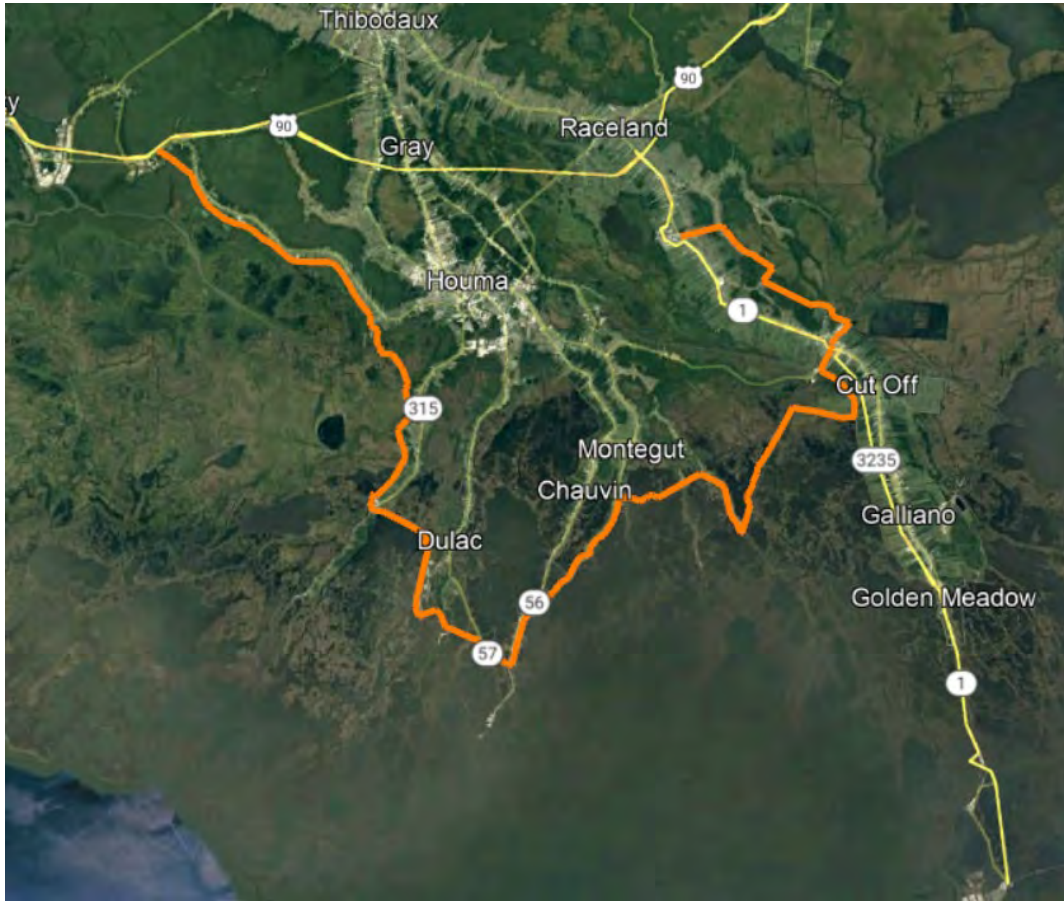


**MORGANZA TO THE GULF  
SURVEYS AND BORINGS ANALYSIS  
TERREBONNE AND LAFOURCHE PARISHES, LOUISIANA**



**APPENDIX E: AGENCY COORDINATION**

**From:** [nmfs.ser.esa consultations - NOAA Service Account](#)  
**To:** [Gunning, Kristin T MVN](#)  
**Cc:** [Naquin, Patricia Shoucair \(Trish\) CIV USARMY CEMVN \(USA\)](#); [Stiles, Sandra E CIV USARMY CEMVN \(USA\)](#); [Behrens, Elizabeth H CIV USARMY CEMVN \(USA\)](#); [Williams, Eric M CIV USARMY CEMVN \(USA\)](#)  
**Subject:** [Non-DoD Source] Re: Expedited Informal Consultation - Morganza to the Gulf Surveys and Borings Environmental Assessment  
**Date:** Wednesday, October 18, 2023 3:11:52 PM

---

National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division has received your request for Endangered Species Act Section 7 consultation. Your consultation request will be logged in and assigned to a Consultation Biologist in the order it was received. Consultation requests are assigned to the next available Consultation Biologist as workload allows. Once it is assigned you will receive an email from the Consulting Biologist notifying you of their contact information.

**Please note that we are running between 10-12 weeks between receiving the consultation request and assigning it to staff due to incompatible workload and staffing levels.**

The project has been assigned a tracking number in our NMFS Environmental Consultation Organizer (ECO), **SERO-2023-02587**. Please refer to the ECO tracking number if you should have any future inquiries regarding this project. ECO does not have current project status at this time.

If you have any questions about the status of your request, please reply to this email.

On Tue, Oct 17, 2023 at 11:37 AM Gunning, Kristin T MVN  
<[Kristin.T.Gunning@usace.army.mil](mailto:Kristin.T.Gunning@usace.army.mil)> wrote:

Good morning,

Please see attached ESA Letter for the Morganza to the Gulf Surveys and Borings Environmental Assessment in Terrebonne and Lafourche Parishes, Louisiana.

Thank you,

Kristin Gunning

Biologist, Environmental Studies Section

Regional Environmental Planning Division, South

USACE, New Orleans District



JOHN BEL EDWARDS  
GOVERNOR



ROGER W. GINGLES  
SECRETARY

**State of Louisiana**  
**DEPARTMENT OF ENVIRONMENTAL QUALITY**  
**ENVIRONMENTAL SERVICES**

**NOV 30 2023**

Mr. David Day  
U.S. Army Corps of Engineers, New Orleans District  
7400 Leake Avenue  
New Orleans, Louisiana 70118

AI No.: 101235  
Activity No.: CER20230003

RE: Morganza to the Gulf Borings and Surveys  
Water Quality Certification WQC 231130-01  
Lafourche and Terrebonne Parishes

Dear Mr. Day:

The Louisiana Department of Environmental Quality, Water Permits Division (LDEQ), has reviewed the application requesting authorization for surveys and borings needed to inform design of project features (levees, drainage structures, and floodgates) for Morganza to the Gulf (the Project). The project consists of the construction of 98 miles of levees, approximately 84 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees located in Lafourche and Terrebonne Parishes.

The information provided in the application has been reviewed to assess compliance with State Water Quality Standards, the approved Water Quality Management Plan and applicable state water laws, rules and regulations. LDEQ has complied with its public notice procedures established pursuant to Clean Water Act Section 401(a)(1). LDEQ determined that the requirements for a Water Quality Certification have been met. LDEQ concludes that the discharge of fill will not violate water quality standards as provided for in LAC 33:IX.Chapter 11. Therefore, LDEQ hereby issues U.S. Army Corps of Engineers, New Orleans District – Morganza to the Gulf Borings and Surveys Water Quality Certification, WQC 231130-01.

Should you have any questions concerning any part of this certification, please contact Elizabeth Hill at (225) 219-3225 or by email at [elizabeth.hill@la.gov](mailto:elizabeth.hill@la.gov). Please reference Agency Interest (AI) number 101235 and Water Quality Certification 231130-01 on all future correspondence to this Department to ensure all correspondence regarding this project is properly filed into the Department's Electronic Document Management System.

Sincerely,

Bliss M. Higgins  
Assistant Secretary

c: IO-W

ec: [david.j.day@usace.army.mil](mailto:david.j.day@usace.army.mil)

**From:** [Hughbanks, Paul J CIV USARMY CEMVN \(USA\)](#)  
**To:** [DCRT Section 106](#)  
**Subject:** USACE Section 106: Finding of No Historic Properties Affected – Geotechnical Survey and Borings for the Morganza to Gulf Project  
**Date:** Friday, November 3, 2023 9:54:10 AM  
**Attachments:** [Attachment 1 - Combined Map Survey Boring APE areas.kml](#)  
[Enclosure 1 - Overview Images.pdf](#)  
[Figure 1 - Overview Map of Morganza to the Gulf using 2021 Status.pdf](#)  
[SHPO Morganza to Gulf Survey and Borings - No Historic Properties Affected.pdf](#)

---

**EXTERNAL EMAIL** Please do not click on links or attachments unless you know the content is safe.

Hello:

Attached, please find a signed Conclusion of No Historic Properties Affected, for the Geotechnical Surveys and Borings related to the ongoing Morganza to the Gulf Project.

Please notify the Archaeologist or District Tribal Liaison with questions or comments. Their contact information follows: Dr. Paul Hughbanks, (504) 862-1100 or [Paul.J.Hughbanks@usace.army.mil](mailto:Paul.J.Hughbanks@usace.army.mil); Brian Ostahowski, MVN Archaeologist and District Tribal Liaison at (504) 862-2188 or [brian.e.ostahowski@usace.army.mil](mailto:brian.e.ostahowski@usace.army.mil).

Sincerely,

Paul Hughbanks

Archaeologist, Natural/Cultural Resources Analysis RPEDS, New Orleans District  
Office: 504-862-1100



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

November 3, 2023

Regional Planning and  
Environment Division, South  
Environmental Planning Branch  
Attn: CEMVN-PDS-N

Kristin Sanders, SHPO  
LA State Historic Preservation Officer  
P.O. Box 44247  
Baton Rouge, LA 70804-4241

**RE: Section 106 Review Consultation**

**Undertaking:** Geotechnical Surveys and Borings to Determine Alignments of the Mississippi River and Tributaries Morganza to Gulf of Mexico, Louisiana Project, Terrebonne and Lafourche Parishes.

**Determination:** **No Historic Properties Affected**

No known historic properties will be affected by this undertaking. Therefore, our office has no objection to the implementation of this project. This effect determination could change should new information come to our attention.

Kristin P. Sanders

State Historic Preservation Officer

Date 12/14/2023

Dear Ms. Sanders:

The U.S. Army Corps of Engineers (USACE), New Orleans District, has begun conducting alignment surveys and soil borings to inform choices related to the Mississippi River and Tributaries (MRT), Morganza to the Gulf of Mexico (MTG), Louisiana Project. USACE is evaluating the on-going Survey and Borings activities for impacts to recorded cultural resources.

As part of CEMVN's evaluation and in partial fulfillment of responsibilities under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act, CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in this letter to affect historic properties. Additionally, in accordance with the of responsibilities of Executive Order 13175, CEMVN offers Federally-recognized Tribes the opportunity to review and comment on the potential of the proposed undertaking described in this letter to significantly affect protected tribal resources, tribal rights, or tribal lands.

**Project Background**

The Morganza to the Gulf project consists of the construction of 98 miles of levees, approximately 84 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees (Figure 1). The majority of the remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation

Canal lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

The purpose of the Morganza to the Gulf project is to provide hurricane and storm damage risk reduction for the communities located within the levee system. The overarching goal is to reduce the risk to people and property within the vicinity of Houma, Louisiana. The project is needed because of the increasing susceptibility of coastal communities to storm surge due to wetland loss, sea level rise, and subsidence. This project represents an opportunity to reduce the risk of catastrophic hurricane and tropical storm damages by implementing an effective, comprehensive system for hurricane and storm damage risk reduction.

A Revised Programmatic Environmental Impact Statement (RPEIS) was completed for the overall MTG project in May 2013. The Record of Decision (ROD) was signed 9 December 2013. The RPEIS assessed both programmatic and constructible features for MTG. Constructible features included Reach F1, F2, G1, HNC Lock Complex and the Bayou Grand Caillou Floodgate. All other features and levee reaches were assessed programmatically and require further detailed evaluation pursuant to NEPA, Federal and State laws as well as Civil Works policies and guidance prior to construction.

According to the NEPA, the survey and boring program currently underway is considered a programmatic analysis and requires further environmental assessment /NHPA compliance before the federal action can be carried forward for construction.

### **Description of the Undertaking**

Survey and Borings have already begun in some portions of MTG. An Environmental Assessment (EA) is being written to address effects of necessary brush cutting done to conduct the surveys, or wetlands impacted by surveys and borings. This letter informs you of any known historic properties that are being avoided. This letter also provides you a Scope of Work for a Task Order that has been awarded and instructs cultural resources survey for Reach A of MTG, where survey and borings have not yet occurred. CEMVN also will invite you to participate in forming a Programmatic Agreement (letters inviting participation have not yet been posted) to most quickly respond to cultural resource needs, as well as to preemptively act where possible by conducting cultural resource survey with similar Task Orders in other Reaches of MTG.

MTG alignment surveys will provide comprehensive topographic, hydraulic, and subterranean maps to define the project baseline alignments, create necessary cross sections of levees and channels, locate specific features, and identify any utilities within the project work area. The surveys include identifying the centerline of the levees and/or structures and then using established vertical (elevation) and horizontal datums along

with high tech GPS enabled equipment to create 2D images with specific locations and shapes to be used to design and build the flood risk reduction structures. The primary effect of survey upon the landscape is clearing of vegetation to create lines-of-sight. Survey protocol would follow the guidelines of the least invasive method(s) necessary to complete the task. For the necessary survey points in any marsh areas, the surveyor will first attempt to capture the required survey points by foot or by using an airboat. If the data cannot be obtained with either of these methods, the surveyors would use an 8 ft wide Marsh Master vehicle to reach the sites.

Borings are also needed to facilitate the design of the levees, drainage structures, and floodgates. A soil boring is a 5-in diameter cylinder of soil acquired by using an instrument called a Thin Wall Shelby Tube which is attached to a rotating shaft and functions similar to a drill, but has a hollow center. The tube is rotated into the ground 3 ft at a time and is then retrieved and the undisturbed soil sample is removed in its natural state for laboratory testing. All soil borings would be drilled to an approximate depth of between 80 feet and 180 feet below the existing ground surface with a rotary drill rig. The holes created by the borings would be backfilled with a Bentonite clay slurry to return the soil to its pre-drilled volume.

A Cone Penetrometer Test (CPT) consists of using hydraulic pressure to push an approximate 1.50-in diameter, cone tipped rod into the ground. This instrument measures tip resistance, sleeve resistance, and pore pressure of the surrounding soil. The CPTs would be performed to an approximate depth of between 80 feet and 125 feet below the ground surface using an electronic piezocone penetrometer with a 10-cm<sup>2</sup> cross-sectional area. The holes from this process would be approximately 1.50-in diameter with no material removal and will close on their own.

### **Area of Potential Effects (APE)**

The APE is defined as all areas where surveys and borings are to occur (See Enclosure 1 for locations). Review of APE for borings activity, will elucidate need for further investigation before full compliance with NHPA can be met. Known resources and past investigations within each of the identified APE's are described below in the "Identification and Evaluation" portion of this letter. The APE totals approximately 3,000 acres and includes all direct and indirect effects from the Undertaking. Access routes are not included in this calculation, as they are either public roads or heavily used agricultural roads or waterways, and are not thought to bring potential effect to historic properties.

### **Identification and Evaluation**

Background and literature review has been conducted by USACE staff. Historic properties in the project vicinity were identified based on a review of the NRHP database, the Louisiana Cultural Resources Map, historic map research, and a review of cultural resources survey reports. Please see Attachment 1 (kml file) for each location



that can be imported for comparison to the Louisiana Cultural Resources Management Map.

#### GIWW East Floodgate

The GIWW East Floodgate requires approximately 380 acres of APE. The GIWW itself has been surveyed by Gagliano et al. (1975), at the reconnaissance and archival level. More recent cultural surveys investigated two pipelines that cross the GIWW near the proposed work (Boyko et al. 2019; Kelley et al. 2019). Additionally, there are at least 4 other cultural surveys (Heller et al. 2020; McIntire 1979; McIntire et al. 1981; Stout and Muller 1983; 22-6462) that cover portions of the area, although none have surveyed the eastern end of the proposed project area. These cultural surveys led to discovery of only one cultural resource within the alignment geotechnical APE. Site 16LF76 was recorded in 1975 and reported as a limited rangia shell deposit. Further testing in 1981 reported it as destroyed by development (CEI 1981). Site 16LF76, and two sites reported as prehistoric mounds but not within the current APE (16LF35 and 16LF36) indicate the need for further investigation in this area of MtG before any construction begins. However, no intact cultural resources exist within the APE for geotechnical survey and borings.

#### Lockport to Larose Reach 1

The Reach 1 portion for Lockport to Larose closely parallels the pipeline surveys of Boyko et al. 2019 and Kelley et al. 2019) at its western end. As the study area of Reach 1 continues east there is no further cultural survey overlap, and there are no cultural resources recorded.

#### GIWW West Floodgate

The GIWW West APE is approximately 680 acres. It is within the Mandalay National Wildlife Refuge and is bisected by the GIWW. Aside from the survey of the GIWW following its construction (Gagliano et. al. 1975), no cultural resource surveys have occurred in this area. As a result, there are no archaeological sites recorded in this location. However, Predictive Modeling studies and archival studies have been conducted for nearby to the APE, and do not give high probability to cultural resources within the current marshy environment of the APE. Prehistoric sites 16TR213 and 16TR197 (3 loci of site) are within one mile distant of the APE but are not within it. These sites indicate the need for further investigation in this area of MtG before any construction begins. However, no intact cultural resources exist within the APE for geotechnical survey and borings.

#### Minors Canal Floodgate

The Minors Canal APE is approximately 13 total acres in boundary size, which includes the area of survey lines and borings. Two Cultural Resource Records investigations as well as predictive modeling of this proposed survey location have occurred (Brown et al. 2000; Moreno et al. 2011). Additionally, historic map analysis suggest that a natural ridge (Bayou Mauvais Bois) exists west of the project area

although it is not within the current APE. Site 16TR215 exists on this ridge to the north, and Site 16TR213 exists to the south. These sites indicate the need for further investigation in this area of MtG before any construction begins. However, no intact cultural resources exist within the APE for geotechnical survey and borings.

#### Reach A Levee South of GIWW

Several cultural resources field investigations of the sites in the survey area (McGimsey 2001; Weinstein and Kelley 1989), as well as predictive modeling of the northern and southern portions of this proposed survey and borings location, have occurred (Brown et al. 2000; Moreno et al. 2011). There are four sites in the vicinity of the geotechnical survey and borings area: site 16TR215 (NRHP eligible) is in the upper portion of the reach near Minors Canal, but no borings are planned within the site boundaries. The other three sites 16TR3 (shell midden - destroyed), 16TR19 (NRHP eligible Mound site with Historic and Prehistoric components) and 16TR218 (Plaquemine village site and historic cemetery) are in the access areas that have been identified by their frequent and heavy use for previous agricultural activity, but would not be impacted as long as the current gravel roads are not augmented for the survey and borings. Future potential impacts from fill transport would likely inform a roadway redesign.

A Phase I cultural resources survey is underway that includes the APE for the Reach A Levee South of GIWW. Findings of the Phase I survey will be coordinated with SHPO and federally recognized Tribes.

#### Reach A Levee North of GIWW

Approximately 50% of the Reach A North of GIWW, overlaps previously cultivated land and has been previously disturbed. Although the northern portion of the reach has not been cultivated, a 2-track road enters that area from modern urbanization near Bayou Black. Also, this northern portion of the APE is slightly overlapped by Land Use Study conducted by Goodwin and Associates (Draughton et al. 1999).

Sites 16TR213 and 16TR215 exist within a mile to the east, and so there is known potential that other cultural resources may exist. These sites indicate the need for further investigation in this area of MtG before any construction begins. A Phase I cultural resources survey is underway that includes the APE for the Reach A Levee North of GIWW. Findings of the Phase I survey will be coordinated with SHPO and federally recognized Tribes.

#### Reach F

Reach F is approximately 8 miles in length and 320 acres in area, and is parallel to the Houma Navigation Canal between Falgout Canal Rd and Bayou Plat. There are two cultural resource surveys including Phase I examination (Kelley et al. 2009; Parrish et al. 2009), as well as another three reports of reconnaissance or predictive effort (Brown et al. 2000; Moreno et al. 2011; DeMarcay et al. 2016), that include the footprint of the proposed survey and borings location. There are no recorded archaeological sites in the footprint.

There is 100% Phase I cultural resources survey coverage of the current Reach F APE, and no further cultural resource investigations are identified as necessary within the APE at this time. The Scope of Work that will examine other areas of APE requiring cultural resources survey before construction begins, will include review of the records for Reach F and will revisit any further need for cultural resource investigations and make a recommendation.

#### Reach J2 Levee

Reach J2 spans the open waters of Wonder Lake between the Bayou Pointe Au Chein and Bayou Terrebonne landforms. It contains approximately 6 miles and 630 acres of APE. Two cultural resources records investigations as well as predictive modeling of this proposed survey locations have occurred (Brown et al. 2000; Moreno et al. 2009). There are no recorded sites in the footprint of the geotechnical survey and boring area. However, there are historic archaeological sites (16TR353 and Dugas Cemetery) located to the northwest straddling the Bayou Terrebonne levee ridge, and prehistoric archaeological sites (16TR310, 16TR33, and 16TR337) located to the southeast straddling the Bayou Pointe Au Chein levee ridge. These sites indicate the need for further investigation in this area of MtG before any construction begins, but they are not within the current APE for geotechnical survey and borings.

#### Shell Canal Floodgate Alignment

The Shell Canal Floodgate occupies approximately 55 acres of APE. There has been no Phase I cultural resources investigations within this study area. However, a reconnaissance-level land use study (Draughton et al. 1999) reviewed the area as part of a USACE channel improvement project. While no archaeological sites were recorded within the footprint of the survey area, the boundary of the historic Live Oak Cemetery is located only 65 feet outside the southwest corner of the survey area and will be avoided. The central portion of the survey area appears disturbed due to the development of the Shell refinery, but both the eastern and western portions appear minimally disturbed.

