



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS, NEW ORLEANS DISTRICT  
7400 LEAKE AVENUE  
NEW ORLEANS, LOUISIANA 70118

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Regulatory Branch  
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SUBJECT: MVN 2018-01446-1-MS

**PUBLIC NOTICE**

**Public Notice Purpose:** Pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (30 Stat. 1151; 33 USC 403) and Section 404 of the Clean Water Act (86 Stat. 816; 33 USC 1344), the U.S. Army Corps of Engineers, New Orleans District, Regulatory Branch is soliciting comments from all interested parties on the development, utilization and long-term management of a proposed mitigation bank. The purpose of this mitigation bank is to provide compensatory mitigation for unavoidable impacts to wetland resources, including other waters of the United States, that result from projects authorized through the Department of the Army permit program.

**PROPOSED AMENDMENT ONE TO THE COW BRANCH COASTAL MITIGATION BANK IN TANGIPAHOA PARISH**

**NAME OF APPLICANT:** Delta Land Services, LLC, 1090 Cinclare Drive, Port Allen, Louisiana 70767

**LOCATION OF WORK:** The 561.7 acre proposed site is located on two separate tracts adjacent to the existing Cow Branch Coastal Mitigation Bank in Sections 27 and 28, Township 7 South, Range 9 East, south of LA 22 approximately 9 miles east of Ponchatoula, Louisiana. The sites are centered at 30.41067° N, -90.30079° W and 30.41172° N, -90.28223° W located in Hydrologic Unit Code 08070205, as shown in the attached prospectus.

**CHARACTER OF WORK:** Site restoration shall be accomplished through cessation of silvicultural activities, hydrological restoration and afforestation of the native vegetative community. This includes removal of raised beds utilized for planted pine stems, site preparation and replanting of appropriate species in order to generate bottomland hardwood credits that could be used as compensation for unavoidable impacts to wetlands associated with Department of the Army (DA) permits authorized under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Additional details of the mitigation plan are included in the attached prospectus.

The Corps of Engineers is soliciting written comments from the public; federal, state, and local agencies and officials; Indian Tribes; and other interested parties. The comment period will close **30 days** from the date of this public notice advertisement. Written comments, including suggestions for modifications or objections to the proposed work, stating reasons thereof, are being solicited from anyone having interest in this prospectus. Letters must reference the applicant's name and the subject number, be addressed and mailed to the above address, ATTENTION: REGULATORY BRANCH.

You are requested to communicate the information contained in this notice to any other parties whom you deem likely to have interest in the matter.

Martin S. Mayer  
Chief, Regulatory Branch

Enclosure

**PROSPECTUS FOR THE PROPOSED COW BRANCH  
COASTAL MITIGATION BANK  
AMENDMENT ONE  
MVN-2018-01446**

TANGIPAHOA PARISH, LOUISIANA



September 4, 2020

PREPARED BY:

DELTA LAND SERVICES, LLC  
1090 CINCLARE DRIVE  
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## 1. Introduction

Delta Land Services, LLC (DLS) has prepared this prospectus in accordance with 33 CFR § 332.8(d)(2) to establish and operate Amendment One of the Cow Branch Coastal Mitigation Bank (Bank). The Bank is comprised of two tracts, Tract A and Tract B, totaling 561.7 acres and is proposed to provide compensatory mitigation for unavoidable impacts to “Waters of the United States” authorized through the issuance of Department of the Army (DA) Permits by the U.S. Army Corps of Engineers (USACE) New Orleans District (CEMVN) pursuant to Sections 9 and 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act of 1972. Additionally, the CBCMB may provide compensatory mitigation for unavoidable impacts to coastal wetland resources under the Louisiana Coastal Resources Program (LCRP)<sup>1</sup> per the provisions of LAC 43:724 and RS 49:214.22 (8). Specifically, Tract A is 418.3 acres and Tract B is 143.4 acres in size.

DLS is the owner and sponsor of the Bank and will construct, operate, monitor, and manage the Bank. DLS will protect the Bank project area by granting the conservation servitude to a land trust as described in Section 7.4.

## 2. Physiography and Site Location

The Bank tracts are located in the Mississippi Alluvial Plain and the Southern Coastal Plain Level III Ecoregions, the Inland Swamps Level IV Ecoregion (73n); the Gulf Coast Flatwoods Level IV Ecoregions (75a); the Mississippi Delta Cotton and Feed Grains land resource region (LRR O); the Atlantic and Gulf Coast Lowland Forest Crop land resource region (LRR T); the Southern Mississippi River Alluvium Major Land Resource Area (MLRA 131A); and the Eastern Gulf Coast Flatwoods Major Land Resource Area (MLRA 152A). The regions are characterized by fertile, medium-textured mineral soils, smooth to undulating topography, and a long growing season. Some convex areas exist as narrow rolling intervening ridges with broad and flat interfluves (NRCS 2006).

The Bank tracts are in Tangipahoa Parish south of Louisiana Highway 22 approximately 9 miles east of Ponchatoula, Louisiana and 8 miles west of Madisonville, Louisiana in Sections 27 and 28 of Township 7 South, Range 9 East (Figures 1 and 2). These are identified as Tract A and Tract B. The approximate center of Tract A is located at Latitude 30.410673° and Longitude -90.300790° and the approximate center of Tract B is located at Latitude 30.411720° and Longitude -90.282231<sup>2</sup>. The Bank is located entirely within the Louisiana Coastal Zone Boundary and adjacent to the existing 486.4-acre Cow Branch Mitigation Bank (MVN-2018-01446) approved by the CEMVN on August 19, 2020.

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<sup>1</sup> The Office of Coastal Management (OCM) of the Louisiana Department of Natural Resources (LDNR) is the agency responsible for implementing the LCRP under the authority of the Louisiana State and Local Coastal Resources Management Act of 1978, as amended (Act 361, La. R.S. 49:214.21 et seq).

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

To get to the sites, proceed from the intersection of Interstate Highway 12 and Louisiana Highway 445, proceed south on LA 445 to its intersection with Louisiana Highway 22. Turn left on LA 22 and proceed east for approximately 1.6 miles before turning right onto Edwards Road. Drive south on Edwards Road for 0.7 miles to Traino Road and proceed 0.3 miles to the intersection of Traino Road and Traino Landing Road. To access Tract A from this intersection, proceed another 1.5 miles on Traino Road to a gated entrance to the tract on the left. To access Tract B from the intersection, turn left onto Traino Landing Road and proceed 0.9 miles south to a dirt/gravel driveway and gated entrance on the right.

The sites lie within the Tangipahoa Subregion as defined by United States Geological Survey (USGS) Hydrologic Unit Code (HUC) 08070205. Natural elevations on the sites range from <0 feet on the southern portion to >5 feet<sup>3</sup> on the northern portion (Figure 3). The sites are in high risk flood zones (Zone AE) as designated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM; Figure 4).

### 3. Project Goals and Objectives

The site consists of 1) pine plantation, 2) scrub-shrub areas recently harvested but managed for the purpose of commercial pine production (i.e seed tree area), 3) existing bottomland hardwood (BLH) forest and existing baldcypress-tupelo swamp (Swamp) forest (Table 1). The goal of the Bank is the rehabilitation<sup>4</sup>, enhancement<sup>5</sup>, preservation<sup>6</sup> and protection of coastal spruce pine-hardwood flatwood, small stream BLH forests and Swamp wetland ecosystems as described by the Louisiana Natural Heritage Program (LNHP 2009) (Table 2 and Figure 5). According to the habitat description of LNHP (2009) and USACE (2017), spruce pine-hardwood flatwoods are natural mixed forest community indigenous to the western Florida parishes in southeast Louisiana. The wetlands variation of this

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<sup>3</sup> All elevations referenced within the report are from digital elevation models (DEM) derived from light detection and ranging (LIDAR) datasets obtained from the Louisiana State University CADGIS Research Laboratory and adjusted per field data collected with real time correction. Elevations are purported in the North American Vertical Datum of 1988 (NAVD) Geoid 12A.

<sup>4</sup> Rehabilitation 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.

<sup>5</sup> Enhancement is defined in 33 CFR § 332.2 as the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

<sup>6</sup> Preservation is defined in 33 CFR § 332.2 as the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

community occupies poorly drained flats, depressional areas and small drainages that lie in a mosaic with higher, nonwetland areas. Hardwoods usually dominate the forest composition but spruce pine (*Pinus glabra*)<sup>7</sup> can dominate areas within the stand with loblolly pine (*Pinus taeda*) also present at some level. The topography is flat to gently undulating and several inches of water may occur on the surface during winter months with soil saturation continuing into the spring. Small stream forests are riparian forests which are located along small rivers and large creeks (LNHP 2009 and USACE 2017). With regards to credit type, USACE (2017) classifies hardwood flatwoods and small stream forests as in-kind habitats with bottomland hardwoods (BLH). Access trails and herbaceous areas will be maintained as non-mitigation acreage within the Bank. The purposes of these features are to provide edge habitat for the benefit of wildlife and to facilitate monitoring/maintenance activities associated with Bank establishment, long-term management and continued recreational use of the property.

Specifically, the project objectives are the improvement and protection of the physical, chemical, and biological functions of a forested wetland system. The restoration and protection of the Bank will serve to achieve these objectives as follows:

- Restoring and protecting historic and self-sustaining surface hydrology through hydrological restoration activities such as degrading remnant raised beds and excessive rutting in existing pine plantations and recently harvested areas;
- Restoring, through means of rehabilitation, 171.0 acres of managed pine plantation to a native spruce pine-hardwood flatwood forested wetland (e.g. Bottomland Hardwood [BLH] communities through the removal of planted pine stems, degradation of raised beds, and reforestation of a diverse assemblage of native species;
- Enhancing 247.5 acres<sup>8</sup> of mature, managed pine stands and recently harvested pine areas currently managed for natural pine regeneration to native BLH forest through the removal of mature, commercially planted pine stems in mature stands and naturally regenerating loblolly pine and invasive species in recently harvested stands; reforestation with a diverse assemblage of native species; the protection of suitable natural regeneration;
- Preserving and protecting 92.1 acres of existing BLH and 45.2 acres of Swamp through the inclusion of these areas in a 561.7-acre perpetual conservation servitude;

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<sup>7</sup> This and all subsequent scientific nomenclature is from NRCS 2020<sup>a</sup>

<sup>8</sup> This includes 104.1 acres of enhancement from Tract A and 143.4 acres of enhancement from Tract B.

- Ensuring post-construction viability and sustainability by implementing specific management strategies such as
  - monitoring for to ensure specific performance standards are met (i.e. compliance monitoring)
  - monitoring for changes and detection of unanticipated issues (i.e. surveillance monitoring)
  - active management such as the control of invasive/noxious species within manageable and non-threatening levels
  - adaptive management when necessary
  - establishment of financial assurances (e.g., construction, establishment) through achievement of long-term success criteria.
- Ensure long-term viability by through continued monitoring and establishment of a long-term fund to cover annual expenditures associated with maintenance and management of the Bank.

#### **4. Ecological Site Suitability and Baseline Conditions**

This section describes the ecological suitability of the site to achieve the objectives of the proposed mitigation bank, including the physical, chemical, and biological characteristics of the bank site and how that site will support the planned types of aquatic resources and function, as stated in 33 CFR §332.8(d)(2)(vii)(B). Additionally, this section provides the baseline and current site conditions on and adjacent to the proposed site.

##### **4.1 Land Use**

###### **4.1.1 Historical Land Uses**

The Bank and adjacent land uses were historically forested wetlands. A review of historical aerial photography reveals that most of the site's conversion to pine plantation began sometime prior to 1959 with what appears to be the first thinning operation. Since that time, multiple timber harvest events have occurred, with the most recent clearcutting and subsequent replanting of the pine plantation on Tract A taking place around 2004. Increment borings of the loblolly pine in this stand confirms the age of this stand is approximately 16 years. The mature pine plantation on Tract B was planted over 40 years ago based on increment borings and has not been harvested since. The enhancement areas on Tract A were predominately pine stands which were harvested around 2014. This stand was harvested under a seed tree regeneration prescription with reliance on residual loblolly pine to provide natural regeneration of this species for continued

management of this stand for commercial pine production<sup>9</sup>. The unmanaged portions of the site have been stands consisting predominately of hardwood and swamp species, although some select harvesting of pine has occurred within the hardwood stands.

#### 4.1.2 Existing/Current Land Uses

The existing/current land use of the northern and north-central portion of Tract A is intensive pine plantation silviculture while the central-south central section is managed for pine production through natural regeneration. The southeast portion of Tract A is an existing Swamp forested wetland. Tract B is a mature pine forest overstory with a hardwood midstory that has developed since the planting and establishment of the current pine stand over 40 years ago.

The US Fish and Wildlife Service (USFWS 2011) identifies portions of property as Palustrine Forested, Broad-Leaved Deciduous Seasonally Flooded (PFO1A, 4%); Palustrine Forested, Broad-Leaved Deciduous, Temporarily Flooded (PFO1C, 50%); Palustrine Shrub Wetland (PSS1C, 2%), Palustrine Forested, Broad-Leaved Deciduous / Needle-Leaved Evergreen, Seasonally Flooded (PFO1/4A, 9%); Palustrine Forested, Needle-Leaved Evergreen / Broad-Leaved Deciduous, Seasonally Flooded (PFO4/1A, 19%); Palustrine Forested, Broad-Leaved Deciduous / Needle-Leaved Deciduous, Semipermanently Flooded - Tidal (PFO1/2T, 14%) and Palustrine Forested, Broad-Leaved Deciduous / Needle-Leaved Deciduous (PFO1/2C, 2%) per the Cowardin classification system (Cowardin et al. 1979; Figure 6).

The land use within a one-mile buffer of the contiguous existing bank and amendment boundary is dominated by forested wetlands (72%), forests (15%)<sup>10</sup>, developed open space areas (5%), agricultural areas (3%)<sup>11</sup>, emergent herbaceous wetlands (1%), shrub/scrub areas (1%), water (1%), intensively developed areas (1%)<sup>12</sup> and barren lands (1%) (Figure 7). These land use classes are from the US Geological Survey's 2016 National Land Cover Dataset (NLCD) as described in USGS (2019).

#### 4.2 Soils

The soils are mapped as BB: Barbary muck, 0-1% slopes, frequently flooded (8%); Go: Guyton silt loam, 0-1% slopes, rarely flooded (38%); Gy: Guyton silt

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<sup>9</sup> The SAF (2018) defines seed tree regeneration as an even-aged regeneration method in which a new age class develops from seeds that germinate in fully exposed microenvironments after removal of all the previous stand except a small number of trees left to provide seed. Seed trees are removed after regeneration is established.

<sup>10</sup> The 15% forests are comprised of evergreen forests (96%), mixed forests (3%) and deciduous forest (1%).

<sup>11</sup> The 3% agricultural areas are comprised of pasture/hay (99%) and cultivated crops (1%).

<sup>12</sup> The 1% intensively developed areas are comprised of low intensity development (95%), medium intensity development (4%) and high intensity development (1%).

loam, 0-1% slopes, occasionally flooded (16%); and OG: Ouachita, Ochlockonee, and Guyton soils, 0-3% slopes, frequently flooded (38%) (NRCS 2020<sup>b</sup>, Figure 8). All the soils within the proposed rehabilitation, enhancement and preservation areas of the Bank exhibit hydric characteristics and were verified as wetlands by CEMVN (see Section 4.3.4).

### **4.3 Hydrology**

#### **4.3.1 Contributing Watershed**

The sites drain to Bedico Creek, Cow Branch and the Tangipahoa River which all drain to Lake Pontchartrain. Tract A and large portion of Tract B is part of the Skulls Creek-Tangipahoa River Subwatershed as defined by USGS 12-digit HUC 080702050403. A small portion of Tract B resides in the Bedico Creek Subwatershed as defined by the USGS 12-digit HUC 080702050402 (Figure 9). Restoration of optimally functioning wetlands on this site will have a positive impact on these Subwatersheds, as well as downstream benefits for the larger Tangipahoa sub-basin and Lake Pontchartrain system.

#### **4.3.2 Historical Hydrology and Drainage Patterns**

Prior to the conversion to pine plantation, the historical hydrology of the northern portion of the sites was primarily from precipitation, local high-water tables, and overland flow from the surrounding areas. The southern portion of the proposed Bank still exhibits a natural state of surface hydrology as drainage alterations were not part of the work associated with development of this area for commercial pine production. Though the extent of tidal influence may have changed over time, surface water from tidal action along the southern boundary was most likely always present as this area is part of the tidal wetland systems bordering the northern shore of Lake Pontchartrain.

#### **4.3.3 Existing/Current Hydrology and Drainage Patterns**

Surface hydrology in the Bank is primarily driven from precipitation and surface flow from adjacent properties. During the conversion from forested wetlands to pine plantations, many of the pine production portions of these sites were either cleared and tilled to create raised beds for commercial plantings or site prepped with methods such as rolling and chopping to create favorable conditions for either the artificial or natural regeneration of pine. Bedding is the establishment of raised beds with a plow in potentially wet areas during site preparation on which seedlings are planted (SAF 2018). This has been a common silvicultural practice used in commercial pine production throughout the Florida parishes. These bedding treatments improve surface soil tillage and soil aeration and reduce shrub competition (Fox et. Al. 2004). These raised beds as well as unintended rutting between rows are impediments to the natural sheet flow and limit surface flow across the site. The southernmost portion of the site exhibits a natural state of

surface hydrology as it is directly connected to a large expanse of unmanaged flooded forests consisting of mixed BLH-swamp habitat.

Surface flow is generally from north to south, with varying degrees of tidal inflow from the southern property boundary (Figure 10). These tidal inflows reach various portions of the property intermittently and are typically associated with tropical events which produce either higher than normal tides or storm surges within Lake Pontchartrain. The existing wetlands within the boundary of the Bank contained hydrology indicators such as (A3), water marks (B1), high water table (A2), surface water (A1), water-stained leaves (B9), drainage patterns (B10), moss trim lines (B16), geomorphic position (D2), and FAC-neutral test (D5) described in the AGCP Regional Supplement (USACE 2010).

#### **4.3.4 Jurisdictional Wetlands Status**

A preliminary jurisdictional determination (PJD) was issued for the entirety of the proposed bank site on May 15, 2020 and is included as Attachment B. Per the delineation report, all areas proposed as credit acres (i.e. rehabilitation, enhancement and preservation) were mapped as wetlands per USACE 1987 and the 2010 regional supplement.

### **4.4 Vegetation**

#### **4.4.1 Historical Plant Communities**

Prior to the use of much this site for commercial wood production, the historical plant community was a BLH forest and most likely best described as spruce pine-hardwood flatwood. As defined by *The Natural Communities of Louisiana* published in 2009 by the Louisiana Department of Wildlife and Fisheries (LDWF) and the LNHP, spruce pine-hardwood flatwoods are natural mixed forest community indigenous to the western Florida parishes in southeast Louisiana. The wetlands variation of this community occupies poorly drained flats, depressional areas and small drainages that lie in a mosaic with higher, nonwetland areas. Hardwoods usually dominate the forest composition but spruce pine (*Pinus glabra*) can dominate areas within the stand with loblolly pine (*Pinus taeda*) also present at some level. These forests support distinct assemblages of plants and animals associated with particular landforms, soils, and hydrologic regimes. They are important natural communities for maintenance of water quality, providing a very productive habitat for a variety of fish and wildlife, and are important in regulation of flooding and stream recharge. With the use of the site shifting from a natural forest community to that of commercial pine production, vegetation management of the site was implemented to favor rotational pine production. Such management involves management of the stands for even-aged pine production where stands are cut, regenerated, and cut again as part of a rotation cycle. The use of broad-leaf herbicide in the early stages of rotation to control hardwoods and encourage



pine to become the dominant species. Under such methods, the pines are always of similar age classes.

#### 4.4.2 Existing Plant Communities

The site consists of four distinct habitat communities as follows: 1) mid-rotation pine plantation; 2) a mature pine stand; 3) a seed-tree harvested area 4) a BLH wetland forest, and 5) a Swamp wetland forest (Table 1, Figure 11). While all communities contained species within the tree strata<sup>13</sup>, the mid-rotation pine plantation, mature pine stand, BLH and Swamp communities contain forests with greater than >60% tree strata canopy cover which is considered high density (closed) canopy. The seed-tree harvested area consist of early successional scrub-shrub community and contains areas <10% tree strata canopy cover which is considered non-forest canopy (Broham & Bryant 2005). The existing aerial extent of the strata cover is quantified on Table 1 and depicted on Figure 12<sup>14</sup>.

The mid-rotation pine plantation on Tract A is dominated by loblolly pine which comprises 80% of the stem density and 85% of the basal area within the tree stratum (Table 3). The mid-rotation pine plantation was harvested, bedded and planted between 2003 and 2004<sup>15</sup>. Much of the bedding has degraded but some remnants do remain. Species documented<sup>16</sup> include, but are not limited to loblolly pine, sweetgum (*Liquidambar styraciflua*), cherrybark oak (*Quercus pagoda*), water oak and willow oak (*Quercus phellos*) in the tree stratum; American beautyberry (*Callicarpa americana*), yaupon (*Ilex vomitoria*), red maple (*Acer rubrum*), laurel oak (*Qercus laurifolia*) and dwarf palmetto (*Sabal minor*) in the sapling/shrub stratum; roundleaf greenbrier (*Smilax rotundifolia*), Indian woodoats (*Chasmanthium latifolium*) and tall horned beaksedge (*Rhynchospora macrostachya*) in the herbaceous stratum; and poison ivy (*Toxicodendron radicans*), muscadine (*Vitus rotundifolia*) and trumpet creeper (*Campsis radicans*) in the woody vine stratum. Tree heights range from approximately 40 to 60 feet

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<sup>13</sup> Strata are defined in the USACE Atlantic and Gulf Coastal Regional Supplement (USACE 2010).

<sup>14</sup> The aerial extent of strata cover was determined utilizing an Unmanned Aerial System (UAS). The UAS system consisted of an Unmanned Aerial Vehicle (UAV) with a high accuracy Global Navigation Satellite Systems (GNSS) antenna and high-resolution camera coupled with survey-grade ground control points for Post-Processing Kinematic (PPK) of the flight imagery. A digital surface model (DSM) was created from the UAS data whereby each pixel contained the MSL elevational value of the top of the vegetation. The AGL was computed by subtracting the average ground elevation from the DSM value.

<sup>15</sup> Based on indigenous knowledge of pine plantation silviculture in the eastern Florida parishes, the average rotation age of pine plantations is typically 25 to 35 years.

<sup>16</sup> Documentation of species within pine forest, bottomland hardwood forest, and seed-tree stands are from the data sheets from a wetland delineation conducted by DLS on August 6, 2019 and sample plot data observed by DLS at various times in 2019 and 2020. Given the difficulty of access to the Swamp stands, documentation of species within this area are from a data sheet from the wetland delineation as well as estimates based on current aerial photography, data from the current Forest Inventory Analysis (FIA) data from the area maintained by the U.S. Forest Service and vegetation data from Coastwide Reference Monitoring Station 0103 (CRMS0103) which is located in a similarly situated area.

above ground level (AGL)<sup>17</sup>. The aerial extent of the tree strata cover for this area is approximately 97% while the aerial extents of the sapling/shrub strata cover and the herbaceous strata cover is 2% and 1%, respectively. The herbaceous strata consist primarily of access trails, food plots and cleared lanes associated with recreational hunting activity.

The mature pine stand of Tract B is a mixture of loblolly pine and hardwoods within the tree stratum with loblolly pine collectively representing 61% of the stem density and 85% of the basal area (Table 3). This stand was harvested and reforested around 1972 to 1973<sup>18</sup>. Species documented in the mature pine of Tract B include, but are not limited to, loblolly pine, willow oak, water oak, blackgum (*Nysaa sylvatica*), cherrybark oak and bottomland post oak (*Quercus similis*) in the tree stratum; dwarf palmetto, cherrybark oak, water oak, willow oak and yaupon in the sapling/shrub stratum; and Indian woodoats and roundleaf greenbrier in the herbaceous stratum; and muscadine and poison ivy in the woody vine stratum. The aerial extent of the tree strata cover is 100%. Within the tree stratum throughout much of this tract, the crowns of pines are dominant emerging at heights ranging from 90 to 110 feet AGL. The crowns of pine and hardwood are codominant with heights ranging between 60 and 90 feet AGL. Smaller hardwood stems reside within the intermediate and suppressed layers of the canopy<sup>19</sup>.

