Mississippi Valley Division,
Regional Planning and Environment Division South

Morganza to the Gulf, Louisiana, Hurricane and Storm Damage Risk Reduction Project

Draft Supplemental Environmental Impact Statement

December 2025

COVER PAGE

Title of Proposed Action: Morganza to the Gulf, Louisiana, Hurricane and Storm Damage Risk Reduction Project

Location(s) of Proposed Action: Terrebonne and Lafourche Parishes, Louisiana

Lead Agency: U.S. Army Corps of Engineers

Non-Federal Sponsors: Louisiana Coastal Protection and Restoration Authority Board and Terrebonne Levee and Conservation District

Cooperating Agencies: Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Louisiana State Historic Preservation Office, Louisiana Department of Energy and Conservation, and Louisiana Department of Wildlife and Fisheries

Abstract: The authorized Morganza to the Gulf, Louisiana, Hurricane and Storm Damage Risk Reduction Project (MTG Project) is a hurricane and storm damage risk reduction project involving a 98-mile alignment of earthen levees, floodgates, environmental water control structures, road gates, and fronting protection for existing pump stations. The purpose of the project is to reduce the risk of damage caused by hurricane storm surges. The U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District has prepared a Supplemental Environmental Impact Statement (SEIS) to evaluate proposed design changes to the authorized MTG Project that consider existing local levee alignments and minimize impacts to sensitive habitats while meeting the 1% Annual Exceedance Probability (AEP) Storm Surge Risk Reduction (100-year level of risk reduction). This SEIS supplements the 2013 Final Post Authorization Change Report/Revised Programmatic Environmental Impact Statement approved in the Chief's Report signed on July 8, 2013. The project is needed because of the increasing susceptibility of coastal communities to storm surge due to wetland loss, sea level change, and subsidence.

Date Comments Must Be Received by: January 23, 2026

Point of Contact for Additional Information: Jason Emery

New Orleans District, U.S. Army Corps of Engineers

Attention: CEMVN–PDS

7400 Leake Avenue New Orleans, LA 70118

Email: mvnenvironmental@usace.army.mil

EXECUTIVE SUMMARY

ES 1.1 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), New Orleans District, Regional Planning and Environment Division South, prepared this draft Supplemental Environmental Impact Statement (SEIS) to update the evaluation of the potential impacts to the human and natural environment from the construction and operation of the Morganza to the Gulf, Louisiana, Hurricane and Storm Damage Risk Reduction Project (MTG Project) in Terrebonne and Lafourche Parishes, Louisiana because designs and existing conditions have evolved since the 2013 Final Post Authorization Change Report/Revised Programmatic Environmental Impact Statement (PACR/RPEIS; USACE 2013). The MTG Project would reduce risks associated with storm surge and flooding in Houma, Louisiana, and surrounding communities for storms up to a 1% Annual Exceedance Probability (AEP) (sometimes referred to as a "100-year level of risk reduction").

Preparation of this SEIS began prior to the recission of the Council on Environmental Quality's former National Environmental Policy Act (NEPA)-implementing regulations (40 Code of Federal Regulations Parts 1500-1508) and the former USACE NEPA Engineering Regulation (ER) 200-2-2. This SEIS was completed in accordance with the NEPA (42 U.S. Code Part 4321, et seq.) and was informed by new administration policies and the Department of Defense NEPA Implementing Procedures published June 30, 2025.

This project meets the standard of "Extraordinary Complexity" as required by 42 U.S. Code Part 4336a(e)(1)(B) and the Department of Defense NEPA Implementing Procedures Part 2.4 to exceed the typical limit of 150 pages set by Congress.

Local Sponsor

The State of Louisiana acting by and through the Coastal Protection and Restoration Authority Board of Louisiana, represented by its chairman, and the Terrebonne Levee and Conservation District, represented by its president, are hereinafter referred to as the Non-Federal Sponsor (NFS). In addition to natural resource agencies, federally recognized Indian Tribes, and the public, this report includes input from the NFS and the North Lafourche Levee District.

Study Area

The study area is located approximately 60 miles southwest of New Orleans, Louisiana, and includes portions of Terrebonne and Lafourche Parishes (see Figure ES-1). The study area is bounded on the north and east by Bayou Lafourche, on the west by the western boundary of Terrebonne Parish and eastern boundary of St. Mary and Assumption Parishes, and on the south by the saline marshes bordering the Gulf of America. The study area

encompasses approximately 1,891 square miles and is characterized by low, flat terrain with marsh, small lakes, numerous navigation channels, drainage canals, and natural bayous that drain into the Gulf of America. The study area is a diverse ecosystem inhabited by a variety of species of birds, mammals, reptiles, and amphibians, as well as forested and herbaceous wetlands.

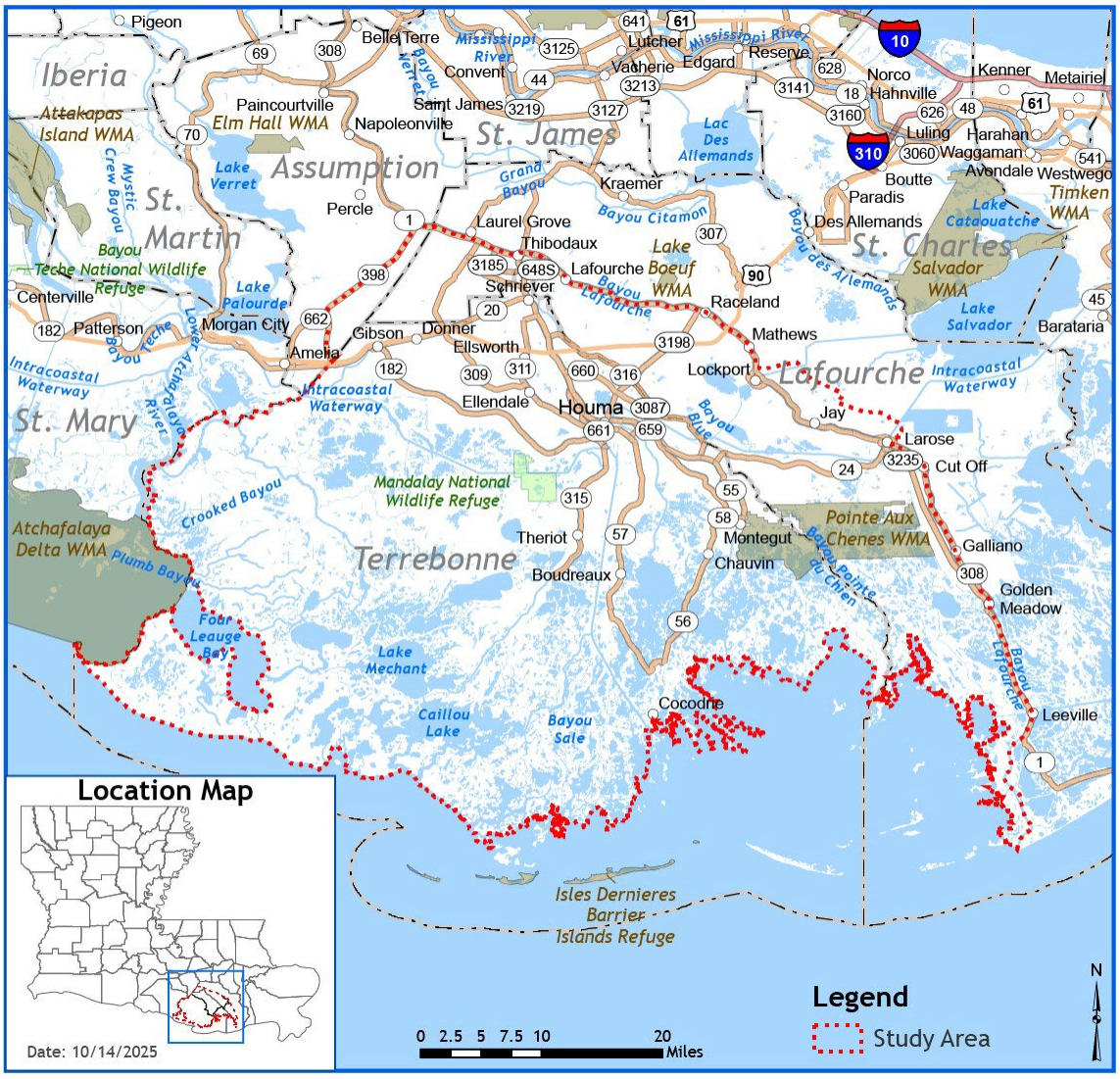


Figure ES-1. Morganza to the Gulf Project Study Area

Purpose and Need

The purpose of the MTG Project is to reduce the risk of catastrophic hurricane and tropical storm damages, up to the 1% AEP (100-year) storm event, by implementing an effective, comprehensive system of structural features including levees, floodwalls, gates, and drainage structures for the communities located inside the proposed MTG Project, in

accordance with the project described in Section 7002(3) of the Water Resources and Reform Development Action of 2014 (WRRDA 2014) and as updated by the USACE 2021 Engineering Documentation Report (2021 EDR) (USACE 2021, available online at https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf/). The project is needed because of the increasing susceptibility of coastal communities to storm surge due to wetland loss, sea level change, and subsidence. The coastal communities occupy low, flat terrain that has been and would continue to be impacted by flooding from hurricane and tropical storm surge from the Gulf. The Proposed Action would provide a 1% AEP (100-year) level of risk reduction for more than approximately 150,000 people in the study area (U.S. Census Bureau 2020).

Proposed Action

The Proposed Action is similar to the Recommended Plan in the 2013 PACR/RPEIS (USACE 2013) and authorized by the WRRDA 2014, with the following exceptions: (1) technical design changes approved by the Chief of Engineer's discretionary authority and (2) revisions to the authorized levee alignment to incorporate 77.6 miles of initial-lift levees constructed by the NFS since the WRRDA 2014 authorization, as documented in the 2021 EDR (USACE 2021). The 2013 PACR/RPEIS is incorporated herein by reference.

The Proposed Action assessed in this SEIS includes construction of approximately 86 miles of levees and structures (in the Barrier Reach, Reaches B, E, G, H, I, J, K, L, Larose C North, and Lockport to Larose Reaches) excluding the construction of Reaches A and F. Construction of the MTG Reach A levee and structures and the Reach F levee are assessed in separate NEPA documents (USACE 2024 Programmatic Environmental Assessment (EA) #598, USACE 2025 EA #602). This SEIS also assesses the long-term hydrologic, induced flooding, and habitat impacts of the fully completed MTG Project (including all reaches and structures) throughout the 50-year performance period. Note that the project to deepen the Houma Navigation Canal is not part of the authorized MTG Project and will be assessed under a separate NEPA document. Figure ES-2 shows the locations of the MTG Project features.

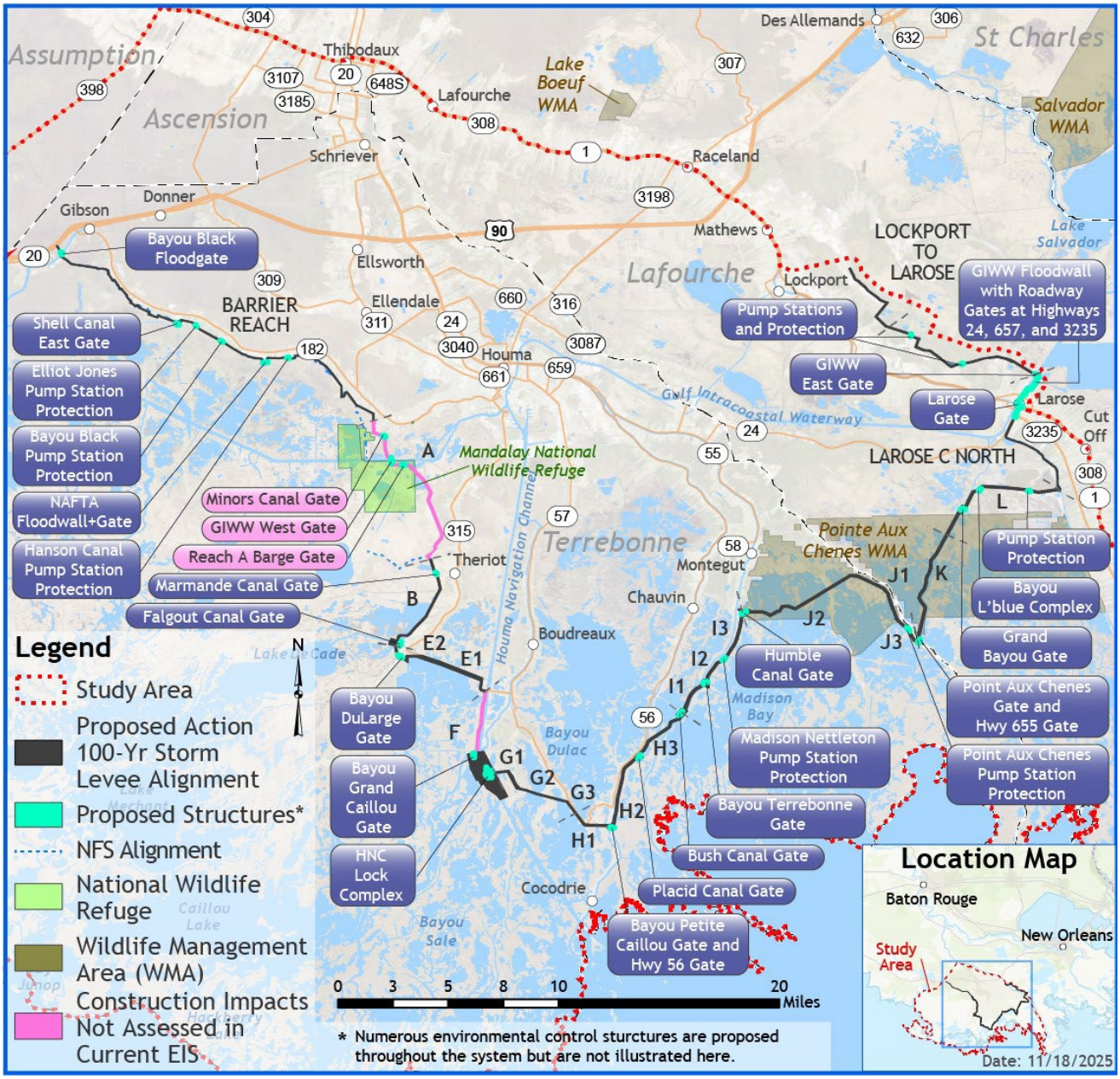


Figure ES-2. Morganza to the Gulf Project Features Map

The Proposed Action levees would be designed to provide risk reduction for storm surge and wave action associated with storm events up to and including the 1% AEP (100-year) storm event. They would be constructed to elevations designed to prevent overtopping under these conditions. Given the ongoing trends of land subsidence and sea level change, which are expected to increase storm surge and wave heights over the 50-year lifespan of the project, the USACE would incorporate a phased approach for levee elevation modifications. The levee system would be initially built to achieve a 1% AEP risk reduction under projected 2035 subsidence and sea level change scenarios. Subsequently, the system would be

raised again to ensure continued 1% AEP risk reduction under 2085 subsidence and sea level change projections. The Proposed Action would also construct or upgrade 24 environmental control structures, 15 navigable floodgates, 8 floodwalls to protect existing pump stations, 8 roadway floodgates, and a 2.5-mile floodwall along the Gulf Intracoastal Waterway (GIWW) in Larose. The environmental control structures would be box culverts with sluice gates and would be installed in areas where the levee crosses drainage canals and areas currently open to tidal exchange. These environmental control structures would typically remain open to allow for the continued flow of tidal water and the movement of fish species in and out of the protected and flood sides of the levee system. However, structures would be closed during specified storm and high-water level conditions in accordance with completed water control plans that would be developed in accordance with ER 1110-2-24.

ES 1.2 PLAN FORMULATION

In the evolution of the MTG Project, several sets of alternative plans were developed and evaluated in the 2002 MTG Feasibility Study/PEIS (USACE 2002) and the 2013 PACR/RPEIS (USACE 2013) with the goal of maximizing risk reduction for residential and commercial structures while minimizing adverse impacts on the natural and human environment. These alternative formulation findings are incorporated into this document by reference. According to the 2021 EDR (USACE 2021), the Proposed Action offers the same level of economic benefit and risk reduction as the authorized alignment assessed in the 2013 PACR/RPEIS.

The Proposed Action assessed in this current SEIS is based on the authorized 2013 PACR/EIS (USACE 2013) alignment with technical design refinements and changes, as reported in the 2021 EDR (USACE 2021). The proposed changes and design refinements will be evaluated in a Design Documentation Report or an Engineering Documentation Report following ER 1110-2-1150. Before construction commences on each Proposed Action feature, a determination will be made if any design changes are not within the Chief of Engineer's discretionary authority. Therefore, at this time, no additional reformulation was part of the development of the SEIS. The 2013 PACR/RPEIS (USACE 2013) is incorporated into this document by reference. Two alternatives were developed for this SEIS—the No Action Alternative and the Modified PACR Alignment (Proposed Action), the latter of which incorporates construction completed by the NFS and considerations to avoid and/or minimize impacts on wetland habitats.

ES 1.3 SIGNIFICANT RESOURCES/ENVIRONMENTAL CONSIDERATIONS

Though efforts were taken to avoid and minimize impacts to the natural and human environment, the Proposed Action would impact wetland habitats and temporarily increase water levels during storm events in some communities and undeveloped lands on the flood side of the proposed levee system.

ES 1.3.1 WETLAND IMPACTS

A total of approximately 4,574 acres (approximately 1,365 average annual habitat units (AAHUs)) of bottomland hardwood (BLH), swamp, fresh/intermediate marsh, and brackish/saline marsh would be impacted directly by construction of the Proposed Action. Up to approximately 1,059 additional acres of BLH, swamp, and intermediate, brackish, and saline marshes could be negatively impacted by project-induced long-term hydrologic shifts once the project is constructed and in operation. This SEIS includes a compensatory habitat mitigation plan (see Appendix C) for replacing the lost functions and values of these habitats through the purchase of mitigation bank credits and/or the construction of BLH, swamp, and marsh habitats within the Barataria-Terrebonne watershed and Mississippi Deltaic Plain. A monitoring plan would be implemented to determine if adaptive management actions, such as changes in operations, could be instituted to avoid impacts. Additional assessments, compensatory mitigation, environmental compliance, and NEPA documentation could be necessary if future changes in operations indicate hydrologic shifts that would incur indirect impacts to significant habitats beyond what is described in this SEIS.

ES 1.4.2 FLOODING IMPACTS

Coastal Storm Modeling System results indicate that some areas on the flood side of the Proposed Action levee system would experience increased water levels during storm conditions, with minor, localized water level increases (as compared to the No Action Alternative) during 50% AEP (20-year storm) events in 2035 and 2085. During more significant, infrequent (1% AEP and 5% AEP) storm events, the project would cause water level increases of several feet or more. Communities on the flood side of the proposed levee system including Gibson, Isle de Jean Charles, Dulac, Cocodrie, the Larose to Golden Meadow levee, and Dularge would be impacted. The duration of increased water levels would be limited to 12 to 48 hours during and immediately following storm events.

Mitigation strategies would be developed based on detailed analysis during the final project design phase, with considerations for both economic and social impacts. Implementation of mitigation measures (as appropriate) would be completed prior to certification of final plans and specifications and before the initiation of construction of any reaches or structures of the Proposed Action. The NFS, in keeping with their Lands, Easements, Rights of Way, Relocations, and Disposal (LERRD) responsibility per the project partnership agreement, would acquire the necessary real property interests related to mitigation for project-induced water level increases for each phase of project construction concurrent with the acquisition of right-of-way for levee construction.

ES 1.4 UNRESOLVED ISSUES/AREAS OF CONTROVERSY

ES 1.4.1 WETLAND VALUE ASSESSMENTS

Wetland Value Assessments (WVAs) have been completed to assess the quantity and quality of direct wetland impacts (expressed in AAHUs) that would occur through

construction of the Proposed Action. However, WVAs to assess the long-term (indirect) impacts to wetlands (expressed in AAHUs) over the 50-year performance period of the Proposed Action after construction are currently being developed in coordination with the project habitat evaluation team. It is anticipated that the completed compensatory habitat mitigation plan as described in this SEIS would sufficiently offset both direct and indirect wetland habitat impacts. Upon completion of WVAs for indirect wetland impacts, if results indicate that compensatory habitat mitigation plans (see Section 4.2 and Appendix C) would not fully mitigate for both direct and indirect habitat impacts (total AAHUs), the USACE would re-evaluate mitigation sites to see if expansion of the sites is possible to mitigate all direct and indirect impacts. If not, mitigation planning may be reopened to identify new sites that could mitigate for 100 percent of impacts by habitat type. Changes to the mitigation plan could be added to the SEIS and a second public review would be completed, or a supplemental NEPA document would be prepared as necessary.

ES 1.4.2 BORROW MATERIAL FOR LEVEE CONSTRUCTION

Borrow sites and staging areas were identified and screened during the preliminary design phase to avoid tracts of land that include significant ecological resources (forests, wetlands, and protected species habitats), cultural resource sites, and hazardous, toxic, radioactive waste (HTRW) concerns. Proximity to construction areas was also considered to minimize haul distances, reduce emissions, and limit traffic impacts. However, surveys have not been conducted to confirm the presence or absence of significant habitats, cultural resources, and HTRW. During the development of final designs, surveys would be conducted to verify the presence or absence of sensitive resources and HTRW concerns. If sensitive resources, cultural resources, or HTRW concerns are identified on the sites during surveys, these areas would be avoided or, in the case of impacts to fish and wildlife resources, a compensatory habitat mitigation plan would be developed in accordance with Section 906 of the Water Resources Development Act (WRDA) of 1986, as amended (33 U.S. Code 2283). Final borrow site selection and material quantity verification would occur after geotechnical, HTRW, and other site surveys have been conducted. If borrow sites are required for levee construction that are different than those assessed in this SEIS, environmental compliance and a supplemental NEPA document would be implemented as appropriate.

