, other herbaceous wetland species and a sparse tree canopy.

3.2.5 Cultural Resources

Cultural resources include historic and archeological resources located in or near the project area. RES completed a preliminary survey of cultural resources to determine potential project impacts. A review of the North Carolina State Historic Preservation Office (SHPO) GIS Web Service database revealed no historic sites within a half mile of the proposed project area. The proposed project will not have any adverse effects to historical structures or viewsheds.

RES will submit a request to the NC State Historic Preservation Office (SHPO) to search records to determine the presence of any areas of architectural, historic, or archaeological significance that may be affected by the Cloud and Banner Mitigation Site.

3.2.6 Constraints

There are no major constraints to construction of the Site. The Site is readily accessible from NC 119. Inspection of the FEMA Flood Insurance Rate Map indicates that a majority of Back Creek and associated floodplains are located within a Zone AE flood area, but no portion of the project is located within a FEMA floodway. A hydrologic analysis will be completed on the existing and proposed conditions of this reach. It is not anticipated that a No-Rise or a Conditional Letter of Map Revision (CLOMR) will need to be prepared for the site (**Figure 9**).

4 PROPOSED BANK CONDITIONS

4.1 Conceptual Mitigation Plan - Dairyland

The Dairyland Mitigation Project presents the opportunity to provide 5,330 stream mitigation units (SMUs). These will be derived from stream restoration and enhancement. **Table 6** details the mitigation types and SMUs generated. The proposed conceptual design plan is shown in **Figure 10**.

Table 6. Proposed Mitigation Summary

Stream Mitigation				
Reach	Mitigation	Length (LF)	Ratio	SMU
HB-1	Enhancement II	717	2.5:1	287
HB-2	Restoration	1310	1:1	1310
HB-3	Enhancement I	334	1.5:1	222
HB-3	Enhancement I	395	1.5:1	263
UT-1	Enhancement III	925	5:1	185
UT-2	Restoration	1085	1:1	1085
WF-1	Preservation	1478	10:1	148
WF-2	Restoration	1481	1:1	1481
	TOTAL	7,725		4,981
		Adjusted Total (7%)		5,330*

*Adjusted SMU total based on non-standard buffer width guidance for 75 foot buffers

4.1.1 Stream Restoration, Enhancement, and Preservation

Current stream conditions along the proposed restoration reaches demonstrate significant habitat degradation as a result of impacts from agricultural land use, water diversion, and existing impoundments. Additionally, the riparian buffer is in poor condition throughout the project area.

Stream restoration efforts will be accomplished through a combination of analytical and analog and/or reference reach-based design methods. The result will be a combination of Priority Level I Restoration, Enhancement Levels I, II, and III, and Stream Preservation for the project area. The cross-section geometry, planform, and profile will be modified to restore appropriate capacity and sinuosity to the channelized streams. The Priority Level I stream restoration will incorporate the design of a single-thread meandering channel, with parameters based on data taken from appropriate regional curve tables for the Piedmont of North Carolina and from reference sites and hydrologic analyses described herein.

Priority Level I Restoration is proposed for Reaches HB2, UT2, and WF2. The design approach for HB2 and UT2 will first involve draining the two existing impoundments. Once the ponds are drained, a meandering channel will be constructed within the natural valley and the remaining area within the pond footprint will be graded and immediately stabilized. Because the buffer is devoid of significant woody vegetation, woody debris will be installed along the bed to improve in-stream habitat. The design approach for Reach WF2 will include meandering the proposed channel within the natural valley, excavating a floodplain bench, and backfilling the existing stream. A minimum 50-foot buffer will be established and planted with native riparian vegetation.

Stream Enhancement Level I is proposed for Reach HB3. The design approach on this reach will focus on bank stabilization, bedform diversity, and riparian buffer restoration. Stabilization activities will include installing grade control structures and installing woody debris structures to improve hydraulic efficiency and aquatic habitat. All disturbed areas within the proposed buffer will be planted with native riparian vegetation.

Stream Enhancement Level III is proposed for Reach UT1. The channel is moderately stable throughout the proposed easement, and there is an intact buffer along the left bank. The right bank buffer is less than 15 feet wide and is primarily composed of Chinese privet. The significant areas of privet growth will be treated and a minimum 50-foot buffer will be planted with native vegetation. Stream Enhancement Level II is proposed for Reach HB1. The design approach on this reach will focus on improving the riparian buffer and incorporating minimal grading to address minor erosional areas. Stream Preservation is proposed for Reach WF1. The channel is stable throughout the easement and provides a variety of aquatic habitats. The riparian buffer is an intact hardwood forest. The proposed easement will extend a minimum of 100 feet outward from the stream channel.

4.2 Conceptual Mitigation Plan – Cloud and Banner

The Cloud and Banner Mitigation Project presents the opportunity to provide 4,801 SMUs and 3.54 WMUs. These will be derived from stream restoration/enhancement and wetland rehabilitation and re-establishment. **Table 7** details the mitigation types and credits generated. The proposed conceptual design plan is shown in **Figure 11**.

