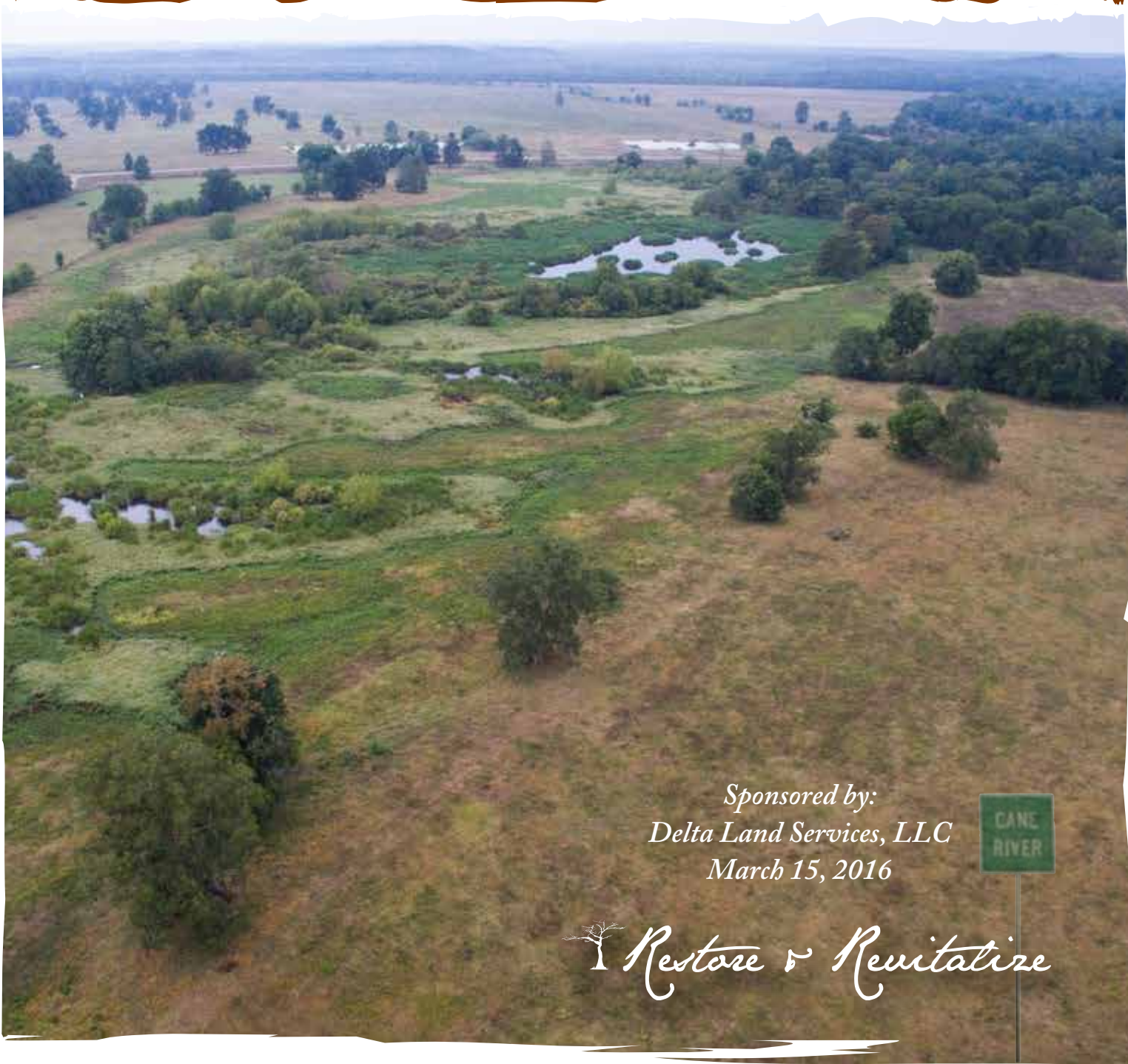




# Cane River Mitigation Bank Prospectus

Natchitoches Parish, Louisiana  
MVK-2015-00472



*Sponsored by:*  
*Delta Land Services, LLC*  
*March 15, 2016*



*Restore & Revitalize*

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# CANE RIVER MITIGATION BANK PROSPECTUS NATCHITOCHE PARISH, LA

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MARCH 15, 2016

PREPARED BY:

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Attachment B. Preliminary Jurisdictional Determination

Attachment C. Hydrology Restoration Drawings

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Attachment E. Charleston 2010 Mitigation Assessment



## 1.0 Introduction, Site Location, and Driving Directions

This report represents a proposal for Delta Land Services (DLS) to establish and operate the 928.4-acre Cane River Mitigation Bank (CRMB). The prospectus was prepared in accordance with 33 CFR § 332.8(d) (2). The CRMB is intended to provide compensatory mitigation for unavoidable impacts to “Waters of the United States<sup>1</sup>” authorized through the issuance of Department of the Army (DA) Permits by the U.S. Army Corps of Engineers (USACE) Vicksburg District (CEMVK) pursuant to Sections 9 and 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act of 1972.

The CRMB is located in parcels of Sections 72 and 73 of Township 7 North, Range 5 West and Sections 63, 65, 71, 72, 79, and 81, Township 6 North, Range 5 West in Natchitoches Parish approximately 2 miles northwest of Chopin, Louisiana. (Figures 1 and 2). The site is adjacent to Interstate 49 (I-49) and traversed by Louisiana State Highway 1 (Hwy 1) which separates the CRMB into Tract A (170.1 acres) and Tract B (758.3 acres). The approximate site center is located at Latitude 31.516389° North and Longitude 92.893056° West<sup>2</sup>. To reach the site from I-49, take exit 113 onto Louisiana State Highway 490 (Hwy 490) in Chopin and continue east for 1.6 miles. Turn left onto Hwy 1 and travel 3.3 miles to arrive at the site entrance on the right.

## 2.0 Project Goals and Objectives

The goals of the CRMB are to 1) restore<sup>3</sup> 673.9 acres of wetland forests by re-establishing<sup>4</sup> 222.1 acres of bottomland hardwood\ baldcypress swamp forest and rehabilitating<sup>5</sup> 451.8 acres of bottomland hardwood\ baldcypress swamp forest; and 2) to restore/enhance 86.9 acres of stream and riparian areas. The stream area includes the restoration of 15.5 acres\ 13,535.9 linear feet (LF) of degraded stream resource and

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<sup>1</sup> 33 CFR § 328 defines waters of the United States as it applies to the jurisdictional limits of the authority of the Corps of Engineers under the Clean Water Act. Waters of the United States include those waters listed in 33 CFR § 328(a). The lateral limits of jurisdiction in those waters may be divided into three categories (i.e., territorial seas, tidal waters, and non-tidal waters, which are further described in 33 CFR § 328.4 (a), (b), and (c).

<sup>2</sup> All coordinates are based on North American Datum of 1983 (NAD83)

<sup>3</sup> Restoration is defined in 33 CFR § 332.2 as the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

<sup>4</sup> Re-establishment is defined in 33 CFR § 332.2 as *the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.*

<sup>5</sup> Rehabilitated is defined in 33 CFR § 332.2 as *the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.*

the restoration/afforestation<sup>6</sup> of 71.9 acres of mixed wetland and upland riparian stream buffer<sup>7</sup> (i.e. 87.4 acres of stream restoration area). The restored wetlands will be protected with 156.0 acres of afforested hardwood buffer. The remaining acreage within the CRMB acreage is 3.9 acres of electrical utility right-of-way (ROW) and 7.2 acres of wildlife openings and associated access trails (Figure 3; Table 1). Specifically, the project objectives are as follows:

- Restore historic and self-sustaining surface hydrology within the 928.4-acre CRMB by backfilling artificial drains and reconnecting an active floodplain by restoring historic contours to channelized and incised stream channels;
- Re-establish 222.1 acres of bottomland hardwood and baldcypress forested wetlands currently utilized as pasture within the CRMB through hydrology restoration and planting of native tree and shrub species;
- Rehabilitate 451.8 acres of bottomland hardwood and baldcypress forested wetlands currently used as pasture by planting native tree and shrub species;
- Restore 156.0 acres of forested upland buffer and 71.9 acres of mixed upland/wetland forested stream buffer currently used as pasture by planting of with native tree species;
- Restore and enhance the ecological value and function of 13,535.9 LF of degraded stream resource;
- Protect the CRMB with a perpetual conservation easement;
- Improve water quality of Bayou Barbue and its receiving water body, the Cane River, by reducing nonpoint source runoff and fecal coliform runoff from livestock operations;
- Restore forested habitat for wildlife and other aquatic fauna by re-establishing a diversity of indigenous floral species and controlling invasive/noxious flora and fauna;
- Ensure long-term viability and sustainability of the CRMB through monitoring, long term maintenance, and adaptive management; and
- Establish funding mechanisms needed to achieve long-term success criteria.

### **3.0 Sponsorship, Land Ownership and Long-term Steward**

DLS will serve as sponsor of the CRMB and will comply with all conditions of sponsorship required by the CEMVK. The real property owner of the CRMB is Allbritton Cattle Company LLC (Owner). DLS, as the sponsor, will provide all wetland mitigation

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<sup>6</sup> The Dictionary of Forestry (Society of American Foresters [SAF] 2008) defines afforestation as *the establishment of a forest or stand in an area where the preceding vegetation or land use was not forest whereas reforestation is the re-establishment of forest cover either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting) —note reforestation usually maintains the same forest type and is done promptly after the previous stand or forest was removed —synonym regeneration.*

<sup>7</sup> Buffers are defined in 33 CFR § 332.2 as *an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from disturbances associated with adjacent land uses.*

and restoration services. DLS may will serve as the long-term steward but may appoint a long-term steward in accordance with 33 CFR § 332.7 (d).

#### **4.0 Sponsor Qualifications**

DLS is a land management and restoration company whose technical staff includes Certified Wildlife Biologists, Professional Wetland Scientists, and Certified Foresters. In addition, DLS has construction specialists on staff experienced in wetland construction activities such as heavy equipment operation, vegetation establishment, herbicide application, and contractor management.

DLS currently operates twelve approved wetland and stream mitigation banks within four USACE Districts totaling 5,721 acres which include 47,829 linear feet of stream restoration. These Districts include CEMVK, New Orleans (CEMVN), Fort Worth (CESWF), and Galveston (CESWG). The approved banks are the Bayou Conway Mitigation Bank (MVN-2010-01111), Bayou Choupique Mitigation Bank (MVN-2011-00824), Ponderosa Ranch of Pointe Coupee Mitigation Bank (MVN-2011-03213), Moss Lake Mitigation Bank (MVN-2012-02652), Bayou Fisher Mitigation Bank (MVN-2013-02342), Laurel Valley Coastal Mitigation Bank (MVN-2013-02798), Roseland Refuge Mitigation Bank (MVK-2010-01423), Oak Land Mitigation Bank (MVK-2011-00308), Little Bayou Pierre Mitigation Bank (MVK-2012-00555), Phillips Creek Mitigation Bank (SWF-2012-00417), Graham Creek Mitigation Bank (SWF-2011-00309), and Danza del Rio Mitigation Bank (SWG-2011-00566). In addition to the banks referenced above, DLS serves as the responsible party for the establishment and maintenance of 3,929 acres of wetlands and 6,720 LF of stream restoration on 17 approved Permittee-Responsible Mitigation (PRM) projects within the CEMVN, CEMVK and CESWG.

#### **5.0 Watersheds and Proposed Service Area**

The site is located within the Lower Red – Lake latt Subbasin (US Geological Survey [USGS] Hydrologic Unit Code [HUC] 11140207. According to CEMVK procedures for mitigation service areas, a bank’s service area may consist of two adjacent 8-digit Hydrologic Unit Codes (HUC). DLS proposes that the bank’s service area be comprised of the 1,435.8-square mile Lower Red – Lake latt Watershed (HUC 11140207) and the 1,114-square mile Bayou Pierre Watershed (HUC 11140206), both of which are within the Red River-Saline Basin (HUC 111402). Furthermore, DLS proposes the inclusion of the 264.2-square mile Middle Red – Coushatta Watershed (HUC 11140202). The purposes for incorporating the third watershed are the lack of currently available stream credits in the area, the relatively small size of the Middle Red - Coushatta Watershed, and the relative rural nature and lack of urbanized areas within these watersheds. The service area would be entirely within the state boundaries of Louisiana (Figure 4).

The vast majority of the land within the proposed service area is undeveloped and exists as forestland (58%) or functioning wetlands (13%). The remaining land use is pasture and grass lands (12%), developed properties (7%), cultivated crops (5%), open water (5%) and barren land (<1%)<sup>8</sup> (Figure 5).

## 6.0 General Need and Technical Feasibility

A majority of the anticipated impacts to utilize the CRMB will be activities and infrastructure associated with industrial and residential development, civil and public works projects, mineral extraction, and linear projects (e.g., pipelines, utilities, roads, etc.). The CRMB would result in consolidating the mitigation for these types of impacts determined to be unavoidable within a single, strategic location. The CRMB will provide the most benefit to the watershed through the restoration of stream resources and protection of a larger block of floodplain forested wetland habitat that will offset any cumulative effect of smaller, spatially fragmented impacts.

Given the current existence of other conservation lands within the area, the restoration at the CRMB will provide a dynamic range of habitats, both spatially and temporally, that will support a rich diversity of flora and will be utilized by many species of fauna on a landscape level (Figure 1). The restoration of bottomland hardwood forests near extant tracts of other undeveloped lands will provide benefit to Nearctic-Neotropical migrant birds and other indigenous silvicolous (forest-dwelling) species. Twedt et al. (1999) listed 14 forest breeding species as species of high concern and of these species, Cerulean warbler (*Setophaga cerulea*) is identified as critically imperiled in Louisiana whose migratory range is known to this area (NatureServe 2012). The planting of densely-spaced seedlings encourages the recruitment of breeding populations of thamnophilid (scrub-dwelling) and silvicolous bird species (Twedt et al. 2010). Large expanses of bottomland hardwoods are vital for the management of Mallards (*Anas platyrhynchos*), wood ducks (*Aix sponsa*) and American woodcock (*Scolopax minor*) (North American Waterfowl Management Plan 2004, Kelly and Rau 2006). The Mississippi Museum of Natural Science (MMNS 2005) purports that old-growth bottomland hardwood forests are critical habitat for 11 of the 18 species of bats known to the Southeast. Two of these species, the Southeastern myotis (*Myotis austroriparius*) and Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) prefer large, hollow trees in mature bottomland hardwood and swamp habitats, respectively (LMRJV 2007; Taylor 2006). Loeb (2013) purports that unfragmented, contiguous forest with small openings maintained for flight corridors are important components in maintaining and sustaining bat populations as these are critical for roosting and predator protection. Restoration of corridors is identified as a strategy to facilitate wildlife and plant migration in response to transitions anticipated with predicted climate change (National Fish, Wildlife and Plants Climate Adaptation Strategy Management Team 2012).

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<sup>8</sup> Multi-Resolution Land Characteristics Consortium (2011) National Land Cover Database (NLCD) [website]. Available URL <http://www.mrlc.gov> (accessed March 11, 2016)

The primary factors considered during site selection were the relatively low landscape position of the project site, its compatibility with surrounding land uses, the presence of hydric soils, and suitability for restoring stable stream channels and native forested wetland vegetation. The construction work required to develop the proposed CRMB will consist of the following activities: 1) degradation of artificial drains, 2) vegetative control and soil preparation 3) and afforestation with appropriate seedlings of tree and shrub species. The presence of extant stands of bottomland hardwoods and swamps adjacent to the CRMB indicates a high potential for successful restoration and the development of a native forested community.

The restoration and protection of streams and forested wetlands described in Section 8.0 will provide additional aquatic functions and values that are not currently realized such as water quality improvement and favorable habitat conditions for fish and wildlife species. Improvements in biological diversity and integrity are expected due in large part to the presence of remnant macro-topographic and micro-topographic features created by historic overbank flooding of the Cane and Red Rivers. Improved water quality will be achieved by re-establishing natural drainage patterns and stream contours and afforestation. Water quality improvements will result from the removal of livestock, which will reduce the potential for non-point source pollution (e.g., soil erosion and fecal coliform). An increase in water quality of the receiving streams and other water bodies will also be realized as a result of increased surface water retention time and sediment filtration by restored wetland and buffer areas. Removal of livestock from the area in perpetuity as well as the introduction of native forested wetland vegetation, increased surface roughness, and increased leaf litter of a flood plain and riparian forest with upland buffers will aid in the reduction of contaminants entering the downstream waterways through non-point source means.

## **7.0 Ecological Suitability and Baseline Conditions**

### **7.1 Climatic, Geomorphic, Physiographic and Ecological Characteristics**

Natchitoches Parish has a warm, humid, subtropical climate characterized by relatively high rainfall. The average annual precipitation in this area ranges from 47 to 62 inches. Most of the rainfall occurs as frontal storms during late fall, winter, and early spring, although an appreciable amount of precipitation also occurs as convective thunderstorms during the early part of the growing season. The average annual temperature ranges from 63° to 67° Fahrenheit. The growing season averages 280 days and ranges from 255 to 305 days.

The CRMB is located in the South Central Plains Level III Ecoregion and the Red River Bottomlands Level IV Ecoregion (35g) (Omernik 1995), the Mississippi Delta Cotton and Feed Grains Region (LRR O) and the Red River Alluvium Major Land Resource Area (MLRA 131C; Natural Resources Conservation Service [NRCS] 2006). Natural topography within and around the CRMB is flat to moderately undulating. Artificial features such as levees, spoil banks, and drainage ditches are present within the CRMB project site. Typical drainage patterns for the area have

been altered to accommodate agricultural and livestock operations on the site. However, some areas remain poorly drained and exhibit soils with low permeability, resulting in prolonged periods of saturation. The project site is situated in the meander scrolls of the former channels and deposition features of the Cane River as well as in the back swamp area of Bayou Barbue, a tributary to the Cane River. Natural site elevation ranges from approximately 86 feet to 100 feet in elevation<sup>9</sup> (Figure 6).

Wildlife common to region include beaver (*Castor canadensis*), bobcat (*Lynx rufus*), white-tailed deer (*Odocoileus virginianus*), fox (*Vulpes vulpes* and *Urocyon cinereoargenteus*), mink (*Mustela vison*), opossums (*Didelphis virginiana*), rabbit (*Sylvilagus* spp.), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), squirrel (*Sciurus* spp.), armadillo (*Dasypus novemcinctus*) and various bird species. Migratory game birds include various ducks, geese and doves. Many fish species are also present in nearby waterways (NRCS 2006).

## 7.2 Existing and Surrounding Land Uses

The site is currently managed by the Owner for livestock grazing. Active management consists of occasional chemical control of broad-leaved herbaceous species and routine mowing. The project site is surrounded primarily by forested and pasture lands (Figure 7). These areas are anticipated to remain in some type of undeveloped land use in the future. Preliminary site evaluations show that the existing forested stands adjacent to the CRMB contain only limited viable seed sources for noxious and invasive species. DLS does not foresee any adverse impacts to the mitigation site resulting from the continued existence and operation of the neighboring land uses.

## 7.3 Soils

The mapped soil units within the CRMB are Pe: Perry clay, occasionally flooded; Mp: Moreland clay, 0-1% slopes, occasionally flooded; La: Latanier clay, 0-1% slopes, rarely flooded; Md: Moreland silt loam, 0-1% slopes, rarely flooded; and Gn: Gallion silty clay loam, 0-1% slope (Figure 8). These map units contain varying degrees of hydric soil components. The Pe and Mp map units have hydric component ratings of 80% and 90%, respectively while the remaining map units have a 1% rating (NRCS 2016<sup>1</sup>; Table 2). Latanier and Moreland soils are considered to be problematic soils as they may not show sufficient hydrologic indicators due to the red parent material (NRCS 1998)<sup>10</sup>. Water and air move through most of these soils at a relatively slow rate, and the surface remains wet for long periods after heavy rains (NRCS 2016<sup>2</sup>).

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<sup>9</sup> All site elevations are in North American Vertical Datum of 1988 (NAVD)

<sup>10</sup> The NRCS 1988 document is out of date but the problem soil references are still applicable and used as internal guidance by the NRCS in Louisiana; Dr. Michael Lindsey, State Soil Scientist for Louisiana, NRCS, personal communication with Mr. Daniel Bollich, Ecological Program Director, Delta Land Services, March 4, 2016.



During a field investigation conducted by DLS in June of 2015, 49 data point locations on the Owner's property were evaluated for wetland hydrology, hydrophytic vegetation and hydric soils per the *Atlantic and Gulf Coastal Plain (AGCP) Regional Supplement* (USACE 2010). Forty three (43) of these data points were located within the CRMB project area (Figure 8; Table 3). Of the 43 data points, soil profiles were not evaluated at 4 locations as these sites were inundated with 4 to 10 inches of surface water and hydrophytic vegetation was the dominant community therefore these soils were assumed to be hydric. Soil profiles at the remaining 39 data points within the CRMB were evaluated for hydric soil indicators per USACE 2010 and the *Field Indicators of Hydric Soils* (NRCS 2010). Fourteen (14) contained a Depleted Matrix (F3), one contained Dark Surfaces (F6) and 9 contained Red Parent Material (TF2) and were accompanied by the presence of wetland hydrology and a dominance of hydrophytic vegetation. The remaining 15 data points had no observable indicators sufficient to be considered a hydric soil. Of the 11 soil profiles observed within the 221.1 acres selected for wetland re-establishment, 10 of these were in areas mapped as Mp (90% hydric rating) and one was in an area mapped as La (1% hydric rating). Based on field indicators, 5 contained an F3 indicator while the remaining 6 contained the TF2 indicator but did not contain both wetland hydrology or hydrophytic vegetation communities. However, DLS anticipates that once vegetation and hydrology is restored, the TF2 indicator will apply and these areas will be considered wetlands.

## 7.4 Vegetation

The site is on the Red River alluvial plain adjacent to the Cane River. According to the NRCS (2006), this resource area is primarily farms with scattered tracts of forested wetlands. This area once consisted entirely of bottomland hardwood and baldcypress forests. A review of the historical aerial photographic record indicates that a portion of the site was cleared as early as 1941 and the entire site converted to open ground by 1966. The property has remained in some type of agricultural use since that time (Figures 9-15). Observation of adjacent, natural forested lands on similar geomorphic and physiographic settings serves to verify that this property was once a forested wetland consisting of bottomland hardwood and baldcypress/swamp wetlands. Trees/shrubs observed in extant bottomland hardwood forests near the CRMB project areas included water oak (*Quercus nigra*), willow oak (*Quercus phellos*), Nuttall oak (*Quercus texana*), cherrybark oak (*Quercus pagoda*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), honeylocust (*Gleditsia triacanthos*), eastern cottonwood (*Populus deltoides*), and sweet pecan (*Carya illinoensis*)<sup>11</sup>. The major tree/shrub species in neighboring swamp, of which there are residuals on Tract A, include baldcypress (*Taxodium distichum*), water tupelo (*Nyssa aquatic*), green ash, Drummond red maple (*Acer rubrum* var. *drummondii*), buttonbush (*Cephalanthus occidentalis*), and black willow (*Salix nigra*).