ES 1.4.3 SEPARATE NEPA ANALYSES FOR CONSTRUCTION OF REACHES A AND F

This SEIS does not fulfill NEPA compliance for the construction of Reaches A and F. Separate NEPA documents are being prepared by the USACE for these project reaches. However, this SEIS does assess the long-term, indirect impacts on hydrology, induced flooding, and habitats from operation of the proposed project once all reaches (including but not limited to Reaches A and F) are constructed and in operation.

ES 1.4.4. WATER QUALITY 404(B)(1) ANALYSIS

As required by Section 402 of the Clean Water Act (CWA), a Louisiana Pollutant Discharge Elimination system (LPDES) permit for the Proposed Action would be obtained prior to construction via the General Permit for Discharges of Storm Water from Construction Activities Five Acres or More from the Louisiana Department of Environmental Quality (LDEQ). Section 404 of the CWA requires authorization from the Secretary of the Army, acting through the USACE, for the discharge of dredged or fill material into all waters of the United States, including wetlands. A draft 404(b)(1) evaluation will be released for a 30-day comment period that will include an assessment of the Least Environmentally Damaging Practicable Alternative. The final version of the 404(b)(1) evaluation will be provided as an appendix to this SEIS.

ES 1.4.4. CULTURAL RESOURCES

There are recorded historic properties throughout the footprint of the Proposed Action assessed in this SEIS. There may be other historic properties, not yet discovered or recorded, in areas that have not yet been surveyed by Phase 1 cultural resource standards. Phase 1 cultural resource surveys are in planning stages to occur for levee alignments and/or for borrow sources, access, and similar features. A Programmatic Agreement will serve as the governing mechanism for anticipated National Historic Preservation Act Section 106 studies and surveys, as described in Section 6.16.

ES 1.4.5 NON-FEDERAL SPONSOR LEVEES COMPLIANCE

The Proposed Action would involve upgrading and widening existing levees that were built by non-federal entities prior to 2021. Environmental compliance for these first-lift levees was handled by the USACE Regulatory Program and Louisiana Department of Conservation and Energy (LDCE) joint permitting process where the NFS secured a permit to authorize the construction activities. Federal and state agencies have indicated concern that some levees were constructed without completion of environmental and cultural resource compliance. Concerns regarding cultural resource compliance for the proposed federal action are being addressed in this SEIS through the development of a Programmatic Agreement in consultation with the NFS, the Louisiana State Historic Preservation Office, federally recognized Tribes, and other consulting parties. The Programmatic Agreement will contain stipulations for mitigating adverse effects for present, future, and past actions related to the MTG Project. Outstanding compensatory habitat mitigation for the past impacts of constructed local levees is being handled through the USACE Regulatory Program. Coordination is ongoing.

ES 1.4.6 OPERATION PLAN FOR FLOODGATES AND STRUCTURES

The USACE is responsible for completing water control plans for navigation and flood-control structures constructed wholly or in part with federal funds (ER 1110-2-24). The requirements for water control plans vary depending on the type of structure, in accordance

with Engineering Manual 1110-2-3600 and Department of Interior's Division of Resources Reviews 1110-2-240. The USACE would determine structure types and associated water control plan/manual requirements during the final design phase of the project. The USACE, MVD would review the water control plans and/or manual, and approval would be required within 1 year after full-scale operations of the structures proposed under the Proposed Action. The water control plan or manual would be updated as needed, at least every 10 years, or more frequently (ER 1165-2-240).

ES 1.4.7 UNCERTAINTIES IN DESIGN

During the preparation of this SEIS, evaluations were conducted concurrent with design refinement; therefore, some inconsistency across project descriptions exists. Inconsistencies will be corrected, and evaluations updated, when designs are further refined based on additional engineering field investigations, environmental compliance, and coordination with the NFS regarding LERRDS.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

THIS PAGE INTENTIONALLY LEFT BLANK

1 Introduction and Purpose and Need

1.1 OVERVIEW

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), New Orleans District (CEMVN), Regional Planning and Environment Division South, prepared this draft Supplemental Environmental Impact Statement (SEIS) to evaluate the potential impacts to the human and natural environment from the construction and operation of the Morganza to the Gulf, Louisiana, Hurricane and Storm Damage Risk Reduction Project (MTG Project) in Terrebonne and Lafourche Parishes, Louisiana. The MTG Project would reduce risks from storm surge and flooding in Houma, Louisiana, and surrounding communities for storms up to a 1% Annual Exceedance Probability (AEP) (100-year) storm event.

The Proposed Action is a modification of the authorized MTG Project, as described in the 2013 Post Authorization Change Report/Revised Programmatic Environmental Impact Statement (2013 PACR/RPEIS; USACE 2013, incorporated herein by reference), and consists of the construction of approximately 86 miles of earthen levees; 15 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) Lock Complex (excluding any deepening of the HNC sill depth beyond the 18 feet required for the MTG Project); 24 environmental control structures designed to allow tidal exchange through the levee; eight floodwalls to protect existing pump stations; eight roadway floodgates; and a 2.5-mile floodwall along the Gulf Intracoastal Waterway (GIWW) in Larose.

Mitigation planning has been completed for unavoidable habitat impacts that would occur from construction and operation of the Proposed Action. The proposed compensatory mitigation plan consists of a combination of USACE-constructed projects and the purchase of in-kind mitigation bank credits (see Sections 3.5.1.1 and 4.2 as well as Appendix C for more details).

This SEIS addresses National Environmental Policy Act (NEPA) compliance and habitat mitigation requirements for all reaches and structures under the Proposed Action. However, because environmental conditions may change over time and some reaches and structures may not be constructed for 5 or more years, the USACE would re-evaluate impacts at the time of construction and revise the mitigation plan if necessary. Supplemental NEPA/environmental compliance addressing changes to project designs for features of the Proposed Action including, but not limited to, levees and structures, borrow sites, and habitat mitigation sites would be completed. This would ensure that the Proposed Action maintains NEPA compliance and mitigation requirements throughout all phases of construction.

Preparation of this SEIS began prior to the recission of the Council on Environmental Quality's former NEPA-implementing regulations (40 Code of Federal Regulations (CFR) Parts 1500-1508) and the former USACE NEPA Engineering Regulation (ER) 200-2-2. This SEIS was completed in accordance with the NEPA (42 U.S. Code (USC) Part 4321, et seq.) and was informed by new administration policies and the Department of Defense NEPA Implementing Procedures, published on June 30, 2025.

1.2 AUTHORITY

In accordance with the 2002, 2003, and 2013 reports of the Chief of Engineers, the MTG Project is authorized as a feature of the Mississippi River and Tributaries Project. Construction of the MTG Project was initially authorized by Section 1001 (24) of the 2007 Water Resources Development Act (WRDA), as follows:

"(24) MORGANZA TO THE GULF OF MEXICO, LOUISIANA —

(A) IN GENERAL —The project for hurricane and storm damage reduction, Morganza to the Gulf of Mexico, Louisiana: Reports of the Chief of Engineers dated August 23, 2002, and July 22, 2003, at a total cost of $886,700,000, with an estimated federal cost of $576,355,000 and an estimated non-federal cost of $310,345,000.

(B) OPERATION AND MAINTENANCE —The operation, maintenance, repair, rehabilitation, and replacement of the Houma Navigation Canal lock complex and the Gulf Intracoastal Waterway floodgate features of the project described in subparagraph (A) that provide for inland waterway transportation shall be a federal responsibility in accordance with section 102 of the WRDA of 1986 (33 USC 2212)."

The project was redesigned in the 2013 PACR/RPEIS to address the limitations of Section 902 of the WRDA of 1986, as amended, and to meet updated post-Hurricane Katrina design guidelines. The MTG Project was subsequently re-authorized by Section 7002(3)5 of the WRRDA of 2014, Public Law (PL) 113-121, in accordance with the 2013 PACR/RPEIS and Report of the Chief of Engineers dated 8 July 2013, at an updated total cost of $10,265,100,000 billion as follows:

"SECTION 7002. AUTHORIZATION OF FINAL FEASIBILITY STUDIES. The following final feasibility studies for water resources development and conservation and other purposes are authorized to be carried out by the Secretary substantially in accordance with the plan, and subject to the conditions, described in the respective reports designated in this section… State: Louisiana; Name: Morganza to the Gulf; Date of Report of Chief of Engineers: July 8, 2013….".

1.3 NON-FEDERAL SPONSOR

The State of Louisiana acting by and through the Coastal Protection and Restoration Authority Board of Louisiana (CPRA), represented by its chairman, and the Terrebonne

Levee and Conservation District (TLCD), represented by its president, are hereinafter referred to as the Non-Federal Sponsor (NFS). On December 28, 2021, a Project Partnership Agreement (PPA) was executed between CEMVN, CPRA, and TLCD. The PPA designates responsibility to the NFS for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of all features of the MTG Project, with the exception of the HNC Lock Complex and the GIWW floodgates east and west of Houma. The GIWW East and West Floodgates are in the GIWW and the HNC Lock Complex is in the HNC, which are both federally maintained waterways. All three structures provide inland waterway transportation in accordance with Section 102 of WRDA 1986, as amended, and Section 1001(24) of WRDA 2007. The USACE is responsible for operating and maintaining these structures as part of its federal responsibilities. For all features of the Proposed Action, the USACE would prepare and issue an OMRR&R manual in accordance with ER 1110-2-401, the executed PPA, and applicable USACE regulations, and the NFS and USACE would be required to conduct OMRR&R responsibilities in a manner compatible with the manual. Additional responsibilities of the NFS are listed in the PPA.

To date, the NFS has started construction for over 80 miles of levees in vicinity of the authorized MTG Project alignment. The NFS has also started construction of floodwalls, environmental control structures, road gates, the HNC Lock Complex, and 13 navigable floodgates. Environmental clearance for these actions was conducted by the NFS through the USACE Regulatory Program. See Section 2.4 and Appendix O for details about NFS levee construction and applicable USACE Regulatory permits.

1.4 STUDY AREA

The study area is located approximately 60 miles southwest of New Orleans, Louisiana and includes all of Terrebonne Parish, excluding the barrier islands, and the western portion of Lafourche Parish (see Figure 1-1). The study area is bounded on the north and east by Bayou Lafourche, on the west by the western boundary of Terrebonne Parish and eastern boundary of St. Mary and Assumption Parishes, and on the south by the saline marshes bordering the Gulf of America. The study area encompasses approximately 1,891 square miles and is characterized by low, flat terrain with marsh, small lakes, numerous navigation channels, drainage canals, and natural bayous that drain into the Gulf of America. The study area is a diverse ecosystem inhabited by a variety of species of birds, mammals, reptiles, and amphibians, as well as fresh, brackish, and saltwater fish. Because of its generally low, flat terrain, the study area is susceptible to flooding and storm surge during tropical storms. Population centers include Thibodaux and Shriever in northern Terrebonne Parish; the city of Houma; Donner and Gibson in western Terrebonne Parish; Chauvin, Dulac, and Montegut in southern Terrebonne Parish; Raceland, Lockport, and Pointe aux Chenes in Lafourche Parish; and the other smaller communities.

Figure 1-1. MTG Project Study Area

1.5 PURPOSE AND NEED

The purpose of the MTG Project is to reduce the risk of catastrophic hurricane and tropical storm damages, up to the 1% AEP (100-year storm) event, by implementing an effective, comprehensive system of structural features including levees, floodwalls, gates, and drainage structures for the communities located inside the levee system of the proposed MTG Project, in accordance with the project described in Section 7002(3) of WRRDA 2014 and as updated by the USACE 2021 Engineering Documentation Report (EDR; USACE 2021, available online at https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf/). The project is needed because of the increasing susceptibility of coastal communities

to storm surge due to wetland loss, sea level change, and subsidence. These coastal communities are located in low, flat terrain that has been and would continue to be impacted by hurricane and tropical storm surge from the Gulf. The Proposed Action would provide risk reduction up to a 1% AEP (100-year storm) event for more than approximately 150,000 people in the study area (U.S. Census Bureau 2020).

1.6 DIFFERENCES BETWEEN THE 2013 AUTHORIZED ALIGNMENT AND PROPOSED ACTION

1.6.1 Design Criteria Changes

The project design approved in the 2013 PACR/RPEIS, as authorized by the Chief of Engineers' Report on July 8, 2013, followed hurricane and storm damage risk reduction criteria developed after the devastating impacts of Hurricane Katrina. These criteria included higher levee and structure elevations, enhanced structural features, greater geotechnical stability, and other measures outlined in the 2013 PACR/RPEIS. The 2013 PACR/RPEIS recommended that these criteria be considered for revising project designs to reduce costs while maintaining the 1% AEP design level of risk reduction. In 2019, the USACE prepared a report to explore opportunities to use adaptive design criteria to ensure the project could be constructed for a more reasonable cost than its authorized total project cost of $10.3 billion (in 2013 price levels) as authorized in WRRDA 2014, while still meeting the authorized intent for risk reduction for the 1% AEP (100-year) storm event. The 2019 Adaptive Criteria Assessment Report showed that the project could be constructed by incorporating adaptive design criteria, shifting the authorized levee alignment in some areas to align with existing levees to reduce the amount of fill needed for federal levee construction, and limiting federal participation to initial construction of the project to the authorized 1% AEP (100-year storm) level of risk reduction.

The three recommended primary design modifications included increasing the allowable overtopping rate, lowering the allowable factor of safety for global stability from 1.5 to 1.3, and eliminating structural superiority criteria. The USACE Risk Management Center's risk assessment team concluded that the suggested factor of safety reduction would result in an inconsequential change in residual risk. The Risk Management Center and CEMVN hydrologists recommended consideration of adjusting the allowable design overtopping rate for well maintained, grass-covered levee slopes from 0.1 cubic feet per second (cfs)/foot to 0.5 cfs/foot. After comparing levee elevations from the overtopping rates assessed in the 2013 PACR/RPEIS (0.1 cfs/foot), the Adaptive Criteria Assessment (1 cfs/foot), and the 2021 EDR (0.5 cfs/foot), the USACE determined that designing MTG Project levee and structure elevations for the 0.5 cfs/foot overtopping rate would result in a reduced of levee and structure elevations while still providing the 1% AEP (100-year storm) event level of risk reduction. Furthermore, the 2023 Hydrologic Engineering Center's River Analysis System (HEC-RAS) model assessed the time required to drain storm water from the land side to the flood side of the proposed levee system based on a 1% AEP (100-year) precipitation event

in 2035. The modeling indicated that drainage time would be negligible between the No Action Alternative and the Proposed Action (see Appendix E for the HEC-RAS model report). Table 1-1 lists the lowered design elevations proposed by the 2021 EDR (USACE 2021) and incorporated into the Proposed Action for this SEIS compared to the 2013 authorized design elevations.

Table 1-1. Levee Design Elevations Comparison—2013 Authorized Alignment and Proposed Action

Reach	2035	2035	2085	2085
	Design Elevations Established in 2013 PACR/RPEIS	**Proposed Action (2021 EDR)**	**Design Elevations Established in 2013 PACR/RPEIS**	**Proposed Action (2021 EDR)**
Barrier	15.5	10.5	20.0	17.0
B	17.5	13.0	20.5	18.5
E Reach 1	21.5	17.0	23.5	20.0
E Reach 2	21.5	17.5	23.5	21.0
G Reach 1	22.5	17.0	24.0	19.5
G Reach 2	22.5	17.5	24.0	20.5
G Reach 3	22.5	18.0	24.0	20.5
H Reach 1	24.0	17.0	26.5	20.0
H Reach 2	24.0	18.0	26.5	22.0
H Reach 3	24.0	20.0	26.5	24.0
I Reach 1	24.0	20.0	26.5	24.0
I Reach 2	24.0	21.0	26.5	25.0
I Reach 3	24.0	20.0	26.5	24.5
J Reach 1	24.0	20.5	26.5	24.0
J Reach 2	24.0	21.5	26.5	25.0
J Reach 3	24.0	20.0	26.5	23.5
K	22.5	20.5	25.5	26.0
L	22.5	20.5	25.5	24.5
Larose C North	18.0	8.5	20.5	16.5
GIWW	NA	8.5	NA	15.5
Lockport to Larose – A	10.5	9.5	15.0	13.0
Lockport to Larose - B	10.5	7.5	15.0	11.0

Sources: USACE. 2021. Morganza to the Gulf EDR P2# 323234, Appendix A, Attachment E. Available online at https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf/); USACE. 2013. Morganza to the Gulf of Mexico, Louisiana, Post Authorization Change Report/Revised Programmatic Environmental Impact Statement. New

Reach	2035	2035	2085	2085
	Design Elevations Established in 2013 PACR/RPEIS	Proposed Action (2021 EDR)	Design Elevations Established in 2013 PACR/RPEIS	Proposed Action (2021 EDR)
Orleans District. Available online at: https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf/				

1.6.2 Shifts in Alignment

The NFS constructed levees in the vicinity of, but not completely within, the federal proposed footprint approved in the 2013 PACR/RPEIS (see Figures 1-2 through 1-6), particularly in the Barrier and Lockport to Larose Reaches. The Proposed Action levee alignment follows the NFS alignment. Shifting the alignment to coincide with existing NFS levees would reduce the amount of required fill for levee construction and minimize construction impacts to wetlands and water bottoms. Approximately 1,000 acres of the 5,000-acre Proposed Action levee footprint would be comprised of existing first-lift levees that the NFS constructed and permitted through the USACE Regulatory Program (see Section 2.4). The environmental impacts from shifting the alignment in Reaches A and F were assessed in separate EAs (EAs #598 and #602; see Sections 2.3.6 and 2.3.7).

Additionally, the 3-mile-long segment near the town of Lockport in the Lockport to Larose Reach that was part of the design footprint in the 2013 PACR/RPEIS (see Figure 1-7) was eliminated from the Proposed Action in this SEIS because hydrologic modeling conducted by the USACE in 2023 indicated that storm surges would increase water levels inside portions of the proposed levee alignment if it were built using those designs. The proposed modified alignment in this SEIS would shorten this reach and tie into the existing Gheens levee with sufficient heights to prevent inundation.