Table 7. Proposed Mitigation Summary

Stream Mitigation				
Reach	Mitigation	Length (LF)	Ratio	SMU
Back Creek	Enhancement II	2679	2.5:1	1072
Back Creek	Enhancement II	945	2.5:1	378
UT1	Enhancement II	337	2.5:1	135
UT2	Enhancement II	752	2.5:1	301
UT3	Enhancement II	326	2.5:1	131
UT4	Restoration	776	1:1	776
UT5	Restoration	782	1:1	782
UT6	Enhancement III	277	5:1	55
UT6	Enhancement I	558	1.5:1	372
TOTAL	TOTAL	7,432		4,001
		Adjusted Total (20%)		4,801*
Wetland Mitigation				
Mitigation Type	Acres	Mitigation Ratio		WMUs
High Enhancement	3.83	2:1		1.92
Low Enhancement	8.12	5:1		1.62
TOTAL	11.95			3.54

*Adjusted SMU total based on non-standard buffer width guidance for 150+ foot buffers

4.2.1 Stream/Wetland Restoration and Enhancement

Current stream and wetland conditions along the proposed restoration reaches demonstrate significant habitat degradation as a result of impacts from agricultural activities and hydrologic impairments (i.e. ditching).

Stream restoration efforts will be accomplished through a combination of analytical and analog and/or reference reach-based design methods. The result will be a combination of Priority Level I Restoration, and Enhancement Levels I, II, and III for the project area. The cross-section geometry, planform, and profile will be modified to restore appropriate capacity and sinuosity to the channelized streams. The Priority Level I stream restoration will incorporate the design of a single-thread meandering channel, with parameters based on data taken from appropriate regional curve tables for the Piedmont of North Carolina and from reference sites and hydrologic analyses described herein.

Stream Enhancement Level II is proposed for Back Creek, UT1, UT2, and UT3. The design approach on this reach will focus on improving the riparian buffer and incorporating minimal grading to address minor erosional areas. Stream Enhancement Level I is proposed for the upper end of Reach UT6. The design approach on this reach will focus on bank stabilization, bedform diversity, and riparian buffer restoration. Stabilization activities will include installing grade control structures and installing woody debris structures to improve hydraulic efficiency and aquatic habitat. All disturbed areas within the proposed buffer will be planted with native riparian vegetation. Stream Enhancement Level III is proposed for the lower end of Reach UT6. The channel is moderately stable throughout the proposed easement, and there is an intact buffer. The design approach on this reach will focus on widening the riparian buffer.

The Cloud and Banner Site offers a total ecosystem restoration opportunity. As such, the wetland enhancement is closely tied to the stream restoration and enhancement activities. Proposed wetland enhancement areas are located adjacent to the proposed stream restoration activities. Wetland enhancement is only proposed in areas that are designated as hydric. Enhancement activities will include: reconnecting low lying areas of hydric soil with the floodplain along restoration reaches, creating a rough soil surface to aid infiltration, and planting native tree species.

4.3 Monitoring – Dairyland and Cloud and Banner

Stream stability and vegetation survival will be monitored across both the restoration and enhancement areas of the sites to determine the success of the stream and buffer mitigation. Stream stability will be monitored with cross section surveys and visual assessment stream walks. Vegetation survival rates will be monitored using vegetation plots over approximately two percent of the planted area.

4.3.1 As-Built Survey

An as-built survey will be conducted following construction to document channel size, condition, and location on constructed or modified channels. The survey will include a complete profile of Thalweg, water surface, bankfull, and top of bank to compare with future geomorphic data. Longitudinal profiles will not be required in annual monitoring reports unless requested by the Interagency Review Team (IRT).

4.3.2 Visual Monitoring

Visual monitoring of all mitigation areas will be conducted a minimum of twice per monitoring year by qualified individuals. The visual assessments will include vegetation density, vigor, invasive species, and

easement encroachments. Visual assessments of stream stability will include a complete stream walk and structure inspection. Digital images will be taken at fixed representative locations to record each monitoring event, as well as any noted problem areas or areas of concern. Results of visual monitoring will be presented in a plan view exhibit with a brief description of problem areas and digital images.

4.3.3 Cross Sections

Permanent cross-sections will be installed at a minimum of one per 20 bankfull widths with half in pools and half in riffles. All cross-section measurements will include bank height ratio and entrenchment ratio. Cross-sections will be monitored annually. There should be little change in as-built cross-sections. If changes do take place, they should be evaluated to determine if they represent movement toward a less stable condition (for example down-cutting or erosion), or are minor changes that represent an increase in stability (for example settling, vegetative changes, deposition along the banks, or decrease in width/depth ratio). Bank height ratio shall not exceed 1.2, and the entrenchment ratio shall be no less than 2.2 within restored reaches. Channel stability should be demonstrated through a minimum of two bankfull events documented in the seven-year monitoring period.

4.3.4 Vegetative Success Criteria

Vegetation monitoring plots will be a minimum of 0.02 acres in size, and cover approximately two percent of the planted area. The following data will be recorded for all trees in the plots: species, height, planting date (or volunteer), and grid location. Monitoring will occur each year during the monitoring period. The interim measures of vegetative success for the site will be the survival of at least 320 planted three-year old trees per acre at the end of Year 3 and 260 five-year old trees per acre at the end of Year 5. The final vegetative success criteria will be the survival of 210 trees per acre with an average height of 10 feet at the end of Year 7 of the monitoring period. Invasive and noxious species will be monitored and controlled so that none become dominant or alter the desired community structure of the site. If necessary, EBX will develop a species-specific control plan.

4.3.5 Wetland hydrology (Cloud and Banner only)

Wetland hydrology will be monitored to document hydric conditions in the wetland restoration areas. This will be accomplished with automatic recording pressure transducer gauges installed in representative locations across the restoration areas and reference wetland. The gauges will be downloaded quarterly and wetland hydroperiods will be calculated during the growing season. Gauge installation will follow current USACE guidance. Visual observations of primary and secondary wetland hydrology indicators will also be recorded during quarterly site visits.