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<sup>11</sup> All plant scientific nomenclature is from Lichvar et al. (2014), USACE (2014) or NRCS (2016<sup>3</sup>).

Much of the CRMB is currently utilized as improved pasture. Hydrophytic vegetation was dominant in 21 of the 43 data point locations described in Section 7.3. A majority of the remaining areas were not dominated by hydrophytic vegetation which was likely due to anthropogenic activities to maintain improved pastures (i.e. drainage and subsequent vegetative manipulation). The dominant herbaceous species in these pastures include white clover (*Trifolium repens*), perennial rye (*Lolium perenne*), Brazilian vervain (*Verbena brasiliensis*), Carolina horsenettle (*Solanum carolinense*), Vasey's grass (*Paspalum urvillei*), curly dock (*Rumex crispus*) and various spikerushes (*Eleocharis* spp.). Clusters of bahiagrass (*Paspalum notatum*), Bermuda grass (*Cynodon dactylon*), Carolina geranium (*Geranium carolinianum*), spiny fruit buttercup (*Ranunculus muricatus*), and southern dewberry (*Rubus trivialis*) also exist throughout the project area. The wetter areas of pasture in Tract A contain hydrophytic herbaceous species such as dotted smartweed (*Persicaria punctata*), narrow leaf cattail (*Typha angustifolia*), lamp rush (*Juncus effusus*), and various sedges (*Carex* spp.).

## 7.5 Hydrology

The proposed CRMB project area is within the floodplain of the Cane River system. The site is located in the 100-year flood zone per the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM; Figure 16). The slightly undulating, terraced landscape was formed as a result of high flow events exceeding geomorphic bankfull<sup>12</sup> capacity of the Cane River, followed by the associated draining and runoff events. The site drains to Bayou Bardue, a tributary of the Cane River, via two small streams. One stream headwaters on Tract B while the other headwaters slightly above Tract A. Two small waterbodies, Vercher Lake and Pierson Lake, reside on Tract A. These waterbodies drain through the tributary system which traverses Tract B in into Bayou Barbue. The hydrogeomorphic wetland class of the CRMB is a combination of riverine wetlands to depressional wetlands with the primary sources of hydrology resulting from a combination of flooding events in the Cane River and Bayou Barbue, overland flow from adjacent lands, and direct precipitation which measures at 56 to 58 inches per year<sup>13</sup>.

During the conversion from forested conditions to open agricultural lands, anthropogenic hydrologic modifications were implemented for efficiently moving water off site. Additionally, a levee was constructed along the southern boundary of the CRMB for the purpose of preventing flooding from Bayou Barbue. Structures with flap gates were installed where Stream One exits the CRMB property. The purpose of the gates is to allow for the outward flow of water while in an open position but can be closed to prevent backwater flooding from entering the property.

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<sup>12</sup> Bankfull is *the stage delineated by the elevation point of incipient flooding, indicated by deposits of sand or silt at the active scour mark, break in Stream bank slope, perennial vegetation limit, rock discoloration, and root hair exposure* (from Fluvial Geomorphology Glossary <http://www.fgmorph.com/showglossary.php>)

<sup>13</sup> Southern Regional Climate Center map depicting statewide annual rainfall isobars based on 1971-2000 normal precipitation records ([http://www.losc.lsu.edu/products/images/louisiana\\_annual\\_prpc.pdf](http://www.losc.lsu.edu/products/images/louisiana_annual_prpc.pdf)).

Surface hydrology within the CRMB was altered by a series of drainage ditches and culverts throughout and along the perimeter of the property and by the channelization of natural swales. Some of the lands utilized as pasture contain drainage laterals throughout the fields which expedite the movement of surface water from the pasture areas into artificial ditches. These drainage features were installed to accommodate specific management goals to ensure agricultural productivity and does have the effect of reducing the duration of ponding and saturation on the site.

## **7.6 Existing Wetland Status**

The CEMVK issued a Preliminary Jurisdictional Determination (PJD) to DLS on September 8, 2015 (MVK-2015-00472) which identify approximately 471.9 acres of the CRMB site as an existing Wetland or Other Water of the US (WOUS). Wetland Restoration within areas currently identified as Wetlands or WOUS per the PJD are considered rehabilitation. Wetland re-establishment will occur on areas currently identified as non-wetland but are expected to become wetlands over a short period of time once the restoration work is completed.

The current National Wetland Inventory (NWI) maps published by the United States Fish and Wildlife Service (USFWS 2015) identify portions of the property as Palustrine Emergent (PEM), and Palustrine Unconsolidated Bottoms (PUB) per the Cowardin classification system (Cowardin et al. 1979; Figure 17). These wetlands<sup>14</sup> are associated with Vercher Lake and the meander scroll landscape on the historic floodplain of the Cane River. Forested wetlands are mapped adjacent to the CRMB as Palustrine Forested Wetlands (PFO).

## **8.0 Mitigation Bank Establishment and Operation**

The primary loss of aquatic function within the proposed CRMB is due to hydrologic alterations of the restoration site in the form of channelized and artificial drainages designed to expedite the flow of surface water offsite. These drainages continue to effectively remove surface water following precipitation and/or flooding events as well as convey excess sediments and pollutants associated with agricultural production. However, some depressions continue to pond for longer durations following these events due to variations in topography.

The implementation of the CRMB will restore 673.9 acres of forested wetland habitat and enhance the physical, chemical, and biological function of 13,535.9 LF of degraded streams. The proposed mitigation work plan involves the backfilling of artificial drains, afforestation of wetlands and riparian buffers, fluvial geomorphologic restoration, and implementation of effective short-term management strategies to successfully establish the bank (i.e. noxious/invasive species control, monitoring, replanting of native species, etc.). Elimination of the existing drainage system will increase floodplain hydroperiod

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<sup>14</sup> The term "wetland" as used in this description indicates these habitats are mapped as wetlands per the NWI map and does not imply that these areas have a CEMVN-issued jurisdictional determination.

and hydrologic regime to an extent that would sufficiently support wetland hydrology from adjacent surface runoff, ponding, and direct precipitation.

DLS will provide appropriate financial assurances to ensure the successful construction and establishment of the mitigation bank per 33 CFR § 332.3 (n). The details of the financial assurance mechanism will be described in the Draft Mitigation Banking Instrument (MBI), which will be prepared per 33 CFR § 332.8 (6) should the CEMVK and Interagency Review Team (IRT) find merit with the CRMB and continue with the review process.

### **8.1 Restoration of Streams and Wetland Hydrology**

Drainage features within the wetland restoration and riparian buffer areas will be rendered ineffective in order to re-establish wetland hydrology and restore the proper flow regimes in the receiving streams. To accomplish this, *in situ* earthen fill material will be used to return artificial drainage ditches to grade (Figures C-7, C-8 and C-10). Hydrology restoration combined with the low permeability of the soils will increase the retention time of surface water and saturation, which will reduce nonpoint source runoff and improve water quality through increased nutrient uptake by vegetation. There are no known hydrological disturbances on or adjacent to the site which will adversely affect hydrologic restoration on the CRMB. DLS anticipates no long-term structural management requirements needed to assure hydrologic restoration.

DLS's review of current site conditions and historic aerial photography reveals only minor changes in stream pattern during the conversion to agriculture; therefore, pattern alterations within restored reaches will be limited to slightly extending meander lengths and marginally increasing stream sinuosity. Evidence suggests that stream dimensions on site were altered from excavation and channelization, having the effect of confining flood events to the limits of the banks. Stream channel restoration will focus on altering the channel dimension in a manner that reduces bank height ratios<sup>15</sup> and increases the frequency at which overbank flooding can occur. The estimated flow frequencies and sediment loads afforded the streams on site by their watersheds do not necessitate major alteration of the channel profiles. However, deeper pools with overhanging structures and vegetative cover will be excavated along the outside of selected meander bends in an effort to manage water temperature and maintain more desirable levels of dissolved oxygen for extended periods following flows.

Modifications of the profile and dimension of the 7,796.8 LF designated as Stream One on Figure 3 and Figure C-1 will focus on the construction of a bankfull bench on either side of the channel. The excavated material will be deposited within the existing confines of the channel. This modification will result in a wider and

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<sup>15</sup> Bank Height Ratio (BHR)=  $LBH/d_{max}$  where LBH is the Lowest Bank Height as measured from the channel bottom and  $d_{max}$  is the deepest part of the channel up to bankfull elevation (Rosgen 2009).

shallower stream channel thereby lowering the bank height to bankfull width ratio and increasing the probability that high flows will escape the confines of the channel and settle onto the adjacent wetlands (Figures C-2 to C-6). The newly created bankfull benches will be revegetated with native, wetland herbaceous species.

The profile of the 5,739.1 LF designated as Stream Two will be modified by excavating pools at various locations along the existing stream's pattern. This stream will likely exhibit a flow regime similar to low gradient bayous and sloughs and will serve to retain flood waters for prolonged periods. The remaining stream channel outside of the excavated pool will be planted with baldcypress once all earth work is completed (Figures C-11 to C-13).

Stream One will have a 100-foot riparian buffer on either side of the stream channel and Stream Two will have a 200-foot riparian buffer on either side of the stream channel. These riparian buffers will contain a mosaic of uplands and wetlands and will be afforested as described in Section 8.2.

The flap-gated structures within the southern levee will remain for some period until seedlings are planted and begin to establish themselves. Once the seedlings are established, DLS will consider replacement of the flapgates with a open, passive structure (i.e. culvert[s]) to allow for natural drainage of the CRMB to occur as well as to allow any floodwaters from Bayou Bardue to enter the southernmost portion of the CRMB (i.e. allow backwater flooding to the site).

DLS estimates that stream restoration and wetland hydrology restoration will result in the excavation and subsequent redepositing of approximately 166,413 to 210,632 cubic yards of native soil material. No fill material will be required from offsite and DLS anticipates that all material excavated will be redeposited on-site in a beneficial manner therefore no offsite disposal of excess material will be required. Any excavation and deposition of fill within existing, jurisdictional wetlands will be done in a manner which results in the rehabilitation of an aquatic resource therefore DLS anticipates that this activity will be covered under a Nationwide Permit 27<sup>16</sup> or comparable DA permit.

## **8.2 Afforestation of Wetlands, Uplands, and Riparian Buffers**

Afforestation activities will commence with mowing and/or shredding of existing herbaceous vegetation prior to the fall of the planting year. Herbicide treatments will be applied by a certified and licensed applicator and subsoiling (ripping) of the rows to be planted will be conducted to a depth of approximately 18 inches (Allen et al. 2001). During the winter following site preparation, bare-root seedlings will be planted in the subsoiled rows at an appropriate spacing to facilitate a minimum planting density of 435 to 436 seedlings per acre (i.e. minimum of 10 square feet per

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<sup>16</sup> The Nationwide Permit 27 is for restoration, establishment and enhancement activities in waters of the United States provided such activity result in a net increase in aquatic resource functions and services (Federal Register Volume 77 Number 34, February 21, 2012).

planted stem). Specifically, areas above 94 feet will be restored as a sugarberry-American elm-green ash-sweetgum-water oak bottomland hardwood (Type 2 and Type 3) while areas between 92 and 94 feet will be restored as an overcup-water hickory bottomland hardwood (Type 1). Areas below 92 feet will be restored to southern baldcypress swamp. The Stream Two channel planting will resemble that of the baldcypress swamp mosaic while the riparian buffer will resemble the Type 2-3 bottomland hardwood mosaic. The upland restoration areas will also resemble the Type 2-3 bottomland hardwood mosaic but will include native, non-wetland species with an indicator status of Facultative Upland (FACU) as described by Lichvar et al. (2012), Lichvar et al. (2014) and USACE (2014).

Afforestation activities will include the planting of native BLH and Swamp species during the first planting season (January 1<sup>st</sup> through March 31<sup>st</sup>) following site preparation. Tables 4 describes the species suitable for each habitat type. The arrangement of species was based upon species noted in adjacent reference sites as well as those in which the native range has been documented for the CRMB by the Louisiana Natural Heritage (LNH 2009), Lester et al. (2005), Burns and Honkala (1990), USACE (2014) and NRCS 2016<sup>3</sup>. The species selected will be site-appropriate in terms of habitat design, soil-moisture regime, and species richness. The exact species and quantities to be planted will be determined by the availability of such species from commercial nurseries providing localized ecotype seedlings. At least five to ten species shall be represented in the planting mosaic to insure adequate species richness and seedlings will be mixed prior to planting so that areas are not afforested with a monotypic species community (Twedt and Best 2004). Hard mast<sup>17</sup> species should account for 40% to 60% of the bottomland hardwood plantings, and baldcypress should account for 50% to 80% of the baldcypress swamp plantings. All species selected for afforestation have a designated growth habit of a tree<sup>18</sup> or combination tree/shrub<sup>19</sup> per NRCS 2016<sup>3</sup>.

The species selected for planting within the baldcypress swamp and Type 1 bottomland hardwood restoration areas will have flood tolerance classes ranging from constant inundation for up to one year (Class I) to long-term seasonal flooding (Class III) as purported by Shankman (1996). The afforestation effort within the Type 2-3 bottomland hardwood areas will integrate the utilization of fast-growing soft mast species with slower-growing hard mast species to allow for greater vertical structural diversity, which is necessary habitat for forest breeding birds of highest conservation importance (Twedt et al. 1999). This will create a scrub-shrub habitat to form early in succession which will be juxtaposed to mature forest thus allowing more thamnisc species to be present with higher nest success rates (i.e., source habitat). Additionally, the presence of adjacent habitat types creates ecotones

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<sup>17</sup> For the purpose of this, hard mast is defined as heavy-seeded species of *Quercus* spp. and *Carya* spp.

<sup>18</sup> Trees are defined as perennial, woody plant with a single stem (trunk), normally greater than 13 to 16 feet in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 13 feet in height).

<sup>19</sup> Shrubs are defined as perennial, multi-stemmed woody plant that is usually less than 13 to 16 feet in height. Shrubs typically have several stems arising from or near the ground, but may be taller than 16 feet or single-stemmed under certain environmental conditions.



(transition zones) that increase the nesting success of silvicolous bird species such as Acadian flycatchers (*Empidonax virescens*) as these species are not forced deeper into the forest interior such as when there is a drastic shift from one habitat type to another (i.e., forested area to grassland). The integration of rapid growth early successional species mimics early successional seral stages that provide nursery habitat for late successional forest species which exhibit increased growth in partial cover and dappled sunlight exposure. The early successional community creates abiotic and biotic environmental conditions that promote seedling emergence and survival of late successional species (Twedt and Portwood 2003, Gardiner and Hodges 1998).

### **8.3 Management of Non-Mitigation Features**

The remaining 11.1 acres within the CRMB conservation easement will consist of non-credit features such as an existing electrical utility line right of way (ROW), access trails and maintained wildlife openings for use as open space or planted as a food plot. The ROW, wildlife openings and access trails represent less than 1.2% of the total bank acreage. The current locations and configurations of these features do not result in major breaks or fragmentation of the restored habitat. Given that recreational uses, such as hunting and wildlife observation, are allowed within the mitigation bank, these open spaces will serve to facilitate these uses while not interfering with wetland functions provided by the restored wetland and upland forests.

A small tractor or all-terrain vehicle (ATV) and associated implements will be used for managing the access trails and wildlife openings. Management will consist of bush-hogging and/or light disking for seedbed preparation, seeding by a small drill or seed spreader, and harrowing for seed coverage.

### **8.4 Bank Operation**

DLS will operate the CRMB as the sponsor. The MBI will describe the operation of the CRMB in greater detail. This instrument will include more information on the objectives, site selection, site protection instrument, and baseline information, as well as a credit determination, credit release schedule, detailed mitigation work plan, performance standards, monitoring requirements, long-term management plan, adaptive management plan, financial assurances, service area use, legal responsibilities of the sponsor, default and closure provisions, reporting protocols, and other pertinent information.

## **9.0 Long-term Protection, Maintenance, Sustainability and Water Rights**

The CRMB will be subject to a perpetual conservation servitude in accordance with in accordance with Louisiana. R.S. 9:1271, et seq. The conservation servitude will be held by a qualified, non-profit organization whose mission is to retain or protect the land's natural habitat, open space, scenic, educational, recreational, historical, or cultural

values. Following approval of the MBI, the servitude will be recorded in the Mortgage and Conveyances Records Office of Natchitoches Parish. As a requirement to receiving any advanced credit release authorization, DLS will provide the CEMVK with evidence of the recording pursuant to 33 CFR § 332.8(t). With the possible exception of the utility ROW, there are currently no known existing surface encumbrances which would interfere with the ability of the conservation servitude to protect the site. Currently, survey work is being conducted by a Louisiana registered land surveyor and title work is being reviewed by DLS' title and real estate attorney. Any encumbrance discovered as a result of this process will be identified and either removed or subordinated to the conservation servitude. Any encumbrances which cannot be removed or subordinated to the conservation servitude will be identified and described in the MBI as to its potential effect on long-term viability of the restoration project. Additionally, any acreage changes which may result from the final survey will be reflected within the MBI.

Long-term management will consist of monitoring, vegetation management, invasive species control, boundary maintenance, site protection, and the funding of such activities. The forest wetland habitat will be managed to increase and maintain the biological, chemical, and physical wetland functions of the CRMB, which will provide forested habitat capable of supporting populations for priority wildlife species (e.g., native wildlife and Nearctic-Neotropical migrants). Invasive species control will include control of nuisance invasive species such as Chinese tallow (*Triadica sebifera*), nutria (*Myocastor coypus*) and feral hogs (*Sus scrofa*). Management and maintenance should encourage the development of snags and woody debris. Snags and woody debris serve as microhabitat for various insects, beetles and termites which are an important food source for Nearctic-Neotropicals as well as the Louisiana black bear (*Ursus americanus luteolus*) (BBCC 2015). Snags are also beneficial to various species of cavity-nesting birds such as downy woodpeckers (*Picoides pubescens*), hairy woodpeckers (*Picoides villosus*), red-bellied woodpeckers (*Melanerpes carolinus*) and white-breasted nuthatches (*Sitta canadensis*). The encouragement of habitat which supports these bird species is beneficial for long-term forest health as studies show these species are beneficial in slowing the spread of emerald ash borers (*Agrilus planipennis*), an invasive species which could pose a risk to ash (*Fraxinus* spp.) species in the near future (Koenig et al. 2013). Deadwood is an important component for various wetland functions such as nutrient cycling and provides habitat for various species of invertebrates, amphibians, and reptiles (Brinson et al. 1995, NRCS 2003). Loeb (2013) states that snags, particularly those large in size and located in clusters, are important in provide roosting habitat for various tree bats such as southern myotis and the Rafinesque big-eared bat. Maintenance of desired forest conditions described by LMVJV (2007) that are compatible with the maintenance of wetland function should be considered in long-term management strategies. A long-term management plan will be included with the MBI which will detail long-term management needs, costs and identify a funding mechanism. DLS, or other Long-term Steward should one be appointed in accordance with in accordance with 33 CFR § 332.7 (d), shall be responsible protecting lands contained within the CRMB in perpetuity.

With regard to water rights, the proposed CRMB will depend primarily on precipitation, supplemented by high water tables, and the potential for backwater flooding associated with Cane River and its local tributaries. As such, long-term hydrology maintenance will not depend on the utilization of water captured from irrigation wells or nearby surface water (i.e. irrigation canals); therefore, sufficient water rights are ensured for such purposes. DLS does not foresee any adverse impacts on neighboring properties resulting from the implementation of this project.

## 10.0 Conclusion

In summary, the restoration of forested wetlands within the 928.4-acre CRMB will provide additional wetland functions and values which are not being realized under the current land use. Implementation of the project will result in the restoration of 917.3 acres of palustrine forested wetlands, uplands and riparian areas. The cessation of current and future livestock grazing; the elimination of anthropogenic drainage features; the re-establishment of natural forested cover; and the restoration of natural hydrologic conditions will result in improved water quality for Bayou Barbue and its receiving waterway, the Cane River.

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## **Attachments**

## **Attachment A: Tables and Figures**

**Table 1. Existing and proposed restoration conditions at the Cane River Mitigation Bank in Natchitoches Parish, Louisiana.**

<b>Baseline Condition<sup>1</sup></b>	<b>Mitigation Habitat and Type</b>	<b>Acres</b>
Non-wetland Pasture	Type 2 and 3 Bottomland Hardwood Re-establishment (>94 feet NAVD)	137.2
Wetland Pasture	Type 2 and 3 Bottomland Hardwood Rehabilitation (>94 feet NAVD)	142.2
Non-wetland Pasture	Type 1 Bottomland Hardwood Re-establishment (92-94 feet NAVD)	74.7
Wetland Pasture	Type 1 Bottomland Hardwood Rehabilitation (92-94 feet NAVD)	196.4
Non-wetland Pasture	Baldcypress Swamp Re-establishment (<92 feet NAVD)	10.2
Wetland Pasture/ Emergent Wetland Range	Baldcypress Swamp Rehabilitation (<92 feet NAVD)	113.2
Non-wetland Pasture	Upland Hardwood Buffer Restoration (>94 feet NAVD)	156.0
Wetland/Non-wetland Pasture	Stream One Riparian Buffer Restoration	25.9
Wetland/Non-wetland Pasture	Stream Two Riparian Buffer Restoration	46.0
Other Waters/ Wetland Pasture	Stream One Channel Restoration (7,796.8 linear feet)	8.9
Other Waters/ Wetland Pasture	Stream Two Channel Restoration (5,739.1 linear feet)	6.6
	<b>Total Wetland Restoration Credit Acreage</b>	<b>673.9</b>
	<b>Total Upland Restoration Acreage</b>	<b>156.0</b>
	<b>Total Stream/Riparian Restoration Acreage</b>	<b>87.4</b>
	<b>Total Restoration Acreage</b>	<b>917.3</b>
Pasture	Wildlife Openings	6.0
Pasture/ Electrical Utility Line Right-of- Way	Non-forested Electrical Utility Line Right-of-Way	3.9
Pasture	Access Trails	1.2
	<b>Total Non-mitigation Acreage</b>	<b>11.1</b>
	<b>Total Project Acreage</b>	<b>928.4</b>

<sup>1</sup> Wetland and Other Waters baseline conditions were determined to be wetlands per a preliminary jurisdictional determination issued by CEMVK to DLS on September 8, 2015 (MVK-2015-00472).