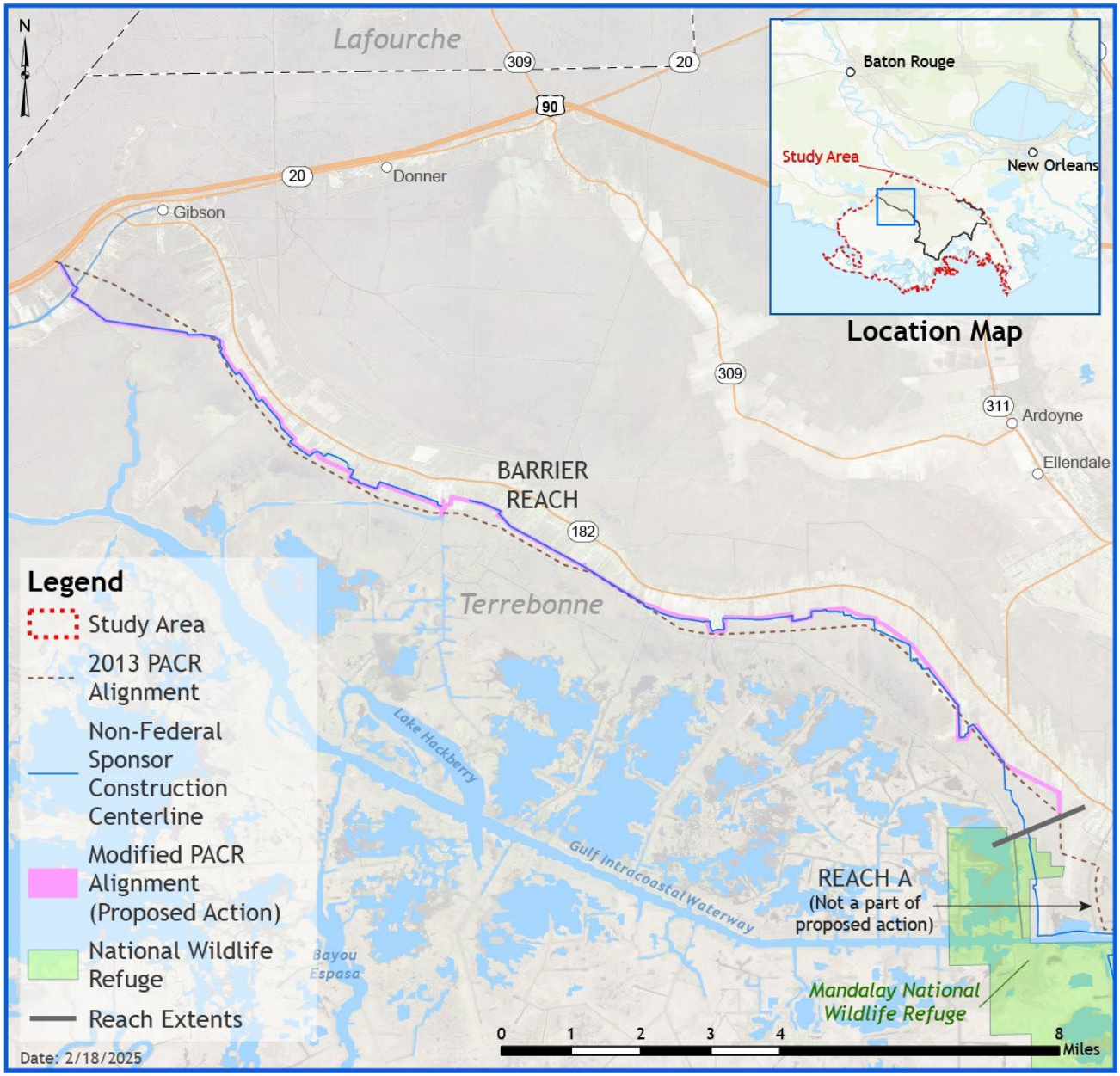


Figure 1-2. 2013 PACR/RPEIS and Proposed Action Alignments—Barrier Reach

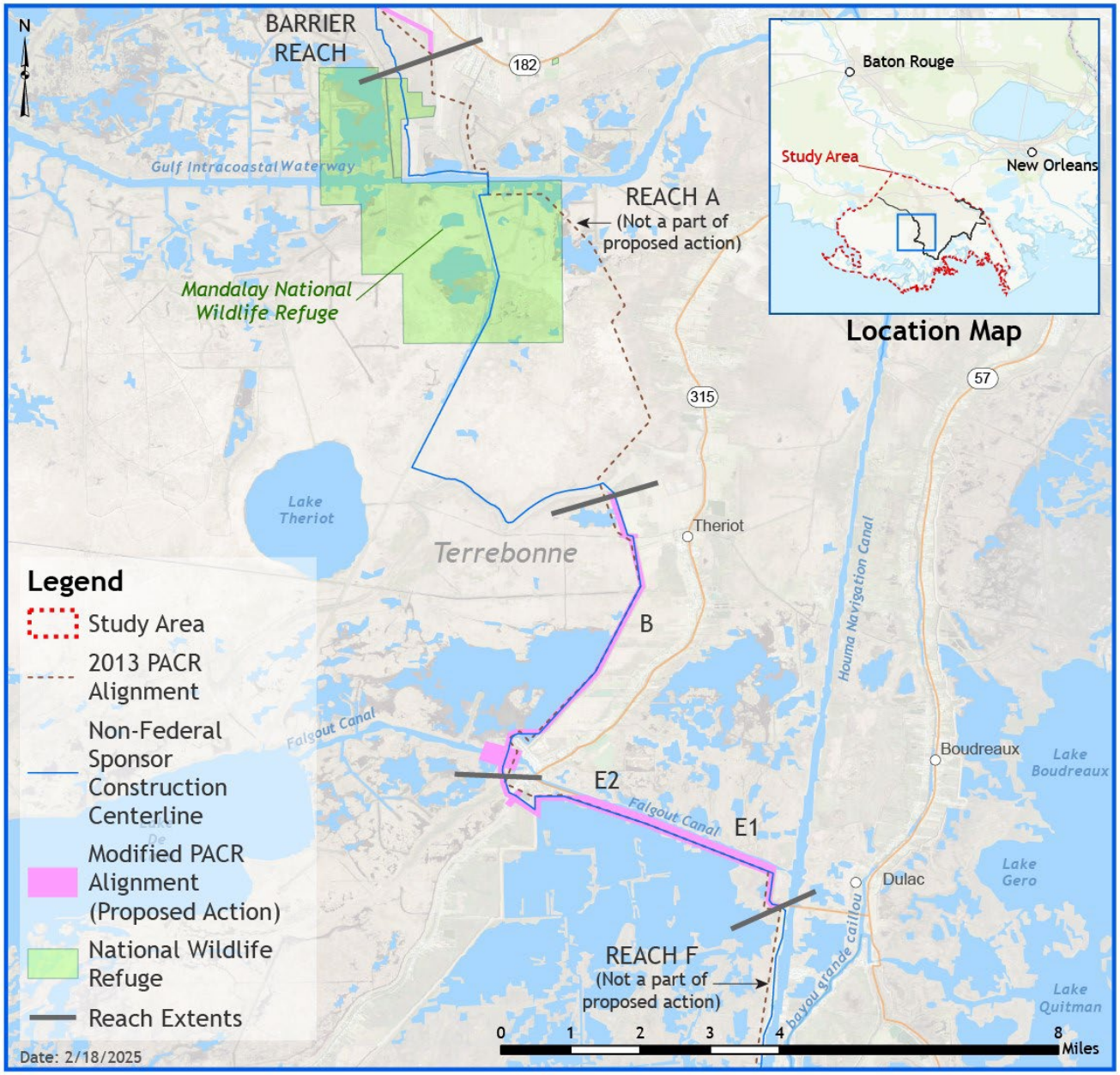


Figure 1-3. 2013 PACR/RPEIS and Proposed Action Alignments—Reaches B and E

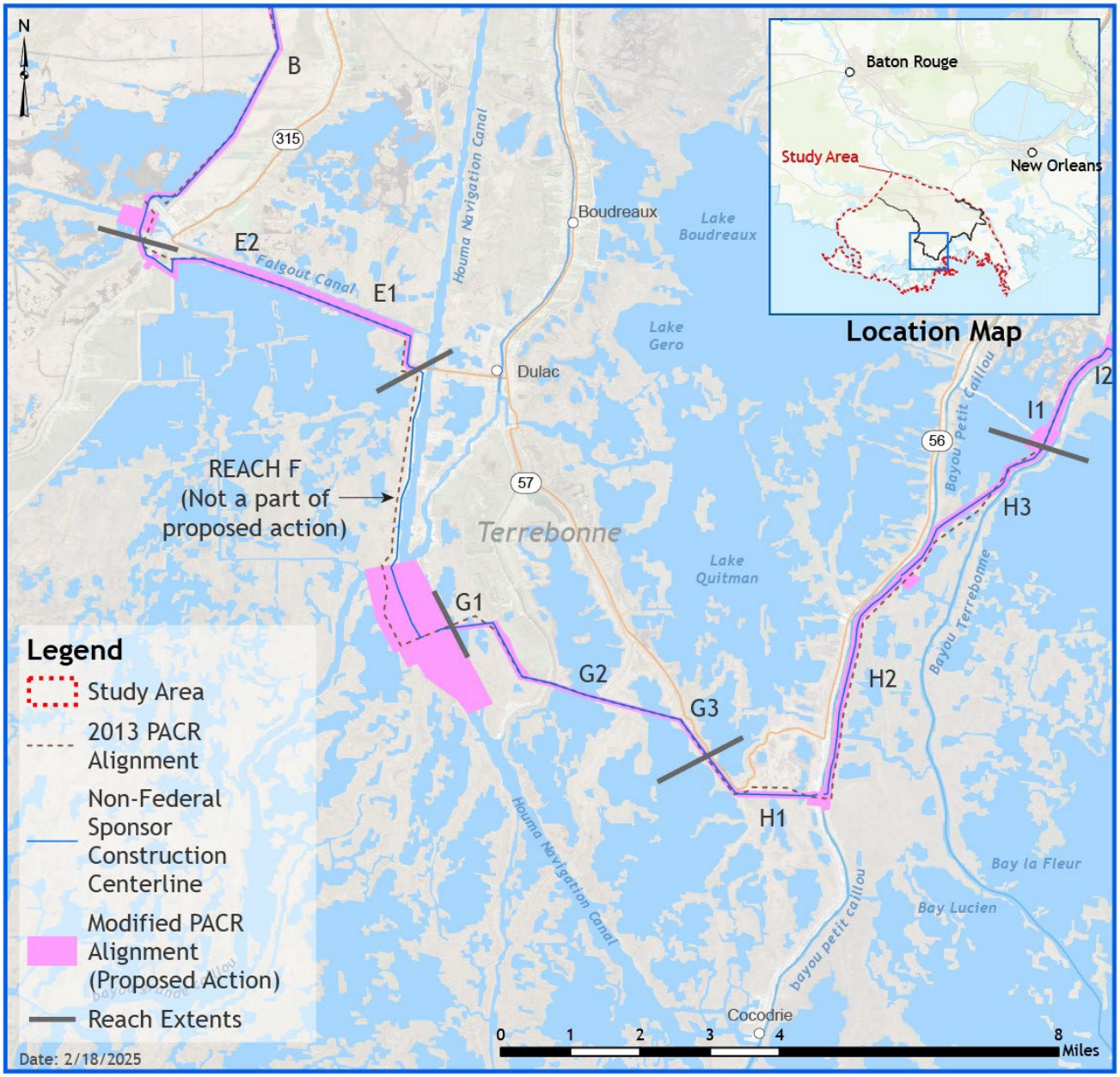


Figure 1-4. 2013 PACR/RPEIS and Proposed Action Alignments—Reaches G and H

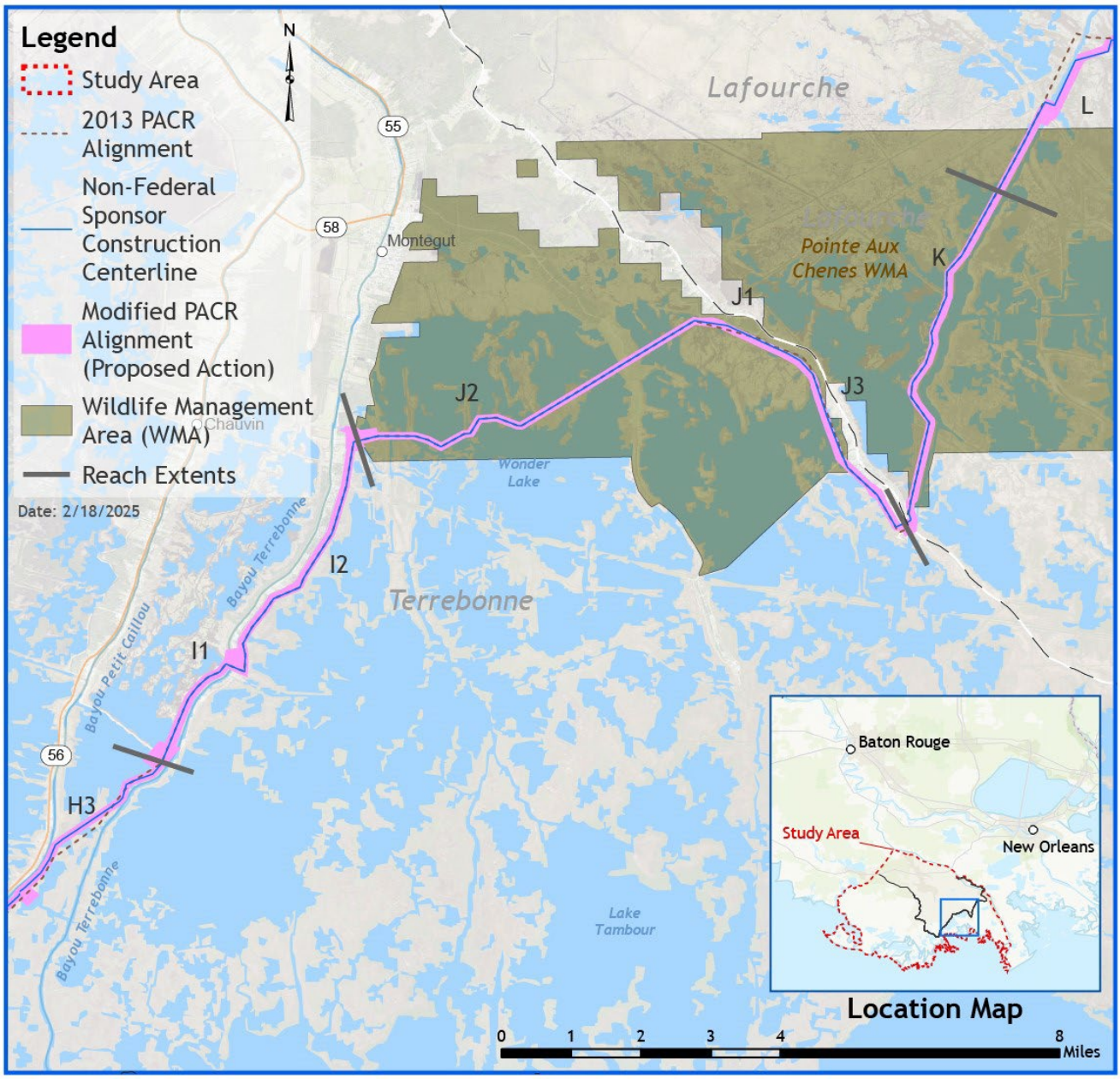


Figure 1-5. 2013 PACR/RPEIS and Proposed Action Alignments—Reaches I, J, and K

A46

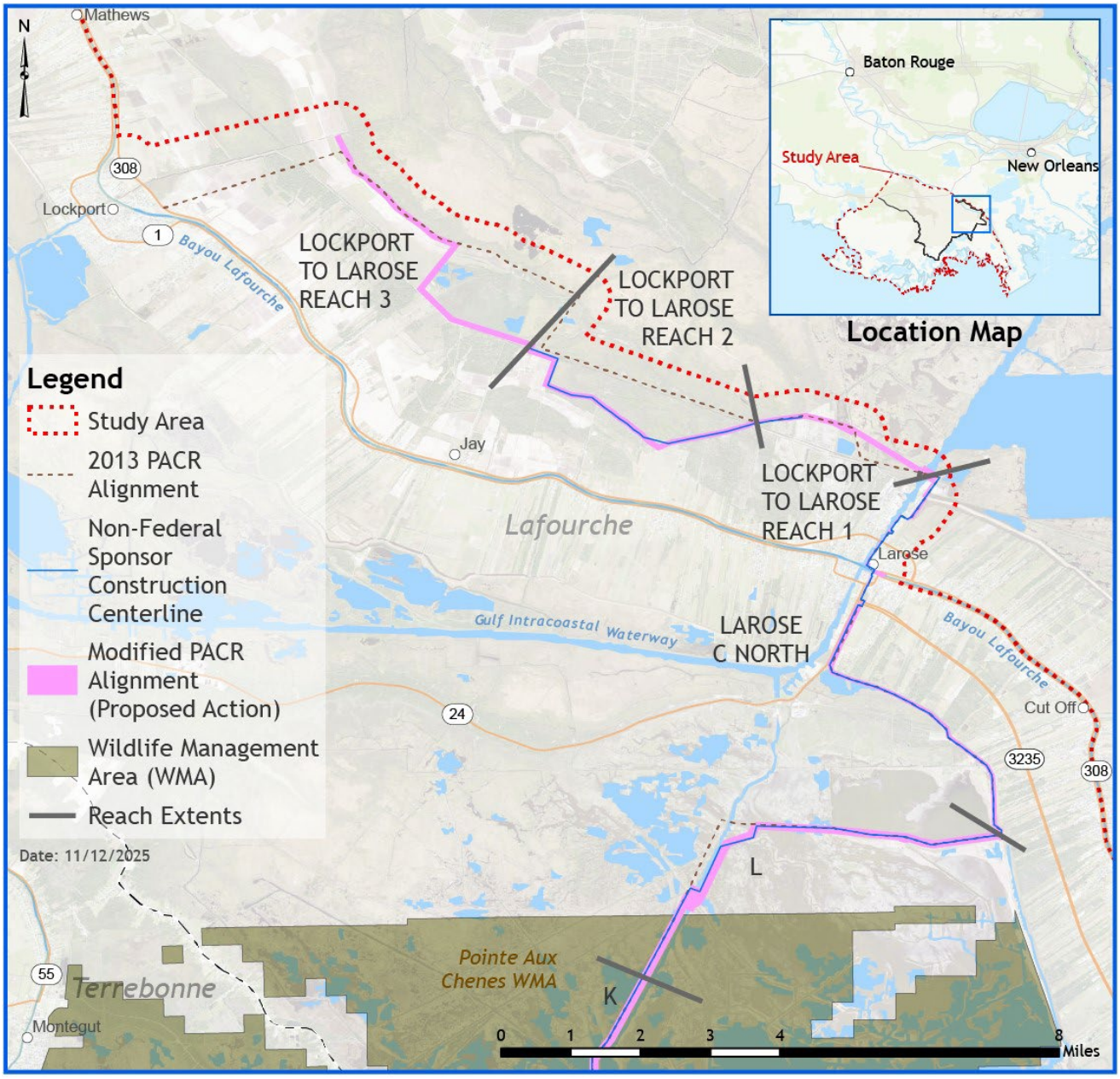


Figure 1-6. 2013 PACR/RPEIS and Proposed Action Alignments—Reaches Larose C North and Lockport to Larose

1.7 SCOPE OF THE SEIS

The Proposed Action assessed in this SEIS includes the current design of the authorized MTG Project in its entirety with the exception of (1) construction of the Reach A levee and all Reach A structures and (2) construction of the Reach F levee. This SEIS does not satisfy required NEPA compliance for the construction of these MTG Project features. Instead, the construction of these features is assessed under separate NEPA documents. The portions of the proposed federal project that are assessed in this SEIS are indicated in Table 1-2.

Reaches A and F were evaluated in separate Environmental Assessments (EAs) because both have advanced designs and are high priority for near-term hurricane and storm damage risk reduction. Reach F underwent updated engineering and design after the 2013 PACR/RPEIS was fianlized, and the updated designs did not significantly alter project impacts from those assessed in the 2013 PACR/RPEIS, allowing a stand-alone EA to fully address NEPA compliance and advance the reach to construction ahead of the Record of Decision (ROD) of this SEIS. The construction of Reach F is particularly urgent because it represents the lowest-elevation, southern reach of the MTG Project levee system and would provide critical risk reduction benefits. Reach A was assessed in an EA tiered from the 2013 PACR/RPEIS because hydraulic modeling showed that it would independently reduce water levels on the land side of Reach A and provide critical storm surge protection even without completion of the full MTG Project alignment. Advancing these two reaches under separate EAs allows the USACE to begin constructing these high-priority, risk-reducing features in advance of the finalization and ROD of this SEIS. See Sections 2.3.6 and 2.3.7 for further details.

The Proposed Action assessed in this SEIS includes construction of the remaining 86 miles of proposed federal levees and structures. This SEIS also assesses the long-term, indirect impacts on hydrology, induced flooding, and habitats of the fully completed MTG Project (including all reaches and structures) throughout its 50-year performance period. Note that the project to deepen the HNC navigation channel is not part of the authorized MTG Project and will be assessed under a separate NEPA document.

Table 1-2. Proposed Action Features Assessed in Current SEIS

Reach	MTG Project Feature	Direct Construction Impacts Assessed in this SEIS	Direct Construction Impacts Assessed in Separate NEPA Documents	Indirect (Operation) Impacts of All Reaches and Structures, 50-Year Performance Period
Barrier	Barrier Reach Levee + Environmental Control Structures	X		X
	Bayou Black Barge Floodgate	X		X
	Shell Canal East Floodgate	X		X
	NAFTA Floodwall and Roadway Gate	X		X
	Elliot Jones Pump Station Fronting Protection	X		X
	Bayou Black Pump Station Fronting Protection	X		X
	Hanson Canal Pump Station Fronting Protection	X		X
A	Reach A Levee and environmental control structures[1]		X[1]	X
	Minors Canal Floodgate		X[1]	X
	GIWW-West Floodgate		X[1]	X
	Reach A Gate		X[1]	X
B	Reach B Levee	X		X
	Marmande Canal Stoplog Gate	X		X
	Falgout Canal Floodgate	X		X
E	Reach E Levee + environmental control structures	X		X
	Dularge Floodgate	X		X
	Hwy 315 Swing Gate	X		X
F	Reach F Levee		X[2]	X
	HNC Lock Complex	X		X
	Bayou Grand Caillou Floodgate	X		X
G	Reach G Levee + environmental control structures	X		X
H	Reach H Levee + environmental control structures	X		X
	Bayou Petite Caillou Floodgate	X		X

Reach	MTG Project Feature	Direct Construction Impacts Assessed in this SEIS	Direct Construction Impacts Assessed in Separate NEPA Documents	Indirect (Operation) Impacts of All Reaches and Structures, 50-Year Performance Period
	Hwy 56 Roadway Gate			X
	Placid Canal Floodgate	X		X
I	Reach I Levee	X		X
	Bush Canal Floodgate	X		X
	Bayou Terrebonne Floodgate	X		X
	Hwy 55 Roadway Gate	X		X
	Madison Nettleton Pump Station Fronting Protection	X		X
	Humble Canal Floodgate[4]	X		X
J[5]	Reach J Levee + environmental control structures	X		X
	Pointe Aux Chenes Pump Station Fronting Protection	X		X
	Hwy 665 Roadway Gate	X		X
	Pointe Aux Chenes Floodgate	X		X
K	Reach K Levee + environmental control structures	X		X
L	Reach L Levee + environmental control structures	X		X
	Grand Bayou Barge Floodgate	X		X
	Reach L Pump Station Fronting Protection	X		X
	Bayou L' Blue Floodgate	X		X
Larose C North	Larose C North Levee	X		X
	GIWW Floodwall with 3 Roadway Floodgates at Highways 3235, 24, and 657	X		X
	Larose Sector Gate (Bayou Lafourche)	X		X
	GIWW East Floodgate with Tie-in Floodwalls	X		X
Lockport to Larose	Lockport to Larose Levee + environmental control structures	X		X
	Pump Station Fronting Protection #1	X		X

Reach	MTG Project Feature	Direct Construction Impacts Assessed in this SEIS	Direct Construction Impacts Assessed in Separate NEPA Documents	Indirect (Operation) Impacts of All Reaches and Structures, 50-Year Performance Period
	Pump Station Fronting Protection #2	X		X

[1] Reach A, Hurricane and Storm Damage Risk Reduction Project, MTG, Terrebonne Parish, Louisiana. Finding of No Significant Impact (FONSI): Programmatic EA #598 May 9, 2024. Note: Reach A NEPA document has programmatic and constructible features and supplemental NEPA is required prior to additional construction (USACE 2024).

[2] Reach F, Hurricane and Storm Damage Risk Reduction Project, MTG, Terrebonne Parish, Louisiana. EA #602, 2025. Note: Reach F NEPA compliance is in-process as of the date this current SEIS was prepared.