4.3.6 Adaptive Management

The Mitigation Plan will include a detailed adaptive management plan that will address how potential problems are resolved. In the event that the site, or a specific component of the site, fails to achieve the defined success criteria, EBX will develop necessary adaptive management plans and/or implement appropriate remedial actions for the site in coordination with the IRT. Remedial actions will be designed to achieve the success criteria specified previously, and will include identification of the causes of failure, remedial design approach, work schedule, and monitoring criteria that will take into account physical and climatic conditions. If tree mortality affects 40 percent or greater of the canopy in a stream or wetland

restoration area, then a remedial/supplemental planting plan will be developed and implemented for the affected area(s).

5 BANK ESTABLISHMENT AND OPERATION

5.1 Establishment and Operation of the Bank

These Bank Parcels shall be established under the terms and conditions of the RES Cape Fear Umbrella Mitigation Banking Instrument (UMBI) made and entered into by EBX, USACE, NCDWR, and other IRT agencies.

5.2 Proposed Credit Release Schedule

All credit releases will be based on the total credit generated as reported by the as-built survey of the Mitigation Site. The pre-construction credit release (15 percent) will be based on the credit total in the Final Mitigation Plan. The second credit release will be based on the As-Built survey, and will adjust the total released credits based on the actual constructed channel lengths. The District Engineer (DE), in consultation with the IRT, will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedule below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. At the direction of the DE, in consultation with the IRT, monitoring may be required to be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described in **Table 8 and Table 9**.

Table 8. Stream Credit Release Schedule

Release Milestone	Credit Release Activity	Interim Release	Total Released
1	Site Establishment (includes all required criteria stated above)	15%	15%
2	Baseline Monitoring Report and As-built Survey	15%	30%
3	First year monitoring report demonstrates performance standards are being met.	10%	40%
4	Second year monitoring report demonstrates performance standards are being met.	10%	50% (60%**)
5	Third year monitoring report demonstrates performance standards are being met.	10%	60% (70%**)
6	Fourth year monitoring report demonstrates performance standards are being met.	5%	65% (80%**)
7	Fifth year monitoring report demonstrates performance standards are being met.	10%	75% (85%**)
8	Sixth year monitoring report demonstrates performance standards are being met.	5%	80% (90%**)
9	Seventh year monitoring report demonstrates performance standards are being met, and project has received close-out approval.	10%	90% (100%**)

**10% reserve of credits to be held back until the bankfull event performance standard has been met.

Table 9. Wetland Credit Release Schedule

Monitoring Year	Credit Release Activity	Interim Release	Total Released
1	Site Establishment (includes all required criteria stated above)	15%	15%
2	Baseline Monitoring Report and As-built Survey	15%	30%
3	First year monitoring report demonstrates performance standards are being met.	10%	40%
4	Second year monitoring report demonstrates performance standards are being met.	10%	50%
5	Third year monitoring report demonstrates performance standards are being met.	10%	60%
6*	Fourth year monitoring report demonstrates performance standards are being met.	10%	70%
7	Fifth year monitoring report demonstrates performance standards are being met.	10%	80%
8*	Sixth year monitoring report demonstrates performance standards are being met.	10%	90%
9	Seventh year monitoring report demonstrates performance standards are being met, and project has received close-out approval.	10%	100%

*Please note that vegetation plot data may not be required with monitoring reports submitted during these monitoring years unless otherwise stated by the Mitigation Plan or directed by the IRT.

5.2.1 Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan can be released by the IRT with written approval of the DE upon satisfactory completion of the following activities:

1. Approval of instrument modification by the DE, in consultation with the IRT;
2. Approval of a final Mitigation Plan;
3. Confirmation that the Bank site has been secured;
4. Delivery of executed financial assurances as specified in the Mitigation Plan;
5. Delivery of a copy of the recorded long-term protection mechanism as described in the Mitigation Plan, as well as a title opinion covering the property acceptable to the DE; and
6. Issuance of any DA permits necessary for construction of the Bank site (if necessary).

5.2.2 Subsequent Credit Releases

The second credit release will occur after the completion of implementation of the Mitigation Plan and submittal of the Baseline Monitoring Report and As-built Survey. All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. As projects approach milestones associated with credit release, the Sponsor

will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

5.3 Financial Assurances

The Sponsor shall provide financial assurances in the form of a Performance Bond to the IRT sufficient to assure completion of all mitigation work, required reporting and monitoring, and any remedial work required. Financial assurances shall be payable at the direction of the USACE to his designee or to a standby trust. Financial assurances structured to provide funds to the USACE in the event of default by the Bank Sponsor are not acceptable. A financial assurance must be in the form that ensures that the USACE receives notification at least 120 days in advance of any termination or revocation.

5.4 Proposed Ownership and Long-Term Management

EBX, acting as the Bank Sponsor, will establish a Conservation Easement, and will monitor the Sites for a minimum of seven years. This Mitigation Plan provides detailed information regarding bank operation, including long term management and annual monitoring activities, for review and approval by the Interagency Review Team (IRT). Upon approval of the Sites by the IRT, the site will be transferred to a long-term land steward (to be determined in the Mitigation Plan). The long-term steward shall be responsible for periodic inspection of the site to ensure that restrictions required in the Conservation Easement or the deed restriction document(s) are upheld. Endowment funds required to uphold easement and deed restrictions shall be negotiated prior to site transfer to the responsible party.

The Bank Sponsor will ensure that the Conservation Easement will allow for the implementation of an initial monitoring phase, which will be developed during the design phase and conducted by the Bank Sponsor. The Conservation Easement will allow for yearly monitoring and, if necessary, maintenance of the Site during the initial monitoring phase. These activities will be conducted in accordance with the terms and conditions of the RES Cape Fear Umbrella Mitigation Bank made and entered into by EBX, USACE, NCDWR, and other IRT agencies.