**Table 2. Soil Map Units comprising the Cane River Mitigation Bank in Natchitoches Parish, Louisiana.**

Map Unit <sup>1</sup> Symbol	Map Unit Name	Component Name and phase	Component Representative Percentage	Component Landform	Hydric Rating	Hydric Criterion <sup>2</sup>
Gn	Gallion silty clay loam, 0 to 1 percent slopes	Buxin, occasionally flooded	1	flood-plain steps	Yes	4
La	Latanier clay, 0 to 1 percent slopes, rarely flooded	Moreland, occasionally flooded	1	flood-plain steps	Yes	4
Md	Moreland silt loam, 0 to 1 percent slopes, rarely flooded	Moreland, occasionally flooded	1	flood-plain steps	Yes	4
Mp	Moreland clay, 0 to 1 percent slopes, occasionally flooded	Moreland, occasionally flooded	90	flood-plain steps	Yes	4
Pe	Perry clay, occasionally flooded	Perry	80	natural levees	Yes	2

<sup>1</sup>A Map unit is a collection of areas defined and named the same in terms of their soil components or miscellaneous areas or both. ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2\\_053959](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2_053959))

<sup>2</sup>A hydric rating of 4 indicates map units that are frequently flooded for long durations or very long durations during the growing season that a) based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or b) Show evidence that the soils meet the definition of a hydric soil. A long duration is defined as a duration class in which inundation for a single event ranges from 7 days to 1 month. ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2\\_053959](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2_053959))

**Table 3. Soil profile analysis at the proposed Cane River Mitigation Bank in Natchitoches Parish, Louisiana (1 of 3).**

<b>Data Point</b>	<b>Map Unit Name</b>	<b>Hydric Rating</b>	<b>Hydric Soil Indicator<sup>1</sup></b>	<b>Explanation</b>
1	Perry clay, occasionally flooded	80	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
2	Perry clay, occasionally flooded	80	Other	Four inches of surface water and dominant hydrophytic vegetation community
3	Latanier clay, 0 to 1% slopes, rarely flooded	1	F3	
4	Latanier clay, 0 to 1% slopes, rarely flooded	1	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
5	Perry clay, occasionally flooded	80	Other	Four inches of surface water and dominant hydrophytic vegetation community
6	Perry clay, occasionally flooded	80	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
7	Latanier clay, 0 to 1% slopes, rarely flooded	1	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
8	Latanier clay, 0 to 1% slopes, rarely flooded	1	Other	Ten inches of surface waters and dominant hydrophytic vegetation community
9	Latanier clay, 0 to 1% slopes, rarely flooded	1	F6	
10	Perry clay, occasionally flooded	80	Other	Four inches of surface water and dominant hydrophytic vegetation community
17	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	TF2	Wetland hydrology or hydrophytic vegetation community present
18	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
19	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	TF2	Wetland hydrology or hydrophytic vegetation community present
20	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	TF2	Wetland hydrology or hydrophytic vegetation community present
21	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
22	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	None	TF2 but no wetland hydrology or hydrophytic vegetation community present

**Table 3. Soil profile analysis at the proposed Cane River Mitigation Bank in Natchitoches Parish, Louisiana (2 of 3).**

<b>Data Point</b>	<b>Map Unit Name</b>	<b>Hydric Rating</b>	<b>Hydric Soil Indicator</b>	<b>Explanation</b>
23	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	TF2	Wetland hydrology or hydrophytic vegetation community present
24	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
25	Moreland clay, 0 to 1 percent slopes, occasionally flooded	90	TF2	Wetland hydrology or hydrophytic vegetation community present
26	Latanier clay, 0 to 1% slopes, rarely flooded	1	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
27	Latanier clay, 0 to 1% slopes, rarely flooded	1	TF2	Wetland hydrology or hydrophytic vegetation community present
28	Latanier clay, 0 to 1% slopes, rarely flooded	1	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
29	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
30	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
31	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
32	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
33	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
34	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
35	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	TF2	Wetland hydrology or hydrophytic vegetation community present
36	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	TF2	Wetland hydrology or hydrophytic vegetation community present
37	Latanier clay, 0 to 1% slopes, rarely flooded	1	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
38	Latanier clay, 0 to 1% slopes, rarely flooded	1	TF2	Wetland hydrology or hydrophytic vegetation community present
39	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
40	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	



**Table 3. Soil profile analysis at the proposed Cane River Mitigation Bank in Natchitoches Parish, Louisiana (3 of 3).**

<b>Data Point</b>	<b>Map Unit Name</b>	<b>Hydric Rating</b>	<b>Hydric Soil Indicator</b>	<b>Explanation</b>
41	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
42	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
43	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
44	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	None	TF2 but no wetland hydrology or hydrophytic vegetation community present
45	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
46	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
47	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
48	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	
49	Moreland clay, 0 to 1 percent slopes, occasionally flooded	80	F3	

<sup>1</sup>Hydric Soil Indicators listed per the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* (USACE 2010).

**Table 4. Proposed Planting Composition at the Cane River Mitigation Bank in Natchitoches Parish, Louisiana (1 of 2).**

<b>Baldcypress Swamp and Stream Two Channel<sup>1</sup> (130.0 Acres)</b>			
<b>Common Name</b>	<b>Scientific Name<sup>2</sup></b>	<b>Indicator Status<sup>2</sup></b>	<b>Composition<sup>3</sup></b>
baldcypress	<i>Taxodium distichum</i> *	OBL	≥50%
swamp tupelo	<i>Nyssa biflora</i>	OBL	≤25%
overcup oak	<i>Quercus lyrata</i>	OBL	≤25%
Nuttall oak	<i>Quercus texana</i>	FACW	≤25%
water hickory	<i>Carya aquatica</i>	OBL	≤25%
Drummond red maple	<i>Acer rubrum</i> var. <i>drummondii</i>	OBL <sup>4</sup>	≤15%
mayhaw	<i>Crataegus opaca</i>	OBL	≤15%
buttonbush	<i>Cephalanthus occidentalis</i>	OBL	≤15%
Carolina ash	<i>Fraxinus caroliniana</i>	OBL	≤15%
pumpkin ash	<i>Fraxinus profunda</i> <sup>5</sup>	OBL	≤15%
eastern swampprivet	<i>Forestiera acuminata</i>	OBL	≤5%
planertree	<i>Planera aquatica</i>	OBL	≤5%
<b>Type 1 Bottomland Hardwood (271.1 Acres)</b>			
<b>Common Name</b>	<b>Scientific Name<sup>2</sup></b>	<b>Indicator Status<sup>2</sup></b>	<b>Composition<sup>3</sup></b>
overcup oak	<i>Quercus lyrata</i> **	OBL	≤25%
willow oak	<i>Quercus phellos</i> **	FACW	≤25%
Nuttall oak	<i>Quercus texana</i> **	FACW	≤25%
Delta post oak	<i>Quercus similis</i> **	FACW	≤25%
water hickory	<i>Carya aquatica</i> **	OBL	≤25%
baldcypress	<i>Taxodium distichum</i>	OBL	≤25%
Drummond red maple	<i>Acer rubrum</i> var. <i>drummondii</i>	OBL <sup>4</sup>	≤15%
mayhaw	<i>Crataegus opaca</i>	OBL	≤15%
Carolina ash	<i>Fraxinus caroliniana</i>	OBL	≤15%
green ash	<i>Fraxinus pennsylvanica</i>	FACW	≤15%
pumpkin ash	<i>Fraxinus profunda</i> <sup>5</sup>	OBL	≤15%
eastern swampprivet	<i>Forestiera acuminata</i>	OBL	≤5%

<sup>1</sup> All species selected have flood tolerances of Class I, II, or III as described in Shankman 1996.

<sup>2</sup> Scientific name and indicator status from 2014 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) except where otherwise noted

<sup>3</sup> Exact species and quantities to be determined by seedling availability from commercial sources providing seedlings grown from localized ecotypes.

<sup>4</sup> Indicator status from 1988 National Wetland Plant List, Region 2 as 2014 National Wetland Plant List does not differentiate indicator status for species with trinomials.

<sup>5</sup> Species not noted in Natchitoches Parish per 2014 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) or USDA Plants Database (<http://plants.usda.gov>) but is noted in neighboring Rapides and Bienville Parishes as a native species.

\*These collective of these species should be between 50 and 80% of overall composition of the specified area.

\*\*These collective of these species should be between 40 and 60% of overall composition of the specified area.

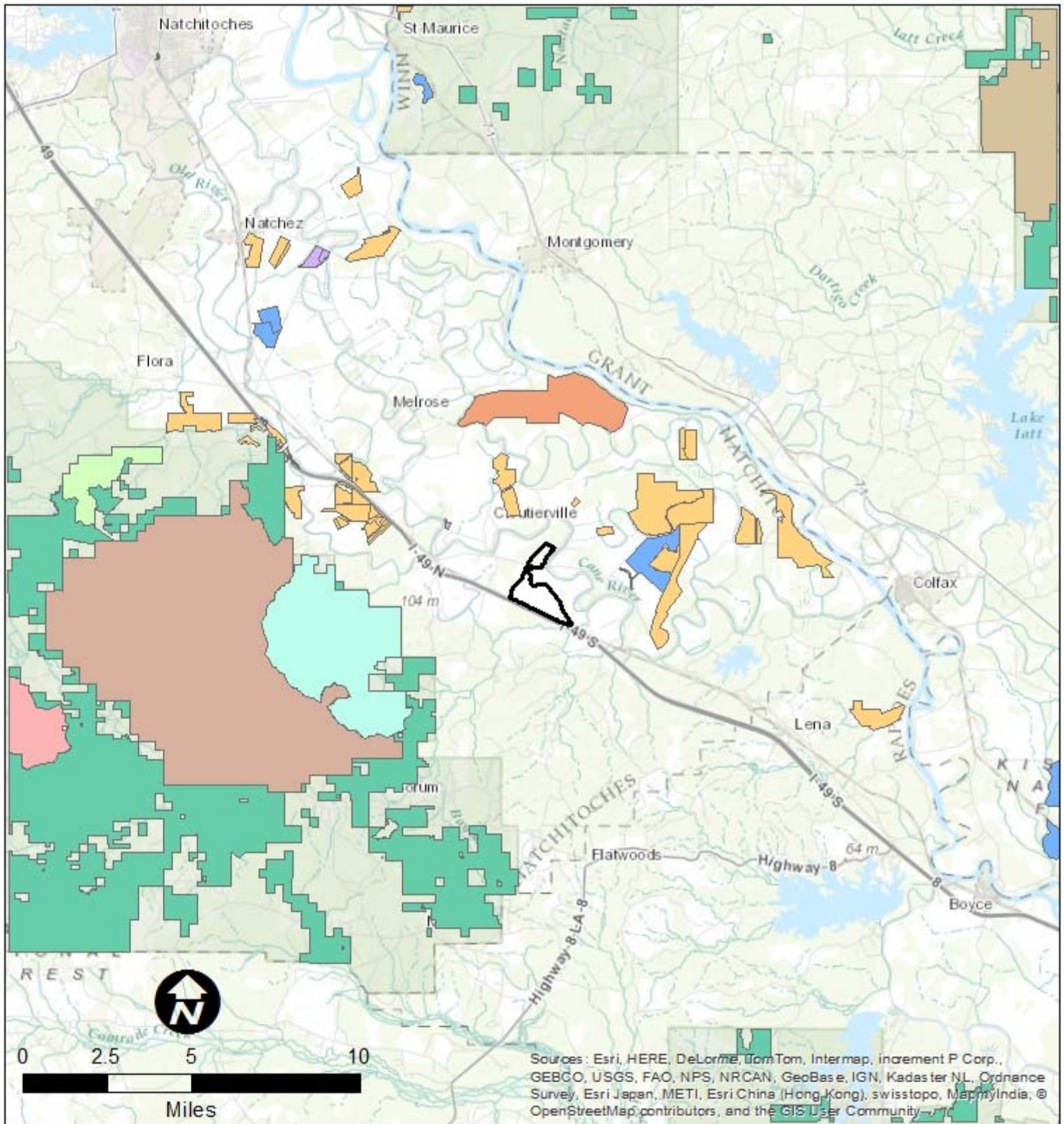
**Table 4. Proposed Planting Composition at the Cane River Mitigation Bank in Natchitoches Parish, Louisiana (2 of 2).**

<b>Type 2-3 Bottomland Hardwood and Stream Riparian Buffer (351.3 Acres)</b>			
<b>Common Name</b>	<b>Scientific Name<sup>1</sup></b>	<b>Indicator Status</b>	<b>Composition<sup>2</sup></b>
cow oak	<i>Quercus michauxii</i> *	FACW	≤25%
cherrybark oak	<i>Quercus pagoda</i> *	FACW	≤25%
willow oak	<i>Quercus phellos</i> *	FACW	≤25%
water oak	<i>Quercus nigra</i> *	FAC	≤25%
Delta post oak	<i>Quercus similis</i> *	FACW	≤25%
Shumard's oak	<i>Quercus shumardii</i> *	FAC	≤25%
Nuttall oak	<i>Quercus texana</i> *	FACW	≤25%
red maple	<i>Acer rubrum</i>	FAC	≤15%
pawpaw	<i>Asimina triloba</i>	FAC	≤15%
sugarberry	<i>Celtis laevigata</i>	FACW	≤15%
green ash	<i>Fraxinus pennsylvanica</i>	FACW	≤15%
sweetgum	<i>Liquidambar styraciflua</i>	FAC	≤15%
American sycamore	<i>Platanus occidentalis</i>	FACW	≤15%
eastern cottonwood	<i>Populus deltoides</i>	FAC	≤15%
American elm	<i>Ulmus americana</i>	FAC	≤15%
cedar elm	<i>Ulmus crassifolia</i>	FAC	≤15%
<b>Upland Forested Buffer (156.0 Acres)</b>			
<b>Common Name</b>	<b>Scientific Name<sup>1</sup></b>	<b>Indicator Status</b>	<b>Composition<sup>2</sup></b>
sweet pecan	<i>Carya illinoensis</i> *	FACU	≤25%
cow oak	<i>Quercus michauxii</i> *	FACW	≤25%
cherrybark oak	<i>Quercus pagoda</i> *	FACW	≤25%
willow oak	<i>Quercus phellos</i> *	FACW	≤25%
water oak	<i>Quercus nigra</i> *	FAC	≤25%
Shumard's oak	<i>Quercus shumardii</i> *	FAC	≤25%
Nuttall oak	<i>Quercus texana</i> *	FACW	≤25%
live oak	<i>Quercus virginiana</i> *	FACU	≤25%
red maple	<i>Acer rubrum</i>	FAC	≤15%
pawpaw	<i>Asimina triloba</i>	FAC	≤15%
sugarberry	<i>Celtis laevigata</i>	FACW	≤15%
green ash	<i>Fraxinus pennsylvanica</i>	FACW	≤15%
sweetgum	<i>Liquidambar styraciflua</i>	FAC	≤15%
red mulberry	<i>Morus rubra</i>	FACU	≤15%
American sycamore	<i>Platanus occidentalis</i>	FACW	≤15%
eastern cottonwood	<i>Populus deltoides</i>	FAC	≤15%
American elm	<i>Ulmus americana</i>	FAC	≤15%
cedar elm	<i>Ulmus crassifolia</i>	FAC	≤15%

<sup>1</sup> Scientific name and indicator status from 2014 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) except where otherwise noted

<sup>2</sup> Exact species and quantities to be determined by seedling availability from commercial sources providing seedlings grown from localized ecotypes.

\*These collective of these species should be between 40 and 60% of overall composition of the specified area.



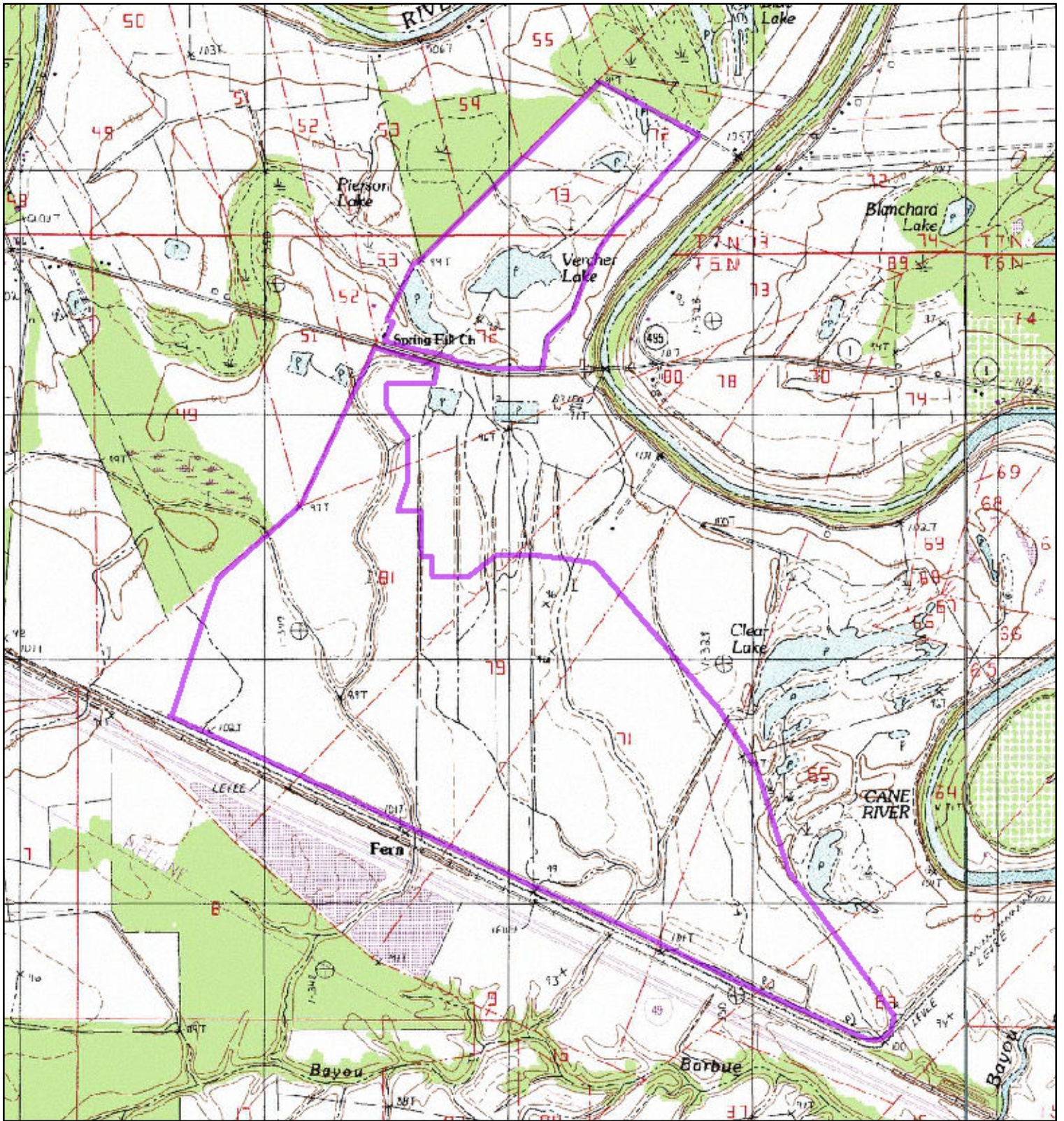
Legend	
	Project Area
	Catahoula Wildlife Preserve
	Cane River Creole National Historical Park
	Cunningham Brake Early Research Natural Area
	Fort Polk
	Fort St Jean Baptist State Historic Site
	Kisatchie Hills Wilderness
	Kisatchie National Forest
	Mitigation Bank
	Red Dirt Wildlife Preserve
	Red River National Wildlife Refuge
	Wetlands Reserve Program

**Cane River Mitigation Bank**  
**VICINITY MAP AND**  
**PROTECTED LANDS**  
**Natchitoches Parish, LA**

Created : TSC/ARCVIEW	
Approved : DEB	
Date : 3/7/2016	
Map No. : F01_VicinityMap	

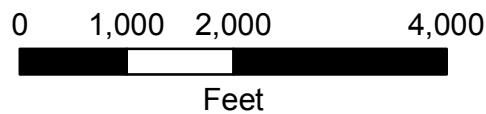
**FIGURE 1**





**Legend**

 Project Area (928.4 ac)



Source: USGS 7.5-Minute Quadrangle "Cloutierville, LA"

**Cane River Mitigation Bank**

**USGS QUADRANGLE MAP**

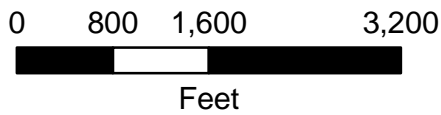
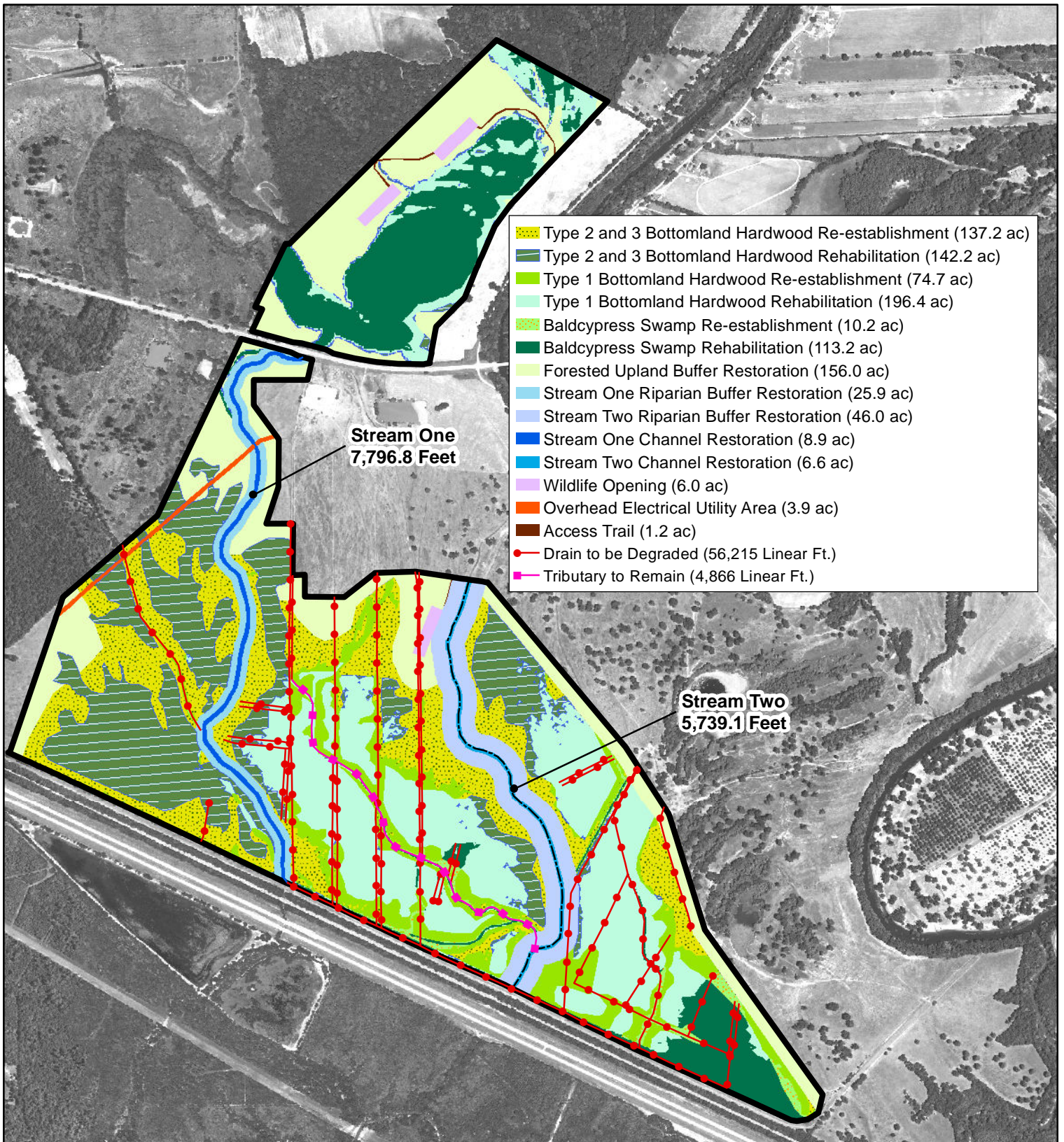
**Natchitoches Parish, LA**