The seed tree area in Tract A was a predominately pine forested stand which was harvested in 2014 and regenerated for pine production under a seed tree method with approximately 10 to 15 pine trees per acre left during the initial harvest to serve as a seed source for natural pine regeneration. As is common in seed tree harvests, many of these pines were harvested approximately 3 to 4 years following the initial harvest. Species documented include, but are not limited to willow oak, laurel oak, swamp chestnut oak, loblolly pine, green ash, pumpkin ash, red maple (*Acer rubrum*), American hornbeam (*Carpinus caroliniana*) and Chinese tallowtree (*Triadica sebifera*) in the tree stratum; Chinese tallowtree, loblolly pine, dwarf palmetto, green ash, red maple, wax myrtle (*Morella cerifera*), yaupon, winged sumac (*Rhus copallinum*), in the sapling/shrub stratum; and Indian woodoats, peppervine (*Nekemias arborea*), common rush (*Juncus effuses*), Cherokee sedge (*Carex cherokeeensis*), tall horned beaksedge, trumpet creeper, common boneset (*Eupatorium perfoliatum*), stinking camphorweed (*Pluchea foetida*), coastal plain yelloweyed grass (*Xyris ambigua*), woolgrass (*Scirpus*

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<sup>17</sup> Tree heights were obtained from a survey-grade elevational point cloud model obtained from an unmanned aerial systems (UAS) mission conducted by DLS on August 4, 2020. The heights were validated by DLS field biologists on a selected sample of tree utilizing a clinometer.

<sup>18</sup> The age of these stands was assessed through indigenous knowledge of this tract along with various increment borings collected in the stand.

<sup>19</sup> A dominant crown class consists of trees with wide crowns above the level of the forest canopy, receiving sunlight from above and the sides. A co-dominant crown class are trees with large crowns within the general level of the forest canopy receiving direct sunlight from above and partially from the sides. Intermediate crowns are trees with crowns beneath the general canopy level receiving some sunlight from above but little from the sides. Suppressed crowns are trees overtopped by large trees and receive no full, direct sunlight from either the top or the sides.

*cyperinus*) and various species of black berry (*Rubus* spp) in the herbaceous stratum.

The aerial extent of the tree strata cover for the seed tree harvested area is approximately 9%, which Broham & Bryant (2005) define as non-canopy; the sapling/shrub strata cover is 45% and the herbaceous strata cover is 46%. Within the sapling/shrub stratum, the average density of species with the capacity of developing into the future tree stratum is approximately 1,240 stems per acre with 42% being loblolly pine, 41% being Chinese tallowtree and the remaining 17% being other native hardwood species. While there are several species listed in the tree stratum, this stratum consists of sporadic clusters of stems lacking a continuous canopy cover through this area (<10%). On average, species in the tree stratum make up an average of 20 trees per acre with an average basal area of 4 square feet per acre. Oaks comprises most of the tree strata stem density (43%) and basal area (52%) (Table 3). Various clusters of small, ponded areas exist with aquatic species such as American white waterlily (*Nymphaea odorata*) and common buttonbush (*Cephalanthus occidentalis*).

The BLH wetland forest within Tract A exists as a single contiguous stand along the southern portion of Tract A between the swamp area and the scrub-shrub area; along the western boundary of Tract A between the boundary and the mid-rotation pine plantation; as smaller stands within the scrub-shrub seed tree area; and as a riparian area along the Cow Branch waterbody which traverses the eastern portion of the mid-rotation pine plantation area. These stands likely had a larger component of pine but only a few residuals remain ( $\leq 0.5\%$ ) as a majority of these were selectively harvested in association with the harvest of the seed tree area in 2014. Species documented include, but are not limited to willow oak, red maple, green ash, in the tree stratum; possumhaw (*Ilex decidua*), and dwarf palmetto in the sapling/shrub strata; and dotted smartweed (*Polygonum punctatum*), Virginia chain fern (*Woodwardia virginica*) and savannah-panic grass (*Phanopyrum gymnocarpon*) in the herbaceous stratum. Tree heights range from approximately 60 to 70 feet above ground level (AGL). Chinese tallowtree has been observed in the tree strata of these stands but are localized and represent an overall 2.0% of the stem density and 1.5% of the basal area. The aerial extent of the tree strata cover is approximately 95%, the sapling/shrub strata cover is 4% and the herbaceous strata cover is 1%. The herbaceous strata consist primarily of access trails, food plots and cleared lanes associated with recreational hunting activity.

The Swamp community includes, but is not limited, to swamp tupelo (*Nyssa biflora*), Drummond's maple (*Acer rubrum drummondii*), pumpkin ash (*Fraxinus profunda*), baldcypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) in the tree stratum; wax myrtle, Drummond's maple, common buttonbush and dwarf palmetto in the sapling/shrub stratum; and dotted smartweed, savannah-panic, bulltongue arrowhead (*Sagittaria lancifolia*), pale spike rush (*Eleocharis macrostachya*), southern cattail (*Typha domingensis*), giant cutgrass (*Zizaniopsis miliacea*), Virginia saltmarsh mallow (*Kosteletzkya virginica*), hairy pod cowpea

(*Vigna luteola*), pickerelweed (*Pontederia cordata*), stiff marsh bedstraw (*Galium tinctorium*), royal fern (*Osmunda regalis*), crimson-eyed rosemallow (*Hibiscus moscheutos*) and redtop panic grass (*Panicum rigidulum*) grass in the herbaceous stratum. This area exists in the southwestern portion of Tract A. Tree heights range from approximately 65 to 75 feet above ground level (AGL). The aerial extent of tree strata cover is 100%.

#### 4.5 General Need for the Project in this Area

The primary threat to hardwood flatwoods and reduction of the historic range of this community type has been changes of land use, primarily conversion of this community to agriculture or pine plantation (LHNP 2009). The rapid commercial and residential developments along the Interstate 12 corridor and conversion to commercial pine plantation represents the greatest loss of hardwood flatwood habitat. Other threats include the construction of roads, pipeline and utility corridors, invasive and exotic species, physical damage from timber harvesting, and chemical contamination (LHNP 2009; Holcomb et al. 2015). The proposed bank will develop and promote long-term maintenance of healthy flatwoods by restoring and maintaining natural species composition; removing and controlling invasive species; and the removal and cessation of bedding and other soil disturbances that may alter natural water flow patterns (LHNP 2009).

The restoration<sup>20</sup>, enhancement and protection of BLH forest, specifically a hardwood flatwood, within the 562.4-acre Bank will provide additional wetland functions and values that are not currently realized under existing conditions and land use. The cessation of intensive silvicultural activities and reforestation<sup>21</sup> with native wetland tree species will provide localized improvement to upstream and downstream waters. Wildlife habitat will improve for resident biota and nearctic-neotropical migrating bird species (e.g., staging, resting, feeding, escape cover, etc.) through reforestation with native wetland tree and shrub species. Holcombe et al. (2015) described spruce pine-hardwood flatwoods as being important habitat for 29 species of greatest conservation need which include 1 species of crustacean, 3 species of amphibians, 5 species of reptiles, 11 species of birds, and 9 species of mammals. The protection of the 561.7-acre Bank along with the existing 486.4-acre Cow Branch Coastal Mitigation Bank will result in 1,048.1 contiguous acres protected under conservation easement (servitude). The entirety of this large area is adjacent to the approximately 28,000-acre Joyce Wildlife Management Area (WMA) managed by the LDWF. The Joyce WMA mostly consists of forested swamp wetlands consisting of baldcypress, water tupelo and

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<sup>20</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 or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

<sup>21</sup> The SAF (2018) defines reforestation as the reestablishment 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.

swamp tupelo and shrub wetlands consisting primarily of Drummond's maple, wax myrtle, red bay and common buttonbush.

The Bank is located within the Lake Pontchartrain Basin, as defined by the watersheds described in Section 6.0. Some of Louisiana's most densely populated areas are contained within this region. These include the cities of Hammond, Baton Rouge, and New Orleans. Also, within the Bank's service area are towns such as Clinton, Kentwood, Amite, Denham Springs, Gonzales, Covington, and Mandeville. These communities and their surrounding municipalities provide a high likelihood for residential and commercial expansion. Major industrial areas exist along the Mississippi River from Baton Rouge to New Orleans and large transportation corridors such as U.S. Highway 190, Interstate Highway 10, Interstate Highway 12, and Interstate Highway 55 traverse this basin. Therefore, it is likely that unavoidable impacts associated with this infrastructure such as pipelines, utilities, and transportation development could be compensated for by proposed Bank. The Bank restoration site would consolidate the mitigation for these types of impacts within a single, strategic location. The Bank will provide the most benefit to the watershed through the restoration and protection of a larger block of sensitive habitat and offsetting any cumulative effect of smaller, spatially fragmented projects.

Development of wetland restoration sites such as this proposed Bank in an area of increasing development and urbanization will provide an important resource regarding storm water retention and flood storage. Major soil resource concerns exist in this area due to the generally unconsolidated nature of loess sediments from which the landscape is formed. These concerns include water erosion, maintenance of organic matter content and productivity, and management of soil moisture. Water erosion is a hazard in sloping areas that are bare due to timber harvest operations. Though many of the soils in this region remain wet or have a high-water table for some or most of the year, forested wetland restoration projects such as the proposed Bank serve to increase the amount of precipitation interception and increase flood/storm water retention time. These functions serve to reduce potential erosion hazards and aid in the accumulation and maintenance of soil organic matter (carbon sequestration). Reforestation and protection of land surrounded by large, extant, and contiguous forested habitat which benefits breeding birds in accordance with existing bird conservation plans (Twedt et al. 2016). The creation of mitigation banks and the use of conservation easements is a restoration strategy identified within the Lake Pontchartrain Basin Comprehensive Management Plan developed by the Lake Pontchartrain Basin Foundation (LPBF), now known as the Pontchartrain Conservancy, as a strategy to offset the threats posed by urbanization (LPBF 2006).

In addition to providing compensation for impacts associated with local commercial and residential developments, the proposed Bank will serve to mitigate

for potential impacts<sup>22</sup> associated with linear projects such as pipelines and roadways in the already highly developed industrial Lake Pontchartrain basin. In addition to these impacts, there are federally funded<sup>23</sup> flood control and risk-reduction infrastructure projects within the basin requiring substantial acreage of wetland mitigation. These include the Comite River Diversion Project, the East Baton Rouge Flood Risk Reduction Project, and the West Shore Lake Pontchartrain Project.

Bottomland hardwoods in Louisiana are known to support 61 Species of Greatest Conservation Need (SGCN) which include 1 mollusk species, 1 crustacean species, 6 arthropods species, 5 amphibian species, 4 reptile species, 20 bird species, 10 mammal species, and 14 plant species (Holcombe et al. 2015).

The restoration and reforestation of the Bank, near larger extant tracts of forested wetlands, will provide benefit to various species of wildlife such as Nearctic-Neotropical migrant birds. Over 107 bird species nest regularly within the LMAV with 70 of these species utilizing BLH as their primary habitat (Twedt et al. 1999). The Partners in Flight (PIF) Bird Conservation Plan (BCP) for the LMAV recommends increasing the interior area of forested fragments to increase habitat for silvicolous (forest-dwelling) bird species (Twedt and Loesch 1999). Twedt et al. (1999) listed 14 forest breeding species as species of high concern and three of these species are identified as high priority conservation species (i.e., Swainson's warbler (*Limnothlypis swainsonii*), Cerulean warbler (*Dendroica creulea*) and swallow-tailed kites (*Elanoides forficatus*). The planting and long-term management of densely-spaced seedlings will provide habitat stability and encourage the recruitment of breeding populations of thamnic (scrub-dwelling) and silvicolous bird species (Twedt et al. 1999, Twedt et al. 2010).

The protection, conservation and 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 [Strategy] 2012). Species other than nongame migratory bird species will benefit from the restoration of the Bank. Large expanses of BLH forests 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 BLH 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 BLH and swamp habitats, respectively (LMRJV 2007; Taylor 2006). Loeb (2013) purports that unfragmented, contiguous forest with small openings

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<sup>22</sup> Impacts as used in this report are those in which are determined to be unavoidable impacts to waters of the United States per 33 CFR §332.1 (a) through (c)

<sup>23</sup> Funding per the Bipartisan Budget Act of 2018 signed into law February 9, 2018.

maintained for flight corridors are important components in maintaining and sustaining bat populations as these are critical for roosting and predator protection.

## **5. Establishment of a Mitigation Bank**

This section describes how the mitigation bank will be established (33 CFR § 332.8(d)(2)(ii)); the technical feasibility of the proposed mitigation bank (33 CFR § 332.8(d)(2)(iv)); and the assurance of sufficient water rights to support the long-term sustainability of the mitigation bank (33 CFR § 332.8(d)(2)(vii)(A)).

### **5.1 Site Restoration Plan**

This Bank will provide 171.0 acres of rehabilitated BLH, 247.5 acres of enhanced BLH, 92.1 acres of preserved BLH to compensate for unavoidable wetland impacts within the Lake Pontchartrain Basin watershed (Table 2)<sup>24</sup>. To accomplish this task, the Sponsor shall complete the following soils/hydrologic and habitat work.

#### **5.1.1 Soils/Hydrologic Work**

The proposed hydrology restoration work within the Tract A rehabilitation areas will involve the clearing of planted pine stems and the degrading of any remnant beds associated with previous establishment of pine plantation areas. Site preparation may include shredding, shearing, burning, ripping and pre-emergent herbicide treatments. These activities will adequately remove any hydrologic impediments associated with the plantation bedding and/or associated rutting. On average, remnant beds within the mid-rotation pine plantation area are approximately 4 - 6 inches in height from the top of the row to the trough between rows, which are approximately 8-feet apart. The degradation of the beds should result in a natural grade which is approximately 6 to 8 inches below the elevation of the top of the beds. Aside from the potential smoothing and grading of some skid trails prior to planting, no extensive earth work is anticipated within the enhancement or preservation areas. These areas do not exhibit the hydrologic modifications that are present in the more recently developed plantation areas. Hydrology restoration drawings including a plan view and typical cross-sections are included as Attachment C.

#### **5.1.2 Vegetative Work**

Pine stems will be removed from the canopy layer of the Tract A rehabilitation as described in Section 5.1.1. Naturally, regenerating loblolly pine and Chinese tallow within the sapling/shrub and tree stratum will be removed from the Tract A enhancement area through the same means described for the Tract A

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<sup>24</sup> Of the rehabilitation and enhanced BLH acres, 171.0 acres of rehabilitation and 245.7 acres of enhancement are  $\leq$ 5 feet NAVD.

rehabilitation area. Efforts will be implemented to the extent practical to avoid desirable, native species that exist within the tree stratum of these areas.

Mature pine stems will be removed from the canopy layer of the Tract B enhancement area through a combination of mechanical harvest and removal, felling in place, and deadening in place. This activity will be conducted in a manner as to minimize further site disturbance with care being taken to avoid damage to residual, desirable native trees, and shrubs such as those described for the mature pine community in Section 4.4.2. Trees that are felled in place will serve as downed woody material (DWM) in the form of fine woody material (FWM), coarse woody material (CWM), and large logs. Trees killed and left standing will serve as snags which will eventually become DWM. As these species of pine are not known to re-sprout, this will reduce the amount of herbicide needed to accomplish this task. The ecosystem services that deadwood within southeastern bottomland hardwoods provide for various species of insects, reptiles, amphibians, birds and mammals as well as inorganic Nitrogen retention are described in Evans (2012) and Baily et al (2006).

Within the Rehabilitation and Enhancement areas, reforestation activities will include the planting of native BLH species during the first planting season (December 15 through March 15) following site preparation. The reforestation effort utilizes fast-growing soft mast species and slower-growing hard mast species to allow for greater vertical structural diversity which is necessary habitat for forest breeding birds of highest conservation importance. The integration of rapid growth, early successional species mimics early natural succession and provides natural habitat and partial cover for late successional species which exhibit increased growth in partial cover and dappled sunlight exposure (Twedt and Portwood 1997). The early successional species create biotic and abiotic environmental conditions that promote seedling emergence and survival of late successional species (Harper et al. 1965, Twedt and Portwood 1997). The species planted within the wetland areas will predominately have an indicator status of Obligate (OBL), Facultative Wetland (FACW) or Facultative (FAC) per the 2018 National Wetland Plant List (USACE 2019).

The species selected for each habitat type will be site-appropriate in terms of habitat design, soil-moisture regime, and species richness. The planting will consist of tree and shrub species as described by Lester et al (2005) and LNHP<sup>25</sup>. Prior to planting, seedlings will be mixed and packaged off-site so that reforested areas do not develop as monotypic communities (Twedt and Best 2004). Table 4 reflect the species and quantity suitable for planting within these proposed habitat type. The exact species and quantities for planting will be determined by the availability of such species from commercial nurseries providing localized ecotype seedlings. The final BLH planting assemblage should consist of approximately 10 or more species to insure adequate species richness (Twedt and Best 2004).

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<sup>25</sup> LNHP Tracking List and Fact Sheets (available URL <http://coastal.la.gov/a-common-vision/2012-coastal-master-plan/>).



BLH planting densities within the Tract A BLH Rehabilitation area will be no less than 538 stems per acre as almost all existing trees are expected to be removed from this area given it is an existing pine plantation. To the extent practical, efforts will be taken to preserve any large, native hardwood trees or any groups of smaller, native hardwood trees which may be encountered in this area during clearing. For enhancement activities on Tract A, the residual hardwood will average about 14 stems per acre once the loblolly pine and any invasive trees are removed. Therefore, it is anticipated that approximately 524 stems per acre will be planted in this area to keep the initial, desirable stem density at 538 post-construction. For enhancement activities on Tract B, the estimated residual density of hardwoods is approximately 67 stems per acre once the mature pine and any invasive trees are removed, felled, and/or deadened. Therefore, it is anticipated that approximately 471 stems per acre to keep the initial, desirable stem density at 538 post-construction. As these densities are based on estimates from limited plot data, this will be monitoring during construction and may be adjusted as to keep the initial density of planted plus residual stems at approximately 538 stems per acre. The residual basal area will also factor into specific planting densities within the enhancement areas as this metric reflects the size and amount of occupancy of the residual trees.

In all plantings, and hard mast species<sup>26</sup> should account for approximately 70% to 80% of all plantings. The increased hard mast species percentage is based on previous experience with reforestation efforts in similar landscape and soil conditions and the presence of seed-producing soft mast species present both within the proposed bank and surrounding forest. The distribution of species across the Bank landscape will create a mosaic of hard and soft mast species to provide seasonally available forages for a wide range of indigenous and migratory wildlife. Chinese tallowtree, Chinese privet (*Ligustrum sinense*) and other invasive tree or shrub species will be removed during site preparation in the rehabilitation and enhancement areas and individual stems treated within the preservation areas.

## 5.2 Technical Feasibility

The construction work required to develop the proposed Bank is based on experience and currently accepted restoration methods and is technically feasible. The construction work will consist of 1) removal of loblolly pine along with any invasive tree species; 2) site preparation, and 3) reforestation with native tree species. The relatively low landscape position and the presence of hydric soils indicate that minimal soil work will be required for successful restoration of wetland hydrology and forested wetlands in the areas currently being used as pine plantations. The existence of forested wetlands within and adjacent to the Bank also suggests a high potential for successful restoration. Once restoration efforts

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<sup>26</sup> For this report, hardmast species consist of native, heavy-seeded species of *Quercus* spp. or *Carya* spp.

have been completed, the site will be on a trajectory for the restoration of a more natural, historic water regime.

### **5.3 Current Site Risks**

The presence of commercially managed pine stands in the surrounding land use does lend to the potential of natural regeneration of loblolly pine within the site. However, as with other bank sites in this type of setting, natural regeneration of loblolly pine will be kept to within a 10% threshold during the during the development of the bank. Aside from this, DLS does not foresee any adverse impacts to the mitigation site resulting from the continued existence and operation of the neighboring land uses. Much of the land use and cover type surrounding the Bank are existing palustrine forested wetlands. These areas have remained in this land use over the past 78 years as evidenced in the historical and recent aerial photographic records (Figures 13 through 22).

### **5.4 Long-Term Sustainability of the Site**

Long-term viability and sustainability of the Bank will be ensured through active and adaptive management including, but not limited to, invasive species control with emphasis on Chinese tallowtree, Chinese privet and feral hogs (*Sus scrofa*); appropriate monitoring, and long-term maintenance. No long-term structural management will be required because there are no water control structures to maintain.

Article 490 of the Louisiana Civil Code treats water resources under the theory of absolute ownership and rule of capture provided that such capture does not result in harm to neighboring properties. The proposed Bank will depend primarily on precipitation, perched water table, and runoff from surrounding areas, locally high-water tables, and potential overbank/backwater flooding of surrounding creeks. As such, long-term hydrology maintenance will not depend on the utilization of water captured from irrigation wells or any other artificial source; therefore, sufficient water rights are ensured for such purposes. The Sponsor does not foresee any adverse impacts on neighboring properties resulting from this project.

## **6. Proposed Service Area**

The Pontchartrain Basin will serve as the service area for the Bank (Figure 23). The use of credits outside of the defined service area will be handled on a case specific basis by the CEMVN and will be specified as such in the subsequent MBI. This Basin is comprised of the Amite Subbasin (USGS Hydrologic Unit Code [HUC] 08070202), the Tickfaw Subbasin (USGS HUC 08070203), the Lake Maurepas Subbasin (USGS HUC 08070204), the Tangipahoa Subbasin (USGS HUC 08070205), the Liberty Bayou-Tchefuncta Subbasin (USGS HUC 08090201), the

Lake Pontchartrain Subbasin (USGS HUC 08090202), and the Eastern Louisiana Coastal Subbasin (USGS HUC 08090203).

## **7. Operation of the Mitigation Bank**

This section describes how the proposed Bank will be operated (33 CFR § 332.8(d)(2)(ii)) and provides details on the proposed ownership arrangements and long-term management strategy for the mitigation bank (33 CFR § 332.8(d)(2)(v.)).

### **7.1 Project Representatives**

*Sponsor:/Agent:*                      *Delta Land Services, LLC*  
*1090 Cinclare Drive*  
*Port Allen, LA 70767*  
*Attn: Daniel Bollich*  
*Phone: 225-388-5146*  
*daniel@deltaland-services.com*

*Landowner:*                              *Delta Land Services, LLC*  
*1090 Cinclare Drive*  
*Port Allen, LA 70767*  
*Attn: Winship Songy*  
*Phone: 225-388-5187*  
*winship@deltaland-services.com*

### **7.2 Qualifications of the Sponsor**

Per 33 CFR § 332.8(d)(2)(vi.), this section describes the Sponsor's, Landowner's and Agent's qualifications to successfully complete all work associated with establishment and operation of the proposed Bank.

DLS will serve as the Sponsor, Agent, and Owner of the Bank and is a land management and restoration company whose technical staff includes Certified Wildlife Biologists, Professional Wetland Scientists, Certified Ecological Restoration Practitioners, and Certified Foresters. In addition, DLS has construction specialists experienced in wetland construction activities such as heavy equipment operation, vegetation establishment, herbicide application, and contractor management. The biographies of DLS personnel are available at [www.deltaland-services.com](http://www.deltaland-services.com).

To date, DLS currently operates, either as a Sponsor or managing entity, 26 approved wetland and/or stream mitigation bank sites totaling 17,730.9 acres in four USACE districts including CEMVN, Vicksburg (CEMVK), Galveston (CESWG) and Forth Worth (CESWF). In addition to mitigation banking, DLS serves as the responsible party for the establishment and maintenance of 4,197.0 acres of

approved Permittee-Responsible Mitigation (PRM) wetland and stream projects within CEMVN and CESWG.

### **7.3 Proposed Long-Term Ownership and Management Representatives**

DLS will serve as the Sponsor, long-term owner, and steward of the Bank. However, the Sponsor may appoint a long-term steward if such an appointment is approved by the CEMVN. The anticipated long-term management will consist of monitoring, invasive species control, site management, boundary maintenance, and site protection.

### **7.4 Site Protection**

To provide conservation protection, DLS shall execute a perpetual conservation servitude (pursuant to the Louisiana Conservation Servitude Act, R.S. 9:1271 *et seq.*) on all acreage identified as the Bank and record it in the Mortgage and Conveyances Records Office of Tangipahoa Parish. DLS will utilize a not-for-profit conservation land trust as the entity that will hold the servitude.

### **7.5 Long-Term Strategy**

Long-term management will consist of monitoring, vegetation management, invasive species control, boundary maintenance, site protection, and the funding of such activities. The forest will be managed to maintain or increase the biological, chemical and physical wetland functions and to achieve and maintain the desired forest conditions, which will provide forested habitat capable of supporting populations for priority wildlife species. The desired forest conditions are defined by the LMVJV (2007). A long-term management plan will be included with the MBI, which will detail long-term management needs, costs and identify a funding mechanism in accordance with 33 CFR § 332.7 (d). The Sponsor (or Long-term Steward) and the Owner (or its heirs, assigns or purchasers) shall be responsible protecting lands contained within the Bank in perpetuity.