#### Shell Canal Floodgate Alternative Alignment

The Shell Canal Floodgate Alternative occupies approximately 64 acres of APE. There has been no Phase I cultural resources investigations within this study area. However, a reconnaissance-level land use study (Draughton et al. 1999) reviewed the area as part of a USACE channel improvement project. While no archaeological sites were recorded within the footprint of the survey area, the boundary of the historic Live Oak Cemetery is located only 65 feet outside the northwest corner of the survey area and will be avoided. The proposed borings south of the Shell refinery are located in a wooden, undisturbed area.

#### SUMMARY

The possible impacts that can be caused by geotechnical surveys and borings are small. While not all areas of APE containing survey and borings has been surveyed

by Phase I standards, there are numerous reconnaissance studies, archival studies, and predictive model studies that cover the APE. Also, many portions of the APE have been developed by agricultural activities, and have seen effects from these that are more spatially invasive than survey and borings. There are no subsurface impacts to historic properties within the current APE.

### **Assessment of Effects**

According to NHPA, cultural resources survey or equivalent data would be completed and reviewed before geotechnical survey and borings were begun. Results of cultural surveys would be shared with SHPO and Federally-recognized Tribes, and effects to historic properties would be coordinated. However, due to a rapidly evolving and changing schedule for Morganza to Gulf, USACE has begun data collection to aid decisions about levee alignment.

Based on the information presented in this letter, USACE has determined that there are no identified historic properties directly within the surveys and borings area. Furthermore, the potential impacts to any undetected cultural resources is of low potential, similar to pre-existing agricultural activities. As such, the USACE has made a determination of **no historic properties affected** as a result of this undertaking. At the same time, the USACE recognizes that concluding for no historic properties affected due to surveys and borings, will not allow that same conclusion for actual construction of the Morganza to Gulf levee reaches. Instead, review for this specific undertaking has initiated a more thorough knowledge of future cultural resources survey needs, as well as potential historic properties requiring additional investigation.

The current project for geotechnical survey and borings will be subject to the standard change in scope of work, unexpected discovery, and unmarked human burial sites act provisions. USACE requests your comments within 30 days.

We look forward to your concurrence with this determination. Should you have any questions or need additional information with this undertaking, please contact Dr. Paul Hughbanks, Archaeologist; U.S. Army Corps of Engineers, New Orleans District at (504) 862-1100 [paul.j.hughbanks@usace.army.mil](mailto:paul.j.hughbanks@usace.army.mil); or Brian Ostahowski, Archaeologist and Tribal Liaison at (504) 862-2188 [brian.e.ostahowski@usace.army.mil](mailto:brian.e.ostahowski@usace.army.mil).

Sincerely,

ERIC M. WILLIAMS  
Chief, Environmental Planning Branch

CC:File

An electronic copy of this letter with enclosures will be provided to the Section 106 Inbox, section106@crt.la.gov.

### **Sources Cited**

Boyko, Wayne, P. Cropley, R. Hale, K. Morgan, S. Smith

2019 *Phase I Cultural Resources Inventory of the Proposed LOCAP to St. James and Swordfish Pipeline Projects, St. James and Lafourche Parishes, Louisiana*. (State Report 22-6228)

Brown, C.T., D.D. Davis, J. Granberry, R. Saucier, L.A. Berg, C. Herman, J.C.G. Miller, J. Pincoske, S.B. Smith, P.P. Robblee, and W.P. Athens

2000 *Morganza to the Gulf Feasibility Study: Cultural Resources Literature and Records Review, Terrebonne and Lafourche Parishes, Louisiana, Volumes 1 and 2*. (State Report 22-2133)

Coastal Environments, Inc.

1981 *Archaeological Testing at the Delta Farms Site (16LF26), Lafourche Parish, Louisiana*. (State Report 22-689)

DeMarcay, G., R. Smith, D. Greer, E. Parrish, D. Stone

2016 *Archaeological Reconnaissance Survey of the Proposed Houma Navigation Canal Lock Complex (TE-113), Terrebonne Parish, Louisiana*. (State Report 22-5263)

Draughton, R., S.B. Smith, J. Horowitz, M. Godzinski, D. Matherne, C. Matthews, J. Preisler, D.D. Davis

1999 *Channel Improvement in the Atchafalaya Basin: Land Use Studies in Assumption, Iberia, Iberville, Pointe Coupee, St. Martin, St. Mary, Terrebonne, and West Baton Rouge Parishes*. (State Report 22-2261)

Gagliano, Sherwood, R.A. Weinstein, E.K. Burden

1975 *Archaeological Investigations along the Gulf Intracoastal Waterway: Coastal Louisiana Area*. (State Report 22-0160)

Heller, Nathanael, S.B. Smith, K. Grandine, E. M. Jeansonne, J. Mariano, J. Lev-Tov

2020 *Phase I Cultural Resources Investigations of the Texas Eastern Transmission LP (Texas-Eastern) Venice Extension Project in Pointe Coupee, West Baton Rouge, Iberville, and Lafourche Parishes, Louisiana*. (State Report 22-6462)



Kelley, David, C.E. Pearson, J. Ryan

2009 *Phase I Cultural Resources Survey of Areas to be Affected by the Houma Navigational Canal Deepening Project, Terrebonne Parish, Louisiana.* (State Report 22-3077)

Kelley, David, D. Wells, P. Jungelblut

2019 *Phase I Cultural Resources Survey of the ACE Pipeline Project, St. James and Lafourche Parishes, Louisiana.* (State Report 22-6368)

McGimsey, Chip

2001 *The Rings of Marksville and Other Stories of Southwest Louisiana Archaeology.* (State Report 22-2448)

McIntire, William G.

1979 *Cultural Resources Survey Covering the Revised Pipeline Route, Lafourche Parish, Louisiana.* (State Report 22-170)

McIntire, William G., D.W. Davis, W.H. Conner, R.A. Detro

1981 *Cultural Resources Survey of the Larose to Golden Meadow Hurricane Protection Levee Sections "F" First Lift and "A" East First Lift.* (State Report 22-723)

Moreno, Meredith, S.B. Smith, D.D. Davis, R.C. Goodwin

2011 *Phase Ia Literature Search and Records Review of Previously Recorded Cultural Resources Located with the Proposed Project Area Associated with the Morganzo to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.* (State Report 22-3291)

Parrish, Jason, D. Greer, J. Kennedy, E. Parrish, R. Smith

2009 *Reconnaissance and Phase I Survey of Portions of the TIFRRP Reach and the Reach G Levee Alignments, Terrebonne Parish, Louisiana.* (State Report 22-3359)

Stout, Michael and J.W. Muller

1983 *Cultural Resources Survey of Larose Floodgate, Larose to Golden Meadow, Louisiana Project.* (State Report 22-856)

Weinstein, Richard and D.B. Kelley

1989 *Cultural Resources Investigations Related to the Terrebonne Marsh Backwater Complex, Terrebonne, St. Mary, and Assumption Parishes, Louisiana.* (State Report 22-1487)

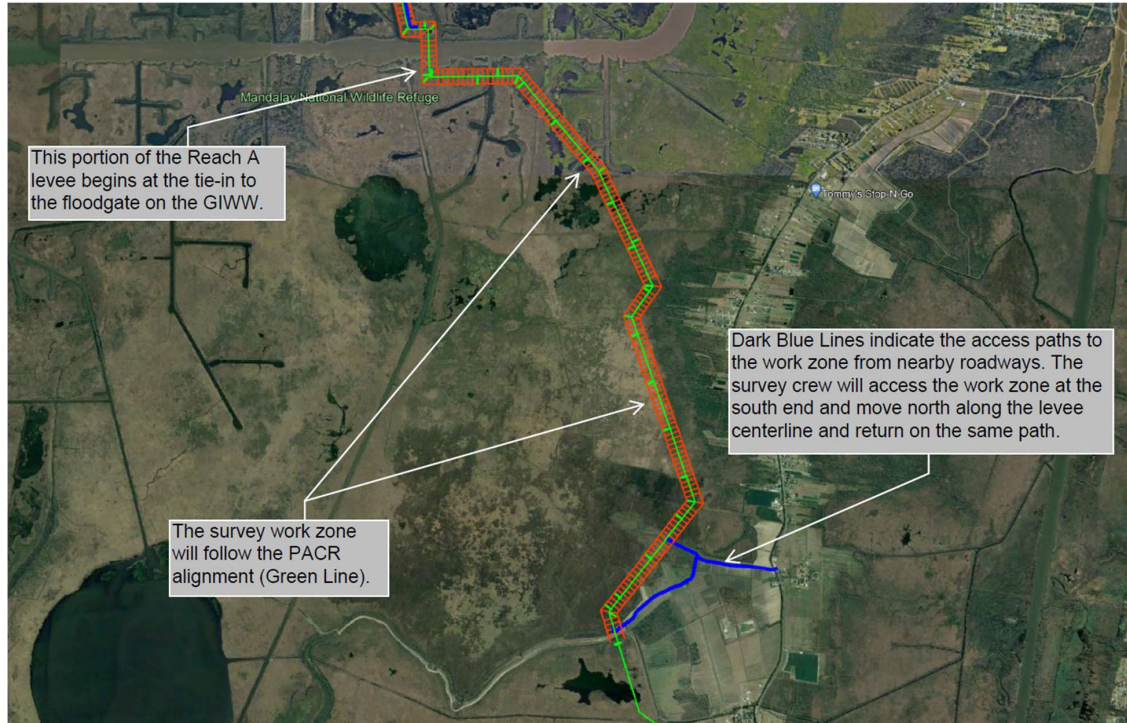




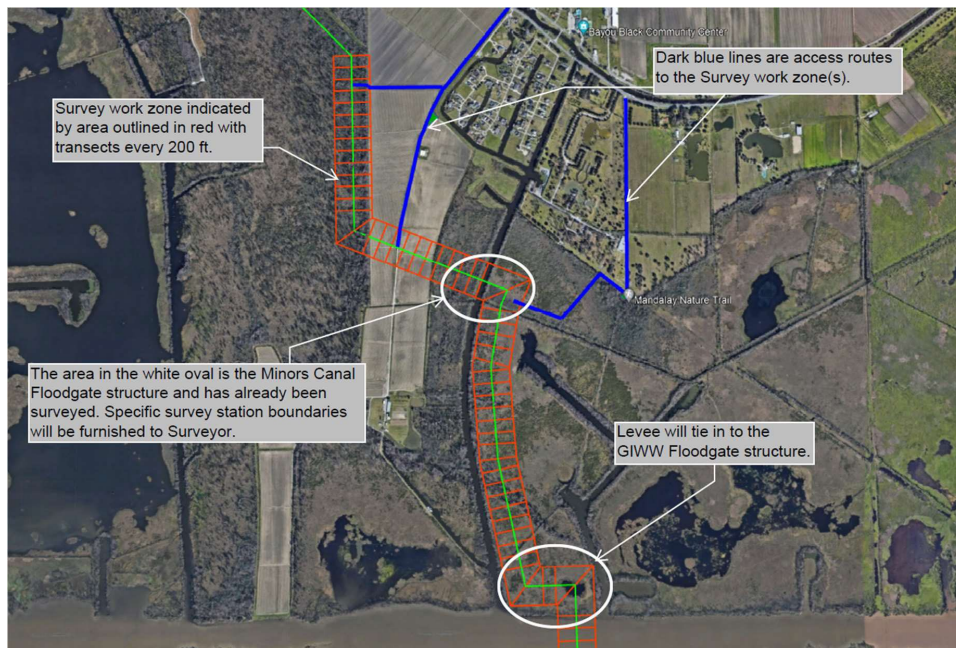


Enclosure 1. Overview Images of APE for the Survey and Borings related to Morganza to Gulf Project.

\*Note\* the word “survey” in these images refer to actions taken by Geotechnical personnel. These do not refer to cultural resource investigations.

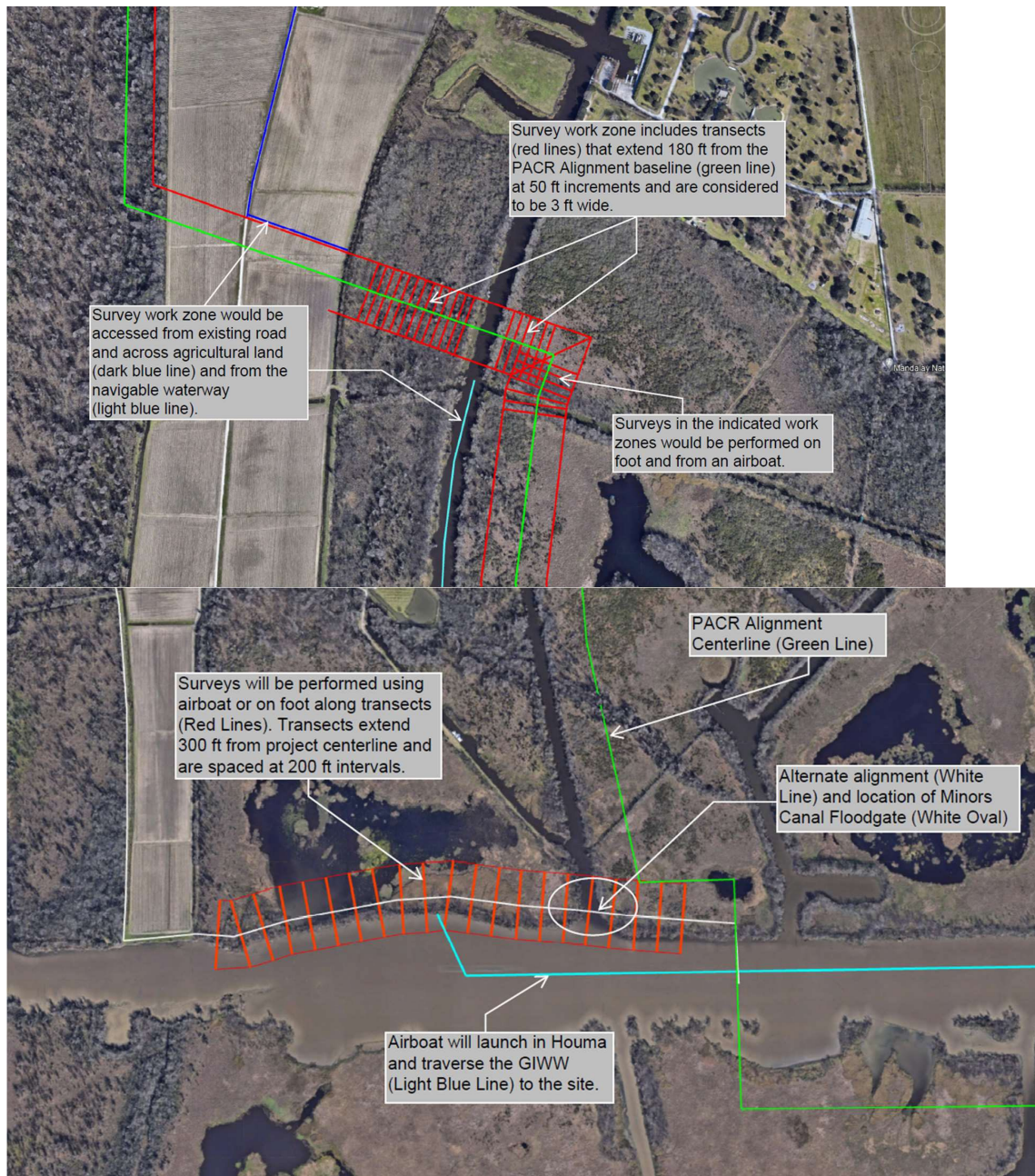


Overview of Reach A South of GIWW



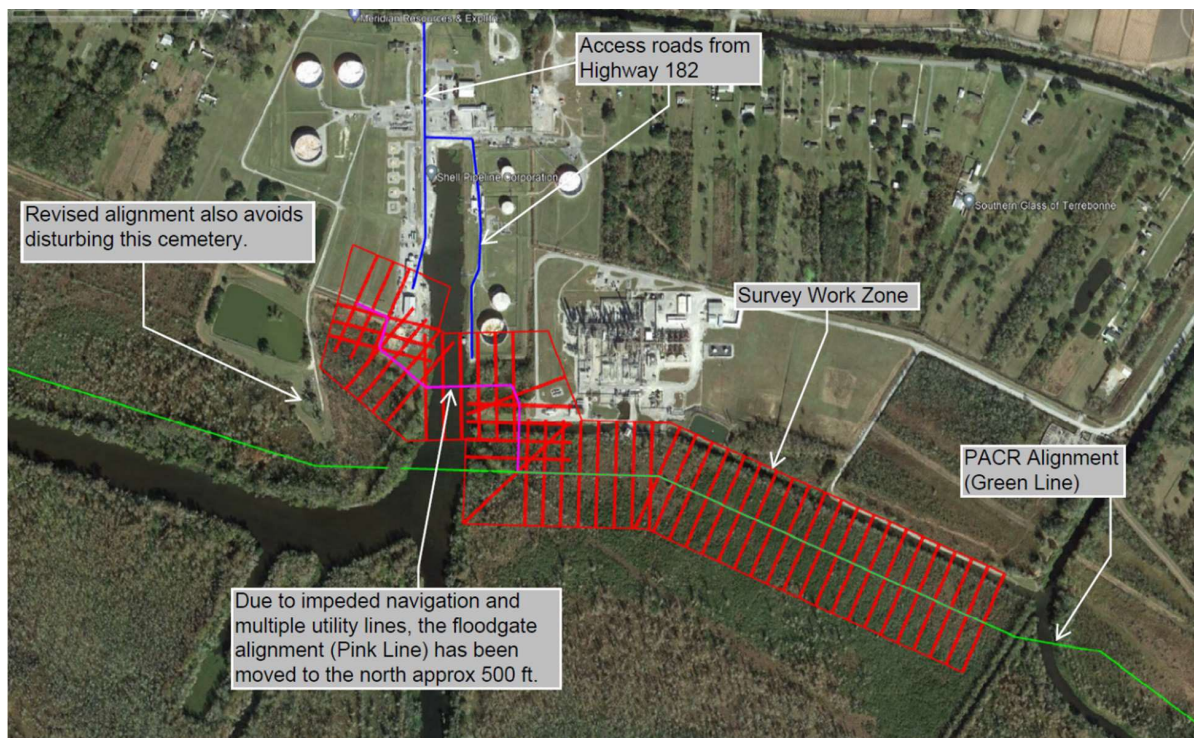
Overview of Reach A North of GIWW





Overview of two Surveys Areas for Minors Canal Floodgate



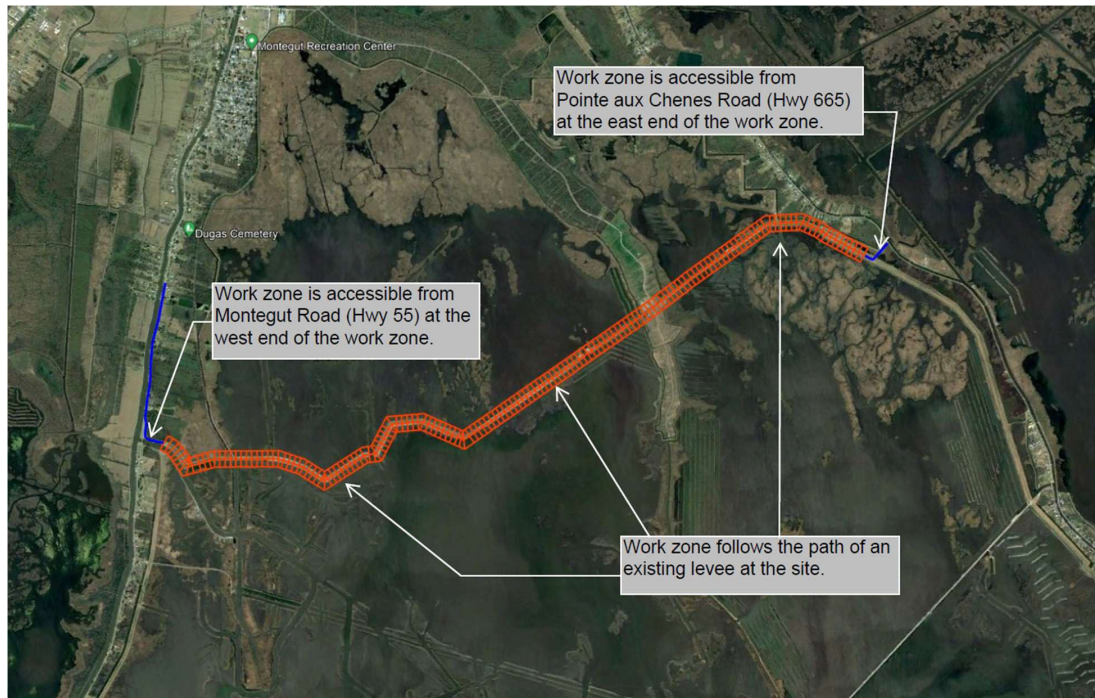


Overview of Shell Canal Floodgate Surveys area.