Created : TSC/ARCVIEW  
 Approved : DEB  
 Date : 3/7/2016  
 Map No. : F02\_QuadMap



**FIGURE 2**





**Cane River Mitigation Bank**

**MITIGATION FEATURES MAP**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

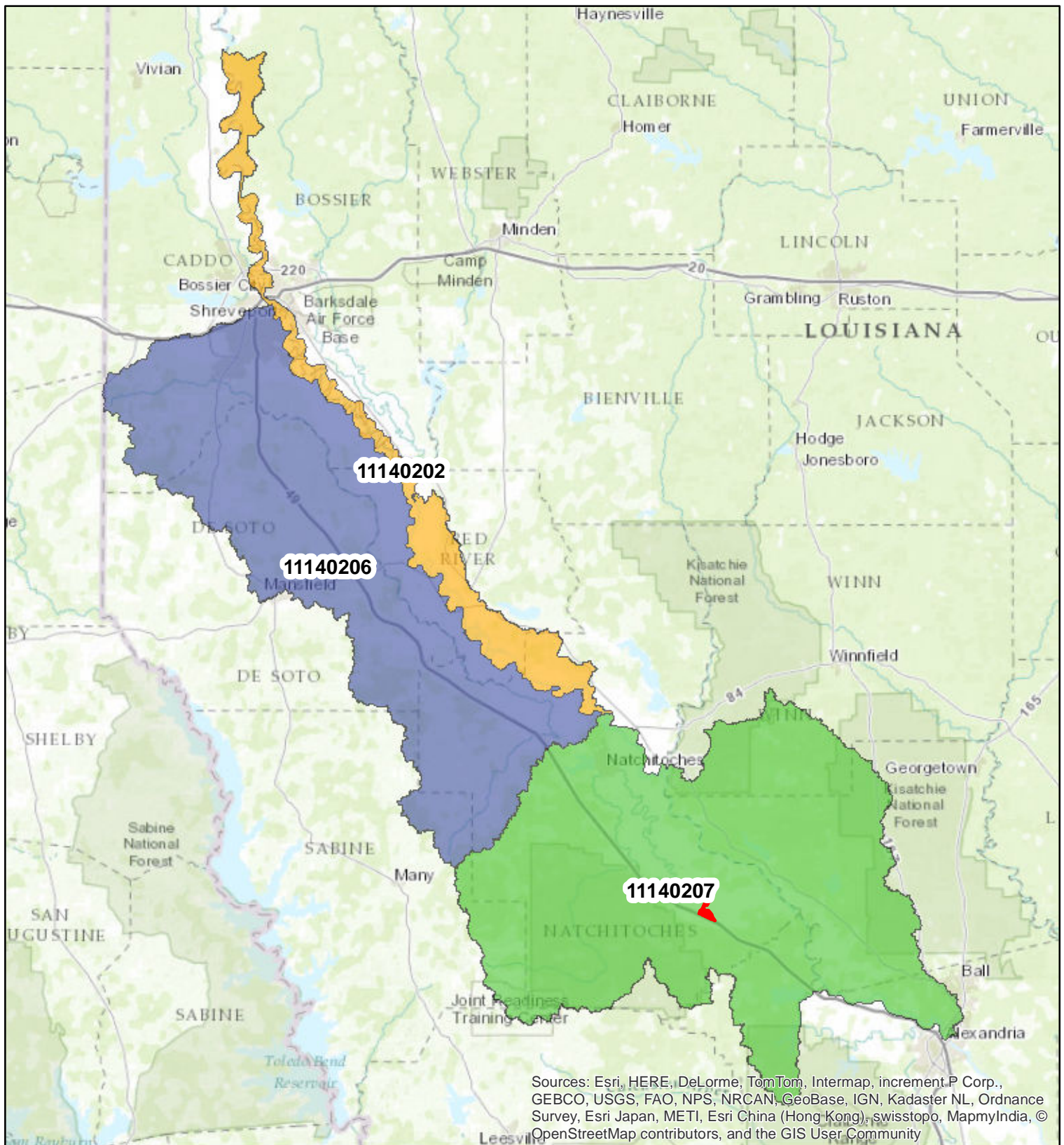
Date :3/7/2016

Map No. : F03\_mitigationfeatures



**FIGURE 3**







Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**Legend**

- Project Area (928.4 ac)
- Middle-Red Coushatta (11140202)
- Lower Red - Lake Iatt (11140206)
- Bayou Pierre (11140207)



  


Miles

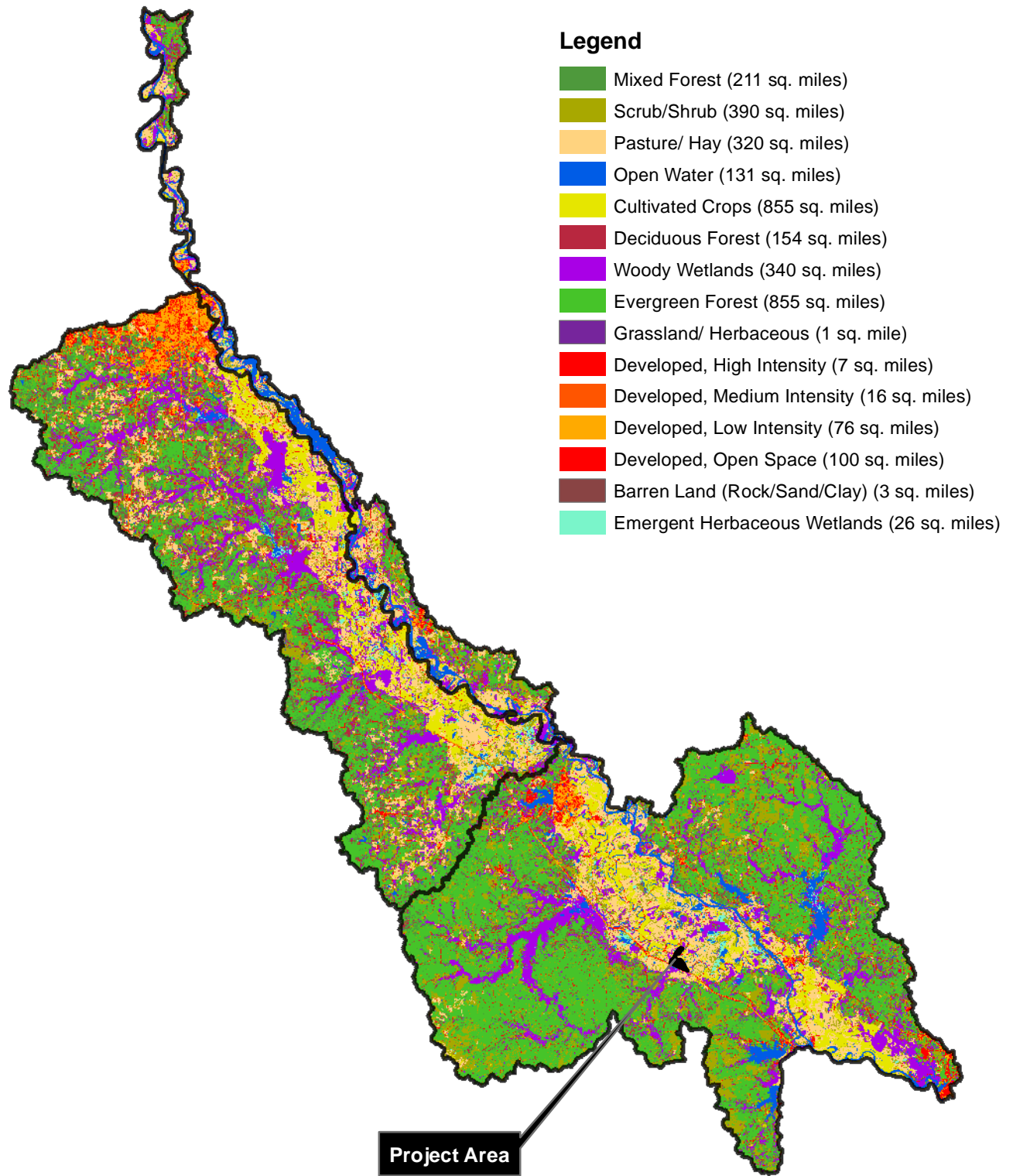
**Cane River Mitigation Bank**

**SERVICE AREA**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW	
Approved : DEB	
Date : 3/7/2016	
Map No. : F04_ServiceArea.mxd	

**FIGURE 4**



**Legend**

 Service Area



0 7.5 15 30



Miles

Source: 2001 National Land Cover Database

**Cane River Mitigation Bank**

**LAND USE WITHIN SERVICE AREA**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

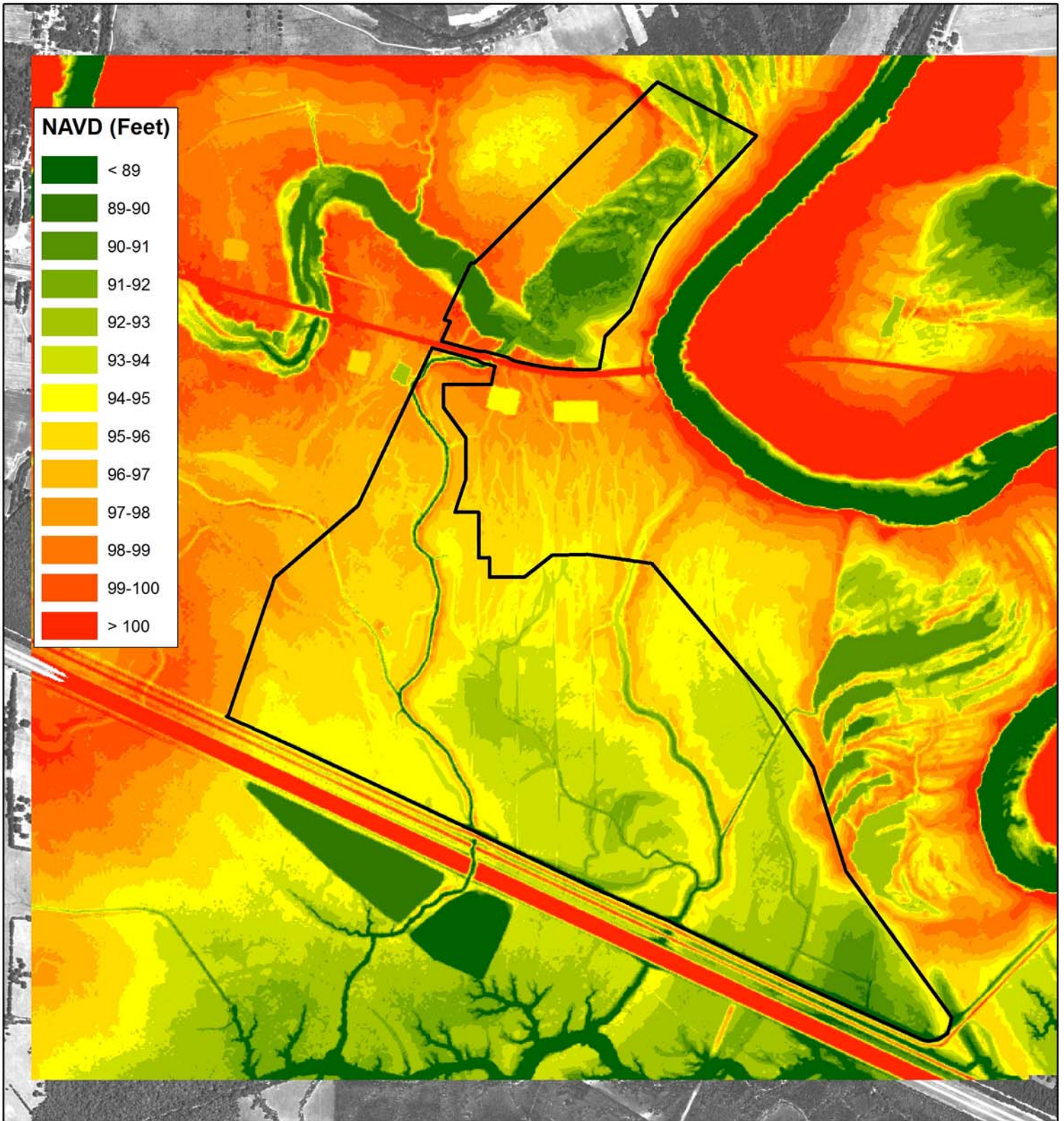
Date : 3/7/2016

Map No. : F5\_ServiceArea.mxd



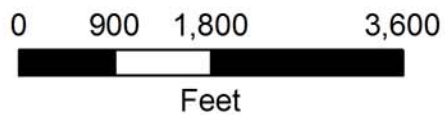
**FIGURE 5**





**Legend**

 Project Area (928.4 ac)



Source: Contours derived from Phase 5 of Louisiana LIDAR Data Development March 2006

**Cane River Mitigation Bank**

**LIDAR CONTOUR MAP**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : JMJ

Date : 3/10/2016

Map No. : F06\_Elevation.mxd



**FIGURE 6**





**Legend**

Hay/Pasture (46.4%)	Emergent Herbaceous Wetlands (2.1%)
Woody Wetlands (16.0%)	Evergreen Forest (2.1%)
Cultivated Crops (11.5%)	Mixed Forest (0.8%)
Developed (9.8%)	Deciduous Forest (0.6%)
Shrub/Scrub (8.2%)	Herbaceous (0.3%)
Open Water (3.8%)	Barren Land (0.1%)

Source: 2001 National Land Cover Database

**Cane River Mitigation Bank**

**LAND USE WITHIN  
ONE MILE EXTENT**

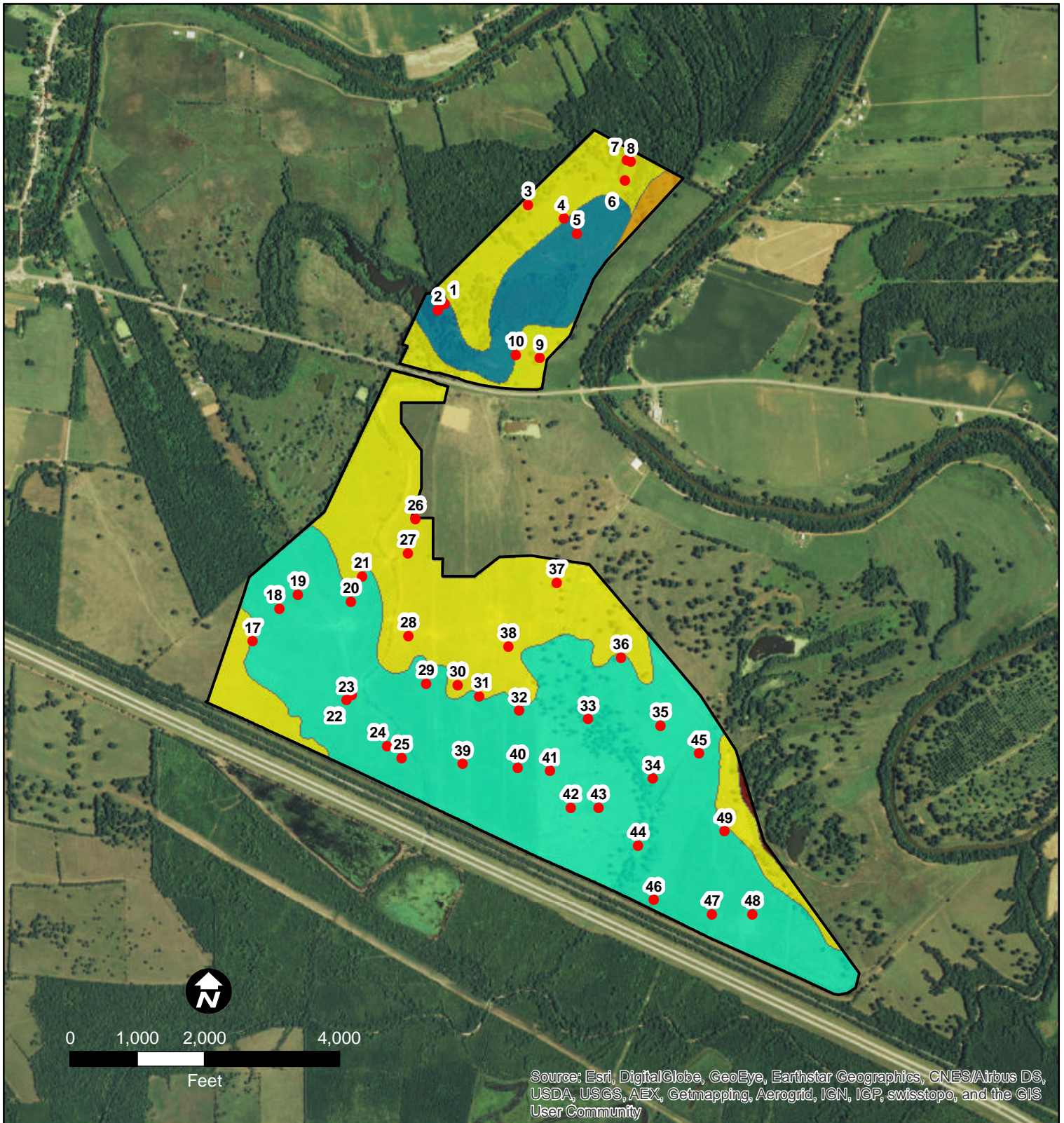
**Natchitoches Parish, LA**

Created : TSC/ARCVIEW
Approved : DEB
Date : 3/7/2016
Map No. : F07_SurroundingLand



**FIGURE 7**





**Legend**

- Mp: Moreland clay, occasionally flooded (54%)
- La: Latanier clay, 0 to 1 percent slopes, rarely flooded (37%)
- Pe: Perry clay, gently undulating (8%)
- Md: Moreland silt loam (1%)
- Gn: Gallion silty clay loam, 0-1% slopes (<1%)
- Data Point Location

**Notes:**

- 1) Soil mapping units taken from Soil Survey Geographic (SSURGO) database for Natchitoches Parish, LA 6/15/2007
- 2) Data point locations taken from Wetland Data Report dated June 18, 2015.

**Cane River Mitigation Bank**

**SOILS MAP UNITS**

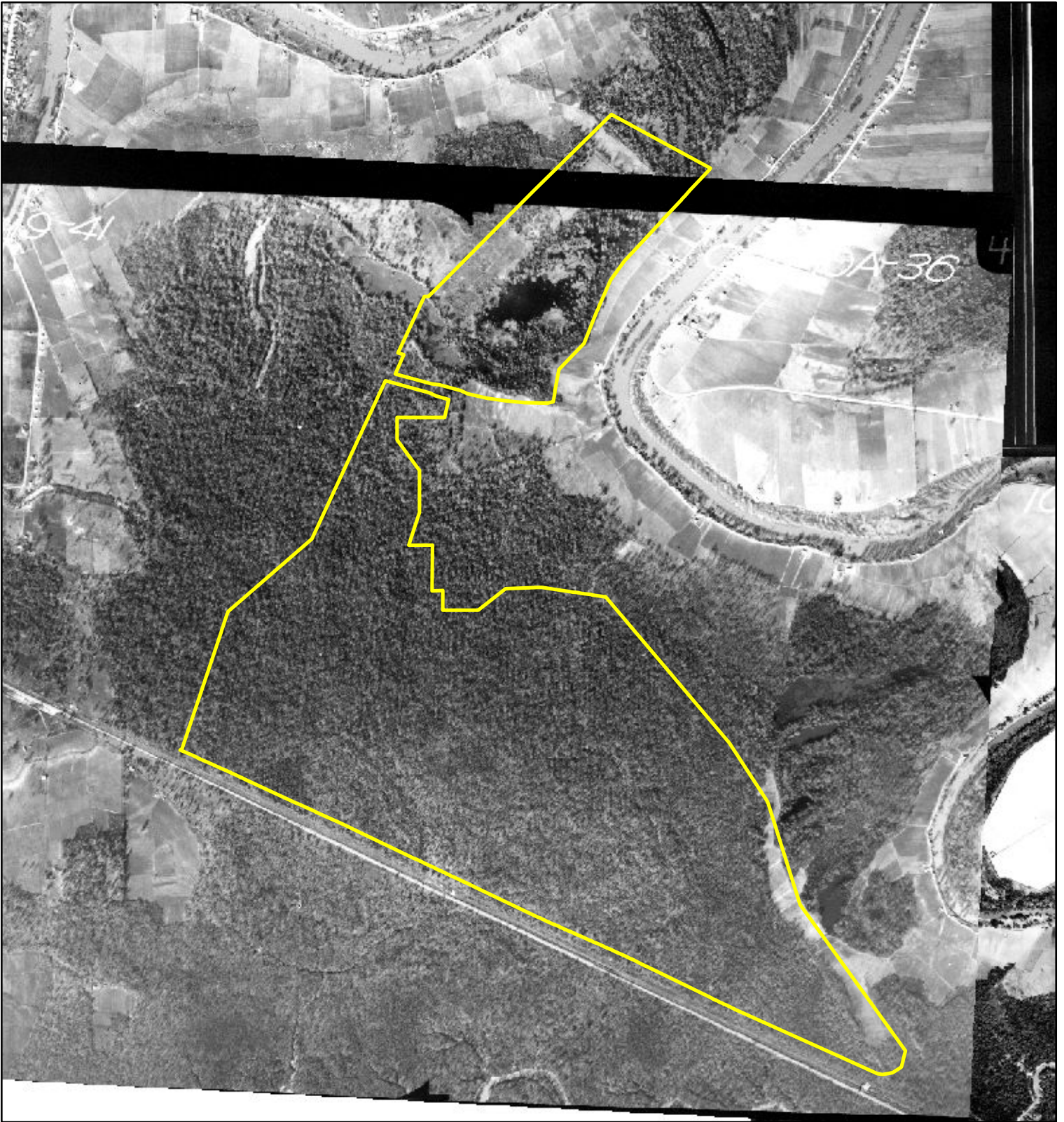
**Natchitoches Parish, LA**

Created : LJW/ARCGIS
Approved : DEB
Date : 3/11/2016
Map No. : F08_Soils.mxd



**FIGURE 8**

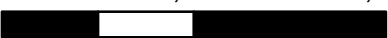




**Legend**

 Project Area (928.4 ac)