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**Attachment A: Tables and Figures**



**Table 1. Baseline Conditions, Existing Strata and Proposed Mitigation Habitat Features at the Cow Branch Coastal Mitigation Bank Amendment One Project Site in Tangipahoa Parish, Louisiana.**

<b>Tract</b>	<b>Baseline Habitat</b>	<b>Existing Strata<sup>1</sup></b>	<b>Proposed Feature</b>	<b>Acres</b>
A	Mid-Rotation Pine Plantation	Tree	BLH Rehabilitation	167.0
A	Mid-Rotation Pine Plantation	Shrub	BLH Rehabilitation	3.5
A	Mid-Rotation Pine Plantation	Herbaceous	BLH Rehabilitation	0.5
A	Mid-Rotation Pine Plantation	Tree	Access Areas	1.2
A	Mid-Rotation Pine Plantation	Herbaceous	Access Areas	0.6
A	Mid-Rotation Pine Plantation	Tree	Wildlife Opening	0.4
A	Mid-Rotation Pine Plantation	Herbaceous	Wildlife Opening	0.4
A	Mid-Rotation Pine Plantation	Shrub	Wildlife Opening	0.1
<b>A</b>	<b><i>Mid-Rotation Pine Plantation</i></b>			<b>173.7</b>
A	Seed Tree Area	Shrub	BLH Enhancement	48.0
A	Seed Tree Area	Herbaceous	BLH Enhancement	46.6
A	Seed Tree Area	Tree	BLH Enhancement	9.5
A	Seed Tree Area	Herbaceous	Access Areas	2.5
A	Seed Tree Area	Shrub	Access Areas	0.5
A	Seed Tree Area	Tree	Access Areas	0.2
<b>A</b>	<b><i>Seed Tree Area</i></b>			<b>107.3</b>
A	BLH Forest	Tree	Preservation	87.8
A	BLH Forest	Shrub	Preservation	3.7
A	BLH Forest	Herbaceous	Preservation	0.6
<b>A</b>	<b><i>BLH Forest</i></b>			<b>92.1</b>
A	Swamp	Tree	Swamp Inclusion	45.2
<b>A</b>	<b><i>Swamp</i></b>			<b>45.2</b>
<b>A</b>	<b><i>Tract A Total</i></b>			<b>418.3</b>
B	Mature Pine	Tree	BLH Enhancement	143.4
<b>B</b>	<b><i>Mature Pine</i></b>			<b>143.4</b>
<b>B</b>	<b><i>Tract B Total</i></b>			<b>143.4</b>
<b>Total</b>				<b>561.7</b>

<sup>1</sup> Strata are defined in the USACE Atlantic and Gulf Coastal Regional Supplement (USACE 2010) and the aerial extent of strata cover was determined utilizing an Unmanned Aerial System (UAS). The UAS system consisted of an Unmanned Aerial Vehicle (UAV) with a high accuracy Global Navigation Satellite Systems (GNSS) antenna and high-resolution camera coupled with survey-grade ground control points for Post-Processing Kinematic (PPK) of the flight imagery. A digital surface model (DSM) was created from the UAS data whereby each pixel contained the MSL elevational value of the top of the vegetation. The AGL was computed by subtracting the average ground elevation from the DSM value.

<b>Table 2. Proposed Mitigation Habitat Types at the Cow Branch Coastal Mitigation Bank Amendment One Project Site in Tangipahoa Parish, Louisiana.</b>	
<b>Mitigation Habitat Type</b>	<b>Acres</b>
Tract A Hardwood Flatwood (BLH-LDNR) Rehabilitation <sup>1</sup>	171.0
<b>Total Forested Restoration</b>	<b>171.0</b>
Tract A Hardwood Flatwood (BLH-LDNR) Enhancement <sup>1</sup>	104.1
Tract B Hardwood Flatwood (BLH-LDNR) Enhancement <sup>1</sup>	141.6
Tract B Hardwood Flatwood (BLH) Enhancement	1.8
<b>Total Forested Enhancement</b>	<b>247.5</b>
Tract A Bottomland Hardwood Forest Preservation	92.1
<b>Total Forested Preservation</b>	<b>92.1</b>
<b>Total BLH Credit Acres<sup>2</sup></b>	<b>510.6</b>
Tract A Swamp Forest Inclusion	45.2
Tract A Access Road and Wildlife Openings	5.9
<b>Total Non-Mitigation Credit Area</b>	<b>51.1</b>
<b>Total Project Acreage</b>	<b>561.7</b>

<sup>1</sup> BLH-LDNR credits are Bottomland Hardwood Rehabilitation or Enhancement Acres that reside below a post-restoration grade of 5 feet Mean Sea Level (MSL) North American Vertical Datum (NAVD) Geoid 12A. These credits will be appropriate for crediting by the Louisiana Department of Natural Resources for mitigation for permitting impacts under LDNR-issued Coastal Use Permits.

<sup>2</sup> Of these totals, 416.7 acres consist of BLH-LDNR credits.

**Table 3: Summary of Existing Woody Species Composition at the Cow Branch Coastal Mitigation Bank Amendment One Project Site in Tangipahoa Parish, Louisiana.**

**Composite Species within the Tree Stratum of the Mid-Rotation Pine Plantation in Tract A<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Percent Density of Stems/Acre</b>	<b>Percent Dominance of Basal Area</b>
<i>Pinus taeda</i>	447	85.4	79.7%	84.5%
<i>Quercus</i> spp.	54	8.6	9.6%	8.5%
<i>Liquidambar styraciflua</i>	60	7.1	10.7%	7.0%
<b>Total</b>	<b>561</b>	<b>101.1</b>	<b>100%</b>	<b>100%</b>

<sup>1</sup> The tree stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7594>) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from 2018 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) and the USDA Plants Database (<https://plants.sc.egov.usda.gov/>) accessed July 24, 2020.

**Table 3 (continued): Summary of Existing Woody Species Composition at the Cow Branch Coastal Mitigation Bank Amendment One Project Site in Tangipahoa Parish, Louisiana.**

**Composite Species within the Tree Stratum of the Mature Pine in Tract B<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Percent Density of Stems/Acre</b>	<b>Percent Dominance of Basal Area</b>
<i>Pinus taeda</i>	106	109.0	60.9%	84.8%
<i>Quercus</i> spp.	31	8.1	17.8%	6.4%
<i>Acer rubrum</i>	14	5.0	8.0%	3.9%
<i>Nyssa sylvatica</i>	17	4.3	9.8%	3.3%
<i>Liquidambar styraciflua</i>	4	1.6	2.3%	1.2%
<i>Fraxinus profunda</i>	1	0.3	0.6%	0.2%
<i>Traidica sebifera</i>	1	0.3	0.6%	0.2%
<b>Total</b>	<b>174</b>	<b>128.6</b>	<b>100%</b>	<b>100%</b>

<sup>1</sup> The tree stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594>) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from 2018 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) and the USDA Plants Database (<https://plants.sc.egov.usda.gov/>) accessed July 24, 2020.

**Table 3 (continued): Summary of Existing Woody Species Composition at the Cow Branch Coastal Mitigation Bank Amendment One Project Site in Tangipahoa Parish, Louisiana<sup>1</sup>.**

**Composite Species within the Tree Stratum of the Seed Tree Harvested Area in Tract A<sup>2</sup>**

Species <sup>3</sup>	Stems/Acre	Basal Area (sq ft/acre)	Percent Density of Stems/Acre	Percent Dominance of Basal Area
<i>Quercus</i> spp.	9	2.2	42.9%	52.4%
<i>Nyssa</i> spp.	4	1.3	21.4%	30.9%
<i>Pinus taeda</i>	6	0.4	28.6%	9.8%
<i>Liquidambar styraciflua</i>	1	0.3	7.1%	6.9%
<b>Total</b>	<b>20</b>	<b>4.2</b>	<b>100%</b>	<b>100%</b>

**Composite Species within the Shrub Stratum of the Seed Tree Harvested Area in Tract A<sup>4</sup>**

Species	Stems/Acre	Stems/Acre Tree Species <sup>5</sup>	Percent Density of Stems/Acre	Percent Density of Stems/Acre of Tree Species
<i>Pinus taeda</i>	514	514	37.5%	41.5%
<i>Triadica sebifera</i>	511	511	37.3%	41.2%
<i>Morella cerifera</i>	74	--	5.4%	--
<i>Fraxinus</i> spp.	57	57	4.2%	4.6%
<i>Diospyros virginiana</i>	46	46	3.3%	3.7%
<i>Quercus</i> spp.	37	37	2.7%	3.0%
<i>Acer rubrum</i>	29	29	2.1%	2.3%
<i>Nyssa sylvatica</i>	29	29	2.1%	2.3%
<i>Rhus copalina</i>	29	--	2.1%	--
<i>Liquidambar styraciflua</i>	17	--	1.3%	1.4%
<i>Baccharis halmifolia</i>	14	--	1.0%	--
<i>Ilex vomitoria</i>	14	--	1.0%	--
<b>Total</b>	<b>1371</b>	<b>1240</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The tree stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594>) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $> 3$  inches diameter at breast height (DBH).

<sup>2</sup> The tree strata comprises  $< 10\%$  canopy cover within the Seed Tree Harvested Area.

<sup>3</sup> Scientific names from 2018 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) and the USDA Plants Database (<https://plants.sc.egov.usda.gov/>) accessed July 24, 2020.

<sup>4</sup> The shrub stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594>) as Woody Plants, excluding woody vines, approximately  $< 20$  feet in height.

<sup>5</sup> Tree species are those having only a growth habit of "Tree" per the USDA Plants Database (<https://plants.sc.egov.usda.gov/>) accessed July 24, 2020.

**Table 3 (continued): Summary of Existing Woody Species Composition at the Cow Branch Coastal Mitigation Bank Amendment One Project Site in Tangipahoa Parish, Louisiana.**

**Composite Species within the Tree Stratum of the Bottomland Hardwood in Tract A<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Percent Density of Stems/Acre</b>	<b>Percent Dominance of Basal Area</b>
<i>Quercus</i> spp.	124	45.6	60.5%	59.8%
<i>Nyssa sylvatica</i>	39	16.4	19.0%	21.5%
<i>Liquidambar styraciflua</i>	14	5.9	6.8%	7.7%
<i>Acer rubrum</i>	11	4.8	5.4%	6.3%
<i>Fraxinus</i> spp.	9	1.8	4.4%	2.4%
<i>Triadica sebifera</i>	4	1.1	2.0%	1.5%
<i>Pinus taeda</i>	1	0.4	0.4%	0.5%
<i>Carpinus caroliniana</i>	3	0.2	1.5%	0.3%
<b>Total</b>	<b>205</b>	<b>76.2</b>	<b>100%</b>	<b>100%</b>

<sup>1</sup> The tree stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594>) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from 2018 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) and the USDA Plants Database (<https://plants.sc.egov.usda.gov/>) accessed July 24, 2020.

**Table 4: Planting Composition of Wetland Rehabilitation and Enhancement Areas at the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana<sup>1</sup>.**

<b>Hard Mast Species<sup>2</sup> (approximately 70-80% overall composition)</b>				
<b>Common Name</b>	<b>Scientific Name<sup>3</sup></b>	<b>Indicator Status</b>	<b>Composition<sup>4</sup></b>	<b>Growth Habit<sup>5</sup></b>
laurel oak	<i>Quercus laurifolia</i>	FACW	≤25%	Tree
swamp chestnut oak	<i>Quercus michauxii</i>	FACW	≤25%	Tree
cherrybark oak	<i>Quercus pagoda</i>	FACW	≤25%	Tree
willow oak	<i>Quercus phellos</i>	FACW	≤25%	Tree
bottomland post oak	<i>Quercus similis</i>	FACW	≤25%	Tree
overcup oak	<i>Quercu lyrata</i>	OBL	≤20%	Tree
Shumard's oak	<i>Quercus shumardii</i>	FAC	≤20%	Tree
Nuttall oak	<i>Quercus texana</i>	FACW	≤20%	Tree
bitternut hickory	<i>Carya cordiformis</i>	FAC	≤15%	Tree
<b>Soft Mast Species<sup>2</sup> (approximately 20-30% of overall composition)</b>				
<b>Common Name</b>	<b>Scientific Name</b>	<b>Indicator Status</b>	<b>Composition</b>	<b>Growth Habit</b>
Drummond red maple	<i>Acer rubrum var. drummondii</i>	FAC	≤15%	Tree
common persimmon	<i>Diospyros virginiana</i>	FAC	≤15%	Tree
green ash	<i>Fraxinus pennsylvanica</i>	FACW	≤15%	Tree
southern magnolia	<i>Magnolia grandiflora</i>	FAC	≤15%	Tree
blackgum	<i>Nyssa sylvatica</i>	FAC	≤15%	Tree
spruce pine	<i>Pinus glabra</i>	FACW	≤15%	Tree
American sycamore	<i>Platanus occidentalis</i>	FAC	≤15%	Tree
Baldcypress	<i>Taxodium distichum</i>	OBL	≤10%	Tree

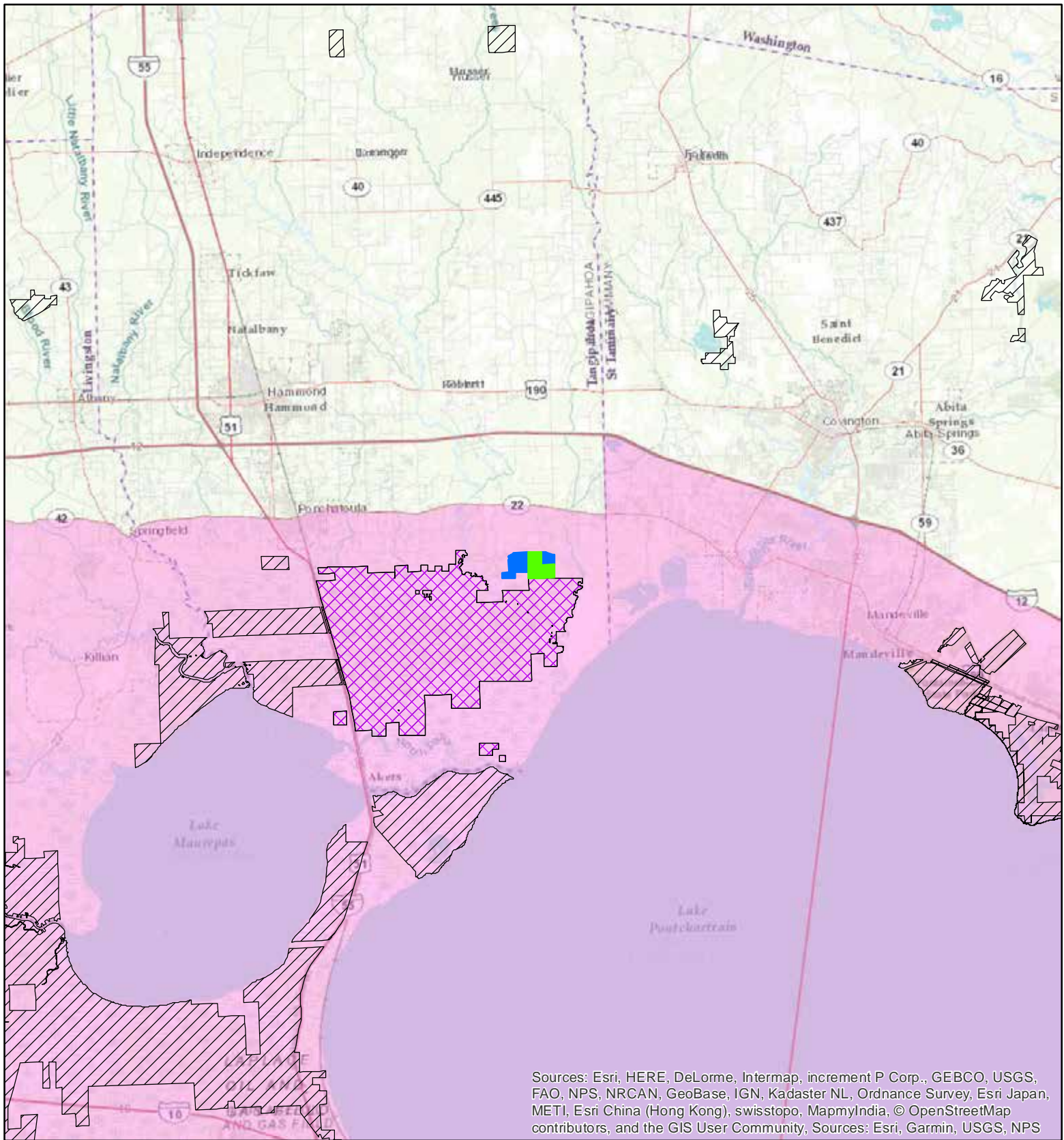
<sup>1</sup>Not all species listed on the above-referenced table are likely to be available however the Sponsor will make all practical efforts to obtain and plant 10 or more species from the list.

<sup>2</sup> For the purpose of this list, hard mast is defined as any oak, hickory or pecan species. All other species are considered soft mast species.

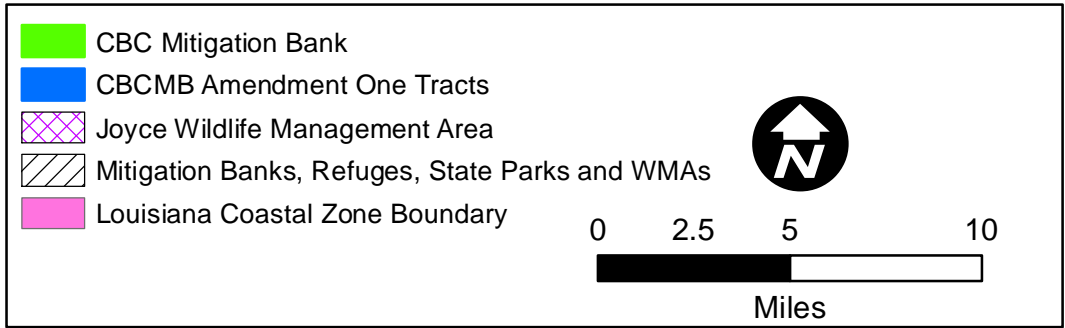
<sup>3</sup> Scientific name and indicator status from 2018 National Wetland Plant List ([http://wetland\\_plants.usace.army.mil/](http://wetland_plants.usace.army.mil/)) and the USDA Plants Database (<https://plants.sc.egov.usda.gov/>) accessed on July 24, 2020..

<sup>4</sup> The composition represents the maximum percentage a species may comprise of the entire planting mosaic regardless of mast type. Exact species and quantities to be determined by seedling availability from commercial sources providing seedlings grown from localized ecotypes.

<sup>5</sup> Growth habit per the USDA Plants Database, available at <http://plants.usda.gov> accessed on July 24, 2020.



Sources: Esri, HERE, DeLorme, 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, Sources: Esri, Garmin, USGS, NPS



**Cow Branch Coastal Mitigation Bank  
Amendment One**

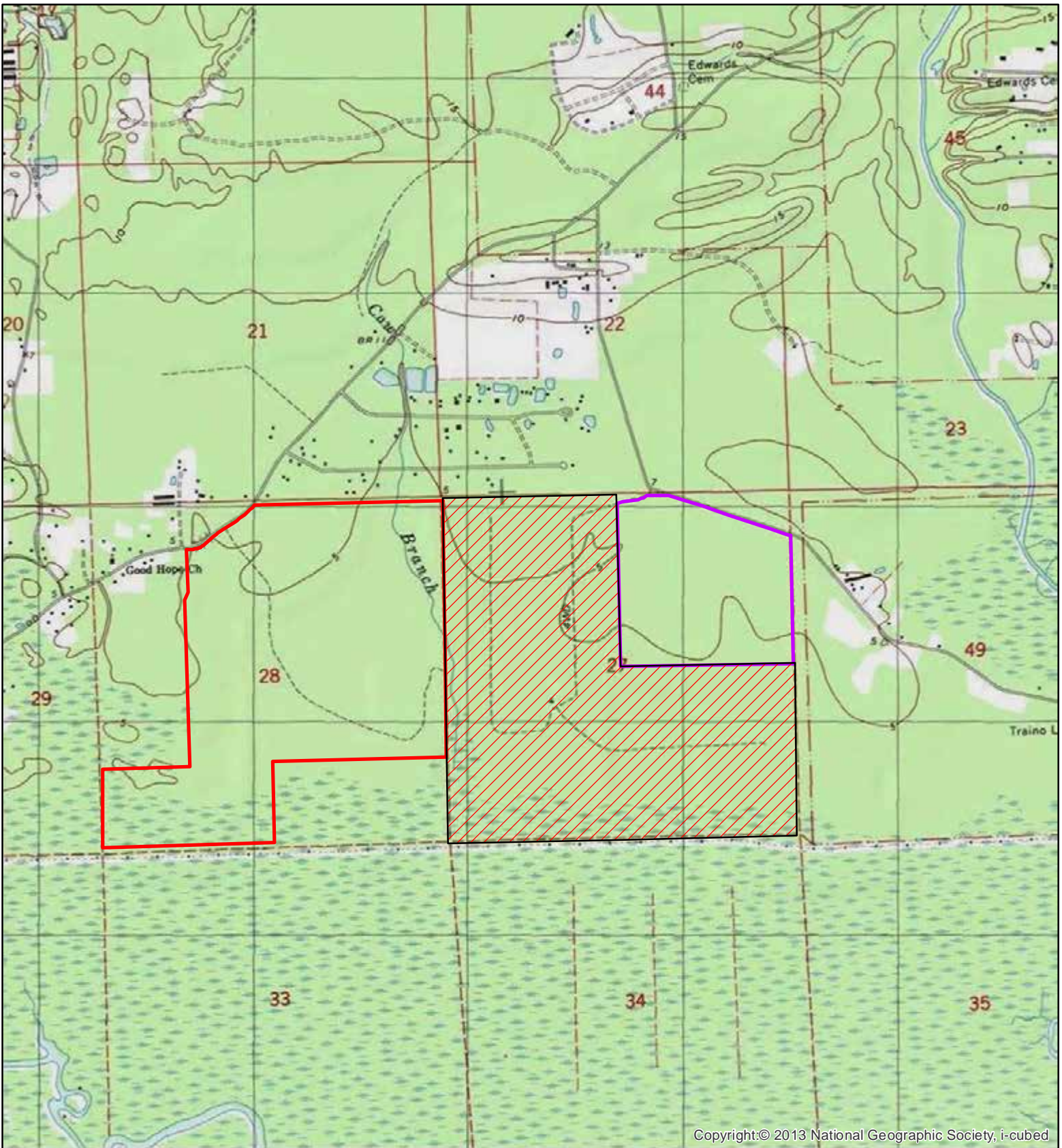
**VICINITY MAP**

**Tangipahoa Parish, LA**


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**FIGURE 1**







Copyright:© 2013 National Geographic Society, i-cubed

 Mitigation Bank (486.4 acres)

**Amendment One Tracts (561.7 acres)**

 Tract A (418.3 acres)

 Tract B (143.4 acres)



0 1,000 2,000 4,000



Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**USGS 7.5-MINUTE QUADRANGLE**

**Tangipahoa Parish, LA**

Created : DEB

Approved : DEB

Date : 08/30/2020

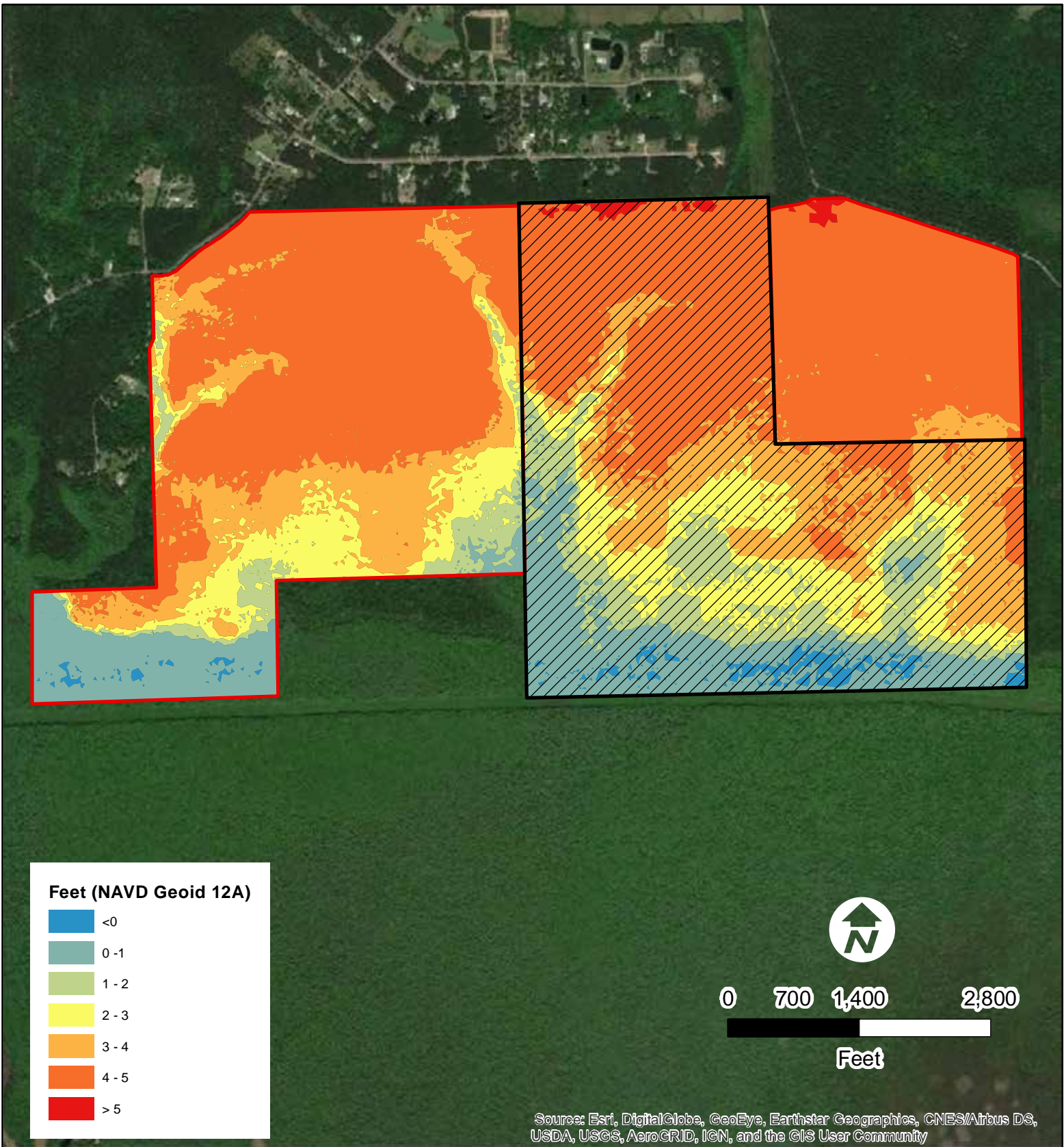
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Note: USGS 7.5-minute Quadrangle "Pontchartroula NE, LA"

**FIGURE 2**





Mitigation Bank (486.4 acres)  
 Amendment One Tracts (561.7 acres)

Note: Elevations are based on publicly available Light Detection and Ranging (LIDAR) Data of an undefined geoid that has been adjusted to the Geoid12A based on real time corrected field survey values utilizing RTK GNSS.