5.5 Assurance of Water Rights

Sufficient water rights exist to support the long-term sustainability of the site, as there are no "severed" rights on the property.

6 REFERENCES

Environmental Banc & Exchange, LLC and US Army Corps of Engineers. 2016. Banking Instrument: RES Cape Fear Umbrella Bank. 9 pp.

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NCDEQ. 2010. "N.C. Wetland Assessment Method User Manual Version 4.1." N.C. Wetland Functional Assessment Team.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, NCDENR, Raleigh, NC.

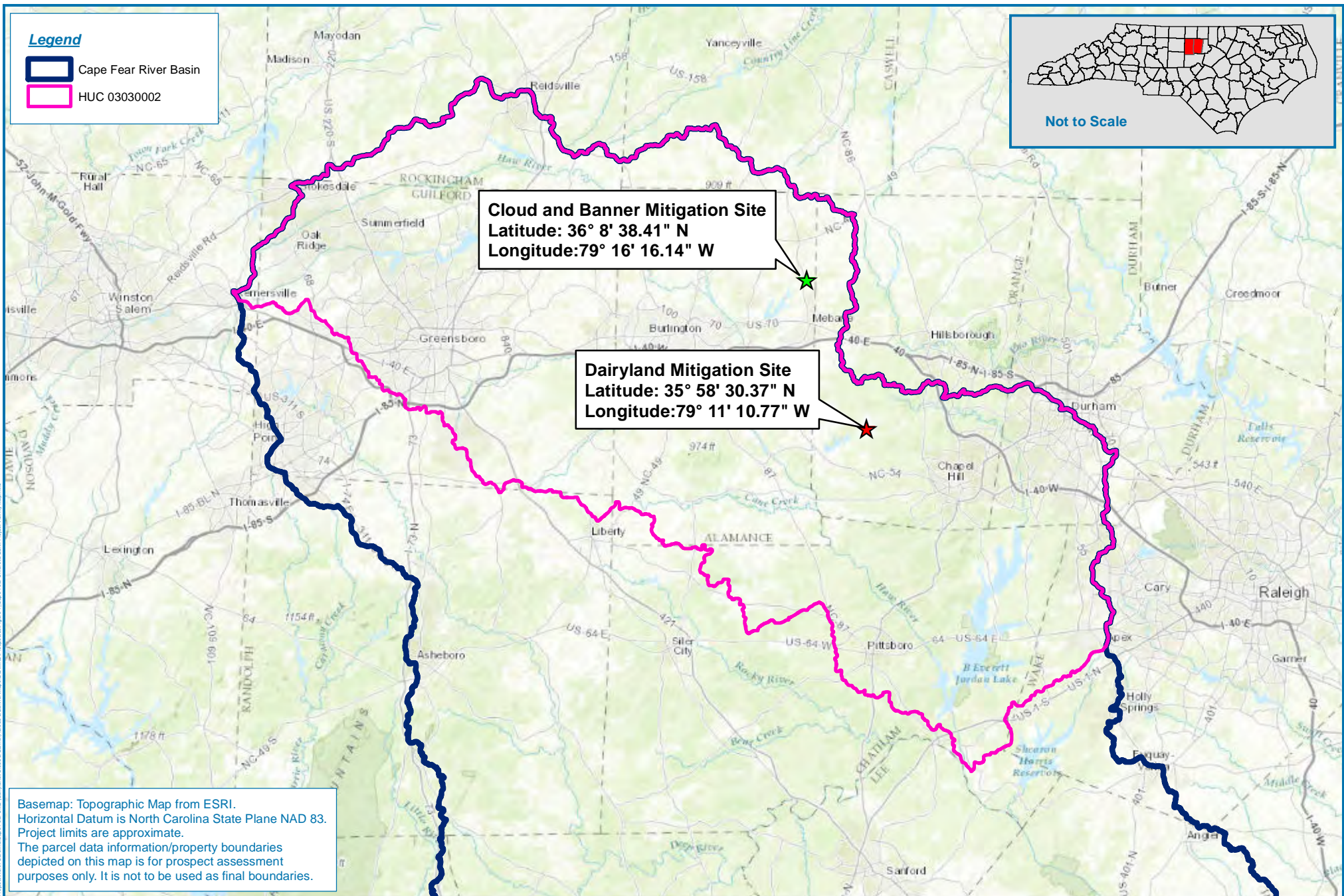
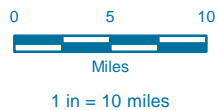