0 900 1,800 3,600  
  
Feet

**Cane River Mitigation Bank**

**1941 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

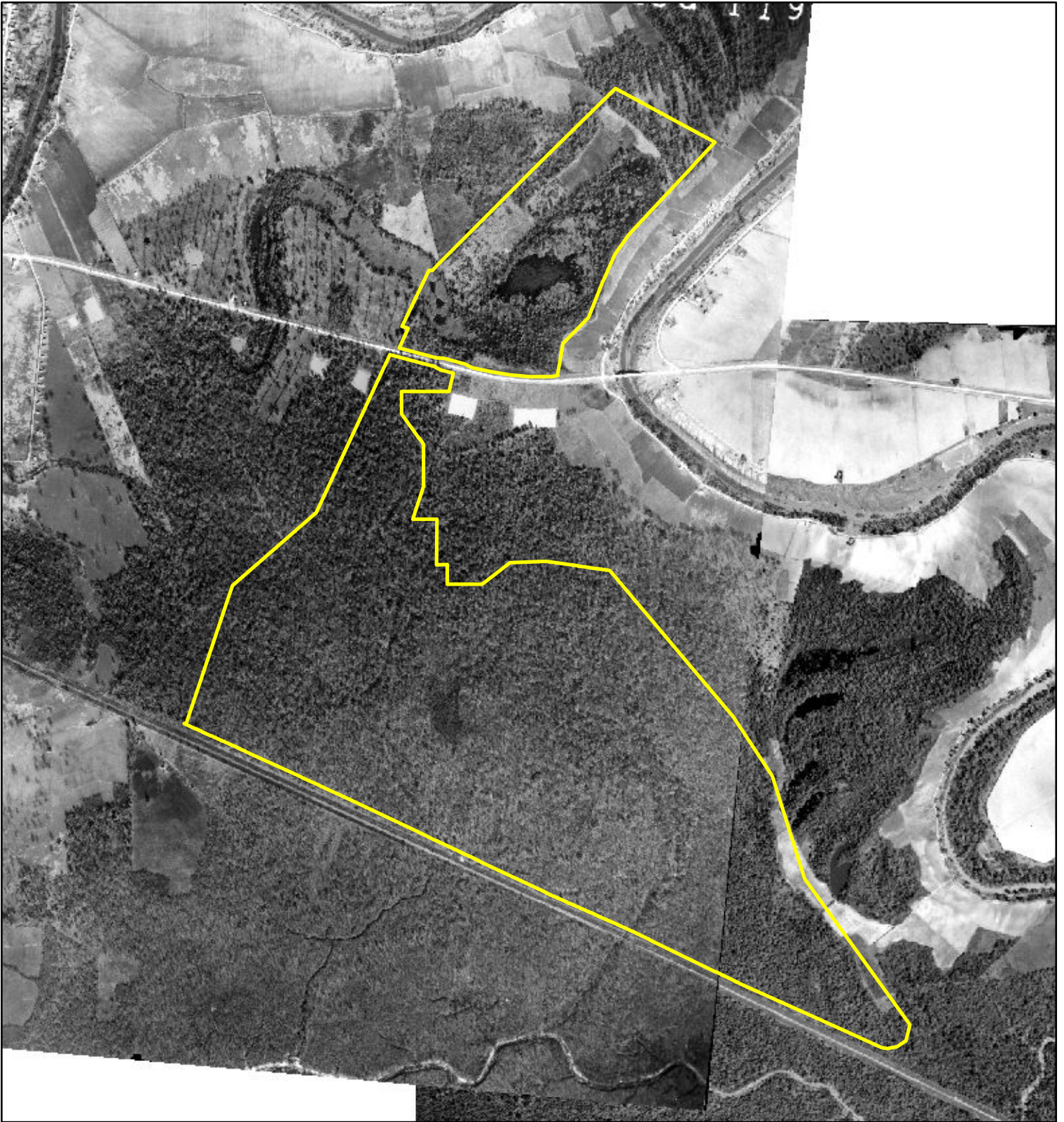
Date : 3/7/2016

Map No. : F09\_Aerials



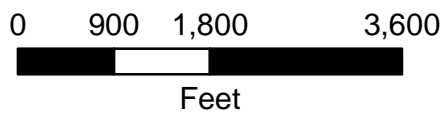
**FIGURE 9**





**Legend**

 Project Area (928.4 ac)



**Cane River Mitigation Bank**

**1950 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

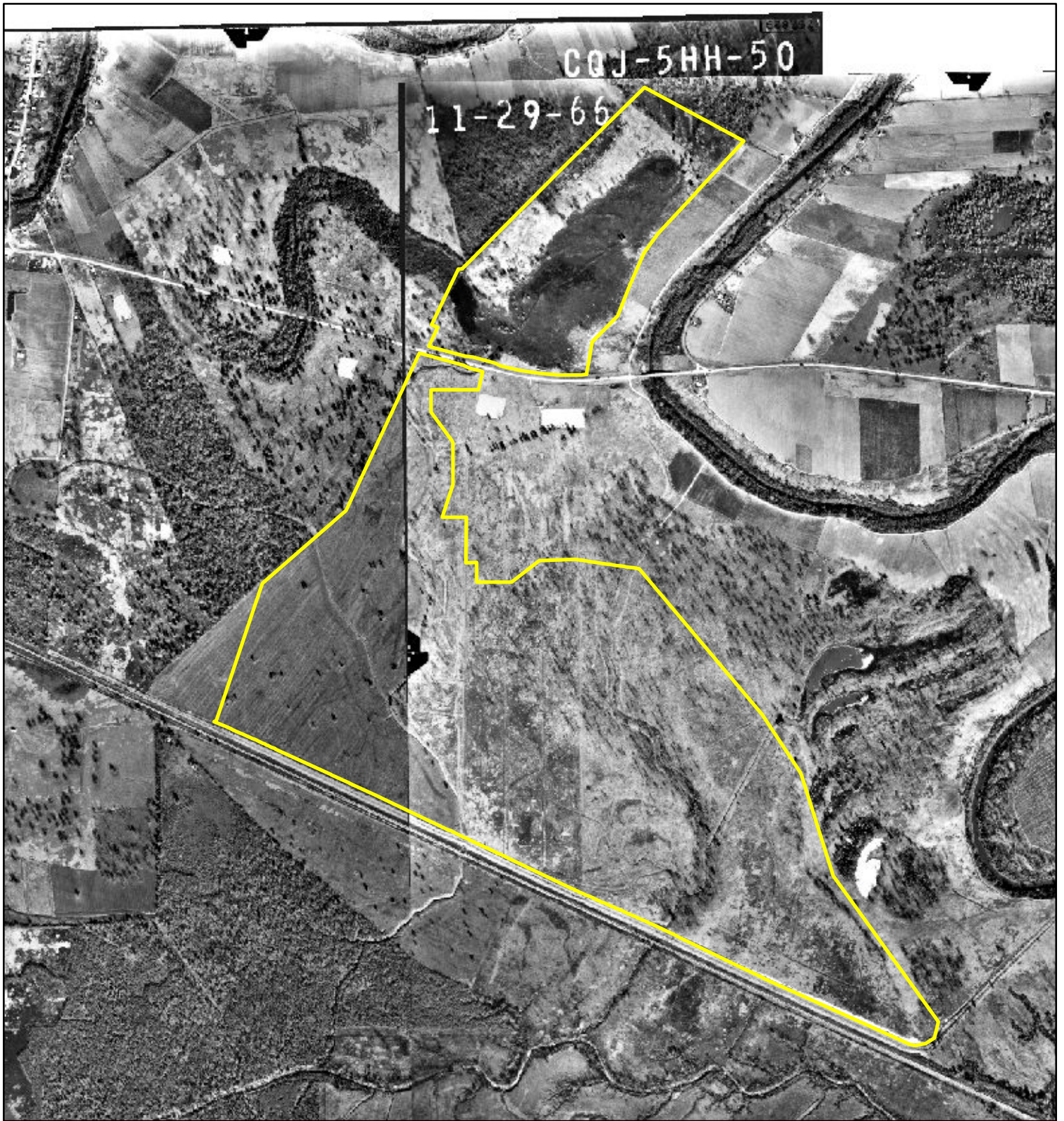
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Map No. : F10\_Aerials



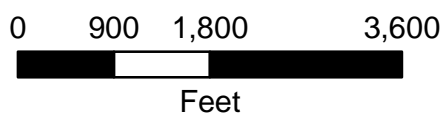
**FIGURE 10**





**Legend**

 Project Area (928.4 ac)



**Cane River Mitigation Bank**

**1966 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

Date : 3/7/2016

Map No. : F11\_Aerials



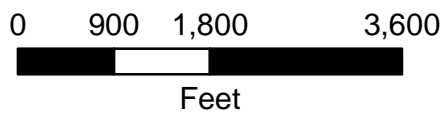
**FIGURE 11**





**Legend**

 Project Area (928.4 ac)



**Cane River Mitigation Bank**

**1972 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : JMJ

Date : 6/9/2015

Map No. : F12\_Aerials



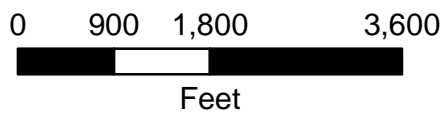
**FIGURE 12**





**Legend**

 Project Area (928.4 ac)



**Cane River Mitigation Bank**

**1998 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

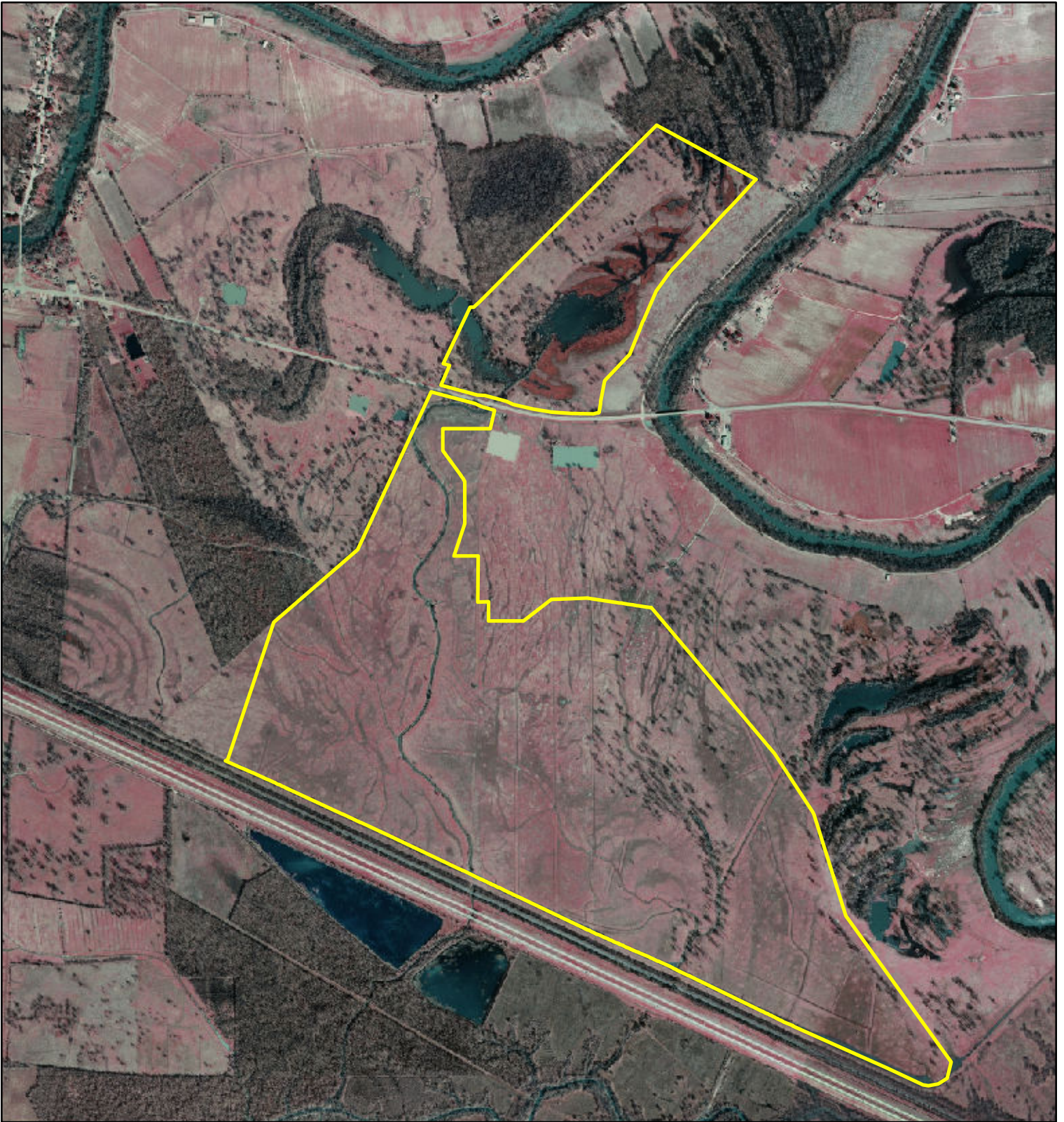
Date : 3/7/2016

Map No. : F13\_Aerials



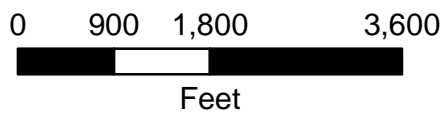
**FIGURE 13**





**Legend**

 Project Area (928.4 ac)



**Cane River Mitigation Bank**

**2004 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

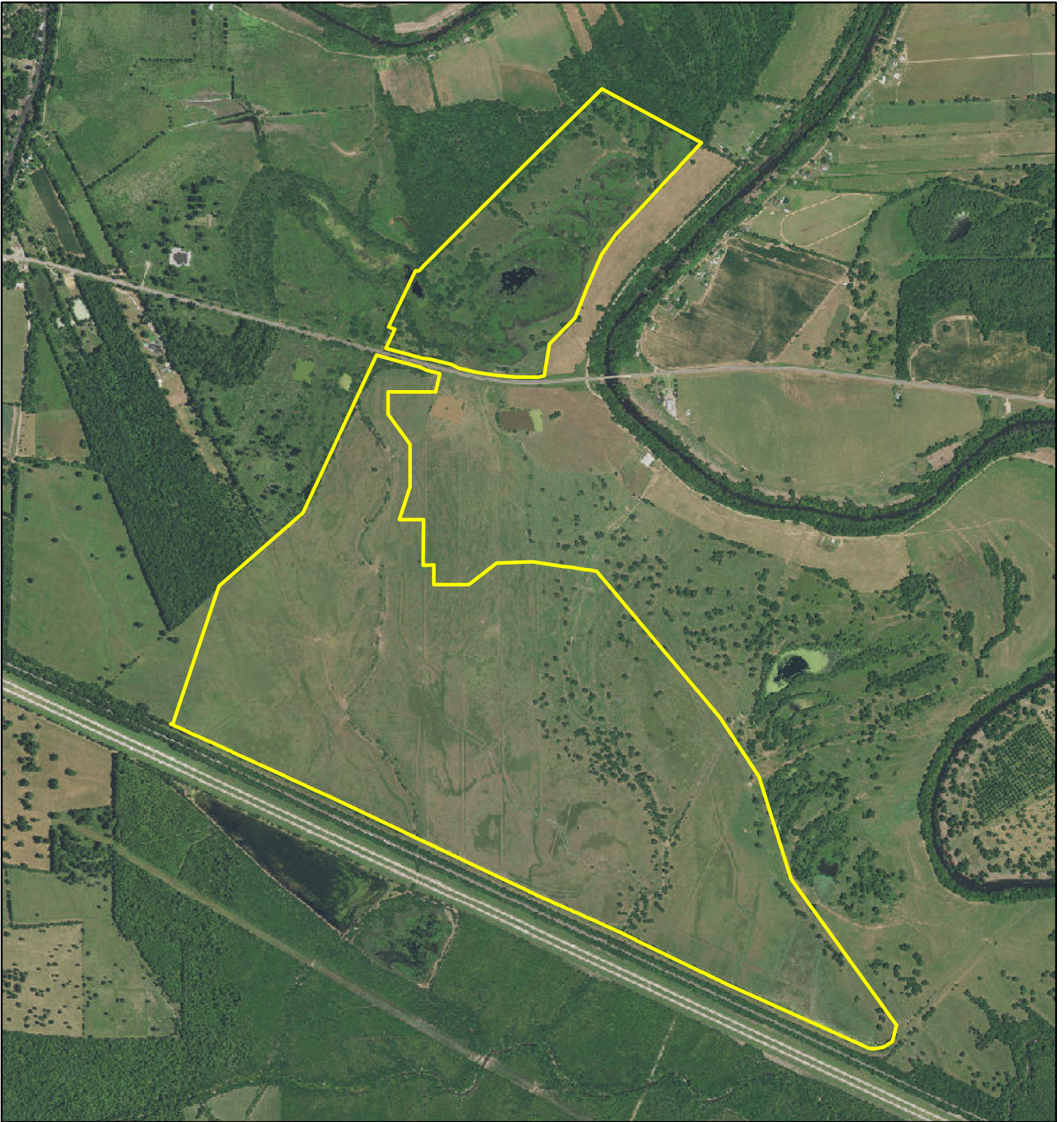
Date : 3/7/2016

Map No. : F14\_Aerials




**FIGURE 14**






**Legend**

 Project Area (928.4 ac)



0 900 1,800 3,600  
  
Feet

**Cane River Mitigation Bank**

**2015 Aerial Photograph**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

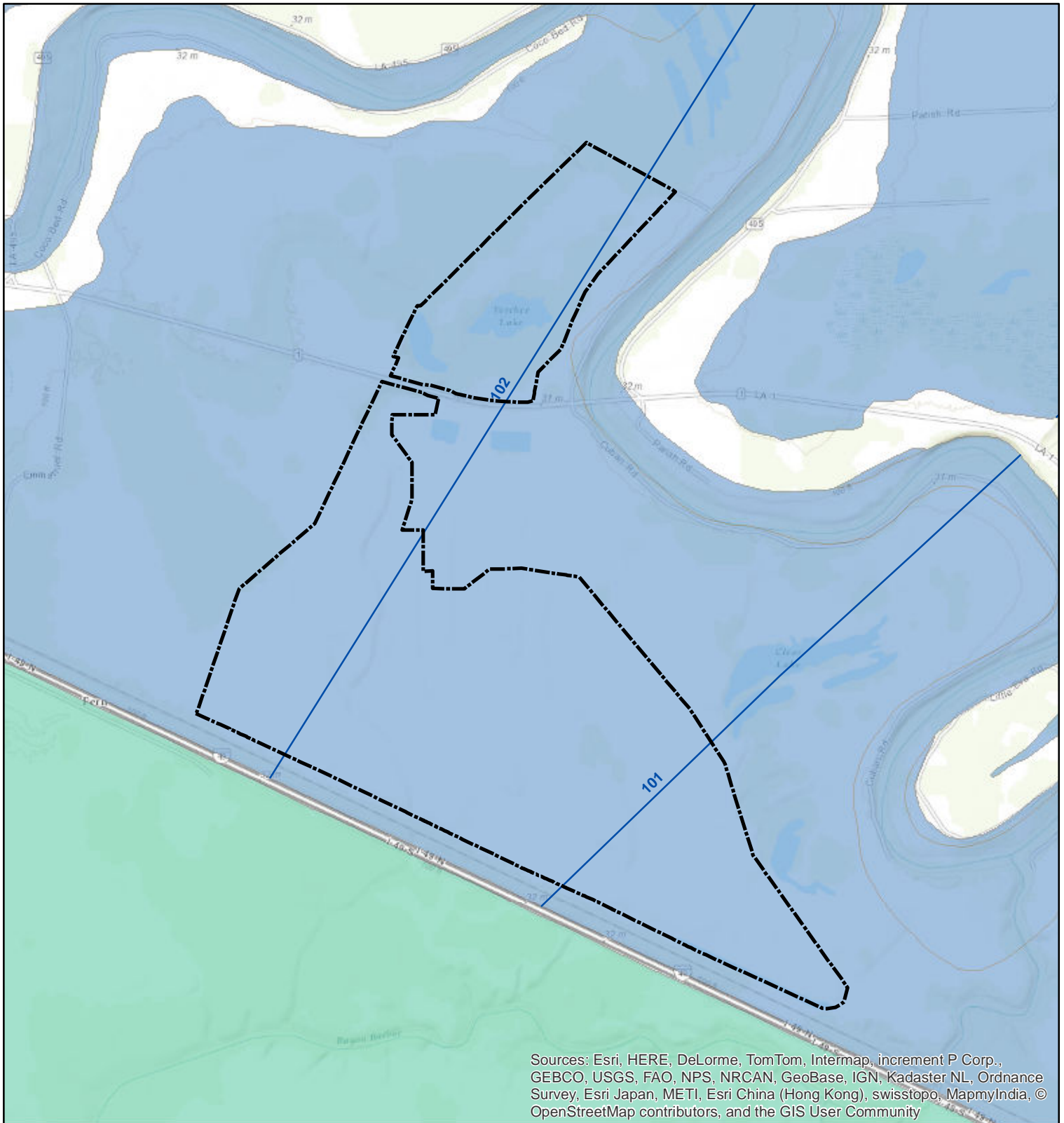
Date : 3/7/2016

Map No. : F15\_Aerials






**FIGURE 15**

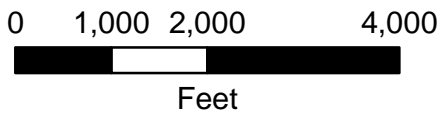




Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**Legend**

-  Project Area (928.4 ac)
-  Zone AE
-  Zone A




Source: FEMA FIRM 22069C0645D effective 07/06/2015

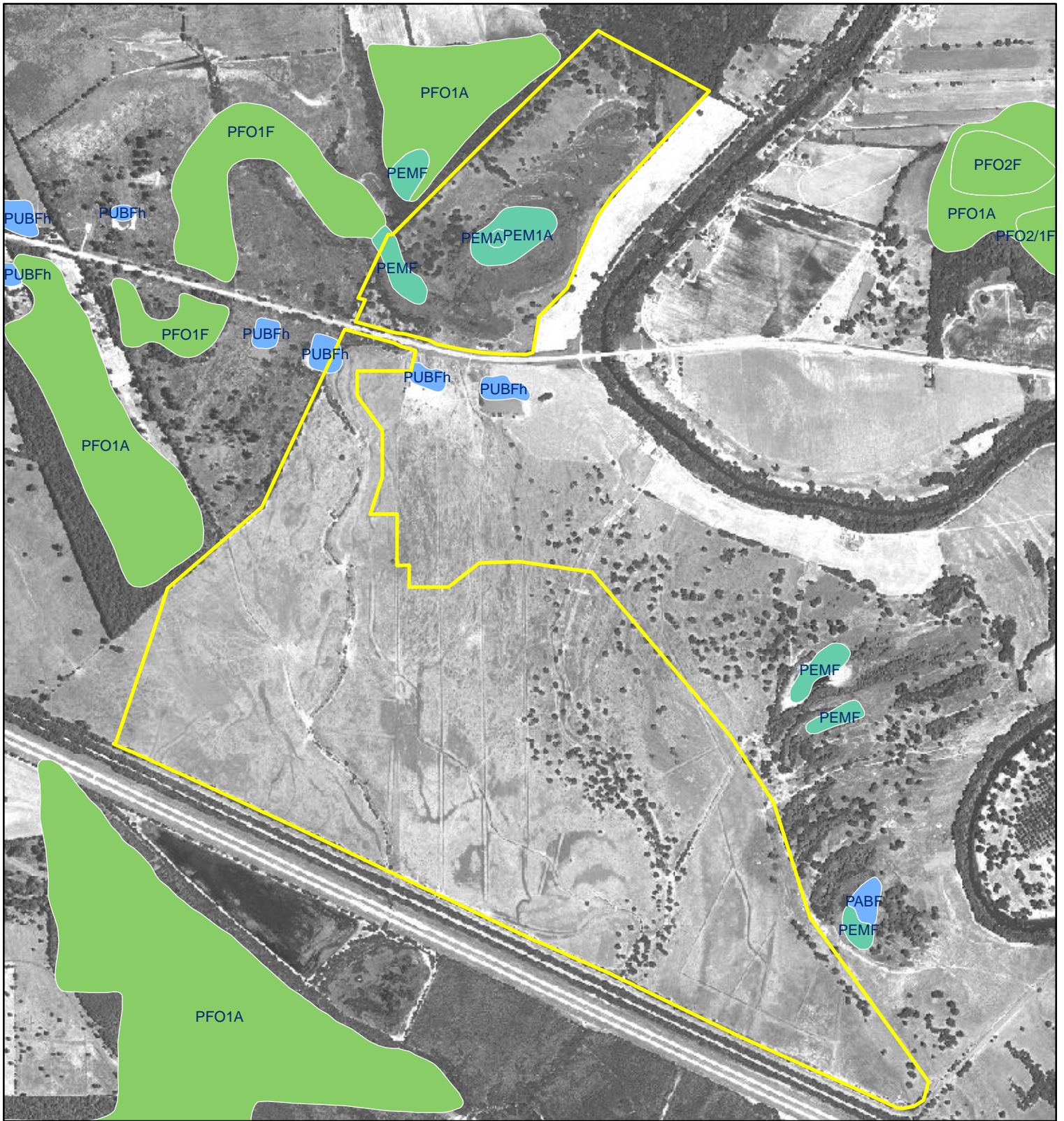
**Cane River Mitigation Bank**

**FLOOD INSURANCE RATE MAP**

**Natchitoches Parish, LA**


Created : TSC/ARCVIEW	
Approved : DEB	
Date : 3/7/2016	
Map No. : F16_Floodzone.mxd	

**FIGURE 16**




**Legend**

- Project Area (928.4 ac)
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond




0    800    1,600    3,200



Feet

SOURCE: U. S. Fish and Wildlife Service. Publication date 5/24/2015. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. <http://www.fws.gov/wetlands/>

**Cane River Mitigation Bank**  
**NATIONAL WETLAND INVENTORY MAP**  
**Natchitoches Parish, LA**

Created : TSC/ARCVIEW	
Approved : DEB	
Date : 3/7/2016	
Map No. : F17_NWIMap	
<b>FIGURE 17</b>	

**Attachment B: Preliminary Jurisdictional Determination**





## DEPARTMENT OF THE ARMY

VICKSBURG DISTRICT, CORPS OF ENGINEERS

4155 CLAY STREET

VICKSBURG, MISSISSIPPI 39183-3435

REPLY TO  
ATTENTION OF:

September 8, 2015

Operations Division

SUBJECT: Jurisdictional Determination – Delta Land Services LLC, 1,086.8 Acres,  
Cane River Mitigation Site, Natchitoches Parish, Louisiana

Mr. Jace M. Jarreau  
Wetland and Stream Ecologist  
Restoration Specialist  
Delta Land Services, LLC  
1090 Cinclare Drive  
Port Allen, Louisiana 70767

Dear Mr. Jarreau:

I refer to your letter dated June 18, 2015, requesting a jurisdictional determination for the subject property located in Natchitoches Parish, Louisiana.

