

**Legend**

**SURVEYED SITE BOUNDARY**

Smith, Fontenot & Phillips, LLC, January 2010

Background Source: SOURCE 1 AGIS Datasets, 2009

FIGURE

**A**

Location Map

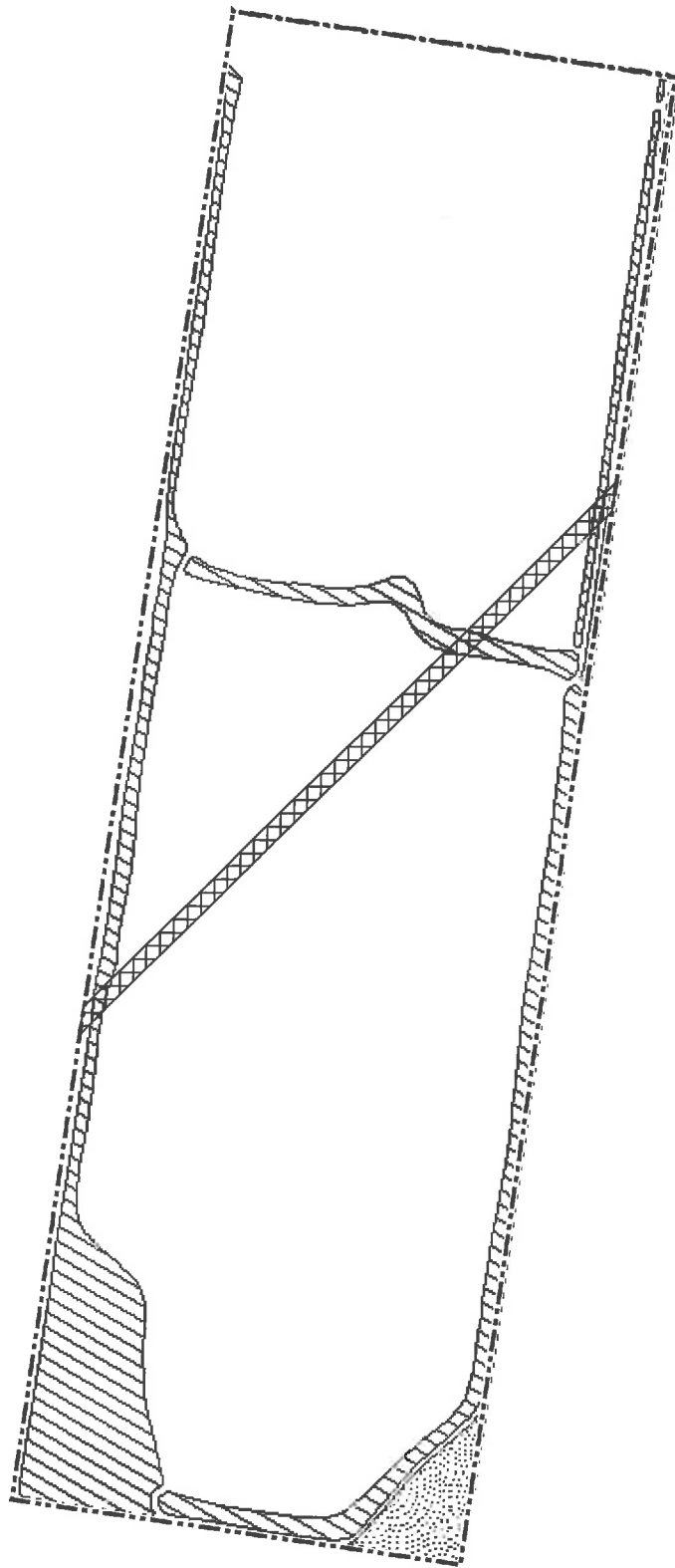
# **Turtle Bayou Mitigation Bank**

Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, 63, & 64, Township 3N, Range 1W  
Rapides Parish, Louisiana



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LA Engineering Lic. EF 3767  
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DRAWN BY: RCO/TH	CHECKED BY: [Signature]	PROJECT NUMBER: 4-0047-002



# Legend

- Pipeline Servitude
- SURVEYED SITE BOUNDARY
- Smith, Fontenot & Phillips, LLC, January 2010
- USACE Wetlands and Waters of the US
- Jurisdictional Wetlands (3.7 acres)
- Waters of the US (15.5 acres)

NOTE: Work in gas pipeline servitude limited to grading of field elevations and recontouring of perimeter ditches, Turtle Bayou and Bench Slough.



FIGURE

**B**

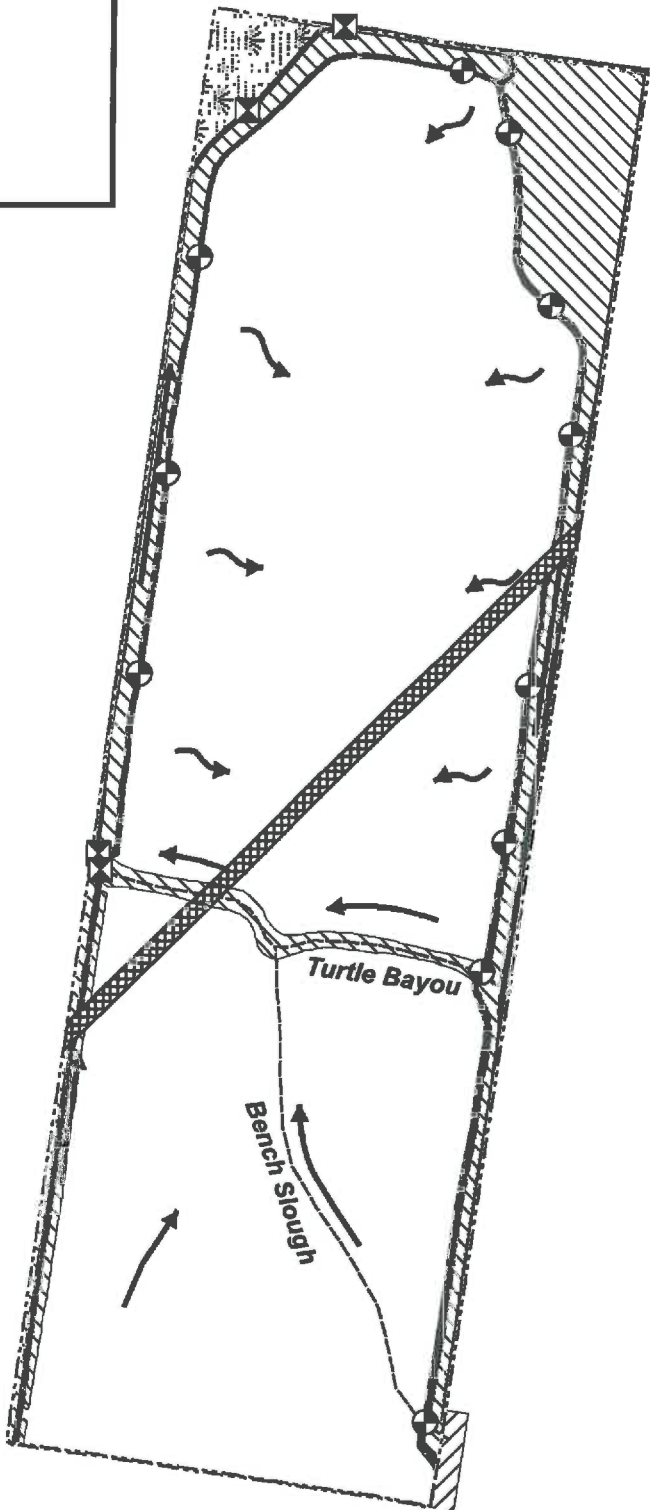
USACE  
Wetlands and Waters  
of the US

SCALE: 1" = 800 Ft  
DATE: 3/9/2011

## Turtle Bayou Mitigation Bank

Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, 63, & 64, Township 3N, Range 1W  
Rapides Parish, Louisiana

	E Sciences, Incorporated LA Engineering, Inc. EF 3767 34 East Pine Street Orlando, Florida, 32801 www.esciencesinc.com Phone: 407-481-9006 Fax: 407-481-9827	PROJECT NUMBER: 4-0047-002
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**LEGEND**

**Hydrologic Restoration**

- Conveyance Structure
- Levee Breach
- Drainage Flow

**Surveyed Site Boundary**

- Smith, Fontenot & Phillips, LLC, January 2010

**Levees Remaining**

**USACE Wetlands and Waters of the US**

- Jurisdictional Wetlands
- Waters of the US to be Filled

**Stream Restoration**

**Hydrologic Conveyance Servitude**

**Gas Pipeline Servitude**

- Notes:
1. Gas Pipeline Servitude not included in plan.
  2. Survey information provided by Smith, Fontenot & Phillips, LLC, January 2010



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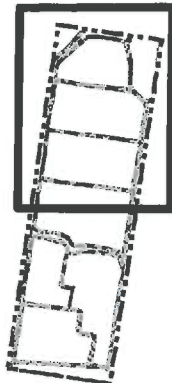
**Drawn** BY: RCOOTH  
**Checked** BY: [Signature]  
**Project Number:** 4-0047-002

# TURTLE BAYOU MITIGATION BANK

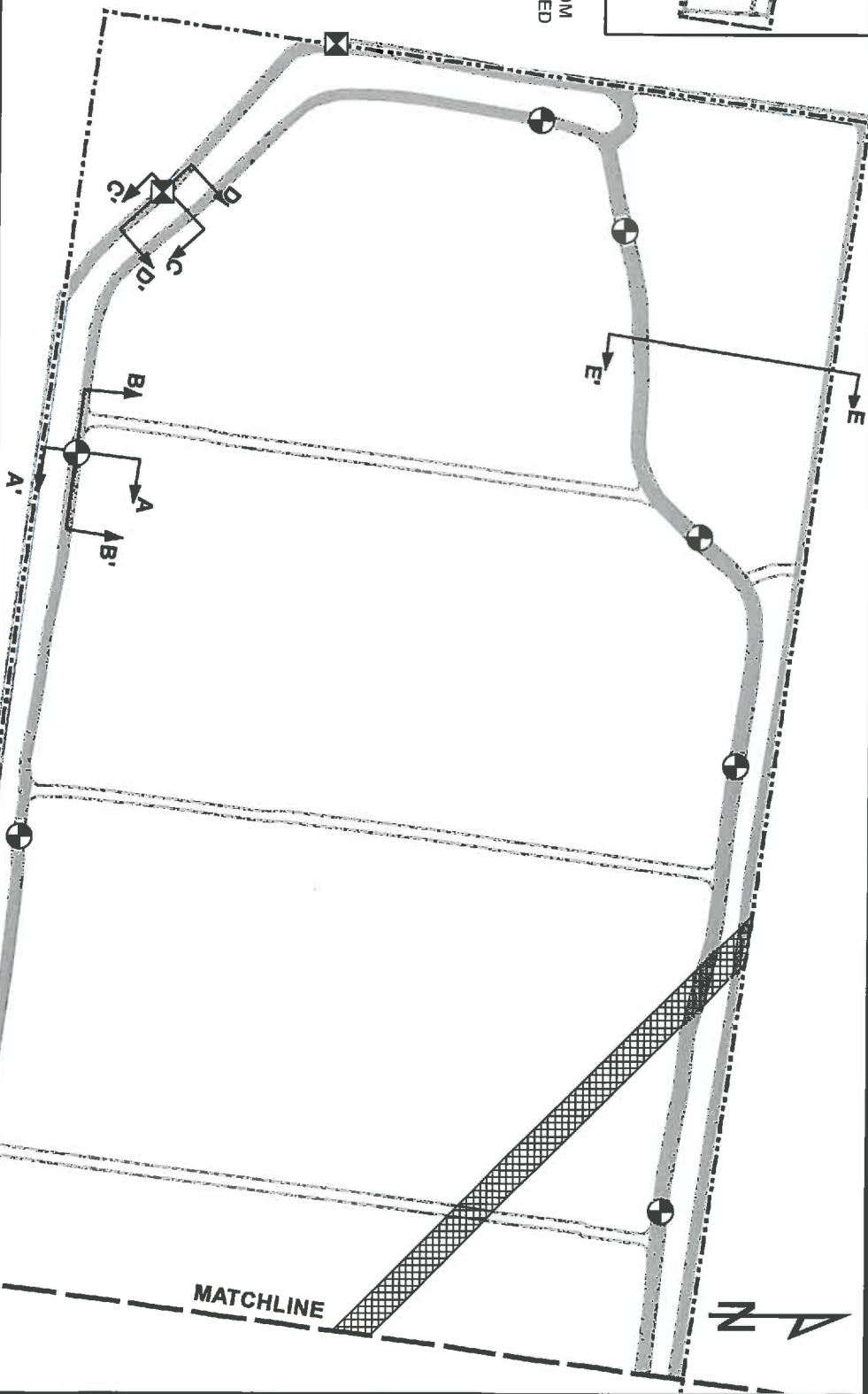
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

**Hydrologic Restoration Plan**

SCALE: 1" = 800'  
DATE: 3/4/2011



GENERAL NOTE:  
DREDGE MATERIAL REMOVED FROM  
LEVEES WILL TYPICALLY BE UTILIZED  
TO FILL IMMEDIATELY ADJACENT  
DITCHES.



- LEGEND**
- Project Limits
  - Hydrologic Restoration
  - Typical Piped Levee Breach Conveyance Structure
  - Typical Levee Breach
  - Stream Restoration
  - Levees Remaining
  - Levees to be Removed and Graded to Match Field Elevation
  - Cross Section (Not to Scale)
  - Gas Pipeline Servitude



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# **TURTLE BAYOU MITIGATION BANK**

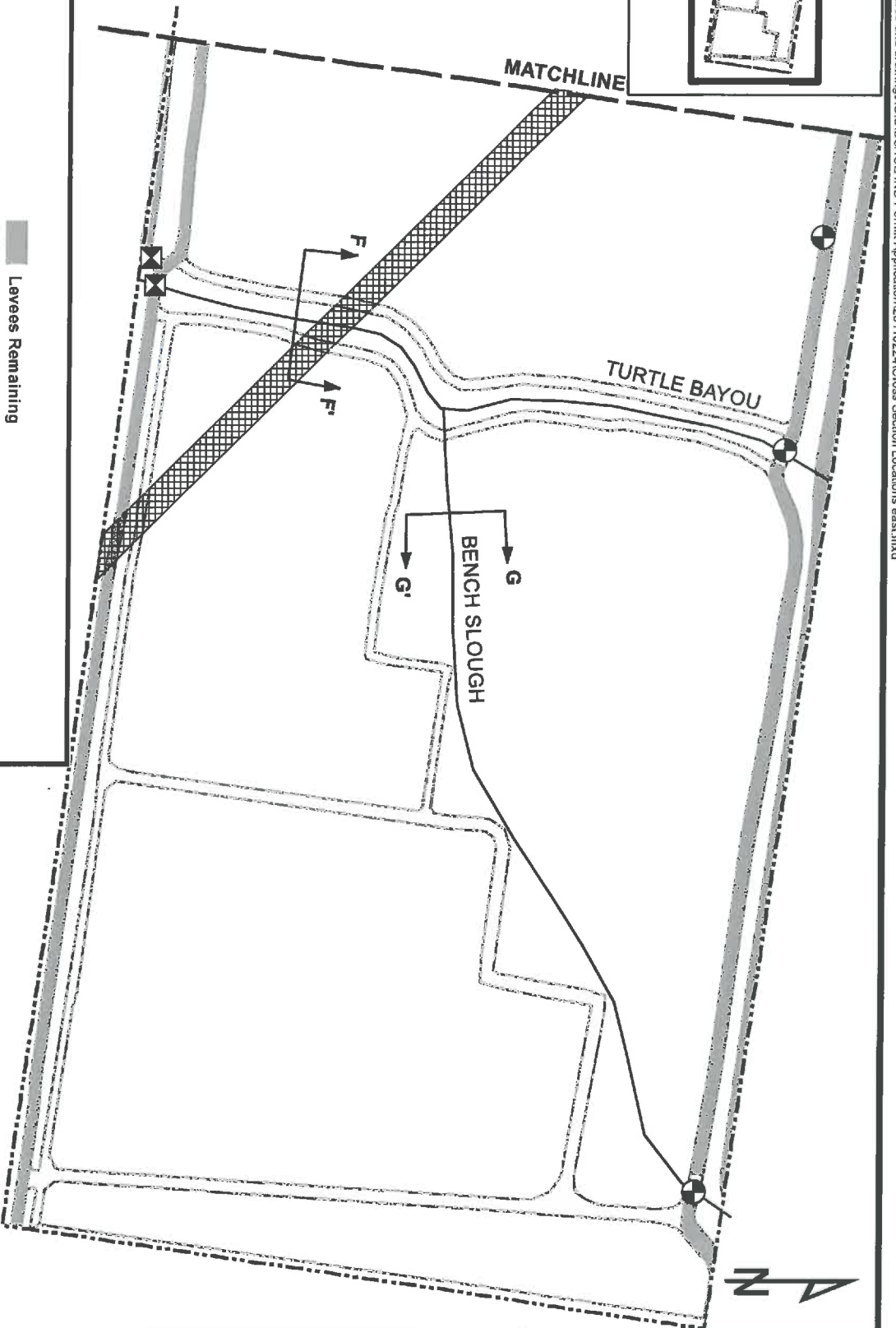
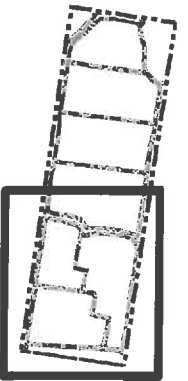
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

Hydrologic Restoration  
Construction Locations

DRAWN BY: RM  
CHECKED BY: RM  
PROJECT NUMBER: 4-0047-002

SCALE: 1" = 400'  
DATE: 3/9/2011

FIGURE  
**C2**



### LEGEND

- Project Limits
- Hydrologic Restoration
- Typical Piped Levee Breach Conveyance Structure
- Typical Levee Breach
- Stream Restoration
- Levees Remaining
- Levees to be Removed and Graded to Match Field Elevation
- Cross Sections (Not to Scale)
- Gas Pipeline Servitude



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## TURTLE BAYOU MITIGATION BANK