FIGURE 1

Vicinity Map
RES Cape Fear Umbrella Mitigation Bank

NORTH CAROLINA

Date: 5/19/2016



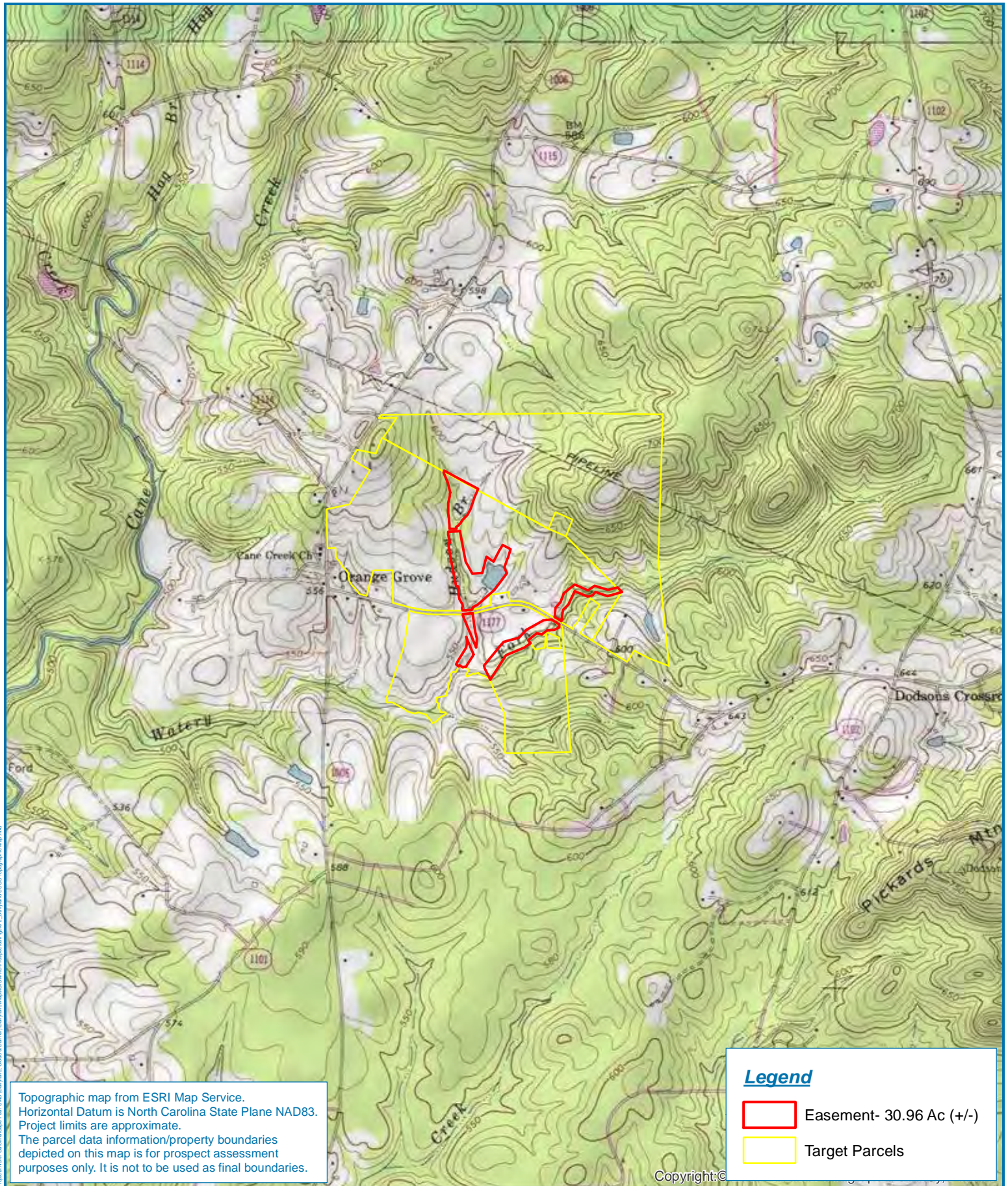


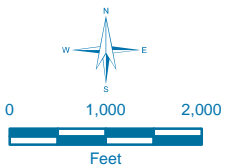
FIGURE 2
USGS Topographic Map

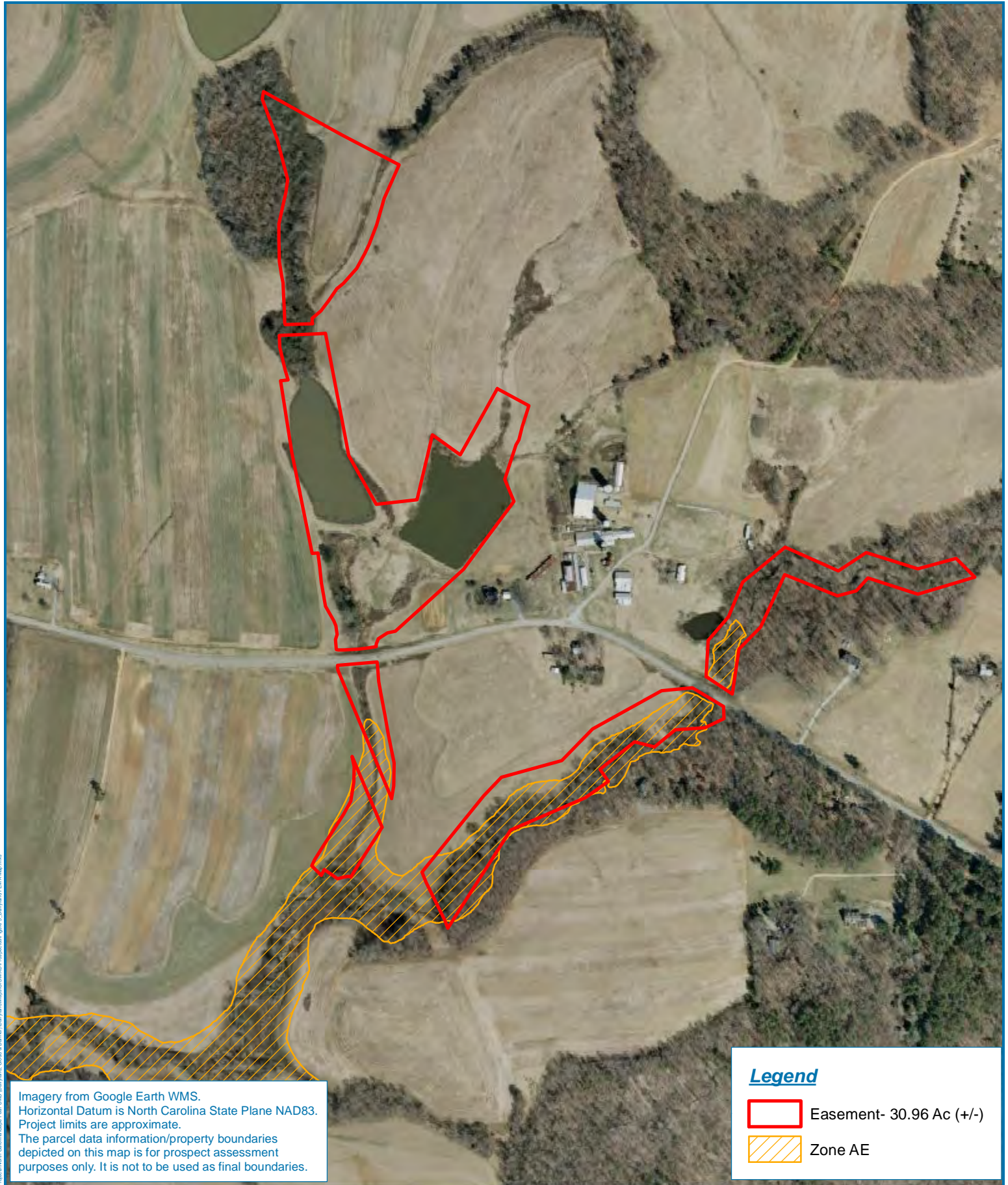
Dairyland Mitigation Site
RES Cape Fear Umbrella Mitigation Bank