Based upon the information provided, it appears there are jurisdictional areas on the property subject to regulation pursuant to Section 404 of the Clean Water Act. The approximate extent of jurisdictional waters of the United States within the boundary of the property described in your letter is depicted on the enclosed preliminary map (enclosure 1). Any work involving the discharge of dredged or fill material (land clearing, ditching, filling, leveeing, culvert crossings, etc.) within the identified jurisdictional waters will require a Department of the Army Section 404 permit prior to beginning work. For your information, I have enclosed a copy of our appeals form (enclosure 2).

For your convenience, an application packet may be obtained at our Regulatory Program webpage: <http://www.mvk.usace.army.mil/Missions/Regulatory.aspx>. An application for work in wetlands or other waters of the United States should be submitted at least 90 to 120 days in advance of the proposed starting date. In order to expedite the evaluation process, please refer to identification no. MVK-2015-472 when submitting the application.

If we may be of any further assistance in this matter, please contact Mr. Aaron Posner of this office, telephone (601) 631-5591, fax (601) 631-5459, or e-mail address: [Aaron.W.Posner@usace.army.mil](mailto:Aaron.W.Posner@usace.army.mil).

Sincerely,

A handwritten signature in black ink that reads "Charles R. Allred, Jr." in a cursive script.

Charles R. Allred, Jr.  
Chief, Enforcement Section  
Regulatory Branch

Enclosures



Natchitoches Parish, LA



8 September 2015

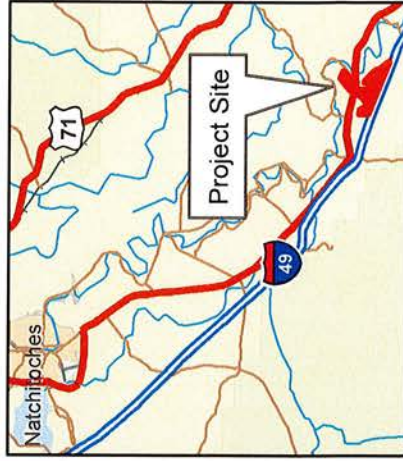
**MVK-2015-472**

Delta Land Services  
Proposed Cane River Compensatory  
Mitigation Site

1086.8 - Acre Site  
Natchitoches Parish, LA

**Preliminary**  
**Jurisdictional Determination**

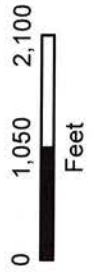
Aaron Posner



US Army Corps  
of Engineers®



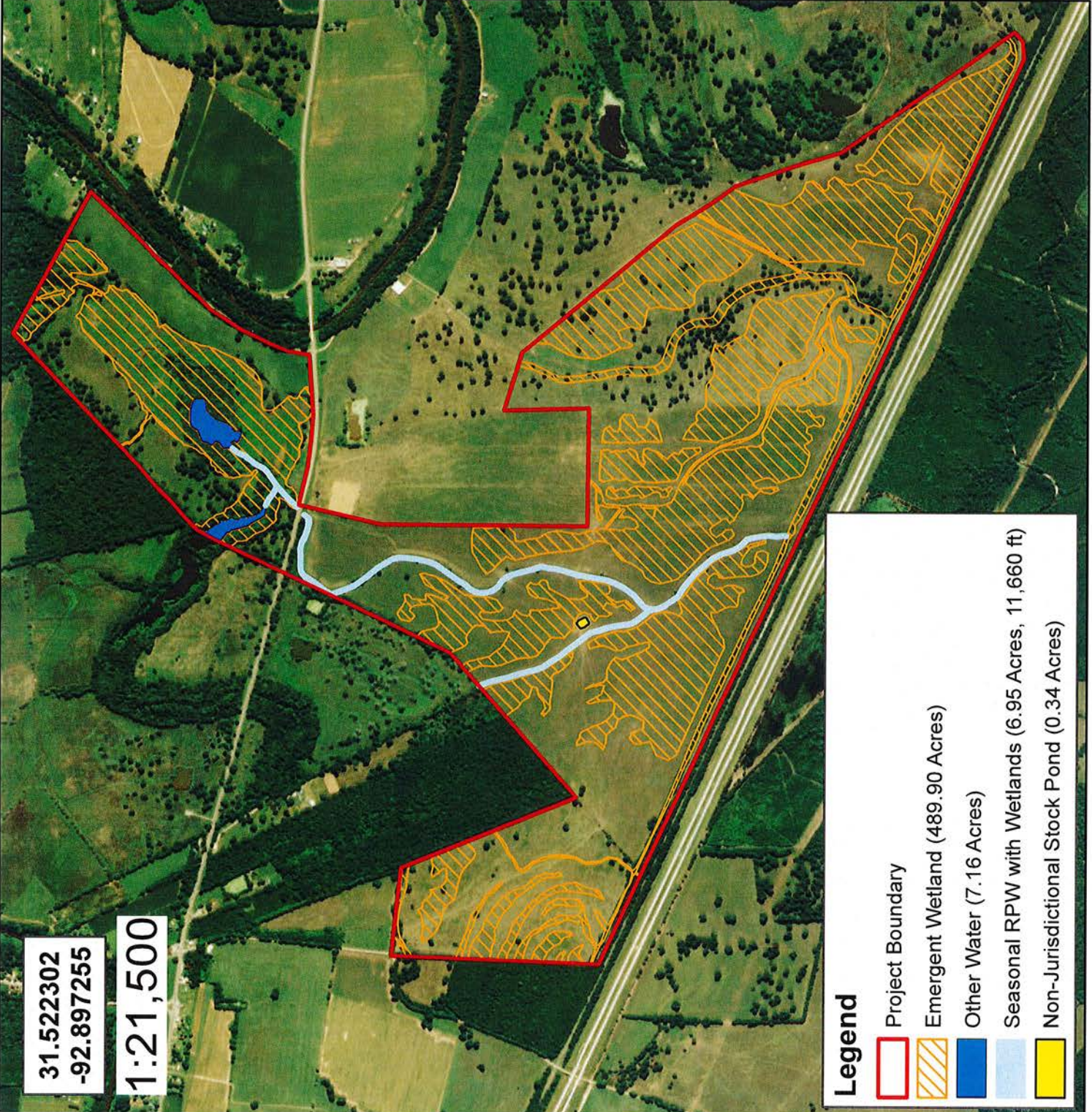
**Regulatory Branch**  
Enforcement Section








Enclosure 1

31.522302  
-92.897255

1:21,500



**Legend**

-  Project Boundary
-  Emergent Wetland (489.90 Acres)
-  Other Water (7.16 Acres)
-  Seasonal RPW with Wetlands (6.95 Acres, 11,660 ft)
-  Non-Jurisdictional Stock Pond (0.34 Acres)



**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND  
REQUEST FOR APPEAL**

**Applicant:** Delta Land Services      **File No.:** MVK-2015-472      **Date:** 9/8/2015

Attached is:	See Section below
INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
PROFFERED PERMIT (Standard Permit or Letter of permission)	B
PERMIT DENIAL	C
APPROVED JURISDICTIONAL DETERMINATION	D
X PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.**

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

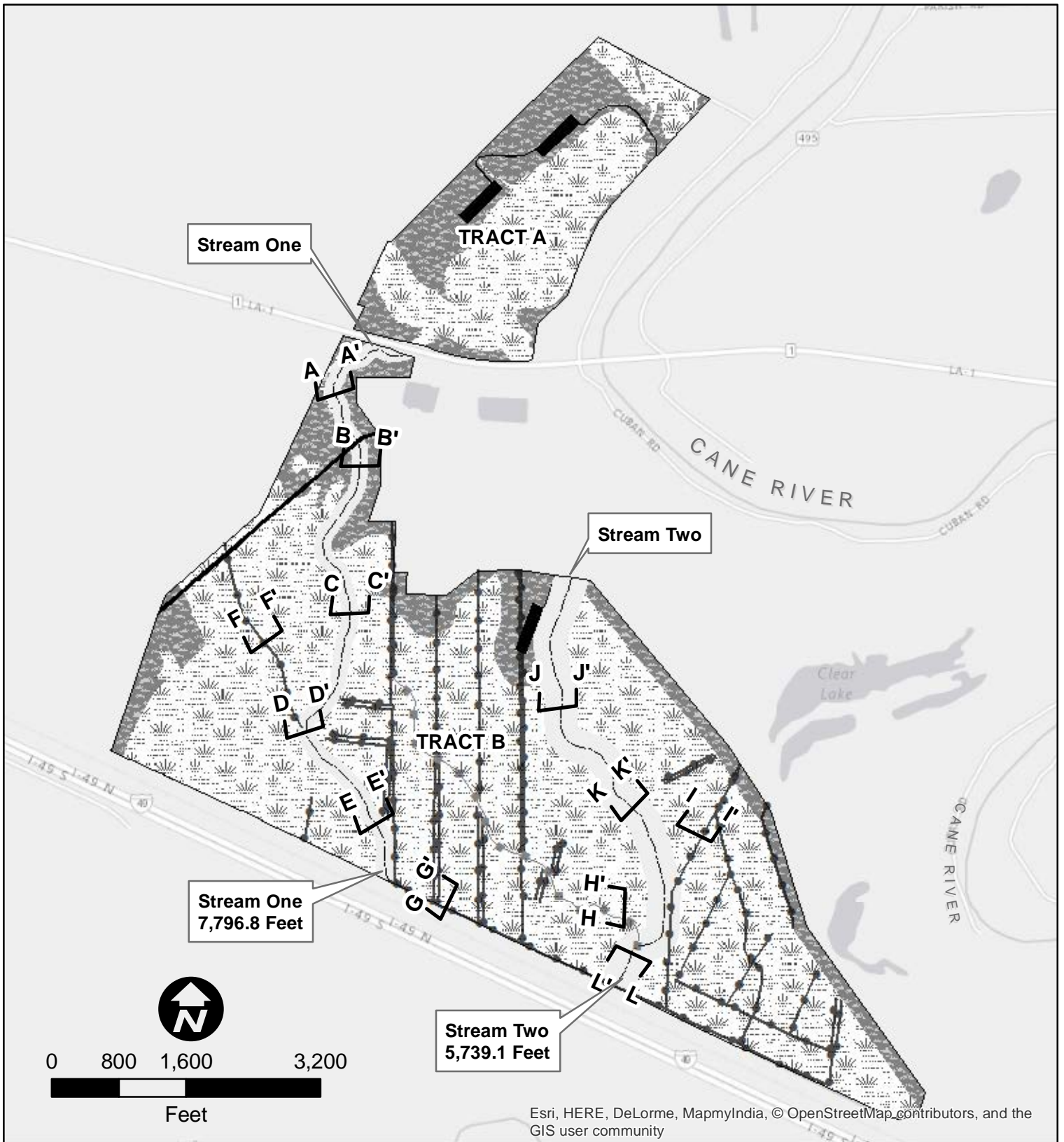
**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

## **Attachment C: Hydrology Restoration Drawings**



Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

**Legend**

- Project Area (928.4 acres)
- Forested Wetland Restoration (673.8 acres)
- Forested Upland Restoration (156.0 acres)
- Stream Channel/ Riparian Buffer Restoration (87.4 acres)
- Open Space (11.1 acres)
- Drain to be Degraded (56,215 feet)
- Tributary to Remain (4,866 feet)

**Cane River Mitigation Bank  
HYDROLOGIC RESTORATION  
PLAN VIEW**

**Natchitoches Parish, LA**

Created : TSC/ARCVIEW

Approved : DEB

Date :3/7/2016

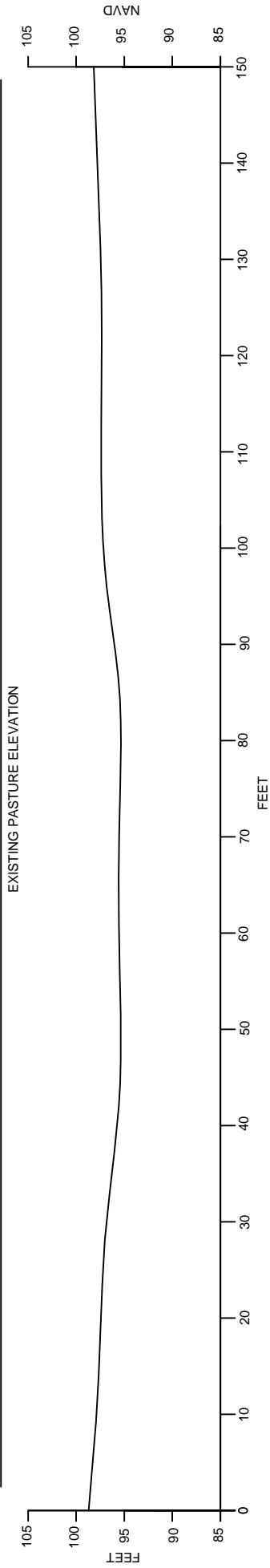
Map No. : C-1\_Planview



**FIGURE C-1**

A

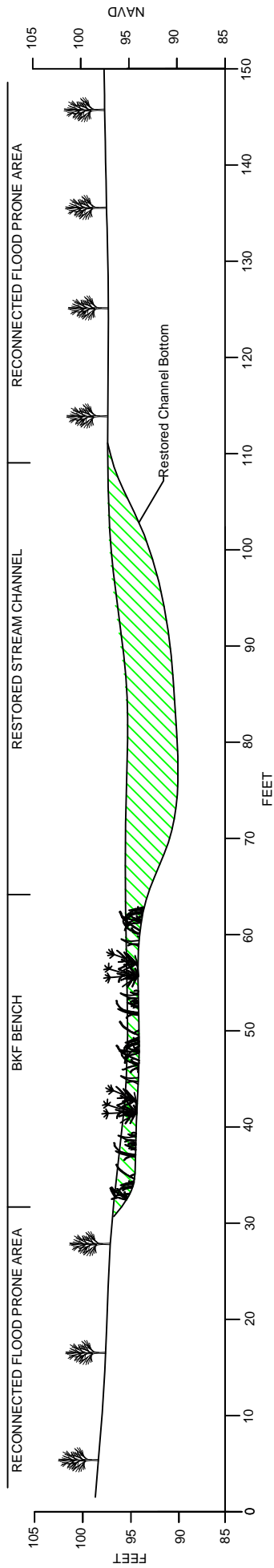
EXISTING CROSS-SECTION



A'

A

PROPOSED CROSS-SECTION



A'

PROPOSED EXCAVATION (PLACED IN RIPARIAN BUFFER)

\*EXCAVATED MATERIAL TO BE PLACED IN ABANDONED STREAM CHANNEL (REHABILITATED WETLAND).


**CANE RIVER MITIGATION BANK**

**CROSS-SECTION A**

NATCHITOCHES PARISH, LA

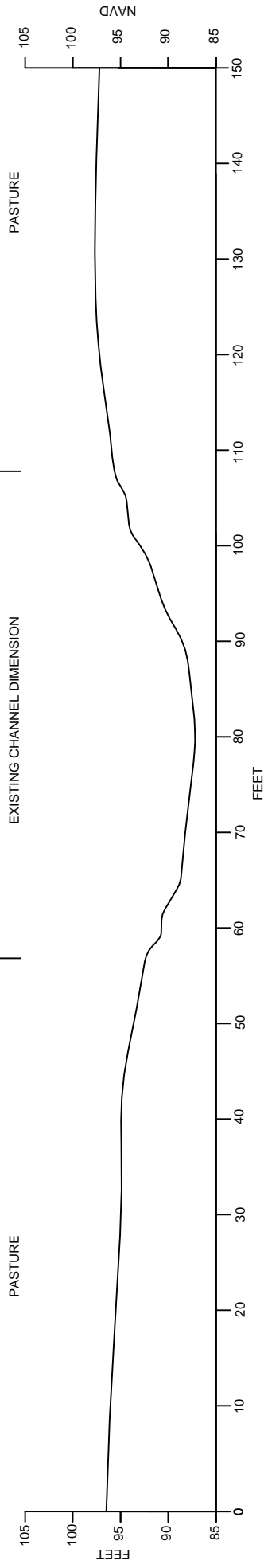
Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

**FIGURE C-2**



B

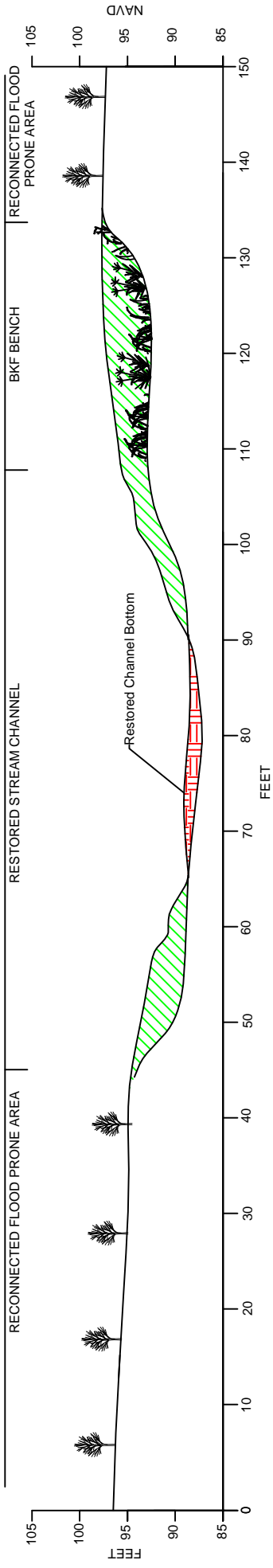
EXISTING CROSS-SECTION



B'

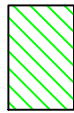
B

PROPOSED CROSS-SECTION



B'

PROPOSED EXCAVATION (PLACED IN RIPARIAN BUFFER)