Sections 62, Township 3N, Range 1W  
 Rapides Parish, Louisiana

Hydrologic Restoration  
 Construction Locations

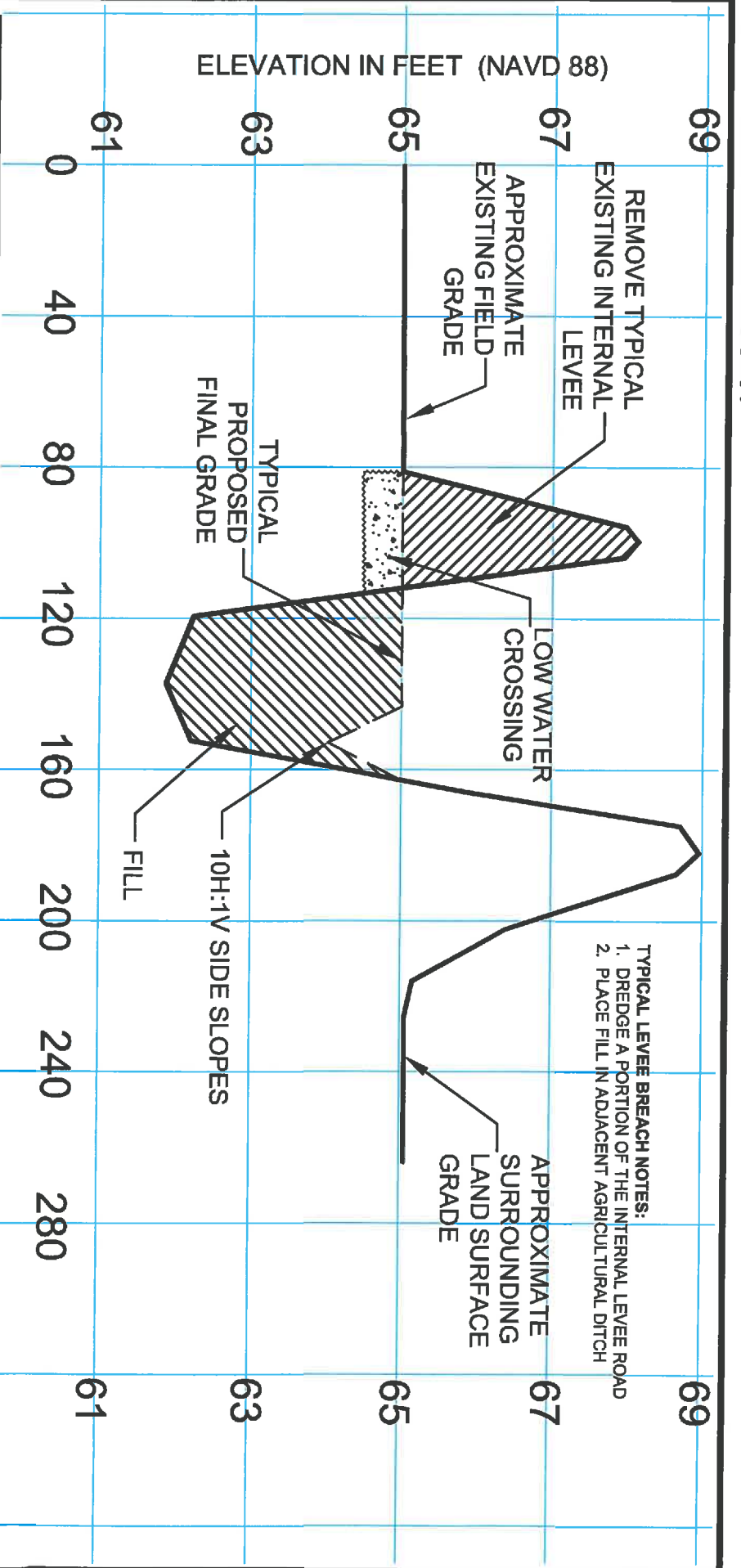
FIGURE

**C3**

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 PROJECT NUMBER: 4-0047-002

SCALE: 1" = 400'  
 DATE: 3/9/2011





**LEGEND**

- ~~~~~ GEOTEXTILE FABRIC
- ▨ 6" THICK RIPRAP (#67 STONE)
- ▨ FILL
- ▨ REMOVE TYPICAL EXISTING INTERNAL LEVEE

**GENERAL NOTES:**

1. ALL GRADES SHOWN ARE APPROXIMATE.
2. ALL ONSITE GRADES SHALL BE GRADUAL, WITH A MAXIMUM SLOPE OF 10H:1V UNLESS OTHERWISE SHOWN.
3. EXISTING ONSITE DREDGED MATERIAL SHALL BE USED TO FILL AREAS TO ELEVATIONS SHOWN. ANY EXCESS DREDGED MATERIAL SHALL BE DISTRIBUTED EVENLY ACROSS THE BROAD FLAT ONSITE AREAS.
4. FILL PLACEMENT SHALL BE CONSTRUCTED IN LIFTS. ALL FILL LIFTS SHALL BE CONSTRUCTED TO A MAXIMUM DEPTH OF 12-INCHES. ALL FILL LIFTS SHALL BE STABILIZED TO A FIELD BULK DENSITY OF 80% STANDARD PROCTOR MAXIMUM DRY DENSITY.

HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 2'



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CHECKED BY: [Signature]  
PROJECT NUMBER: 4-0047-002

**TURTLE BAYOU MITIGATION BANK**

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana



Typical Levee Breach  
A - A'

SCALE: AS INDICATED  
DATE: 3/7/2011

ENGINEER OF RECORD

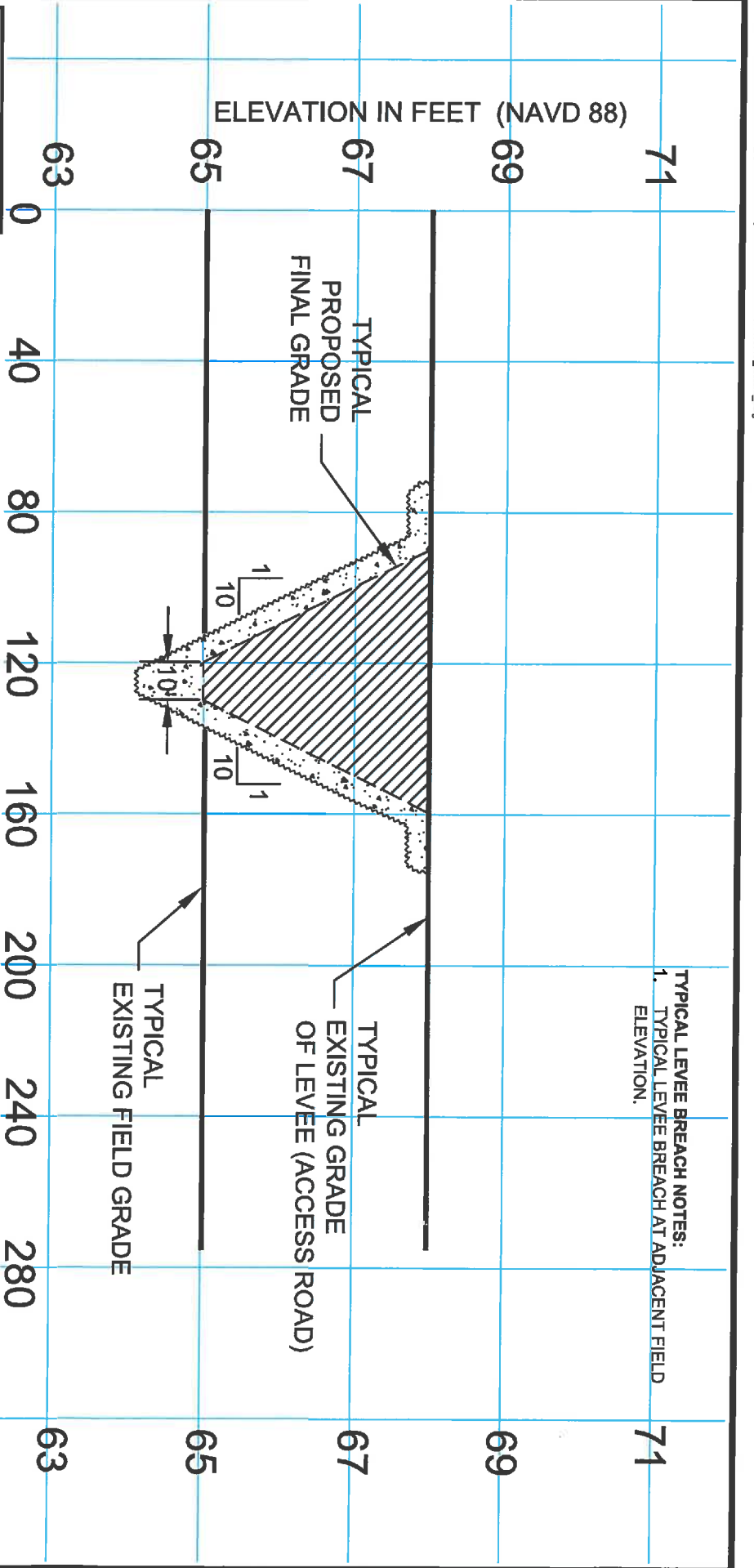
Peter K. Pantow

Date: 3/7/2011

Louisiana License Number: PE #33404

FIGURE

**C4**



### LEGEND

- GEOTEXTILE FABRIC
- 6" THICK RIPRAP (#57 STONE)
- REMOVE TYPICAL EXISTING INTERNAL LEVEE

### GENERAL NOTES:

1. ALL GRADES SHOWN ARE APPROXIMATE.
2. ALL ONSITE GRADES SHALL BE GRADUAL, WITH A MAXIMUM SLOPE OF 10H:1V UNLESS OTHERWISE SHOWN.
3. EXISTING ONSITE DREDGED MATERIAL SHALL BE USED TO FILL AREAS TO ELEVATIONS SHOWN. ANY EXCESS DREDGED MATERIAL SHALL BE DISTRIBUTED EVENLY ACROSS THE BROAD FLAT ONSITE AREAS.
4. FILL PLACEMENT SHALL BE CONSTRUCTED IN LIFTS. ALL FILL LIFTS SHALL BE CONSTRUCTED TO A MAXIMUM DEPTH OF 12-INCHES. ALL FILL LIFTS SHALL BE STABILIZED TO A FIELD BULK DENSITY OF 80% STANDARD PROCTOR MAXIMUM DRY DENSITY.

HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 2'



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CHECKED BY: [Signature]  
PROJECT NUMBER: 4-0047-002

## TURTLE BAYOU MITIGATION BANK

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

TYPICAL LEVEE BREACH NOTES:  
1. TYPICAL LEVEE BREACH AT ADJACENT FIELD ELEVATION.

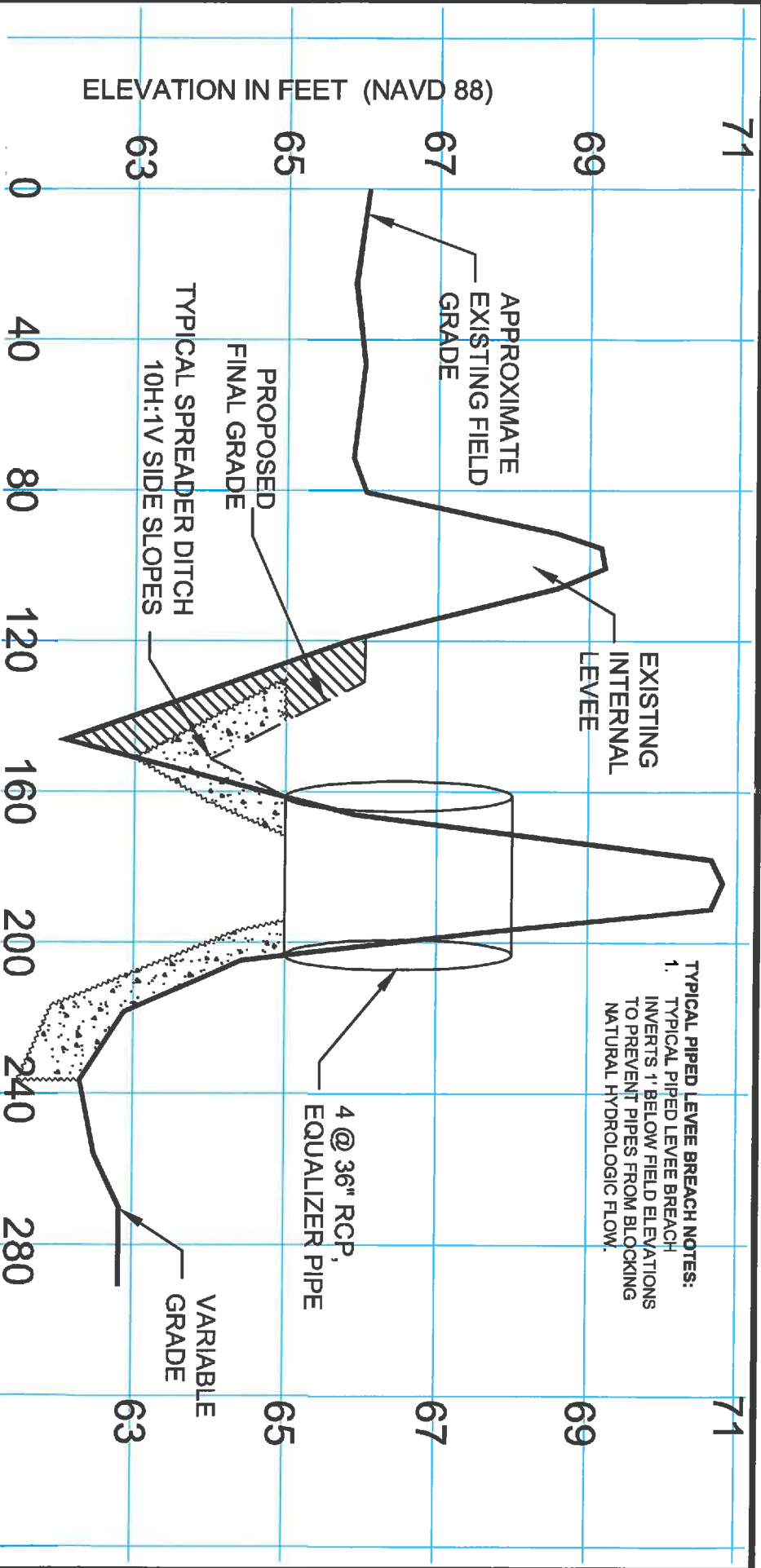
ENGINEER OF RECORD  
Peter K. Parlow  
Date: 3/7/2011  
Louisiana License Number: PE #33404

Typical Levee Breach  
B - B'

SCALE: AS INDICATED  
DATE: 3/7/2011

C5

FIGURE



### LEGEND

- ~~~~~ GEOTEXTILE FABRIC
- ..... 1" THICK RIPRAP
- /// FILL

### GENERAL NOTES:

1. ALL GRADES SHOWN ARE APPROXIMATE.
2. ALL ONSITE GRADES SHALL BE GRADUAL, WITH A MAXIMUM SLOPE OF 10H:1V UNLESS OTHERWISE SHOWN.
3. EXISTING ONSITE DREDGED MATERIAL SHALL BE USED TO FILL AREAS TO ELEVATIONS SHOWN. ANY EXCESS DREDGED MATERIAL SHALL BE DISTRIBUTED EVENLY ACROSS THE BROAD FLAT ONSITE AREAS.
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HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 2'



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PROJECT NUMBER: 4-004-7-002

## TURTLE BAYOU MITIGATION BANK

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

TYPICAL PIPED LEVEE BREACH NOTES:  
1. TYPICAL PIPED LEVEE BREACH INVERTS 1' BELOW FIELD ELEVATIONS TO PREVENT PIPES FROM BLOCKING NATURAL HYDROLOGIC FLOW.

ENGINEER OF RECORD  
Peter K. Partlow

Date: 3/7/2011

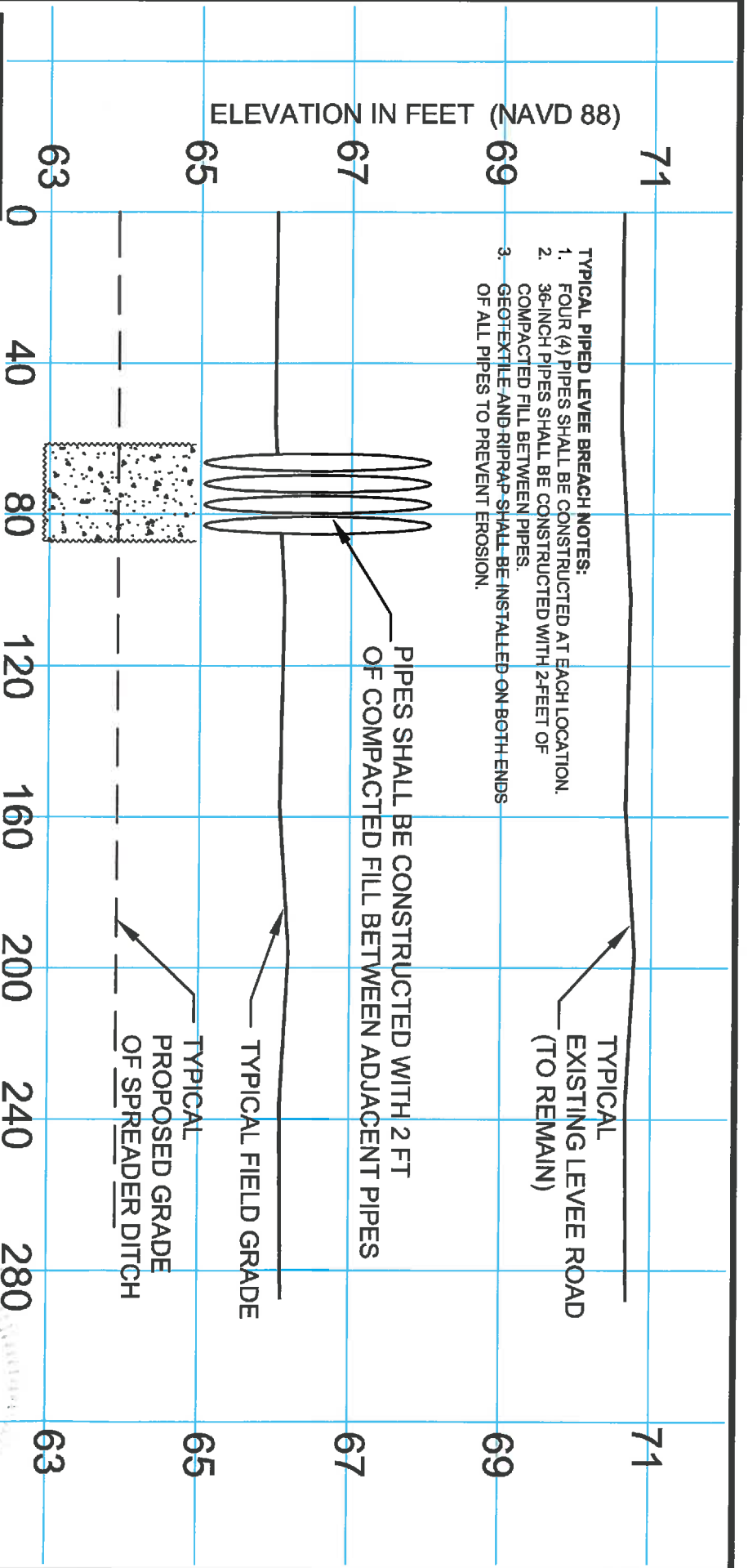
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Typical Piped Levee Breach  
C - C'