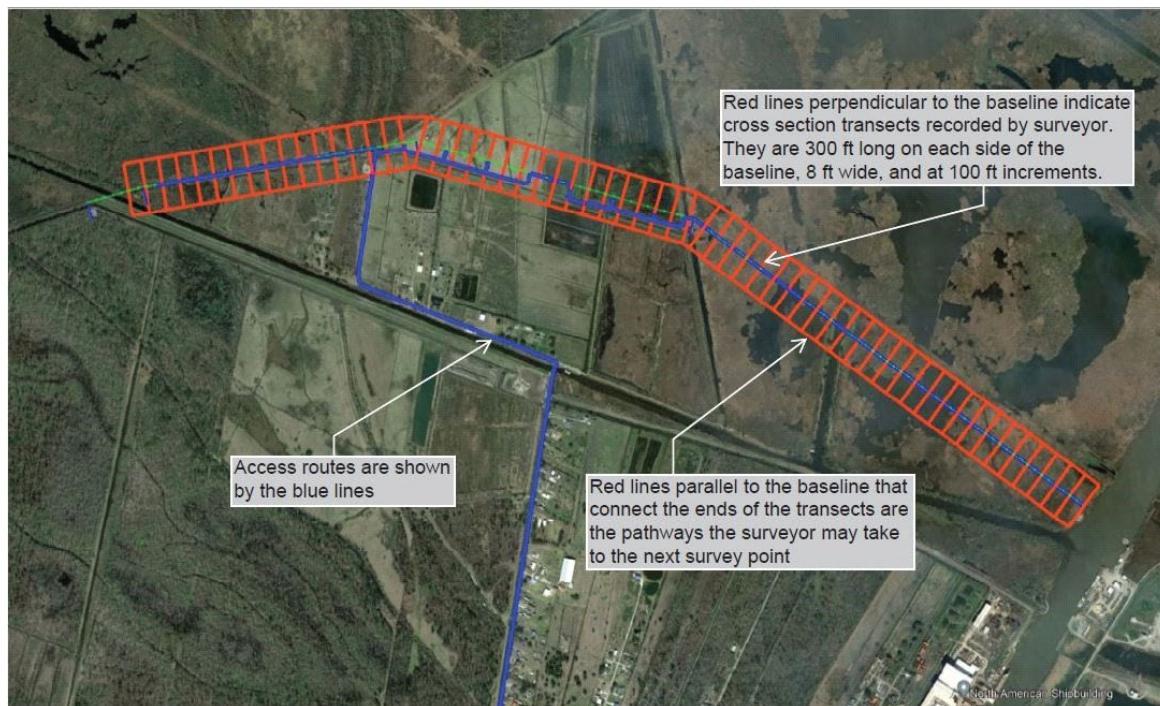


Overview of Reach F. North is to left, South is to right.



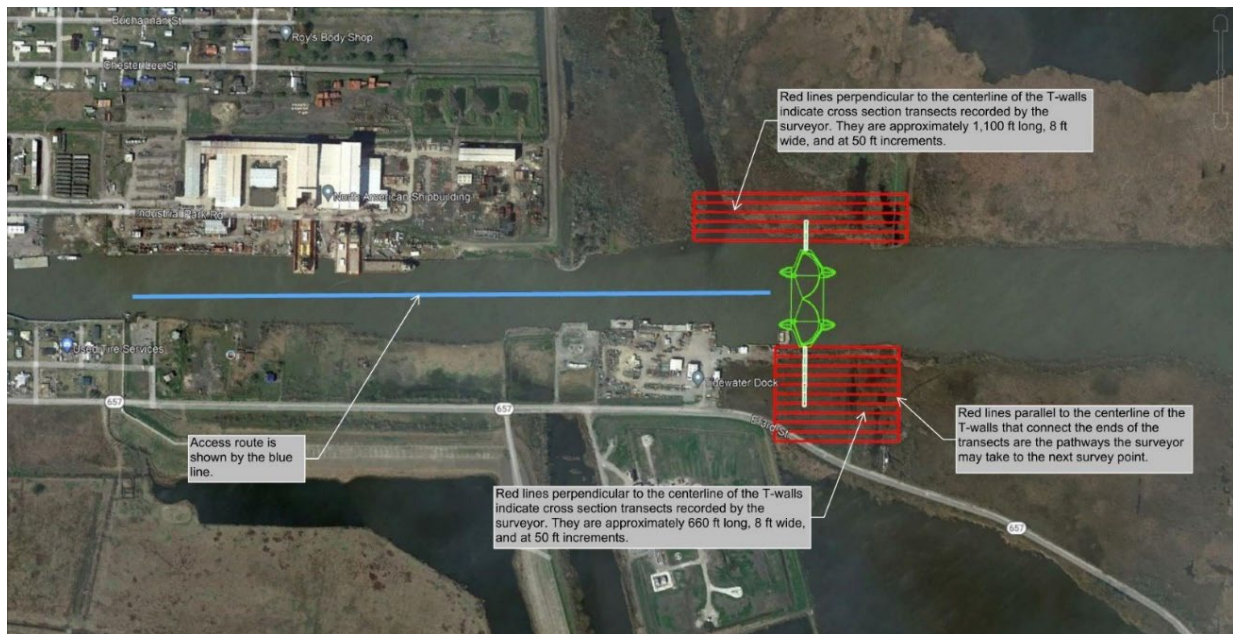


Overview of Reach J2.

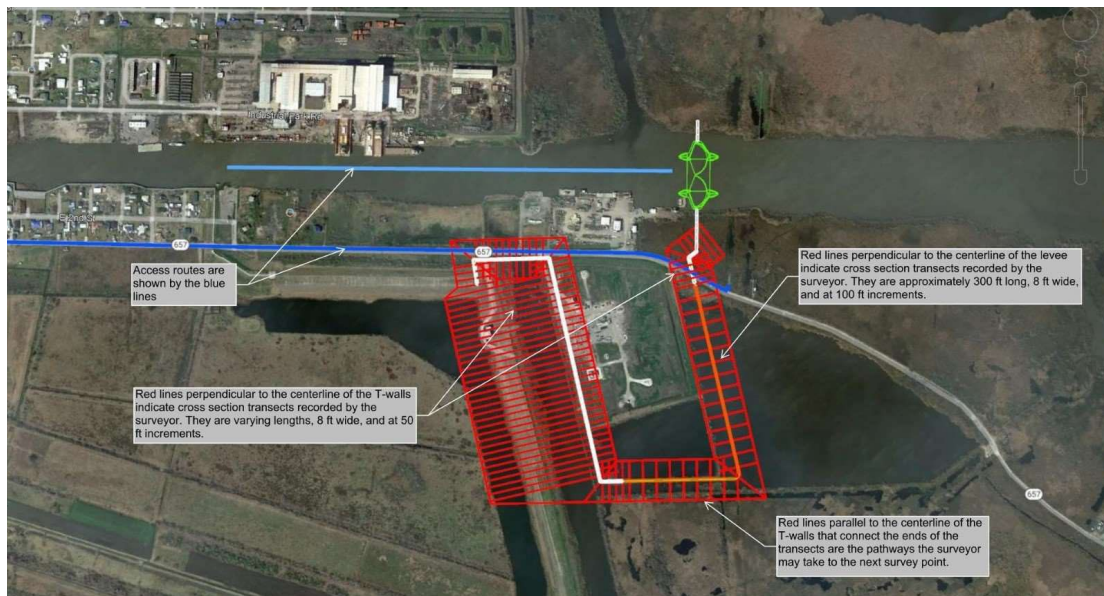


Overview of Lockport to Larose Reach 1.

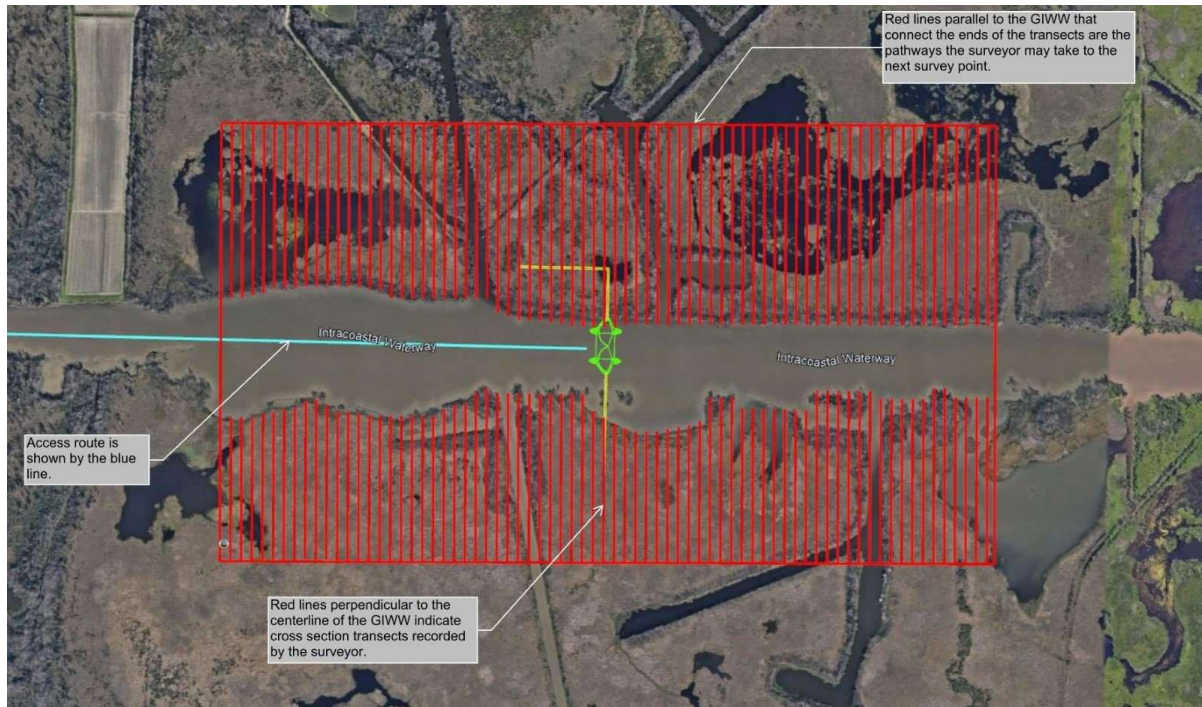




Overview of GIWW East Floodgate Area. South is left, North is Right.



Overview of GIWW East T-Wall and Levee Area. South is left, North is Right.



Overview of GIWW West Floodgate Area.



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Louisiana Ecological Services  
200 Dulles Drive  
Lafayette, Louisiana 70506



January 5, 2024

Colonel Cullen Jones  
District Engineer  
U.S. Army Corps of Engineers  
Post Office Box 60267  
New Orleans, Louisiana 70160-0267

Dear Colonel Jones:

The U.S. Army Corps of Engineers' (USACE) is proposing to conduct surveys and borings for the proposed Morganza to the Gulf of Mexico, LA (MTG) Project, Hurricane and Storm Damage Risk Reduction System. The objective of the proposed project is to reduce hurricane-related damages up to 100-year recurrent frequency storm events. Surveys and borings are needed to inform design of project features (levees, drainage structures, and floodgates) for the MTG Project. The features are described in the Final Post Authorization Change Report (PACR) and Revised Programmatic Environmental Impact Statement (PEIS) dated May 2013. The project consists of the construction of 98 miles of levees in the Terrebonne Basin, approximately 84 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. Some of the borings and surveys work would fall outside of the original project alignment proposed in the PACR. In total 184 soil borings and 166 cone penetrated test are planned to occur.

This report contains a description of existing fish and wildlife resources in the project area, discusses the Tentatively Selected Plan and the No Action Alternative habitat conditions, identifies fish and wildlife-related impacts and provides recommendations to improve the proposed MTG surveys and borings project. This document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Fish and Wildlife Service (Service) has coordinated with the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF). Their comments have been incorporated into this report.

We appreciate the cooperation of your staff on this project. Should your staff have any questions regarding the enclosed report, please have them contact Hugh O'Connor (337/291-3109) of this office.

Sincerely,

Brigitte D. Firmin  
Field Supervisor  
Louisiana Ecological Services

BRIGETTE FIRMIN

Digitally signed by BRIGETTE  
FIRMIN  
Date: 2024.01.05 19:59:03 -0600



## Enclosures

cc: Environmental Protection Agency, Dallas, TX  
CEMVN-RPEDS, PDS  
National Marine Fisheries Service, Baton Rouge, LA  
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA  
LA Dept. of Natural Resources (CMD), Baton Rouge, LA  
Coastal Protection and Restoration Authority (CPRA), Baton Rouge, La



**Draft Fish and Wildlife Coordination Act Report  
for the  
Morganza to the Gulf of Mexico, LA (MTG) Project, Hurricane and Storm  
Damage Risk Reduction System, Surveys and Borings**



SUBMITTED TO  
NEW ORLEANS DISTRICT  
U.S. ARMY CORPS OF ENGINEERS

PREPARED BY  
Hugh O'Connor  
FISH AND WILDLIFE BIOLOGIST

U.S. FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
LAFAYETTE, LOUISIANA  
November 2023

## TABLE OF CONTENTS

TABLE OF CONTENTS .....	i
EXECUTIVE SUMMARY .....	1
INTRODUCTION .....	3
DESCRIPTION OF THE PROJECT AREA.....	4
DESCRIPTION OF SURVEY AND BORINGS .....	7
FISH AND WILDLIFE RESOURCES.....	31
<b>Description of Habitats</b> .....	31
<i>Existing conditions</i> .....	31
<i>No Action Alternative</i> .....	32
<b>Fishery/Aquatic Resources</b> .....	32
<i>Existing conditions</i> .....	32
<i>No Action Alternative</i> .....	33
<b>Essential Fish Habitat</b> .....	33
<i>Existing conditions</i> .....	33
<i>No Action Alternative</i> .....	34
<b>Wildlife Resources</b> .....	34
<i>Existing conditions</i> .....	34
<i>Wildlife with Conservation Concerns</i> .....	37
<i>No Action Alternative</i> .....	37
<b>Endangered and Threatened Species</b> .....	37
<i>At-Risk Species</i> .....	39
<i>Proposed Species</i> .....	40
<i>Candidate Species</i> .....	40
<b>Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA)</b> .....	41
<b>Refuges and Wildlife Management Areas and CWPPRA Projects</b> .....	43
EVALUATION METHODOLOGY .....	44
PROJECT IMPACTS .....	46
<i>Habitat Types</i> .....	46
<i>Fishery Resources</i> .....	46
<i>Essential Fish Habitat</i> .....	46
<i>Wildlife</i> .....	47
<i>Threatened and Endangered Species</i> .....	47
<i>Migratory Bird Treaty Act (MBTA) and Bald and Eagle Protection Act (BGEPA)</i> .....	47
<i>At-Risk Species and Gulf Coast Joint Venture</i> .....	47
<i>FWS Concerns</i> .....	47
SERVICE POSITION AND RECOMMENDATIONS .....	48
LITERATURE CITED .....	50

## EXECUTIVE SUMMARY

This report contains a description of existing fish and wildlife resources in the project area, discusses the future with the Tentatively Selected Plan (TSP) and the future with the No Action Alternative (NAA) habitat conditions, identifies fish and wildlife-related impacts, and provides recommendations to improve the proposed Morganza to the Gulf of Mexico Surveys and Borings (MTG S&B). This document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Fish and Wildlife Service (Service) has coordinated with the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF). Their comments have been incorporated into this report.

Surveys and borings are needed to inform design of project features (levees, drainage structures, and floodgates) for Morganza to the Gulf (the Project or MTG). The features are described in the Final Post Authorization Change Report (PACR) and Revised Programmatic Environmental Impact Statement (PEIS) dated May 2013. The project consists of the construction of 98 miles of levees, approximately 84 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. Some of the borings and surveys work would fall outside of the original project alignment proposed in the PACR. In total, 184 soil borings and 166 cone penetrated test are planned to occur.

Marshes, swamps, and bottomland hardwood forests (BLH) are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries).

The MTG S&B anticipates impacting the Terrebonne Basin with a decrease of 17.502 marsh acres (-8.58 AAHUs) over the 61-year period of analysis. Additionally, the MTG S&B will result in a decrease of 0.793 swamp acres (-0.24 AAHUs) and 0.854 bottomland hardwood (BLH) acres (-0.08 AAHUs). The TSP would directly impact 19.149 acres of jurisdictional wetlands (-8.9 AAHUs). The Service is assuming that there will be some impacts to vegetated shallows, but those impacts will be temporary and negligible. There are no expectations for indirect impacts from surveys and borings. For unavoidable impacts, compensatory mitigation is required to replace the loss of jurisdictional wetland function and area.

The Service supports the MTG S&B provided that the following fish and wildlife recommendations are carried out concurrently with project implementation:

1. Full in-kind compensation (quantified in AAHUs) should be provided for unavoidable net adverse project impacts on forested wetlands, marsh, and associated submerged aquatic vegetation (SAV). Since survey and borings impacts will spatially overlap with levee construction impacts for MTG Reach A, in the area of Reach A the Service will consider only requiring mitigation for the survey and boring impacts for target years (TYs) prior to levee construction. Any boring impacts that do not spatially overlap with construction impacts should still be mitigated. The Service and the NMFS should be consulted in the development of plans and specifications for mitigation features.

2. Care should be taken to avoid impacts to bald eagles and their nesting habitat. Prior to and during any project construction, on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to this office. Prior to construction, the Service and the LDWF recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nests during the nesting season (October through mid-May). If an active or inactive eagle nest is discovered within 1,500 feet of the project footprint, then follow the bald and golden eagle guidelines to determine whether disturbance will occur and/or an incidental take permit is needed. Any take should be reported to this office and LDWF. Bald eagle nest (active, inactive, or seemingly abandoned) should be protected, and no large trees should be removed.
3. During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable. For more detail on avoiding contact with manatee contact this office. Should a proposed action directly or indirectly affect the West Indian manatee, further consultation with this office will be necessary.
4. Avoid adverse impacts to nesting wading bird colonies through careful design of project features and timing of construction. The Service and the LDWF recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season (September 1 through February 15).
5. Avoid adverse impacts to alligator snapping turtle by minimizing disturbance and alteration of nesting habitat, particularly in the nesting season (April-June), including minimizing the removal of log jams in streams.
6. The Service recommends avoiding impacts on the Mandalay National Wildlife Refuge (NWR). If impacts cannot be avoided, impacts will need to be mitigated for on the Mandalay NWR. For surveys and borings, please coordinate all activities with refuge staff and with Mr. Pon Dixon, Project Leader of the Bayou Sauvage Urban NWR Complex (985/882-2014).
7. The impacts to Essential Fish Habitat should be discussed with the NMFS to determine if the project complies with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Magnuson-Stevens Act; P.L. 104-297, as amended) and its implementing regulations.
8. Access roads across existing wetlands should be avoided if possible and secondary impacts to wetland hydrology should be prevented or reduced. To avoid changes to hydrology the Service recommends appropriately sized culverts (minimum 24-inch culverts) be installed and maintained every 300 feet across access roads through wetlands



with additional culverts placed at stream crossings and drainage features. Alternatively, upon completion of construction activities, access roads should be degraded to restore natural hydrology.

9. The Service recommends that the USACE contact the Service for additional consultation if: 1) the scope or location of the proposed project is changed significantly, 2) new information reveals that the action may affect listed species or designated critical habitat; 3) the action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. Additional consultation as a result of any of the above conditions or for changes not covered in this consultation should occur before changes are made and or finalized.

## **INTRODUCTION**

This report contains a description of existing fish and wildlife resources in the project area, discusses the future with the Tentatively Selected Plan (TSP) and the future with the No Action Alternative (NAA) habitat conditions, identifies fish and wildlife-related impacts, and provides recommendations to improve the proposed Morganza to the Gulf of Mexico Surveys and Borings (MTG S&B). This document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Fish and Wildlife Service (Service) has coordinated with the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF). Their comments have been incorporated into this report.

This project was authorized in May of 2011 through the Water Resource Development Act of 2007. Please reference the Service's Fish and Wildlife Coordination Act Report from April 2013 and the Service's June 2013 comment letter on the Morganza to the Gulf Post Authorization Change Report (PACR).

Surveys and borings are needed to inform design of project features (levees, drainage structures, and floodgates) for Morganza to the Gulf (the Project or MTG). The features are described in the Final Post Authorization Change Report (PACR) and Revised Programmatic Environmental Impact Statement (PEIS) dated May 2013. The project consists of the construction of 98 miles of levees, approximately 84 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. Some of the borings and surveys work would fall outside of the original project alignment proposed in the PACR.

### Surveys and Survey Methods

The USACE, or a contractor for the USACE, would perform the survey work on the proposed projects as presented below. The surveys are topographical and would include identifying the centerline of the levees and/or structures and then using established vertical (elevation) and horizontal datums along with high tech GPS enabled equipment to create 2D images with specific locations and shapes to be used by the contractors to design and build the flood risk reduction structures. Topographical surveys capture the features of the landscape and any nearby utilities. Survey protocol would follow the guidelines of the least invasive method(s) necessary to complete the task. For the necessary survey points in any marsh areas, survey data will be

collected from pre-determined transects within the work area and will be primarily accessed by foot or airboat. If the data cannot be obtained with either of these methods, the surveyors would use an 8-foot-wide Marsh Master vehicle to reach the sites. More detailed descriptions of access routes are provided in the sections below.

#### Borings and Cone Penetration Tests

Borings and Cone Penetration Tests (CPTs) are needed to facilitate the design of the levees and accompanying structural features (i.e., drainage structures, floodgates, etc.). A CPT consists of using hydraulic pressure to push a cone tipped rod into the ground. The CPTs would be performed to an approximate depth of between 80 and 125 feet below the ground surface using an electronic piezocone penetrometer with a 10-cm<sup>2</sup> cross-sectional area. The holes from this process would be approximately 1.50-inch diameter with no material removal and would close on their own with no adverse effect to the existing soil. A soil boring is normally a 5-inch diameter cylinder of soil (can be 3-inch diameter for shallow borings for access road design) acquired by using an instrument called a Thin Wall Shelby Tube which is attached to a rotating shaft and functions like a drill but has a hollow center. The tube would be rotated into the ground 3 feet at a time and then retrieved and the undisturbed soil sample removed. All 5-inch soil borings would be drilled to an approximate depth of between 80 and 180 feet below the existing ground surface with a rotary drill rig. The holes created by the borings would be backfilled with a Bentonite clay slurry to return the soil to its pre-drilled volume. In total 189 soil borings and 163 cone penetrated tests will be conducted.