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**ELEVATION MAP**




**Tangipahoa Parish, LA**

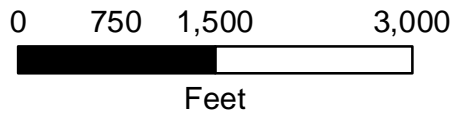
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Date : 08/30/2020
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**FIGURE 3**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

-  Mitigation Bank
-  Amendment One Tracts
-  FEMA Flood Zone AE



Note: Flood Zones are from FEMA Map Panels 22105C0460F and 22105C0470F, effective dates 7/22/2010.

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**FLOOD ZONES**

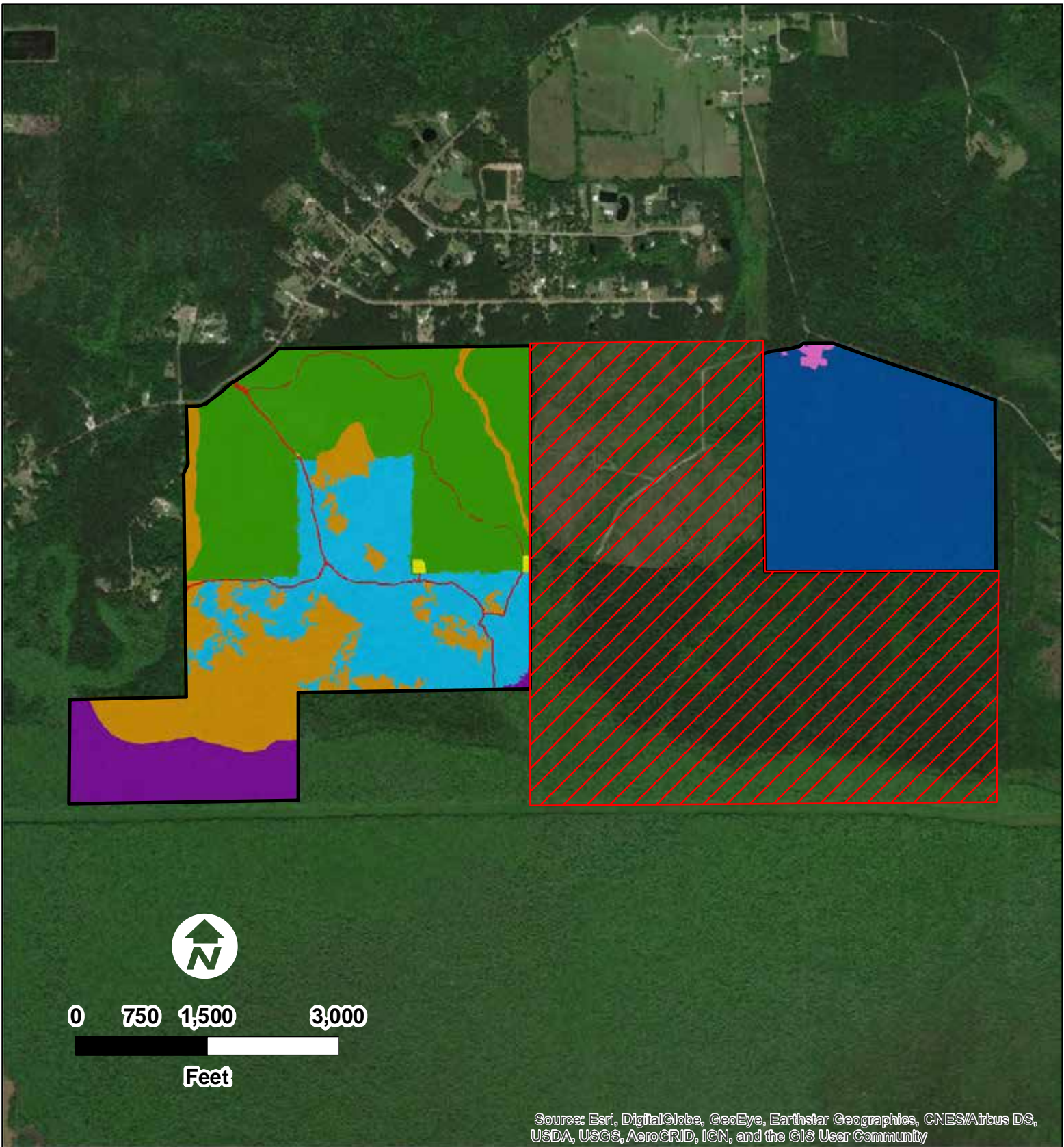
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 Approved : ---  
 Date : 08/30/2020  
 F04\_FEMA.mxd



**FIGURE 4**





- |  |   |
|--|---|
| Mitigation Bank (486.4 ac)                   | Tract A Swamp Inclusion (45.1 ac)         |
| Amendment One Tracts (561.7 ac)              | Tract A Access Areas (5.0 ac)             |
| Tract A BLH Rehabilitation - LDNR (171.0 ac) | Tract A Wildlife Openings (0.9 ac)        |
| Tract A BLH Enhancement - LDNR (104.1 ac)    | Tract B BLH Enhancement - LDNR (141.6 ac) |
| Tract A BLH Preservation (92.1 ac)           | Tract B BLH Enhancement (1.8 ac)          |

**Cow Branch Coastal Mitigation Bank  
Amendment One**

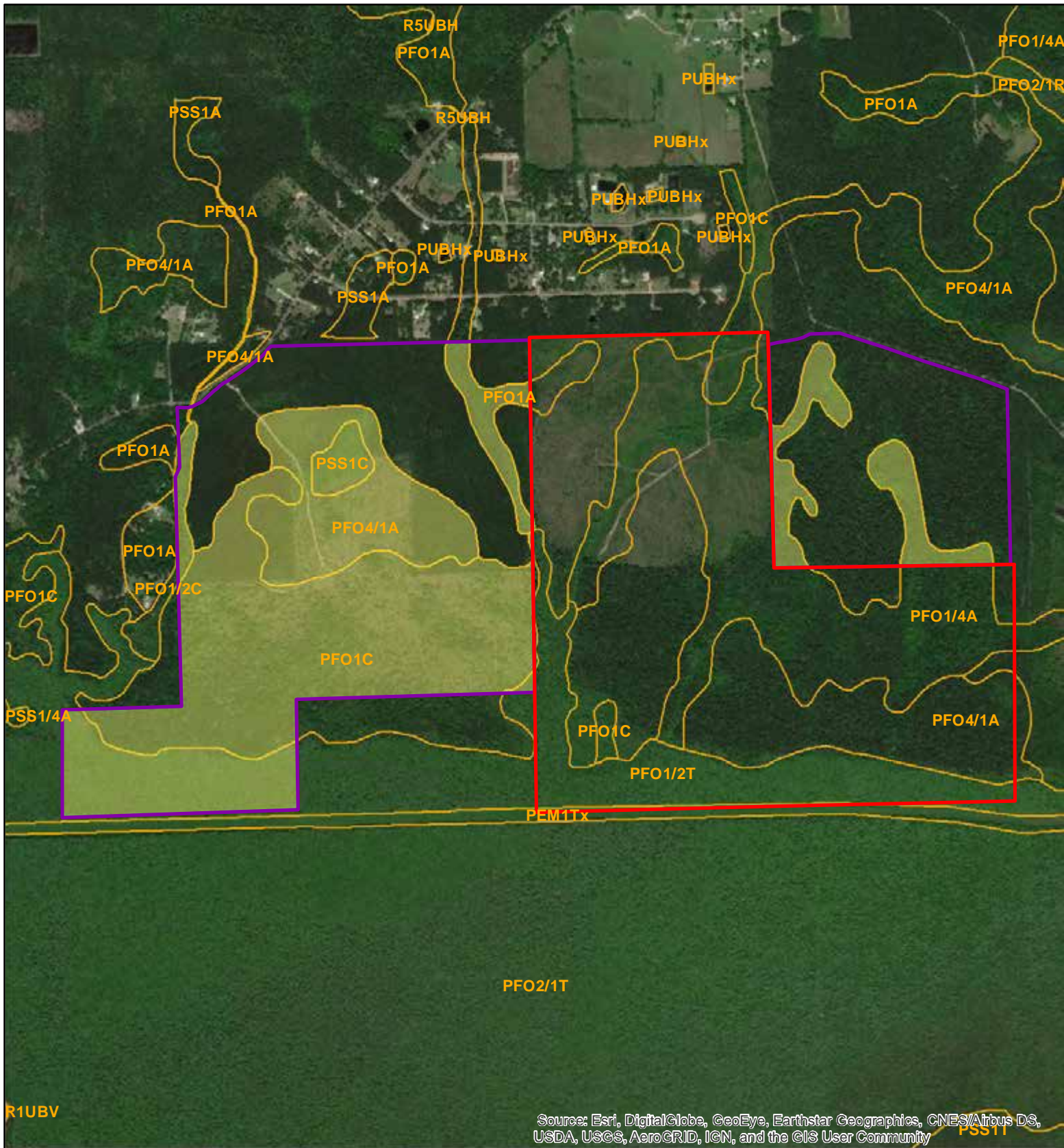
**PROPOSED MITIGATION FEATURES**

**Tangipahoa Parish, LA**

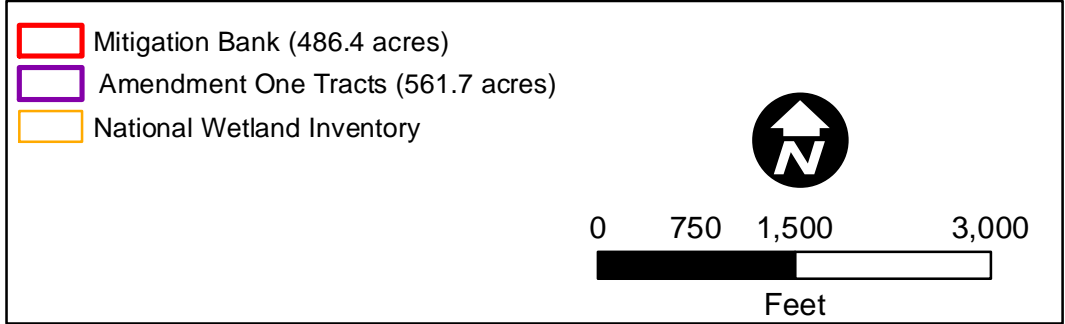
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**FIGURE 5**

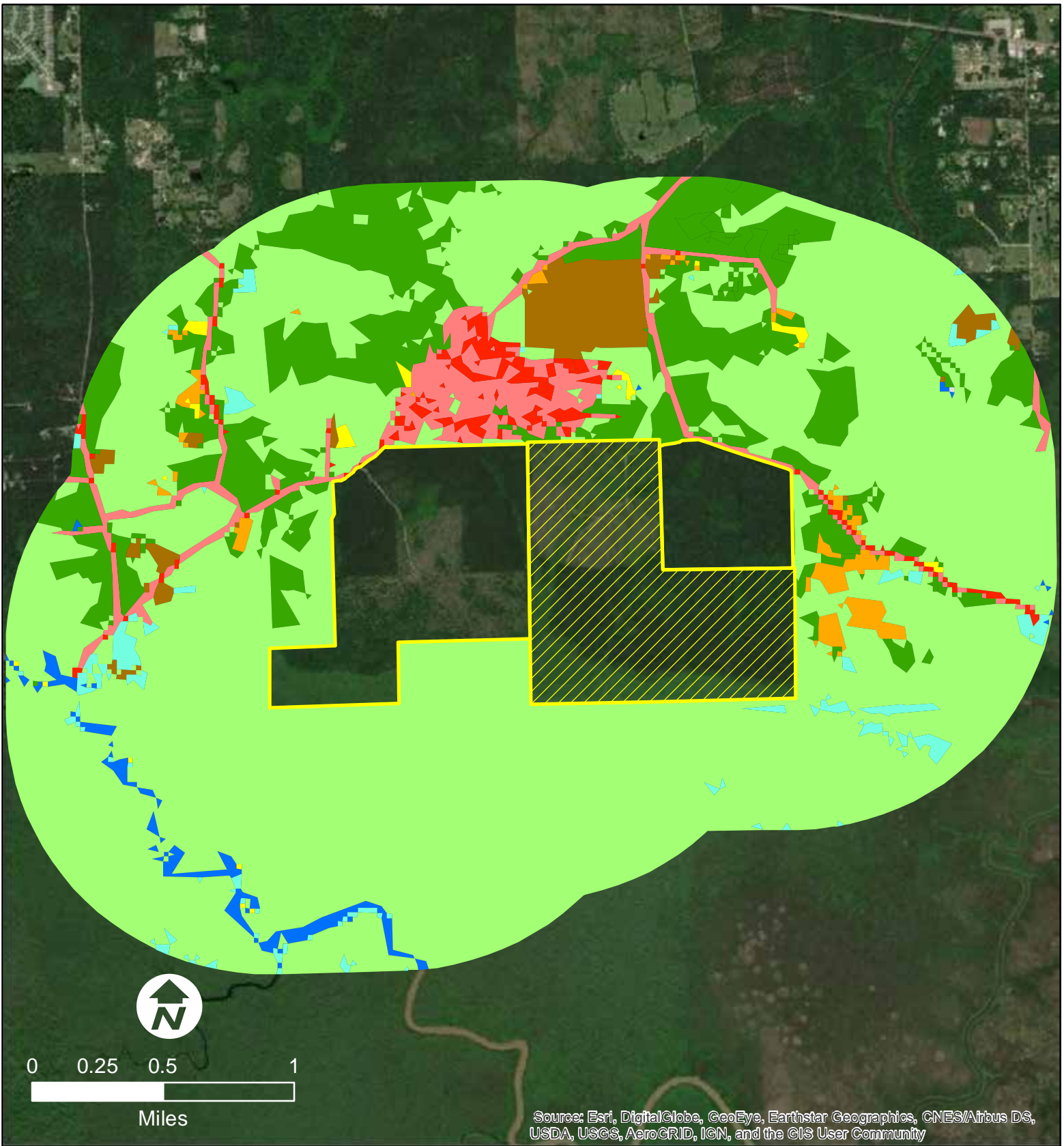
















Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community




<b>Cow Branch Coastal Mitigation Bank Amendment One</b>	
<b>NATIONAL WETLAND INVENTORY</b>	
<b>Tangipahoa Parish, LA</b>	
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Approved : ---	
Date : 08/30/2020	
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<b>FIGURE 6</b>	



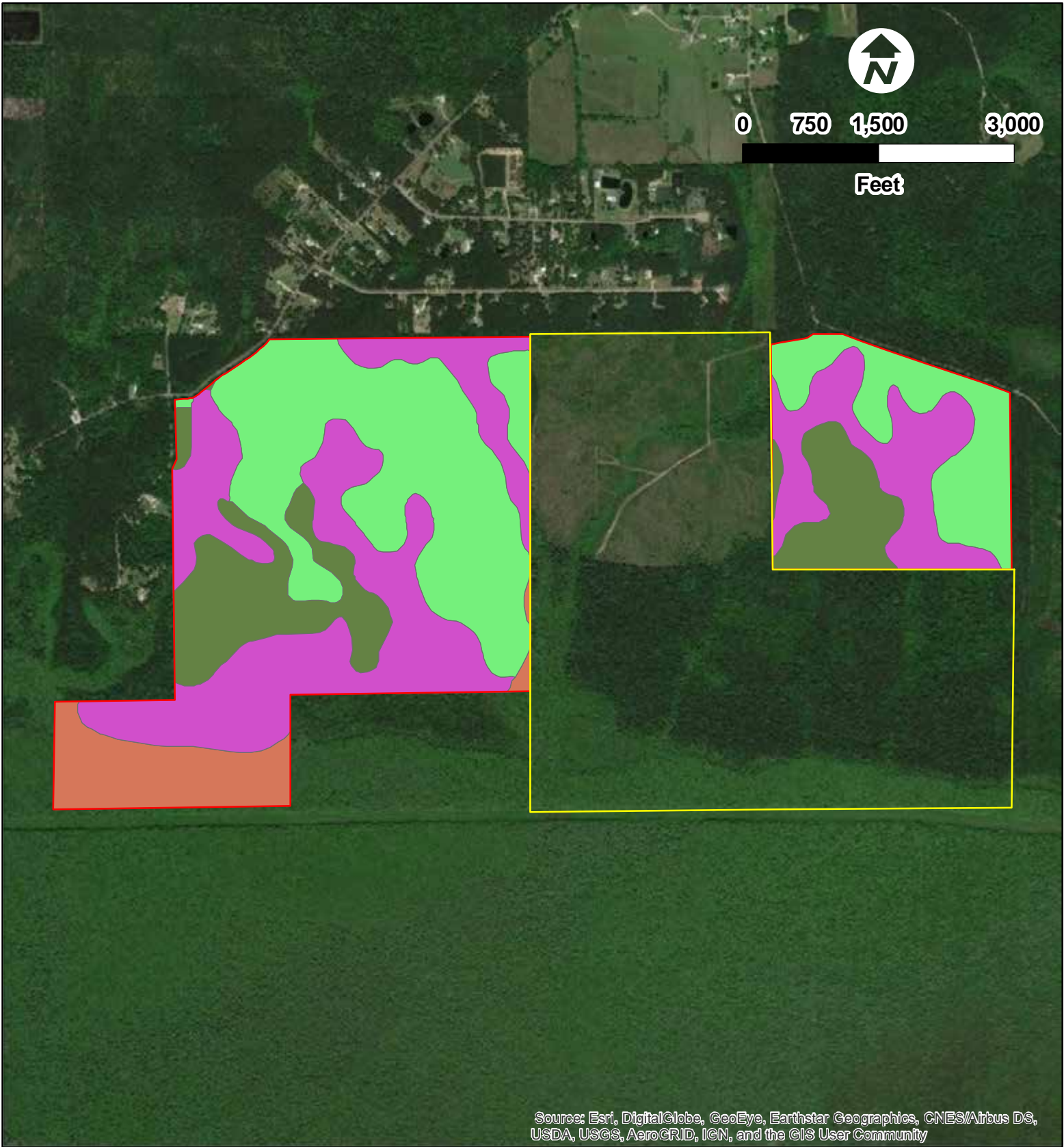
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

	Mitigation Bank (486.4 acres)		Forest (15%)
	Amendment One Tracts (561.7 acres)		Forested Wetland (72%)
	Agriculture (3%)		Herbaceous (1%)
	Barren Land (1%)		Herbaceous Wetland (1%)
	Developed Open Space (5%)		Scrub/Shrub (1%)
	Developed Various Intensity (1%)		Water (1%)







Note: Land Use data obtained from the USGS 2016 National Land Cover Database.