SCALE: AS INDICATED  
DATE: 3/7/2011

FIGURE  
**C6**





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**PROJECT NUMBER:** 4-0047-002

# **TURTLE BAYOU MITIGATION BANK**

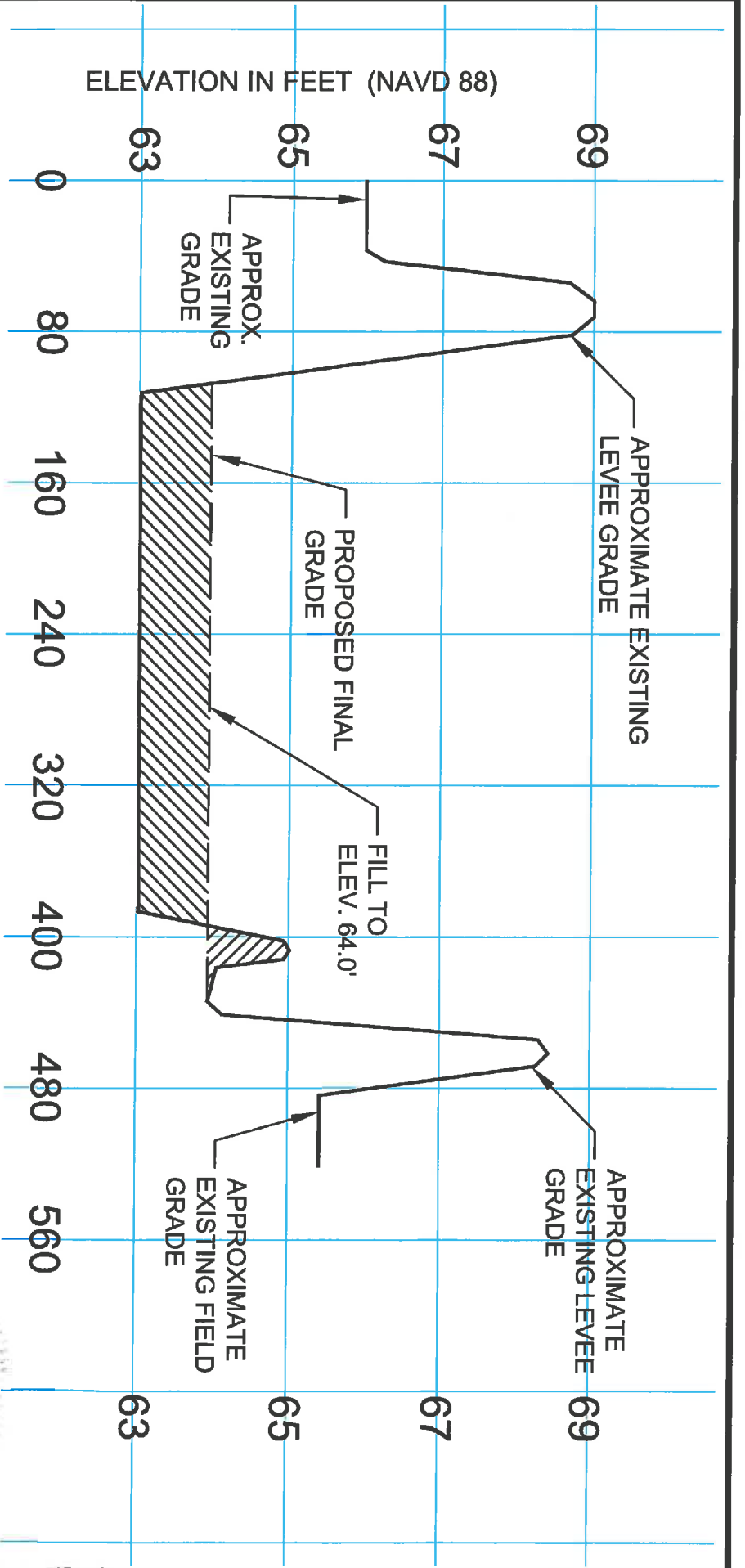
Section 62, Township 3N, Range 1W  
 Rapides Parish, Louisiana

**Typical Piped Levee Breach D - D'**

**ENGINEER OF RECORD**  
 Peter K. Parton  
 Date: 3/7/2011  
 Louisiana License Number: PE #33404

**SCALE:** AS INDICATED  
**DATE:** 3/7/2011

**FIGURE**  
**C7**



ELEVATION IN FEET (NAVD 88)

**LEGEND**

- FILL
- DREDGE

HORIZONTAL SCALE: 1" = 80'  
VERTICAL SCALE: 1" = 2'

**GENERAL NOTES:**

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PROJECT NUMBER: 4-0047-002

**TURTLE BAYOU MITIGATION BANK**

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

**ENGINEER OF RECORD**

Peter K. Partlow

Date: 3/9/2011

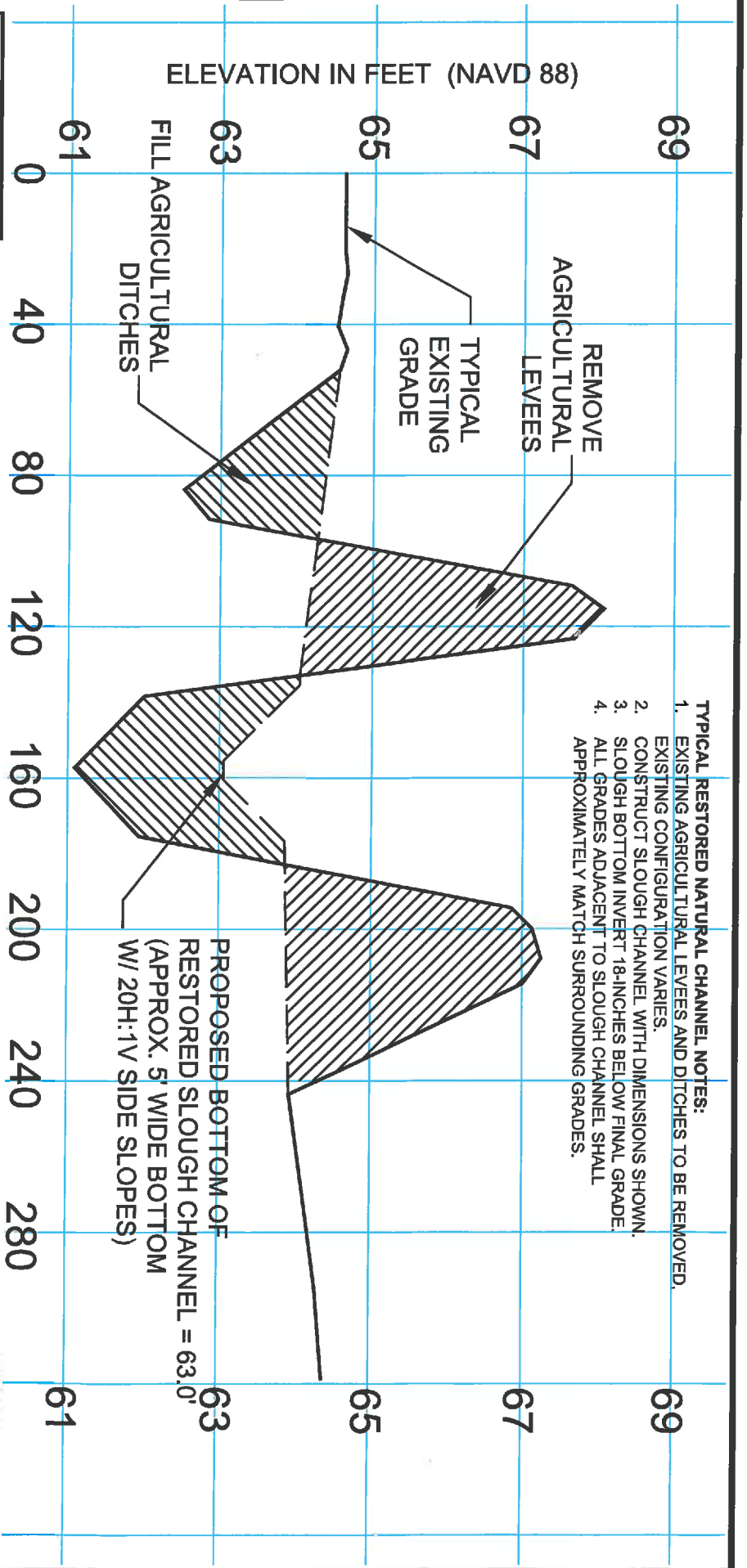
Louisiana License Number: PE #333404

Cross Section  
E - E'

SCALE: AS INDICATED  
DATE: 3/9/2011

**C8**

FIGURE



- TYPICAL RESTORED NATURAL CHANNEL NOTES:**
1. EXISTING AGRICULTURAL LEVEES AND DITCHES TO BE REMOVED.
  2. EXISTING CONFIGURATION VARIES.
  3. CONSTRUCT SLOUGH CHANNEL WITH DIMENSIONS SHOWN.
  4. SLOUGH BOTTOM INVERT 18-INCHES BELOW FINAL GRADE.
  5. ALL GRADES ADJACENT TO SLOUGH CHANNEL SHALL APPROXIMATELY MATCH SURROUNDING GRADES.

**LEGEND**

- FILL AGRICULTURAL DITCHES
- REMOVE AGRICULTURAL LEVEES

**GENERAL NOTES:**

1. ALL GRADES SHOWN ARE APPROXIMATE.
2. ALL ONSITE GRADES SHALL BE GRADUAL, WITH A MAXIMUM SLOPE OF 20H:1V UNLESS OTHERWISE SHOWN.
3. EXISTING ONSITE DREDGED MATERIAL SHALL BE USED TO FILL AREAS TO ELEVATIONS SHOWN. ANY EXCESS DREDGED MATERIAL SHALL BE DISTRIBUTED EVENLY ACROSS THE BROAD FLAT ONSITE AREAS.
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HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 2'



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**TURTLE BAYOU MITIGATION BANK**

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

ENGINEER OF RECORD

Peter K. Partlow

Date: 3/9/2011

Louisiana License Number: PE #33404

FIGURE

Typical Turtle Bayou

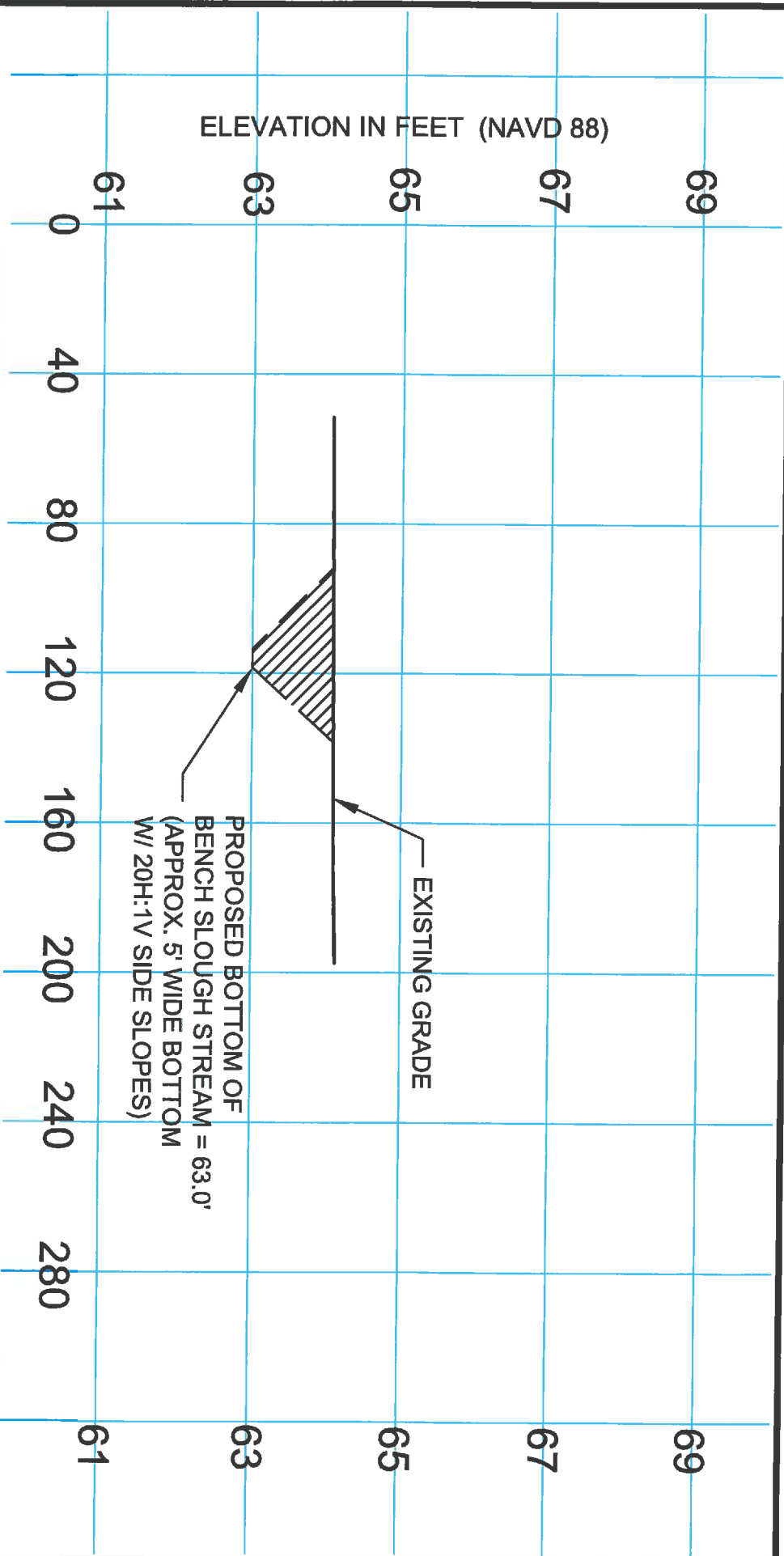
F - F'

**C9**

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PROJECT NUMBER: 4-0047-002

SCALE: AS INDICATED  
DATE: 3/9/2011

ELEVATION IN FEET (NAVD 88)



## LEGEND



DREDGE

**GENERAL NOTES:**

1. ALL GRADES SHOWN ARE APPROXIMATE.
2. ALL ONSITE GRADES SHALL BE GRADUAL, WITH A MAXIMUM SLOPE OF 10H:1V UNLESS OTHERWISE SHOWN OR NOTED ON CROSS SECTION DETAIL SHEETS.
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HORIZONTAL SCALE: 1" = 40'  
VERTICAL SCALE: 1" = 2'



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BY: RM	BY: 	4-0047-002

# TURTLE BAYOU MITIGATION BANK

**Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana**

SCALE: AS INDICATED	DATE: 3/9/2011
------------------------	-------------------

### Cross Section G-G'

FIGURE

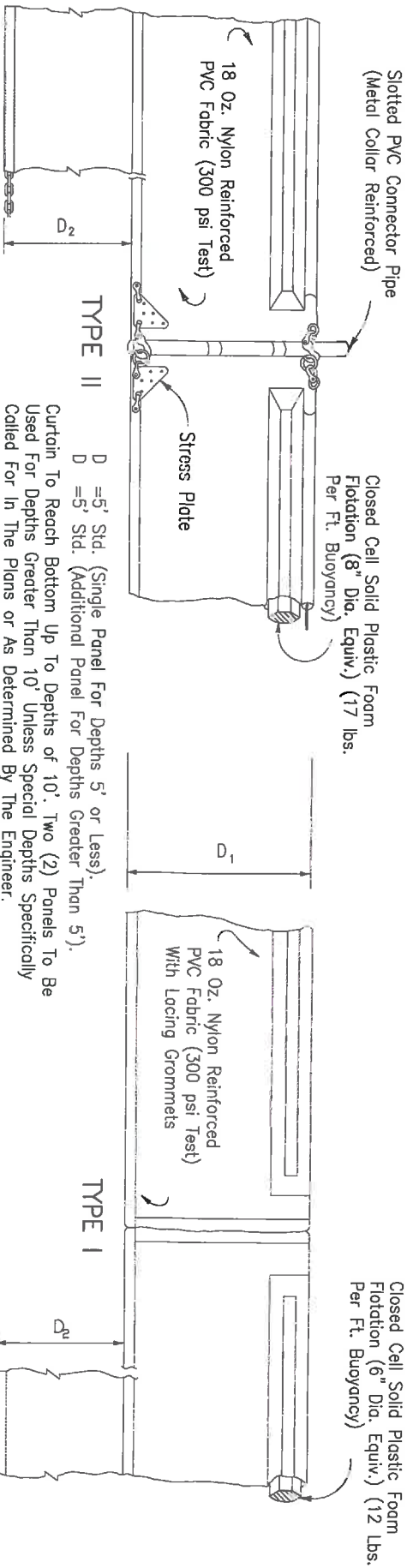
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# ENGINEER OF RECORD

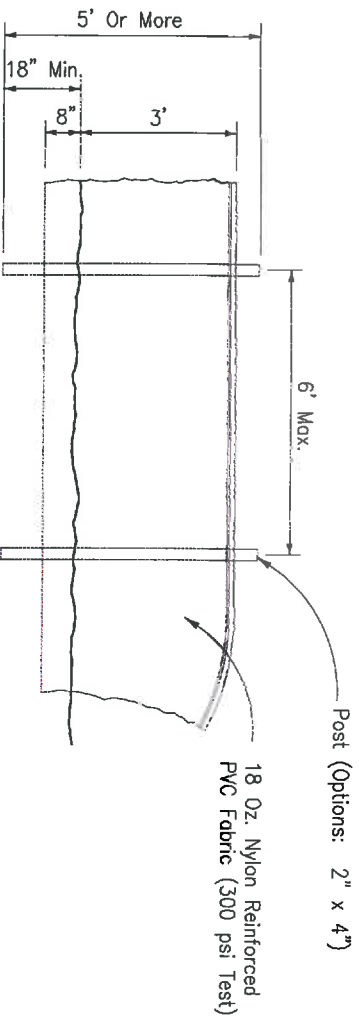
**Peter K. Partlow**

Date: 3/9/2011

Louisiana License Number: PE #33404



## FLOATING TURBIDITY BARRIERS



## STAKED TURBIDITY BARRIER



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## TURTLE BAYOU MITIGATION BANK