PROPOSED EARTHEN FILL



CANE RIVER MITIGATION BANK

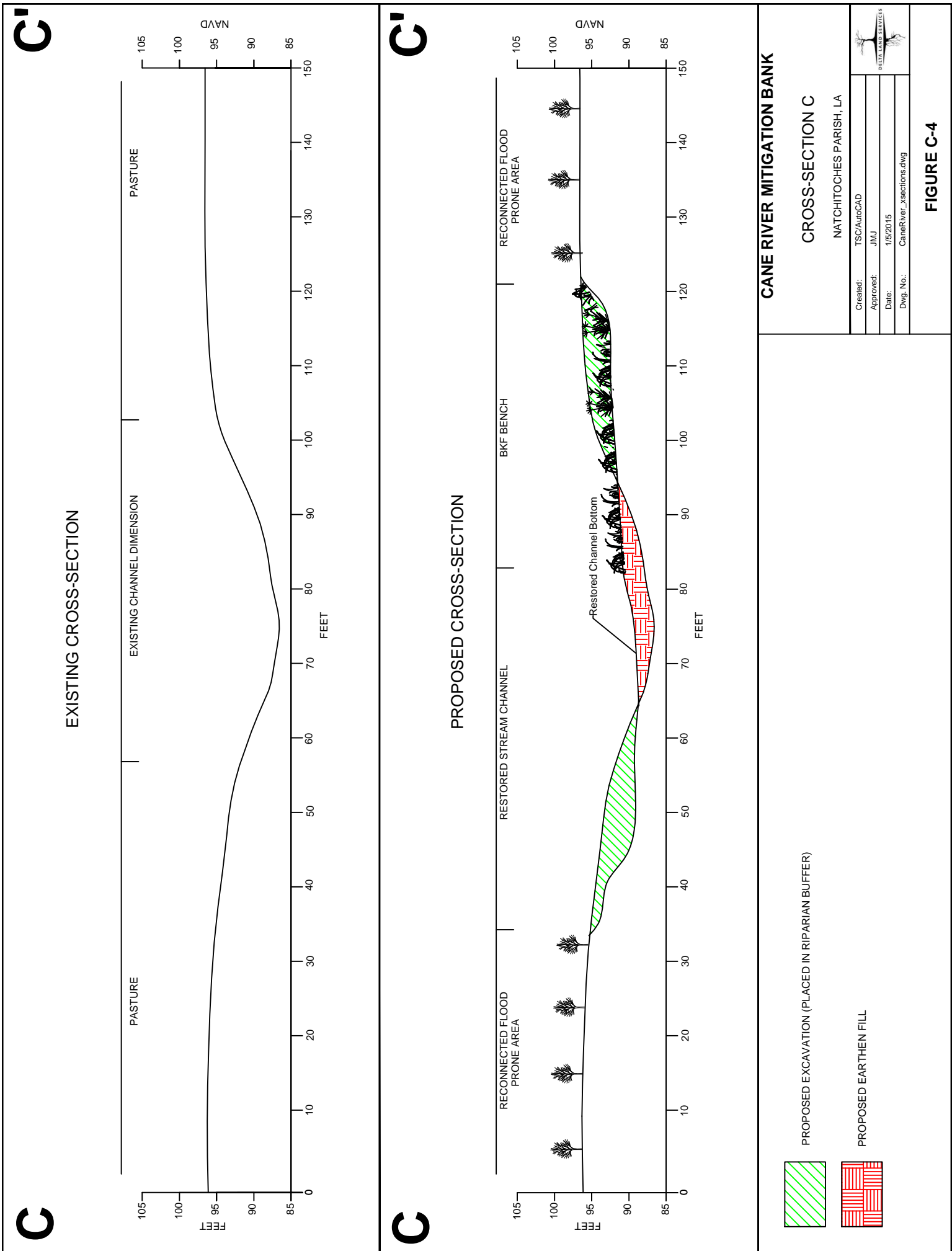
CROSS-SECTION B

Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

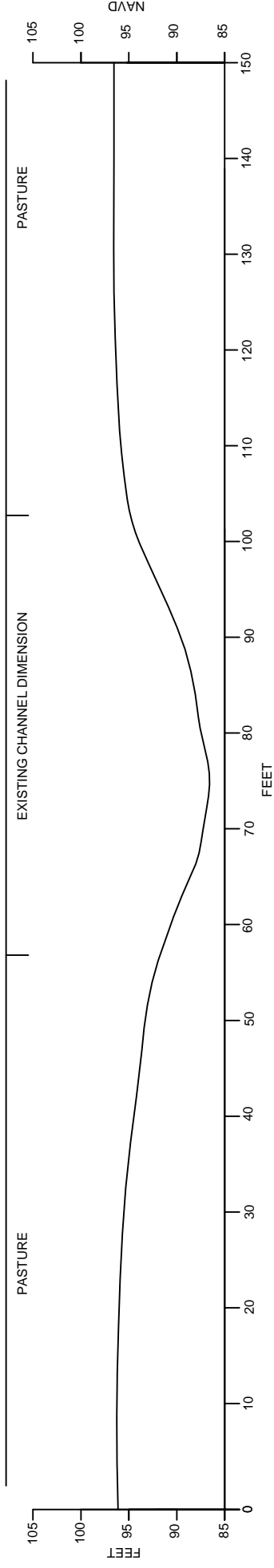
NATCHITOCHE PARISH, LA



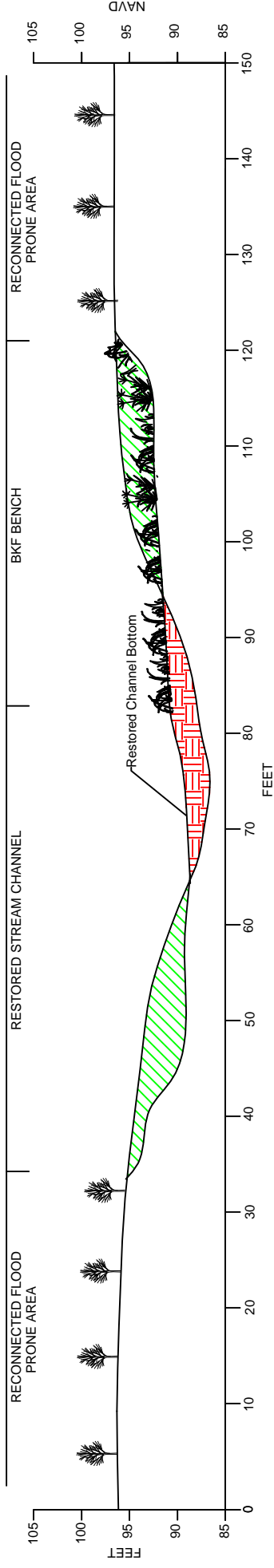
FIGURE C-3



EXISTING CROSS-SECTION



PROPOSED CROSS-SECTION



-  PROPOSED EXCAVATION (PLACED IN RIPARIAN BUFFER)
-  PROPOSED EARTHEN FILL

**CANE RIVER MITIGATION BANK**

**CROSS-SECTION C**

NATCHITOCHESS PARISH, LA

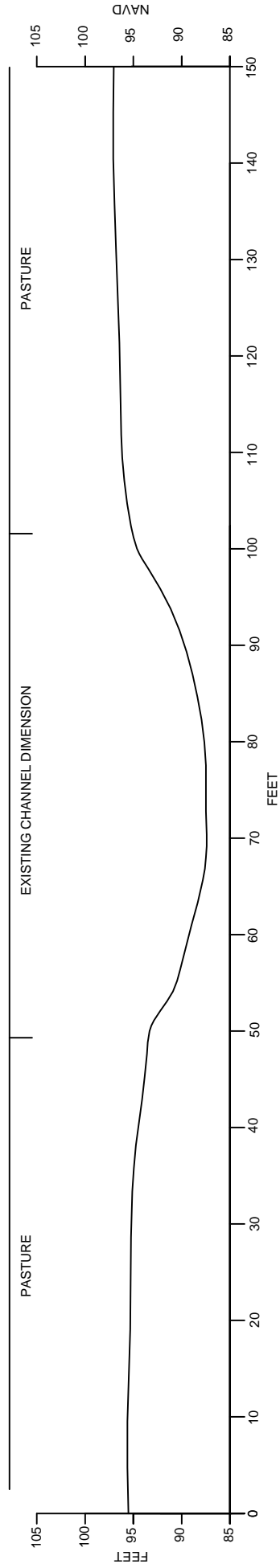
Created: TSC/AutoCAD  
 Approved: JMJ  
 Date: 1/5/2015  
 Dwg. No.: CaneRiver\_xsections.dwg

**FIGURE C-4**



D

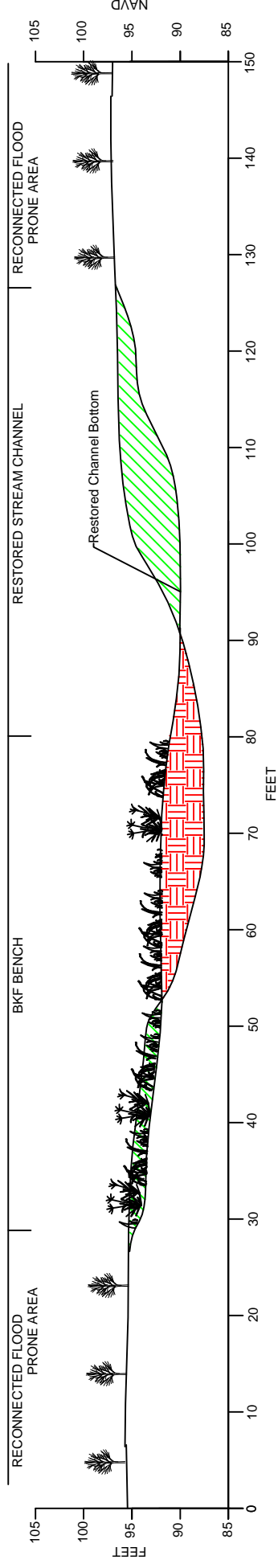
EXISTING CROSS-SECTION



D'

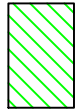
D

PROPOSED CROSS-SECTION

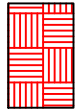


D'

PROPOSED EXCAVATION (PLACED IN RIPARIAN BUFFER)



PROPOSED EARTHEN FILL



CANE RIVER MITIGATION BANK

CROSS-SECTION D

NATCHITOCHEES PARISH, LA

Created: TSC/AutoCAD

Approved: JMJ

Date: 1/5/2015

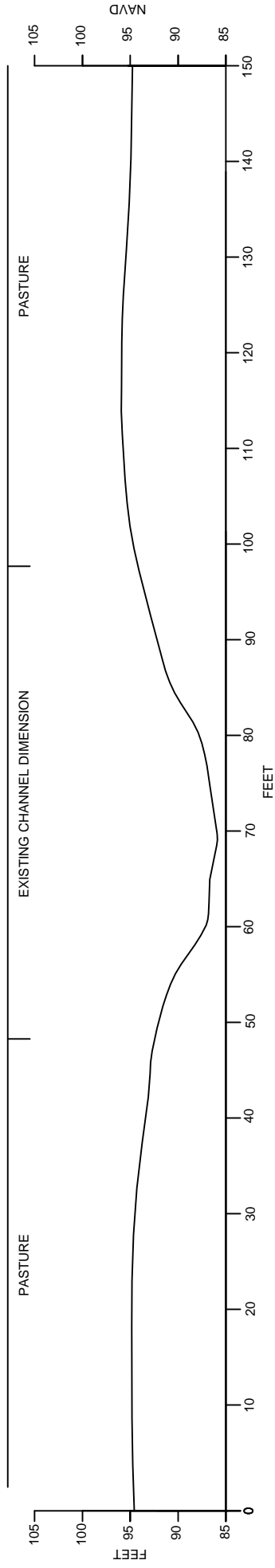
Dwg. No.: CaneRiver\_xsections.dwg



FIGURE C-5

E

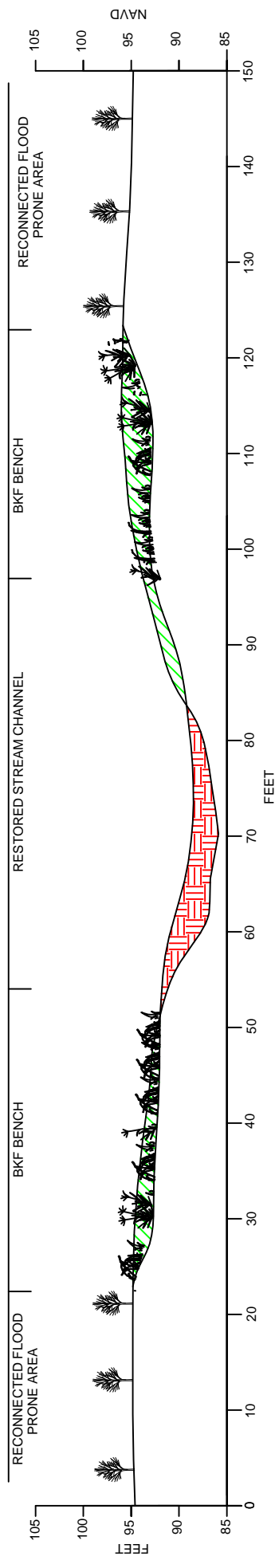
### EXISTING CROSS-SECTION



E

E

### PROPOSED CROSS-SECTION



### CANE RIVER MITIGATION BANK

### CROSS-SECTION E

Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

NATCHITOCHEES PARISH, LA



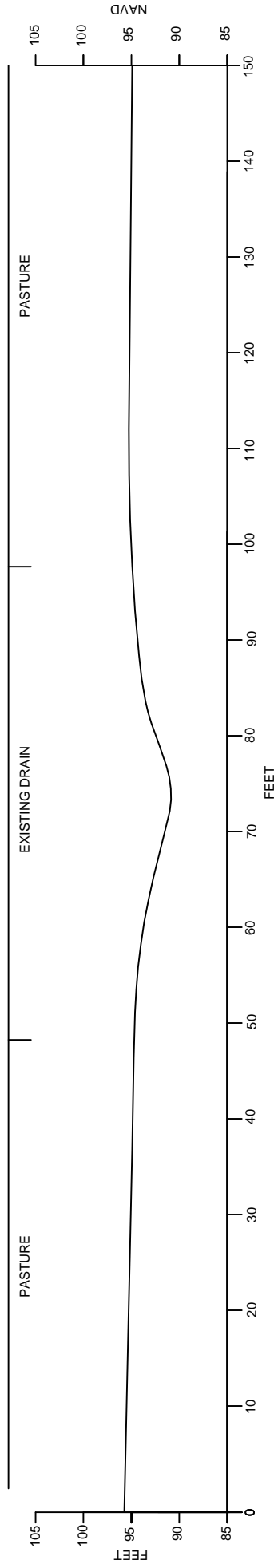
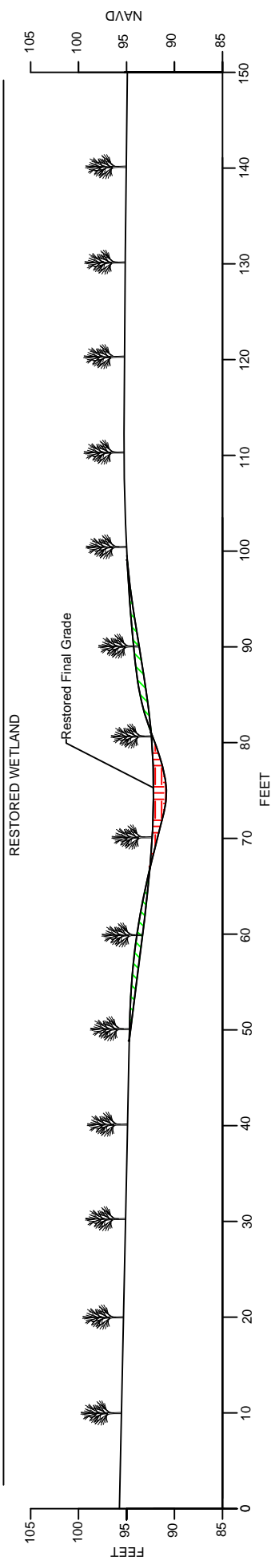
FIGURE C-6

 PROPOSED EXCAVATION (RIPARIAN BUFFER)

 PROPOSED EARTHEN FILL

\* SEE WITH FRESHWATER EMERGENT VEGETATION



**F****EXISTING CROSS-SECTION****F****F****PROPOSED CROSS-SECTION****F****CANE RIVER MITIGATION BANK****CROSS-SECTION F**

Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

NATCHITOCHEES PARISH, LA



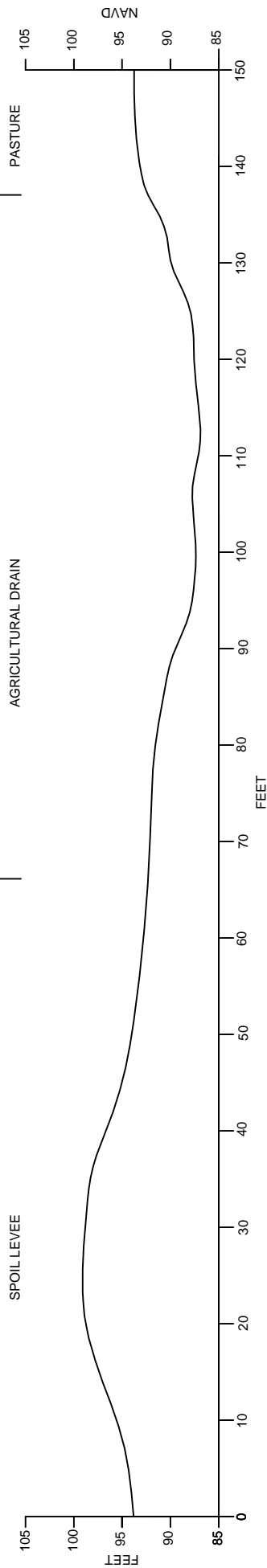
PROPOSED EXCAVATION

PROPOSED EARTHEN FILL

**FIGURE C-7**

G

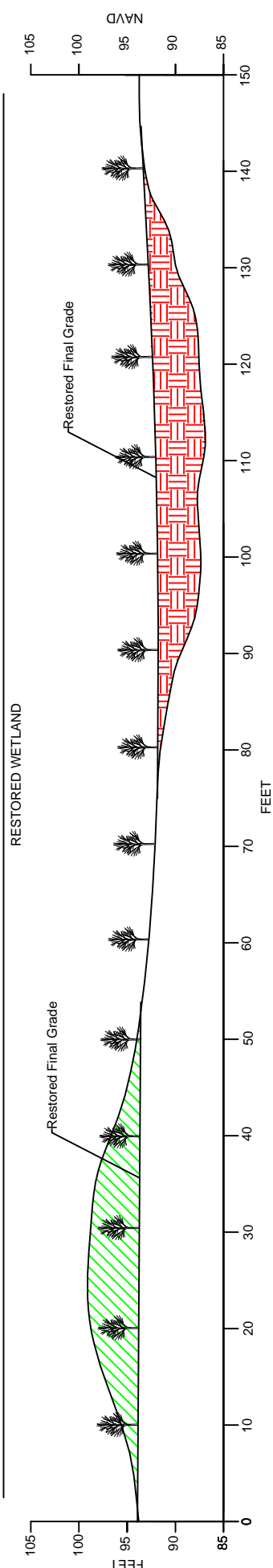
### EXISTING CROSS-SECTION



G

G

### PROPOSED CROSS-SECTION



### CANE RIVER MITIGATION BANK

### CROSS-SECTION G

Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

NATCHITOCHE PARISH, LA



FIGURE C-8

PROPOSED EXCAVATION

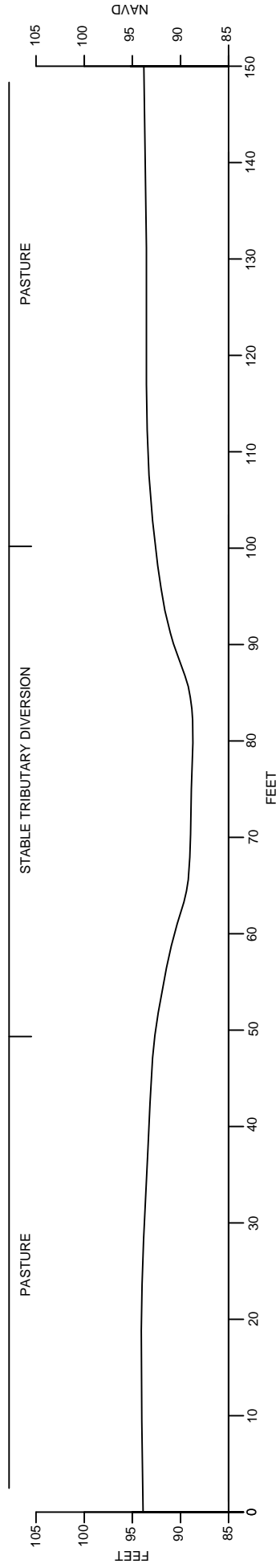


PROPOSED EARTHEN FILL



H

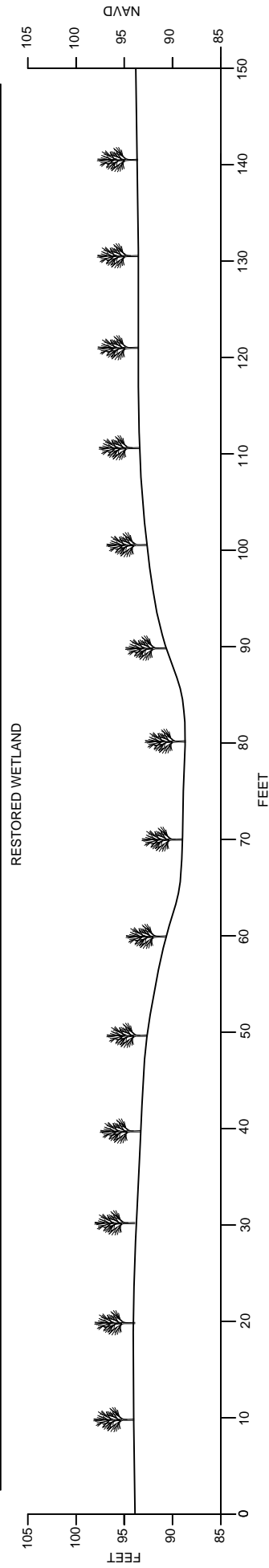
### EXISTING CROSS-SECTION



H'

H

### PROPOSED CROSS-SECTION



H'

\*NOTE: NO MODIFICATION BETWEEN EXISTING AND PROPOSED; VEGATIVE PLANTINGS ONLY.