### **DESCRIPTION OF THE PROJECT AREA**

The study area lies within a region dominated by extensive wetlands created by deltaic processes of the Mississippi River. The study area occupies portions of three hydrologic subbasins within the Terrebonne Basin. Those subbasins are discussed below, along with the specific portions of the subbasins that occur within the study area.

#### Penchant Subbasin

The Penchant Subbasin is bounded by Atchafalaya Bay and the Atchafalaya River on the west and Bayou du Large on the east. The Gulf of Mexico forms its southern boundary; the subbasin extends north to the natural levee along Bayou Black. The northern rim of the basin supports bottomland hardwood forests and cypress-tupelo swamps. South of those forested wetlands is an extensive zone of fresh marshes. Those marshes are usually underlain by floating or semi-floating organic soils, except near the Atchafalaya River and Atchafalaya Bay where more mineral soils are found. The fresh marshes that dominate the northern half of the subbasin grade into intermediate, brackish, and, finally, saline marshes along the Gulf coast. That portion of the study area within the Penchant Subbasin lies roughly east of a line extending southward from Bayou Copasaw to Lake Mechant. The Mauvais Bois and Marmande ridges bisect this portion of the study area, separating the fresh marsh zone from the more brackish and tidally influenced marshes to the south. The Small Bayou LaPointe ridge further subdivides this tidal zone.

Wetlands between the Small Bayou LaPointe ridge and Bayou du Large grade from fresh marsh at the upper end to brackish marsh adjacent to Lake Mechant. During high Atchafalaya River stages, water levels are elevated throughout the northern Penchant Subbasin. Under those conditions, Atchafalaya River water and drainage from the Lake Verret Basin flows eastward via

the Gulf Intracoastal Waterway (GIWW) across the northern Penchant Subbasin toward Houma (Paille 1997). From the GIWW, water also flows southward down Bayou Copasaw and Minor's Canal into the tidal zone. During low Atchafalaya River stages, water levels tend to be lower, and the freshwater supply is limited to rainfall and runoff from a portion of the Lake Verret Basin drainage. During high Atchafalaya River flows, fresh water from Minor's Canal and other sources bathes the tidal marshes south of the Marmande and Mauvais Bois ridges. The marshes south of the Small Bayou LaPointe ridge are less influenced by this fresh water. During the late summer and fall, low to moderate salinities occur throughout most of this tidal zone.

#### Timbalier Subbasin

The Timbalier Subbasin is located between Bayou du Large to the west and Bayou Lafourche on the east. It is bounded on the south by the Gulf of Mexico and on the north by the GIWW. Former distributary channels that radiate from the Houma area divide the area into a series of interdistributary basins. Those channels include Bayou Grand Caillou, Bayou Petit Caillou, Bayou Terrebonne, Bayou St. Jean Charles, and Bayou Pointe au Chien. Lands along distributary channels are the highest naturally occurring lands within the area; they are widest and highest in the northern portion of the basin. Closer to the Gulf, they generally become progressively lower and narrower. Because of the higher banks along the former distributary channels, human settlement and development is located predominantly along those features.

The northern portion of the interdistributary basin between Bayou du Large and Bayou Grand Caillou supports an extensive zone of cypress swamp. Dead swamps and low-salinity marshes grade into brackish and saline marshes south of the living swamps. The hydrology of this basin is strongly influenced by the Houma Navigation Channel (HNC). During high Atchafalaya River stages, up to 8,000 cubic feet per second (cfs) of freshwater flow from the GIWW southward to the Gulf through the HNC. Under these conditions, much of the area is freshened. From its junction with the HNC, fresh water also flows southward down lower Bayou Grand Caillou and freshens adjacent marshes. During periods of low river stages, and especially during the fall, brackish conditions prevail throughout this area. Because the HNC is such an efficient channel, tides may push salt water up the HNC and adversely affect cypress swamp and adjacent low-salinity marshes.

Louisiana Highway 57 crosses the interdistributary basin between Bayou Grand Caillou and Bayou Petit Caillou. That highway separates the Lake Boudreaux Basin from the saline marshes to the south. Living and dead cypress swamps occur in northern portions of the Lake Boudreaux Basin; most of the northern area is occupied by low-salinity and brackish marshes. The lower Lake Boudreaux Basin consists primarily of brackish and saline marshes amid large open water areas. The HNC cuts diagonally through the zone south of Louisiana Highway 57 and seasonally provides that area with fresh water. Fresh water from the HNC may also flow via Bayou Dulac into the western portion of the Lake Boudreaux Basin, seasonally reducing salinities in that area. The interdistributary basin between Bayou Petit Caillou and Bayou Terrebonne is bisected by Bush Canal. Brackish marshes north of that canal are protected by an existing hurricane protection levee system, and tidal exchange is regulated by water control structures. The saline marshes south of Bush Canal are not enclosed by a levee system. At several locations, oilfield canals cut from east to west across that portion of the subbasin, allowing saline waters from Lake Barre to readily move into Bayou Petit Caillou.



Of the marshes located between Bayou Terrebonne and Bayou Pointe au Chien, the study area includes only those areas north of Lake Barre. Open water and remnants of brackish marsh dominate the northern portion of that area. During high Atchafalaya River stages, a small amount of fresh water flows from the GIWW southward through Company Canal, Bayou Terrebonne, and into open water areas east of Bayou Terrebonne via Humble Canal. The southern portion of the study area is dominated by broken saline marshes located along the northern shore of Lake Barre and Lake Felicity.

The Grand Bayou intertributary basin lies between Bayou Pointe au Chien and Bayou Lafourche. Some fresh marsh remains in the extreme northwestern portion of this basin. Fresh water from the GIWW seasonally enters the northern end of this basin through Bayou L'Eau Bleu and helps to maintain the fresh and low-salinity marshes in the basin's northern end. Most of the basin, however, is dominated by brackish and saline marshes.

#### Fields Subbasin

The Fields Subbasin is located between Bayou Lafourche to the northeast, Bayou Terrebonne to the west and northwest, and Louisiana Highway 24 to the south. This inland subbasin is characterized by fresh marsh and cypress-tupelo swamp and is nearly surrounded by developed lands. The hydrology of this basin is heavily influenced by external sources of fresh water supplied by the GIWW and Bayou Lafourche via Company Canal. The year-round freshwater conditions which prevail throughout this subbasin result from those abundant freshwater inflows in combination with minimal daily tidal effects.

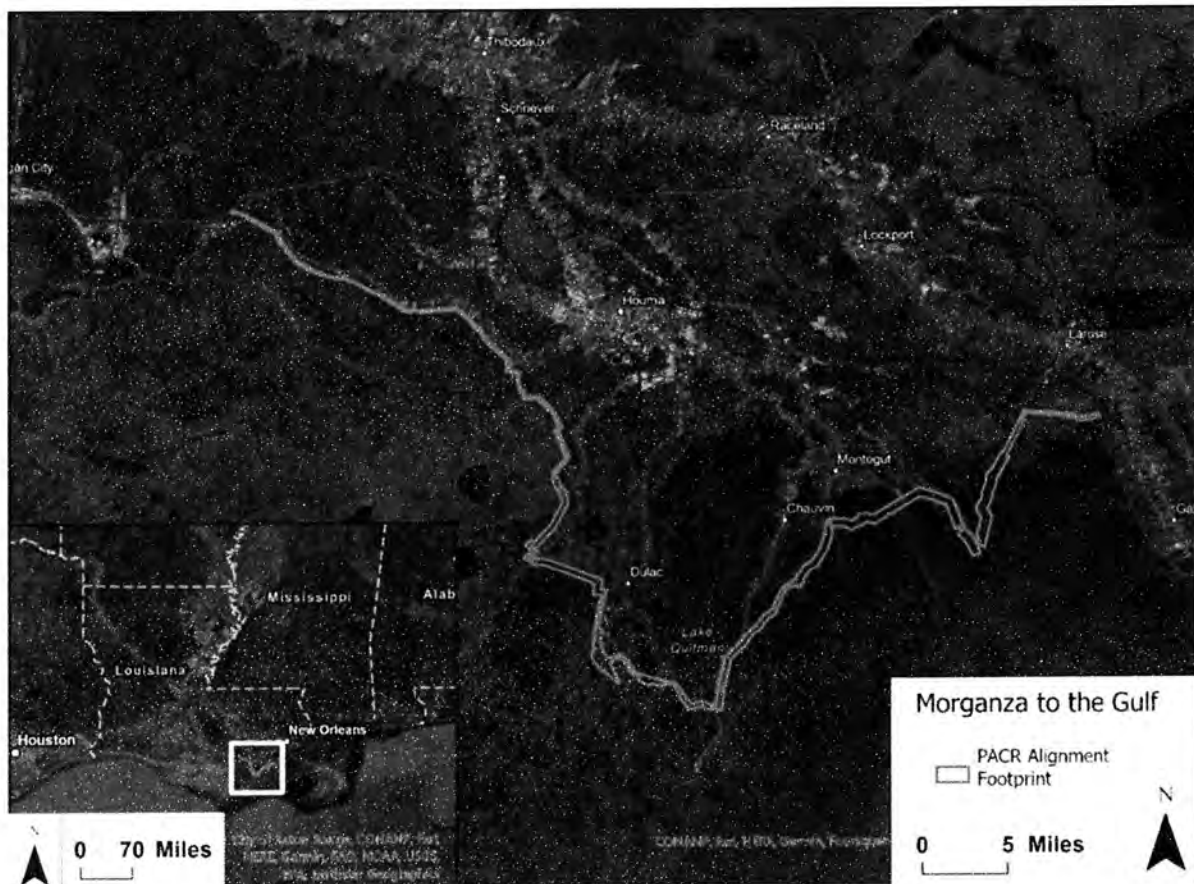


Figure 1. Project Area

## DESCRIPTION OF SURVEY AND BORINGS

In total 189 soil borings and 163 cone penetrated tests will be conducted.

### GIWW East Floodgate

#### Surveys

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).

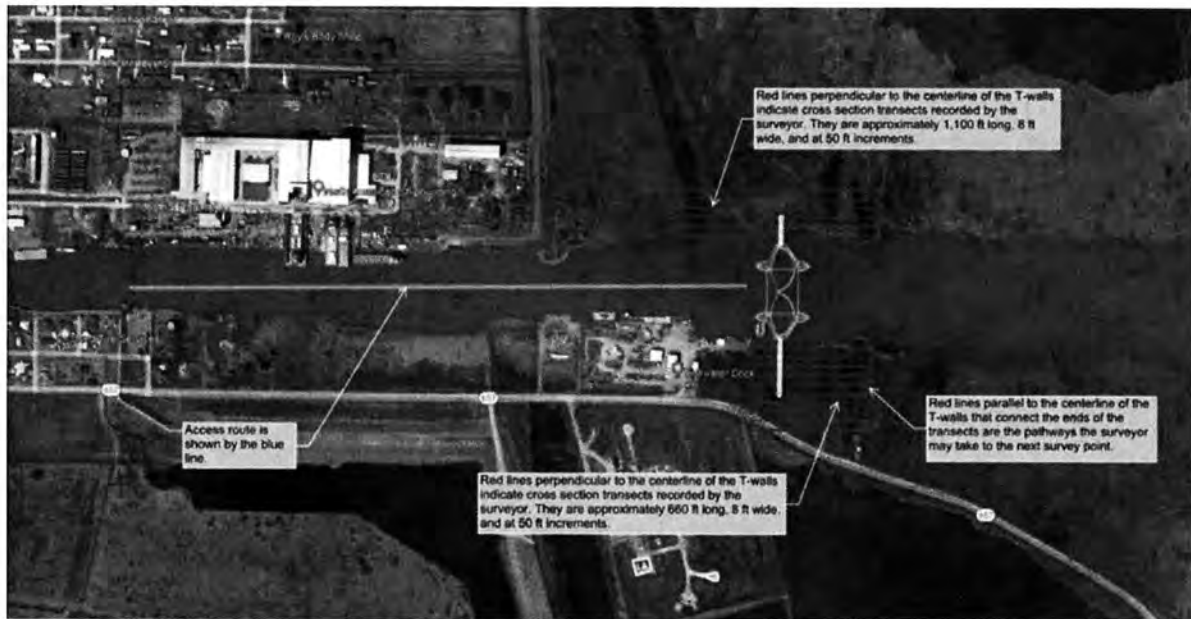


Figure 2. GIWW East Floodgate Surveys

### Borings

Three (3) soil borings and three (3) cone penetration tests (CPTs) would be taken at the approximate locations shown on the below figures. All soil borings are located within the PACR alignment. One (1) boring and one (1) CPT would be performed with a drill or CPT mounted Cargo Buggy and two (2) borings and two (2) CPTs would be performed with a drill mounted elevating boat in the waterway. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s) described in the figures below.



Figure 3. GIWW East Floodgate Boring Locations

## GIWW East Floodgate Proposed Floodwall and Levee Alignment

### Survey

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).

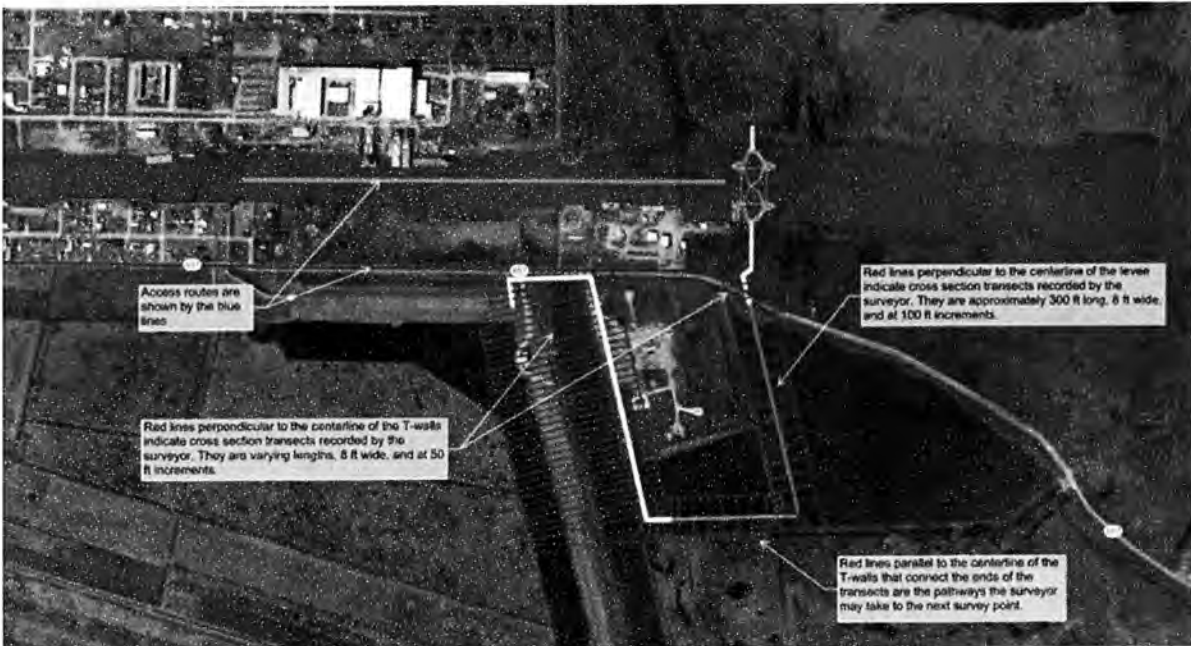


Figure 4. GIWW East Floodgate Proposed Floodwall Levee Alignment Surveys

### Borings

Seven (7) soil borings and six (6) cone penetration tests (CPTs) would be taken at the approximate locations shown on the below figures. Marsh explorations will be performed with boring and CPT rigs mounted on a Cargo Buggy. Marine explorations will be performed with boring and CPT equipment mounted on an elevating boat. Land explorations would be performed with boring equipment mounted on a truck or a track driven CPT rig. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s) described in the figures below.

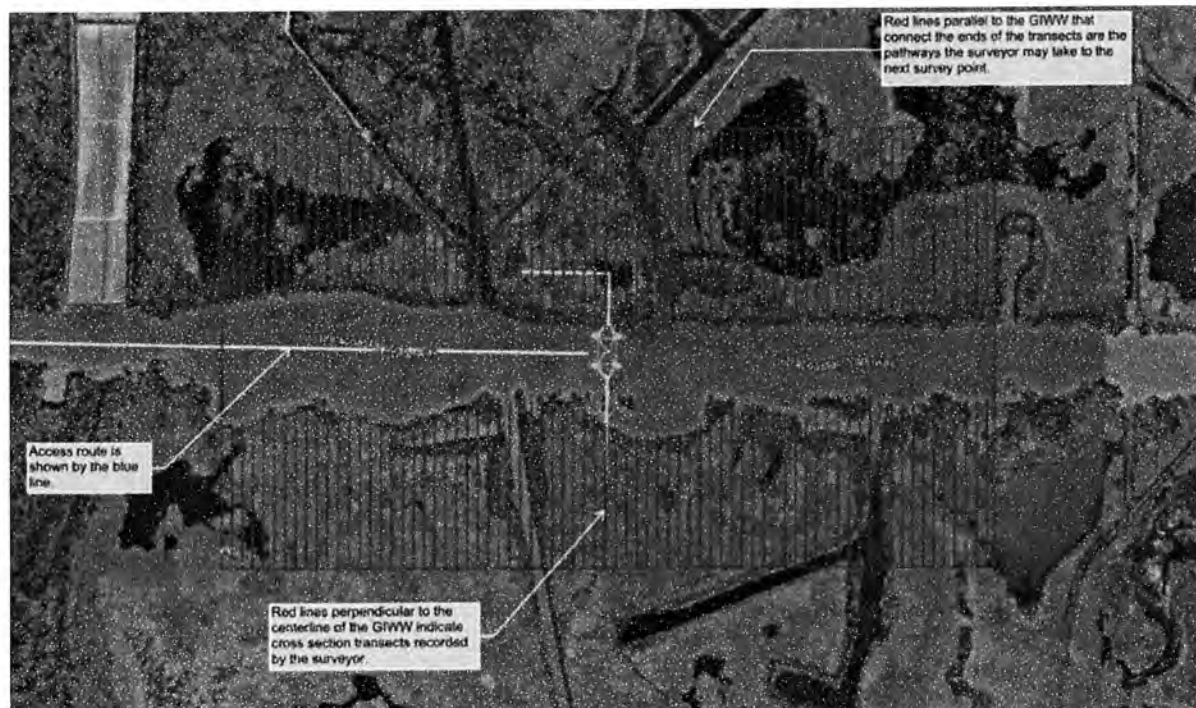


*Figure 5. GIWW East Floodgate Proposed Floodwall and Levee Alignment Boring Locations*

## **GIWW West Floodgate**

### Survey

The survey work zone will encompass approximately 1.33 miles of the GIWW and will extend perpendicular from the centerline of the waterway approximately 2000 feet to the north and south. An airboat will be the initial means of collecting the data points. If the path becomes overly obstructed or otherwise not accessible by airboat, the Marsh Master vehicle would be used to complete the work.

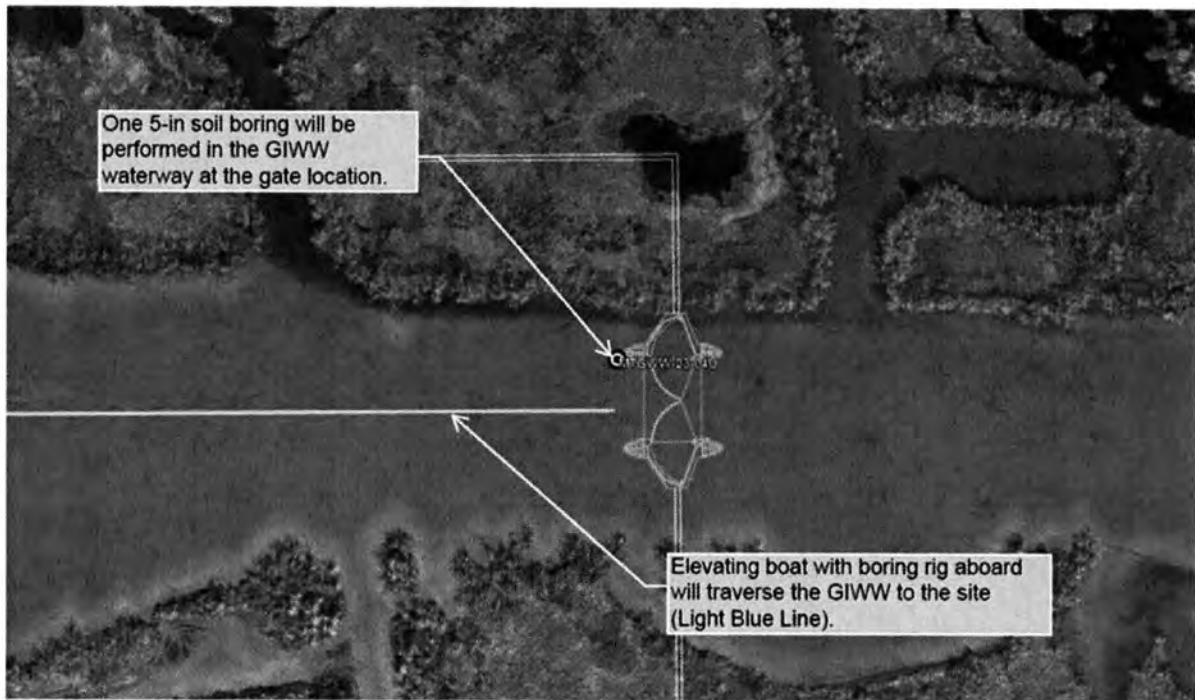


*Figure 6. GIWW West Floodgate Surveys*

### Borings

Most of the borings required for this project already exist, but there will need to be one more soil boring performed in the GIWW waterway near the end of the proposed bullnose dolphin at the NW corner of the floodgate.