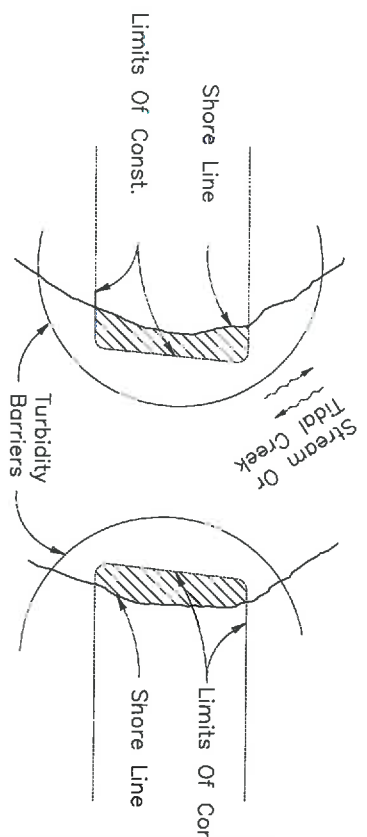
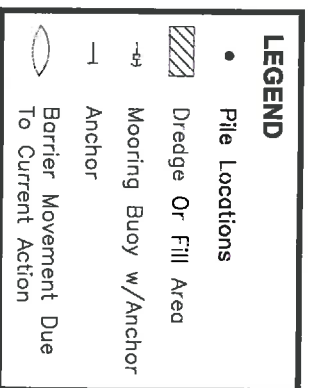
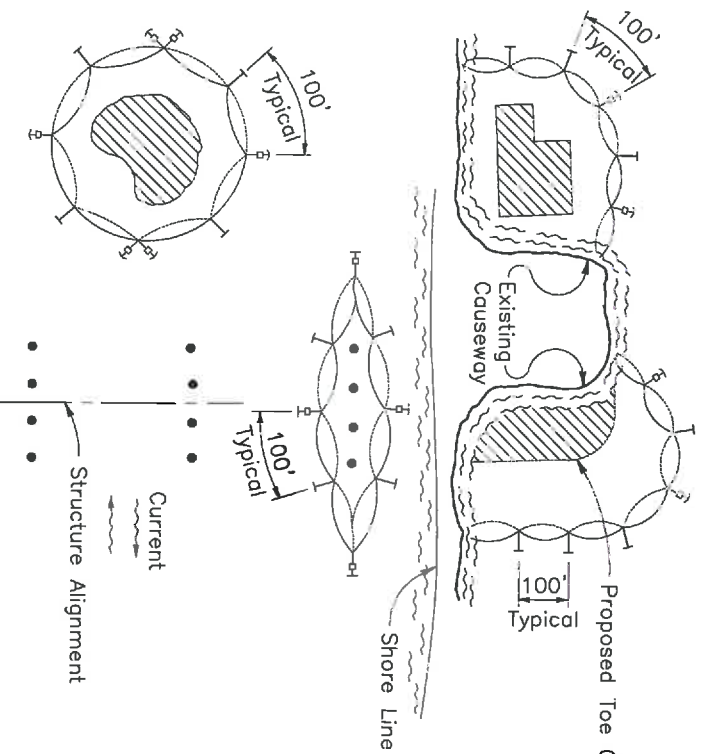
Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

Turbidity Barrier Details

SCALE: NOT TO SCALE  
DATE: 3/9/2011

FIGURE  
**C11**





- NOTES:
1. Turbidity barriers are to be used in all permanent bodies of water regardless of water depth.
  2. Number and spacing of anchors dependent on current velocities.
  3. Deployment of barrier around pile locations may vary to accommodate construction operations.

Note:  
Turbidity barriers for flowing streams and tidal creeks may be either floating, or staked types or any combinations of types that will suit site conditions and meet erosion control and water quality requirements. The barrier type(s) will be at the Contractors option unless otherwise specified in the plans.

## FLOATING TURBIDITY BARRIER - STANDARD DETAIL



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## TURTLE BAYOU MITIGATION BANK

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

Floating Turbidity Barrier  
Detail

FIGURE

C12

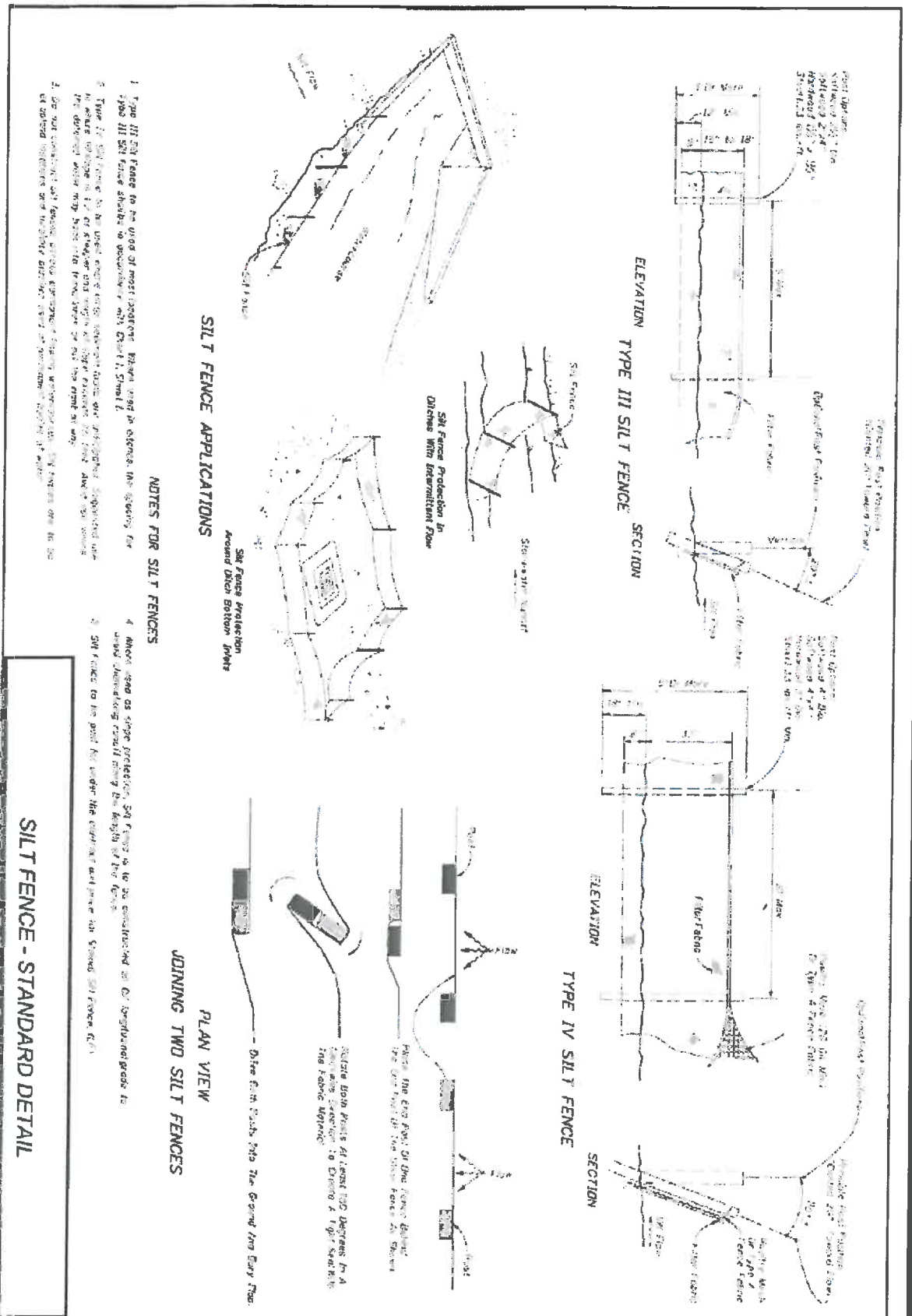
DRAWN  
BY: RM

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BY: [Signature]

PROJECT NUMBER:  
4-0047-002

SCALE:  
NOT TO SCALE

DATE:  
3/9/2011



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# TURTLE BAYOU MITIGATION BANK

Silt Fence Detail

FIGURE

C13

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PROJECT NUMBER: 4-0047-002

Section 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

SCALE: NOT TO SCALE  
DATE: 3/9/2011

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## **FIGURES**

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## **TABLES**

<b>Table 1</b>	<b>Canopy and Understory Species Selected for Reforestation of the Turtle Bayou Mitigation Bank</b>
<b>Table 2</b>	<b>Selected Species by Planting Zone for the Turtle Bayou Mitigation Bank</b>

## **ATTACHMENT**

**USACE Wetlands and Waters of the U.S.**

## **I. MITIGATION BANK OBJECTIVES**

E Sciences, Incorporated on behalf of Ecosystem Renewal, LLC, is pleased to present the following prospectus for the Turtle Bayou Mitigation Bank (Site) to the IRT and USACE New Orleans District. We are requesting that this Site be evaluated for consideration as a wetland mitigation bank to provide compensation for unavoidable wetland impacts authorized by the issuance of the Department of Army (DA) permits under Section 404 of the Clean Water Act and Sections 9 and 10 of the Rivers and Harbors Act of 1899. The specific objectives of the bank are the following:

- Restoration of self-sustaining, cypress-tupelo and bottomland hardwood floodplain and flatwood wetland hydrology to the Site
- Re-establishment of self-sustaining, cypress-tupelo and bottomland hardwood and wet hardwood flatwood communities appropriate to the area and to the hydrologic regimes located on-site
- Improved fish and wildlife habitat functions and values to adjacent, forested private lands and to the Bayou Teche and greater Red River watersheds through the re-establishment and rehabilitation of the cypress-tupelo and bottomland hardwood ecological system on-site.
- Improvement in local water quality discharges from the Site into local waterways and into Bayou Boeuf, a tributary of the Red River.
- Increased flood storage

## **II. SITE LOCATION AND REGIONAL SIGNIFICANCE**

The proposed Turtle Bayou Mitigation Bank is located in Section 62, Township 3 North, Range 1 West in Rapides Parish, Louisiana (**Figure 1**). The Site totals approximately 270.7 acres. The Site is located west of the dead end of Jenkins Road which intersects with U.S. Highway 71/167 approximately 0.67 miles to the east. Specifically, the geographical center point of the Site is located approximately 2.5 miles south of Interstate 49 and 2 miles west of U.S. Highway 71/167, between the towns of Moreland and Coverdale. Location of the Site overlain on a USGS quad map is provided in **Figure 2**.

The Site is within HUC Cataloging Unit 08080102 (Bayou Teche) and within the larger 080801 (Atchafalaya - Vermilion) Accounting Unit. The Site is located within the Red River Bottomlands EPA Level IV ecoregion and within the South Central Plains EPA Level III ecoregion (**Figures 1 and 2**). Locally, the Site contributes drainage to Turtle Bayou and Bench Slough which drains to the Bayou Boeuf sub basin, a tributary to Bayou Courtableau and the Red River.

**Figure 3** presents a recent aerial of the proposed mitigation bank. The 270.7 acre Site currently consists of approximately 267 acres of agricultural lands used for rice cultivation and crayfish production, 3.7 of existing bottomland hardwood forest, and 29.8 acres of jurisdictional waters of

the United States. The site includes portions of Bench Slough and Turtle Bayou, both of which were altered to facilitate management of hydrology on the site for agricultural production. The National Resource Conservation Service (NRCS) classifies the majority of the site as Prior Converted Wetlands. The Site is contiguous with approximately 1,000 acres of an existing bottomland hardwood forest that includes Bayou Boeuf to the south and is currently owned and managed by Louisiana State University (LSU). The eastern portion of the LSU property includes an area of higher topographic relief that may have historically contributed to the headwaters of Plantation Slough located offsite to the east. A mitigation site, currently under review by the USACE New Orleans District, is located to the east and is contiguous with the Turtle Bayou Mitigation Bank project site. That property will also provide restoration of bottomland hardwood forest including a hydrologic restoration plan that will complement the bottomland hardwood forest restoration at the Turtle Bayou Mitigation Bank site. The Site is contiguous on the western and northern boundaries with approximately 800 acres of restored wetlands enrolled in the United States Department of Agriculture's (USDA) Wetland Reserve Program (WRP). The Site drains predominantly to the south and west to Bayou Boeuf, which flows generally to the southeast to Bayou Courtableau and the confluence with the Red River. Based on historical aerial research the Site was forested and drainage relatively unaltered in 1952. By 1978, the majority of the site was converted into agricultural production through timber harvesting, levee construction and drainage improvements, with management of the entire site for cultivated rice and crayfish production continuing into the present.

Based on the historical aerial photography research and surrounding forested habitat, the Site most likely supported both bottomland hardwood and cypress-tupelo community types, as defined in the *Natural Communities of Louisiana* and electronically published by the LDWF and Louisiana Natural Heritage Program (LNHP). Bottomland hardwood communities are ranked by the LNHP as G4 and G5 globally, and with an S2 state ranking. This community type includes species associations that occur within bottomland hardwood ecosystems on hydric soils as forested, alluvial wetlands, which are maintained hydrologically by natural, seasonal flooding events. The entire site is within the 100 year floodplain for Bayou Boeuf and within second bottomlands associated with Turtle Bayou and Bench Slough. Bottomland hardwood floodplain wetlands occur throughout Rapides Parish and the Bayou Teche Cataloging Unit. The status of wet and mesic hardwood flatwoods are ranked by the LNHP as G2 and G3 globally, and with a S2 and S3 state ranking. These imperiled and rare hardwood flatwoods and bottomland hardwood community types are associations that occur within bottomland hardwood ecosystems on hydric soils on poorly drained flats, depressions and small drainages (slashes), and are generally not affected by overbank flooding. Cypress-tupelo communities are found throughout the Rapides Parish and Bayou Teche Cataloging Unit and include species associations that may vary widely but with low floristic diversity and sparse undergrowth. These communities occur in soils that are inundated or saturated on a nearly permanent basis throughout the growing season except during periods of extreme drought. Cypress-tupelo communities are ranked by the LNHP as G3 and G5 globally and with a S4 state ranking.



Established in 1807, Rapides Parish is located in central Louisiana and encompasses 1,362 square miles and has a population of over 131,000. While the actual geographic center of Louisiana is located in Avoyelles Parish to the southeast, Rapides Parish is often referred to as the center of the state because its largest cities, Alexandria and Pineville, are the hub for most transportation routes. Rapides Parish's economy, as measured by gross domestic product, grew by 38% between 2003 and 2007, with a total economic activity ranking of eleventh out of Louisiana's sixty-four parishes. In 2008, the City of Alexandria began to implement the largest reinvestment project in the city's history. The program, known as SPARC (Special Planned Activity Redevelopment Corridors), includes as much as \$100 million in infrastructure investments. This increased activity is resulting in the need for high quality mitigation within the Bayou Teche watershed, Red River basin and Bayou Boeuf sub-basins to offset unavoidable impacts to bottomland hardwood wetland community types due to regional development and infrastructure improvements and to support a growing need for industrial and oil and natural gas pipeline development throughout Louisiana. The Turtle Bayou Mitigation Bank will provide a significant amount of high quality mitigation within the Bayou Teche watershed and larger Red River basin.

Total Maximum Daily Loads (TMDLs) were developed for Bayou Boeuf from its headwaters to its confluence with Bayou Cocodrie. Impairments due to both point and non-point source loading are associated with agricultural and urban land uses resulting in the development of TMDLs for several parameters including total dissolved solids and total suspended solid (TDS and TSS), dissolved oxygen, nutrients, and fecal coliform. The local watershed surrounding and including the proposed mitigation bank contributes to both agricultural and urban runoff received by Bayou Boeuf. The proposed mitigation bank, through conversion of agricultural lands to forested wetland, is expected to provide and enhance certain biogeochemical processes including attenuation, transformation, and storage of certain pollutants that may contribute to the reduction of TMDL pollutants within Bayou Boeuf.

In terms of wildlife usage, the endangered Louisiana black bear is known to occur frequently in both the southern and central parts of the bank's proposed primary and secondary service areas (**Figure 4**) and Rapides Parish is listed as having "occasional sightings". The United States Fish and Wildlife Service recognizes critical black bear habitat occurring through much of the secondary service area extending from Saint Marie Parish to Des Orses Swamp at the southern reaches of the Red River northward to the confluence of the Red River with the Mississippi River and the Grassy Lake Wildlife Management Area. The Site will provide valuable habitat along Bayou Boeuf that, in combination with nearby public lands, will function as part of a significant landscape corridor to facilitate movement and re-patriation of the black bear within the greater Red River basin.

Restoration of this Site specifically will provide for 1) the restoration of declining and imperiled habitat types within the Bayou Teche and greater Atchafalaya-Vermillion and Red River watersheds, 2) high-quality habitat for wetland dependent wildlife and wildlife requiring mature

forested ecosystems including the Louisiana Black Bear, 3) improvements in the hydrologic connectivity of Bayou Boeuf to its floodplain and water quality discharges into Bayou Boeuf through agricultural ditch backfilling, restoration of historic drainage patterns, and breaching of surrounding levees, 4) increased flood storage and water quality treatment via overland flow of non-point source runoff associated with agricultural activities; and finally, 5) improved wildlife dispersion and genetic diversity through landscape corridor and connectivity functions resulting from the interconnection and preservation of large tracts of forested wetland habitat within close proximity to Bayou Boeuf .

### **III. PROPOSED SERVICE AREA**

The Turtle Bayou Mitigation Bank is located within Bayou Teche HUC cataloging unit (08080102) covering 2210 square miles and within the larger Atchafalaya-Vermilion (080801) accounting unit covering 5900 square miles. The Bayou Teche cataloging unit will serve as the proposed primary service area while the secondary service area will consist of the larger Atchafalaya-Vermillion accounting unit.