[3] MTG, Louisiana Final PAC Report and Programmatic EIS. ROD: December 9, 2013 (USACE 2013).

[4] The pre-load work and mitigation associated with initial construction of this structure was assessed in EA #583, FONSI signed April 3, 2022. This current SEIS assesses the structure construction and operation (USACE 2022).

[5] An EA was prepared for construction of Reach J1 to elevation 13 (EA#406, FONSI signed July 29, 2005) (USACE 2005). This J1 levee reach is assessed for NEPA compliance again in this current SEIS due to updated designs and elevations (20.5 feet). See proposed levee elevations in Section 3.3.

2 Background and History

2.1 TIMELINE OF PROJECT AUTHORIZATIONS AND MAJOR STORM EVENTS

Table 2-1 provides a timeline of authorizations, studies, and tropical storm events that have influenced various studies and authorizations under the MTG Project. See Section 2.3.3 for details about the 2013 PACR/RPEIS, which this current document supplements.

Table 2-1. Timeline of MTG Project Authorizations, Feasibility Studies, and Major Storm Events

1985	Hurricane Juan caused extensive flooding in Terrebonne and Lafourche parishes.
1992	Reconnaissance study was authorized by resolution Docket 2376, and WRDA 96 (PL 104-303, Sec 425) and adopted April 1992 by the Committee of Public Works and Transportation of the U.S. House of Representatives. In August 1992, Hurricane Andrew caused extensive flooding in Terrebonne and Lafourche parishes.
1994	USACE completed the Morganza to the Gulf reconnaissance report (USACE, 1994).
1995	In the Energy and Water Development Appropriation Act of 1995 (PL 103-316), Congress directed the USACE to consider the interrelationship of studies and projects that impact the coastal area of Louisiana, including the Morganza feasibility study, the Lower Atchafalaya Basin reevaluation study, and several projects being pursued under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) program, and directed the USACE to consider improvements at and/or within the HNC. The Feasibility Cost Share Agreement was executed in June 1995.
1996	Section 425 of WRDA 96 (PL 104-303) required the USACE to develop a study of the HNC lock as an independent feature of the Morganza to the Gulf project.
1997	USACE completed the HNC lock study, which recommended a 200-ft wide lock in the HNC south of Bayou Grand Caillou and concluded that a lock structure would provide direct and indirect benefits to the environmental (marsh) habitat in the study area (USACE 1997). The report recommended that the HNC lock continue to be investigated as part of comprehensive Morganza to the Gulf hurricane and storm damage reduction plans and that the detailed design phase of the lock be expedited and proceed concurrently with the feasibility study.
1998	Congress authorized the USACE to initiate detailed design of the multipurpose HNC lock.
2000	The Morganza to the Gulf project was conditionally authorized in WRDA 2000 at a cost of $550 million subject to having a favorable Chief of Engineer's report completed by December 2000; the terms of this conditional authorization were not met. The Design Agreement for the HNC Lock Complex was signed in January 2000.
2002	The Morganza to the Gulf feasibility study and PEIS were completed in March 2002 (USACE 2002). In September and October 2002, Tropical Storm Isidore and Hurricane Lili impacted the study area.
2003	In July 2003, the USACE issued a supplemental Chief of Engineers report (USACE 2003), which made changes to the NFS in-kind services.
2004	Section 158 of the Energy and Water Development Appropriations Act, 2004 (Public Law 108-137) authorized construction on Reach J-1, which had been previously identified as work-in-kind.
2005	In August and September, Hurricanes Katrina and Rita impacted the study area.

2007	WRDA 2007 (PL 110-114) authorized the Morganza to the Gulf, Louisiana project for hurricane and storm damage risk reduction at a total cost of $886.7 million.
2008	A reconnaissance-level analysis and programmatic cost estimate (ARCADIS, 2008) was completed to determine whether there would still be a federal interest in the project with post-Katrina interim criteria (USACE, 2007) incorporated and whether a feasibility-level PAC report should be initiated. Based on an analysis of four alternatives, the general alignment strategy for the PAC report was determined, but not the final level of risk reduction. Phase I Design for the HNC Lock Complex was finalized in a 50% Design Documentation Report (URS, 2008). In September 2008, Hurricanes Gustav and Ike impacted the study area.
2011	The Design Agreement Amendment 2 executed in January 2011 increased the funding ceiling and added CPRA as a co-sponsor with the Louisiana Department of Transportation and Development (DOTD).
2012	Legislation changed the former Office of Coastal Protection and Restoration (OCPR) to the Coastal Protection and Restoration Authority (CPRA) and changed the former CPRA to the Coastal Protection and Restoration Authority Board (CPRAB).
2014	WRRDA 2014 authorized the MTG Project at $10.3 billion in accordance with the Chief of Engineers Report dated 8 July 2013.
2021	In 2021, an EDR was approved by the MVD Commander to document the incorporation of adaptive design criteria and other design refinements in the MTG Project, as directed in ER 1110-2-1150 (dated 31 Aug 99), based on the current MTG design. The EDR included an additional decision document, the Level 3 Economic Reevaluation Report, approved 14 December 2021, and approved an increased NFS(s) construction cost share, as proposed by the CPRAB in a letter of intent, dated March 27, 2019 (and updated November 17, 2021), supporting the option that limits federal participation to initial construction (2035). On December 28, 2021, a PPA for the MTG Project was executed by the USACE and the NFS.
2024	Hurricane Francine produced a storm surge with a recorded height of 11.5 feet and caused extensive damage in the study area. Non-federal entities performed emergency repairs for non-federal levees.

2.2 OTHER USACE PROJECTS AND PROGRAMS IN THE STUDY AREA

The study area is a large region where other USACE projects and studies, separate from the MTG Project, are being planned, operated, or constructed by the USACE. The most relevant USACE projects in the study area are listed in Table 2-2. Reasonably foreseeable future projects that have not been constructed yet (as of October 2025) are assessed in Section 6.18 Cumulative Impacts.

Table 2-2. List of USACE Projects in the Study Area

Name	Relationship to MTG Project
GIWW	The GIWW federal navigation channel runs contiguously through the Morganza to the Gulf study area from Bayou Lafourche at Larose through Houma and on to the Atchafalaya River. The Morganza to the Gulf hurricane levee system crosses the GIWW in two locations requiring floodgates. The GIWW has an authorized depth of 12 feet.

Name	Relationship to MTG Project
HNC Deepening Study	The 40-mile HNC is a federal navigation channel that connects Houma and the GIWW directly to the Gulf. Oil and gas industries in Houma rely heavily upon the channel. The USACE, DOTD, CPRA, and the Port of Terrebonne signed a partnering agreement to begin efforts to advance the HNC deepening project. The project consists of deepening the HNC channel to −20 feet. compared to the currently authorized channel depth of -15 feet. The project provides for the construction of rock foreshore risk reduction and retention dikes for channel bank erosion control, reduction of sedimentation in the channel, and for retention of dredged material. The disposal plan provides for beneficial use of dredged material by placing material in locations and quantities with earthen containment structures to restore wetland habitats.
Bayou Lafourche and Lafourche-Jump Waterway	This federal navigation channel is along the eastern edge of the study area and intersects the MTG levee system at the GIWW floodway. Its length is 50 miles from Lockport, Louisiana to the Gulf with depths of 28 feet in the Bar Channel, 27 feet in the Jetty Channel, and 9 feet in channel to Lockport.
Larose to Golden Meadow Hurricane and Storm Damage Reduction Project	The Larose C North Reach of the MTG Project is co-located on a portion of the existing 48-mile Larose to Golden Meadow ring levee system. This project was authorized by the Flood Control Act of 1965. Funds to initiate construction were first appropriated in 1972. To date, the first and second lifts on all levee reaches have been completed and the third and final lift has been completed on all but one reach. This existing project consists of a ring levee approximately 48 miles in length protecting the areas along the east and west banks of Bayou Lafourche, extending from Larose to just south of Golden Meadow. Floodwalls are constructed in areas where the congested nature of improvements and limited ROW prevented the construction of levees. The project provides for the construction of navigable floodgates on Bayou Lafourche at the upper and lower limits of the study area.
Bubba Dove Surge Barrier	The Bubba Dove Surge Barrier is a floodgate in the existing HNC channel along the MTG Project alignment and was designed and constructed by the NFS to provide interim flood risk reduction until the HNC Lock Complex is constructed. It will be incorporated into the HNC Lock Complex once constructed. The floodgate is 42-feet high (including 13-foot flood walls), 273-feet long, and 60-feet wide and remains open most of the time. The floodgate is closed and filled with water to sink it in place during flooding or major storms.
Upper Barataria Basin	The Upper Barataria Basin Chief's Report was signed on January 2022. The project requires authorization and appropriation to proceed to construction. The project consists of a 30.6-mile levee alignment including 12.3 miles of existing levee/floodwall improvements. The 16-18.5-foot elevation levee would originate in Luling, Louisiana, connecting to the Mississippi River Levee via the Davis Pond Diversion Structure West Guide Levee. Continuing south, the plan would update and improve deficiencies in the St. Charles Parish Levee, crossing Bayou Des Allemands with a 270-foot barge gate structure, and would then continue parallel to Hwy 90 where it ties into high ground near Raceland. Section 209 of WRRDA 2024 requires an evaluation of a connection between Upper Barataria Basin and MTG. Coordination of the evaluation is underway.

2.3 USACE MORGANZA TO THE GULF PROJECT NEPA STUDIES

USACE planning and NEPA studies that have been, or are in the process of being, completed for various components of the MTG Project are described briefly in Sections 2.3.1 through 2.3.8.

2.3.1 2002 Feasibility Study and Programmatic EIS

The MTG Feasibility Study was authorized by the Energy and Water Development Appropriation Act of 1995 (Public Law 103-316). This authority led to the completion of 2002 MTG Feasibility Study/PEIS. This document disclosed as much detail as possible concerning what a hurricane risk reduction system would entail; detailed plans would be generated and evaluated if the concept met approval. The USACE was directed to give particular attention to the interrelationships of the various ongoing studies in the area and to consider improvements for the HNC. In August 2002, the USACE issued a Chief of Engineers report.

2.3.2 2005 Reach J1 Levee EA #406

The Reach J1 Levee project is located on the west bank of Bayou Point-aux-Chenes along Louisiana (LA) Highway 665 to Parish Road 73, approximately 16 miles south of Houma. The project proposed constructing a 2.7-mile levee consisting of a segmented flood side borrow canal, a dual-purpose marsh platform and levee berm, a T-wall at the pipeline crossing, a protected-side berm and fishery access trenasse, a temporary construction access road, and improvements including culverts to the old board road to make it a permanent access road. The levee would be constructed in two lifts, with the final height built to a design grade of +13 feet. A Finding of No Significant Impact (FONSI) was signed July 29, 2005.

2.3.3 2013 PACR/RPEIS. ROD: December 9, 2013.

The 2013 PACR/RPEIS proposed revisions to alternatives assessed in the 2002 MTG Feasibility Study/PEIS because of new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita. In addition to the No Action Alternative, two levee-design alternatives that shared the same alignment but varied in width and height were evaluated: the 1% AEP and the 3% AEP. Both alternatives would include 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. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the HNC Lock Complex and 23 environmental water control structures designed to allow tidal exchange through the levee. Although the 2013 PACR/RPEIS was mainly programmatic in its assessment of project impacts, the following features had sufficient design details to be fully assessed at that time: levee reaches F1, F2, and G1; the HNC Lock Complex; and the Bayou Grand Caillou Floodgate. The 2013 PACR/RPEIS was approved in the Chief's Report signed on July 8,

2013, and is incorporated into this document by reference. The ROD to complete the NEPA process was signed on December 9, 2013.

2.3.4 2022 Humble Canal Floodgate Pre-load EA #583

This document assessed construction of a preload levee to prepare for future construction of the Humble Canal floodgate, associated floodwalls, and earthen levees. Mitigation for bottomland hardwood (BLH), fresh and brackish marsh was required. This current SEIS assesses construction of the Humble Canal Floodgate. A FONSI was signed April 3, 2022.

2.3.5 2022 Supplemental EA #583A: Mitigation for the Humble Canal Gate Site Preparation and Initial Levee Preload Terrebonne Parish, Louisiana

This Supplemental EA revised the fresh marsh and brackish marsh mitigation plan assessed in the 2022 Humble Canal Floodgate Pre-load EA and identified in-kind mitigation bank credit purchase in the Deltaic Plain as the selected mitigation plan. EA #583A's FONSI was signed on December 21, 2022.

2.3.6 2024 Reach A Programmatic EA #598

The levee and structures addressed under this Programmatic EA were assessed for NEPA compliance in the 2013 PACR/RPEIS. These features were identified by the USACE and the NFS as critical for reducing hurricane and storm damage risks because they would be built where no local levees exist. Additionally, through hydrologic modeling the USACE determined that constructing Reach A would reduce water levels in areas interior to the levee system without construction of other MTG Project reaches, demonstrating the independent utility of this reach.

EA #598 assessed a combination of both programmatic and constructible features including 7.2 miles of earthen levee and a 0.2-mile floodwall, 11 environmental control structures, two collector canals, a 56-foot-wide barge type floodgate on the Minor's Canal north of the GIWW, and a 125-foot to 225-foot-wide sector gate on the GIWW west of Houma (GIWW West). In its Fish and Wildlife Coordination Act Report (FWCAR) recommendations, the U.S. Fish and Wildlife Service (FWS) recommended avoiding impacts to the Mandalay National Wildlife Refuge (NWR), and if impacts could not be avoided, impacts would need to be mitigated for on the Mandalay NWR. In its FWCAR responses, the USACE committed to continue to look for opportunities to avoid and minimize impacts to Mandalay NWR. A FONSI was signed on May 9, 2024. The USACE is in the process of developing an additional EA to complete NEPA compliance for the programmatic features assessed in EA #598.

2.3.7 2025 Reach F EA #602

An EA is being prepared (as of October 2025) for the construction of the Reach F levee. NEPA compliance was satisfied for construction of the Reach F levee in the 2013 PACR/RPEIS. The EA assesses a modified footprint and design refinements to the Reach F levee design proposed in the 2013 PACR/RPEIS. Reach F has the lowest elevation on the southern portion of the MTG Project alignment and is a top priority for hurricane and storm damage risk reduction.

2.3.8 2025 MTG Surveys and Borings EA #597

This EA was prepared to evaluate the potential impacts of conducting site investigations, including surveys, geotechnical borings, and cone penetration tests, necessary to investigate the geophysical and topographic conditions along portions of the MTG Project alignment, including the GIWW East and West Floodgates, the GIWW East T-Wall and levee alignment, and the Reach A, F, J2, and Lockport to Larose Reach 1 levees. The data from these activities was necessary to inform the design of these project features. A FONSI was signed on November 4, 2025.

2.4 NFS CONSTRUCTION AND COMPLIANCE

Non-federal entities funded and constructed components of the authorized MTG Project prior to the December 2019 Memorandum of Understanding (MOU) between the USACE and the NFS. According to the USACE 2021 EDR (2021 EDR) (USACE 2021), as of December 2021, non-federal entities had independently constructed approximately 47 miles of levee alignment to elevations ranging from 5 to 15 feet (although final elevations may differ due to compaction and settling), as well as a total of 23 structures including barge floodgates, environmental control structures to allow for tidal exchange, and fronting protection of existing pump stations (see Figure 2-1). Since the EDR, the NFS has reported over 80 miles of levees constructed from elevations ranging from 8 to 15 feet. The constructed features provide an interim level of risk reduction, but do not provide a 1% AEP (100-year) level of risk reduction. Section 326 of WRRDA 2024 allows for the NFS to receive credit towards their cost share for work performed on the MTG Project after March 31, 1989, if certain criteria are met.

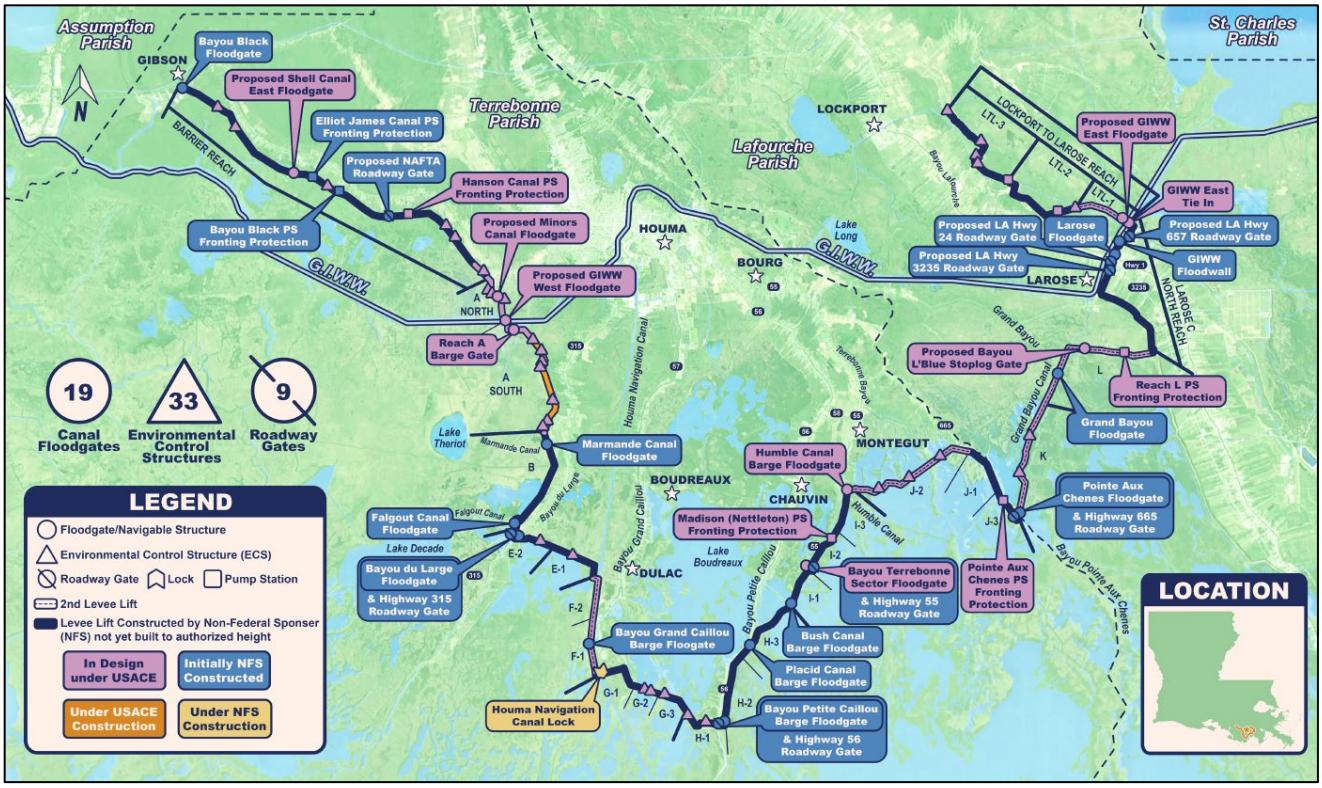


Figure 2-1. Map of Project Elements Constructed by NFS

Environmental compliance for the NFS construction of interim levees and structures was sought through the USACE Regulatory Program/Clean Water Act (CWA) Section 404 permitting process. The permits identified the NFS proposed work as the Least Environmentally Damaging Practicable Alternative. Table 2-3 provides a summary of the permitted work, required wetland mitigation to compensate for impacts to wetland habitat, and the status of wetland mitigation as of October 2025. More than 1,000 acres of wetlands and water bottoms were impacted by NFS construction (see Table 2-3). See Appendix O for more details about the NFS construction and permit status. As described in Section 3 Alternatives, the Proposed Action entails upgrading these levees and structures to provide a 1% AEP (100-year) level of risk reduction. These existing levees form the foundation of the Proposed Action and would reduce the amount of fill needed for federal levee construction.

Table 2-3. NFS Construction and USACE Regulatory Program Wetland/Waters of the U.S. Permit Status, Acres (as of October 2025)

Reach/Structure	Permit #	Mitigation Acres Required	Mitigation Acres Completed	Mitigation Acres Remaining
Barrier Reach Levee and Floodgate	MVN-2022-00728-WPP	Permit application in processing.		
Reach B Levee	MVN-2016-00049-WLL	Permit application in processing.		
Reach E Levee and Two Environ-mental control Structures	MVN-2011-1090 WPP	39	0	39
Reaches F&G Levee	MVN-2009-0559-WJJ[1]	200	114	34
Reach F Supplemental Mitigation	MVN-2009-0559-WJJ[2]	86	138	86
HNC Lock Complex	MVN 2015-01590 CO	41	39	1
Reaches G2&H1/ Levee, Bayou Petit Caillou FG and environmental control structures	MVN-2011-1088-WJJ	167	167	0
Reach H Levee	MVN-2005-1663-CY	369	204	165
Reach I Levee	MVN-2024-0365-WPP[1]	NFS withdrew their permit application in March 2025.		
Reach J-2/ Levee and environmental control structures	MVN-2011-1087-WJJ, 2012-0330-WJJ	54	52	0
Reach J-3/ Levee	MVN-2010-1631-WJJ	21	20.7	0
Reaches K&L Levee	MVN-2011-1611-WJJ	88	56	33

[1]CEMVN Regulatory Program is considering applying 52 acres credit for marsh mitigation site created by NFS for the HNC Lock Complex (as of October 2025).

[2]The mitigation for this permit included 86.2 acres above and beyond the 86.2 acres required.

3 Alternatives

3.1 PLAN FORMULATION

In the evolution of the MTG Project, several sets of alternative plans were developed and evaluated in the 2002 MTG Feasibility Study/PEIS (USACE 2002) and the 2013 PACR/RPEIS (USACE 2013) with the goal of maximizing the risk reduction to residential and commercial structures while minimizing adverse impacts on the natural and human environment. These alternative formulation findings are incorporated into this document by reference. According to the 2021 EDR (USACE 2021), the Proposed Action offers the same level of economic benefit and risk reduction as the authorized alignment assessed in the 2013 PACR/RPEIS.