### CANE RIVER MITIGATION BANK

### CROSS-SECTION H

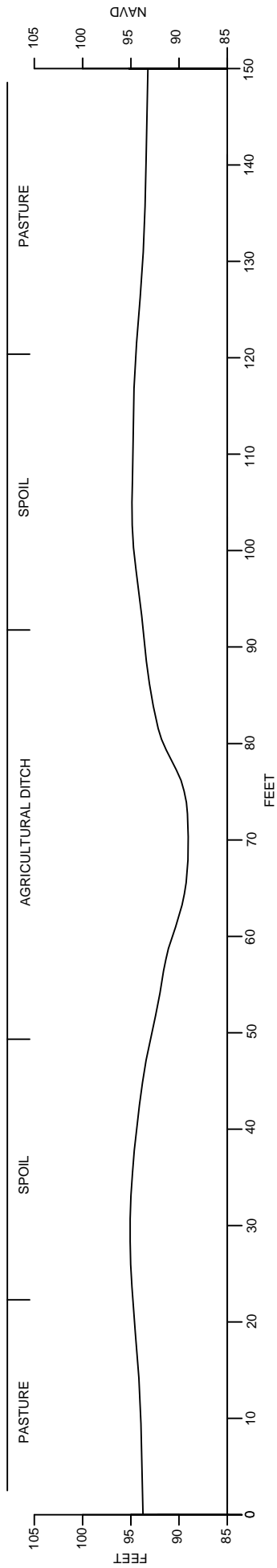
Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

NATCHITOCHEES PARISH, LA

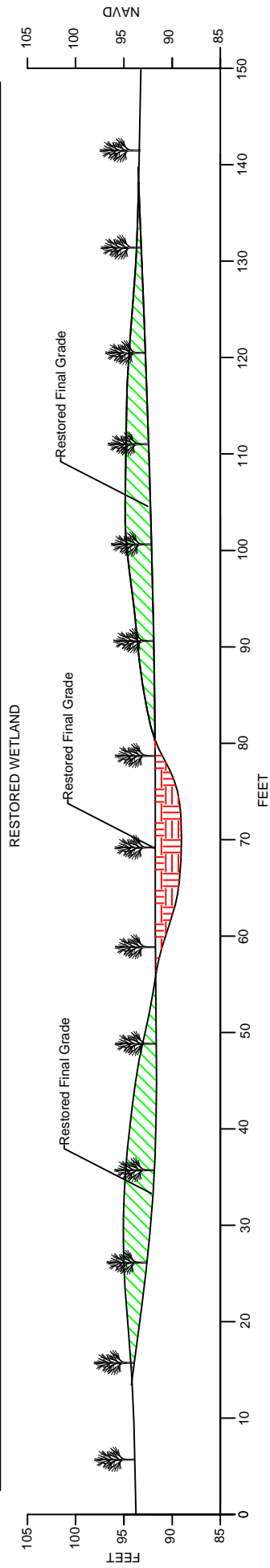


FIGURE C-9

### EXISTING CROSS-SECTION



### EXISTING CROSS-SECTION



PROPOSED EXCAVATION (PLACED IN AGRICULTURAL FIELD)



PROPOSED EARTHEN FILL



### CANE RIVER MITIGATION BANK

#### CROSS-SECTION I

NATCHITOCHES PARISH, LA	
Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

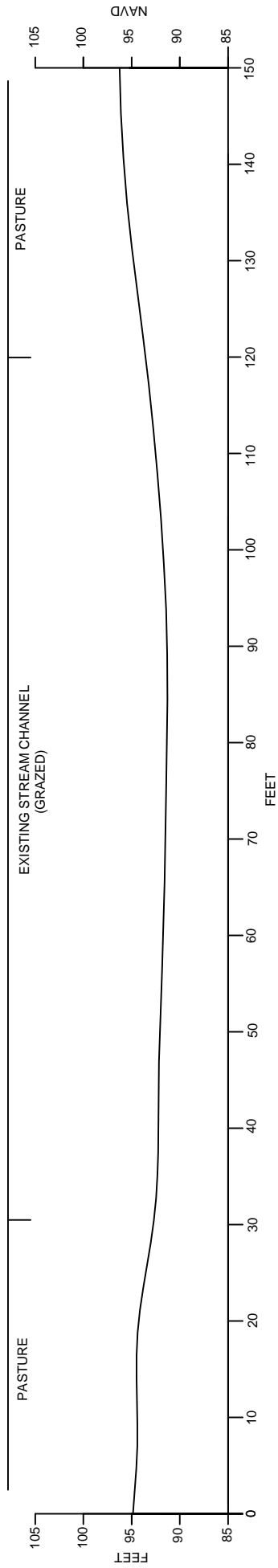


FIGURE C-10



J

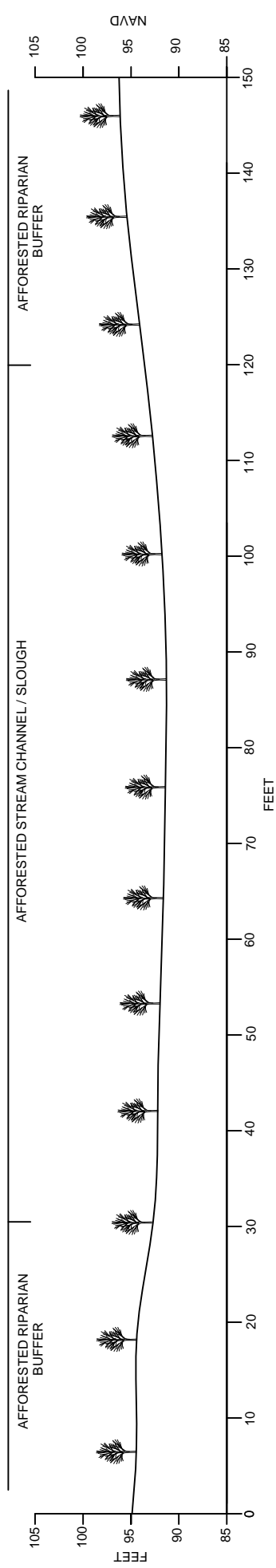
### EXISTING CROSS-SECTION



J

J

### PROPOSED CROSS-SECTION



J

\*NOTE: NO MODIFICATION BETWEEN EXISTING AND PROPOSED; VEGATATIVE PLANTINGS ONLY.

### CANE RIVER MITIGATION BANK

### CROSS-SECTION J

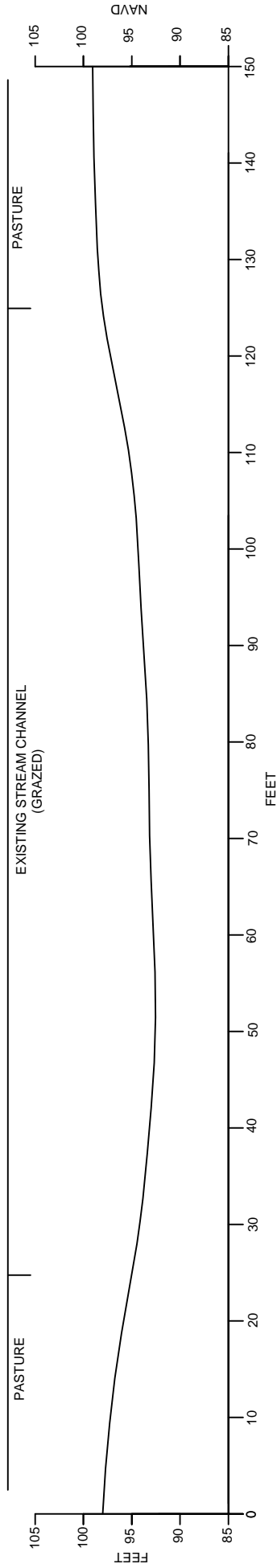
NATCHITOCHEES PARISH, LA	
Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg



FIGURE C-11

K

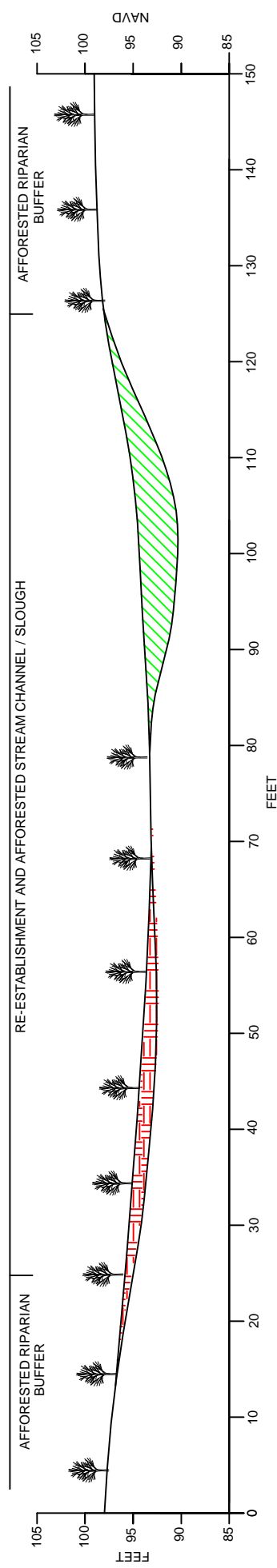
### EXISTING CROSS-SECTION



K

K

### PROPOSED CROSS-SECTION



K

### CANE RIVER MITIGATION BANK

### CROSS-SECTION K

Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg

NATCHITOCHEES PARISH, LA

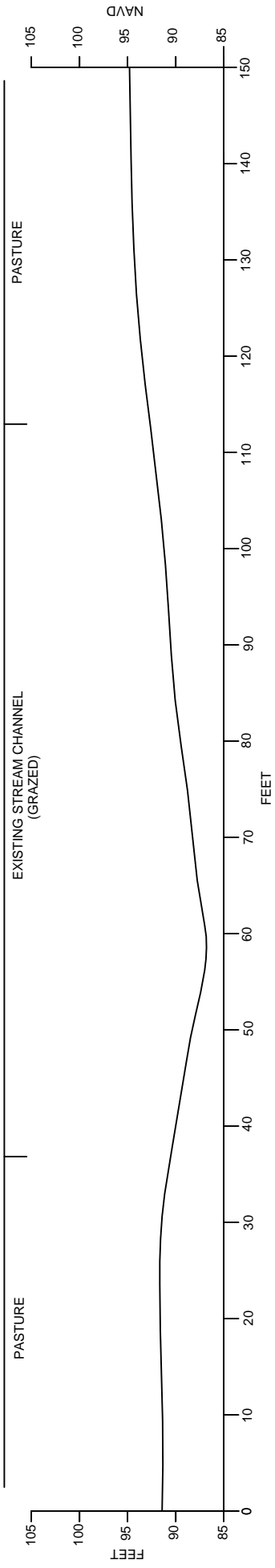


 PROPOSED EXCAVATION (PLACED IN AGRICULTURAL FIELD)

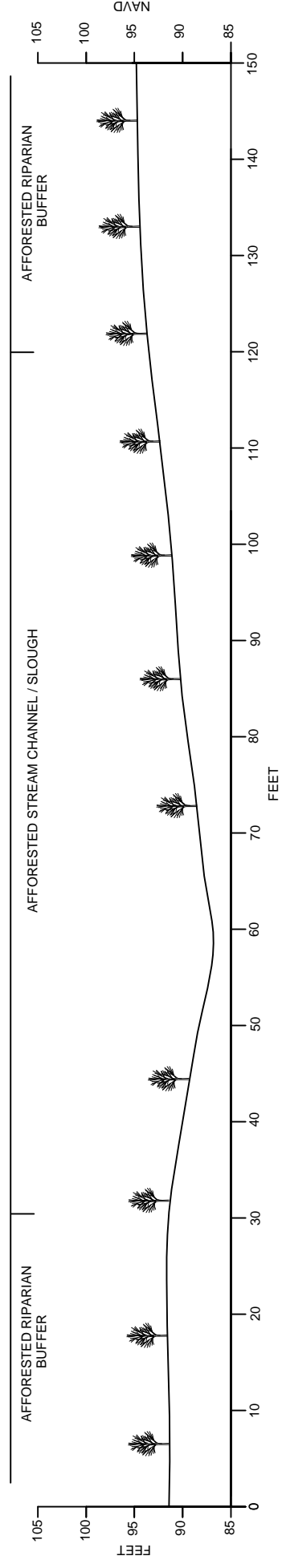
 PROPOSED EARTHEN FILL

FIGURE C-12

### EXISTING CROSS-SECTION



### PROPOSED CROSS-SECTION



\*NOTE: NO MODIFICATION BETWEEN EXISTING AND PROPOSED; VEGATATIVE PLANTINGS ONLY.

### CANE RIVER MITIGATION BANK

### CROSS-SECTION L

NATCHITOCHEES PARISH, LA	
Created:	TSC/AutoCAD
Approved:	JMJ
Date:	1/5/2015
Dwg. No.:	CaneRiver_xsections.dwg



FIGURE C-13



## **Attachment D: Site Photographs**



Oblique aerial view, north to south, of the proposed Cane River Mitigation Bank, Natchitoches Parish, Louisiana, September 1, 2015.



Oblique aerial view, southwest to northeast, of the proposed Cane River Mitigation Bank, Tract A, Natchitoches Parish, Louisiana, September 1, 2015.





Oblique aerial view, north to south, of Tract B and existing Stream One pattern at the proposed Cane River Mitigation Bank, Tract B, Natchitoches Parish, Louisiana, September 1, 2015.



Oblique aerial view, south to north, of Tract B and existing Stream One pattern at the proposed Cane River Mitigation Bank, Tract B, Natchitoches Parish, Louisiana, September 1, 2015.



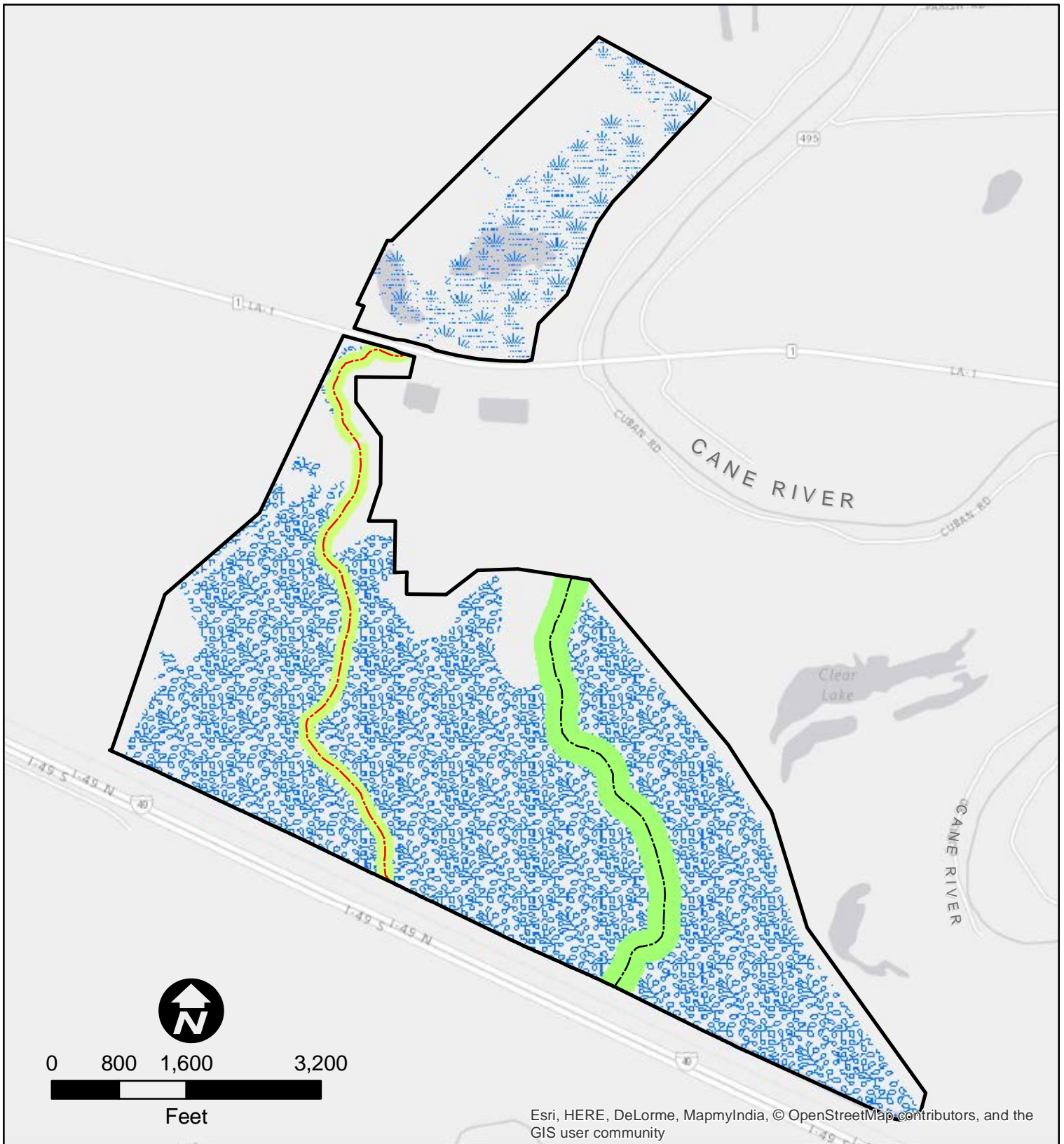


Northerly view of Tract A from Louisiana Highway One, Proposed Cane River Mitigation Bank, Natchitoches Parish, Louisiana, April 5, 2015.



Southerly view of Tract B from Louisiana Highway One, Proposed Cane River Mitigation Bank, Natchitoches Parish, Louisiana, April 5, 2015.

**Attachment E: Charleston 2010 Mitigation Assessment**



**Legend**

- Stream 1 Area: 34.8 acres of channel and buffer; 7,796.8 linear feet
- Stream 2 Area: 52.6 acres of channel and buffer; 5,739.1 linear feet
- Area A: 63.0 acres of buffered wetlands (A1); 39.1 acres unbuffered wetlands (A2)
- Area B: 93.0 acres of buffered wetlands (B1); 478.9 acres of unbuffered wetlands (B2)

**Cane River Mitigation Bank**

**CHARLESTON METHOD AREAS**

**Natchitoches Parish, LA**

Created : LJW/ARCGIS  
 Approved : DEB  
 Date : 3/14/2016  
 Map No. : E01\_Charleston



**FIGURE E-1**

Project: Cane River Mitigation Bank  
 Permit Application MVK-2015-00472  
 Compensatory Mitigation  
 Credit Factors and Worksheets

**RESTORATION AND ENHANCEMENT MITIGATION FACTORS**

Factors	Factors	Options			
Net Improvement	0		to		3.00
Upland Buffer	0		to		1.00
Credits Schedule	Not Applicable	After	Concurrent	Before	
	0	0.10	0.30	0.50	
	Not Applicable	0 to 5 Years	5 to 10	10 to 20	Over 20
		Years	Years	Years	Years
Temporal Loss	0	-0.1	-0.2	-0.30	-0.40
		Out of Kind		In Kind	
Kind		0.00		0.40	
	Case by Case	Drainage Basin	Adjacent 8-Digit HUC	8 Digit HUC	
Location	0.00	0.10	0.20	0.40	

**PROPOSED RESTORATION OR ENHANCEMENT MITIGATION**

Factor	Area A1(Buffer)	Area A2	Area B1 (Buffer)	Area B2	Area
Net Improvement	2.5	2.5	2.6	2.6	0
Upland Buffer	0.9	0	0.8	0	0
Credit Schedule	0.5	0.5	0.5	0.5	0
Temporal Loss	-0.3	-0.3	-0.3	-0.3	0
Kind	0.4	0.4	0.4	0.4	0
Location	0.4	0.4	0.4	0.4	0
Sum of m Factors	4.4	3.5	4.4	3.6	0
Mitigation Area	63	39	93	478.9	0
M X A	277.2	136.5	409.2	1724	0
Total Mitigation Acres	673.9				
Total Mitigation Acres	2546.9				
Credits/Mitigation Acre	3.8				

	Rehabilitation Acreage (Tract A)	102
	Restoration Acreage (Tract A)	102
<b>Area A1</b>	Upland Buffer Acreage (Tract A)	63.0
<b>Area A2</b>	Restoration Acreage less Buffer (Tract A)	39
	NonFeature Acreage (Tract A)	5.1

170.1

**Percentage of Restoration**

	Re-establishment Acres (Tract B)	222.1	38.8%
	Rehabilitation Acreage (Tract B)	349.8	61.2%
	Restoration Acreage (Tract B)	571.9	<b>Net Improvement</b>
<b>Area B1</b>	Upland Buffer Acreage (Tract B)	93.0	2.8
<b>Area B2</b>	Restoration Acreage less Buffer (Tract B)	478.9	2.5
	Stream Restoration Acres (Tract B)	87.4	<b>Weighted</b>
	NonFeature Acreage (Tract B)	6.0	1.1
		758.3	1.5

	Wetland Restoration Acreage	673.9	2.6
	Upland Buffer Acreage	156.0	
	Wetland Restoration+Upland Buffer Acreage	829.9	
	Wetland Credits (No Buffer)	2546.9	
	Buffer Credits	131.1	
	Total Credits	2678.0	
	Credits/Wetland Restoration Acre	3.8	
	Credits/Restoration and Upland Acre	3.1	

Total Project Acreage	928.4
-----------------------	-------

**Percent Wetland Protected**

<b>Buffers</b>		
Tract A Restoration Perimeter (Feet)	18480	
Tract A Restoration Perimeter Buffered (Feet)	16896	91.4%
Tract B Restoration Perimeter (Feet)	56496	
Tract B Restoration Perimeter Buffered (Feet)	44880	79.4%

Tract A Average Buffer Width (Feet)	162.4
Tract B Average Buffer Width (Feet)	175.1
Tract A Buffer Factor	1
Tract B Buffer Factor	1
Tract A Buffer Value	0.9
Tract B Buffer Value	0.8



**Restoration Mitigation Factors for Linear Systems Worksheet**

Project:  
Permit Application #  
Compensatory Mitigation  
Credit Factors and Worksheets

Cane River Mitigation Bank  
MVK-2015-00472

Factor	Stream 1	Stream 2	Stream 3
<b>Stream Type<sup>1</sup></b>	0.4	0.05	
0.60 Perennial (> or = to 15ft bankful width)			
0.40 Perennial (<15' bankful width)			
0.05 Season RPW's			
<b>Priority Category</b>	0.05	0.05	
0.30 Primary			
0.20 Secondary			
0.05 Tertiary			
<b>Net Improvement<sup>2</sup></b>	3	1	
3.00 Excellent (Restoration)			
2.00 Moderate (Enhancement)			
1.00 Minimal (Stabilization)			
0.00 Not Applicable			
<b>Credit Schedule</b>	0.1	0.1	
0.1 Before			
0.05 Concurrent			
0.20 After			
0.00 Not Applicable			
<b>Location</b>	0.1	0.1	
0.1 8-Digit HUC			
0.05 Adjacent HUC			
0.20 Drainage basin			
0.00 Case by Case			
<b>Riparian Buffer (Side A)</b>	0.34	0.38	
<b>Riparian Buffer (Side B)</b>	0.34	0.38	
Calculate Value from the Riparian Buffer Factor Section			
<b>Sum of Factors</b>	4.3	2.1	0.0
<b>Restoration Area in Linear Feet</b>	7796.8	5739.1	
<b>Factors x Restoration Area</b>	33,760	11,823	0
<b>Summary of Environmental Credits</b>			
Total Credits	45,582.7 Credits		
Credits/Linear Foot	3.4		

<sup>1</sup>Stream type does not include man-made linear features.

<sup>2</sup>Net Improvement values are for restoration only. For riparian buffer enhancement or preservation choose **Not Applicable** and calculate buffer values under Riparian Buffer Section.

**Riparian Buffer Section**

A buffer improvement value will be assigned to buffers that meet the minimum required buffer width identified below (Chart A). Stream plans that do not include sufficient riparian buffers to protect the mitigation site may not generate compensatory mitigation credits. To determine buffer preservation or enhancement value, follow the steps below:

**How to Use:**

**Step 1:** Determine required buffer width based on land use from Chart A below.

**Step 2:** Using the minimum required buffer width from Chart A, determine the type of buffer activity will be performed from Chart B (preservation or enhancement). Assign the value of that activity to the worksheet based on work being performed on one or both sides of the stream bank.

**Step 3:** If the mitigation proposal includes both preservation and enhancement, use the formula below to determine the credit value. :

$$(\% \text{ Buffer Preservation} \times \text{Chart B value}) + (\% \text{ Buffer Enhancement} \times \text{Chart B value}) = \text{Buffer Value}$$

\*Note: The applicant cannot receive credit for enhancement and preservation in the same area of buffer zone.

**Chart A: Minimum Stream Buffer Zone Widths For Mitigation Credit**

Land Use	Required Minimum Buffer Width (ft)			
	<5% Slope	5-20%	21-40%	>40%
Single Family Residential	50	100	150	200
Multi-Family Residential	60	120	180	240
Commercial/Golf Course/Agricultural/Silviculture	75	150	225	300
Industrial/Landfill	100	200	300	TBD
Other categories (Case by Case)	TBD			

**Chart B: Riparian Buffer Preservation/Enhancement Values**

Buffer Width	Minimum Required Buffer		2X Minimum Required Buffer		4X Minimum Required Buffer		6X Minimum Required Buffer	
	1-side Only	Both Banks	1-side Only	Both Banks	1-side Only	Both Banks	1-side Only	Both Banks
<b>Preservation: Age of Trees</b>								
15-5 Years	0.075	0.1	0.084	0.11	0.09	0.125	0.1	0.13
>50 Years	0.125	0.15	0.14	0.17	0.16	0.19	0.165	0.2
<b>Enhancement:</b>								
Riparian Planting and Invasive Control	0.20	0.3	0.22	0.34	0.25	0.38	0.26	0.39

**Note: Stream buffer will be adjacent to wetland restoration so minimum buffer of 50 feet utilized in calculation**