Together the primary and secondary service areas are located within a contributing drainage area that includes portions of Rapides, Avoyelles, Evangeline, Point Coupee, St. Landry, Lafayette, St. Martin, Iberia, Vermillion, St. Mary, and Iberville Parishes (**Figure 4a**). Regionally, the contributing drainage area provides habitat corridors that extend predominantly north to south throughout the proposed service areas supporting the movement and reproductive success of Louisiana black bear in this region, as depicted in **Figure 4b**. As noted previously, black bear are known to occur frequently in both the southern and central parts of the primary and secondary service areas and Rapides Parish is listed as having “occasional sightings.

Major water resources within the contributing drainage area include Bayou Boeuf, Bayou Teche, Bayou Robert, Bayou Cocodrie, Bayou Courtableau, and portions of the Red River. With reconversion of the bank to natural wetland habitat, improved water quality discharges are expected to result from natural biogeochemical processes such as uptake, transformation, attenuation and storage of many of the TDML parameters established for the bank’s receiving water, Bayou Boeuf, thereby potentially reducing pollutants into downstream receiving waters Bayou Cocodrie and the Red River. From a watershed perspective, as detailed above in the discussion of the bank site’s location and regional significance, the proposed service area of the bank is hydrologically and ecologically supported through the Site’s ability to provide valuable landscape corridor connectivity for the endangered Louisiana black bear between surrounding public lands within upstream and downstream cataloging units, and through the Site’s potential to provide water quality treatment from upstream sources feeding Turtle Bayou and Bench Slough as well as improve water quality discharges from the site into Bayou Boeuf and the greater Atchafalaya-Vermillion and Red River watersheds.

## **IV. BACKGROUND AND CURRENT SITE CONDITIONS**

### **A. Baseline Ecological Condition**

The Site is predominantly agricultural lands maintained and managed for rice and crayfish production. By 1978, the site was cleared, drained, and ditched prior to federal wetlands regulation. Currently, and for the last 30 years, the site was farmed for a commodity crop (cultivated rice) under a USDA program deeming the area exempt from Section 404 of the Clean Water Act under the authority of the 1985 Food Security Act. The Site consists of a total of 270.7 acres, the majority of which is comprised of agricultural land (267 acres) classified as Prior Converted Wetlands (PC) by the NRCS. An estimated 33.5 acres of the Site is jurisdictional wetland and waters of the United States, with the remaining acreage composed of agricultural fields, levees, and roads. Of the jurisdictional acreage, 3.7 acres consists of a remnant bottomland hardwood forest in the southwest corner of the site associated with Bayou Boeuf. The remaining 29.8 acres consists of jurisdictional waters of the United States and includes a shallow agricultural reservoir with scattered cypress and emergent wetland vegetation in the northwest corner of the site, the remnant, dredged portions of Bench Slough and Turtle Bayou, and other contiguous agricultural ditches.

A series of constructed levees extend north to south throughout the site to establish individual cells that may be flooded and drained as needed to facilitate agricultural activities. A portion of Turtle Bayou extends through the center of the site and was dredged to control water elevations for agricultural production and for water storage purposes. Turtle Bayou and Bench Slough were also completely dredged for agricultural management purposes. Bench Slough and Turtle Bayou were altered from their natural course and now serve to convey drainage from the various cells to the re-directed Bench Slough ditch to the north along the bank property boundary, and ultimately to Bayou Boeuf to the south. A constructed levee and ditch also extends along the southern property boundary conveying water to the west and ultimately, to Bayou Boeuf located further to the south of the Site.

### **B. Soils**

The Site is mapped by the NRCS as occurring within the Moreland-Latanier and Moreland soil associations. Specifically, the site is mapped predominantly as Moreland clay, 0 to 1 percent slopes, occasionally flooded (MoA) (**Figure 5**). This soil map unit is described as somewhat poorly drained hydric soils occurring at low elevations on the Red River alluvial plain. Areas of the site associated with Bench Slough are comprised of Moreland clay, 0 to 1 percent slopes, frequently flooded (MrA) and are also described as somewhat poorly drained hydric soils occurring at low elevations on the Red River alluvial plain. Because rice and crayfish production require extended periods of flooding throughout both the winter, spring and summer growing seasons, pumping and flooding of the site has continued to maintained the hydric soil character within the Prior Converted Wetland areas of the site despite the degree of hydrologic alteration and being heavily tilled. Mr.

David Templet of D&S Environmental Services (DSES) previously confirmed the presence of hydric soils within jurisdictional areas of the Site.

### **C. Surrounding Land Use**

The majority of the nearby land use is forested wetland, WRP conservation lands, cultivated crop lands, improved pasture, and low intensity development. **Figure 6** presents USGS classified surrounding land use within a half-mile of the Site. Specifically, surrounding land use consists predominantly of nearly 700 acres of woody wetlands and 500 acres of shrub/scrub wetland. Surrounding land use was field verified during site visits conducted on December 9, 2009 and March 10-12, 2010.

### **D. Existing Hydrology**

The Site is located within a contributing drainage area that includes the Bayou Teche HUC cataloging unit (08080102) covering 2210 square miles within the larger Atchafalaya-Vermilion (080801) accounting unit, which encompasses a drainage area of 5900 square miles. The Site occurs predominantly within the 100 year floodplains of Bayou Boeuf, located southwest of the property, Turtle Bayou located to the north, and Robert Bayou to the east (**Figure 7**). The dominant drainage features on the site consist of the extensively altered Turtle Bayou extending north and south through the center of the site and the re-directed Bench Slough, extending east to west as a perimeter ditch and levee system (**Figure 8**).

The Site hydrology has been extensively altered from a natural condition to facilitate management of the Site for agricultural production of rice and crayfish. Turtle Bayou extends in a north-south direction through the center of the Site and has been dredged and leveed for use as an agricultural reservoir. A pump station and gated culverts control the transfer of water to and from Turtle Bayou and Bench Slough along the north property boundary, and with an unnamed pair of parallel ditches and levees along the southern property boundary. Bench Slough had once connected with Turtle Bayou near the center of the Site and extended to the northeast and offsite to Plantation Slough. Bench Slough was filled and replaced with a series of “step levees” extending from Turtle Bayou northeast to the Site’s northern boundary where the Bench Slough flow was leveed and redirected to form a pair of parallel ditches along the north property boundary. The northernmost of the two ditches that make up the redirected Bench Slough is located offsite and flows to the west and around the western property boundary to the south and eventually to Bayou Boeuf. The onsite portion of the redirected Bench Slough flows to the west and is leveed off from a direct connection with a dredged and leveed pond in the northwest corner of the Site. The pond was historically part of a larger wetland slough system that connected Turtle Bayou with Bayou Boeuf to the south. A tributary to Plantation Slough was historically located offsite in the eastern half of the contiguous, adjacent property and flowed to the north to Plantation Slough. This feature was dredged and leveed to form a reservoir that is controlled with gated culverts and a riser pipe that connects to the northern east west ditch now located within a hydrologic servitude granted to the Sponsor for

restoration purposes. This ditch flows to the west and connects through gated culverts with the redirected Bench Slough to the west.

In addition to the alterations to Turtle Bayou and Bench Slough, the site is made up of a levee network from north-to south partitioning the Site into several rectangular plots or cells that are alternately flooded and drained to facilitate rice and crayfish production. Each of the levees that extend to the north and south intersect with the levees of the perimeter ditch system. Water elevations in each of the rectangular plots is controlled using a pump and gravity flow water management system to variously flood or drain them, as required. Water distribution and drainage is controlled by levees, perimeter ditches, French drains and gate-valve culverts, which control flow into and between cells as well as discharge to the north or south perimeter ditches. Surface water input to the site is currently controlled by a large surface water pump located in the south central levee road/boundary at the old discharge point of Bench Slough and distributed and manipulated as needed via the gated control structures and culverts.

Water entering the southern perimeter ditch system is conveyed westward toward the southwest corner of the Site. Any discharge or movement of water from the Turtle Bayou-Bench Slough system into the northern perimeter ditch is also conveyed to the west toward a large ditch paralleling I-49 that directly discharges into Bayou Boeuf. The fragmented, remnant forested wetland in the southwest portion of the site is currently hydrologically cut-off from the remainder of the site by a large levee running from the northwest property boundary southeast and ties into the southern perimeter road/levee.

Under the currently managed scenario, all drainage on the Site is conveyed to the west and ultimately to Bayou Boeuf. Plantation Slough, located offsite to the east, drains offsite to the north through a metal overflow stand-pipe and then flows westerly through the northern perimeter ditch that converges with the re-directed and ditched portion of Bench Slough, which continues to convey flow westerly and discharging to the large ditch paralleling I-49 and Bayou Boeuf.

Hydrologic input onto the Site currently consists of rainfall, pumped surface water, or overbank flooding events from Bayou Boeuf large enough to back-up through the I-49 ditch and western perimeter ditch. Overland flow from the north is now intercepted by the northern perimeter ditch and re-directed portion of Bench Slough. Any surface water flow that historically entered the site from the south is now intercepted by the southern boundary ditch and conveyed to the west, eventually discharging to Bayou Boeuf via the western boundary ditch and large ditch paralleling I-49. Overbank flooding from Bayou Boeuf also provides significant hydrologic input to the western portion of the site during spring and fall flooding events. Overbank flooding is able to access the site via the perimeter ditch at the western bank boundary, which is connected to the I-49 ditch and Bayou Boeuf at high water levels.



The NRCS characterizes this area as receiving a mean annual precipitation ranging from 43-73 inches. Moreland series soils are somewhat poorly drained with runoff and permeability characterized as very slow by the NRCS. A seasonal high water table is common at a depth of 1 to 3 feet below the surface during the winter and early spring. As a result, these soils are often saturated to slightly inundated, and are suitable for the re-establishment of cypress-tupelo and bottomland hardwood and wet hardwood flatwood community types. The water holding capacity, capillary action, and relatively homogenous soil structure in the clayey soils found throughout the site should maintain inundated and saturated conditions sufficient to support hydrophytic vegetation throughout the Site post hydrologic restoration. Wetland hydrology currently persists in areas claimed as jurisdictional wetlands. The historic and current agricultural water management regimen with major and minor ditching has effectively altered the wetland hydropattern for the majority of the Site.

There are no known, existing hydrologic disturbances either on or adjacent to the Site over which the Sponsor will not have control. The landowner has granted a 100 foot hydrologic conveyance easement to the Sponsor on the northern perimeter ditch for the portion not within the bank boundary to facilitate restoration activities. All on-site hydrologic conveyances are fully owned and controlled by the landowner, and will be controlled by the Sponsor during development of the Site.

Historically, hydrology to the Site was supplied by seasonal flooding events of Bayou Boeuf, and the direct surface water flow and seasonal flooding events of Turtle Bayou and Bench Slough as they existed historically flowing through the Site. Based on the historic aerial information available, the flat topography of the area, and the predominately hydric, clayey silt loam soils, we determined the site historically supported bottomland hardwood and hardwood flatwood wetland community types. The historic depressional wetlands and the deeper Slough systems within the Site likely maintained wetter cypress-tupelo wetland community types with longer hydroperiod durations prior to ditching, leeving and leveling. The observation of cypress-tupelo in the remnant historic drains that persist offsite to the north and south, and the extensive presence of hardwood flatwoods to the north and south of the site further corroborate that both cypress-tupelo and bottomland hardwood community types historically occurred on the Site. Additionally, standing water on the Site historically persisted longer after rainfall events, and contributed to the offsite flow of Turtle Bayou and Bench Slough. The Site ditching efficiently conveys surface water from the Site as channelized flow when drained for farming operations. The perimeter ditching effectively intercepts water that would normally find its way into the existing natural depressional areas and floodplain flats topography of the Site. Because the Site is managed as a rice and crayfish farm, water is artificially staged up within the cells throughout the growing season; however, this artificial, managed hydrology and intensive farming have eliminated forested wetland function from the Site.

The proposed hydrologic restoration plan will effectively restore historic hydrologic conditions by backfilling excavated internal ditching, removing internal levees, breaching levees associated with the perimeter ditches to the west, north and south to allow the conveyance of historic surface water flow from Turtle Bayou and Bench Slough through the site. Stream restoration of the historic stream profiles and channels of Turtle Bayou and Bench Slough, to the extent practicable, and fixed elevation weirs on the western end will also restore historic overbank flooding from Bayou Boeuf and Turtle Bayou as well as historic internal surface water drainage patterns. Removal of internal levees and ditches will additionally restore historic overland flow conditions through the site. The hydrologic restoration will also increase water storage and hydroperiod durations such that the net effect will be hydroperiod durations and stages conducive to the re-establishment of the bottomland hardwood community types and associations proposed for restoration.

#### **E. Existing Vegetative Communities**

Non-jurisdictional areas of the Site consist of cultivated rice (*Oryza sativa*), open water and/or tilled soil. The forested jurisdictional wetland in the southwest is dominated by sugarberry (*Celtis laevigatus*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and scattered nuttall oak (*Quercus nuttallii*) in the overstory with saplings of the same species occurring in the shrub layer. The herbaceous layer is nearly devoid of vegetation other than occasional occurrences of dwarf palmetto (*Sabal minor*). Several species of woody vine occur throughout the wetland including poison ivy (*Toxicodendron radicans*), trumpet creeper (*Campis radicans*), and rattan (*Berchemia scandens*). Giant cutgrass (*Zizaniopsis miliacea*) and water lettuce (*Pistia stratiotes*) are common throughout the perimeter ditching bordering the Site. Scattered bald cypress (*Taxodium distichum*) is present along the edge of the agricultural reservoir in the northwest.

#### **F. Existing Wetlands**

Approximately 33.5 acres of existing forested wetlands and waters of the United States occur on-site. The initial on-site wetland delineation was performed by Mr. David Templet of D&S Environmental Services, Inc (DSES). An approved USACE jurisdictional determination for the Turtle Bayou Mitigation Bank and the adjacent contiguous portion of property to the east, collectively referred to as the Bryant Site, was received on April 7, 2010 and is provided as an **Attachment** to this prospectus. The jurisdictional determination extended outside the Site boundaries and included wetlands and waters of the United States located within a one-hundred foot hydrologic conveyance servitude that extends along the northern Site boundary, but still within property owned by the same landowner. The jurisdictional wetlands located on the Site are limited to the forested wetland in the southwest corner of the site. Surface waters classified as waters of the United States include Turtle Bayou, the northern and western perimeter ditches (re-directed Bench Slough), the southern perimeter ditch, and the agricultural reservoir in the northwest corner of the property.

## V. MITIGATION ACTIVITIES AND CONCEPTUAL RESTORATION PLAN

### A. Wetland Mitigation Types

The mitigation types proposed for the Site will result in a total mitigation acreage of 250.7 acres consisting of forested wetland re-establishment, rehabilitation, and enhancement. The existing gas pipeline servitude extending from the southwest to the northeast is not included within the total mitigation acreage. Of the 250.7 acres of mitigation proposed, the Sponsor proposes to provide restoration for a total of 247.0 acres of wetlands to be composed primarily of bottomland hardwood floodplain forest, wet hardwood flatwoods, and cypress-tupelo community types. Of the 247.0 acres of restoration, the Sponsor proposes to re-establish 218.9 acres of primarily bottomland hardwood floodplain forest within existing farmed agricultural areas, and rehabilitate 28.1 acres of existing surface waters into cypress-tupelo wetlands in the redirected Bench Slough ditch, northwest corner pond, and ditches along the west and southern property boundaries. Of the 28.1 acres of rehabilitation, 3.0 acres will be restoring, to the extent practicable, the excavated and leveed portions of Turtle Bayou. Of the 218.9 acres of re-establishment proposed, 2.6 acres will be the restored stream channel of the historical Bench Slough and the hydrologic connection with Turtle Bayou. The proposed Turtle Bayou rehabilitation and Bench Slough re-establishment will consist of cypress-tupelo wetlands within and along the channel, and bottomland hardwood wetlands within the lower floodplain areas adjacent to the channels. After restoration of the stream channels and profiles, re-establishment and rehabilitation will be accomplished through both the vegetative and hydrologic restoration activities detailed below.

Additionally, the Sponsor proposes to enhance 3.7 acres of existing bottomland hardwood wetlands by improving the hydrologic connectivity with Bayou Boeuf and re-integrating this existing wetland with the Site. **Figure 9** presents the mitigation types and estimated acres proposed for the Site. Please note that these acreages are approximate and may be subject to change.

### B. Hydrologic Restoration

The overall objective of the hydrologic restoration plan is to restore a more natural, seasonal hydrologic variation and flow pattern across the entire site and to reestablish historic conveyance of drainage and flood waters associated with Turtle Bayou and Bench Slough through the site. Conveyance of flood waters into the Site associated with overbank flooding of Bayou Boeuf will be enhanced through the setting of fixed-elevation conveyance structures on the western boundary of the site (**Figure 10**), and at the levee on the northeast boundary of the remnant, existing bottomland hardwood floodplain wetland in the southwest corner of the Site. The conceptual hydrologic restoration plan presented in **Figure 10** will also address modification and restoration of internal surface water flow patterns associated with Bench Slough and Turtle Bayou, and overland flow through the Site through removal of the current internal man-made levee system. A Construction Permit application is currently being prepared and is submitted concurrently with this Prospectus for hydrologic restoration work within proposed jurisdictional wetlands and surface waters.

Engineering drawings consisting of specific cross sections and construction details of the proposed work and conveyance structures were prepared by a Professional Engineer licensed in the State of Louisiana and are submitted with the required construction permit application.

Internal levees that serve to separate the site into rectangular fields will be removed and used to backfill internal ditching to allow for unimpeded overland flow throughout the Site between fields. Strategic breaching of the internal perimeter levees will also restore historic surface water flow through the site via restoration of Turtle Bayou and Bench Slough, as well as other minor historic conveyances that formerly flowed through the site from the north and east. These breeches will reestablish historic surface water flow onto the site and historic hydrologic connections. Specifically, the following improvements are proposed that will ultimately result in the complete hydrologic restoration of the site:

The northern perimeter ditch levee will be breached to restore hydrologic connectivity between the Site and the redirected Bench Slough. The levee at the western end of the north perimeter ditch will be breached to connect the ditch with the northwest corner pond. The internal levee east of the western Site boundary and north of the southern Site boundary will also be breached to provide connectivity and rehabilitation of Waters of the U.S. along the western and southern Site boundary into cypress-tupelo wetlands. Material from internal levees will be used to backfill the western and southern perimeter ditch to increase the elevation of the ditch bottom to facilitate re-vegetation with species typical of cypress-tupelo wetlands within the ditch. An additional breach along the west levee of the ditch, just north of the remnant bottomland hardwood forest in the southwest corner of the Site will provide connectivity offsite to a ditch that connects to the southwest corner wetland and Bayou Boeuf.