The Proposed Action assessed in this current SEIS is based on the authorized 2013 PACR/EIS alignment (USACE 2013) with technical design refinements and changes, as reported in the 2021 EDR (USACE 2021) with further refinements outlined in this report. The proposed changes and design refinements will be evaluated in a Design Documentation Report or an Engineering Documentation Report following ER 1110-2-1150. Before construction commences on each Proposed Action feature, a determination will be made if any design changes including cumulative impact of changes across the project are not within the Chief of Engineer's discretionary authority.

Therefore, at this time, no additional reformulation was part of the development of this SEIS. The 2013 PACR/RPEIS (USACE 2013) is incorporated into this document by reference. Two alternatives were developed for this SEIS—the No Action Alternative and the Proposed Action, the latter of which incorporates construction completed by the NFS and considerations to avoid and/or minimize impacts on wetland habitats.

3.2 NO ACTION ALTERNATIVE

NEPA requires that a federal agency consider a "no action" alternative in addition to a proposed federal action alternative. The No Action Alternative represents the baseline conditions in which no federal action would be implemented and describes the expected future condition of the natural and human environment in the absence of the Proposed Action. This alternative serves as the basis for comparing the potential impacts of the Proposed Action. The No Action Alternative assessed in this SEIS assumes continuation of existing conditions including the levees, floodgates, and environmental control structures constructed by local entities prior to executing the PPA as the NFS for the federal project in 2021 (see Figure 3-1). The NFS constructed earthen levees and structures to elevations ranging from 5 to 15 feet (NAVD88[1]), which does not reduce the risk of catastrophic hurricane and tropical storm damages up to a 1% AEP (100-year storm) event. The study area is characterized by low, flat terrain that is highly susceptible to flooding from the tidal

[1] All elevations throughout this SEIS are referenced to the North American Vertical Datum of 1988 (NAVD88) unless otherwise specified.

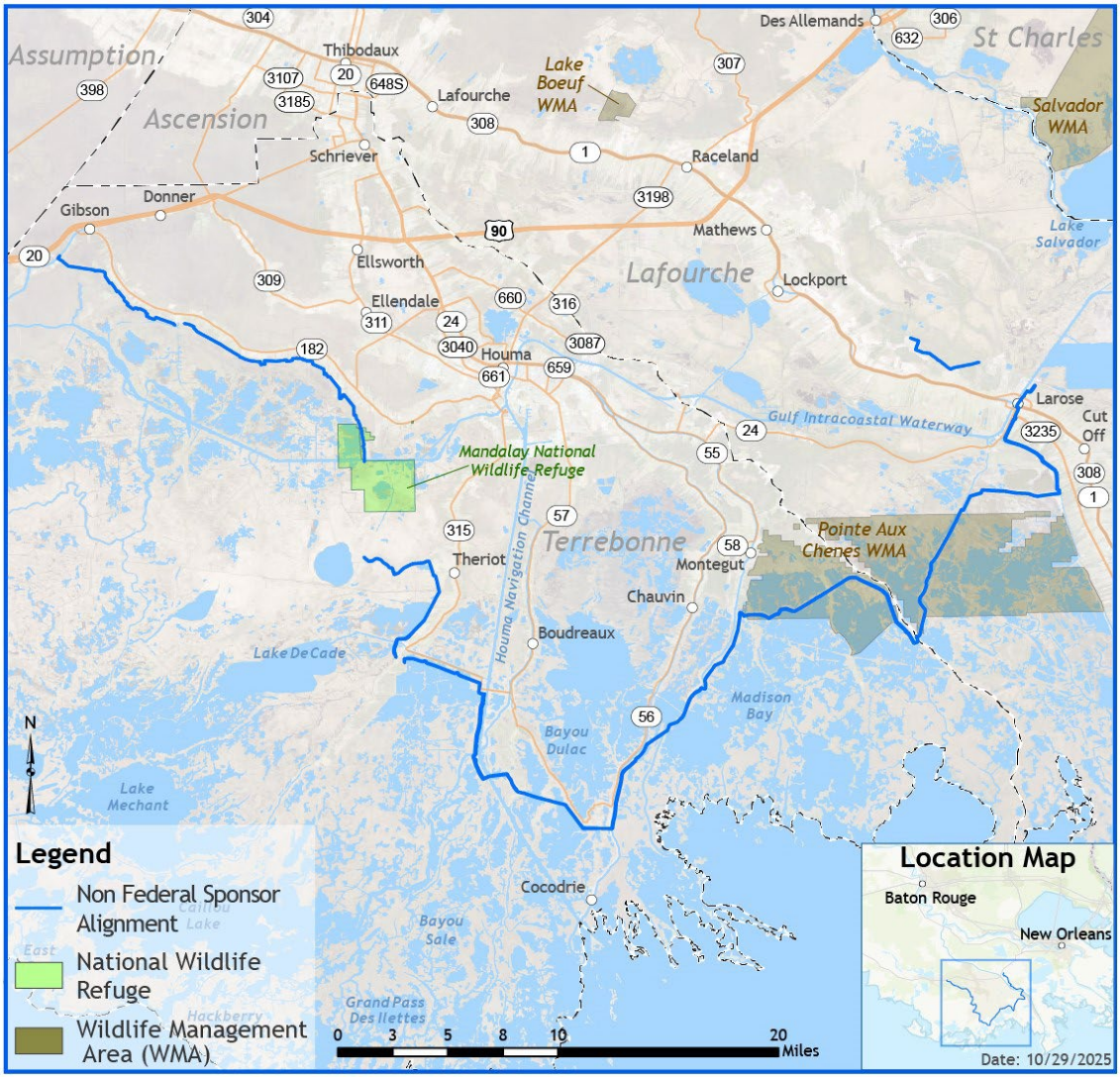


Figure 3-1. Alignment of Existing Levees Under the No Action Alternative

surges of hurricanes and tropical storms. Storm surge for a 1% AEP (100-year) storm event would continue to cause property damage, destruction of natural habitats, and human suffering under the No Action Alternative. Ongoing subsidence and sea level changes are expected to magnify storm surge and flood risks in the future. See the 2021 EDR for details about hurricane and storm damage risks projected for the No Action Alternative conditions as calculated by the Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) model (Environmental compliance for the NFS construction of interim levees and structures was sought through the USACE Regulatory CWA Section 404 permitting process. See Section 2.4 of this SEIS for a summary of the permitted work and required wetland mitigation to compensate for impacts to wetland habitat.

3.3 PROPOSED ACTION

3.3.1 Overview

The Proposed Action includes construction of approximately 86 miles of levees and structures and the 50-year performance period of all reaches and structures to provide a 1% AEP (100-year) level of risk reduction. The proposed alignment and structures are shown in Figure 3-2. See Appendix A for detailed maps of the proposed alignment and Appendix B for detailed project descriptions of all project features. See Section 1.6 for information about differences between the 2013 authorized alignment and the Proposed Action, including design criteria changes (Table 1-2) and location changes (Figures 1-2 through 1-7). See Section 4.4 for a list of best management practices (BMPs) and measures that would be implemented to avoid or minimize impacts to socioeconomic and environmental resources during construction.

3.3.2 Levees

The levee system would extend from high ground along Highway 90 near the town of Gibson and traverse in a southeastern direction through marshes south of the town of Argyle and north of the town of Cocodrie. From there, it would extend through the town of Lapeyrouse and the Pointe-aux-Chenes Wildlife Management Area (WMA), along the GIWW near the town of Larose, and terminate east of the town of Lockport. This alternative is closely based on the alignment authorized in the 2013 PACR/RPEIS, with alignment shifts (mainly in the Barrier and Lockport to Larose Reaches) to follow existing NFS-constructed levees and avoid impacts to wetland habitat on the flood side of the alignment.

The majority of the proposed levee would be constructed on existing local levees (see Figures 1-2 through 1-6 for maps comparing the Proposed Action and existing local levee alignments). Local levee construction was carried out by the NFS in various segments and stages over several decades, and environmental compliance for construction was sought through the USACE Regulatory Program permitting process (see Section 2.4 and Appendix O for details regarding the permit status of NFS levees). The Proposed Action would upgrade existing local levees and structures to provide a 1% AEP (100-year storm) level of risk reduction. The existing NFS levees would form the foundation of the Proposed Action levees and would reduce the amount of fill needed for federal levee construction (see Figure 3-3; note that although shown in the figure, Reach A and Reach F levee construction are assessed in separate NEPA documents as explained in Section 1.7).

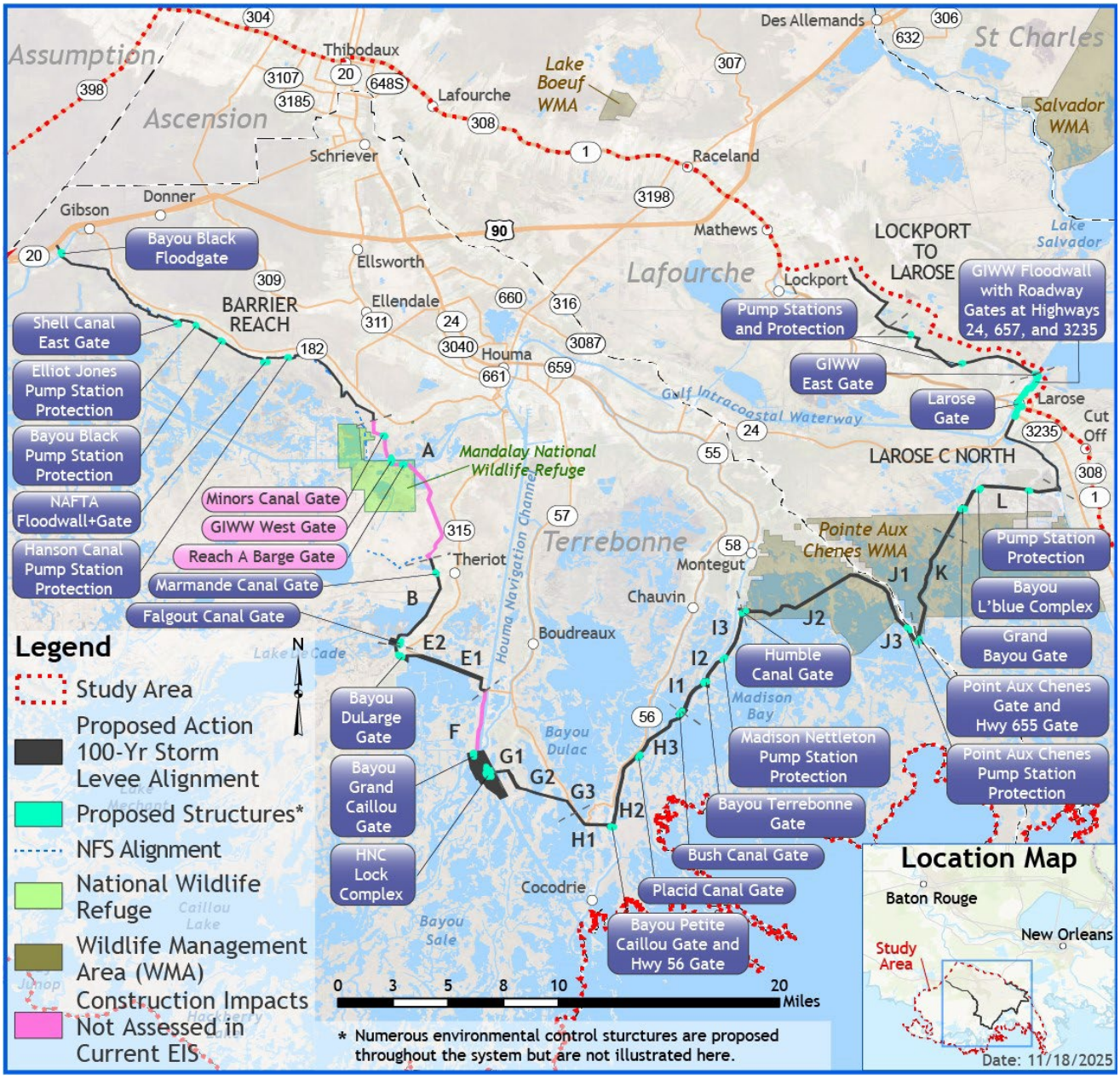


Figure 3-2. Project Features of the Proposed Action

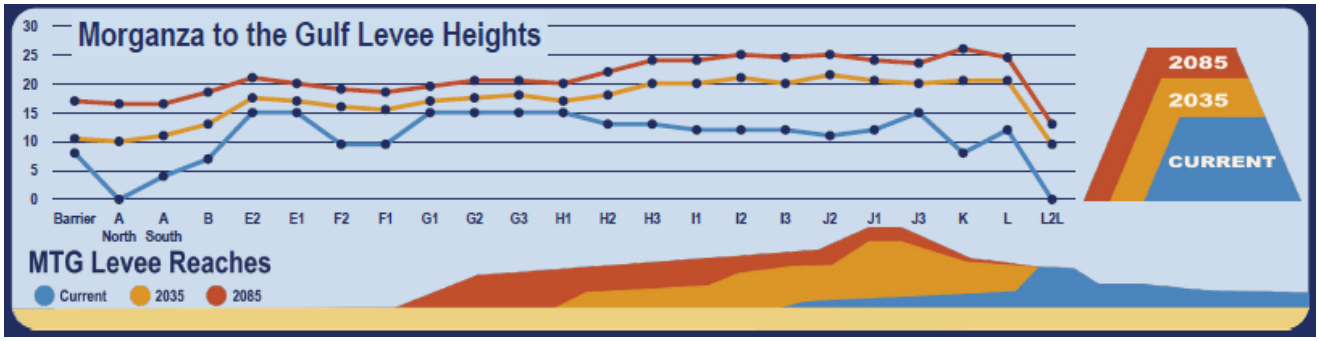


Figure 3-3. MTG Project Levee Heights

The proposed levees would be designed to provide risk reduction for storm surge and wave action associated with storm events up to and including the 1% AEP (100-year) storm event. They would be constructed to elevations designed to prevent overtopping under these conditions. Given the ongoing trends of land subsidence and sea level change, which are expected to increase storm surge and wave heights over the 50-year lifespan of the project, the USACE would incorporate a phased approach for levee elevation modifications. The levee system would be initially built to achieve a 1% AEP risk reduction under projected 2035 subsidence and sea level change scenarios. Subsequently, the system would be raised again to ensure continued 1% AEP risk reduction under 2085 subsidence and sea level change projections (see Table 3-1 and Figure 3-3). The impact analysis and mitigation plan in this SEIS address the footprint and operational characteristics of the 2085 levee design, as it represents the final elevation required to maintain a 1% AEP risk reduction throughout the 50-year performance period, accounting for future subsidence and sea level change.

During construction, the existing NFS levees (where they coincide with the Proposed Action alignment) would be degraded to a suitable level and constructed to 2035 design heights with hauled borrow material (see Section 3.3.4 for information about borrow material sites). During hurricane season, where proposed levee construction includes degrading existing local levees, the USACE would maintain the existing level of flood risk reduction by using methods such as installing temporary flood barriers, for example sheet piles or concertainers (large sand-filled baskets), to close gaps in the levee system. Geofabric would be installed when a suitable base is established, and future lifts would be placed and compacted atop previously constructed lifts. Table 3-1 lists the proposed design elevations for 2035 and 2085 by levee reach. See Figures 3-4 and 3-5 for typical cross-sections of the 2035 and 2085 design elevations. Note that levee elevations, widths, and slopes would vary by reach. See Appendix B for detailed descriptions of each levee by reach. The width of the ROW depicted in Figures 3-4, Figure 3-5, and Appendix B would be refined during final design and would likely be narrower than shown in the figures. Likewise, the toe-to-toe levee footprints

depicted would be refined during final design and may be narrower than shown in the figures.

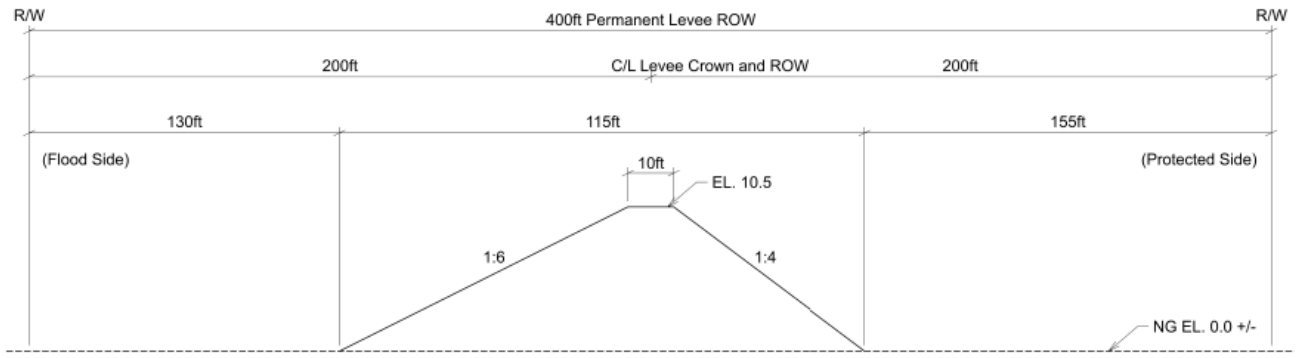
Table 3-1. Levee Design Elevations of the No Action and Proposed Action Alternatives[1]

Reach	No Action Alternative[3]	Proposed Action Levee Design Elevation 2035	Proposed Action Levee Design Elevation 2085
Barrier	8.0	10.5	17.0
B	7.0	13.0	18.5
E-1[2]	15.0	17.0	20.0
E-2	15.0	17.5	21.0
G-1[2]	15.0	17.0	19.5
G-2[2]	15.0	17.5	20.5
G-3[2]	15.0	18.0	20.5
H-1[2]	15.0	17.0	20.0
H-2[2]	13.0	18.0	22.0
H-3[2]	13.0	20.0	24.0
I-1[2]	12.0	20.0	24.0
I 2[2]	12.0	21.0	25.0
I-3[2]	12.0	20.0	24.5
J-1[2]	12.0	20.5	24.0
J-2[2]	11.0	21.5	25.0
J-3[2]	15.0	20.0	23.5
K	8.0	20.5	26.0
L	12.0	20.5	24.5
Larose C North	1.5	8.5	15.5-16.5
Lockport to Larose	6’ (sub-Reach B only)	7.5-9.5	11-13

[1]Reaches A and F are assessed in separate NEPA documents (EAs # 598 and 602).

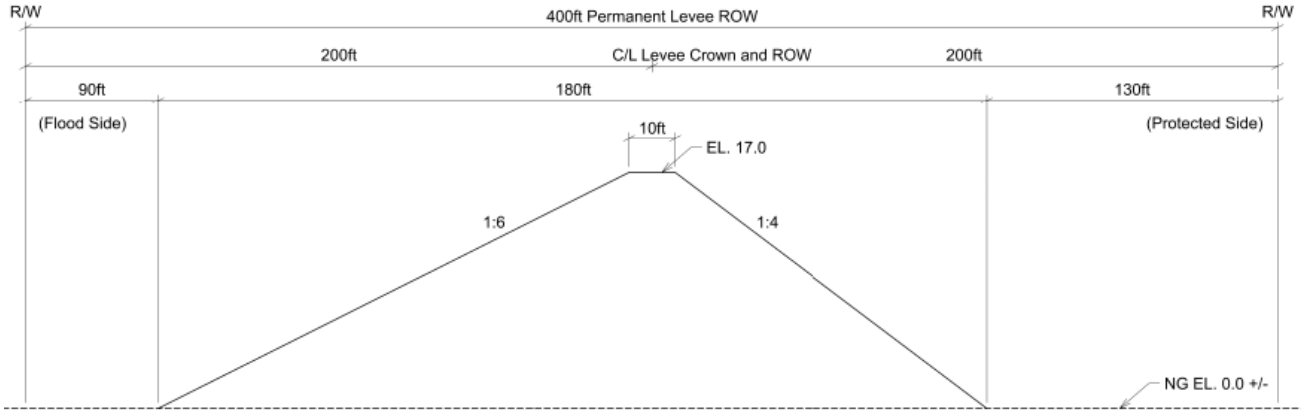
[2]This reach is comprised of subsegments with design elevations in the range shown here.

[3]Levees were constructed by the NFS prior to 2022. Environmental compliance was conducted through the USACE Regulatory Program.



Note: Height, width, and slope would vary by reach.

Figure 3-4. Typical Levee Section for 2035 Design Elevation



Note: Height, width, and slope would vary by reach.

Figure 3-5. Typical Levee Section for 2085 Design Elevation

3.3.3 Structures

The Proposed Action would include construction or upgrading of 24 environmental control structures, 15 navigable floodgates, 8 floodwalls to protect existing pump stations, 8 roadway floodgates, and a 2.5-mile floodwall along the GIWW in Larose (see Table 3-2 and Figure 3-2). The structures and floodwalls would be built to the 2085 1% AEP (100-year) level of risk reduction. The environmental control structures, consisting of box culverts with sluice gates, would be installed at locations where the levee crosses drainage canals or areas that are currently exposed to tidal flows. When in the “open” position, these structures would allow for the continued flow of tidal water and the movement of fish species in and out of these areas. Additionally, the control structures would facilitate the drainage of isolated areas and help manage the maximum inundation of marsh. See Appendix B for detailed

descriptions of each structure. See Section 3.3.7 for information about the draft water control plan.