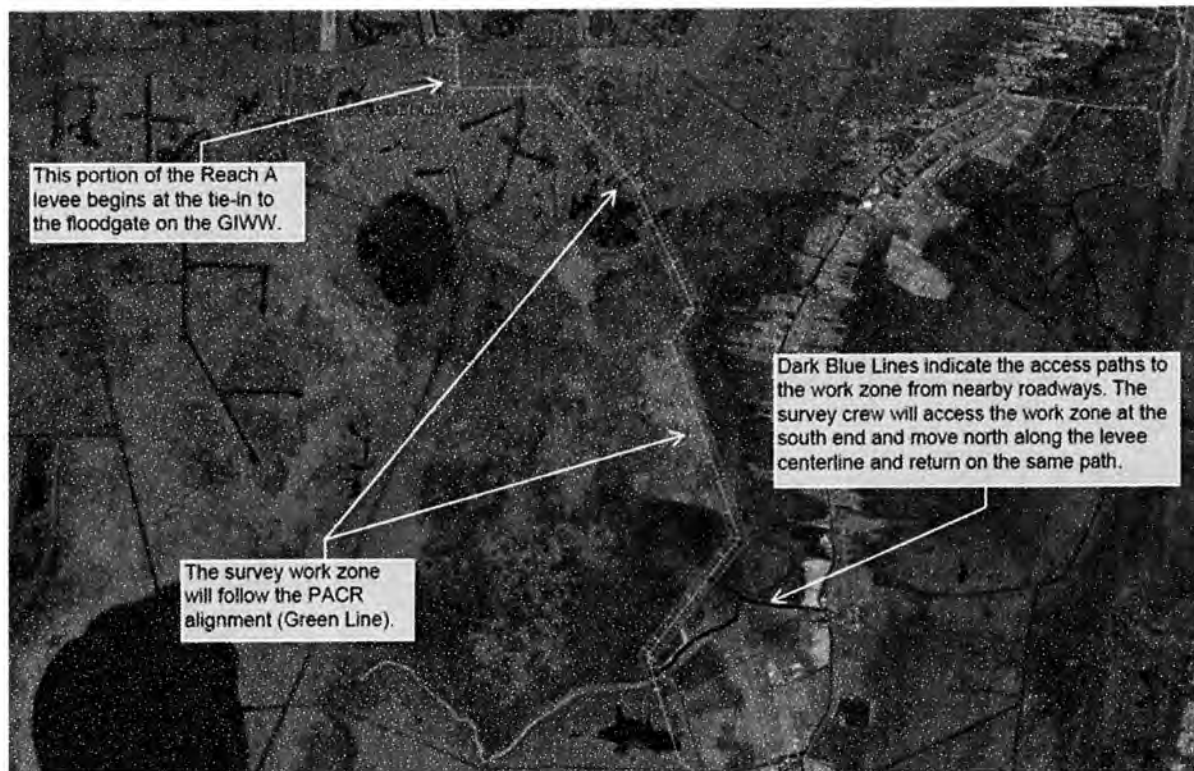
*Figure 7. GIWW West Floodgate Boring Locations*

#### **Reach A Levee – South of GIWW (PACR Alignment)**

##### Surveys

Survey points would be recorded every 200 ft along the levee centerline and up to 300 ft in each direction perpendicular to the levee centerline. The surveys would be conducted within the work zone(s) shown below.

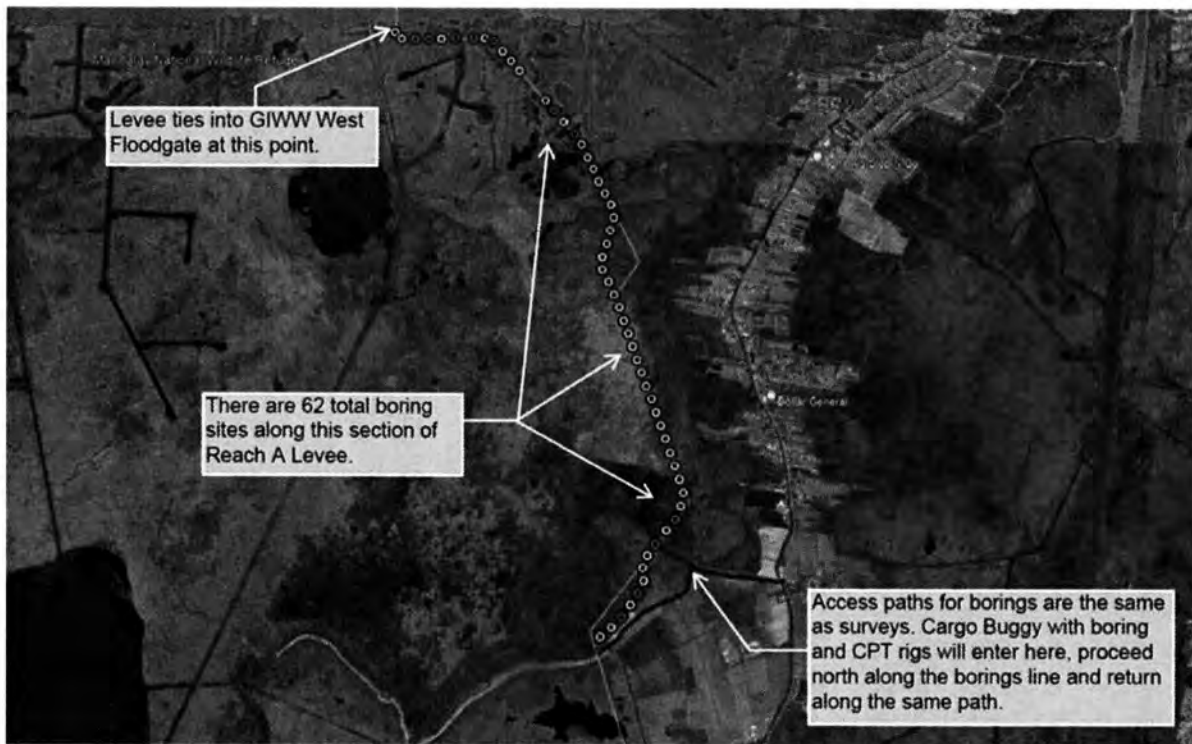




*Figure 8. Reach A Levee – South of GIWW (PACR Alignment) Surveys*

#### Borings

Thirty-four (34) soil borings and twenty-eight (28) cone penetration tests (CPTs) would be taken. All soil boring sites are located along the proposed levee centerline. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).

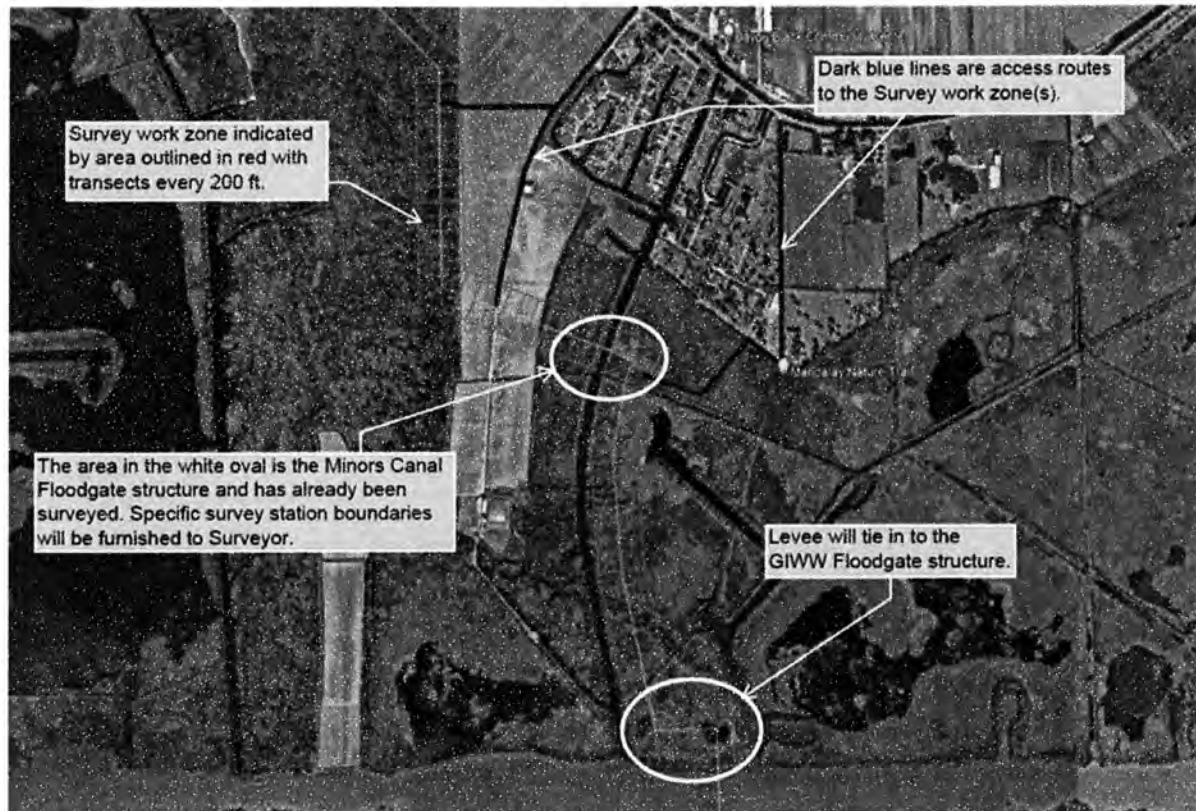


*Figure 9. Reach A Levee – South of GIWW (PACR Alignment) Boring Locations*

#### **Reach A Levee – North of GIWW (PACR Alignment)**

##### Surveys

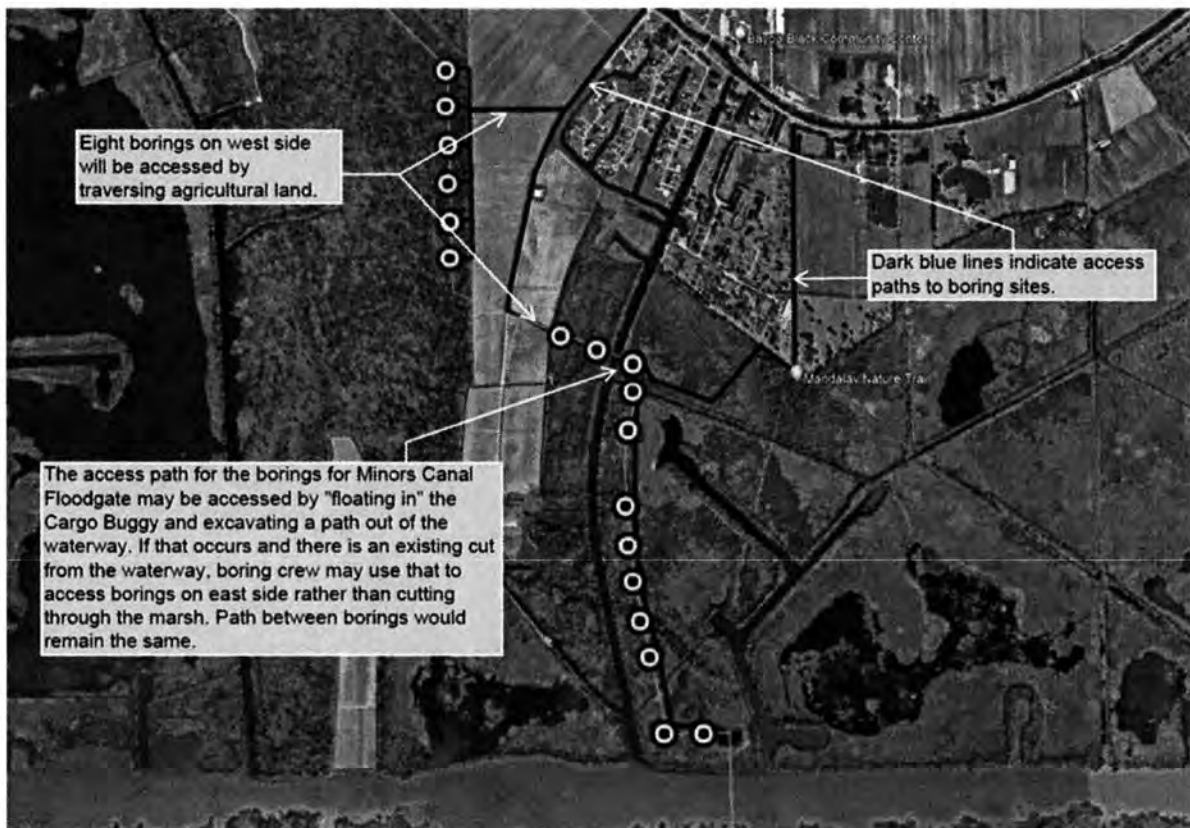
Survey points would be recorded every 200 ft along the levee centerline and up to 300 ft in each direction perpendicular to the levee centerline.



*Figure 10. Reach A Levee – North of GIWW (PACR Alignment) Surveys*

#### Borings

Twelve (12) soil borings and eleven (11) cone penetration tests (CPTs) would be taken. All soil boring sites are located within the current levee footprint and would not extend outside the toe of the existing levee.



*Figure 11. Reach A Levee – North of GIWW (PACR Alignment) Boring Locations*

#### **Minors Canal Floodgate (PACR Alignment)**

##### Surveys

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).



*Figure 12. Minors Canal Floodgate (PACR Alignment) Surveys*

### Borings

Six (6) 5-in soil borings, five (5) 3-in soil borings, and two (2) cone penetration tests (CPTs) would be taken at the site of the barge floodgate and tie-in levee walls. Four (4) of the 5-in soil borings will be performed with marsh equipment. The two (2) remaining 5-in soil borings and both CPTs will be performed with a rotary drill rig mounted on a shallow draft elevation boat in the waterway. The five (5) 3-in soil borings would be performed along the PACR alignment from the floodgate location to the nearest existing roadway in order to provide the geotechnical data necessary to construct an access road to the floodgate. Three (3) of these 3-in soil borings will be performed from marsh equipment. The two (2) remaining 3-in soil borings are in agricultural land and can be accessed by a truck boring rig.





Figure 13. Minors Canal Floodgate (PACR Alignment) Boring Locations

### Minors Canal Floodgate (Alternate Alignment)

#### Surveys

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).

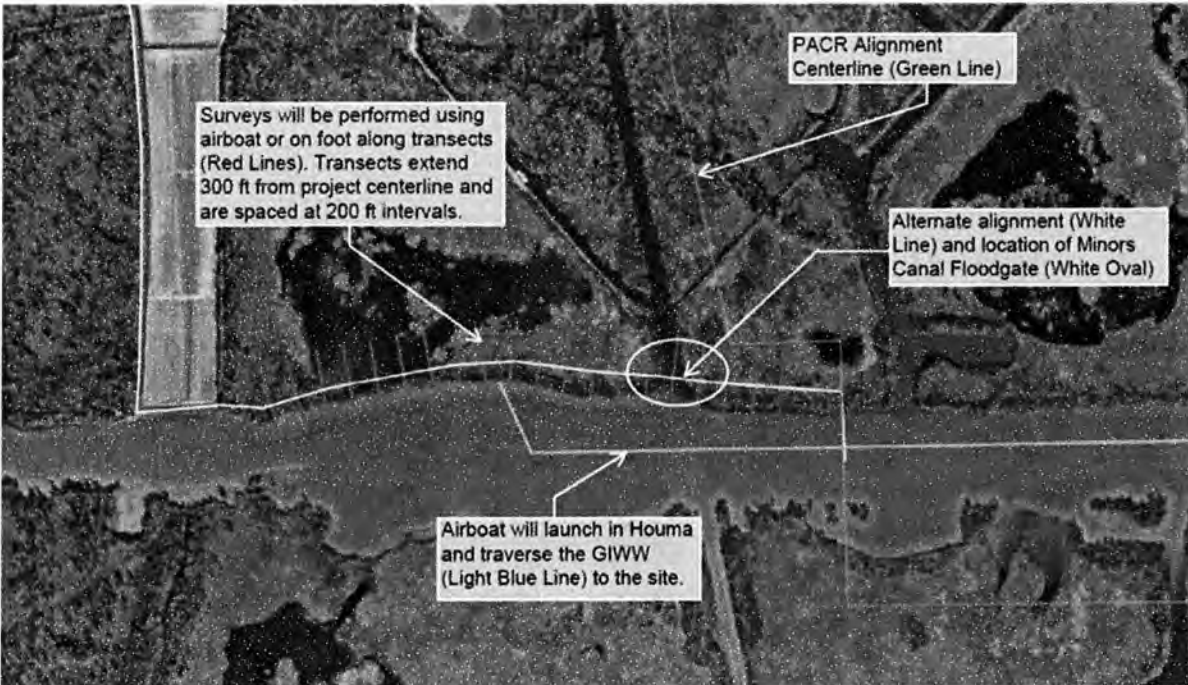


Figure 14. Minors Canal Floodgate (Alternate Alignment) Surveys

#### Borings

Four (4) 5-in diameter soil borings and four (4) Cone Penetration Tests (CPTs) will be performed at the site location of the barge floodgate and tie-in levee walls. Seven (7) of the soil borings will be performed with marsh equipment. The remaining soil boring will be performed with a rotary drill rig on top of a shallow draft elevation boat in the waterway.

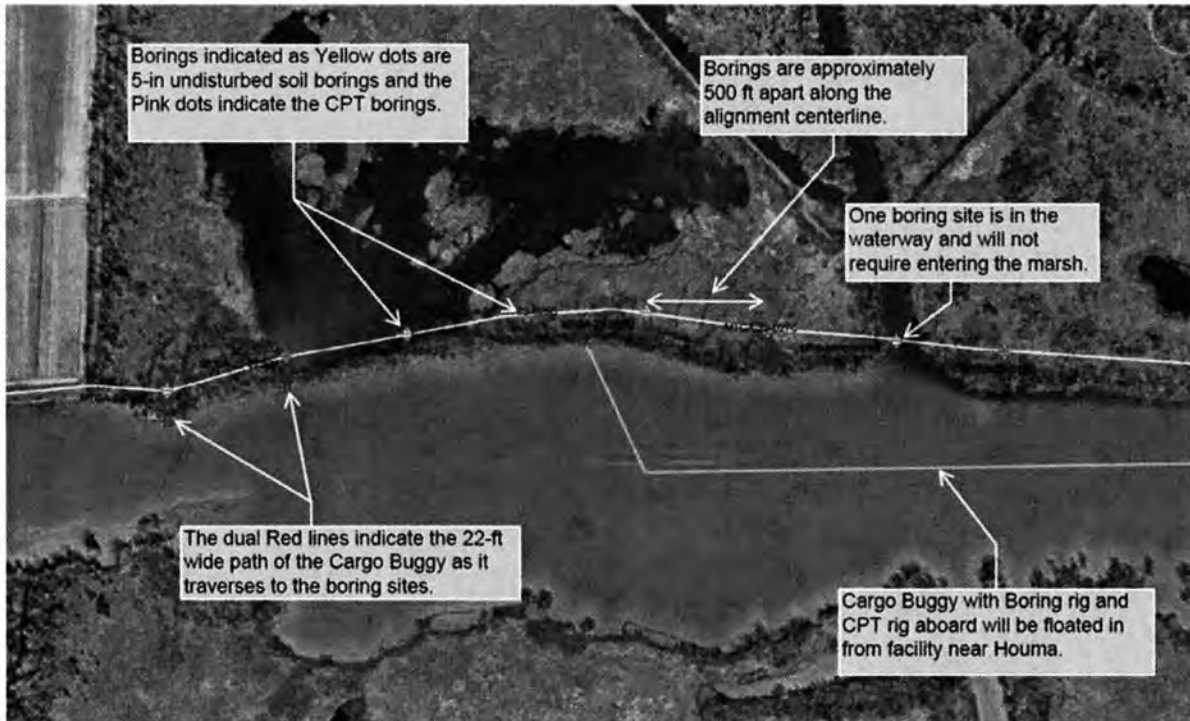
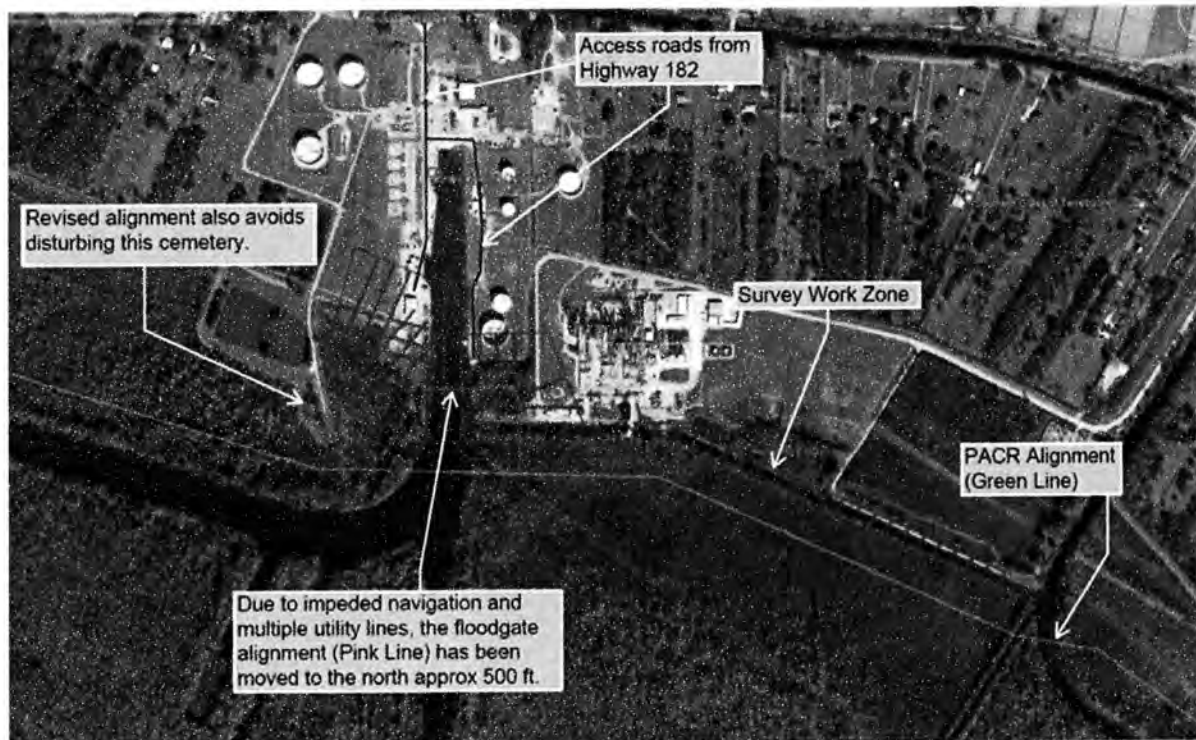


Figure 15. Minors Canal Floodgate (Alternate Alignment) Boring Locations

## Shell Canal East Floodgate

### Surveys

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).