The hydrologic servitude located offsite to the northeast will be utilized to allow for re-establishment of hydrologic connectivity to the forested wetland and Plantation Slough offsite to the north east. The historic channel of Bench Slough, can then, to the extent practicable, be restored at the location of the stair-step ditch and levee, and reconnected into Turtle Bayou.

### **C. Vegetative Restoration**

The Site will be planted at a minimum density of 538 trees per acre with a mixture of species typical of cypress-tupelo and bottomland hardwood communities found on floodplain flats, and major and minor bottoms. **Table 1** lists hard mast and soft mast canopy and sub-canopy species chosen for the reforestation efforts. The species that are proposed for planting are typical of cypress-tupelo, bottomland hardwood floodplain forest and wet hardwood flatwoods community types. **Table 2** lists the dominant and subdominant species expected from both planting and natural recruitment from nearby cypress-tupelo, bottomland hardwood floodplain and flatwood seed sources. Planting stock will be 2-3 foot bare root seedlings planted on 9 foot centers.

Major species' associations typical of cypress tupelo, bottomland hardwood floodplain forest and wet hardwood flatwoods community types and the topographic positions they occupy in the landscape are the basis for the planting zones depicted in **Figure 11** and outlined in **Tables 1 and 2**. The topographic positions of the various proposed planted species is intended to mimic the natural landscape, composition and spatial distribution associated with each species' physiology as well as their saturation/inundation preference for this region. Sound guidelines for restoring bottomland hardwood forests authored by Allen et al. (2001) were published through the United States Geological Survey technical report series, and were recently revised in 2004. This guidance provides a wealth of direction for determining species placement per topographic zone relative to their flood/saturation tolerance, and provides descriptions for major species' associations typical of bottomland hardwood wetlands. Inundation tolerance and topographic position are the basis for the planting zones depicted.

Determination of species placement within the planting zones was also based on community descriptions for bottomland hardwood floodplain forest and wet hardwood flatwoods from the *Natural Communities of Louisiana* electronically published by the LDWF and LNHP. Species associations, as depicted in the planting zones outlined in **Figure 11** are taken from Table 14.1 of Allen et al. (2001) *A Guide to Bottomland Hardwood Restoration* and from the community descriptions published by LDWF and LNHP referenced above. However, certain species that can occur over a wider range of hydrologic conditions, or which have a greater range of inundation and/or saturation tolerance may be planted within several topographic or hydrologic zones to establish greater diversity throughout the extent of the Site.

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**Table 1: Canopy and Understory Species Selected for Reforestation of the Turtle Bayou Mitigation Bank**

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<b>Hard Mast Species</b>	<b>Soft Mast Species</b>
Nuttall Oak ( <i>Quercus texana</i> )	Baldcypress ( <i>Taxodium distichum</i> )
Bitter Pecan/Water Hickory ( <i>Carya aquatica</i> )	Green Ash ( <i>Fraxinus pennsylvanica</i> )
Overcup Oak ( <i>Quercus lyrata</i> )	Red Maple ( <i>Acer rubrum</i> ) or Swamp Red Maple ( <i>Acer rubrum</i> var. <i>drummondii</i> )
Willow Oak ( <i>Quercus phellos</i> )	American Elm ( <i>Ulmus americana</i> ) or Cedar Elm ( <i>Ulmus crassifolia</i> )
Laurel Oak ( <i>Quercus laurifolia</i> )	Water Tupelo ( <i>Nyssa aquatica</i> )
Water Oak ( <i>Quercus nigra</i> )	Common Persimmon ( <i>Diospyros virginiana</i> )
Pin Oak ( <i>Quercus palustris</i> )	Swamp Tupelo ( <i>Nyssa sylvatica</i> var. <i>biflora</i> )

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**Table 2: Selected Species by Planting Zone for the Turtle Bayou Restoration Site**

<b>Species Association/Planting Zone<sup>a</sup></b>	<b>Dominant Species</b>	<b>Subdominant Species or Associates</b>	<b>Acres</b>
Cypress-Tupelo	Bald Cypress Water Tupelo	Swamp Tupelo Green Ash Swamp Red Maple	30.7
Elm-Ash-Sugarberry	American Elm Green Ash Sugarberry	Overcup Oak Nuttall Oak Water Hickory Willow Oak Common Persimmon Water Oak	97.6
Overcup Oak-Bitter Pecan	Overcup Oak Bitter Pecan/Water Hickory Nuttall Oak	Willow Oak American Elm Red Maple Common Persimmon Water Oak Pin Oak Laurel Oak	118.7
<b>Total Acres Planted</b>			<b>247.0</b>

<sup>a</sup>Species association as defined in **Figure 11**

Site preparation will consist of burning, disking or sub soiling should the Site exhibit heavily compacted soils. Site preparation will take place no more than 6 months prior to planting during the December 15<sup>th</sup> to March 15<sup>th</sup> planting season. Trees will be placed in the appropriate planting zone by a biologist or certified forester, and hand planted in the planting zones identified in **Figure 11**. If present, removal of noxious nuisance and exotic species that could compromise the restoration effort will be done prior to planting, and the Site will be maintained to a nuisance and exotic species level of less than 5 % coverage. Designated hydrologic modifications for each phase will be completed prior to the planting effort.

#### **D. Monitoring Plan**

1/20<sup>th</sup> of an acre circular monitoring plots for every 10 acres of restored and enhanced acreage will be established immediately after planting and will provide as-built and time-zero monitoring data for the planted restoration area. All seedlings within each plot will be tagged. The time zero report will inventory number of species, tree height and diameter for planted species within each plot, and will be provided with the first annual monitoring report required by the USACE after MBI approval and issuance. The monitoring plan will be able to demonstrate the success of the mitigation effort and quantify improvement in wetland ecological functional lift. All required monitoring,

maintenance, and reporting activities, as well as remedial actions will be performed by Ecosystem Renewal, LLC.

Appropriate water level monitoring devices (staff gages, piezometers, lysimeters or tensiometers) will be established at appropriate locations. Select gauges may be outfitted with electronic, automatic recording equipment to measure real-time water level fluctuations at periodic intervals. Water level measurements during the first year will be conducted at an appropriate frequency until targeted hydrologic success is demonstrated. Relative standing water level measurements, if present, will also be taken during annual vegetative monitoring events at all sampling plots. Water levels will be plotted and analyzed for seasonal high water stages and hydroperiod duration and, if appropriate, frequency of inundation. Local precipitation data and stream gauge data for surrounding area water resources such as Bayou Boeuf that are in close proximity to the mitigation bank will be obtained from the USGS or any other federal, state or local government entities, once quality assured, and will be utilized in the hydrologic analysis to determine success of the mitigation efforts.

Each of the established survey plots will be sampled on an annual basis in the spring. Groundcover within the established plots will be sub sampled using an appropriate and representative number of randomly selected 1m<sup>2</sup> sampling quadrats. The following parameters will be recorded for each survey plot:

1. survival rate (mortality and survivorship of seedlings)
2. tree density per species,
3. tree height,
4. diameter at breast height (dbh),
5. crown condition,
6. viability status (as defined by Conner et al. 2002)
7. Percent cover of species for each vegetative stratum
8. Total percentage “facultative, facultative-wetland, and obligate” and total percentage “facultative-upland and upland” species in each vegetative stratum
9. Recruited species count
10. Targeted nuisance and exotic species and percent cover for each stratum

Mortality and survivorship will be determined by counting the number of live, stressed and dead planted trees for each planted species within the survey plot. Mortality for each planting zone will then be estimated from the survey plot data. A general reconnaissance of the Site will also be performed to determine if the survey plot data is representative of the Site, or if there are any areas of abnormally high mortality. In addition, a cursory examination of each planting zone will be performed to determine overall survival rate and identify any dead spots. At each annual monitoring event, recruited species in each sampling plot will be identified and counted. Targeted, undesirable nuisance or exotic species type and cover for each stratum present will be estimated within each survey plot for item (10) above, as well as by visual estimation throughout the site. Areas requiring treatment will be treated prior to the next monitoring event. Permanent

photographic stations will also be set-up at representative, elevated areas and at each survey plot. Baseline panoramic photos will be taken immediately after planting, with photos taken thereafter during each annual vegetative monitoring event. Hydrologic conditions and signs of wildlife use and observed wildlife will also be documented during each annual monitoring event.

#### **E. Maintenance Plan**

Semi-annual surveying and treatment of nuisance/exotic species will be performed by means of mechanical and/or chemical control. Additionally, low-intensity prescribed fires prior to planting may be conducted to control competing nuisance/exotic herbaceous and woody vegetation and provide an immediate nutrient source for planted seedlings. Inspection of all permanent hydrology controlling features, ditch blocks or levee breaches for erosion or instability will also be performed during each annual monitoring event, and repair/stabilization will be conducted as necessary.

Should evidence of destructive deer, feral pig, beaver and/or nutria foraging activity be observed, wire fencing or protection devices may be installed around tree seedlings in an effort to control damage to seedlings from foraging, rubbing or rooting. Additionally, the permanent hydrology controlling feature or perimeter levee breaches may be constructed up to six to nine months after planting to decrease the likelihood of nutria and beavers being able to enter the Site, thereby giving seedlings time to establish (Allen et al. 2001).

Should drought conditions result within the first year of planting, temporary irrigation measures may be taken to assist in the establishment and proper rooting of planted seedlings. Artificial irrigation will not be used under any circumstance to create the targeted hydrologic regime proposed by the hydrologic restoration efforts.

Turtle Bayou Mitigation, LLC will not be responsible for replacement of seedlings or trees when mortality is due to an Act of God or other force majeure event that occurs after the initial, permitted success criteria are met. In the event of such mortality, Turtle Bayou Mitigation, LLC will retain a registered and licensed forester to determine if an Act of God or other force majeure has occurred.

### **VI. FUNCTIONAL EVALUATION OF ECOLOGICAL BENEFIT**

We propose to perform a Wetland Value Assessment (WVA) and/or Modified Charleston Method (MCM) assessment to quantify the expected ecological functional gain that will be provided by the mitigation activities proposed. The WVA assessment will be performed according to guidance published January 10, 1994 by the Louisiana Department of Natural Resources. The MCM analysis will be performed according to guidance published by the NOD entitled *Modified Charleston Method Guidebook for the Use of the Excel Workbook*. The MCM assessment will score the entire mitigation acreage for all parameters except for the kind/location scenarios, thereby giving a baseline credits/acre for each type of mitigation proposed by the Turtle Bayou Mitigation Bank.

## **VII. OWNERSHIP AND CONTROL**

### **A. Sponsor Qualifications and Contact Information**

The subject property is owned fee-simple by Mr. William Bryant and Central Rice Farms, LLC. The mitigation bank will be owned and operated by Turtle Bayou Mitigation, LLC, an Ecosystem Renewal, LLC affiliated company. The principals, members, and managers of Ecosystem Renewal, LLC have extensive experience in environmental services, ecological restoration, engineering, construction, silviculture, and business management. All project construction; monitoring and short-term management will be accomplished by Ecosystem Renewal LLC, with E Sciences, Inc. providing all permitting and technical support. E Sciences, Inc. and individual members of E Sciences provide mitigation and restoration consulting services to numerous mitigation service providers, have permitted numerous publicly and privately owned on-site and off-site mitigation areas, and worked in the public regulatory arena permitting mitigation banks for over 15 years. Ecosystem Renewal, LLC has successfully permitted or is currently permitting mitigation banks in the USACE-Vicksburg District, the USACE-New Orleans District, the USACE-Galveston District and the USACE Jacksonville District. To date, permitted banks with approved MBI's operated by EcoSystem Renewal, LLC include the Zachary Mitigation Bank near Baton Rouge, Louisiana, the Missouri Loop Mitigation Bank in Morehouse Parish, Louisiana, and the Shreveport Mitigation Bank near Bossier City, Louisiana. Contact information for the Sponsor, landowner and agent is provided below:

- Sponsor – Turtle Bayou Mitigation, LLC, Danny Moran, 2040 Steele Boulevard, Baton Rouge, LA 70808; Phone: 225-387-1289; Email: steeleblvd@gmail.com.
- Landowner – Mr. W.R. (Ronnie) Bryant and Central Rice Farms, LLC; 132 Jenkins Road, Alexandria, LA 71302 & (318) 715-5893
- Agent – E Sciences, Incorporated, Peter K. Partlow, P.E., 34 E Pine Street, Orlando, FL 32801; Phone:407-481-9006;

### **B. Long-Term Protection**

Other than a seventy-two (72) foot wide gas pipeline servitude that exists on the property beginning from the north central part of the northern property boundary and extending southeast to the southern property boundary, the Sponsor has full control over the mitigation bank property. The pipeline servitude includes overlapping portions of a fifty (50) foot wide servitude used by Exxon and a thirty (30) foot wide servitude used by Tex Gas. There is an eight (8) foot overlap of these two servitudes resulting in the total seventy-two foot wide servitude. None of the acreage composing the pipeline servitude is proposed as mitigation, nor will the servitude area be planted. Long-term protection of the site will be established through a conservation servitude granted to an appropriate third-party land trust or other not-for-profit agency whose primary purpose is the long-term protection of natural and native lands.

There are no other liens, encumbrances or easements on any portion of the bank property. A title opinion by a licensed and qualified attorney of law will be provided once the Sponsor is informed by the USACE that we may proceed with submittal of a draft mitigation banking instrument and draft conservation servitude. Any portion of the Site that will be placed under a conservation servitude will have any exceptions of title that are not acceptable to the CEMVN cancelled or subordinated to the conservation servitude. The existing pipeline servitude will be lessened and excepted from the conservation servitude area. Recordation and restrictions of the conservation servitude will be subject to requirements of the MBI.

**C. Financial Assurances**

Turtle Bayou Mitigation, LLC will establish financial assurances according to 33 CFR Parts 254 and current New Orleans District policy. The short-term construction, maintenance and monitoring and long-term management draft financial assurance mechanisms will be submitted with the draft MBI.

**D. Contingency Measures**

Remedial actions and contingency measures will be in accordance with the approved MBI. In the event of a catastrophic or force majeure event, as determined by the CEMVN and IRT, and that affects the long term viability of the mitigation bank, the CEMVN and IRT can ensure that the appropriate corrections occur by directing Turtle Bayou Mitigation, LLC, the designated Long-Term Steward or the designated Third Party to implement an adaptive management plan or corrective measures. The corrective measures implemented will be funded by a release of either escrow or stand by trust funds for administering the short-term construction and maintenance financial assurances, or funds from the long term management fund. We propose that any unspent funds remain in the long term management fund for long-term management of the Site, if not utilized to repair Turtle Bayou Mitigation Bank from a catastrophic or force majeure event. This long-term management fund will be transferred to the designated Long-Term Steward, landowner or other appropriate third party for use in addressing any future catastrophic events or long-term land management requirements once all monitoring is completed and all credits are released for sale. We understand that if the CEMVN or IRT believes that Turtle Bayou Mitigation, LLC or the Long-Term Steward is not being prudent in complying with the terms and intent of the approved MBI, the CEMVN will provide written notice to Turtle Bayou Mitigation, LLC or the Long-Term Steward that includes a detailed description of the basis for any presumed non-compliance.

In the event that Turtle Bayou Mitigation, LLC or the Long-Term Steward are found to be in non-compliance by the CEMVN or IRT, the responsible party will institute a CEMVN and/or IRT approved adaptive management plan and submit a written corrective action plan to the CEMVN and IRT for review and approval. The corrective action plan will, at a minimum, identify the cause of the non-compliance, the remedial measures necessary, and a time line for implementing remedial measures to bring the Turtle Bayou Mitigation Bank into compliance. To the extent practicable, the CEMVN and IRT will approve or disapprove the corrective action plan within forty-five (45) days

of receipt, provided that sufficient information and acceptable measures are contained within the plan.

Should Turtle Bayou Mitigation, LLC or the Long-Term Steward be placed in non-compliance and either does not provide the adaptive management plan or does not implement the features of the corrective action plan within the time frame specified by the CEMVN and IRT, all or a portion of the funds in the escrow account will be released to a third party designated by the CEMVN or IRT at the time of default to effect necessary corrections or acquire equivalent ecological value elsewhere.

## **VIII. LONG TERM MANAGEMENT**

The landowner, William Bryant and Central Rice Farms, LLC, or another appropriate third-party will be the designated Long-Term Steward charged with long-term management and maintenance responsibility once the permitted long term success criteria are attained. Long-term management responsibilities may also be transferred to the third-party conservation easement holder. The Long-Term Steward may be the recipient of the Long-Term Management Fund for use in addressing catastrophic events or land management requirements once long-term performance measures are achieved and all credits from the bank are released.