Table 3-2 Proposed Action Structures[1,2]

Reach	Structure
Barrier	Bayou Black 56-foot Wide Barge Floodgate
	Shell Canal East 125-foot Wide Barge Floodgate
	NAFTA Floodwall with 36-foot Wide Roadway Swing Gate
	Floodwall in Front of Existing Elliot Jones Pump Station
	Floodwall in Front of Existing Bayou Black Pump Station
	Floodwall in Front of Existing Hanson Canal Pump Station
	Environmental Control Structures: 7 sets
Reach B	Marmande Canal 30-foot Wide Barge Floodgate
	Falgout Canal 56-foot Wide Barge Floodgate
Reach E	Dularge 56-foot Wide Barge Floodgate
	40-foot Wide Roadway Swing Gate on Hwy 315 (Bayou Dularge Rd.)
	Environmental Control Structures: 2 sets
Reach F	Bayou Grand Caillou 56-foot Wide Barge Floodgate HNC Lock Complex
Reach G	Environmental Control Structures: 3 sets
Reach H	Bayou Petite Caillou 56-foot Wide Barge Floodgate
	Wide Roadway Swing Gate on Hwy 56 (Little Caillou Rd.)
	Placid Canal 56-foot Wide Barge Floodgate on Bayou Petite Caillou and Placid Canal
	Environmental Control Structures: 2 sets
Reach I	Bush Canal 56-foot Wide Barge Floodgate
	Bayou Terrebonne 56-foot Wide Floodgate
	Roadway Swing Gate on Hwy 55 (Montegut Rd.)
	Floodwall in Front of Existing Madison Nettleton Pump Station
	Humble Canal 56-foot Wide Sector Gate
Reach J	Floodwall in Front of Existing Pointe Aux Chenes Pump Station
	Roadway Swing Gate on Lower Hwy 665
	Pointe Aux Chenes 56-foot Wide Barge Floodgate
	Environmental Control Structures: 3 sets
Reach K	Environmental Control Structures: 2 sets
Reach L	Grand Bayou 56-foot Wide Barge Floodgate with Sluice Gates

Reach	Structure
	Floodwall in Front of Existing Pump Station South of Larose
	Bayou L'Blue 15-foot Wide Stoplog Floodgate with Four Sluice Gates
	Environmental Control Structures: 1 set
Larose C North	GIWW Floodwall: 2.5-mile-long, 16.5-foot-high Floodwall along the GIWW with three Roadway Swing Gates. Located in the town of Larose
	Larose (Bayou Lafourche) 56-foot Wide Barge Floodgate
	GIWW East 225-foot Wide Floodgate plus 465-foot Linear Concrete Floodwalls to Tie-into Levees
Lockport to Larose	Floodwall in Front of Existing L2L # 1 Pump Station
	Floodwall in Front of Existing L2L # 2 Pump Station
	Environmental Control Structures: 5 Sets and Replace Existing Culvert
[1] Most barge floodgates listed would include construction of floodwalls that would tie-in to the proposed levee. [2] See Appendix B for detailed descriptions of each of these structures.	

3.3.4 Borrow Sites and Staging Areas

An estimated 55 million cubic yards (cy) of borrow material would be required to construct levees to the 2035 design elevation, with an estimated 28 million more cy needed to reach 2085 design elevations (subject to final designs and planning). Borrow areas have been identified that would be excavated to depths of -20 feet for fill material and hauled via trucks and barges for levee construction. Cleared areas (referred to as "staging areas") would be established near work sites for construction vehicle parking, construction trailers, and material storage. Figure 3-6 depicts locations of proposed borrow sites and access routes that would be used during construction (note that staging areas are not shown in the map due to their small size). See Appendix A for more specific maps and Appendix B for project descriptions of the borrow sites, access routes, and staging areas for each reach and structure of the Proposed Action.

The USACE used best available data including but not limited to satellite imagery, spatial habitat data, the National Landcover Database, U.S. Geological Survey soils and vegetation data, cultural resource databases and maps, state databases for oil and gas pipelines and wells, contamination sites, and the FWS online wetland mapper to avoid forests, wetlands, protected species habitats, cultural sites, and hazardous, toxic, radioactive waste (HTRW) concerns. Proximity to construction areas was also considered when choosing borrow sites to minimize haul distances, reduce emissions, and limit traffic impacts.

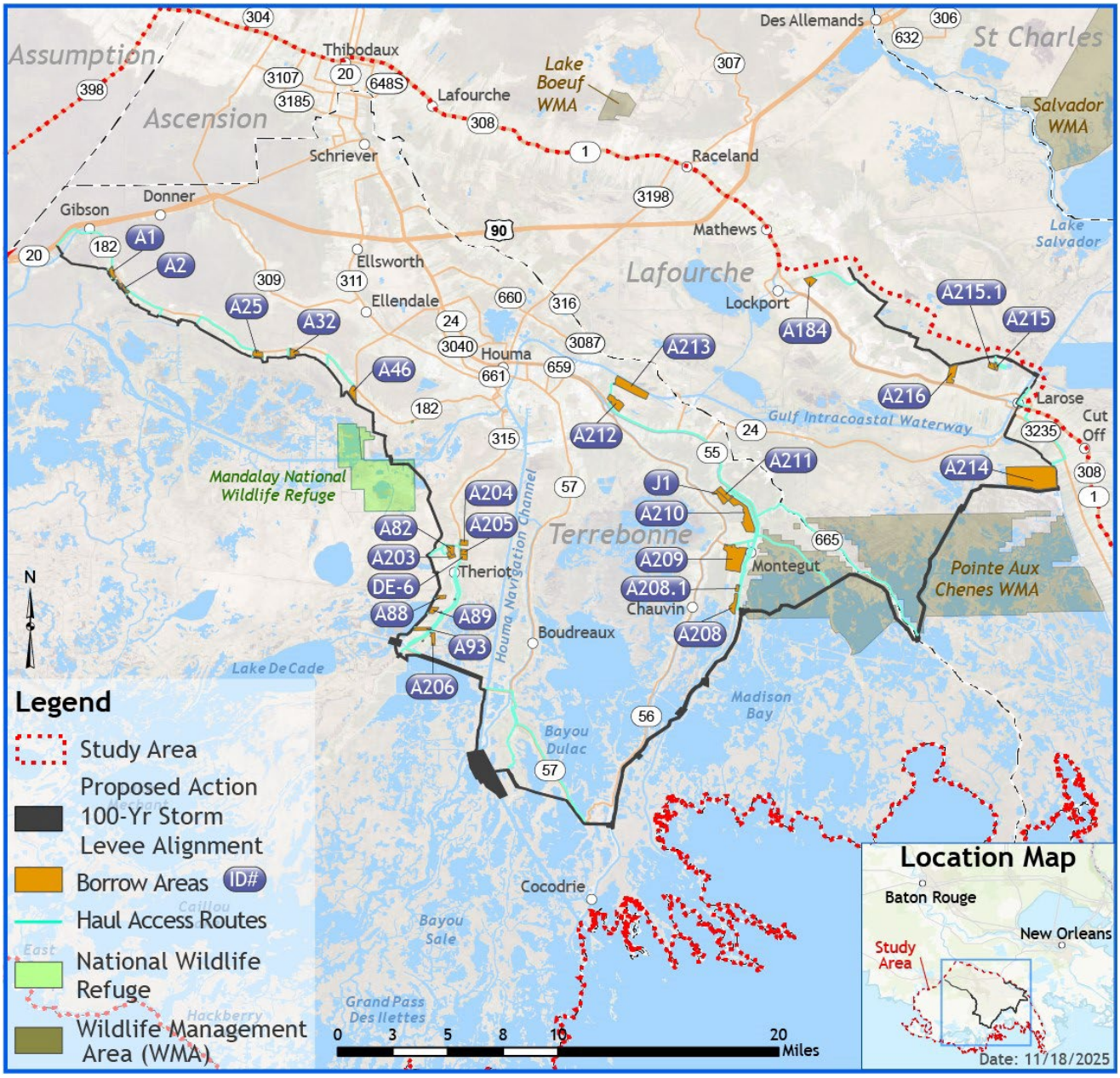


Figure 3-6. Borrow Sites and Construction Access Roads

The USACE commits to performing field surveys during final designs (before construction) to confirm the presence or absence of significant habitats, cultural resources, and HTRW. If sensitive resources or cultural resources are identified at the sites during surveys, these areas would be avoided or, in the case of impacts to fish and wildlife resources, a compensatory mitigation plan would be developed in accordance with Section 906 of the WRDA of 1986, as amended (33 USC 2283). To avoid sensitive areas identified during field surveys (if any), a “no-work-zone” buffer would be enforced for forested wetlands (150 feet or the trip line, whichever is larger) and marsh habitat (100 feet). Required buffers for

cultural resources sites if identified are being determined through the cultural resource Programmatic Agreement (see Section 6.16 for information about the Programmatic Agreement process). The USACE would coordinate with resource agencies to determine specific buffers based on habitat type, quality, and function once field surveys are completed and before construction to avoid impacts to sensitive habitats. If HTRW concerns are identified, the USACE would relocate or avoid these areas in coordination with the NFS and construction contractors. Final borrow site selection and material quantity verification would occur after geotechnical, cultural resource, HTRW, other site surveys have been conducted.

Proposed borrow sites and staging areas would be acquired by the NFS through temporary work easements. Upon expiration of the temporary work easements, the land would revert to the underlying fee owner. After return, decisions regarding use of the land or pit would be at the discretion of the owner.

The MTG Project was granted a waiver that may allow contractors to obtain borrow from readily available commercial borrow sites if determined to be in the best interest of the government. As such, additional borrow sites outside of those shown in Figure 3-6 may be identified through a “sources sought” solicitation which would require additional NEPA analysis prior to approval for use.

Initial surveys would be conducted to verify existing conditions during design. After the site is selected and construction commences, clearing and grubbing would occur as necessary to remove unsuitable material. Excavation would proceed within depth limits defined in project drawings, with stockpiling of materials allowed within designated areas. Upon completion, borrow sites would be graded to ensure positive drainage and avoid abrupt grade transitions. Any debris from site preparation would be buried within the completed borrow pit. Borrow areas utilized for compacted fill would be drained and kept dry using approved methods such as ditching or sump pumping.

Final staging areas would also be developed during the final design phase. A SWPPP would be implemented at each site to control stormwater runoff. Existing conditions would be verified through surveys, and areas would be cleared only to the extent necessary to accommodate construction trailers, equipment, and vehicle parking. A geotextile separator fabric and approximately six inches of crushed stone would be placed to stabilize the ground surface for each staging area.

3.3.5 Haul and Access Routes

3.3.5.1 Roadway Access

Haul routes for delivering construction material and equipment would be primarily located and maintained on existing state highways, parish roads, and existing agricultural roads (see Figure 3-6 and Appendix A for maps of proposed haul routes). Haul trucks would be watertight and equipped with secured tailgates to prevent spillage. Contractors would be

required to maintain clean transport routes and address any material spilled or tracked onto public roadways.

In areas lacking sufficient access, temporary haul roads would be constructed. For example, a 60-foot-wide haul route would be constructed to provide construction access between borrow site A184 and Reach Lockport to Larose (see Figure 3-7). The 60-foot-wide right-of-way would be cleared of vegetation and topped with approximately 2 feet of sand, geotextile fabric, and crushed stone (see Figure 3-8). The gravel road would traverse along the 40 Arpent Canal and cross an agricultural field. This new gravel road would remain after construction for continued access to the levee during operations. The NFS would acquire a perpetual road easement from the landowner.

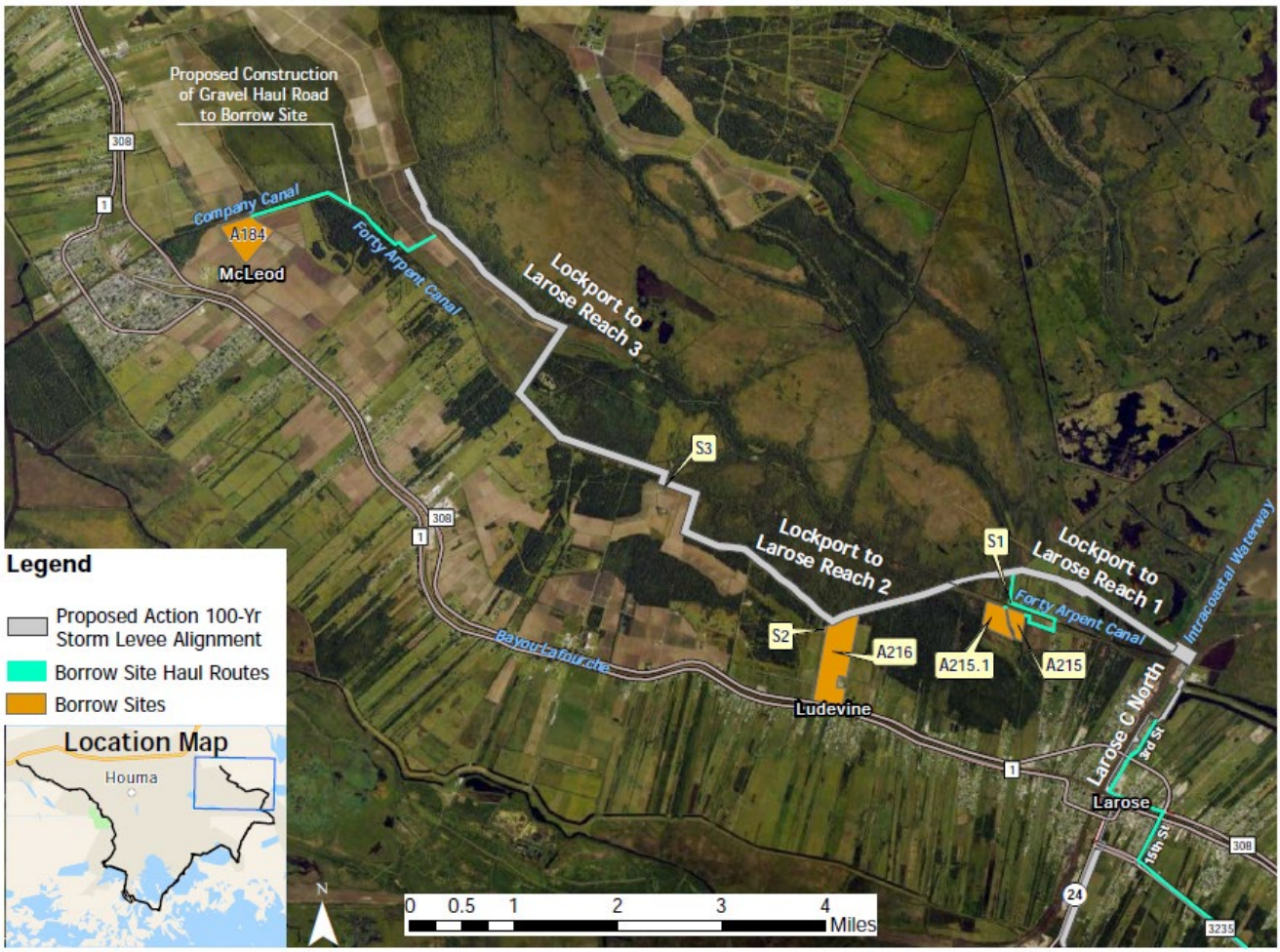


Figure 3-7. Location of New Proposed Haul Road -- Lockport to Larose Reach

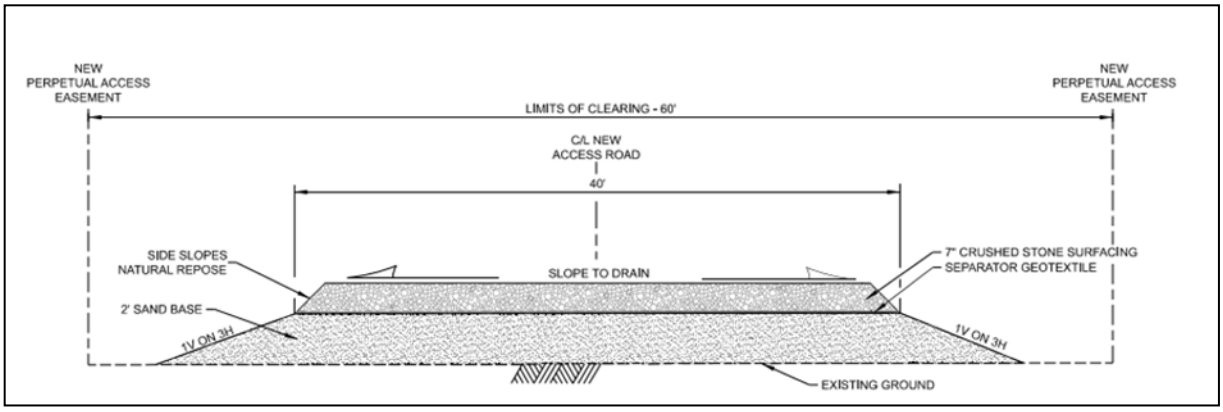


Figure 3-8. Cross Section of Proposed Haul Road

3.3.5.2 Temporary Bridge Access

Construction of the Reach B levee would require haul trucks to cross Thibodeaux Canal to deliver borrow material from borrow sites along the eastern edge of the canal to proposed levee construction along the west side of the canal (see Figure 3-9). To avoid placing fill in Thibodeaux Canal and associated environmental impacts, two temporary bridges called "pontoon bridges" would be installed consisting of floating barges with ramps (see Figure 3-10). Barges would be assembled on site to span the canal, and the travel surface of the barges would be covered with timber matting. Timber matting would also be installed to provide a hinged surface from the barge to the adjacent land that would allow for trucks to pass from land to the bridge. Temporary anchors would be inserted through the barge segments and embedded into the canal bottom to secure the connected barges in place. The temporary pontoon bridges would float on the water to avoid impacts to drainage. Once construction of the Proposed Action is complete, the bridge, anchors, and timber mat ramps would be disassembled and removed. Thibodeaux Canal is a drainage canal and not used for navigation; therefore, no impacts to navigation would occur due to the installation of these temporary pontoon bridges for construction access (see Section 6.15.2.2.5 about impacts of the Proposed Action on navigation).

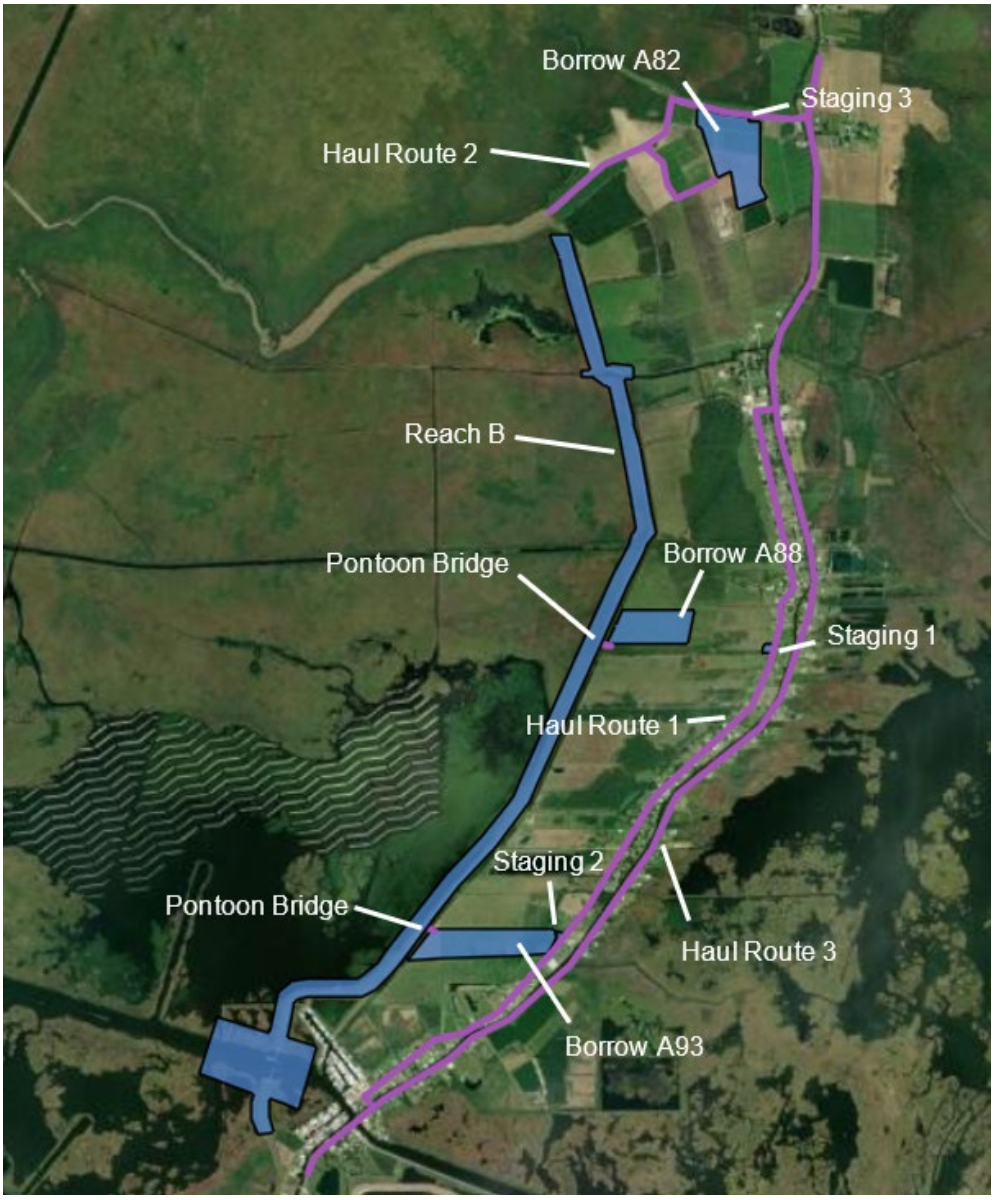


Figure 3-9. Locations of Proposed Temporary Pontoon Bridges in Reach B

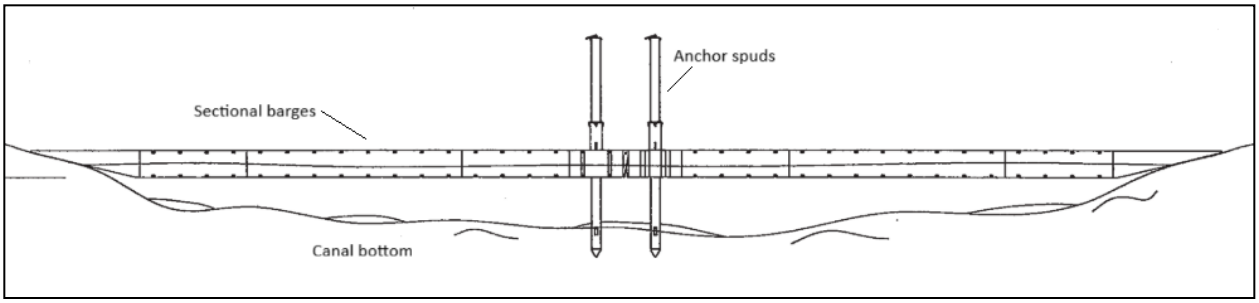


Figure 3-10. Cross Section of Proposed Temporary Pontoon Bridges

3.3.5.3 Marine Access

Although the majority of construction deliveries would be delivered via trucks on existing roadways, some material deliveries would be delivered using barges on navigation canals in the study area. Barges carrying borrow material and construction equipment would travel along Bayou Terrebonne, Bush Canal, and Bayou Petite Caillou and deliver material and equipment to existing cleared areas near the Reach H levee (see Figure 3-11). An example of an existing cleared area to be used for barge offloading along the Reach H levee is shown in Figure 3-12. A temporary timber mat ramp would be placed within the existing cleared area to provide access from the barge to land, such that no vegetation or surface waters would be impacted. Excavators would be used to move material from the barge into dump trucks for delivery along the levee reach. No road access exists to the proposed right-of-way for Reach H; therefore, dump trucks would travel from barge offloading areas directly onto the Reach H levee construction right-of-way.