*Figure 16. Shell Canal East Floodgate Surveys*

#### Borings

Ten (10) 5-in soil borings and three (3) CPTs would be taken at the location of the barge floodgate. Five (5) of the borings would be performed on dry land, three (3) from a rig mounted on an elevating boat in the waterway, and five (5) in the marsh area. Reference the photos below for the proposed exploration locations and access paths.



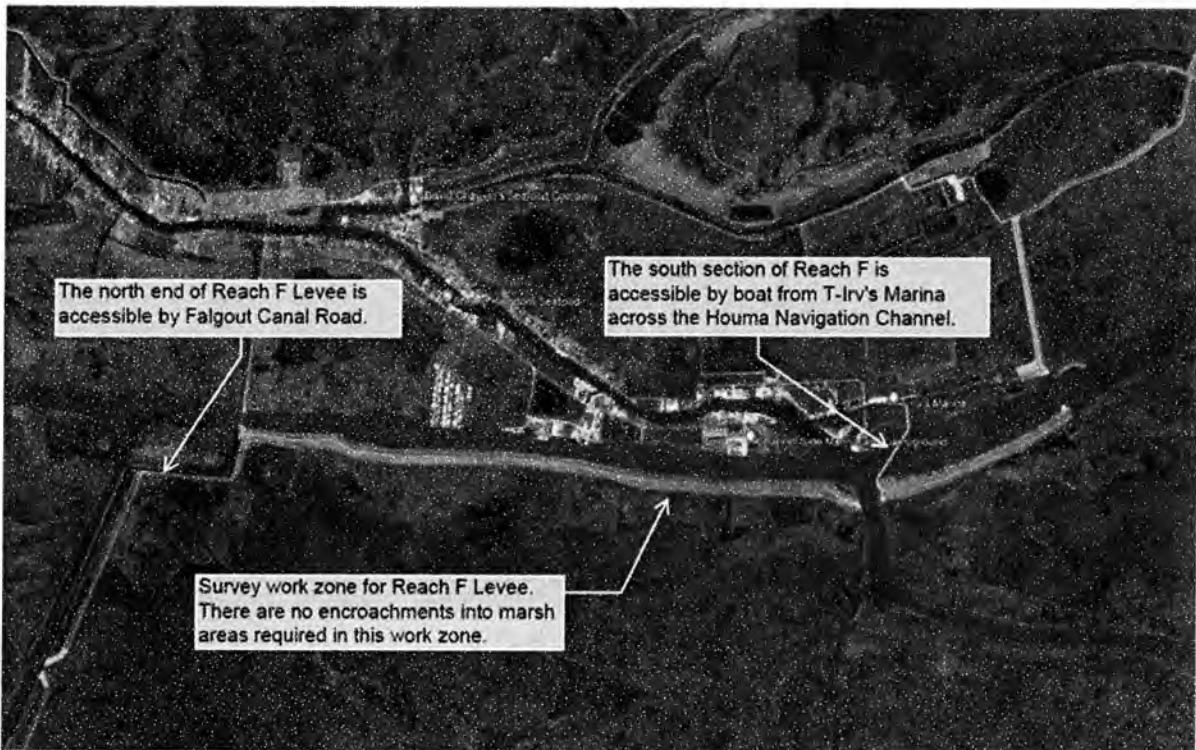


*Figure 17. Shell Canal East Floodgate Boring Locations*

## **Reach F Levee**

### Surveys

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).



*Figure 18. Reach F Levee Surveys*

#### Borings

Thirty (30) soil borings and thirty-one (31) cone penetration tests (CPTs) would be taken at the approximate locations shown in the Figures below. All soil boring sites are located within the current non-federal sponsor (NFS) constructed levee footprint and would not extend outside the toe of the existing levee.









Figure 22. Reach J2 Levee Surveys

### Borings

Sixty-five (65) soil borings and sixty-three (63) cone penetration tests (CPTs) would be taken at the approximate locations shown below. All soil boring sites are located within the current NFS constructed levee footprint and would not extend outside the toe of the existing levee.

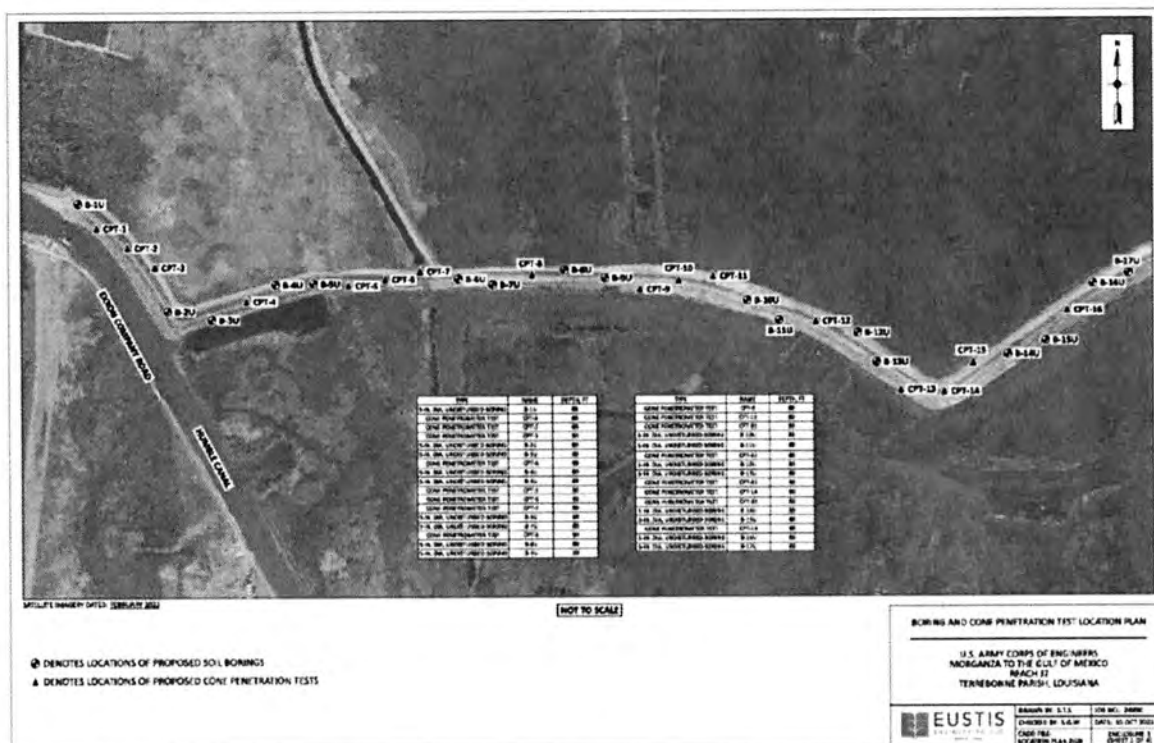
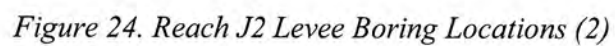


Figure 23. Reach J2 Levee Boring Locations (1)



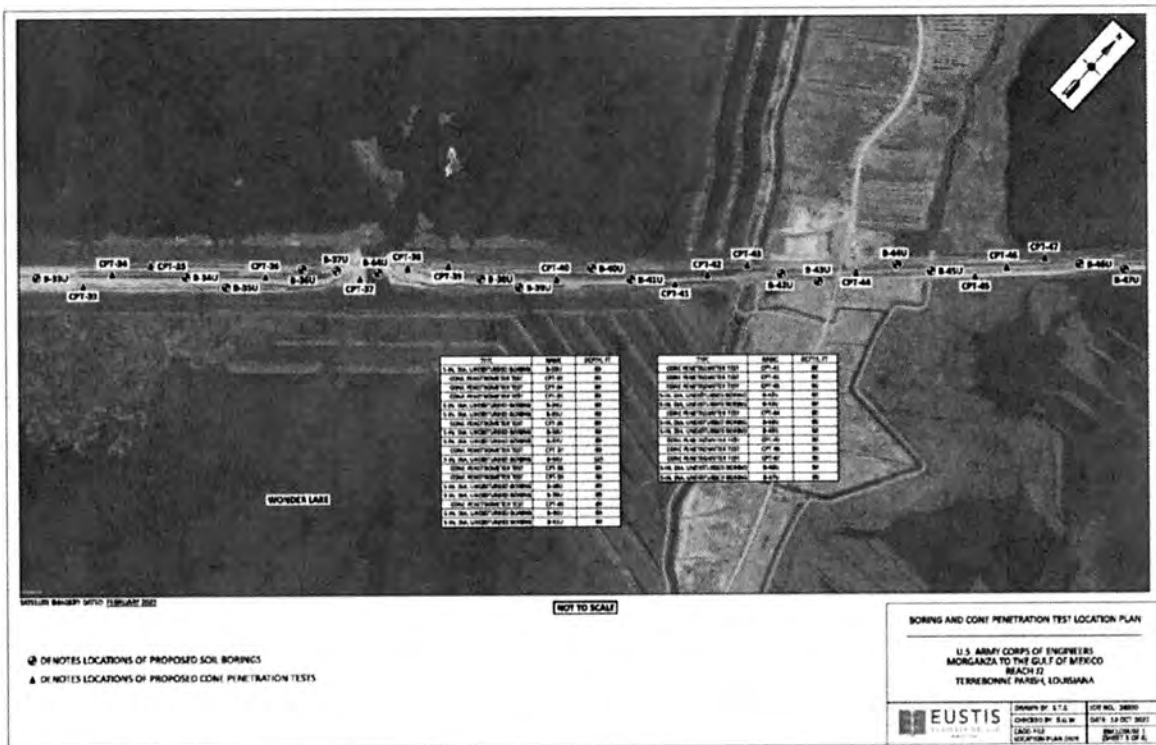


Figure 25. Reach J2 Levee Boring Locations (3)

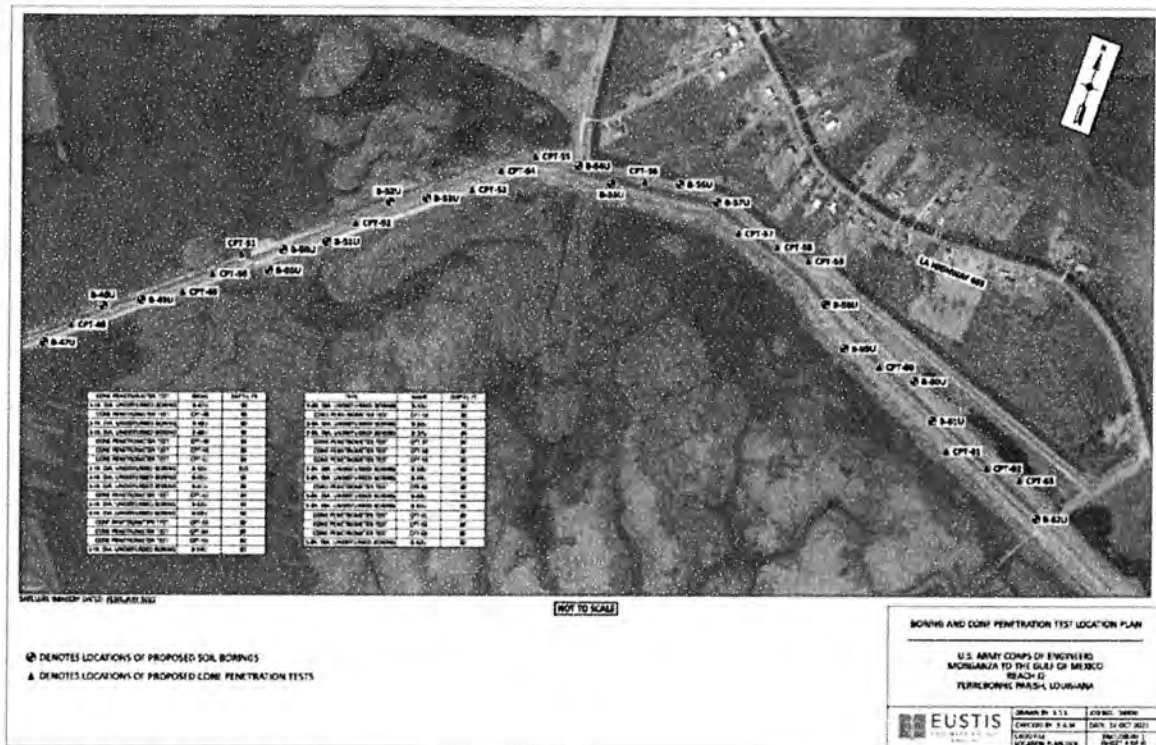


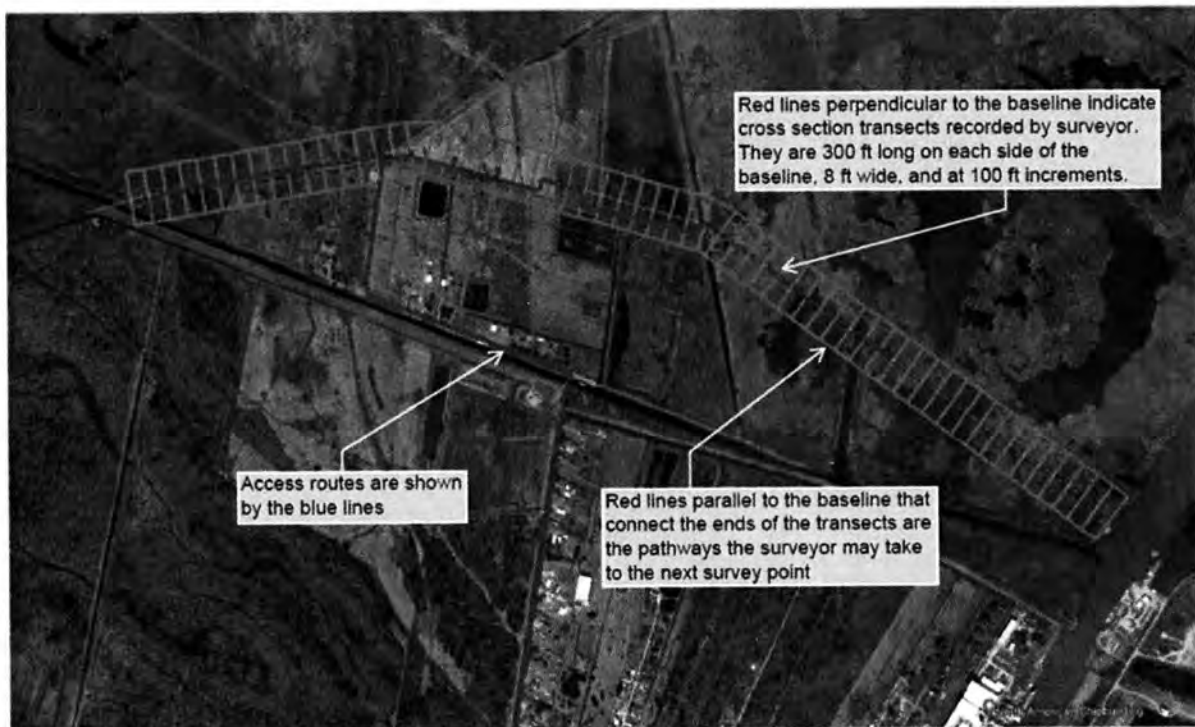
Figure 26. Reach J2 Levee Boring Locations (4)

## Reach 1 Levee

### Surveys

The surveys would be conducted within the work zone(s) shown below. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).





*Figure 27. Reach 1 Levee Surveys*

#### Borings

Twelve (12) soil borings and twelve (12) cone penetration tests (CPTs) would be taken at the approximate locations shown below. All soil boring sites are located along the proposed SOW levee footprint. The Contractor is to ensure that all personnel and work equipment are to remain in the designated work zone(s).



Figure 28. Reach 1 Levee Boring Locations

## FISH AND WILDLIFE RESOURCES

### Description of Habitats

#### *Existing conditions*

**Forested Wetlands** – Forested wetlands in the study area were divided into two major types; i.e., bottomland hardwood forests and cypress-tupelo swamp. Bottomland hardwood forests found in coastal portions of the project area occur primarily on the natural levees of distributary channels. Dominant vegetation may include sugarberry (*Celtis laevigata* Willd), water oak (*Quercus nigra* L.), live oak (*Quercus virginiana* Mill.), bitter pecan (*Carya aquatica* (Michx. f.) Nutt.), black willow (*Salix nigra* Marshall), American elm (*Ulmus americana* L.), Drummond red maple (*Acer rubrum* L.), Chinese tallow-tree (*Triadica loureiro*), boxelder (*Acer negundo* L.), green ash (*Fraxinus pennsylvanica* Marshall), baldcypress (*Taxodium* Rich.), and elderberry (*Sambucus* L.). Cypress-tupelo swamps are located along the flanks of larger distributary ridges as a transition zone between bottomland hardwoods and lower-elevation marsh or scrub-shrub habitats. Cypress (*Taxodia* Rich.)-tupelo (*Nyssa* L.) swamps exist where there is little or no salinity and usually minimal daily tidal action.

**Scrub-Shrub** – Scrub-shrub habitat is often found along the flanks of distributary ridges. Typically, it is bordered by marsh at lower elevations and by developed areas, cypress-tupelo swamp, or bottomland hardwoods at higher elevations. Typical scrub-shrub vegetation includes elderberry (*Sambucus* L.), wax myrtle (*Morella cerifera* (L.) Small), buttonbush (*Cephalanthus* L.), black willow (*Salix nigra* Marshall), Drummond red maple (*Acer rubrum* L.), Chinese tallow-tree (*Triadica loureiro*), and groundselbush (*Baccharis halimifolia* L.).

**Fresh Marsh** – Fresh marshes occur at the upper ends of intertributary basins and are often characterized by floating or semi-floating organic soils. Most fresh marshes exhibit minimal daily tidal action; fresh marshes in the Atchafalaya River delta and adjacent to Atchafalaya Bay are the exceptions. Vegetation may include maidencane (*Panicum hemitomon* Schult.), bulltongue (*Sagittaria lancifolia* L.), cattail (*Typha* L.), California bulrush (*Schoenoplectus californicus* (C.A. Mey.) Palla), pennywort (*Hydrocotyle* L.), giant cutgrass (*Zizaniopsis miliacea* (Michx.) Döll & Asch.), American cupscale (*Sacciolepis striata* (L.) Nash), spikerushes (*Eleocharis* R. Br.), bacopa (*Bacopa* Aubl.), and alligatorweed (*Alternanthera philoxeroides* (Mart.) Griseb.). Associated open water habitats may often support extensive beds of floating-leaved and submerged aquatic vegetation including water hyacinth (*Eichhornia* Kunth), *Salvinia* (*Salvinia* Ség.), duckweeds (*Lemna* L.), American lotus (*Nelumbo lutea* Willd.), white waterlily (*Nymphaea odorata* Aiton), water lettuce (*Pistia stratiotes* L.), coontail (*Ceratophyllum demersum* L.), Eurasian milfoil (*Myriophyllum spicatum* L.), hydrilla (*Hydrilla* Rich.), pondweeds (*Potamogeton* L. or *Stuckenia* Börner), naiads (*Najas* L.), fanwort (*Cabomba* Aubl.), wild celery (*Apium graveolens* L.), water stargrass (*Heteranthera dubia* (Jacq.) MacMill.), elodea (*Egeria densa* Planch.), and others.

**Developed Areas** – Most developed areas are located on higher elevations of former distributary channels and are typically well drained. They include agricultural lands, and commercial and residential developments.