ORANGE COUNTY, NORTH CAROLINA

Date: 5/19/2016

Drawn by: BPB



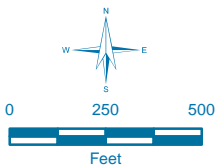


**FIGURE 5
FEMA Map**

**Dairyland Mitigation Site
RES Cape Fear Umbrella Mitigation Bank
ORANGE COUNTY, NORTH CAROLINA**

Date: 5/19/2016

Drawn by: BPB



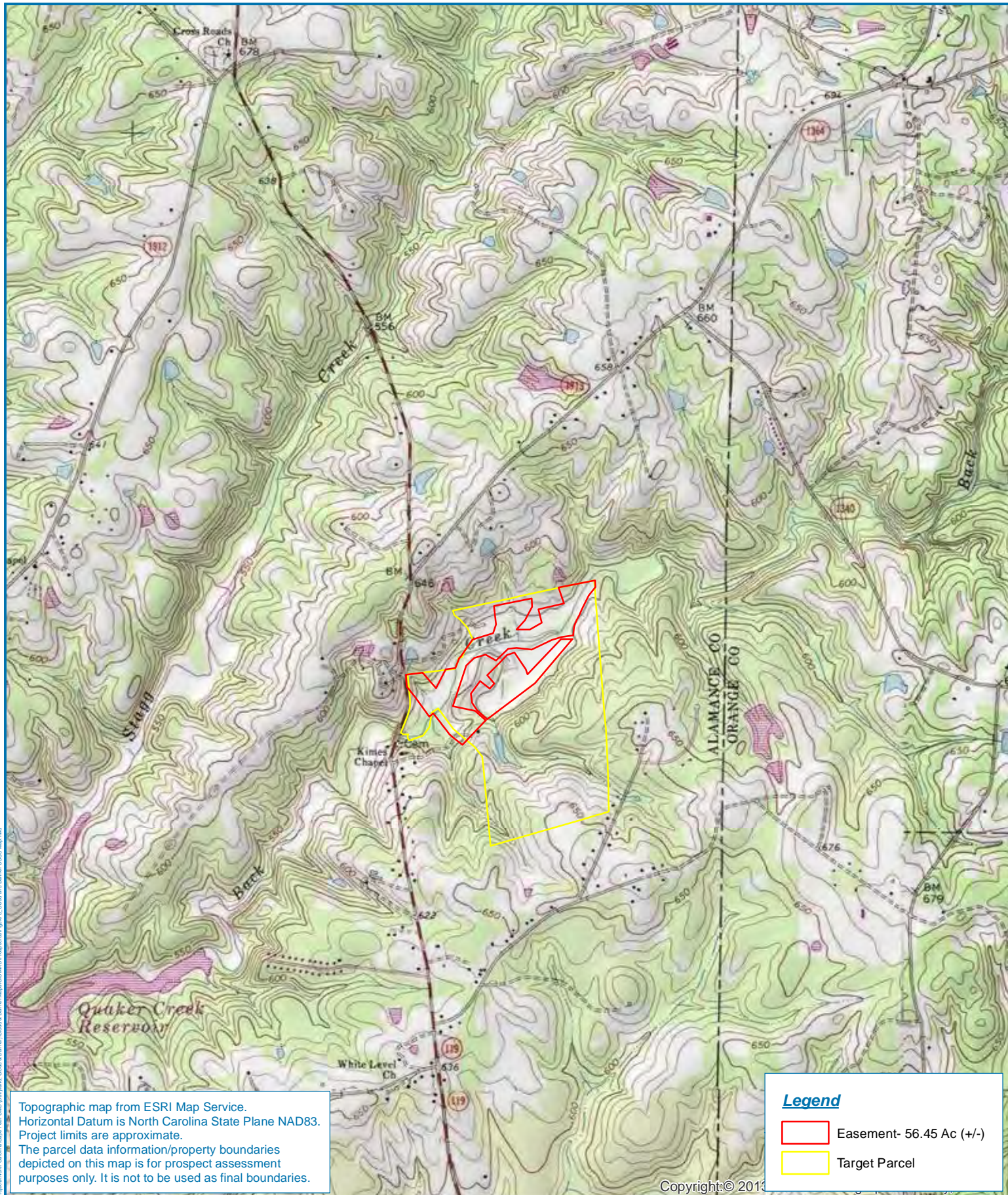


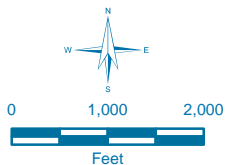
FIGURE 6
USGS Topographic Map

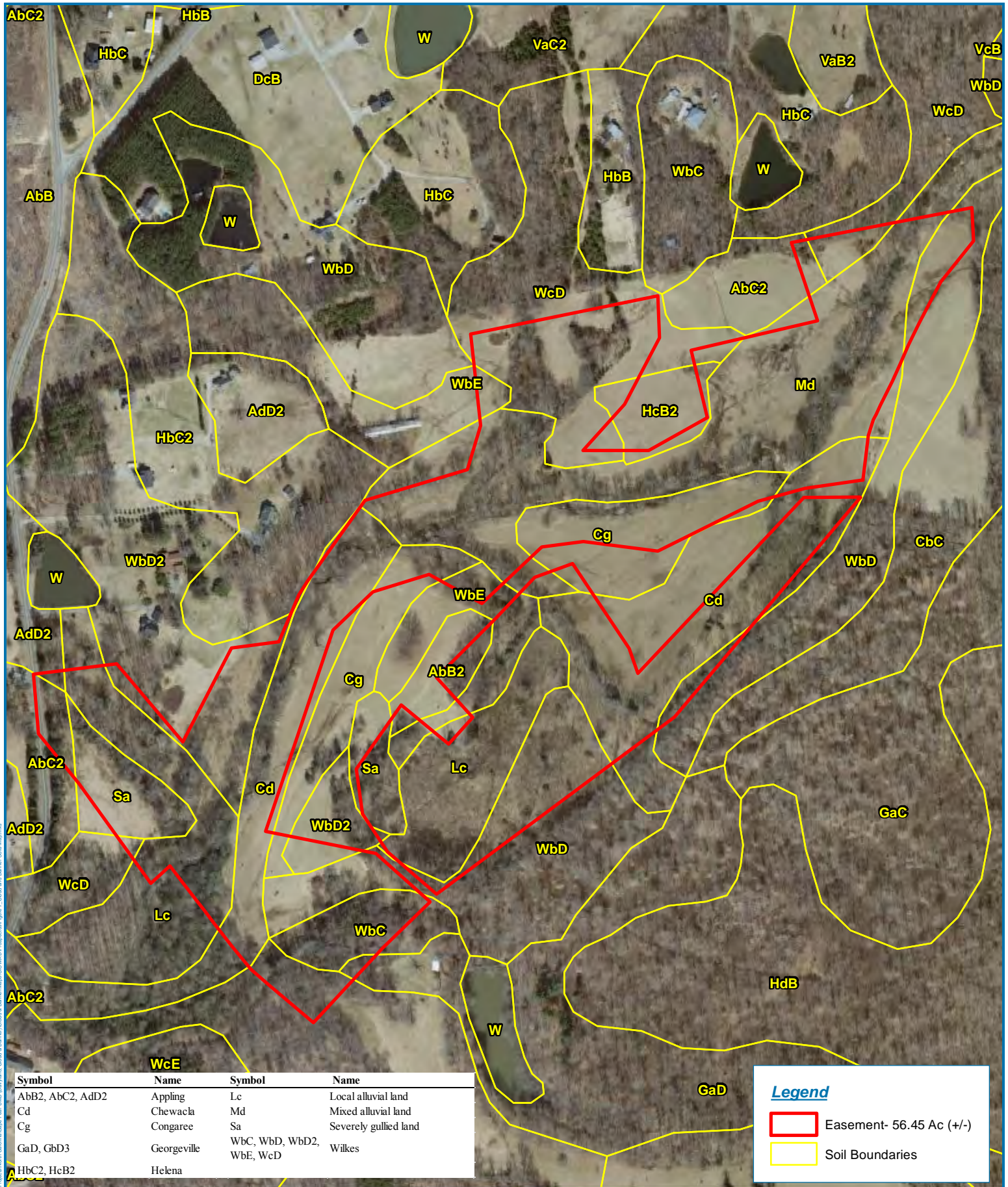
Cloud and Banner Mitigation Site
RES Cape Fear Umbrella Mitigation Bank

ALAMANCE COUNTY, NORTH CAROLINA

Date: 5/19/2016

Drawn by: BPB





Symbol	Name	Symbol	Name
AbB2, AbC2, AdD2	Appling	Lc	Local alluvial land
Cd	Chewacka	Md	Mixed alluvial land
Cg	Congaree	Sa	Severely gullied land
GaD, GbD3	Georgeville	WbC, WbD, WbD2, WbE, WcD	Wilkes
HbC2, HcB2	Helena		

Legend

Easement- 56.45 Ac (+/-)

Soil Boundaries

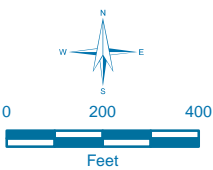


FIGURE 7
Soils Map

Cloud and Banner Mitigation Site
 RES Cape Fear Umbrella Mitigation Bank

ALAMANCE COUNTY, NORTH CAROLINA

Date: 5/19/2016

Drawn by: BPB



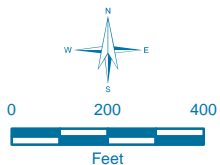
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FIGURE 8
National Wetlands Inventory Map
Cloud and Banner Mitigation Site
RES Cape Fear Umbrella Mitigation Bank
ALAMANCE COUNTY, NORTH CAROLINA