Figure 3-11. Location of Proposed Barge Offloading Sites for Reach H Construction

Figure 3-12. Pictorial Example of Existing Barge Offloading Area

3.3.6 Project Implementation and Time Frame

The construction of the full 86-mile Proposed Action levee alignment and structures would occur over numerous years and would be dictated by the USACE Civil Works budget process. Through coordination with the NFS, the USACE prioritizes which levee reaches and structures to request funding for design based on determinations of which provide the most critically needed risk reduction benefits. If funded, developing the final designs and completing environmental compliance of the levee or structure typically requires 2 to 4 years.

Currently, funds have been received and work is underway for 24 contracts in the MTG Project that are a combination of levees, structures, and compensatory mitigation. Construction is anticipated to occur in fiscal years 2026 through 2032. The goal is to complete construction of all MTG Project features to 2035 design heights to provide risk reduction for storm events up to and including the 1% AEP storm event by 2035, pending funding received. To maintain the 1% AEP risk reduction over the 50-year performance period, additional levee lifts are anticipated for 2045 and 2070, with final completion anticipated in 2085. Given the scale of the project and funding constraints, construction would proceed in phases, with impacts from each phase mitigated accordingly. All unavoidable adverse impacts would be mitigated before or concurrent with construction in compliance with NEPA, Section 404 of the CWA, and USACE regulations. The first phase of construction is anticipated to begin in 2027 and would entail raising the Reach J2 levee to 2035 design elevations.

The construction of levee reaches to the 2035 design elevation is expected to last approximately 24-36 months per reach. The construction of floodgate structures is expected to take approximately 24-48 months each, depending on their size and complexity. Construction would occur from approximately 6:00 a.m. to 9:00 p.m. daily, with some levee reaches and structures built concurrently.

This SEIS addresses NEPA compliance and habitat mitigation requirements for all reaches and structures under the Proposed Action. However, as conditions change over time and some reaches and structures may not be constructed for 5 years or more, the USACE would prepare supplemental NEPA documents and re-initiate mitigation planning to address unforeseen impacts, including those resulting from evolving environmental conditions or project designs. If additional or intensified impacts are identified, supplemental NEPA documents and mitigation plans would be completed to ensure that all environmental impacts are addressed and mitigated throughout the project's 50-year performance period.

3.3.7 Operation and Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R)

The USACE is responsible for completing water control plans for navigation and flood-control structures constructed wholly or in part with federal funds (ER 1110-2-24). The

requirements for water control plans vary depending on the type of structure, in accordance with Engineering Manual (EM) 1110-2-3600 and Department of Interior's Division of Resources Reviews (DIVR) 1110-2-240. The USACE would determine structure types and associated water control plan/manual requirements during the final design phase. The USACE, MVD would review the water control plans and/or manual, and approval would be required within 1 year after full-scale operations of the proposed structures. The water control plan or manual would be updated as needed, at least every 10 years, or more frequently (ER 1165-2-240).

USACE has developed a preliminary draft water control plan for proposed structures (see Appendix M). The primary goal of the operating plan is to prevent interior flooding caused by high water levels on the exterior side of the levee system. Although storm surge associated with named storms is the most common driver of high exterior water levels, other hydrologic conditions—such as flooding from the Atchafalaya River during heavy rainfall—may also necessitate structure closures. The HNC Lock Complex has additional salinity criteria for operations. The structures would be closed when either of the following conditions occur:

- A named storm is present in the Gulf and poses a threat to the Louisiana coastline; or
- Water levels surpass thresholds specific to each reach and structure during storm events, as outlined in Appendix M.

The NFS would be responsible for the OMRR&R of the Proposed Action levees and structures (once constructed) at no cost to the federal government (except for the HNC Lock, GIWW West Floodgate, and GIWW East Floodgate, which the USACE would operate and maintain). The USACE would prepare and issue an OMRR&R manual in accordance with ER 1110-2-401, the executed PPA, and applicable USACE regulations, and the NFS and USACE would be required to conduct OMRR&R responsibilities in a manner compatible with the manual. The OMRR&R activities would generally consist of operating the structures to assure proper working order; painting, lubrication, corrosion prevention; removing debris and shoaled sediment from interior ponding areas; cutting grass, repairing levee slides, placing gravel on the levee crown, or other repair activities; and performing regular inspections of the levees, floodwalls, and structures.

3.4 INDUCED FLOODING ASSOCIATED WITH THE PROPOSED ACTION

3.4.1 Overview

The MTG Project would provide substantial hurricane and storm damage risk reduction benefits inside the levee system but is projected to increase water levels[2] (referred to as "induced flooding") outside the levee system in certain areas for 12 to 48 hours during and immediately following storm events. The severity of these impacts would depend on factors

[2] The term "water level" in this report refers to the technical term "still water level" (SWL), which is the average water surface level at any instant, excluding local variation due to waves and wave setup, but including the effects of tides and storm surges. The "still water level" is an elevation referenced to NAVD88 in this report.

such as storm intensity and distance from the levee system. Mitigation strategies to address project-induced water level increases would be developed based on detailed analysis during the final design phase, with considerations for both economic and social impacts. Implementation of mitigation measures (as appropriate) would be completed prior to certification of final plans and specifications and before the initiation of construction of any reaches of the Proposed Action.

The sections below provide a general overview of the flood-risk reduction and induced flooding impacts associated with operation of the Proposed Action, once constructed. See Sections 6.2 (Hydrology) and 6.15 (Socioeconomics) for detailed discussions about Proposed Action flooding impacts, including the number of residential and commercial structures that could be impacted and other details. See Section 4.3 (Induced Flooding Mitigation) for details about induced flooding mitigation measures. See Section 6.17 for information about coordination that would occur with the Isle de Jean Charles community, which is one of the communities that would be impacted by project-induced flooding during storms and is home to members of the Isle de Jean Charles Indian Tribe.

3.4.2 Reduced Flooding Inside the MTG Levee System

The MTG Project would significantly reduce flood and storm surge risks for communities inside the levee system. An economic study was done in the 2013 PACR/EIS to determine whether the benefits of building and maintaining the levees would justify the costs. This study compared the expected costs of construction and operation with the benefits, which mainly come from reducing emergency response expenses and preventing damage to homes and buildings from flooding. In 2021, the analysis was updated to incorporate current price levels and revised design standards (see Section 1.6.1 for information about revised design standards). The updated analysis evaluated the anticipated benefits over a 50-year performance period and determined that the value of reduced hurricane and storm damage risks would exceed the costs of constructing and maintaining the project. In summary, the benefits would substantially exceed the costs, thus justifying the proposed project. See the 2021 EDR (USACE 2021) for more details about the economic justification. Updated 2023 hydrologic and 2025 coastal storm modeling results indicate that inside the levee system, approximately 9,516 structures would be benefitted through reduced water levels during 1% AEP (100-year storm) events because of the Proposed Action.

Once construction of the proposed levees and structures is complete, results of the HEC-RAS 2025 model indicate that when storms are not approaching and proposed structures are open, differences in water surface elevations between the No Action and Proposed Action alternatives on both the flood side and protected sides of the levees would be negligible to minor, with minor increases in water levels during spring tides and cold fronts (see Section 6.2 and Appendix E). Environmental control structures, consisting of box culverts with sluice gates, would be installed at locations where the levee crosses drainage canals or areas that are currently exposed to tidal flows. When in the “open” position, these

structures would allow for the continued flow of tidal water and the movement of fish species in and out of these areas. Additionally, the control structures would facilitate the drainage of isolated areas and help manage the maximum inundation of marsh. See Appendix E for the 2023 and 2025 HEC-RAS reports. Section 3.3.7 includes information about the draft water control plan for Proposed Action flood gates, Environmental Control Structures (ECS), and other project features.

3.4.3 Project-Induced Flooding Outside the MTG Levee System

Based on 2025 Coastal Storm Modeling System (CSTORM-MS) results for years 2035 and 2085, during storm events when the proposed levee system gates and environmental control structures are closed, the levees would serve as storm surge barriers, forcing stormwater to "stack" on the exterior side of the levees. The model results indicate that some areas on the flood side of the proposed levee system would experience increased water levels during storm conditions, with minor, localized water level increases and widespread negligible water level impacts (as compared to the No Action Alternative) during 50% AEP (20-year storm) events in 2035 and 2085. During significant, infrequent (1% AEP (100-year) and 5% AEP (20-year) storm events), the project would cause water level increases of several feet or more. Communities on the flood side of the proposed levee system including Gibson, Isle de Jean Charles, Dulac, Cocodrie, the Larose to Golden Meadow levee, and Dularge would be impacted. Project-induced water level increases would be more substantial near the proposed MTG levees and would decrease farther from the MTG levees. The duration of increased water levels would be limited to 12 to 48 hours during and immediately following storm events. Residential and commercial structures in these areas as well as the effectiveness of local levees would be impacted. See Sections 6.2 and 6.15 for details.

The community of Isle de Jean Charles is located south of the proposed Reach J levee and is the ancestral home of members of the Isle de Jean Charles Indian Tribe, a Louisiana state recognized Tribe. Many Isle de Jean Charles tribal members have moved to northern Terrebonne Parish in Schriever, Louisiana, in coordination with the State of Louisiana's Office of Community Development's Isle De Jean Charles (IDJC) Resettlement. Water levels would increase at multiple structures on the flood side of the proposed Reach J levee. Isle de Jean Charles includes a 6- to 7-foot-tall local levee. During 1% AEP (100-year storm) events, this levee would be overtopped under the No Action Alternative. The amount of storm surge and water volumes overtopping the local levee during storms would increase under the Proposed Action. See further details in Section 6.2 and 6.16. Public outreach with the Isle de Jean Charles Tribal Community is described in Section 6.18. See Section 4.3 for more information about induced flooding mitigation.

3.5 DATA GAPS, RISK AND UNCERTAINTY

3.5.1 Data Gaps

Before construction begins, environmental compliance with all laws and regulations must be demonstrated for the features of the Proposed Action, and the mitigation of unavoidable

adverse impacts must be implemented prior to or concurrent with the unavoidable loss occurring. The following analyses and studies would be completed prior to construction to ensure compliance with NEPA and all environmental laws, executive orders, and regulations.

3.5.1.1 Wetland Value Assessments

Wetland Value Assessments (WVAs) have been completed to assess the quantity and quality of direct wetland impacts (expressed in average annual habitat units (AAHUs)) that would occur through construction of the Proposed Action (see Section 6.3 for details). However, WVAs to assess the long-term (indirect) impacts to wetlands (expressed in AAHUs) over the 50-year performance period of the Proposed Action after construction are currently being developed in coordination with the project habitat evaluation team (HET). It is anticipated that the completed compensatory habitat mitigation plan as described in this SEIS would sufficiently offset both direct and indirect wetland habitat impacts. Upon completion of WVAs for indirect wetland impacts, if results indicate that compensatory habitat mitigation plans (see Section 4.2 and Appendix C) would not fully mitigate for both direct and indirect habitat impacts (total AAHUs), the USACE would re-evaluate mitigation sites to see if expansion of the sites is possible to mitigate all direct and indirect impacts. If not, mitigation planning may be reopened to identify new sites that could mitigate for 100 percent of impacts by habitat type. Changes to the mitigation plan could be added to the SEIS and a second public review would be completed, or a supplemental NEPA document would be prepared as necessary.

3.5.1.2 Borrow Material for Levee construction

Borrow sites and staging areas were identified and screened during the preliminary design phase to avoid tracts of land that include significant ecological resources (forests, wetlands, and protected species habitats), cultural resource sites, and hazardous, toxic, radioactive waste (HTRW) concerns. Proximity to construction areas was also considered to minimize haul distances, reduce emissions, and limit traffic impacts. However, surveys have not been conducted to confirm the presence or absence of significant habitats, cultural resources, and HTRW. During the development of final designs, surveys would be conducted to verify the presence or absence of sensitive resources and HTRW concerns. If sensitive resources, cultural resources, or HTRW concerns are identified on the sites during surveys, these areas would be avoided or, in the case of impacts to fish and wildlife resources, a compensatory habitat mitigation plan would be developed in accordance with Section 906 of WRDA of 1986, as amended (33 USC 2283). Final borrow site selection and material quantity verification would occur after geotechnical, HTRW, and other site surveys have been conducted. If borrow sites are required for levee construction that are different than those assessed in this SEIS, environmental compliance and a supplemental NEPA document would be implemented as appropriate.

3.5.1.3 Water quality 404(b)(1) Analysis

As required by Section 402 of the CWA, a Louisiana Pollutant Discharge Elimination system (LPDES) permit for the Proposed Action would be obtained prior to construction via the General Permit for Discharges of Storm Water from Construction Activities Five Acres or More from the Louisiana Department of Environmental Quality (LDEQ). Section 404 of the CWA requires authorization from the Secretary of the Army, acting through the USACE, for the discharge of dredged or fill material into all waters of the United States, including wetlands. A draft 404(b)(1) evaluation will be released for a 30-day comment period that will include an assessment of the Least Environmentally Damaging Practicable Alternative. The final version of the 404(b)(1) evaluation will be provided as an appendix to the SEIS.

3.5.1.4 Cultural Resources

There are recorded historic properties throughout the alignment discussed in this SEIS. There may be other historic properties, not yet discovered or recorded, in areas that have not yet been surveyed by Phase 1 cultural resource standards. Phase 1 cultural resource surveys are in planning stages to occur for levee alignments and/or for borrow sources, access, and similar features. A Programmatic Agreement will serve as the governing mechanism for anticipated National Historic Preservation Act (NHPA) Section 106 studies and surveys, as described in Section 6.16.

3.5.1.5 Operation Plan for Floodgates and Structures

The USACE is responsible for completing water control plans for navigation and flood-control structures constructed wholly or in part with federal funds (ER 1110-2-24). The requirements for water control plans vary depending on the type of structure, in accordance with EM 1110-2-3600 and DIVR 1110-2-240. The USACE would determine structure types and associated water control plan/manual requirements during the final design phase. The USACE, MVD would review the water control plans and/or manual, and approval would be required within 1 year after full scale operations of the proposed structures. The water control plan or manual would be updated as needed, at least every 10 years, or more frequently (ER 1165-2-240).

The water control manual currently directs operators to close structures under specific water level conditions outside of storm events. An analysis was completed that determined there would be limited closures in the near-term based on the past 5 years of water levels. However, with sea level change, it is anticipated that structure closures outside of storm events would become more common over time. Sea level change is an uncertain phenomenon, both in duration and magnitude. The operator of each structure would be required to submit an annual report of daily operations that would be reviewed by USACE to assess and monitor how sea level change may be affecting closure rates. Once a threshold of 30 total days of closures per year of operation is met, this would trigger a re-analysis of potential impacts to hydrology and ecological resources during non-storm conditions. If this analysis identifies potential impacts beyond the scope of this SEIS, NEPA would be updated

to include a re-evaluation of impacts to significant habitat and appropriate mitigation for those impacts. See Appendix M for details.

3.5.2 Risk and Uncertainty

Risk and uncertainty are intrinsic in water resources planning and design. USACE ER 1105-2-101, dated January 3, 2006, provides guidance on the evaluation framework to be used in USACE flood damage reduction studies. The risk analysis approach for the current alternatives is documented in the 2013 PACR/RPEIS and incorporated herein by reference.

During the preparation of this SEIS, evaluations were conducted concurrent with design refinement; therefore, some inconsistency across project descriptions exists. Inconsistencies will be corrected, and evaluations updated, when designs are further refined based on additional engineering field investigations, environmental compliance, and coordination with the NFS regarding Lands, Easements, Right of Ways, Relocations, and Disposals (LERRDS). Consistent with these design refinements, the Programmatic features of Reach A (addressed in a separate Programmatic Environmental Assessment (PEA # 598); see Section 2.3.6 for more information about this EA) require further evaluation to determine an alignment that 1) may avoid and minimize impacting the FWS' Mandalay NWR lands, and 2) that may be the least environmentally damaging practicable alternative alignment. Risk and uncertainty are inherent in hydrologic and ecologic modeling used for the SEIS because the models express complex natural systems through mathematic expressions and variables. The modeling reports included in Appendix E each provide a more detailed explanation of the uncertainties for each model.

4 Mitigation

4.1 INTRODUCTION

Laws, regulations, and USACE policy ensure that adverse impacts to significant resources have been avoided or minimized to the extent practicable and that remaining, unavoidable impacts have been compensated to the extent justified. The appropriate application of mitigation is to formulate an alternative that first avoids, then minimizes, and lastly, compensates for unavoidable adverse impacts. Efforts to avoid and minimize impacts from construction of the Proposed Action have occurred and the plan to mitigate the remaining unavoidable impacts to habitats is proposed below and detailed in Appendix C. This section in conjunction with Appendix C meet requirements under 33 CFR 332.4(c) and 42 USC Part 4321.

4.2 COMPENSATORY HABITAT MITIGATION

Though efforts were, and continue to be, taken to avoid and minimize habitat impacts, the Proposed Action would result in unavoidable impacts to habitats that require development of a compensatory habitat mitigation plan. The detailed mitigation plan is provided in Appendix C and includes methodologies, site selection criteria, and the habitat assessment results. Factors considered in the selection and evaluation of mitigation projects included risk and reliability, environmental, implementation timing, watershed and ecological site considerations, and cost-effectiveness as analyzed through the Cost Effectiveness/Incremental Cost Analysis (CE/ICA) process. As required by WRDA 2007 Section 2036(a), an Adaptive Management and Monitoring Plan is included in the mitigation plan. The mitigation plan would compensate for impacts to significant habitats for all features of the MTG Project assessed in this SEIS (see Section 1.7 for a summary of the scope of this SEIS). NEPA compliance for Reaches A and F are addressed under separate EAs, as described in Section 2.3. See Appendix C for information related to compensatory mitigation for these two reaches (see Appendix C).

Compensatory mitigation is defined as “the restoration (re-establishment or rehabilitation), establishment, enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved”. Pursuant to Section 1163 of WRRDA of 2016, implementation guidance requires that functional assessments be performed to quantify habitat impacts and determine mitigation requirements. For this project, WVA models were used to evaluate both the potential impacts of the Proposed Action and the benefits of proposed mitigation projects. Habitat impacts and mitigation benefits were quantified in terms of acres and AAHUs, allowing for a standardized, science-based comparison.

The compensatory mitigation plan focuses on replacing lost ecological functions for the following habitat types: fresh/intermediate marsh, brackish/saline marsh, and BLH/swamp habitats. Mitigation planning was conducted on a watershed scale to ensure that the full range of habitat impacts from the entire Proposed Action alignment could be addressed. The plan was developed in-kind by habitat type, consistent with the requirements of 33 USC 2283, which mandates that mitigation be functionally equivalent to the impacted resources.

Potential mitigation measures were developed by the USACE MTG Project Development Team (PDT) for BLH, swamp, for fresh/intermediate marsh, and brackish/saline marsh habitat impacts in accordance with the formulation requirements set forth in attachment 1 of Appendix C. The proposed compensatory mitigation plan would replace the lost functions and values of the impacted areas through in-kind restoration, establishment, or enhancement activities that increase or improve the habitat functions and values within a particular mitigation site. Restoration would involve creating a habitat type from open water or cleared land parcels where none currently exists, but which historically occurred in the vicinity of the mitigation site area. Establishment would involve creating a habitat type from open water or cleared land parcels where none currently exists, but which could support target habitats. Enhancement would involve implementing actions to improve already existing low-quality habitat. Measures included the construction of USACE constructed mitigation projects and the purchase of in-kind credits. As the PDT developed and considered measures in early mitigation planning efforts, the NFS-proposed sites, shown in Figure 4-1 below, were also received and considered.