**Canals and Bayous** – Canals and larger bayous typically range in depth from 4 or 5 feet, to over 15 feet. Strong tidal flows may occur at times through those waterways, especially where they provide hydrologic connections to other large waterbodies. Such canals and bayous may have mud or clay bottoms that range from soft to firm. Dead-end canals and small bayous are typically shallow, and their bottoms may be filled in to varying degrees with semi-fluid organic material. Erosion due to wave action and boat wakes, together with shading from overhanging woody vegetation, tends to retard the amount of intertidal marsh vegetation growing along the edges of those waterways.

#### *No Action Alternative*

Under the no action alternative there is the expectation of increased salinity and inundation from the effects of relative sea level rise (RSLR). At the same time there is some marsh accretion, from freshwater inputs, in the area leading to a net gain in marsh currently. Assuming RSLR and accretion predictions stay the same there is the possibility of increasing marsh habitat from forested wetland and open water conversation to marsh habitats. RSLR would increase salinity in the area potentially leading to conversion of fresh/intermediate marsh to more brackish/salt marshes.

#### **Fishery/Aquatic Resources**

##### *Existing conditions*

Wetlands throughout the study area abound with small resident fishes and shellfishes such as least killifish (*Heterandria formosa*), rainwater killifish (*Lucania parva*), sheepshead minnow (*Cyprinodon variegatus*), mosquitofish (*Gambusia affinis*), sailfin molly (*Poecilia latipinna*),

grass shrimp (*Palaemonetes*), and others. Those species are typically found along marsh edges or among submerged aquatic vegetation and provide forage for a variety of fish and wildlife. Fresh water and low-salinity marshes provide habitat for commercially and recreationally important resident freshwater fishes such as largemouth bass (*Micropterus salmoides*), yellow bass (*Morone mississippiensis*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), warmouth (*Lepomis gulosus*), blue catfish (*Ictalurus furcatus*), channel catfish (*Ictalurus punctatus*), buffalo (*Ictiobus*), freshwater drum (*Aplodinotus grunniens*), bowfin (*Amia calva*), and gar (*Lepisosteidae*). Areas supporting stable freshwater fisheries occur in the northern portion of the Penchant Subbasin. Freshwater fishes may also utilize low-salinity areas (intermediate marsh zone), provided they have access to fresher areas during periods of high salinity.

The coastal marshes also provide nursery habitat for many estuarine-dependent commercial and recreational fishes and shellfishes. Because of the protection and abundant food afforded by those wetlands, they are critical to the growth and production of species such as blue crab (*Callinectes sapidus*), white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), Gulf menhaden (*Brevoortia patronus*), Atlantic croaker (*Micropogonias undulatus*), red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), sand seatrout (*Cynoscion arenarius*), spot (*Leiostomus xanthurus*), southern flounder (*Paralichthys lethostigma*), striped mullet (*Mugil cephalus*), and others. Those species are generally most abundant in the brackish and saline marshes; however, blue crab, white shrimp, Gulf menhaden, red drum, and Atlantic croaker as well as several other species also utilize fresh and low-salinity marshes.

Because tidal marshes provide essential nursery habitat, commercial shrimp harvests are positively correlated with the area of tidal emergent wetlands, not open water area (Turner 1977 and 1982). Future commercial harvests of shrimp and other fishes and shellfishes could be adversely impacted by the high rates of marsh loss throughout the study area (Turner 1982).

The eastern oyster (*Crassostrea virginica*) occurs throughout much of the brackish and saline marsh zones within the study area. Oyster harvesting constitutes a valuable fishery in the northern portions of that zone, where salinities range from 10 to 15 parts per thousand (ppt).

#### *No Action Alternative*

The potential for increases in marsh due to accretion would provide more habitat for fisheries and aquatic resources. At the same time the possibility of increased salinization would change the dominant species in the area to more salt tolerant ones.

### **Essential Fish Habitat**

#### *Existing conditions*

The project is located within an area identified as Essential Fish Habitat (EFH) by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, Magnuson-Stevens Act; P.L. 104-297). The updated and revised 2006 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council (GMFMC), identifies estuarine wetlands and associated waters in the project area that



are considered EFH for various life stages of multiple federally managed species. Specific habitat types designated as EFH include estuarine emergent marsh, submerged aquatic vegetation, soft bottom, sand and shell bottom, and associated water column. These habitat types serve as EFH for Federally managed species including brown shrimp, white shrimp, red drum, lane snapper (*Lutjanus synagris*), and gray snapper (*Lutjanus griseus*). The 2017 Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan describes EFH for HMS spatially rather than by habitat type, and estuarine waters in the project area would be considered EFH for bull sharks (*Carcharhinus leucas*).

In addition to being designated as EFH for these species, water bodies and wetlands in the project area provide nursery and foraging habitats supportive of a variety of economically important marine fishery species, such as striped mullet, Eastern oyster, pinfish (*Lagodon rhomboides*), spot, Gulf killifish (*Fundulus grandis*), bay anchovy (*Anchoa mitchilli*), Atlantic croaker, Gulf menhaden, spotted seatrout, sand seatrout, southern flounder, black drum, white shrimp, brown shrimp, and blue crab. Some of these species also serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (i.e., mackerels, snappers, and groupers) and highly migratory species managed by the NMFS (i.e., billfishes and sharks). Wetlands in the project area also produce nutrients and detritus, important components of the aquatic food web, which contributes to the overall productivity and economic value of the estuary.

#### *No Action Alternative*

Increases in marsh habitats from accretion would provide more essential fish habitat for many species. If salinities rose many of the currently present species would not be able to cope leading to a domination of more salt tolerant species.

### **Wildlife Resources**

#### *Existing conditions*

Numerous species of birds utilize study-area marshes, including large numbers of migratory waterfowl which winter there. Project-area fresh and intermediate marshes provide excellent wintering habitat for migratory waterfowl, especially puddle ducks. For this reason, the North American Waterfowl Management Plan's Gulf Coast Joint Venture has recognized this area, the Terrebonne Unit (which includes fresh and intermediate marshes in this study area), as a key waterfowl wintering area. Brackish marshes having abundant submerged aquatic vegetation may also support large numbers of puddle ducks. Puddle ducks that occur in the study area include mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), northern pintail (*Anas acuta*), blue-winged teal (*Spatula discors*), green-winged teal (*Anas carolinensis*), American widgeon (*Mareca americana*), wood duck (*Aix sponsa*), and northern shoveler (*Spatula clypeata*). The resident mottled duck also utilizes project-area coastal marshes. Diving ducks prefer larger ponds, lakes, and open water areas. Common diving duck species include lesser scaup (*Aythya affinis*), canvasback (*Aythya valisineria*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), red-breasted merganser (*Mergus serrator*), common merganser (*Mergus merganser*), and hooded merganser (*Lophodytes cucullatus*). The snow goose (*Anser caerulescens*) and the greater white-fronted goose (*Anser albifrons*) also utilize coastal marshes. Other migratory game birds found in coastal marshes include the king rail (*Rallus elegans*), clapper rail (*Rallus*

*crepitans*), Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), American coot (*Fulica americana*), common moorhen (*Gallinula chloropus*), and common snipe (*Gallinago gallinago*).

Marshes and associated shallow open water areas provide habitat for several wading birds, shorebirds, seabirds, and other nongame birds. Common wading birds include the little blue heron (*Egretta caerulea*), great blue heron (*Ardea herodias*), green-backed heron (*Butorides striatus*), yellow-crowned night heron (*Nyctanassa violacea*), black-crowned night heron (*Nycticorax nycticorax*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), cattle egret (*Bubulcus ibis*), reddish egret (*Egretta rufescens*), white-faced ibis (*Plegadis chihi*), white ibis (*Eudocimus albus*), and roseate spoonbill (*Platalea ajaja*). Shorebirds include the killdeer (*Charadrius vociferus*), American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*), common snipe (*Gallinago gallinago*), and various species of sandpipers (*Scolopacidae*) including western sandpiper (*Calidris mauri*). Seabirds include American white pelican (*Pelecanus erythrorhynchos*), brown pelican (*Pelecanus occidentalis*), black skimmer (*Rynchops niger*), herring gull (*Larus argentatus*), laughing gull (*Leucophaeus atricilla*), and several species of terns (*Sterna*). Other nongame birds such as boat-tailed grackle (*Quiscalus major*), red-winged blackbird (*Agelaius phoeniceus*), seaside sparrow (*Ammodramus maritima*), neotropic cormorant (*Phalacrocorax brasilianus*), northern harrier (*Circus hudsonius*), belted kingfisher (*Megasceryle alcyon*), and sedge wren (*Cistothorus platensis*) also utilize coastal areas.

Common mammals occurring in the coastal marshes include nutria (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), river otter (*Lontra canadensis*), raccoon (*Procyon lotor*), swamp rabbit (*Sylvilagus aquaticus*), white-tailed deer (*Odocoileus virginianus*), and coyote (*Canis latrans*).

Reptiles are most abundant in fresh and low-salinity coastal wetlands. Common species include the American alligator (*Alligator mississippiensis*), cottonmouth (*Agkistrodon piscivorus*), water snakes (*Nerodia*), mudsnake (*Farancia abacura*), speckled kingsnake (*Lampropeltis holbrooki*), eastern ribbon snakes (*Thamnophis sauritus*), western ratsnakes (*Pantherophis obsoletus*), red-eared slider (*Trachemys scripta elegans*), common snapping turtle (*Chelydra serpentina*), alligator snapping turtle (*Macrochelys temminckii*), common mud turtle (*Kinosternon subrubrum*), smooth softshell turtle (*Apalone mutica*), and spiny softshell turtle (*Apalone spinifer*). Amphibians commonly found in the area include the American bullfrog (*Lithobates catesbeianus*), pig frog (*Lithobates grylio*), bronze frog (*Lithobates clamitans*), southern leopard frog (*Lithobates sphenoccephalus*), cricket frogs (*Acris*), tree frogs (*Pseudacris*) (*Hyla*), chorus frogs (*Pseudacris*), three-toed amphiuma (*Amphiuma tridactylum*), sirens (*Siren*), and several species of toads. In brackish and saline marshes, reptiles are limited primarily to the American alligator and the diamond-backed terrapin (*Malaclemys terrapin*), respectively.

Forested wetlands and scrub-shrub areas provide habitats for songbirds such as the mockingbird (*Mimus polyglottos*), yellow-billed cuckoo (*Coccyzus americanus*), northern parula (*Setophaga americana*), yellow-rumped warbler (*Setophaga coronata*), prothonotary warbler (*Protonotaria citrea*), white-eyed vireo (*Vireo griseus*), Carolina chickadee (*Poecile carolinensis*), and tufted titmouse (*Baeolophus bicolor*). Additionally, these areas also provide important resting and feeding areas for songbirds migrating across the Gulf of Mexico. Other avian species found in

forested wetlands include the American woodcock (*Scolopax minor*), common flicker (*Colaptes auratus*), brown thrasher (*Toxostoma rufum*), belted kingfisher (*Megasceryle alcyon*), loggerhead shrike (*Lanius ludovicianus*), pileated woodpecker (*Dryocopus pileatus*), red-headed woodpecker (*Melanerpes erythrocephalus*), downy woodpecker (*Dryobates pubescens*), common grackle (*Quiscalus quiscula*), and American crow (*Corvus brachyrhynchos*). Numerous other bird species use forested wetlands throughout the study area.

Forested habitats and associated waterbodies also support raptors such as the red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), Mississippi kite (*Ictinia mississippiensis*), northern harrier (*Circus cyaneus*), screech owl (*Megascops asio*), great horned owl (*Bubo virginianus*), and barred owl (*Strix varia*). Wading bird colonies typically occur in cypress swamp and scrub-shrub habitat. Species found in those nesting colonies include anhinga (*Anhinga anhinga*), great egret, great blue heron, black-crowned night heron, tricolored heron (*Egretta tricolor*), little blue heron, cattle egret, snowy egret, white-faced ibises and glossy ibises (*Plegadis falcinellus*), and reddish egret. Waterfowl species found in forested wetlands and adjacent waterbodies in the project area include, but are not limited to, wood duck, mallard, green-winged teal, gadwall, and hooded merganser.

Game mammals associated with forested wetlands include eastern cottontail (*Sylvilagus floridanus*), swamp rabbit, gray squirrel (*Sciurus carolinensis*) and fox squirrels (*Sciurus niger*), and white-tailed deer. Commercially important fur bearers include river otter, muskrat, nutria, mink, and raccoon. Other mammals found in forested wetlands include striped skunk (*Mephitis mephitis*), coyote, Virginia opossum (*Didelphis virginiana*), bobcat (*Lynx rufus*), armadillo (*Dasypus novemcinctus*), gray fox (*Urocyon cinereoargenteus*), and red bat (*Lasiurus borealis*). Smaller mammal species serve as forage for both mammalian and avian carnivores and include the cotton rat (*Sigmodon hispidus*), marsh rice rat (*Oryzomys palustris*), white-footed deer mouse (*Peromyscus leucopus*), eastern wood rat (*Neotoma floridana*), eastern harvest mouse (*Reithrodontomys humulis*), least shrew (*Cryptotis parva*), and southern flying squirrel (*Glaucomys volans*).

Reptiles which utilize study area bottomland hardwoods, cypress swamps, and associated shallow water include the American alligator, ground skink (*Scincella lateralis*), five-lined skink (*Eumeces fasciatus*), broad-headed skink (*Eumeces laticeps*), green anole (*Anolis carolinensis*), Gulf coast ribbon snake (*Thamnophis proximus orarius*), yellow-bellied water snake (*Nerodia erythrogaster flavigaster*), speckled kingsnake, southern copperhead (*Agkistrodon contortrix contortrix*), cottonmouth (*Agkistrodon piscivorus*), pygmy rattlesnake (*Sistrurus miliarius*), broad-banded water snake (*Nerodia fasciata confluens*), diamond-backed water snake (*Nerodia rhombifer*), spiny softshell turtle, red-eared slider, southern painted turtle (*Chrysemys dorsalis*), Mississippi mud turtle, stinkpot (*Sternotherus odoratus*), common snapping turtle and alligator snapping turtle, in addition to numerous other species.

Some of the amphibians believed to be in study-area forested wetlands include dwarf salamander (*Eurycea quadridigitata*), three-toed amphiuma, lesser siren (*Siren intermedia*), central newt (*Notophthalmus viridescens louisianensis*), Gulf coast toad (*Incilius nebulifer*), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), green treefrog (*Hyla cinerea*), squirrel treefrog (*Hyla squirella*), pigfrog, bullfrog, southern leopard frog, bronze frog, upland chorus frog (*Pseudacris*



*feriarum*), southern cricket frog (*Acris gryllus gryllus*), and spring peeper (*Pseudacris crucifer*).

Most developed areas provide low-quality wildlife habitat. Sites developed for agricultural purposes are located on low ridges and on lower elevation areas that have improved drainage. In agricultural areas, wildlife habitat is primarily provided by unmaintained ditch banks and field edges, fallow fields, pasture lands, and rainfall-flooded fields. Cultivated crops, especially soybeans, provide forage for some wildlife species. Game species that utilize agricultural lands include the white-tailed deer, mourning dove (*Zenaidura macroura*), northern bobwhite (*Colinus virginianus*), eastern cottontail, and common snipe. Seasonally flooded cropland and fallow fields may provide important feeding habitat for wintering waterfowl, wading birds, and other waterbirds.

#### *Wildlife with Conservation Concerns*

Many of the wildlife resources are species with conservation concern in Louisiana. These include pygmy rattle snake, reddish egret, black-rail, gull-billed tern, black skimmer, mottled duck, bobwhite, little blue heron, roseate spoonbill, king rail, sandwich tern, seaside sparrow, bald eagle, red head, lesser scaup, dickcissel and west Indian manatee. Additionally: northern pintail, gadwall, lesser scaup, blue-winged teal, mottled duck, redhead, northern bobwhite, loggerhead shrike, seaside sparrow, western sandpiper, reddish egret, little blue heron, king rail, black rail, gull-billed tern, and black skimmer are all considered priority species by the Gulf Coast Joint Venture.

#### *No Action Alternative*

Increases in marsh due to accretion could lead to greater foraging habitat for many wildlife species. RSLR and the accompanying salinity increase could greatly change the wildlife species composition in the area, particularly for aquatic and plant species. These changes in dominant plant and aquatic species could have a domino effect, leading to the loss of other species in the area. Additionally, the potential loss of forested wetland habitat in the area would decrease the amount of nesting habitat for many birds and terrestrial species in the area.

### **Endangered and Threatened Species**

#### *West Indian Manatee (Trichechus manatus) – Threatened – Marine Mammal (Protection Act)*

The endangered West Indian manatee (*Trichechus manatus*) is known to regularly occur in Lakes Pontchartrain and Maurepas and their associated coastal waters and streams. It also can be found less regularly in other Louisiana coastal areas, most likely while the average water temperature is warm. Based on data maintained by the Louisiana Wildlife Diversity Program, approximately 84 percent of reported manatee sightings (1990-2019) in Louisiana have occurred from the months of June through December. Manatee occurrences in Louisiana appear to be increasing and they have been regularly reported in the Amite, Blind, Tcheguncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of southeastern Louisiana. Manatees may also infrequently be observed in the Mississippi River and coastal areas of southwestern Louisiana. Cold weather and outbreaks of red tide may adversely affect these animals. However, human activity is the primary cause for declines in species number due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution.



During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable.

All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). We recommend the following to minimize potential impacts to manatees in areas of their potential presence:

- All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s).
- If a manatee(s) is sighted in or near the project area, all vessels associated with the project should operate at "no wake/idle" speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels should follow routes of deep water whenever possible.
- If used, siltation or turbidity barriers should be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.
- Temporary signs concerning manatees should be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities should display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8½" X 11" reading language similar to the following: "CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT". A second temporary sign measuring 8½" X 11" should be posted at a location prominently visible to all personnel engaged in water-related activities and should read language similar to the following: "CAUTION: MANATEE AREA/ EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION".
- To ensure manatees are not trapped due to construction of containment or water control structures, we recommend that the project area be surveyed prior to commencement of work activities. Should manatee be observed within those areas, the contractor should immediately contact the Service's Louisiana Ecological Services Office (337/291-3100)

and the Louisiana Department of Wildlife and Fisheries, Wildlife Diversity Program (225/765-2821).

- Collisions with, injury to, or sightings of manatees should be immediately reported to the Service's Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Wildlife Diversity Program (225/765-2821). Please provide the nature of the call (i.e., report of an incident, manatee sighting, etc.); time of incident/sighting; and the approximate location, including the latitude and longitude coordinates, if possible.

*Eastern Black Rail (Laterallus jamaicensis ssp. Jamaicensis) – Threatened*

The eastern black rail (*Laterallus jamaicensis ssp.*) is a wetland-dependent bird requiring dense emergent cover and extremely shallow water depths (< 6 cm) over a portion of the wetland-upland interface to support its resource needs. Birds are found in a variety of salt, brackish, and freshwater marsh habitats that can be tidally or non-tidally influenced. Plant structure is considered more important than plant species composition in predicting habitat suitability (Flores and Eddleman 1995). In Louisiana, occurrences have been documented in high brackish marsh vegetated with Gulf cordgrass (*Spartina spartinae*), saltgrass (*Distichlis spicata*), sea oxeye (*Borrchia frutescens*), and saltmeadow cordgrass (*Spartina patens*) and often interspersed with shrubs such as marsh elder (*Iva frutescens*) or groundselbush. The high marsh is only inundated during extreme high tide events. In general, the character of the high marsh is a short grassy savannah. It may also occur in working wetland habitats such as rice fields. Recent surveys conducted within Louisiana have revealed that the eastern black rail occurs in Cameron, Vermilion, and St Charles Parishes in both the breeding and non-breeding season.

On October 8, 2020, the eastern black rail was added to the list of threatened species along with a 4(d) rule, which became effective on November 9, 2020. If the proposed action would directly or indirectly affect the eastern black rail or its habitat, further consultation with the Service will be necessary.

*At-Risk Species*

The Service's Southeast Region has defined "at-risk species" as those that are: 1) proposed for listing under the ESA by the Service; 2) candidates for listing under the ESA, which means the species has a "warranted but precluded 12-month finding"; or 3) petitioned for listing under the ESA, which means a citizen or group has requested that the Service add them to the list of protected species. Petitioned species include those for which the Service has made a substantial 90-day finding as well as those that are under review for a 90-day finding. As the Service develops proactive conservation strategies with partners for at-risk species, the states' Species of Greatest Conservation Need (defined as species with low or declining populations) will also be considered.

The Service's goal is to work with private and public entities on proactive conservation to conserve these species, thereby precluding the need to federally list as many at-risk species as possible. While not all species identified as at-risk will become ESA listed species, their potentially reduced populations warrant their identification and attention in project planning. Listed below are species currently designated as "at-risk" that may occur within the proposed study area.