## IX. REFERENCES

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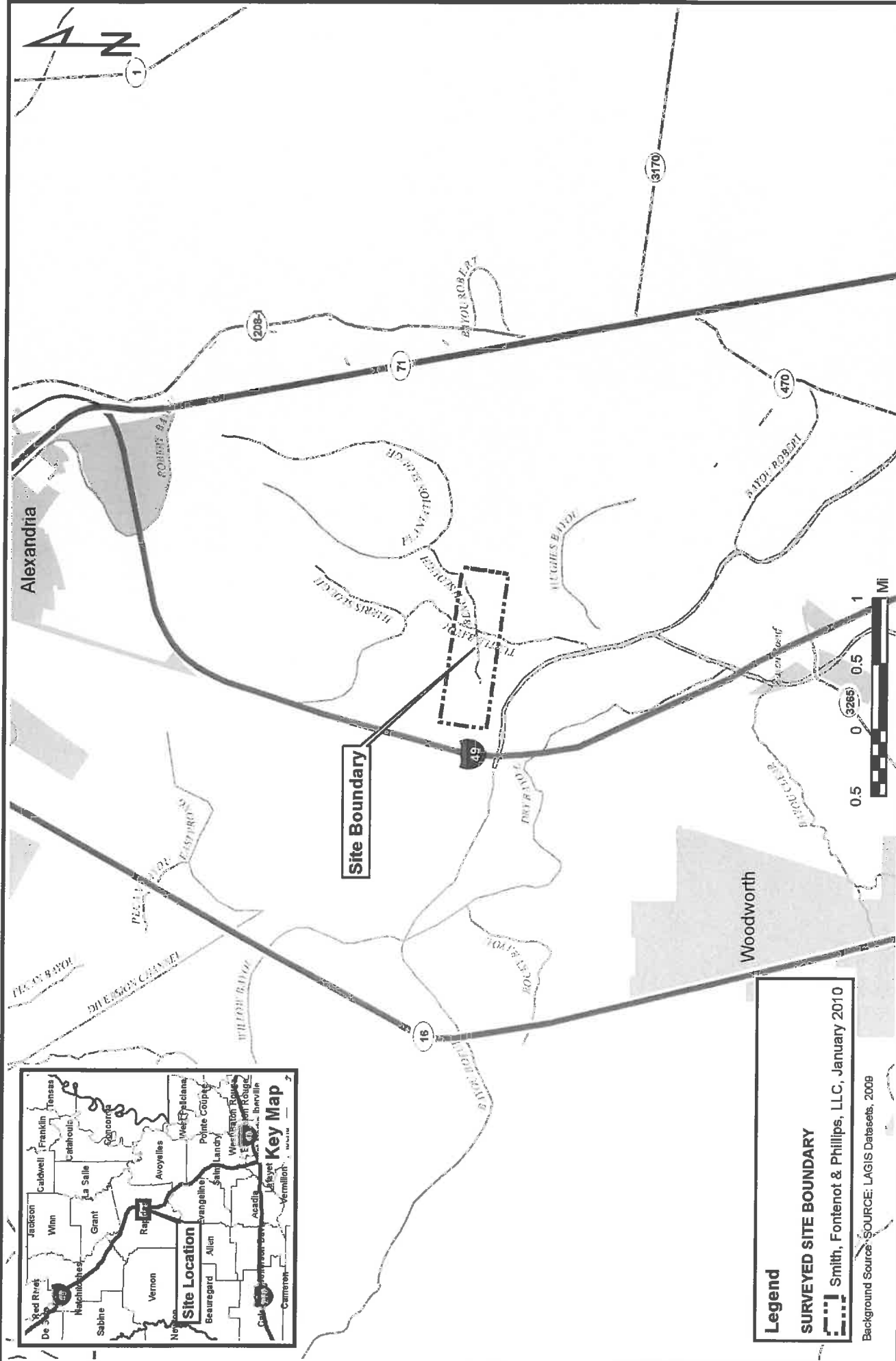
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URL: <http://www.cityofalexandrialala.com/home.asp> Accessed April 7, 2010

# FIGURES



**E Sciences**

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Orlando, Florida 32801  
www.esclencesinc.com  
Phone: 407-481-9006  
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**PROJECT NUMBER:**  
4-0047-002

**DRAWN BY:** RCO/TH

**CHECKED BY:** [Signature]

**Figure 1**

**Location Map**

**Turtle Bayou Mitigation Bank**

Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

**Legend**

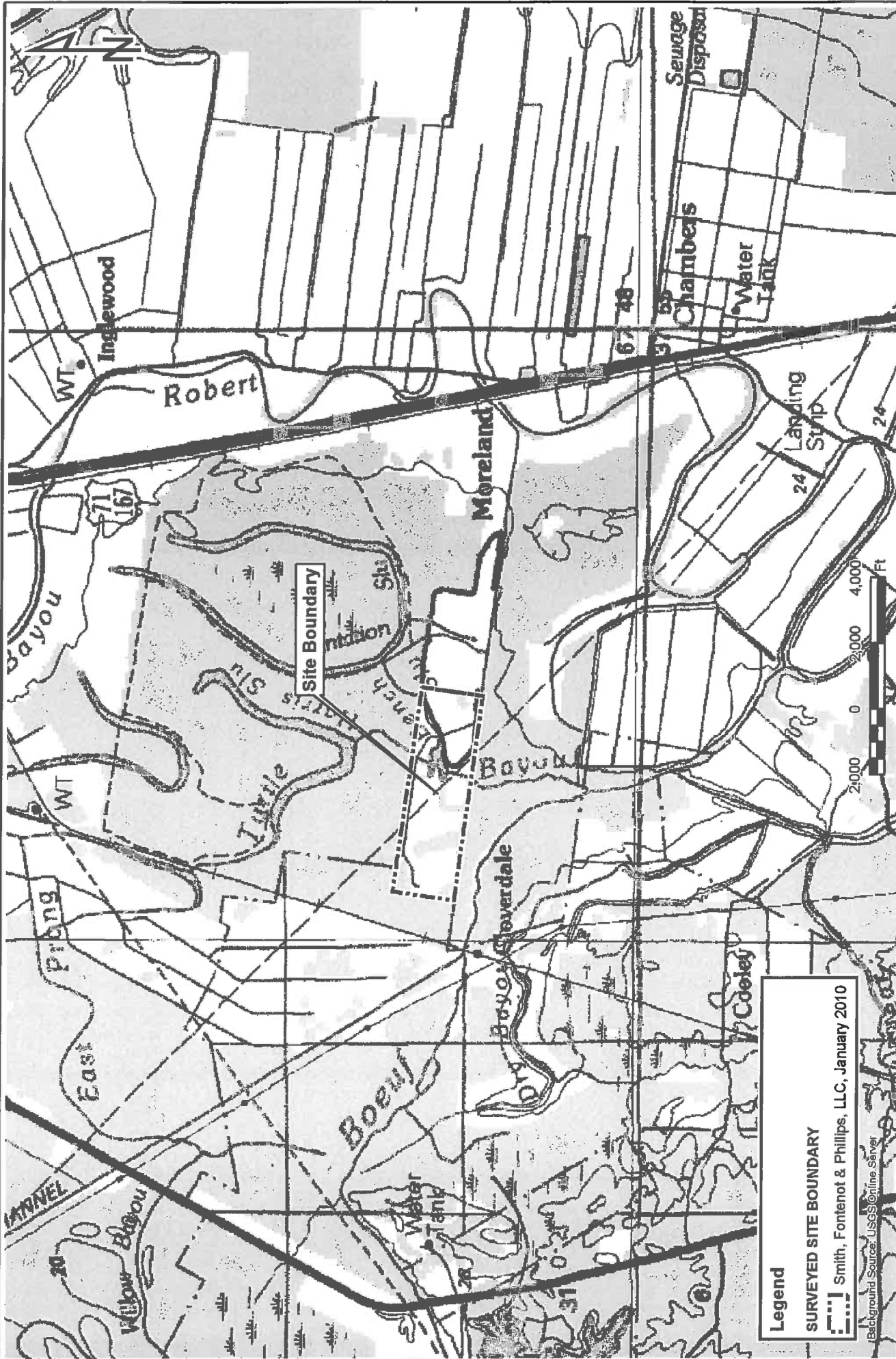
  **SURVEYED SITE BOUNDARY**

Smith, Fontenot & Phillips, LLC, January 2010

Background Source: SOURCE: LAGIS Datasets, 2009

**SCALE:** 1" = 1 Mi

**DATE:** 1/13/2011



**Legend**

**SURVEYED SITE BOUNDARY**

Smith, Fontenot & Phillips, LLC, January 2010

Background Source: USGS Online Server

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<b>Turtle Bayou Mitigation Bank</b>		
Latitude: 31.20°N Longitude: 92.46°W Sections 62, Township 3N, Range 1W Rapides Parish, Louisiana		
<b>USGS Topographic Map</b>	SCALE: 1" = 4,000 Ft	
<b>FIGURE 2</b>	DATE: 1/13/2011	
PROJECT NUMBER: 4-0047-002		



**Legend**

**SURVEYED SITE BOUNDARY**

Smith, Fontenot & Phillips, LLC, January 2010

Background Source: NAIP/USDA, 2009

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<h2 style="text-align: center;">Turtle Bayou Mitigation Bank</h2> <p style="text-align: center;">           Latitude: 31.20°N Longitude: 92.46°W            Sections 62, Township 3N, Range 1W            Rapides Parish, Louisiana         </p>				
<p><b>2009 Aerial Photograph</b></p>		<p>SCALE: 1" = 1,000 Ft</p>		
<p><b>FIGURE</b></p> <p style="font-size: 48pt; text-align: center;">3</p>		<p>DATE: 1/13/2011</p>		

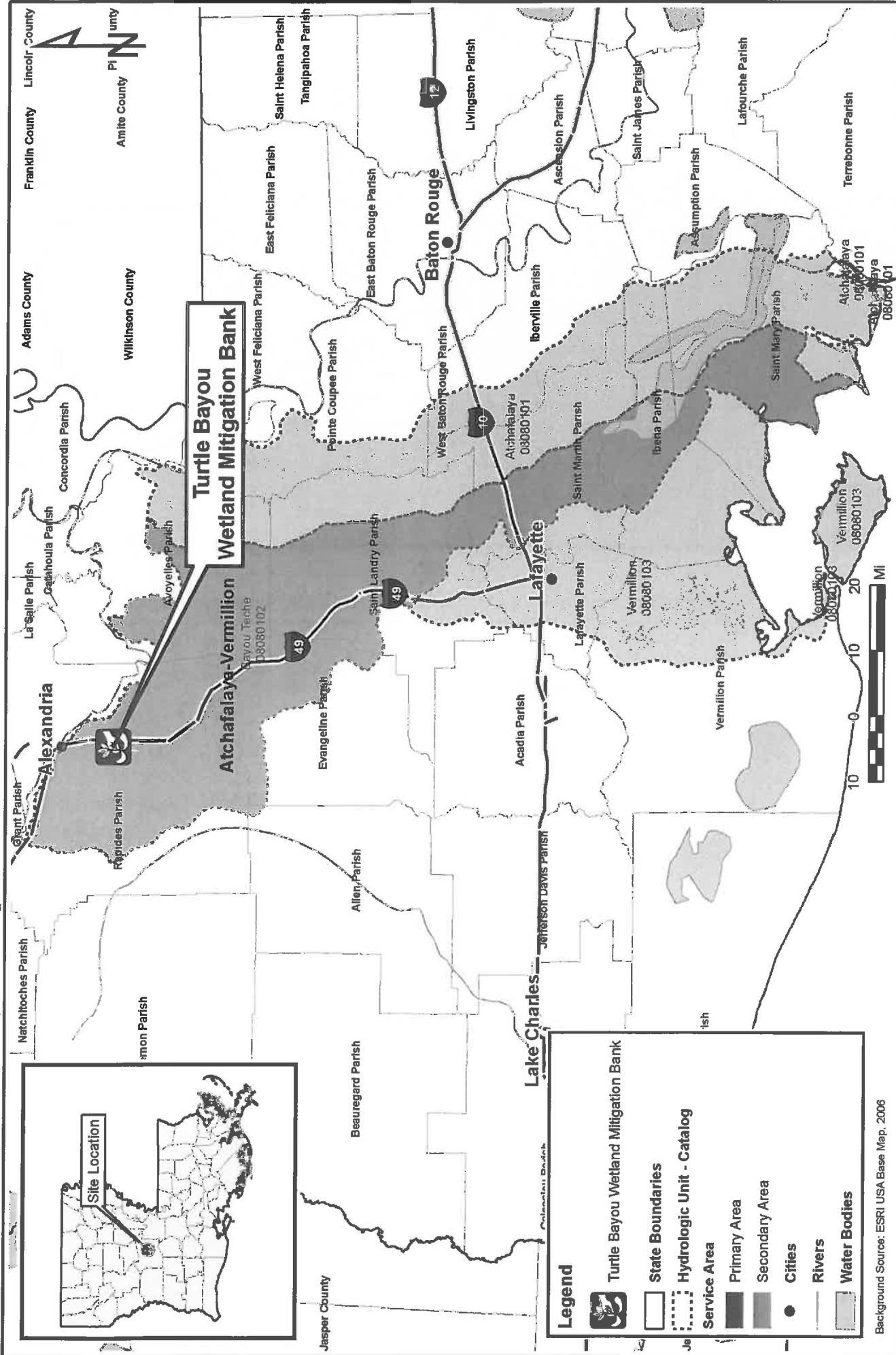


FIGURE  
**4A**

Service Area Map

SCALE: 1" = 20 MI  
DATE: 1/13/2011

## Turtle Bayou Mitigation Bank

Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana



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4-0047-002





### Legend

#### SURVEYED SITE BOUNDARY

Smith, Fontenot & Phillips, LLC, January 2010

#### Soils

Source: NRCS, USDA, 2008

Symbol	Name	Hydric
	MoA, Moreland clay, 0 to 1 percent slopes occasionally flooded, All hydric	
	MrA, Moreland clay, 0 to 1 percent slopes frequently flooded, All hydric	
	W, Water	

Background Source: NAIP, USDA, 2009

### Soils Map

FIGURE  
**5**

SCALE: 1" = 1,000 Ft

DATE: 1/13/2011

## Turtle Bayou Mitigation Bank

Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

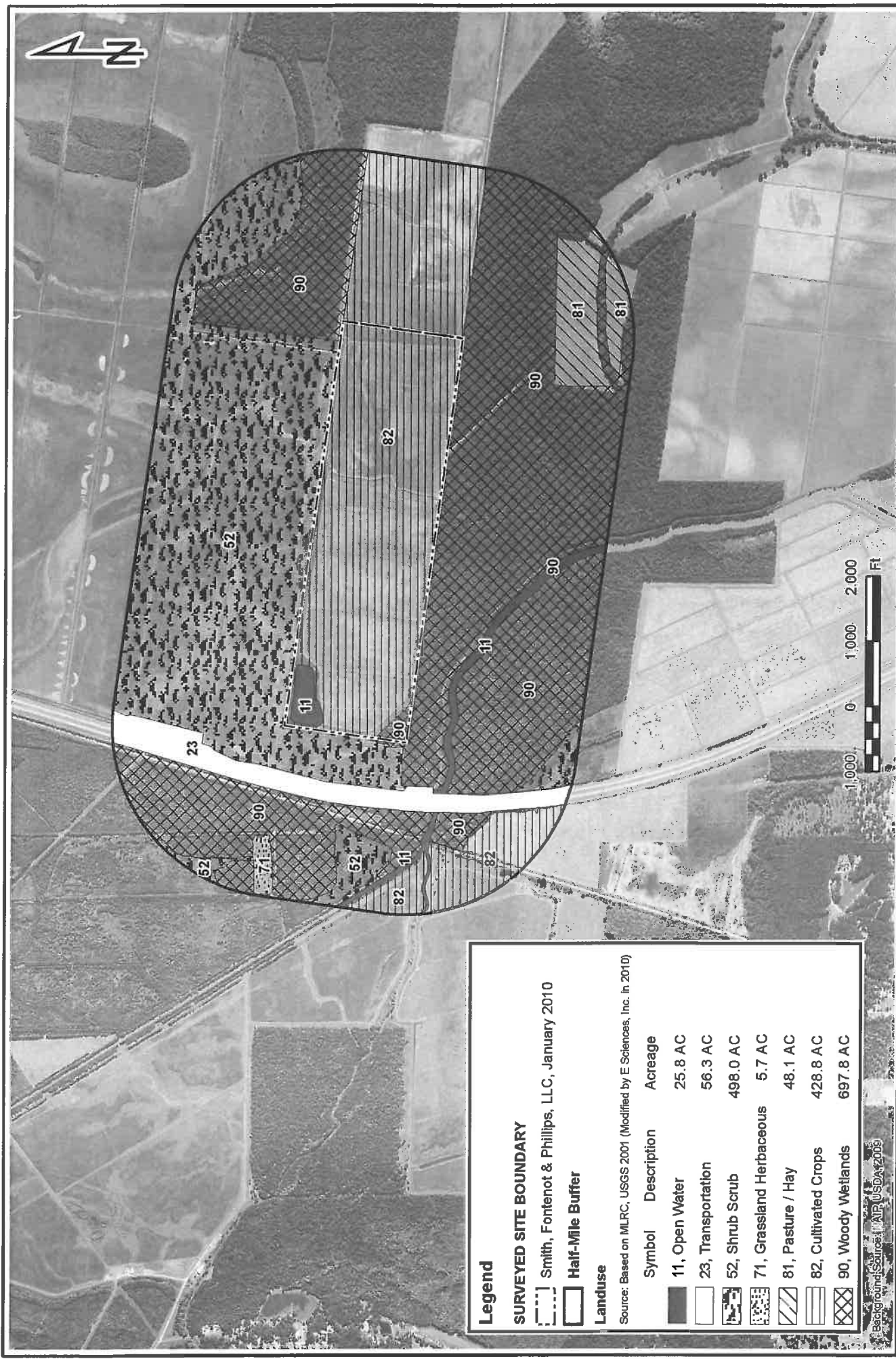


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**Legend**

**SURVEYED SITE BOUNDARY**  
[---] Smith, Fontenot & Phillips, LLC, January 2010  
[---] Half-Mile Buffer

**Landuse**

Symbol	Description	Acreage
[Solid Black]	11, Open Water	25.8 AC
[White]	23, Transportation	56.3 AC
[Cross-hatch]	52, Shrub Scrub	498.0 AC
[Diagonal Lines]	71, Grassland Herbaceous	5.7 AC
[Horizontal Lines]	81, Pasture / Hay	48.1 AC
[Vertical Lines]	82, Cultivated Crops	428.8 AC
[Grid]	90, Woody Wetlands	697.8 AC

Source: Based on MLRC, USGS 2001 (Modified by E Sciences, Inc. in 2010)  
Background Source: AIR, USDA 2006

**Figure 6**

**Land Use Map**

SCALE: 1" = 2,000 Ft  
DATE: 1/13/2011

**Turtle Bayou Mitigation Bank**  
Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

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**PROJECT NUMBER:**  
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**PROJECT NUMBER:** 4-0047-002