Date: 5/19/2016

Drawn by: BPB





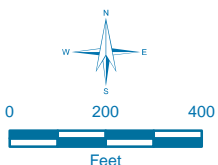
**FIGURE 9
FEMA Map**

**Cloud and Banner Mitigation Site
RES Cape Fear Umbrella Mitigation Bank**

ALAMANCE COUNTY, NORTH CAROLINA

Date: 5/19/2016

Drawn by: BPB



Stream Mitigation				
Reach	Mitigation	Length (LF)	Ratio	SMU
HB-1	Enhancement II	717	2.5:1	287
HB-2	Restoration	1310	1:1	1310
HB-3	Enhancement I	334	1.5:1	222
HB-3	Enhancement I	395	1.5:1	263
UT-1	Enhancement III	925	5:1	185
UT-2	Restoration	1085	1:1	1085
WF-1	Preservation	1478	10:1	148
WF-2	Restoration	1481	1:1	1481
		7725		4981
		Adjusted Total (7%)		5330

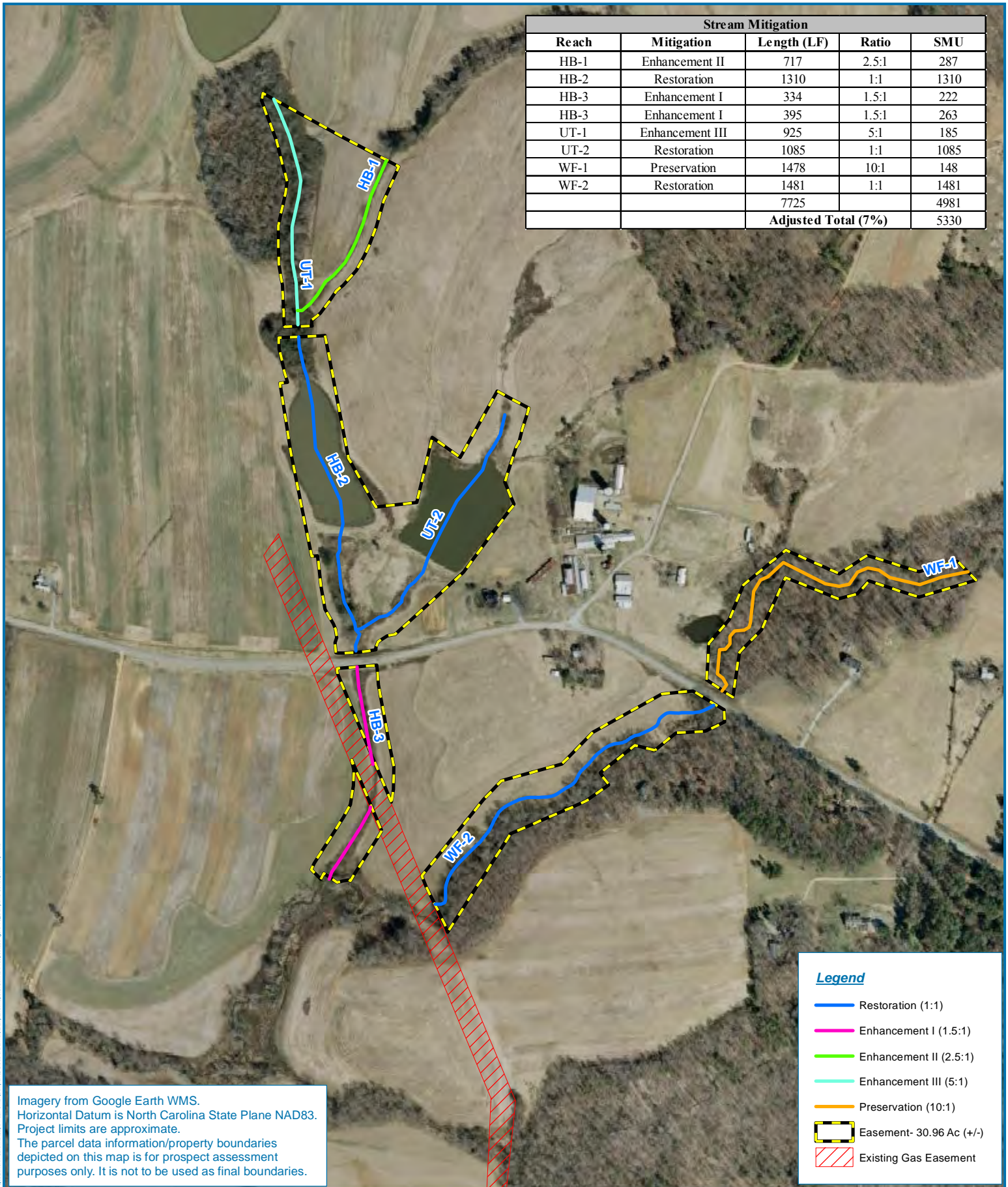


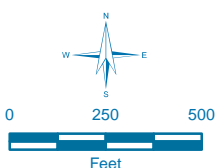
FIGURE 10
Conceptual Map

Dairyland Mitigation Site
RES Cape Fear Umbrella Mitigation Bank

ORANGE COUNTY, NORTH CAROLINA

Date: 5/19/2016

Drawn by: BPB



Dairyland Site



Photo 1: Upper reaches north of Dairyland Road devoid of riparian buffer



Photo 2: Active erosion along WF-1 south of Dairyland Road

Cloud and Banner Site



Photo 1: Existing riparian area of Reach UT4 before confluence with Back Creek



Photo 2: Back Creek at upper end of project