### *Proposed Species*

#### Alligator Snapping Turtle

The alligator snapping turtle (AST, *Macrochelys temminckii*) has a wide geographic range and occurs in bayous, rivers, streams, swamps, and lakes in Texas, Louisiana, Oklahoma, Arkansas, Missouri, Illinois, Kentucky, Tennessee, Mississippi, Alabama, Georgia, and Florida. They prefer water bodies (small streams [perennial], bayous, canals, swamps, lakes, reservoirs, ponds, and oxbows) with overhang banks and adjacent riparian forest, especially bald cypress bordered banks. Sections of waterways with steep-sloped banks, or those lined with concrete, stone, etc. are likely avoided, especially when there are no trees on the bank. However, relatively short sections of non-preferred bank composition do not necessarily preclude occupation of the entire waterway. They may venture onto the adjacent floodplain during high water events. Although they have been found at the edge of the Gulf of Mexico, coastal marshes and saline water are not their preferred habitat type. They also prefer waterbodies with snags and submerged logs, tree root masses, or other debris in the water. Adults generally stick to deeper water (enough to cover their body to deeper than 20ft), but in areas with deep, loose mud, they have been found in 10 inches of water with a mud layer of several feet. Juveniles can be found in shallow streams less than 1 foot deep. AST are sensitive to water temperature and will change locations as needed to thermoregulate. AST generally stay on the water bottom, but they do move along the bottom, and can travel considerable distances (miles) in just days or weeks. Trapping surveys are generally effective at locating AST, but lack of capture, especially during short-term limited area survey efforts, does not confirm absence.

AST rarely leave the water except for nesting females generally from April to early July (typically April-May in southern parts of the range including Louisiana and May-July in north/western portion of the range). Egg incubation time is generally between 96 and 143 days. Nesting areas may have varying amounts of canopy cover. Nests are generally located between 4 and 656 feet from the water line, and more likely less than 300 feet from the water line.

Alligator snapping turtle is considered vulnerable (S3) by the LDWF. The LDWF recommends minimizing disturbance and alteration of nesting habitat, particularly during nesting season (April – June). Nesting typically occurs close to riverbanks and lake shores. Additionally, the LDWF recommends minimize removal of log jams in streams, as woody debris provides cover and hunting areas used by this species. Stream alteration should be avoided to protect turtle habitat. If dredging is needed, material should be dumped away from potential turtle nesting sites or dumped prior to egg laying (May – early June). Please contact Keri Lejeune at 337-735-8676 for more information.

Should the proposed project directly or indirectly affect the alligator snapping turtle or its habitat, further conference with this office and the LDWF will be necessary.

### *Candidate Species*

#### Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) is a candidate species and not yet listed or proposed for listing. Consultation with U.S. Fish and Wildlife Service under section 7 of the Endangered

Species Act is not required for candidate species, like the monarch. We encourage agencies, however, to take advantage of any opportunity they may have to conserve the species.

On June 20, 2014, President Obama signed a Presidential Memorandum, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators," outlining an expedited agenda to address the devastating declines in honey bees and native pollinators, including the monarch butterfly. Recent research has shown dramatic declines in monarchs and their habitats leading conservation groups to petition the Service to list the species under Endangered Species Act (ESA). Ensuring adequate and sustainable habitats, meeting all the life history needs of these species is of paramount importance. The Service and its partners are taking immediate actions to replace and restore monarch and pollinator habitat on both public and private lands across the U.S. landscape. Therefore, the Service recommend revegetation of disturbed areas with native plant species, including species of nectar-producing plants and milkweed endemic to the area, we recommend consultation with state botanists to determine appropriate species where possible.

### **Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA)**

There are several species found throughout the project area that are protected under the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.) and/or the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d), including bald eagle, brown pelican and other colonial nesting birds, and most native bird species.

During project construction, on-site personnel should be informed of the possible presence of nesting bald eagles (*Haliaeetus leucocephalus*) near the project boundary, and should identify, avoid, and immediately report any such nests to this office. The LDWF and the Service recommend all bald eagle nests (active, inactive, or seemingly abandoned) should be protected, and no large trees should be removed. Additionally, no major activities should occur within the nesting period (September 1 – June 1). If an active or inactive eagle nest is discovered within 1,500 feet of the project footprint, then follow the bald and golden eagle guidelines to determine whether disturbance will occur and/or an incidental take permit is needed.

### **Colonial Nesting Waterbirds Language**

In accordance with the Migratory Bird Treaty Act of 1918 (as amended) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), please be advised that the project area is located in habitats which are commonly inhabited by colonial nesting waterbirds and/or seabirds.

Please be aware that entry into or disturbance of active breeding colonies is prohibited by the LDWF. In addition, the LDWF prohibits work within a certain radius of an active nesting colony.

Colonies may be present that are not currently listed in the database maintained by the LDWF. Though the waterbird colony database is extensive and updated often, colony nesting site locations are very fluid, particularly, in marsh habitats where late nesters or new colonies can be established between surveys. Due to the difficult nature of documenting all nesting colonies, the



LDWF and the Service recommend that a qualified biologist inspect the proposed construction site for the presence of documented and undocumented nesting colonies during the nesting season of each year that project construction is ongoing. This field visit should take place no more than two weeks before project construction begins.

Following the field visit a survey report should be provide the LDWF and the Service which is to include the following information:

1. qualifications of survey personnel;
2. survey methodology including dates, site characteristics, and size of survey area;
3. species of birds present, activity, estimates of number of nests present, and general vegetation type including digital photographs representing the site; and
4. topographic maps and ArcGIS shapefiles projected in UTM NAD83 Zone 15 to illustrate the location and extent of the colony.

Please mail survey reports on CD to:

Wildlife Diversity Program  
Louisiana Dept. of Wildlife & Fisheries  
P.O. Box 98000  
Baton Rouge, LA 70898-9000

To minimize disturbance to colonial nesting birds, the following conservation measures should be considered:

1. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).
2. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

In addition, we recommend that on-site contract personnel including project-designated inspectors be trained to identify colonial nesting birds and their nests and avoid affecting them during the breeding season (i.e., the time period outside the activity window). Should on-site contractors and inspectors observe potential nesting activity, coordination with the LDWF and the Service should occur. If no nesting colonies are found within 1000 feet (2000 feet for Brown Pelicans) of the proposed project, no further consultation with the LDWF and the Service will be necessary. If you have any questions or need additional information on birds from the LDWF, please contact Rob Dobbs at 337-735-8675.

## Migratory Birds

The Migratory Bird Treaty Act (MBTA) prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the U.S. Department of Interior, Fish and Wildlife Service. The following migratory birds may be present at your project location at certain times of the year.

Common Name	Species name	Breeding Season
American Golden plover	<i>Pluvialis dominica</i>	Breeds elsewhere
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Sep 1 to Jun 1
Black Skimmer	<i>Rynchops niger</i>	May 20 to Sep 15
Cerulean Warbler	<i>Dendroica cerulea</i>	Apr 25 to Jul 20
Chimney Swift	<i>Chaetura pelagica</i>	Mar 15 to Aug 25
Dickcissel	<i>Spiza americana</i>	May 5 to Aug 31
Gull-billed Tern	<i>Gelochelidon nilotica</i>	May 1 to Jul 31
Kentucky Warbler	<i>Oporornis formosus</i>	Apr 20 to Aug 20
King Rail	<i>Rallus elegans</i>	May 1 to Sep 5
Lesser Yellowlegs	<i>Tringa flavipes</i>	Breeds Elsewhere
Little Blue Heron	<i>Egretta caerulea</i>	Mar 10 to Oct 15
Marbled Godwit	<i>Limosa fedoa</i>	Breeds elsewhere
Painted Bunting	<i>Passerina ciris</i>	Apr 25 to Aug 15
Pectoral Sandpiper	<i>Calidris melanotos</i>	Breeds elsewhere
Prairie Warbler	<i>Dendroica discolor</i>	May 1 to Jul 31
Prothonotary Warbler	<i>Protonotaria citrea</i>	Apr 1 to Jul 31
Reddish Egret	<i>Egretta rufescens</i>	Mar 1 to Sep 15
Ruddy Turnstone	<i>Arenaria interpres morinella</i>	Breeds elsewhere
Rusty Blackbird	<i>Euphagus carolinus</i>	Breeds elsewhere
Sandwich Tern	<i>Thalasseus sandvicensis</i>	Apr 25 to Aug 31
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Breeds elsewhere
Swallow-tailed Kite	<i>Elanoides forficatus</i>	Mar 10 to Jun 30
Willet	<i>Tringa semipalmata</i>	Apr 20 to Aug 5
Wood Thrush	<i>Hylocichla mustelina</i>	May 10 to Aug 31

Figure 29. Migratory Birds

## Refuges and Wildlife Management Areas and CWPPRA Projects

It is likely the proposed surveys and borings will impact Mandalay National Wildlife Refuge. Should surveys and borings fall within the Mandalay National Wildlife Refuge, those Surveys and Borings would not be compatible with the purposes for which the refuge was established. The Service recommends avoiding impacts on the Mandalay National Wildlife Refuge (NWR). If impacts cannot be avoided, impacts will need to be mitigated for on the Mandalay NWR. For surveys and borings, please coordinate all activities with refuge staff and with Mr. Pon Dixon, Project Leader of the Bayou Sauvage Urban NWR Complex (985/882-2014).

## EVALUATION METHODOLOGY

To quantify anticipated indirect project impacts to fish and wildlife resources, the Service used the 2017 (version 2) USACE-approved Wetland Value Assessment (WVA) models. The WVA model was developed to evaluate restoration projects proposed for funding under Section 303 of the CWPPRA and was modified through the USACE approval process for use in the USACE planning process. These models are approved for regional use on USACE Civil Works projects. Further information on this model may be obtained from the USACE's New Orleans District, Regional Planning and Environmental Division South at <https://ecolibrary.planusace.us/> (use the search term "WVA"). The WVA quantifies changes in fish and wildlife habitat quality and quantity that are expected to result from a proposed project. The WVA operates under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland habitat type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated or expressed using community models developed specifically for each habitat type. The results of the WVA, measured in Average Annual Habitat Units (AAHUs), can be combined with cost data to provide a measure of the effectiveness of a project in terms of cost per AAHU gained or lost.

The WVA community models have been designed to function at a community level and therefore attempt to define an optimum combination of habitat conditions for all fish and wildlife species utilizing a given habitat type. Each model consists of 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index (SI) graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values, and 3) a mathematical formula that combines the Suitability Index for each variable into a single value for habitat quality; that single value is referred to as the Habitat Suitability Index, or HSI. The output of each model (the HSI) is assumed to have a linear relationship with the suitability of a coastal wetland system in providing fish and wildlife habitat.

The WVA models operate under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated and expressed using a mathematical model developed specifically for each wetland type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the Suitability Indices for each variable into a single value for wetland habitat quality, termed the Habitat Suitability Index (HSI). The WVA models assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. This standardized, multi-species, habitat-based methodology facilitates the assessment of project-induced impacts on fish and wildlife resources.

Field data were used in conjunction with the above-discussed mathematical models to compute an HSI value for each target year (TY). Target years were established when significant changes

in habitat quality or quantity were expected during the 50-year project life, under future with-project and future without-project conditions.

The product of an HSI value and the acreage of available habitat for a given target year is known as the Habitat Unit (HU). The HU is the basic unit for measuring project effects on fish and wildlife habitat. Future HUs change according to changes in habitat quality and/or quantity. Results are annualized over the project life to determine the Average Annual Habitat Units (AAHUs) available for each habitat type.

The change (increase or decrease) in AAHUs for each future with-project scenario, compared to future without-project conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the habitat being evaluated; a net loss of AAHUs indicates that the project is damaging to that habitat type. In determining future with-project conditions, all project-related direct (construction) impacts were assumed to occur in TY1.

Three types of USACE certified wetland value assessments (WVAs) were used to determine direct impacts to fish and wildlife resources: bottomland hardwood (BLH), swamp and fresh/intermediate marsh. For all three WVAs data was collected both in the field, using satellite imagery, and Coastwide Reference Monitoring System (CRMS) data.

The WVA fresh/intermediate marsh model consist of six variables: 1) percent of wetland covered by emergent vegetation; 2) percent open water dominated by submerged aquatic vegetation (SAV); 3) degree of marsh edge and interspersions; 4) percent of open water less than or equal to 1.5 feet deep; 5) mean high salinity during the growing season; and 6) aquatic organism access. The WVA model for swamp consists of seven variables: 1) stand structure; 2) stand maturity; 3) water regime; 4) mean high salinity during the growing season; 5) size of contiguous forested area; 6) Suitability and traversability of surrounding land uses and 7) disturbance. The WVA model for bottomland hardwood consists of seven variables: 1) tree species composition; 2) stand maturity; 3) understory/midstory cover; 4) hydrology; 5) size of contiguous forested area; 6) Suitability and traversability of surrounding land uses and 7) disturbance. Changes in each variable are predicted for future without-project and future with-project scenarios over a 50-year project life. By incorporating variables for SAV and shallow open water into each of the marsh models, impacts to those habitat components are combined with impacts to emergent marshes. Because emergent marsh is of higher overall fish and wildlife value than SAV, and because SAV is of higher value than shallow open water, those latter components receive proportionally less weight when combined into one AAHU value. The swamp and BLH models do not include SAV or shallow open water variables; hence, impacts to those habitats are not included in the WVA analysis for swamp.

A Habitat Evaluation Team (HET) was formed to assist with and concur on the methodology and quantification of environment impacts. The HET assumed survey and boring equipment will have direct impacts (crushing vegetation, breaking up substrate, etc.) on a 15-foot corridor around the proposed levee center line. No indirect impacts are expected, and mitigation will likely only be required for any impacts that do not spatially overlap with levee construction impacts.



Further explanation of how impacts/benefits are assessed within the WVA process and an explanation of the assumptions affecting HSI values for each target year are available for review at the Fish and Wildlife Service's (Service) Louisiana Ecological Services field office (<https://ecos.fws.gov/ServCat/Reference/Profile/162814>).

## PROJECT IMPACTS

### *Habitat Types*

A total of 19.149 acres of habitat are expected to be negatively impacted leading to a loss of 8.9 AAHUs. This includes 0.793 acres of swamp (-0.24 AAHUs), 0.854 acres bottomland hardwood (-0.08 AAHUs) and 17.502 acres marsh (-8.58 AAHUs). All impacts are expected to come from survey and borings machinery and transport. Since there are no expected changes to hydrology or habitat type no indirect impacts are expected. The Service does not anticipate the need for service roads for survey and borings. If that is not the case the Service should be contacted for consultation on additional wetland impacts from service road construction. In the event that service road construction is needed the Service recommends avoiding stockpiling of borrow on wetlands; and constructing culverts within the access roads to allow for proper hydrologic exchange within the system.

<b>Geotechnical Boring Impacts</b>	<b>Swamp</b>	<b>Swamp</b>	<b>BLH</b>	<b>BLH</b>	<b>Marsh</b>	<b>Marsh</b>	<b>Total</b>	<b>Total</b>
<b>Location/Feature</b>	<b>acres</b>	<b>AAHUs</b>	<b>acres</b>	<b>AAHUs</b>	<b>acres</b>	<b>AAHUs</b>	<b>acres</b>	<b>AAHUs</b>
Reach A	0.793	-0.240	0.678	-0.040	12.468	-6.130	13.939	-6.410
Reach F	0	0	0	0	0	0	0.000	0.000
Reach J2	0	0	0	0	0	0	0.000	0.000
L2L - Reach 1	0	0	0	0	2.02	-1.14	2.020	-1.140
GIWW East Floodgate	0	0	0	0	2.30	-1.00	2.300	-1.000
Shell Canal Floodgate	0	0	0.176	-0.04	0.714	-0.31	0.890	-0.350
	0.793	-0.240	0.854	-0.080	17.502	-8.580	19.149	-8.900

Figure 30. Impact Acres and AAHUs

### *Fishery Resources*

No significant impacts are expected to fishery resources because no hydrologic impacts are expected from survey and borings. There will be minor impacts in the form of disturbance of SAV and the channel bottom. Fishery resources may be disturbed during the in-water portion of the survey and borings process. There may be take of any species on, or within, the substrate where the borings are taken.

### *Essential Fish Habitat*

There are no expected long-term impacts to essential fish habitat because no hydrologic impacts are expected from survey and borings. In the short term there will be disturbance of emergent marsh, SAV, and channel bottoms, but these minimized impacts will be mitigated through the Reach A construction activities.

### *Wildlife*

Wildlife could be disturbed during the survey and borings process but no long-term effects to wildlife are expected beyond habitat destruction within the 15-foot-wide corridor around the levee centerline. There will be take of species within the substrate where borings are taken.

### *Threatened and Endangered Species*

The USACE is responsible for determining whether the proposed Project is likely (or not likely) to adversely affect any listed species and/or critical habitat, and for requesting the Service's concurrence with that determination. If the USACE determines, and the Service concurs, that the selected alternative is likely to adversely affect listed species and/or critical habitat, a request for formal consultation in accordance with Section 7 of the ESA should be submitted to the Service. That request should also include the USACE's rationale supporting their determination.

### *Migratory Bird Treaty Act (MBTA) and Bald and Eagle Protection Act (BGEPA)*

During project construction, the Service recommends that on-site contract personnel be informed of the need to identify nesting bald eagles and colonial nesting birds and their nests and should avoid affecting them during the breeding season.

### *At-Risk Species and Gulf Coast Joint Venture*

The project is not expected to have long term benefits or negative impacts to Gulf Coast Venture species. There will a small amount of habitat destruction around the levee centerline that could disturb species at the time of the survey and borings, but the habitat destruction is not expected to have significant long-term effects on species.

### *FWS Concerns*

The Service assumed no service roads would be needed for surveys and borings for MTG Reach A. If service roads will be necessary, please contact this office for further consultation.

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Act regulations to include:

- avoiding the impact altogether by not taking a certain action or parts of an action;
- minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
- compensation for the impact by replacing or providing substitute resources or environments.

Coastal marshes and forested wetlands are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries). Therefore, the Service recommends that unavoidable losses of those habitats be compensated in kind.

The Service's mitigation policy (Federal Register, Volume 46, Number 15, pages 7656-7663, January 23, 1991) provides guidance to help ensure that the level of mitigation recommended by

the Service is consistent with the value and scarcity of the fish and wildlife resources involved. In keeping with that policy, the Service usually recommends that losses of high-value habitats which are becoming scarce be avoided or minimized to the greatest extent possible. Unavoidable losses of such habitats should be fully compensated by replacement of the same kind of habitat value; this is called "in-kind" mitigation.

### **SERVICE POSITION AND RECOMMENDATIONS**

1. Full in-kind compensation (quantified in AAHUs) should be provided for unavoidable net adverse project impacts on forested wetlands, marsh, and associated submerged aquatic vegetation. Since survey and borings impacts will spatially overlap with levee construction impacts for MTG Reach A, in the area of Reach A the Service will consider only requiring mitigation for the survey and boring impacts for TYs prior to levee construction. Any Boring impacts that do not spatially overlap with construction impacts should still be mitigated. The Service and the NMFS should be consulted in the development of plans and specifications for mitigation features.
2. Care should be taken to avoid impacts to bald eagles and their nesting habitat. Prior to and during any project construction, on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to this office. Prior to construction, the Service and the LDWF recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nests during the nesting season (October through mid-May). If an active or inactive eagle nest is discovered within 1,500 feet of the project footprint, then follow the bald and golden eagle guidelines to determine whether disturbance will occur and/or an incidental take permit is needed. Any take should be reported to this office and the LDWF. Bald eagle nest (active, inactive, or seemingly abandoned) should be protected, and no large trees should be removed.
3. During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable. For more detail on avoiding contact with manatee contact this office. Should a proposed action directly or indirectly affect the West Indian manatee, further consultation with this office will be necessary.
4. Avoid adverse impacts to nesting wading bird colonies through careful design of project features and timing of construction. The Service and the LDWF recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season (September 1 through February 15).

5. Avoid adverse impacts to alligator snapping turtle by minimizing disturbance and alteration of nesting habitat, particularly in the nesting season (April-June), including minimizing the removal of log jams in streams.
6. The Service recommends avoiding impacts on the Mandalay National Wildlife Refuge (NWR). If impacts cannot be avoided, impacts will need to be mitigated for on the Mandalay NWR. For surveys and borings, please coordinate all activities with refuge staff and with Mr. Pon Dixon, Project Leader of the Bayou Sauvage Urban NWR Complex (985/882-2014).
7. The impacts to Essential Fish Habitat should be discussed with the NMFS to determine if the project complies with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Magnuson-Stevens Act; P.L. 104-297, as amended) and its implementing regulations.
8. Access roads across existing wetlands should be avoided if possible and secondary impacts to wetland hydrology should be prevented or reduced. To avoid changes to hydrology the Service recommends appropriately sized culverts (minimum 24-inch culverts) be installed and maintained every 300 feet across access roads through wetlands with additional culverts placed at stream crossings and drainage features. Alternatively, upon completion of construction activities, access roads should be degraded to restore natural hydrology.
9. The Service recommends that the USACE contact the Service for additional consultation if: 1) the scope or location of the proposed project is changed significantly, 2) new information reveals that the action may affect listed species or designated critical habitat; 3) the action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. Additional consultation as a result of any of the above conditions or for changes not covered in this consultation should occur before changes are made and or finalized.



## LITERATURE CITED

- Flores, R.E., and W.R. Eddleman. 1995. California black rail use of habitat in southwestern Arizona. *The Journal of Wildlife Management* 59:357-363.
- Paille, R.F. 1997. Lower Atchafalaya Basin Re-Evaluation Study: a Planning Aid Report on Freshwater Inflows to the Terrebonne Basin. U.S. Fish and Wildlife Service, Ecological Services, Lafayette, LA. 28 pp.
- Turner, R.E. 1977. Intertidal vegetation and commercial yields of penaeid shrimp. *Trans. Am. Fish. Soc.* 106:411-416.
- Turner, R.E. 1982. Wetland losses and coastal fisheries: an enigmatic and economically significant dependency, Pages 112 - 120. *In* Boesch, D.F., ed. 1982. *Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options*. U.S. Fish and Wildlife Service, Biological Service Program, Washington, D.C. FWS/OBS-82/59. 256 pp.