<b>Cow Branch Coastal Mitigation Bank Amendment One</b>	
<b>LAND USE WITHIN ONE MILE</b>	
<b>Tangipahoa Parish, LA</b>	
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Approved : ---	
Date : 08/30/2020	
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<b>FIGURE 7</b>	




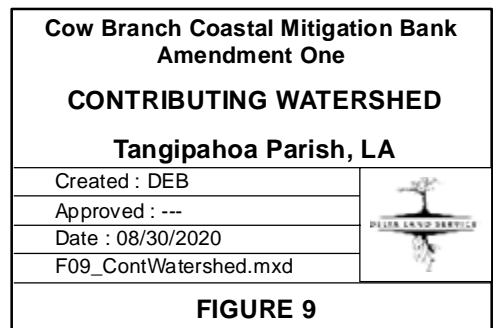
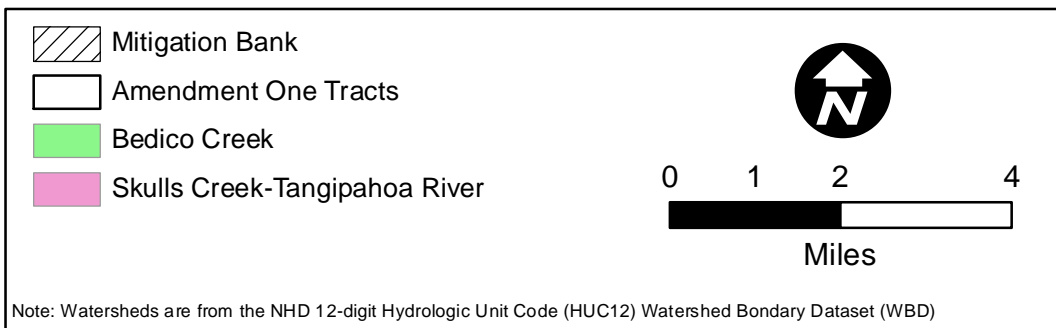
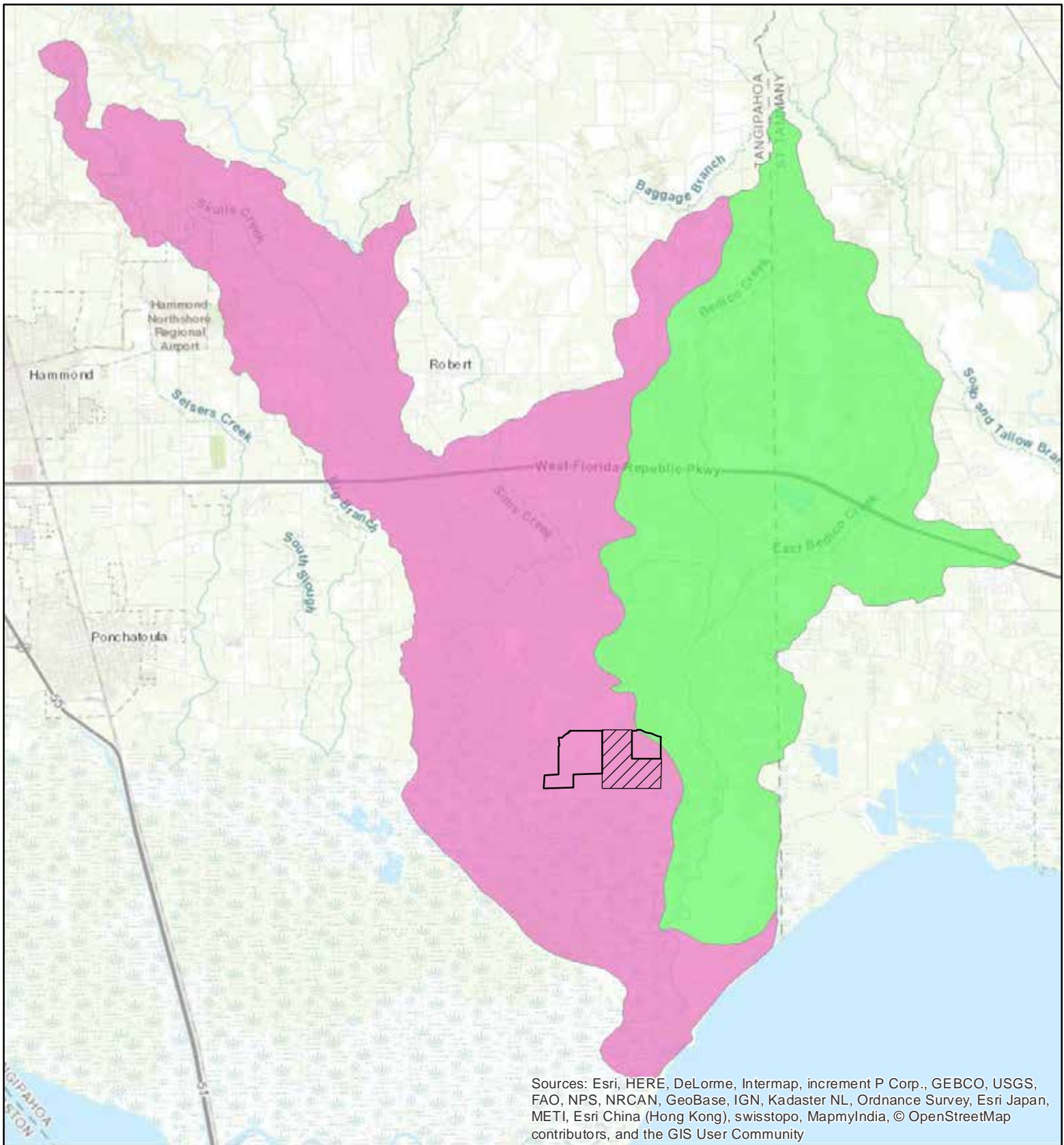


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

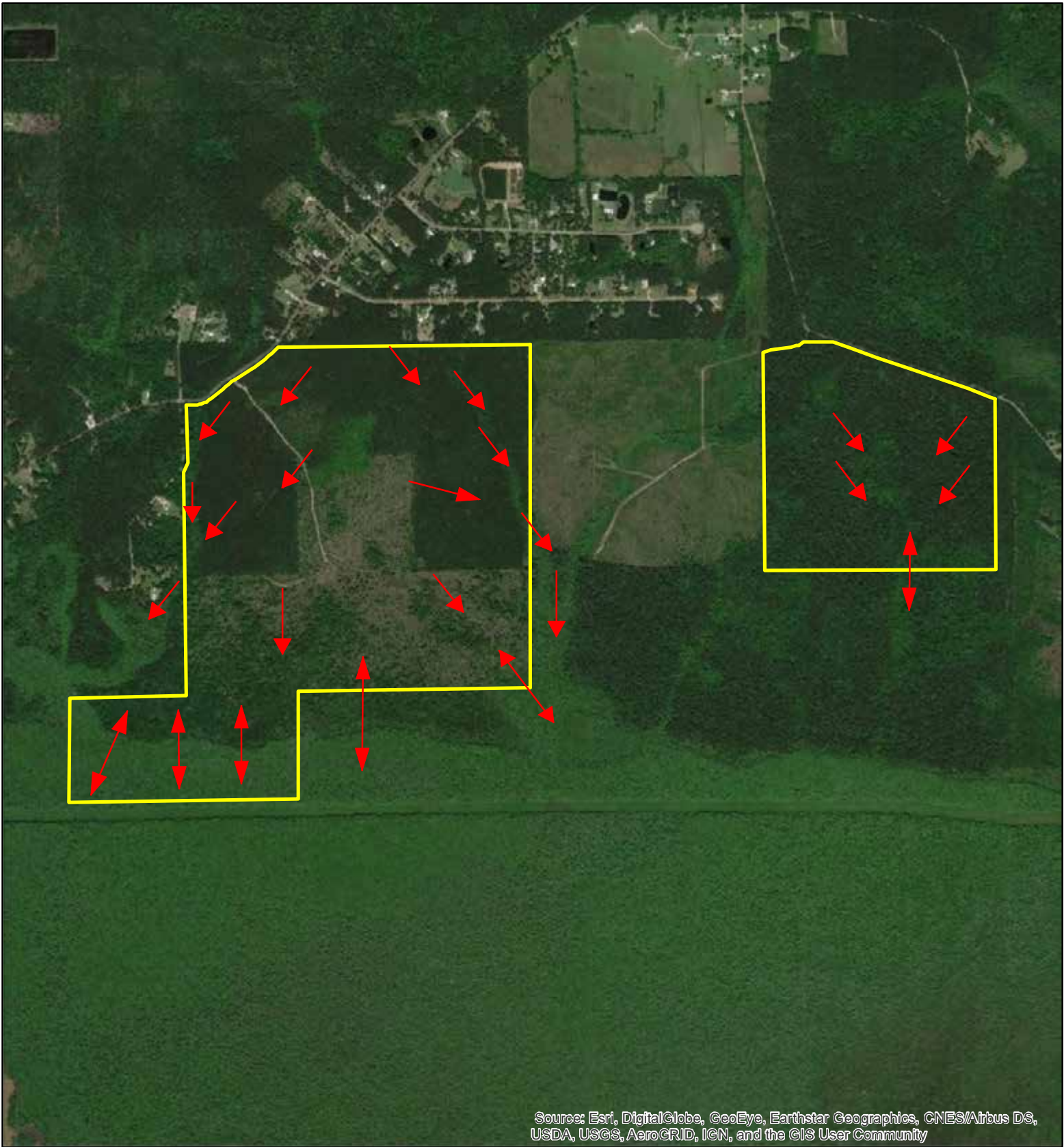
	Mitigation Bank (486.4 acres)
	Amendment One Tracts (561.7 acres)
	OG: Ouachita, Ochlockonee and Guyton soils, 0 to 3 percent slopes, frequently flooded (38%)
	Gy: Guyton silt loam, 0 to 1 percent slopes, rarely flooded (16%)
	Go: Guyton silt loam, 0 to 1 percent slopes, occasionally flooded (38%)
	BB: Barbary muck, 0 to 1 percent slopes, frequently flooded (8%)

Note: Soil Map Units from NRCS Soil Survey Geographic (SSURGO) data for Tangipahoa Parish, LA, spatial version 5..



<b>Cow Branch Coastal Mitigation Bank Amendment One</b>	
<b>SOIL MAP UNITS</b>	
<b>Tangipahoa Parish, LA</b>	
Created : DEB	
Approved : ---	
Date : 08/30/2020	
F08_Soils.mxd	
<b>FIGURE 8</b>	










Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

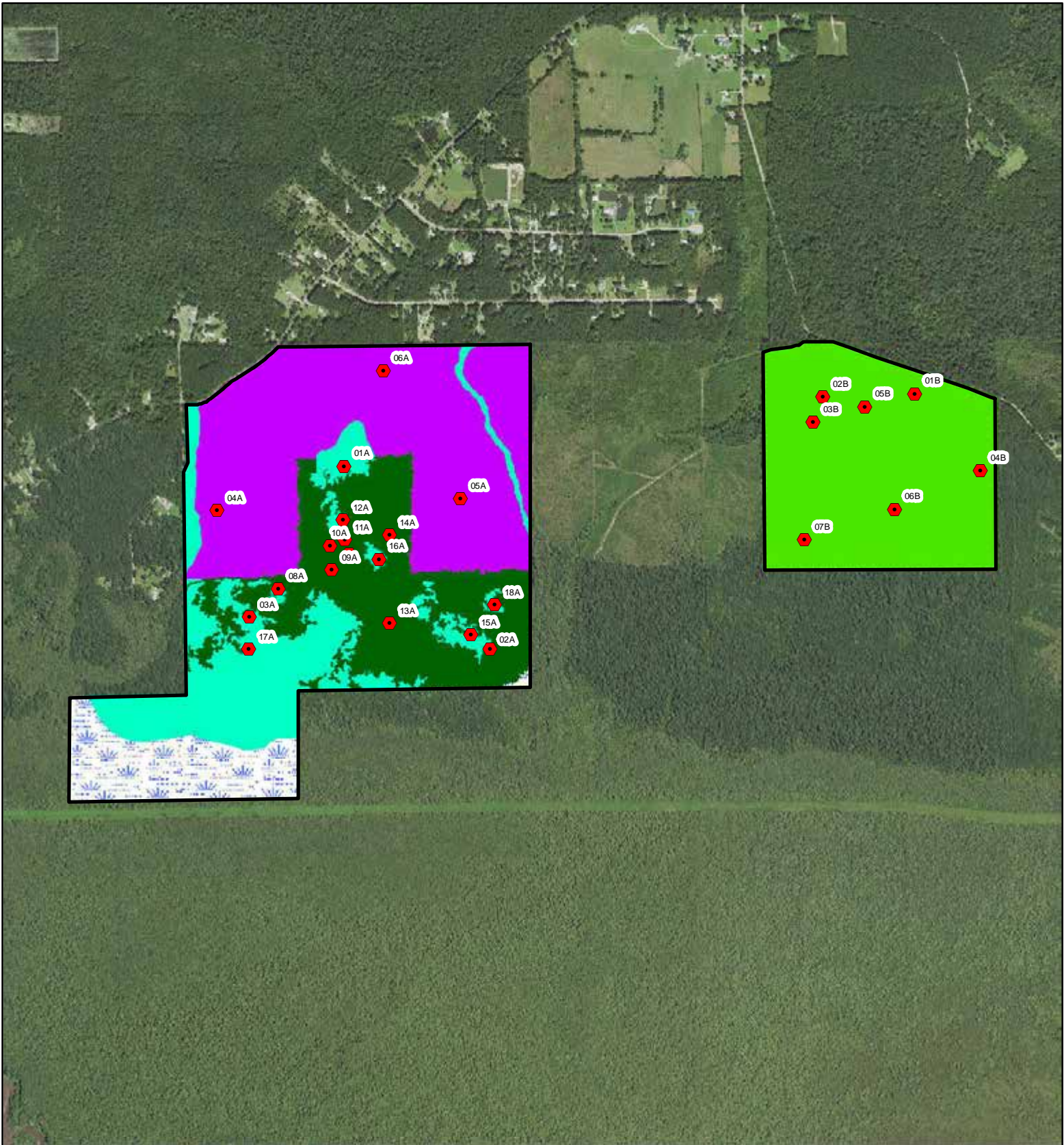
 Amendment One Tracts (561.7 ac)  
 Flow Direction

  
 0    750    1,500    3,000  
  
 Feet

**Cow Branch Coastal Mitigation Bank  
 Amendment One**  
**EXISTING SITE HYDROLOGY**  
**Tangipahoa Parish, LA**

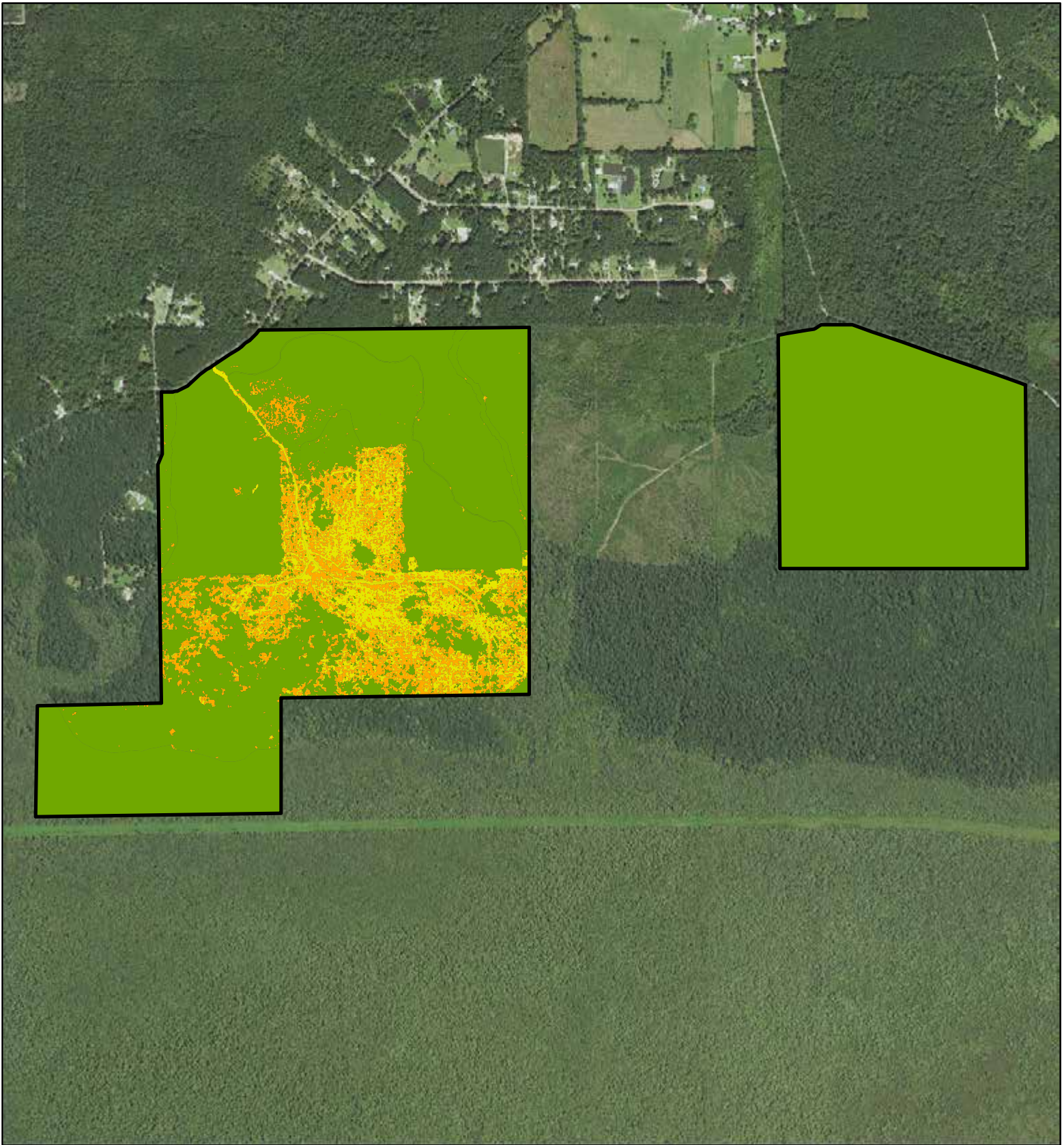
Created : LJW	
Approved : DEB	
Date : 07/07/2020	
F10_ExistingHydro.mxd	
<b>FIGURE 10</b>	









<b>Cow Branch Coastal Mitigation Bank Amendment One</b>	
<b>EXISTING PLANT COMMUNITY</b>	
<b>Tangipahoa Parish, LA</b>	
Created : DEB	
Approved : ---	
Date : 08/30/2020	
F11_ExistingPlant.mxd	
<b>FIGURE 11</b>	





-  Amendment One Tracts (561.7 acres)
-  Tree Strata Aerial Cover (454.7 acres)
-  Shrub Strata Aerial Cover (55.8 acres)
-  Herbaceous Strata Aerial Cover (51.2 acres)



0 700 1,400

Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**EXISTING STRATA COVER**

**Tangipahoa Parish, LA**

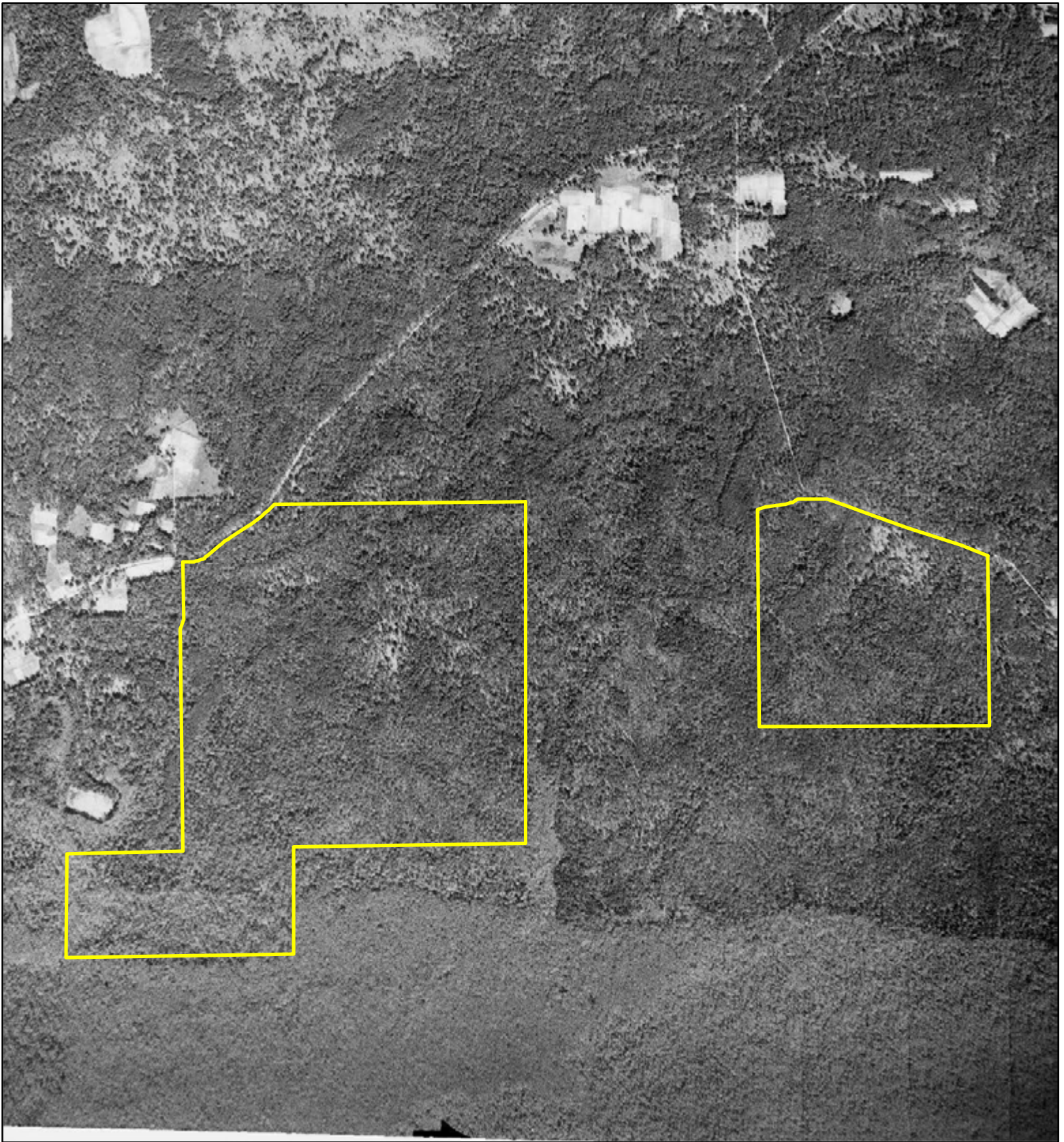
Created : DEB  
 Approved : ---  
 Date : 08/30/2020  
 F11\_ExistingStrata.mxd



Note: Plant Strata derived from Digital Surface Model from Unmanned Aerial Systems (UAS) data acquired on August 4, 2020.


**FIGURE 12**





 Amendment One Tracts



0 750 1,500 3,000  
  
Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**1940 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : LJW

Approved : DEB

Date : 07/08/2020

F13\_1940Aerial.mxd




**FIGURE 13**





 Amendment One Tracts



0 750 1,500 3,000  
  
Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**1959 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : LJW

Approved : DEB

Date : 07/08/2020

F14\_1959.mxd




**FIGURE 14**





 Amendment One Tracts



0 750 1,500 3,000  
  
Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**1967 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : LJW

Approved : DEB

Date : 07/08/2020

F15\_1967Aerials.mxd




**FIGURE 15**





 Amendment One Tracts



0 750 1,500 3,000  
  
Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**1979 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : LJW

Approved : DEB

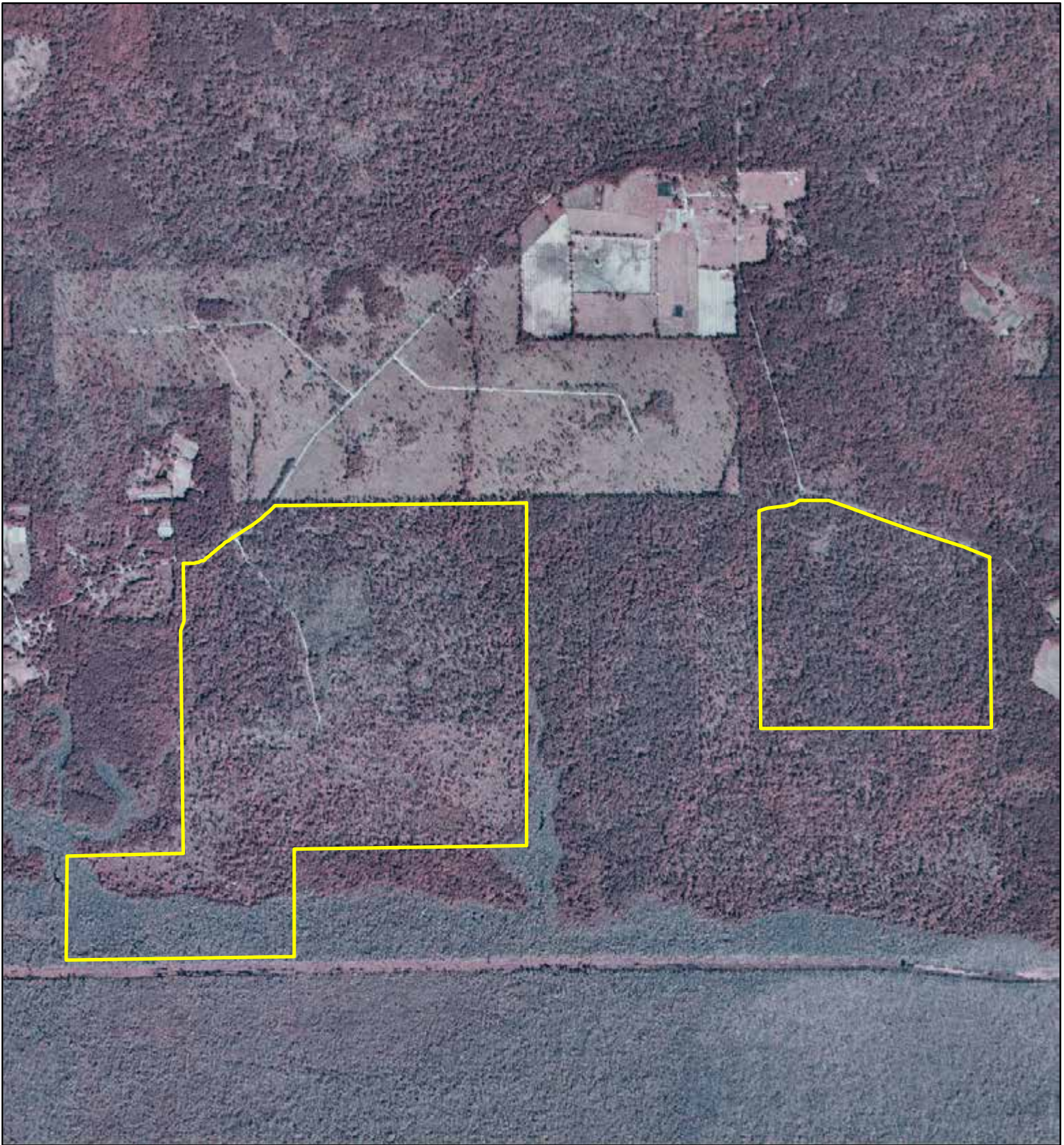
Date : 07/08/2020

F16\_1979.mxd

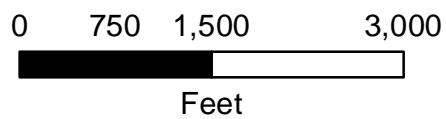


**FIGURE 16**





 Amendment One Tracts



**Cow Branch Coastal Mitigation Bank  
Amendment One**

**1983 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : DEB  
Approved : ---  
Date : 08/30/2020  
F17\_1983Aerial.mxd




**FIGURE 17**





 Amendment One Tracts



0 750 1,500 3,000  
  
Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**1998 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : DEB