**Legend**

**SURVEYED SITE BOUNDARY**

— Smith, Fortenot & Phillips, LLC, January 2010

**Floodzones FEMA 1999**

A

X

Background Source: NAIP, USDA, 2009

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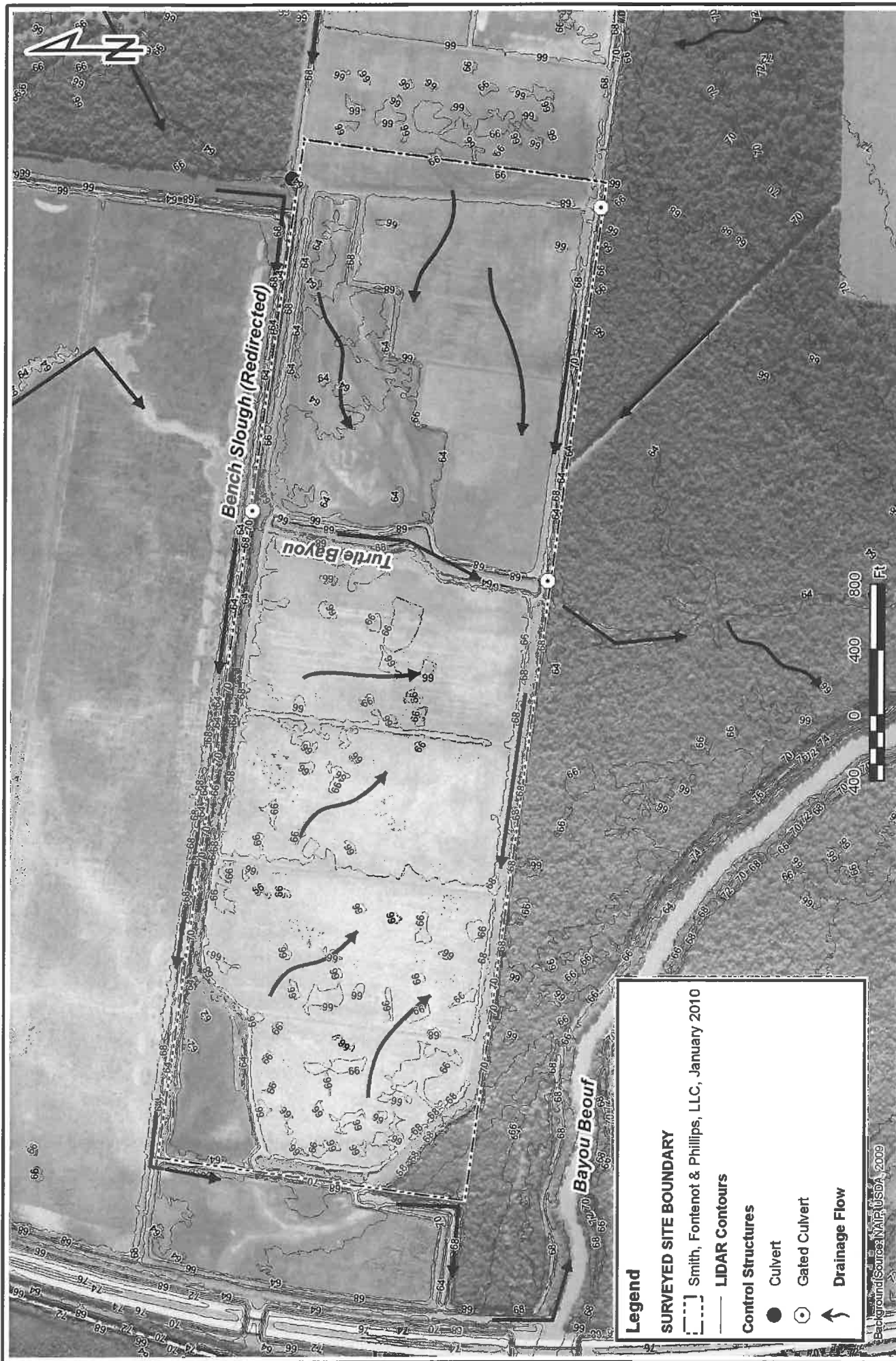
# Turtle Bayou Mitigation Bank

Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

## FEMA Floodplain Map

FIGURE  
**7**

SCALE: 1" = 2,000 Ft  
DATE: 1/13/2011





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PROJECT NUMBER: 4-0047-002	CHIEF BY: 
DRAWN BY: RCO/TH	

## Turtle Bayou Mitigation Bank

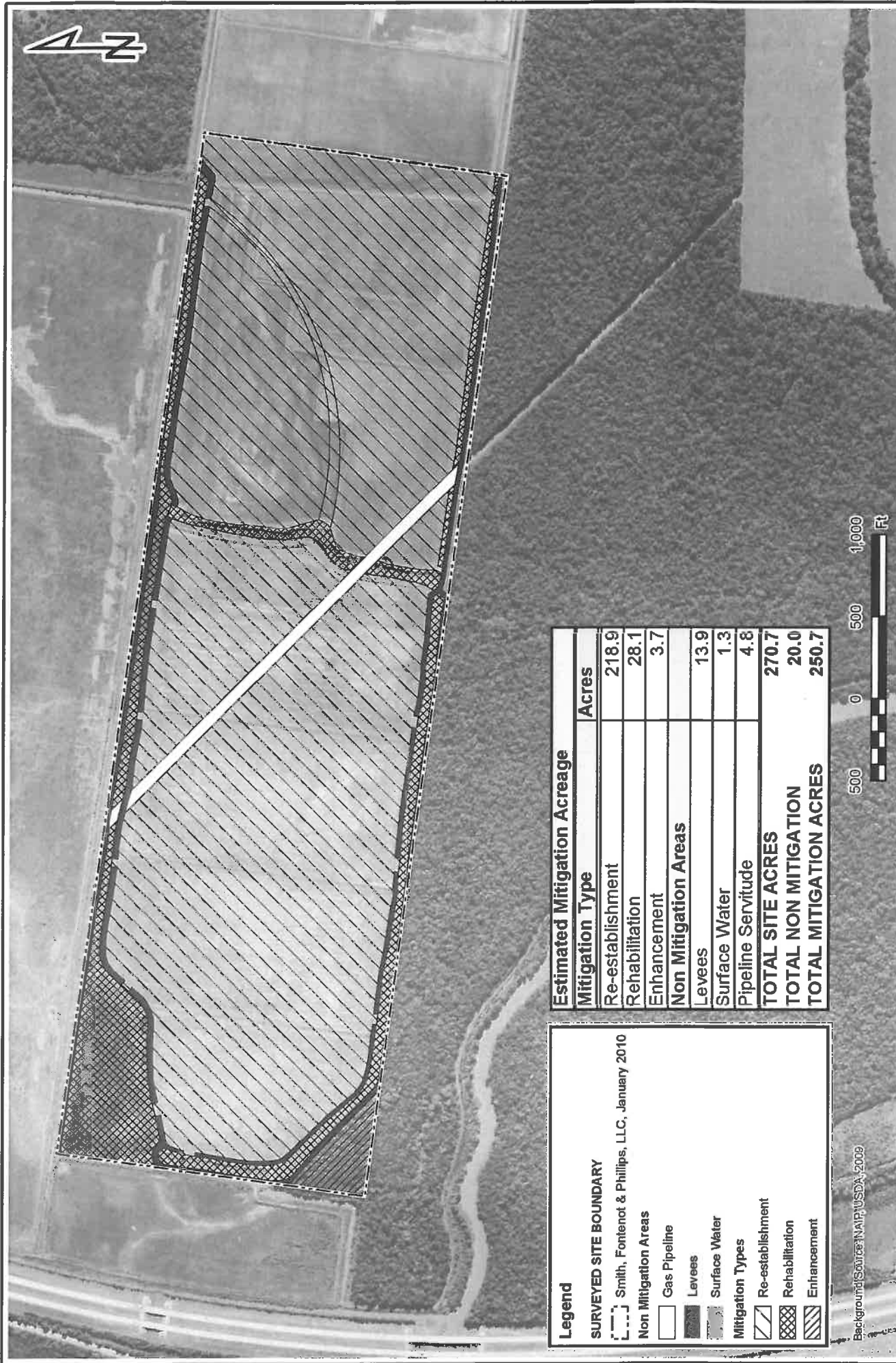
Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

### Current Drainage Map

FIGURE  
**8**

SCALE: 1" = 800 Ft  
DATE: 1/13/2011





**Legend**

**SURVEYED SITE BOUNDARY**  
 [---] Smith, Fontenot & Phillips, LLC, January 2010

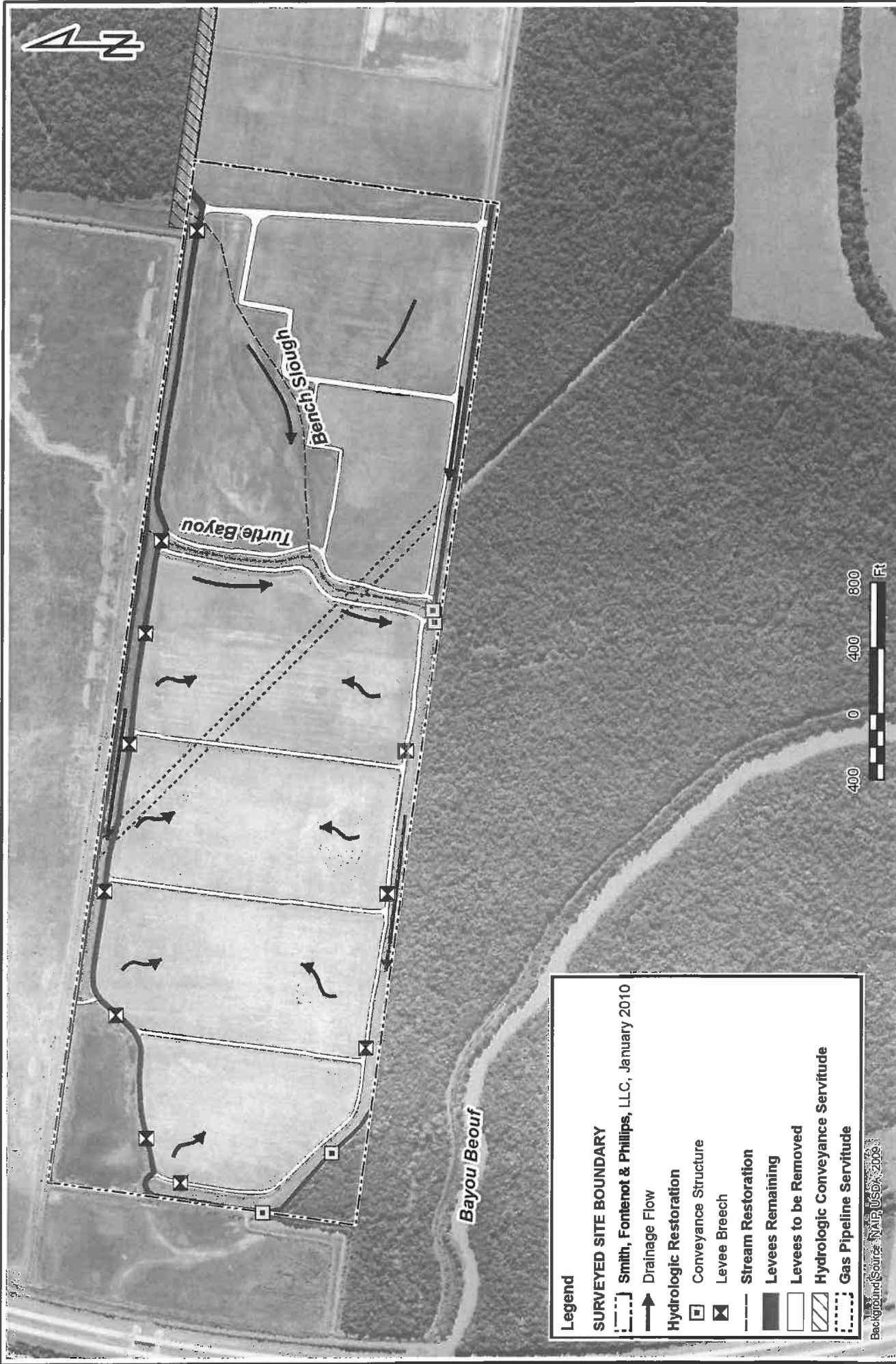
**Non Mitigation Areas**  
 [ ] Gas Pipeline  
 [ ] Levees  
 [ ] Surface Water

**Mitigation Types**  
 [ / ] Re-establishment  
 [ X ] Rehabilitation  
 [ \ ] Enhancement

Estimated Mitigation Acreage	
Mitigation Type	Acres
Re-establishment	218.9
Rehabilitation	28.1
Enhancement	3.7
<b>Non Mitigation Areas</b>	
Levees	13.9
Surface Water	1.3
Pipeline Servitude	4.8
<b>TOTAL SITE ACRES</b>	<b>270.7</b>
<b>TOTAL NON MITIGATION</b>	<b>20.0</b>
<b>TOTAL MITIGATION ACRES</b>	<b>250.7</b>

Background Source: NAIP, USDA, 2009

<p><b>Figure 9</b></p>	<p><b>Mitigation Types Map</b></p>		<p>DATE: 1/13/2011</p>
	<p><b>Turtle Bayou Mitigation Bank</b></p> <p>Latitude: 31.20°N Longitude: 92.46°W            Sections 62, Township 3N, Range 1W            Rapides Parish, Louisiana</p>		
<p>SCALE: 1" = 800 Ft</p>		<p>DRAWN BY: RCO/TH</p>	<p>CHECKED BY: [Signature]</p>
<p>E Sciences, Incorporated            LA Engineering, LLC, EF 3767            34 East Pine Street            Orlando, Florida, 32801            www.esciencesinc.com            Phone: 407-481-9006            Fax: 407-481-9627</p>		<p>PROJECT NUMBER: 4-0047-002</p>	



**Legend**

**SURVEYED SITE BOUNDARY**

Smith, Fontenot & Phillips, LLC, January 2010

**Drainage Flow**

**Hydrologic Restoration**

Conveyance Structure

Levee Breach

**Stream Restoration**

Levees Remaining

Levees to be Removed

Hydrologic Conveyance Servitude

Gas Pipeline Servitude

Background Source: NAIP, USGS, 2006

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By: RCO/TH

**Checked**  
By: [Signature]

**Project Number:**  
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# Turtle Bayou Mitigation Bank

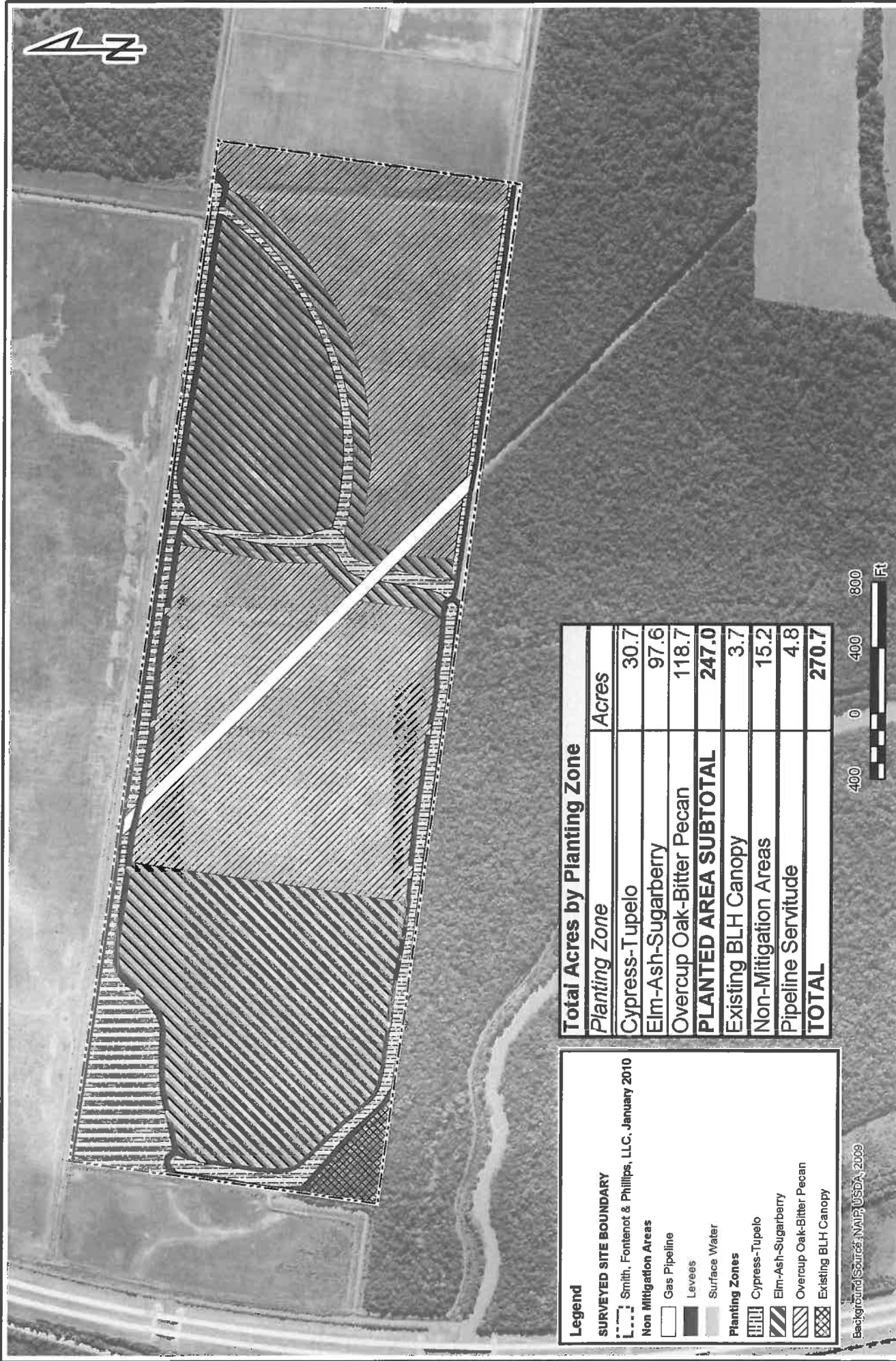
Latitude: 31.20°N Longitude: 92.46°W  
Sections 62, Township 3N, Range 1W  
Rapides Parish, Louisiana

## Hydrologic Restoration Plan

**FIGURE**  
**10**

SCALE: 1" = 800 Ft

DATE: 1/13/2011



**Legend**

**SURVEYED SITE BOUNDARY**  
 Smith, Fontenot & Phillips, LLC, January 2010

**Non Mitigation Areas**  
 Gas Pipeline  
 Levees  
 Surface Water

**Planting Zones**  
 Cypress-Tupelo  
 Elm-Ash-Sugarberry  
 Overcup Oak-Bitter Pecan  
 Existing BLH Canopy

Total Acres by Planting Zone	
Planting Zone	Acres
Cypress-Tupelo	30.7
Elm-Ash-Sugarberry	97.6
Overcup Oak-Bitter Pecan	118.7
<b>PLANTED AREA SUBTOTAL</b>	<b>247.0</b>
Existing BLH Canopy	3.7
Non-Mitigation Areas	15.2
Pipeline Servitude	4.8
<b>TOTAL</b>	<b>270.7</b>

Background Source: NAIP USDA, 2009

FIGURE  
**11**

Planting Zones Map

SCALE: 1" = 800 Ft  
DATE: 1/13/2011

## Turtle Bayou Mitigation Bank

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 Rapides Parish, Louisiana

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