Approved : ---

Date : 08/30/2020

F18\_1998Aerial.mxd




**FIGURE 18**





 Amendment One Tracts



0 750 1,500 3,000  
  
Feet

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**2004 AERIAL PHOTOGRAPH**

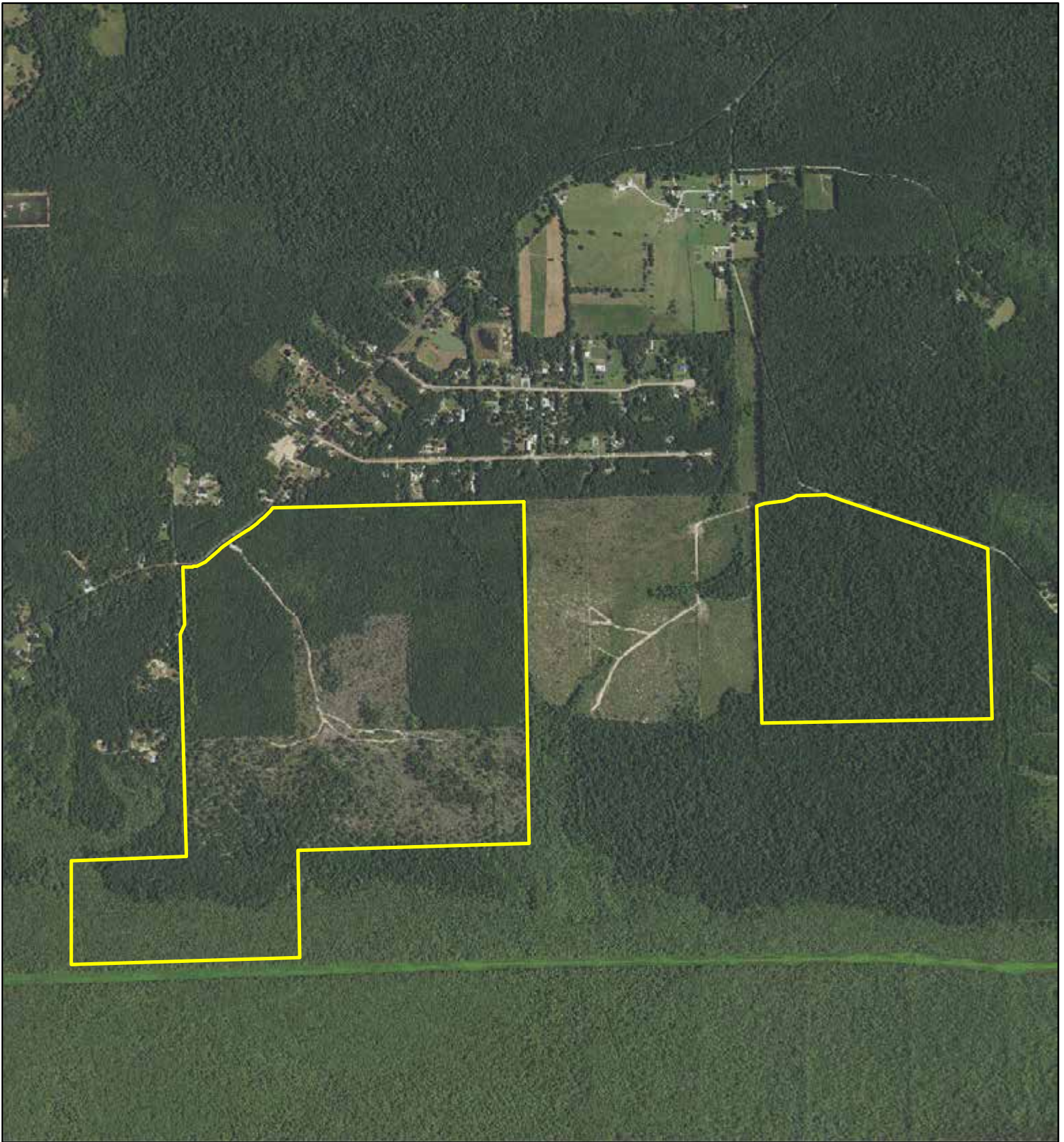
**Tangipahoa Parish, LA**

Created : DEB  
Approved : ---  
Date : 08/30/2020  
F19\_2004Aerial.mxd

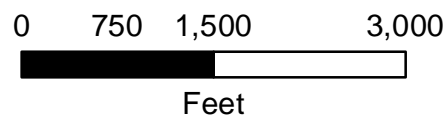


**FIGURE 19**





 Amendment One Tracts



**Cow Branch Coastal Mitigation Bank  
Amendment One**

**2015 AERIAL PHOTOGRAPH**

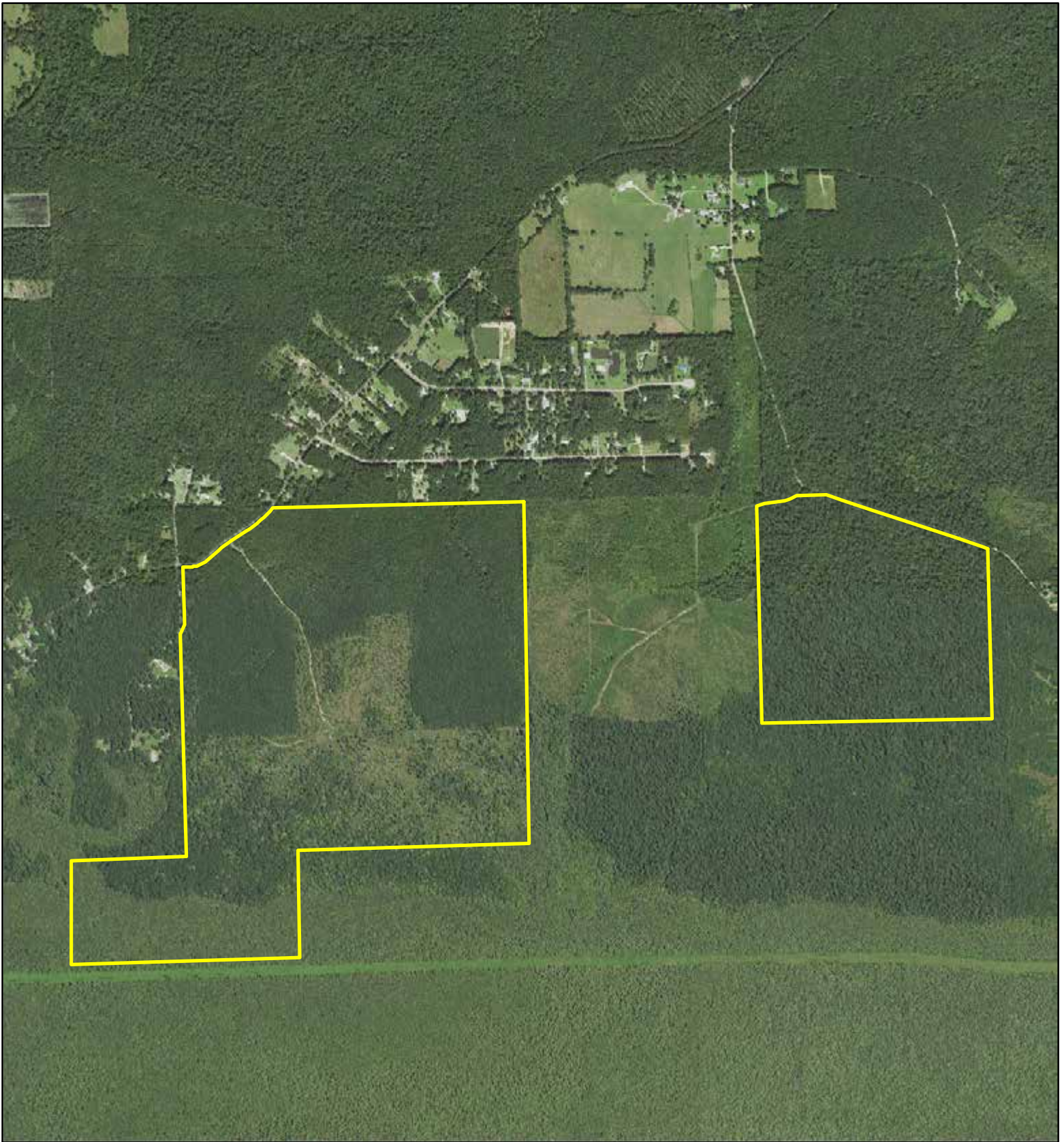
**Tangipahoa Parish, LA**

Created : LJW  
Approved : DEB  
Date : 07/08/2020  
F20\_2015Aerial.mxd

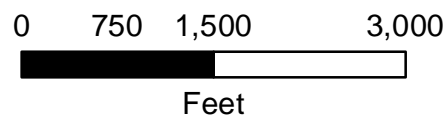


**FIGURE 20**





 Amendment One Tracts



**Cow Branch Coastal Mitigation Bank  
Amendment One**

**2019 AERIAL PHOTOGRAPH**

**Tangipahoa Parish, LA**

Created : LJW

Approved : DEB

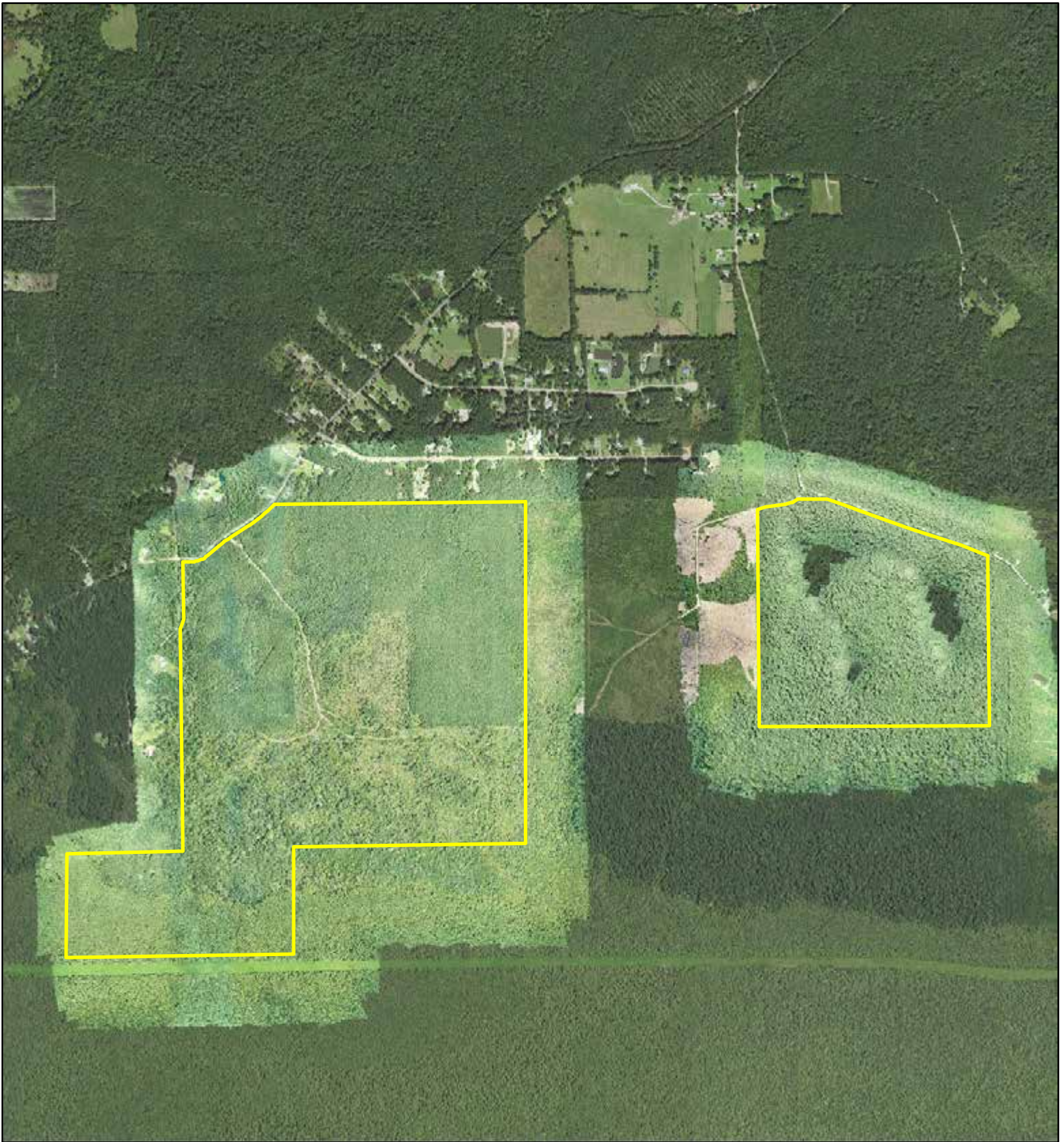
Date : 07/08/2020

F21\_2019Aerial.mxd

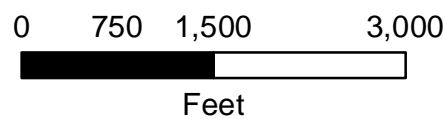


**FIGURE 21**





 Amendment One Tracts



Note: Imagery consists of orthomosaic derived from UAS data flown on 8/4/2020

**Cow Branch Coastal Mitigation Bank  
Amendment One**

**2020 UAS Imagery**

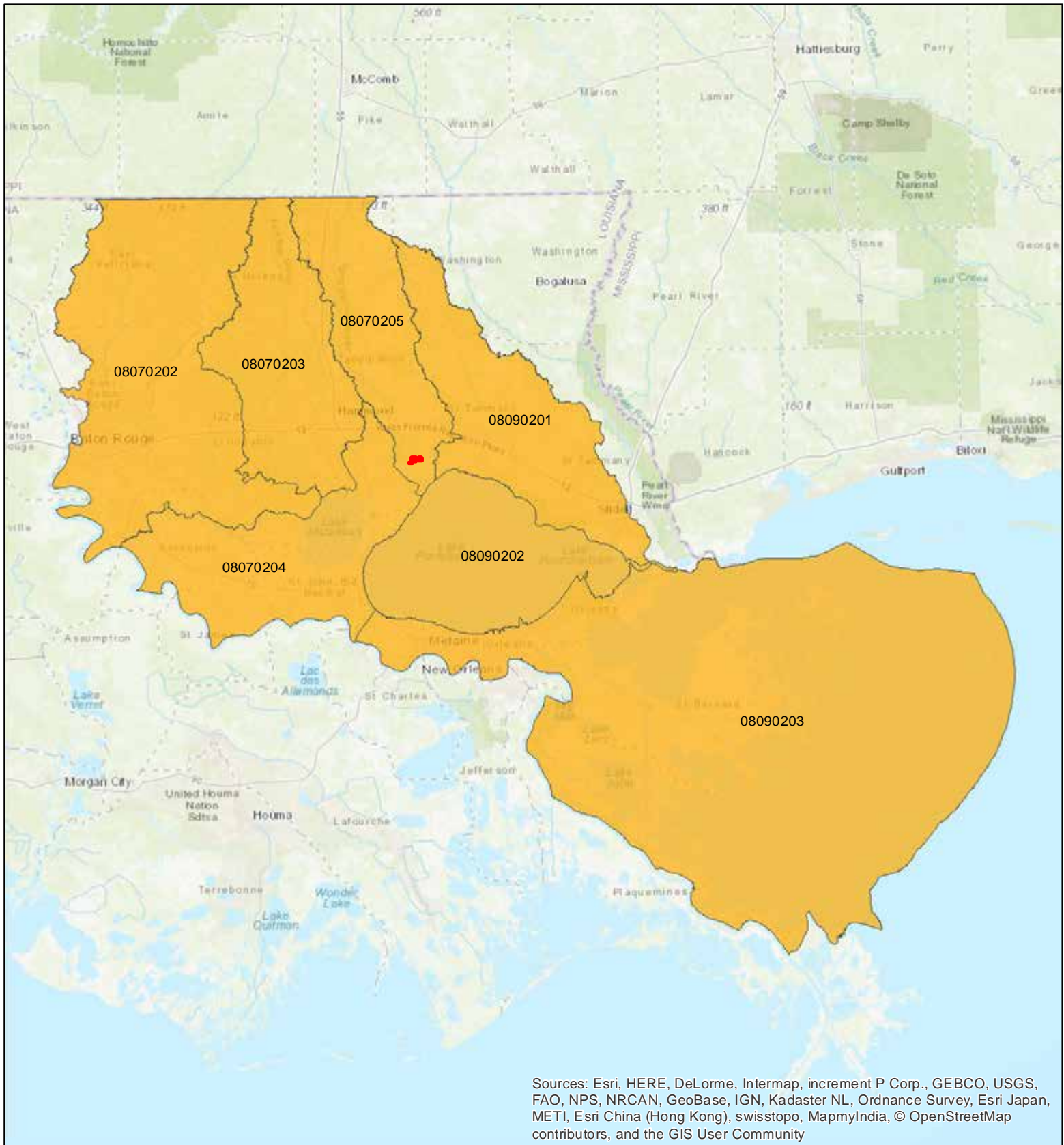
**Tangipahoa Parish, LA**

Created : DEB  
Approved : ---  
Date : 08/30/2020  
F22\_2020UASImage.mxd

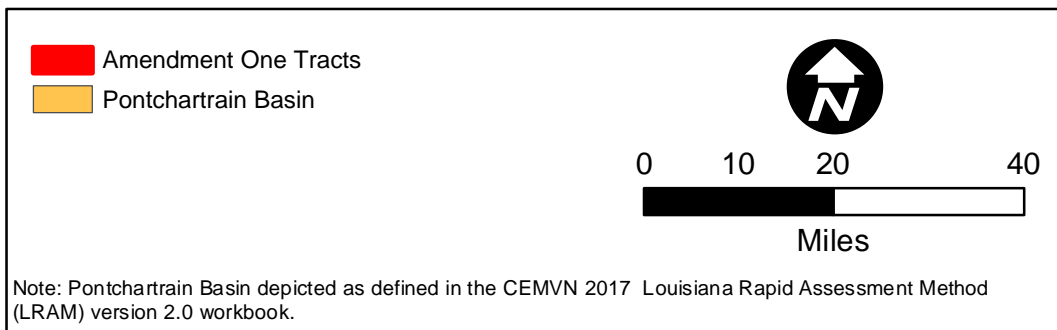


**FIGURE 22**






Sources: Esri, HERE, DeLorme, 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



**Cow Branch Coastal Mitigation Bank  
Amendment One**

**BANK SERVICE AREA**

**Tangipahoa Parish, LA**

Created : LJW	
Approved : DEB	
Date : 08/28/2020	
F23_ServiceArea.mxd	
<b>FIGURE 23</b>	

**Attachment B: Jurisdictional Determination**



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT  
7400 LEAKE AVE  
NEW ORLEANS LA 70118-3651

May 15, 2020

Operations Division  
Surveillance and Enforcement Section

Mr. Jace Jarreau  
Delta Land Resources  
1090 Cinclare Dr.  
Port Allen, LA 70767

Dear Mr. Jarreau:

Reference is made to your request for a U.S. Army Corps of Engineers' (Corps) jurisdictional determination on property located in Section 27, Township 7 South, Range 9 East, Tangipahoa Parish, Louisiana (enclosed map). Specifically, this property is identified as a 594 acre addendum to the Proposed Cow Branch Coastal Mitigation Tract.

Based on review of recent maps, aerial photography, soils data, the delineation report provided with your request, and a site inspection conducted on March 6, 2020, we have determined that part of the property contains wetlands that may be subject to Corps' jurisdiction. The approximate limits of the wetlands are designated in red on the map. A Department of the Army permit under Section 404 of the Clean Water Act will be required prior to the deposition or redistribution of dredged or fill material into waters of the U.S.

Please be advised that this property is in the Louisiana Coastal Zone and a Coastal Use Permit may be required prior to initiation of any activities on this site. For additional information, contact Ms. Christine Charrier, Office of Coastal Management, Louisiana Department of Natural Resources at (225) 342-7953.

You and your client are advised that this preliminary jurisdictional determination is valid for a period of 5 years from the date of this letter unless new information warrants revision prior to the expiration date.

Should there be any questions concerning these matters, please contact Mr. Brian Oberlies at (504) 862-2275 and reference our Account No. MVN-2018-01446-1-SY. If you have specific questions regarding the permit process or permit applications, please contact our Eastern Evaluation Section at (504) 862-2292.

Sincerely,

GUARISCO.BRAD.AN  
THONY.1376421941

Digitally signed by  
GUARISCO.BRAD.ANTHONY.13764  
21941  
Date: 2020.05.15 15:26:03 -05'00'




for Martin S. Mayer  
Chief, Regulatory Branch

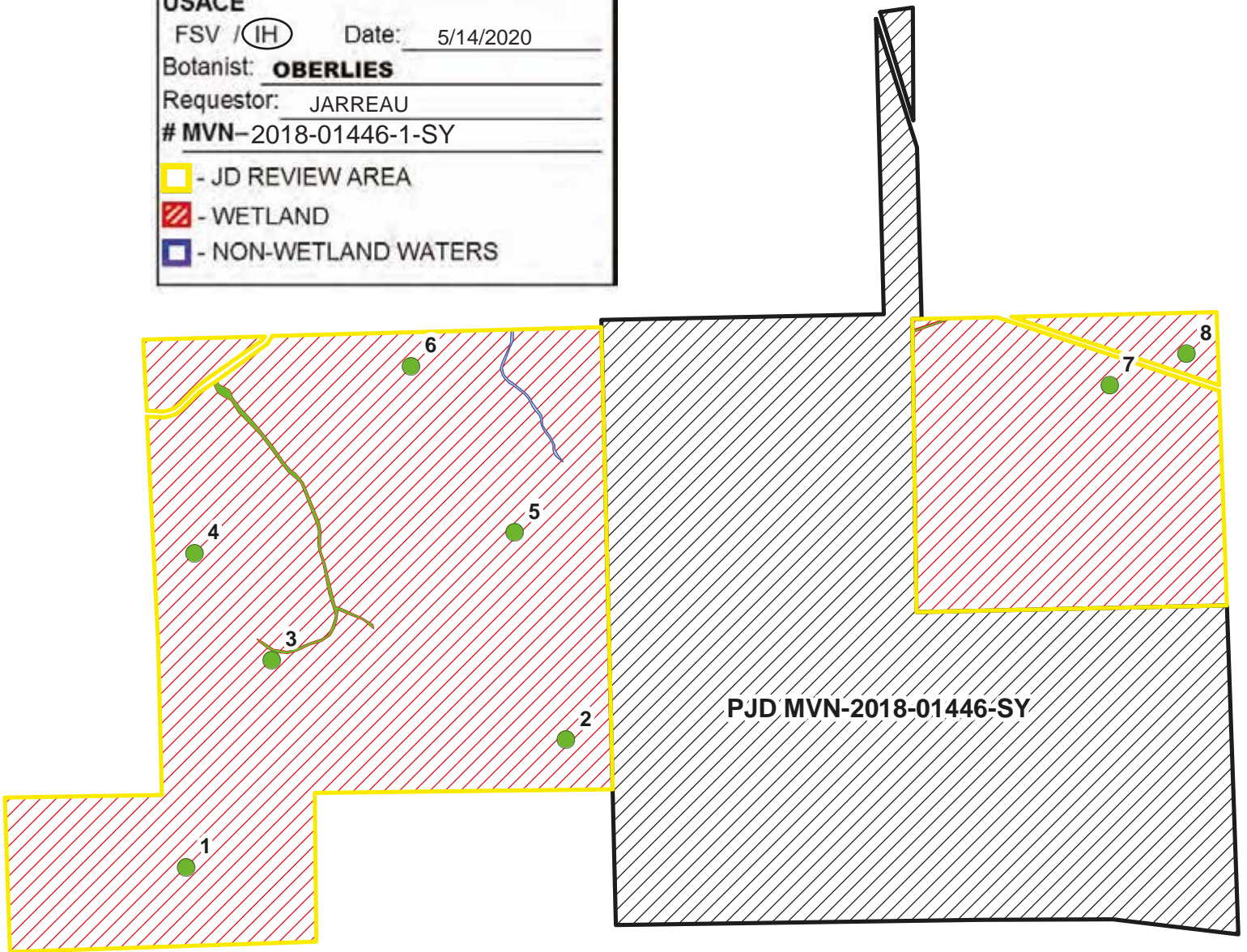
Enclosures








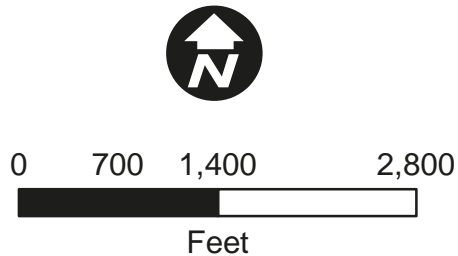
U.S. ARMY CORPS OF ENGINEERS  
**PRELIMINARY**  
 JURISDICTIONAL DETERMINATION

**USACE**  
 FSV / IH      Date: 5/14/2020  
 Botanist: **OBERLIES**  
 Requestor: JARREAU  
 # MVN-2018-01446-1-SY

 - JD REVIEW AREA  
 - WETLAND  
 - NON-WETLAND WATERS




-  WLD Addendum 1 Project Area (594.3 ac)
-  PJD MVN-2018-01446-SY
-  Other Waters of the U.S. (0.5 ac)
-  Wetland (591.6 ac)
-  Data Points



**Cow Branch WLD Addendum**

**WETLAND DELINEATION MAP**

**Tangipahoa Parish, LA**

Created : TSC/ARCVIEW	
Approved : JMJ	
Date : 05/08/2020	
Map No. : F07_WLD	

**FIGURE 7**

**PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM**

**BACKGROUND INFORMATION**

**A. REPORT COMPLETION DATE FOR PJD:** May 15, 2020

**B. NAME AND ADDRESS OF PERSON REQUESTING PJD:**

Mr. Jace Jarreau  
Delta Land Resources  
1090 Cinclare Dr.  
Port Allen, LA 70767

**C. DISTRICT OFFICE, FILE NAME, AND NUMBER:** MVN-2018-01446-1-SY

**D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:**

**(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)**

State: Louisiana County/parish/borough: Tangipahoa Parish City: Bedico

Center coordinates of site (lat/long in degree decimal format):

Lat.: 30.41075 ° Long.: -90.299457 °

Universal Transverse Mercator:

Name of nearest waterbody: Cow Branch

**E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**

Office (Desk) Determination. Date: 2/5/2020

Field Determination. Date(s): 3/6/2020

**TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.**

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
1	30.41075	-90.299457	592.8 ac	Wetland	404
2	30.4145	-90.296724	0.5 ac	Nonwetland Waters	404

**SUPPORTING DATA. Data reviewed for PJD (check all that apply)**

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:  
Map: Vicinity map.
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - Office concurs with data sheets/delineation report.
  - Office does not concur with data sheets/delineation report. Rationale: \_\_\_\_\_.
- Data sheets prepared by the Corps: \_\_\_\_\_.
- Corps navigable waters' study: \_\_\_\_\_.
- U.S. Geological Survey Hydrologic Atlas: \_\_\_\_\_.
  - USGS NHD data.
  - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: 1:24k, Ponchatoula NE.
- Natural Resources Conservation Service Soil Survey. Citation: NRCS web soil survey.
- National wetlands inventory map(s). Cite name: \_\_\_\_\_.
- State/local wetland inventory map(s): \_\_\_\_\_.
- FEMA/FIRM maps: \_\_\_\_\_.
- 100-year Floodplain Elevation is: \_\_\_\_\_. (National Geodetic Vertical Datum of 1929)
- Photographs:  Aerial (Name & Date): 98,04,05,15  
or  Other (Name & Date): \_\_\_\_\_.
- Previous determination(s). File no. and date of response letter: \_\_\_\_\_.
- Other information (please specify): \_\_\_\_\_.

**IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.**

OBERLIES.BRIAN.M  
C INNIS.1230779739

Digitally signed by  
OBERLIES.BRIAN.MC  
INNIS.1230779739  
Date: 2020.05.14 08:41:16 -05'00'

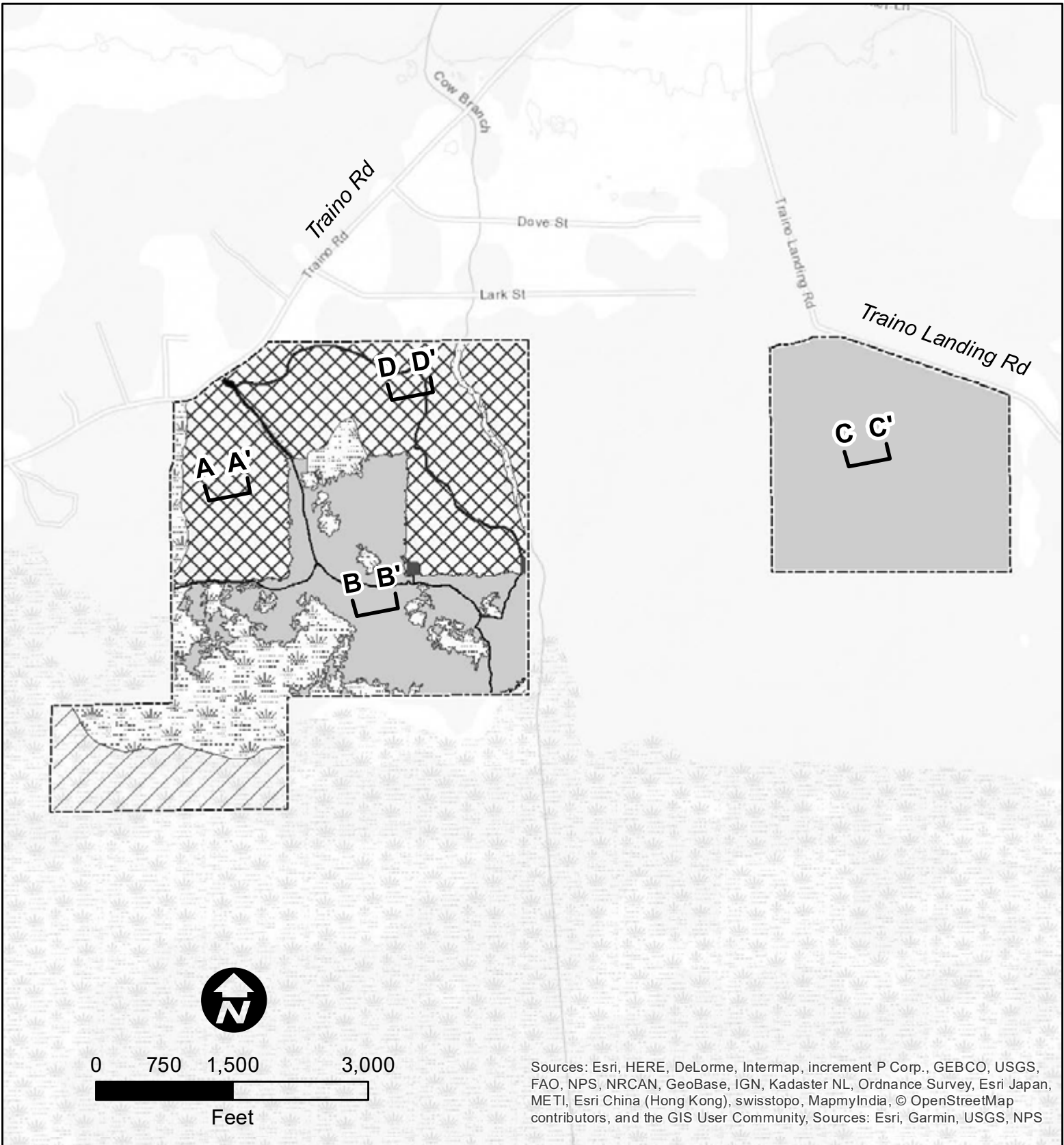
Signature and date of  
Regulatory staff member  
completing PJD

Requested by agent








Signature and date of  
person requesting PJD  
(REQUIRED, unless obtaining  
the signature is impracticable)<sup>1</sup>

<sup>1</sup> Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.


**Attachment C: Hydrology Restoration Drawings**



Sources: Esri, HERE, DeLorme, 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, Sources: Esri, Garmin, USGS, NPS

	Project Area (561.7)		Swamp Inclusion (45.2 ac)
	BLH Rehabilitation (171.0 ac)		Access Areas (5.0)
	BLH Enhancement (247.5 ac)		Wildlife Openings (0.9 ac)
	BLH Preservation (92.1 ac)		

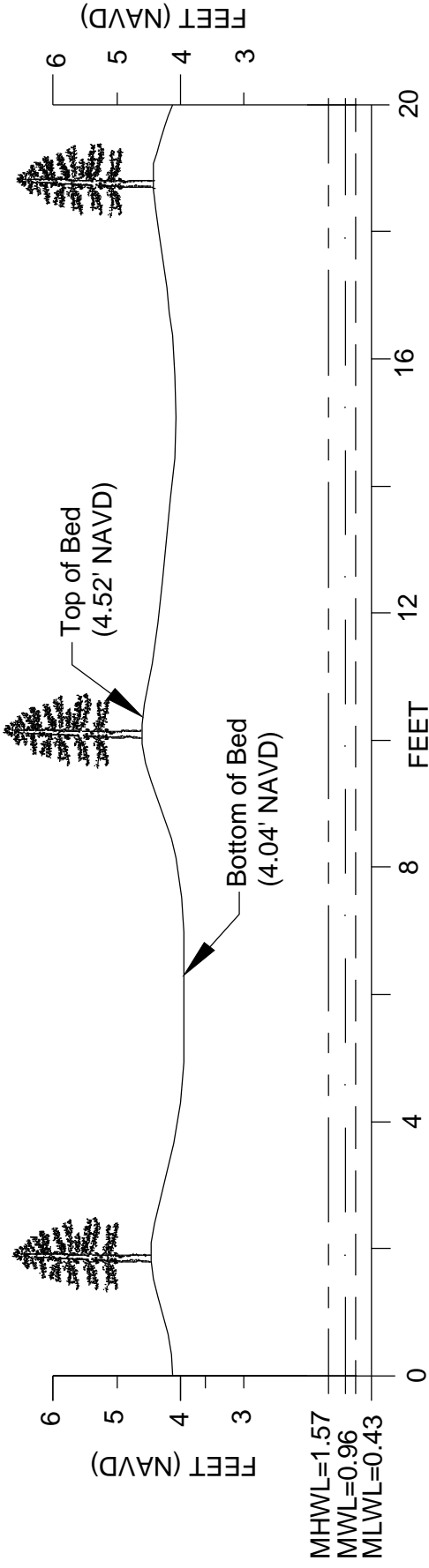
**Cow Branch Coastal Mitigation Bank  
Amendment One  
HYDROLOGY RESTORATION  
PLAN VIEW  
Tangipahoa Parish, LA**

Created : LJW	
Approved : DEB	
Date : 9/20/2020	
File :C4_ F01_PlanView.mxd	

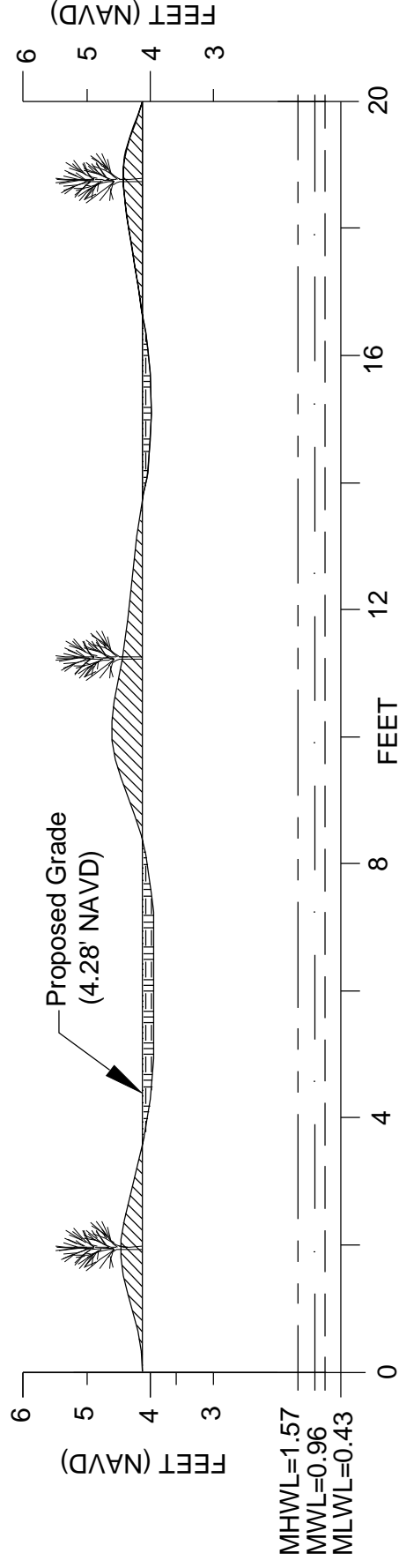
**C-4 FIGURE 1**

**A**

Existing Cross-Section A  
Bedded Pine Plantation

**A'****A**

Proposed Cross-Section A  
BLH Rehabilitation

**A'**

PROPOSED EXCAVATION

PROPOSED FILL

Notes:

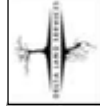
1. All elevational data are based on GEOID12A.
2. Mean High, Mean, Mean Low Water Levels (MHWL, MWL, MLWL) were derived from CRMS station 0103 from a period spanning October 1, 2013 through November 2, 2018 and are purported in GEOID12A.
3. Trees not to scale.

**COW BRANCH COASTAL MITIGATION BANK  
AMENDMENT ONE**

**CROSS-SECTION A**

TANGIPAHOA PARISH, LA

Created:	TSC/AutoCAD
Approved:	DEB
Date:	08/30/2020
Dwg. No.:	AmendOne_TYPSections.dwg

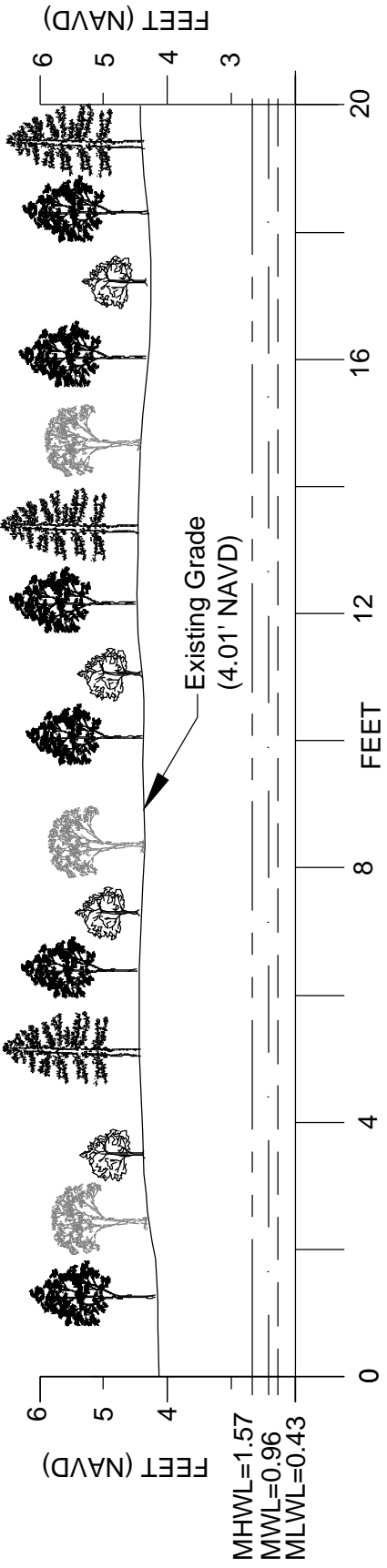


**MWP-C FIGURE 2**

B'

Existing Cross-Section B

Scrub-Shrub (Recently Harvested)

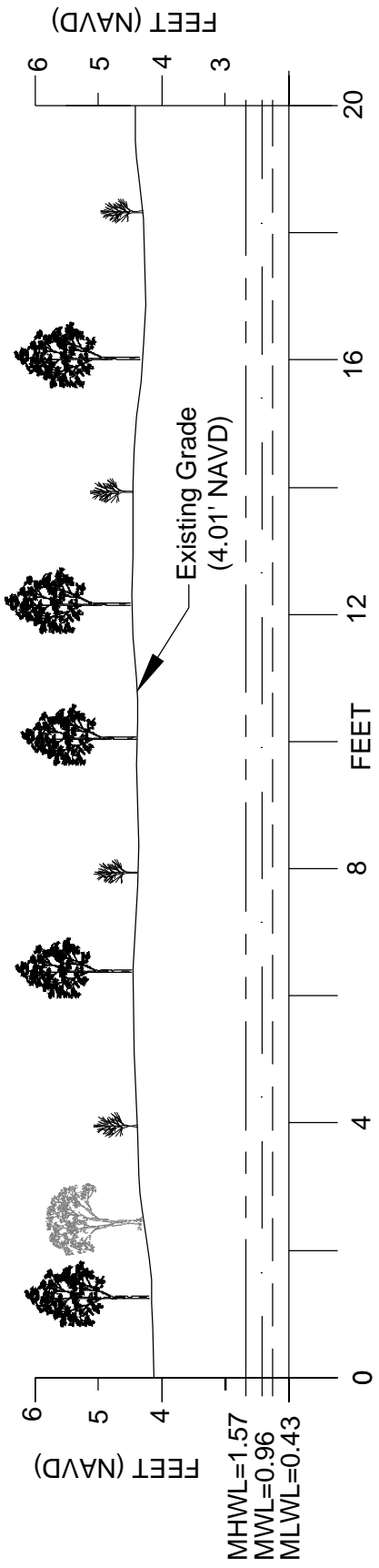


B

B'

Proposed Cross-Section B

BLH Enhancement



B

**COW BRANCH COASTAL MITIGATION BANK  
AMENDMENT ONE**

**CROSS-SECTION B**



TANGIPAHOA PARISH, LA

Created:	TSC/AutoCAD
Approved:	DEB
Date:	08/30/2020
Dwg. No.:	AmendOne_TYPsections.dwg

**MWP-C FIGURE 3**

**Notes:**

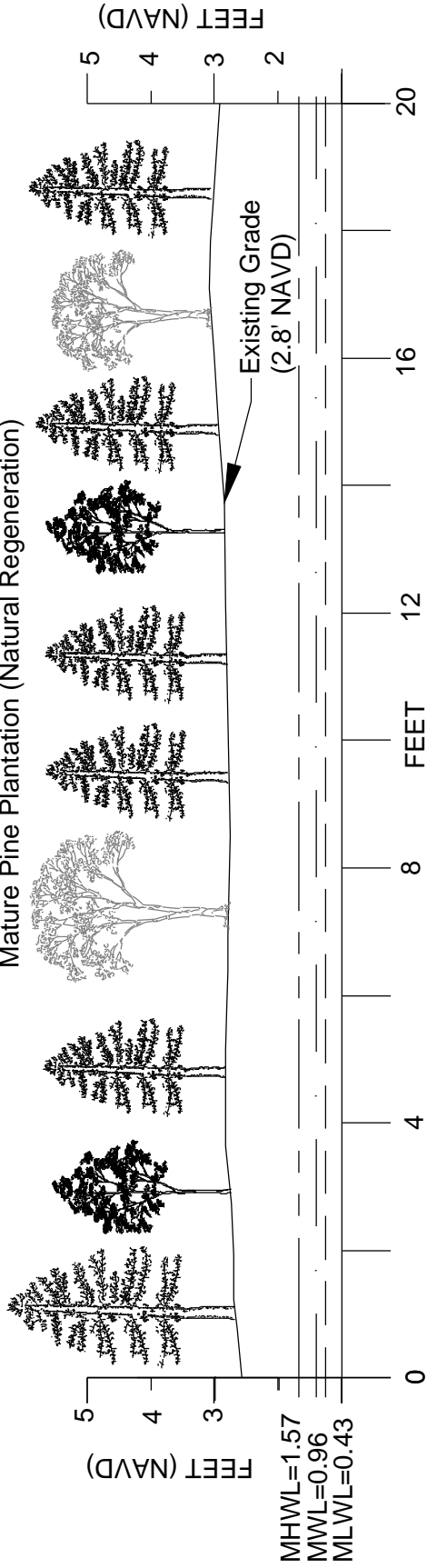
- All elevational data are based on GEOID12A.
- Mean High, Mean, Mean Low Water Levels (MHWL, MWL, MLWL) were derived from CRMS station 0103 from a period spanning October 1, 2013 through November 2, 2018 and are purported in GEOID12A.
- Trees not to scale.

 PROPOSED EXCAVATION  
 PROPOSED FILL

C

Existing Cross-Section C

Mature Pine Plantation (Natural Regeneration)

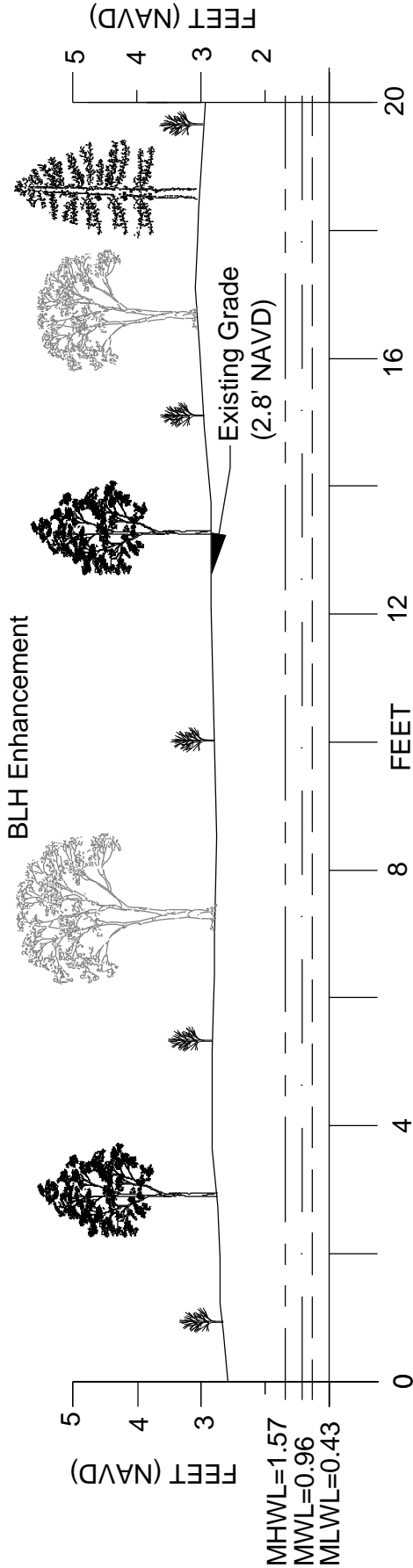


C

C

Proposed Cross-Section C

BLH Enhancement



C

**COW BRANCH COASTAL MITIGATION BANK  
AMENDMENT ONE**

CROSS-SECTION C

TANGIPAHOA PARISH, LA

Created:	TSC/AutoCAD
Approved:	DEB
Date:	08/30/2020
Dwg. No.:	AmendOne_TYPsections.dwg

**PROPOSED EXCAVATION**

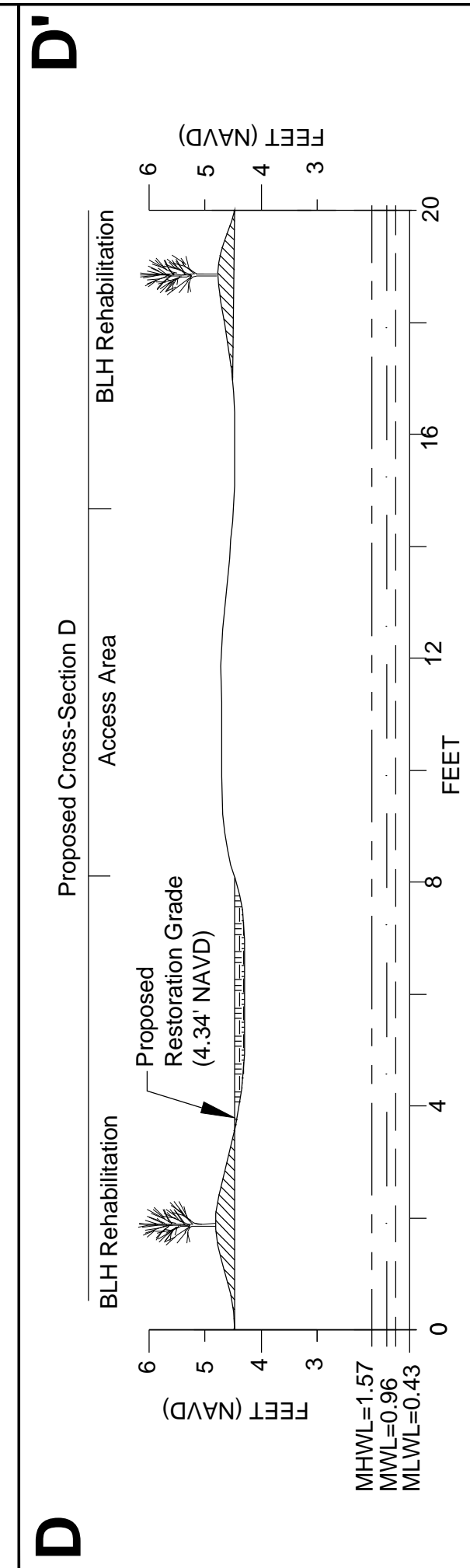
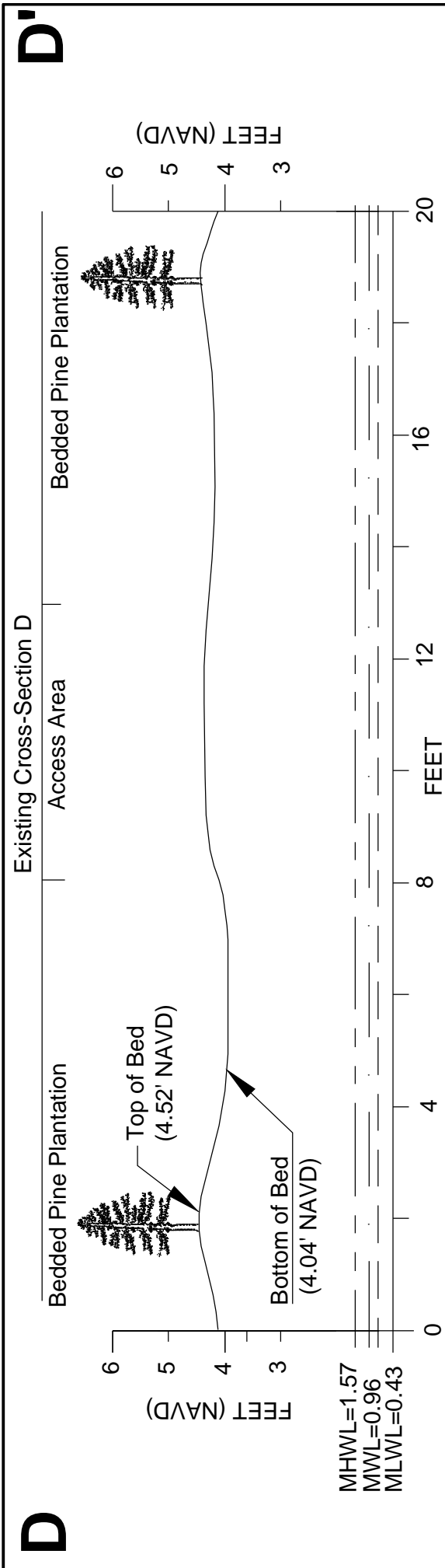
**PROPOSED FILL**

Notes:

- All elevational data are based on GEOID12A.
- Mean High, Mean, Mean Low Water Levels (MHWL, MWL, MLWL) were derived from CRMS station 0103 from a period spanning October 1, 2013 through November 2, 2018 and are purported in GEOID12A.
- Trees not to scale.

**MWP-C FIGURE 4**





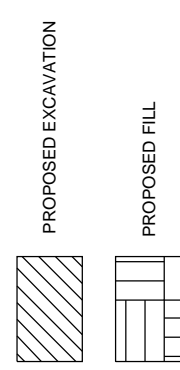
**COW BRANCH COASTAL MITIGATION BANK AMENDMENT ONE**  
**CROSS-SECTION D**  
 TANGIPAHOA PARISH, LA

Created:	TSC/AutoCAD
Approved:	DEB
Date:	08/30/2020
Dwg. No.:	AmendOne_TYPSections.dwg

**Notes:**

- All elevational data are based on GEOID12A.
- Mean High, Mean, Mean Low Water Levels (MHWL, MWL, MLWL) were derived from CRMS station 0103 from a period spanning October 1, 2013 through November 2, 2018 and are purported in GEOID12A.
- Trees not to scale.

**MWP-C FIGURE 5**



**Attachment D: Site Photographs**



Aerial view west (east boundary) of Tract A, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, March 2019.



Aerial view north of Seed Tree Area and Mid-Rotation Pine Plantation on Tract A, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, July 9, 2020.





Aerial view south of Seed Tree Area, Existing BLH and Existing Swamp on Tract A, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, July 9, 2020.



Tract A Mid-Rotation Pine Plantation, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, February 2019.





Tract A Mid-Rotation Pine Plantation, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, February 2019.



Tract A Seed Tree Area, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, October 2014 (Image courtesy of Google Earth®).





Tract A Seed Tree Area, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, February 2019.



Tract A Seed Tree Area and Access Road, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, June 2020.





Tract A Seed Tree Area with Residual Hardwood Area, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, February 2019.



Tract A Seed Tree Area with Small Poned Areas of Floating and Emergent Vegetation, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, February 2019.





Tract A Existing Bottomland Hardwood Area, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, February 2019.



Tract A Cow Branch with Existing Bottomland Hardwood Riparian Area, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, May 2020.





Aerial view east (west boundary) of Tract B, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, March 2019.



Tract B Mature Pine Stand with mid to large DBH Loblolly Pine, Cow Branch Coastal Mitigation Bank Amendment One, Tangipahoa Parish, Louisiana, May 2020.

**Attachment E: Individual Plot Data Summaries**

**Plot Conditions and Spatial Location Summary Table, Proposed Cow Branch Mitigation Bank  
Amendment One Site, Tangipahoa Parish, Louisiana.**

<b>Plot ID</b>	<b>Tract</b>	<b>Base Line Habitat Condition</b>	<b>Proposed Bottomland Hardwood Mitigation Type</b>	<b>Date</b>	<b>Latitude<sup>1</sup></b>	<b>Longitude<sup>1</sup></b>
1A	A	Existing Bottomland Hardwood	Preservation	7/29/2020	30.412582	-90.301378
2A	A	Existing Bottomland Hardwood	Preservation	8/6/2019	30.406547	-90.295892
3A	A	Existing Bottomland Hardwood	Preservation	8/6/2019	30.407860	-90.304862
4A	A	Mid-Rotation Pine Plantation	Rehabilitation	8/6/2019	30.411222	-90.306014
5A	A	Mid-Rotation Pine Plantation	Rehabilitation	8/6/2019	30.411527	-90.297172
6A	A	Mid-Rotation Pine Plantation	Rehabilitation	8/6/2019	30.415563	-90.299916
7A	A	Seed Tree Area	Enhancement	6/23/2020	30.409836	-90.301225
8A	A	Seed Tree Area	Enhancement	6/23/2020	30.408751	-90.303807
9A	A	Seed Tree Area	Enhancement	6/23/2020	30.409323	-90.301865
10A	A	Seed Tree Area	Enhancement	7/14/2020	30.410079	-90.301909
11A	A	Seed Tree Area	Enhancement	7/14/2020	30.410261	-90.301397
12A	A	Existing Bottomland Hardwood	Preservation	7/14/2020	30.410894	-90.301446
13A	A	Seed Tree Area	Enhancement	7/29/2020	30.407638	-90.299795
14A	A	Seed Tree Area	Enhancement	7/29/2020	30.410409	-90.299762
15A	A	Existing Bottomland Hardwood	Preservation	7/29/2020	30.407245	-90.296851



**Plot Conditions and Spatial Location Summary Table, Proposed Cow Branch Mitigation Bank Amendment One Site, Tangipahoa Parish, Louisiana.**

<b>Plot ID</b>	<b>Tract</b>	<b>Base Line Habitat Condition</b>	<b>Proposed Bottomland Hardwood Mitigation Type</b>	<b>Date</b>	<b>Latitude<sup>1</sup></b>	<b>Longitude<sup>1</sup></b>
16A	A	Existing Bottomland Hardwood	Preservation	7/29/2020	30.409654	-90.300158
17A	A	Existing Bottomland Hardwood	Preservation	7/29/2020	30.406851	-90.304920
18A	A	Existing Bottomland Hardwood	Preservation	7/29/2020	30.408183	-90.295987
1B	B	Mature Pine	Enhancement	8/6/2019	30.414702	-90.280681
2B	B	Mature Pine	Enhancement	7/14/2019	30.414631	-90.283998
3B	B	Mature Pine	Enhancement	7/14/2019	30.413839	-90.284369
4B	B	Mature Pine	Enhancement	7/14/2019	30.412265	-90.278334
5B	B	Mature Pine	Enhancement	8/6/2019	30.414296	-90.282485
6B	B	Mature Pine	Enhancement	7/29/2020	30.411074	-90.281432
7B	B	Mature Pine	Enhancement	7/29/2020	30.410144	-90.284728

<sup>1</sup> Latitude and Longitude based on North American Datum of 1983 (NAD83)

**Plot 1A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Nyssa biflora</i>	210	63.3	7	4 to 14	91.3%	97.4%
<i>Quercus nigra</i>	20	1.7	4	4	8.7%	2.6%
<b>Total/Avg QMD</b>	<b>230</b>	<b>65.0</b>	<b>7</b>	<b>4 to 14</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 2A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Quercus phellos</i>	130	53.9	9	3 to 20	50.0%	56.5%
<i>Quercus pagoda</i>	10	15.8	17	17	3.8%	16.6%
<i>Quercus nigra</i>	30	11.5	8	5 to 11	11.5%	12.1%
<i>Quercus michauxii</i>	30	9.7	8	7 to 8	11.5%	10.2%
<i>Fraxinus profunda</i>	30	1.9	3	3 to 4	11.5%	2.0%
<i>Fraxinus pennsylvanica</i>	20	1.7	4	4	7.7%	1.8%
<i>Triadica sebifera</i>	10	0.9	4	4	3.8%	0.9%
<b>Total/Avg QMD</b>	<b>260</b>	<b>95.4</b>	<b>8</b>	<b>3 to 20</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 3A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Acer rubrum</i>	20	20.6	14	13 to 16	15.4%	38.1%
<i>Quercus phellos</i>	20	12.1	11	10 to 13	15.4%	22.4%
<i>Quercus pagoda</i>	10	6.6	11	13	7.7%	12.2%
<i>Quercus michauxii</i>	30	3.6	5	4 to 5	23.1%	6.7%
<i>Pinus taeda</i>	10	3.5	8	9	7.7%	6.5%
<i>Quercus laurifolia</i>	10	3.5	8	9	7.7%	6.5%
<i>Triadica sebifera</i>	10	2.7	7	7	7.7%	5.0%
<i>Carpinus caroliniana</i>	20	1.4	4	3 to 4	15.4	2.6%
<b>Total/Avg QMD</b>	<b>130</b>	<b>54.0</b>	<b>9</b>	<b>3 to 16</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 4A: Mid-Rotation Pine Plantation Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems / Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Pinus taeda</i>	460	91.7	6	4 to 9	82.1%	85.1%
<i>Quercus nigra</i>	40	12.3	8	7 to 8	7.1%	11.4%
<i>Liquidambar styraciflua</i>	40	2.7	4	3 to 4	7.1%	2.5%
<i>Quercus pagoda</i>	20	1.0	3	3	3.6%	1.0%
<b>Total/Avg QMD</b>	<b>560</b>	<b>107.7</b>	<b>6</b>	<b>3 to 9</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 5A: Mid-Rotation Pine Plantation Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Pinus taeda</i>	480	83.4	6	3 to 10	82.6%	90.6%
<i>Liquidambar styraciflua</i>	80	7.6	4	3 to 6	13.8%	8.3%
<i>Quercus laurifolia</i>	20	1.0	3	3	3.4%	1.1%
<b>Total/Avg QMD</b>	<b>580</b>	<b>92.0</b>	<b>5</b>	<b>3 to 10</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 6A: Mid-Rotation Pine Plantation Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Pinus taeda</i>	400	81.0	6	4 to 9	74.1%	78.3%
<i>Liquidambar styraciflua</i>	60	11.0	6	4 to 7	11.1%	10.6%
<i>Quercus pagoda</i>	60	8.8	5	3 to 6	11.4%	8.5%
<i>Quercus nigra</i>	20	2.7	5	5	3.7%	2.6%
<b>Total/Avg QMD</b>	<b>540</b>	<b>103.5</b>	<b>6</b>	<b>3 to 9</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 7A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, June 23, 2020.**

**Woody Species in the Shrub Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Percent Density of Stems/Acre</b>
<i>Triadica sebifera</i>	700	50.0%
<i>Pinus taeda</i>	400	35.7%
<i>Nyssa sylvatica</i>	100	7.1%
<i>Morella cerifera</i>	100	7.1%
<b>Total</b>	<b>1300</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 8A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Shrub Stratum<sup>1</sup>.**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Percent Density of Stems/Acre</b>
<i>Pinus taeda</i>	600	60.0%
<i>Triadica sebifera</i>	200	20.0%
<i>Acer rubrum</i>	100	10.0%
<i>Rhus copalina</i>	100	10.0%
<b>Total</b>	<b>1000</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 9A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, June 23, 2020.**

**Woody Species in the Shrub Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Percent Density of Stems/Acre</b>
<i>Triadica sebifera</i>	500	62.5%
<i>Pinus taeda</i>	200	25.0%
<i>Rhus copalina</i>	100	12.5%
<b>Total</b>	<b>800</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 10A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>.**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Quercus michauxii</i>	10	5.5	10	10	50.0%	85.9%
<i>Pinus taeda</i>	10	0.9	4	4	50.0%	14.1%
<b>Total/Avg QMD</b>	<b>20</b>	<b>6.4</b>	<b>8</b>	<b>4 to 10</b>	<b>100.0%</b>	<b>100.0%</b>

**Woody Species in the Shrub Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Percent Density of Stems/Acre</b>
<i>Pinus taeda</i>	1000	52.6%
<i>Triadica sebifera</i>	500	26.3%
<i>Quercus virginiana</i>	100	5.3%
<i>Quercus nigra</i>	100	5.3%
<i>Nyssa sylvatica</i>	100	5.3%
<i>Ilex vomitoria</i>	100	5.3%
<b>Total</b>	<b>1900</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 11A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>.**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Quercus phellos</i>	10	3.5	8	8	25.0%	64.8%
<i>Pinus taeda</i>	30	1.9	3	3 to 4	75.0%	35.2%
<b>Total/Avg QMD</b>	<b>40</b>	<b>5.4</b>	<b>5</b>	<b>3 to 8</b>	<b>100.0%</b>	<b>100.0%</b>

**Woody Species in the Shrub Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Percent Density of Stems/Acre
<i>Pinus taeda</i>	1100	55.0%
<i>Triadica sebifera</i>	500	25.0%
<i>Morella cerifera</i>	200	10.0%
<i>Liquidambar styraciflua</i>	100	5.0%
<i>Baccharis halmifolia</i>	100	5.0%
<b>Total</b>	<b>2000</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 12A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Acer rubrum</i>	70	17.6	7	5 to 8	53.8%	40.3%
<i>Liquidambar styraciflua</i>	20	10.1	10	8 to 11	15.4%	23.1%
<i>Quercus phellos</i>	20	8.9	9	9 to 10	15.4%	20.4%
<i>Quercus laurifolia</i>	20	7.1	8	3 to 13	15.4%	16.2%
<b>Total/Avg QMD</b>	<b>130</b>	<b>43.7</b>	<b>8</b>	<b>3 to 13</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 13A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Nyssa biflora</i>	30	8.9	7	6 to 8	75.0%	71.8%
<i>Quercus similis</i>	10	3.5	8	6 to 8	25.0%	28.2%
<b>Total/Avg QMD</b>	<b>40</b>	<b>12.4</b>	<b>8</b>	<b>6 to 8</b>	<b>100.0%</b>	<b>100.0%</b>

**Woody Species in the Shrub Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Percent Density of Stems/Acre
<i>Triadica sebifera</i>	1100	57.9%
<i>Fraxinus pennsylvanica</i>	400	21.1%
<i>Diospyros virginiana</i>	200	10.5%
<i>Pinus taeda</i>	200	10.5%
<b>Total</b>	<b>1900</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 14A: Seed Tree Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Liquidambar styraciflua</i>	10	2.0	6	6	25.0%	43.5%
<i>Quercus phellos</i>	20	1.7	4	4	50.0%	37.0%
<i>Quercus laurifolia</i>	10	0.9	4	4	25.0%	19.6%
<b>Total/Avg QMD</b>					<b>100.0%</b>	<b>100.0%</b>

**Woody Species in the Shrub Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Percent Density of Stems/Acre
<i>Morella cerifera</i>	220	31.4%
<i>Diospyros virginiana</i>	120	17.1%
<i>Acer rubrum</i>	100	14.3%
<i>Pinus taeda</i>	100	14.3%
<i>Triadica sebifera</i>	80	11.4%
<i>Quercus phellos</i>	60	8.6%
<i>Liquidambar styraciflua</i>	20	2.9%
<b>Total</b>	<b>1830</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 15A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.-**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Quercus phellos</i>	130	33.9	7	3 to 14	59.1%	49.3%
<i>Quercus nigra</i>	30	13.5	9	4 to 14	13.6%	19.6%
<i>Quercus texana</i>	10	7.9	12	12	4.5%	11.5%
<i>Fraxinus profunda</i>	10	5.5	10	10	4.5%	8.0%
<i>Nyssa biflora</i>	20	5.5	7	6 to 8	9.1%	8.0%
<i>Liquidambar styraciflua</i>	10	2.0	6	6	4.5%	2.9%
<i>Quercus michauxii</i>	10	0.5	3	3	4.5%	0.7%
<b>Total/Avg QMD</b>	<b>220</b>	<b>68.8</b>	<b>8</b>	<b>3 to 14</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 16A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Quercus laurifolia</i>	60	32.5	10	4 to 18	26.1%	34.7%
<i>Liquidambar styraciflua</i>	40	29.8	12	3 to 16	17.4%	31.8%
<i>Nyssa biflora</i>	30	16.1	10	6 to 14	13.0%	17.2%
<i>Quercus nigra</i>	90	9.7	4	4 to 7	39.1%	10.4%
<i>Fraxinus pennsylvanica</i>	10	5.5	10	10	4.3%	5.9%
<b>Total/Avg QMD</b>	<b>230</b>	<b>93.6</b>	<b>9</b>	<b>3 to 18</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 17A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Quercus michauxii</i>	30	37.3	15	6 to 18	13.6%	29.4%
<i>Quercus laurifolia</i>	40	29.7	12	3 to 22	18.2%	23.4%
<i>Nyssa biflora</i>	30	20.9	11	8 to 16	13.6%	16.5%
<i>Quercus nigra</i>	50	13.5	7	4 to 12	22.7%	10.6%
<i>Quercus phellos</i>	20	11.6	10	4 to 14	9.1%	9.1%
<i>Triadica sebifera</i>	10	5.5	10	10	4.5%	4.3%
<i>Liquidambar styraciflua</i>	30	4.8	5	4 to 6	13.6%	3.8%
<i>Quercus pagoda</i>	10	3.5	8	8	4.5%	2.8%
<b>Total/Avg QMD</b>	<b>220</b>	<b>126.8</b>	<b>10</b>	<b>3 to 22</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 18A: Existing Bottomland Hardwood Area at Tract A of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Nyssa biflora</i>	20	25.2	15	12 to 18	10.0%	40.4%
<i>Quercus laurifolia</i>	110	22.9	6	4 to 10	55.0%	36.3%
<i>Quercus phellos</i>	60	14.2	7	4 to 10	30.0%	22.5%
<i>Liquidambar styraciflua</i>	10	0.5	3	3	5.0%	0.8%
<b>Total/Avg QMD</b>	<b>200</b>	<b>63.1</b>	<b>8</b>	<b>4 to 18</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 1B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems / Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Pinus taeda</i>	210	189.3	13	7 to 17	77.8%	92.5%
<i>Nyssa sylvatica</i>	20	8.1	8	7 to 10	7.4%	4.0%
<i>Quercus phellos</i>	10	2.7	7	7	3.7%	1.3%
<i>Liquidambar styraciflua</i>	10	2.7	7	7	3.7%	1.3%
<i>Quercus nigra</i>	10	0.9	4	4	3.7%	0.4%
<i>Quercus similis</i>	10	0.9	4	4	3.7%	0.4%
<b>Total/Avg QMD</b>	<b>270</b>	<b>204.6</b>	<b>11</b>	<b>4 to 17</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 2B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Acer rubrum</i>	70	24.4	8	4 to 12	46.7%	34.1%
<i>Pinus taeda</i>	10	21.8	20	20	6.7%	30.5%
<i>Nyssa sylvatica</i>	30	11.5	8	5 to 13	20.0%	16.1%
<i>Liquidambar styraciflua</i>	10	7.9	12	12	6.7%	11.0%
<i>Quercus phellos</i>	20	3.9	6	6	13.3%	5.5%
<i>Quercus laurifolia</i>	10	2.0	6	6	6.7%	2.8%
<b>Total/Avg QMD</b>	<b>150</b>	<b>71.5</b>	<b>9</b>	<b>4 to 20</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.





**Plot 3B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Pinus taeda</i>	40	110.6	23	22 to 24	50.0%	79.1%
<i>Quercus phellos</i>	20	21.4	14	14	25.0%	15.3%
<i>Nyssa sylvatica</i>	10	4.4	9	9	12.5%	3.1%
<i>Quercus laurifolia</i>	10	3.5	8	8	12.5%	2.5%
<b>Total/Avg QMD</b>	<b>80</b>	<b>139.9</b>	<b>18</b>	<b>8 to 24</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

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**Plot 4B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 14, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Pinus taeda</i>	120	129.6	14	6 to 19	75.0%	93.9%
<i>Quercus phellos</i>	30	7.0	7	4 to 8	18.8%	5.1%
<i>Nyssa sylvatica</i>	10	1.4	5	4	6.3%	1.0%
<b>Total SPA &amp; BA / QMD</b>	<b>160</b>	<b>138.0</b>	<b>13</b>	<b>4 to 19</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 5B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, August 6, 2019:**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Pinus taeda</i>	110	141.3	15	10 to 23	33.3%	79.6%
<i>Nyssa sylvatica</i>	50	4.9	4	4 to 5	22.7%	3.2%
<i>Quercus michauxii</i>	10	2.0	6	6	4.5%	1.3%
<i>Fraxinus profunda</i>	10	2.0	6	6	4.5%	1.3%
<i>Quercus nigra</i>	10	1.4	5	5	4.5%	0.9%
<i>Liquidambar styraciflua</i>	10	0.9	4	4	4.5%	0.6%
<i>Quercus pagoda</i>	10	0.9	4	4	4.5%	0.6%
<i>Quercus phellos</i>	10	0.9	4	4	4.5%	0.6%
<b>Total, Range or Mean</b>	<b>220</b>	<b>154.3</b>	<b>10</b>	<b>4 to 23</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utills/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately  $\geq 20$  feet in height or  $>3$  inches diameter at breast height (DBH).

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**Plot 6B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020..**

**Woody Species in the Tree Stratum<sup>1</sup>**

Species <sup>2</sup>	Stems/Acre	Basal Area (sq ft/acre)	Quadratic Mean DBH (in)	DBH Range (in)	Density of Stems/Acre	Dominance of Basal Area
<i>Nyssa biflora</i>	120	121.5	14	8 to 18	75.0%	97.4%
<i>Acer rubrum</i>	20	7.0	8	8	12.5%	5.3%
<i>Quercus phellos</i>	20	4.4	6	4 to 8	12.5%	3.3%
<b>Total/Avg QMD</b>	<b>160</b>	<b>132.9</b>	<b>12</b>	<b>4 to18</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.



**Plot 7B: Mature Pine Area at Tract B of the Proposed Cow Branch Coastal Mitigation Bank in Tangipahoa Parish, Louisiana, July 29, 2020.**

**Woody Species in the Tree Stratum<sup>1</sup>**

<b>Species<sup>2</sup></b>	<b>Stems/Acre</b>	<b>Basal Area (sq ft/acre)</b>	<b>Quadratic Mean DBH (in)</b>	<b>DBH Range (in)</b>	<b>Density of Stems/Acre</b>	<b>Dominance of Basal Area</b>
<i>Pinus taeda</i>	130	48.9	8	4 to 16	68.4%	83.0%
<i>Acer rubrum</i>	10	3.5	8	8	5.3%	5.9%
<i>Quercus nigra</i>	20	2.8	5	4 to 6	10.5%	4.8%
<i>Triadica sebifera</i>	10	2.0	6	6	5.3%	3.4%
<i>Quercus pagoda</i>	20	1.7	4	4	10.5%	2.9%
<b>Total/Avg QMD</b>	<b>190</b>	<b>58.9</b>	<b>8</b>	<b>4 to 16</b>	<b>100.0%</b>	<b>100.0%</b>

<sup>1</sup> The stratum is defined in the US Army Corps of Engineers Atlantic and Gulf Coastal Plain Regional Supplement, version 2.0 (<https://usace.contentdm.oclc.org/utis/getfile/collection/p266001coll1/id/7594> accessed July 25, 2020) as Woody Plants, excluding woody vines, approximately ≥20 feet in height or >3 inches diameter at breast height (DBH).

<sup>2</sup> Scientific names from the US Department of Agriculture Plants Database (<https://plants.usda.gov/> accessed July 25, 2020) except where otherwise noted.