A final array of mitigation alternatives was identified for each habitat type impacted and are briefly described in sections 4.2.1 to 4.2.4 and shown below in Figure 4-2. These sites were strategically chosen for their capacity to fully meet compensatory mitigation needs for the entire MTG alignment in-kind. The tentatively selected projects (TSPs) for each habitat impacted together make up the mitigation plan that fully compensates for MTG impacts (see Table 4-1). See Appendix C for details on the mitigation planning process and detailed project descriptions. Impacts associated with implementing the final array of mitigation alternatives are assessed in Section 6 Environmental Consequences.

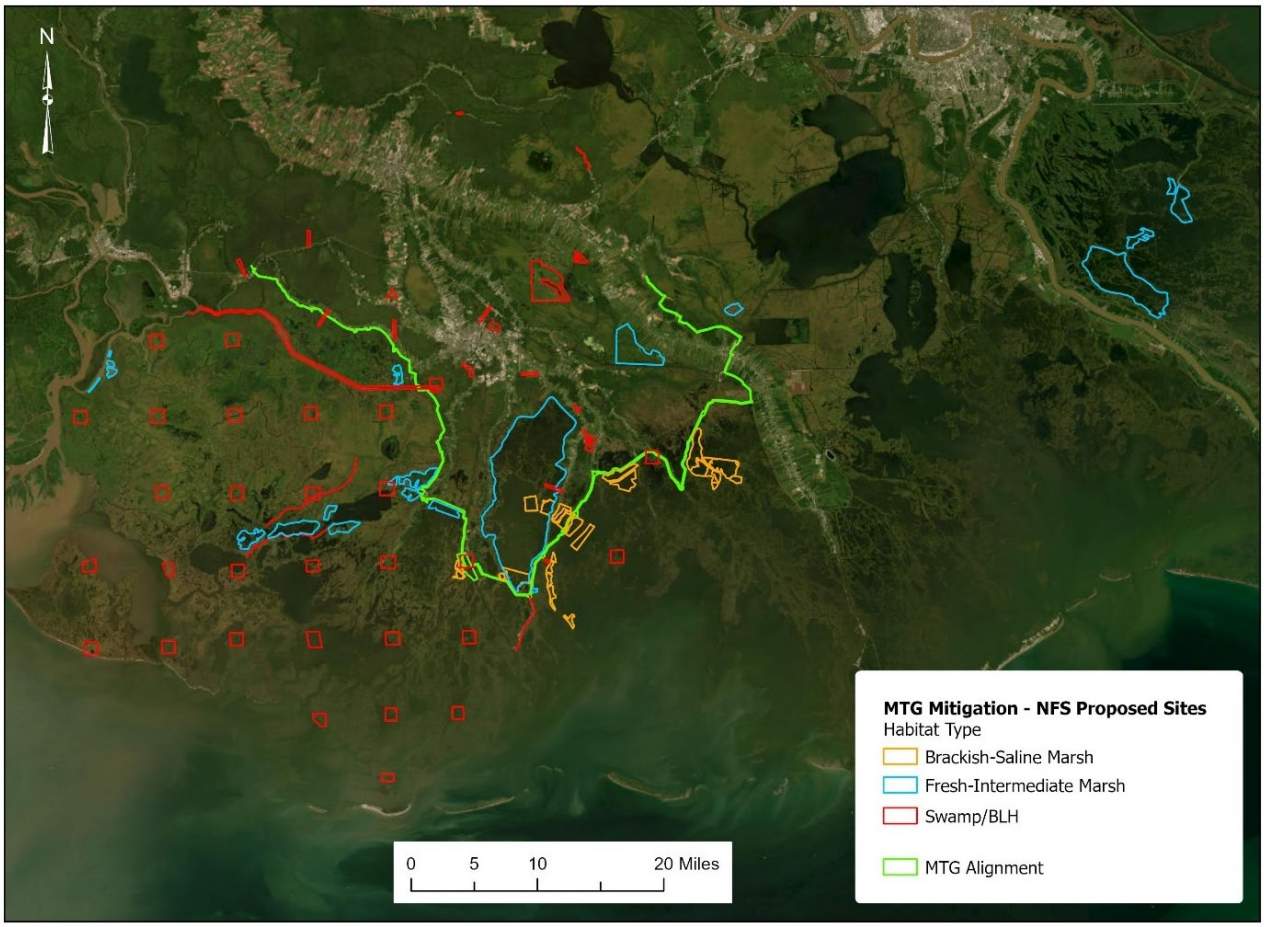


Figure 4-1. NFS Proposed Mitigation Sites

Table 4-1. TSP Habitat Mitigation Plan

Impacted Habitat Type	In-Kind Mitigation TSP	Acres
BLH	Napoleonville	588
Swamp	Napoleonville	1,063
Fresh/Intermediate Marsh	Combo Mitigation Bank/Delta Farms	2,895
Brackish/Saline Marsh	Combo Mitigation Bank/West Terrebonne	6,431

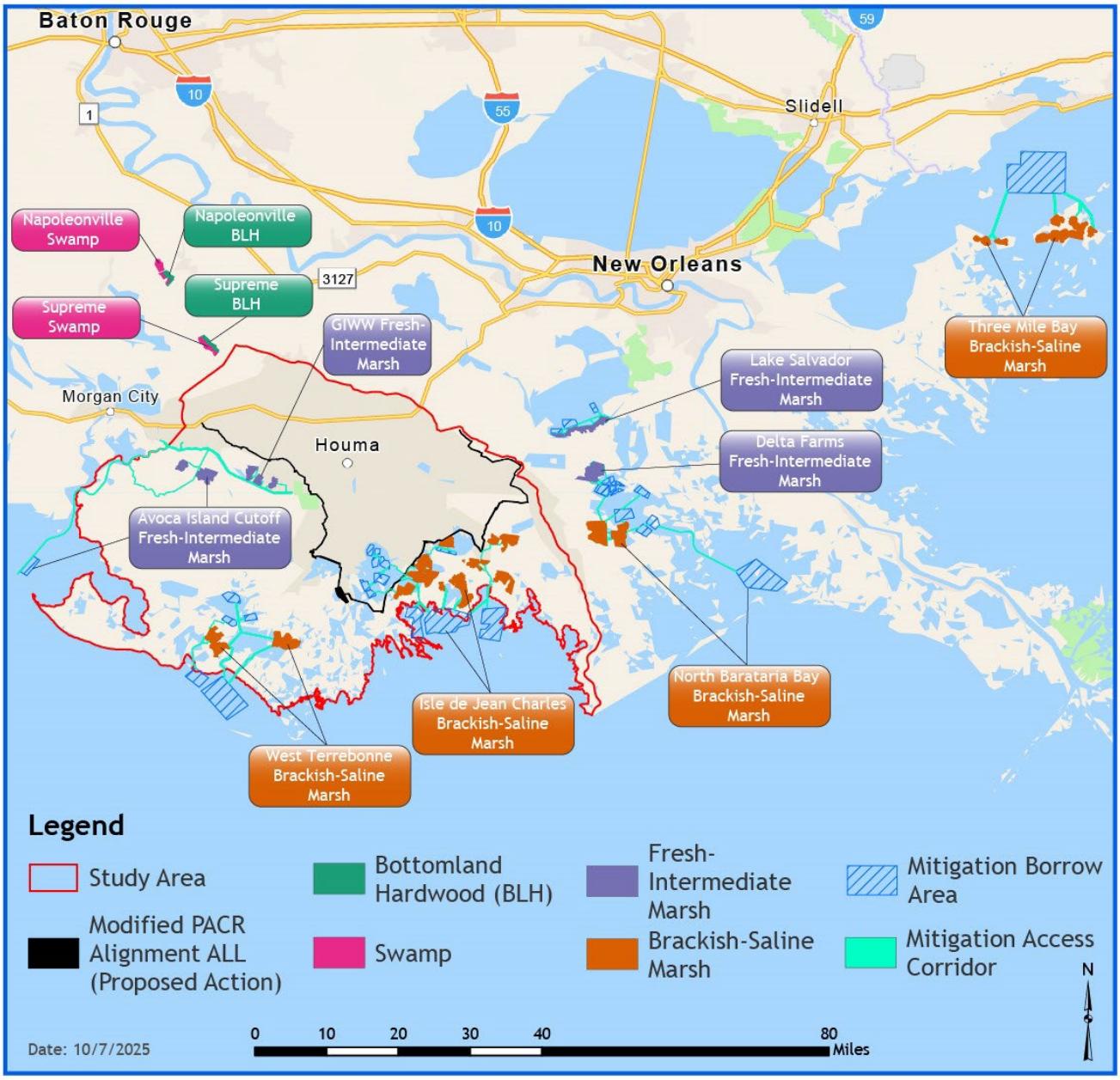


Figure 4-2. Final Array of Mitigation Alternatives by Habitat Type

4.2.1 Mitigation Banks (Common for All Habitat Types)

The PDT identified all USACE Regulatory Program-approved mitigation banks with perpetual conservation servitudes within the same watershed as the impacts with available, in-kind credits for purchase. Because the availability of mitigation bank credits varies from year to year, the viability of satisfying all mitigation requirements through the purchase of mitigation bank credits would be determined before construction of the project feature. If

appropriate and cost-effective, the USACE may choose to purchase mitigation bank credits from more than one bank to fulfill the compensatory mitigation requirements for a particular habitat type. Purchase of mitigation bank credits would be dependent on receipt of an acceptable proposal(s) and total purchase cost. No particular bank(s) is (are) proposed for use at this time. The bank(s) from which credits would be purchased would be selected through a solicitation process, through which any mitigation bank meeting eligibility requirements and having the appropriate resource type of credits could submit a proposal to sell credits.

Mitigation banks would be required to run the same version of the WVA model as was used to assess the impacts from constructing the MTG Project feature to ensure that the assessment of the functions and values provided by the mitigation bank match the assessment of the lost functions and values at the impacted site.

4.2.2 Combination of Mitigation Bank and USACE-Constructed Project (Common for All Habitat Types)

This alternative consists of a combination of the purchase of mitigation bank credits and the implementation of a USACE construction project. This combination would ensure the timeliest satisfaction of 100 percent of the mitigation requirement while maximizing cost efficiencies. A range of 25, 50, and 75 percent mitigation credit/USACE-Constructed project combinations were evaluated for cost effectiveness.

4.2.3 BLH and Swamp Mitigation Alternatives

4.2.3.1 Common Elements in USACE-Constructed BLH & Swamp Mitigation Alternatives

Construction of BLH and swamp mitigation sites would include establishing staging areas, followed by site preparation and surveying. Grading and drainage modifications would be implemented based on topographic data to meet the hydrologic goals of the mitigation project and maintain drainage of adjacent lands. This could include creating swales, site leveling, and filling/rerouting drainage canals. After grading, the sites would be surveyed to create a planting grid, and deep soil tillage (subsoiling) to promote seedling root development and infiltration would be conducted 6 months before planting, if necessary. Seedlings would be planted and spaced using tree species approved by CEMVN biologists, and plant stakes and mowing poles would be inserted to guide maintenance.

Post-construction maintenance would occur over 2 to 3 years, with mowing and herbicide treatments conducted up to three times per year. Supplemental tree planting may occur 2 to 3 years after the initial planting to ensure success criteria are met. The overall timeline for both Napoleonville and Supreme BLH projects to meet initial success is approximately 5 years, including 2 years of construction and planting, and 3 years of maintenance and monitoring. See the mitigation plan in Appendix C. Attachments of that appendix include the Monitoring and Adaptive Management Plans for BLH and swamp mitigation.

4.2.3.2 BLH Mitigation Alternatives

4.2.3.2.1 Napoleonville BLH Project (TSP)

This USACE-constructed mitigation site would be constructed northwest of the town of Napoleonville in Assumption Parish, Louisiana. The site is currently an agricultural field that would be cleared of existing crops and leveled. The terrain is generally flat with an average elevation of 6.5 feet (NAVD88). Agricultural fields surround this site on all sides. Construction materials and equipment would be transported to the site via highways LA-70 to the North, LA-1 to the East, and LA-403 to the South.

This alternative consists of approximately 588 acres for BLH restoration/establishment. Of the 588 total acres of this project site, 534 acres would be used for planting and 54 acres would be used for miscellaneous features (staging areas, access routes, drainage canals, utility buffers, and/or minor real estate shifts).

4.2.3.2.2 Supreme BLH Project

This USACE-constructed site is in Assumption Parish, Louisiana west of the towns of Supreme and Labadieville. The site is currently an agricultural field that would be cleared of existing crops and leveled. Site elevations range from 3.5-feet to 9.0 feet, with an average elevation of 6.3 feet (NAVD88). Agricultural fields surround this site on the northern, eastern, and southern perimeter; forested wetlands occur to the west of the site. Construction materials and equipment would be transported to the site via highways LA-1010, LA-1, and LA-1011.

Of the 616 total acres of this project site, the acreage of the plantable area is 533 acres with 83 acres that would be used for miscellaneous features (staging areas, access routes, drainage canals, utility buffers, and/or minor real estate shifts).

4.2.3.2.3 Mitigation Bank Credits

See description under 4.2.1.

4.2.3.2.4 Combination of Mitigation Bank Credits & USACE Constructed Project (Napoleonville)

See descriptions under 4.2.1 and Napoleonville.

4.2.3.3 Swamp Mitigation Alternatives

4.2.3.3.1 Napoleonville Swamp Project (TSP)

This USACE-constructed mitigation site would be constructed on agricultural fields northwest of the town of Napoleonville in Assumption Parish, Louisiana. Site elevations range from 1.0 to 9.0-feet (NAVD88), with an average elevation of 4.0 feet. Forested

wetland fragments flank the western/southwestern edge of the agricultural fields, providing hydrologic connectivity and seed sources for restoration. Construction materials and equipment would be transported to the site via highways LA-70 to the North, LA-1 to the East, and LA-403 to the South.

This alternative consists of approximately 1,063 acres of swamp restoration/establishment including 962 acres for planting seedlings and 101 acres available for miscellaneous features (staging areas, access routes, drainage canals, utility buffers, and/or minor real estate shifts). Following the leveling and clearing efforts, the soil preparation may begin. The site would be divided into 3 separate restoration cells identified as: North Swamp, Central Swamp, and South Swamp. The three cells cover approximately 690 acres, 228 acres, and 145 acres, respectively. However, each cell has unique planting acreages: 632 acres, 197 acres, and 133 acres, respectively.

4.2.3.3.2 Supreme Swamp Project

This USACE-constructed site is in Assumption Parish, Louisiana in agricultural fields west of the towns of Supreme and Labadieville (see Figure 4-1). Site elevations range from 2.0 to 7.0-feet, with an average elevation of 4.0 feet. Agricultural fields surround this site on the northern, eastern, and southern perimeter, and forested wetland habitat occurs on the west. Construction materials and equipment would be transported to the site via highways LA-1010 to the North, LA-1 to the East, and LA-1011.

This alternative consists of approximately 1,105 acres of swamp restoration/establishment including 958 acres for planting seedlings and 147 acres available for miscellaneous features (staging areas, access routes, drainage canals, utility buffers, and/or minor real estate shifts).

4.2.3.3.3 Mitigation Bank Credits

See description under 4.2.1.

4.2.3.3.4 Combination of Mitigation Bank Credits & USACE Constructed Project (Napoleonville)

See descriptions under 4.2.1 and Napoleonville.

4.2.4 Marsh Mitigation Alternatives

4.2.4.1 Common Elements in USACE-Constructed Marsh Mitigation Sites

Construction of marsh mitigation sites would include the restoration or establishment of marsh habitat in various locations in Terrebonne and Barataria watersheds following similar processes and methodologies. These USACE-constructed sites would range in size from approximately 2,177 acres to 2,895 acres and would be in open water areas, often adjacent to waterways such as Bayou Penchant, the GIWW, and Lake Salvador. To build the marsh

platforms, dredged material from nearby borrow areas would be transported via barges or pumped into the marsh platform area. The process would include constructing earthen perimeter containment dikes to hold the dredged slurry, followed by cross dikes to divide the sites into smaller cells. After the first marsh platform lift, additional lifts would be completed over multiple years, and the sites would be dewatered and the dikes degraded to an elevation of +1.0 to +1.5 feet. The restoration areas would naturally vegetate after the dewatering and dike degradation processes. These projects are designed to enhance coastal marshes, increase habitat for wildlife, and mitigate the impacts of land loss due to erosion and other environmental factors. The overall goal is to raise the marshes to an elevation of +1.0 to +1.5 feet to support long-term ecological success.

4.2.4.2 Fresh/Intermediate Marsh Mitigation Alternatives

4.2.4.2.1 Avoca Island Cutoff Fresh/ Intermediate Marsh Project

This USACE-constructed site is in open water north of Bayou Penchant within Terrebonne Parish, Louisiana. Construction materials and equipment would be barged in using the Atchafalaya Navigation Canal. The water bottom elevation of the site is assumed to be -2.0 feet, with a typical water elevation range of +0.5 to +3.0 feet. This alternative consists of approximately 2,858 acres of fresh and intermediate marsh restoration/establishment. The proposed construction would consist of three sites: Site 1, Site 2, and Site 3 with sizes 1,031 acres, 1,010 acres, and 817 acres respectively. To construct the marsh platforms, material from a borrow area adjacent to the Atchafalaya Navigation Channel, at Mile 150 to Mile 147.5, would be dredged mechanically and hauled to the project site via barge. Once the barged material reaches the project site, a hydraulic unloader would pump the material from the barges to the marsh creation sites.

4.2.4.2.2 GIWW Fresh/Intermediate Marsh Project

This USACE-constructed site is in open water north of the GIWW within Terrebonne Parish, Louisiana. To construct the marsh platform, material from a borrow area adjacent to the Atchafalaya Navigation Channel, at Mile 150 to Mile 147.5, would be dredged mechanically and hauled to the project site via barge. The water bottom elevation of the site is assumed to be -2.0 feet, with a typical water elevation range of +0.5 to +3.0 feet. This alternative consists of approximately 2,177 acres of fresh and intermediate marsh restoration/ establishment. The proposed construction would consist of three sites: Site 1, Site 2, and Site 3 with sizes 568 acres, 626 acres, and 983 acres respectively. To construct the marsh platforms, material from a borrow area adjacent to the Atchafalaya Navigation Channel, at Mile 150 to Mile 147.5, would be dredged mechanically at the borrow site and hauled to the project site via barge. Once the barged material reaches the project site, a hydraulic unloader would pump the material from the barges to the marsh creation sites.

4.2.4.2.3 Lake Salvador Fresh/Intermediate Marsh Project

This USACE-constructed site is in open water along the southern edge of Lake Salvador and north of the GIWW, within Lafourche Parish, Louisiana. To construct the marsh platform, material from borrow areas within Lake Salvador be dredged via hydraulic cutterhead and dredge slurry would be pumped into the marsh creation area. The water bottom elevation of the site is assumed to be -2.0 feet, with a typical water elevation range of +0.5 to +3.0 feet. This alternative consists of approximately 2,380 acres of fresh and intermediate marsh restoration/establishment. The proposed construction would consist of five sites: Site 1, Site 2, Site 3, Site 4, and Site 5. The footprint of Site 1 and Site 2 would provide approximately 1,746 acres while Site 3 and Site 4 would provide approximately 331 acres, and Site 5 would provide approximately 303 acres. To construct the marsh platform, material from two borrow areas within Lake Salvador, approximately 1,000-ft to 5,000-ft from the marsh creation sites, would be dredged via hydraulic cutterhead and dredge slurry would be pumped into the marsh creation area.

4.2.4.2.4 Delta Farms Fresh/Intermediate Marsh Project

This USACE-constructed site is in open water northwest of Little Lake and northeast of the town Cutoff within Lafourche Parish, Louisiana. This alternative consists of approximately 2,895 acres of fresh and intermediate marsh restoration/establishment. The proposed construction would consist of four sites: Site 1, Site 2, Site 3, and Site 4. The footprints of these sites are 843 acres, 606 acres, 614, and 831 acres respectively. The assumed water bottom elevation of the site is assumed to be -2.0 feet, with a typical water elevation range of +0.5 to +3.0 feet. It is assumed the required marsh elevation is approximately +1.0 to +1.5 feet.

To construct the marsh platform, material from a borrow areas within Little Lake would be dredged via hydraulic cutterhead and dredge slurry would be pumped into the marsh creation area. Once the barged material reaches the project site, a hydraulic un-loader would pump the material from the barges to the marsh creation sites. Mitigation Bank Credits

See description under 4.2.1.

4.2.4.2.5 Combination of Mitigation Bank Credits and USACE Constructed Project (Delta) (TSP)

See descriptions under 4.2.1 and 4.2.4.2.4.

4.2.4.3 Brackish/Saline Marsh Alternatives

4.2.4.3.1 Isle De Jean Charles Brackish and Saline Marsh Project

This USACE-constructed site is primarily located in Terrebonne Parish, with some portions extending into Lafourche Parish. The project site is divided into four distinct marsh creation

areas (MCA) labeled as MCA-1, MCA-2, MCA-3, and MCA-4. The individual MCAs have the following acreages (from MCA-1 to MCA-4): 4,215 acres; 3,623 acres; 2,055 acres; and 6,816 acres. The assumed water bottom elevations at the sites are as follows (in order from MCA-1 to MCA-4): -2.90 feet, -3.50 feet, -3.30 feet, and -2.80 feet. The target elevation for the entire site (including all MCAs) is +1.25 feet. To construct the marsh platform, material from 3 borrow areas near Wonder Lake, Lake Boudreaux, Lake Barre, and Lake Felicity would be dredged mechanically and pumped to the project site.

4.2.4.3.2 North Barataria Brackish and Saline Marsh Project

This USACE-constructed site is primarily located in Lafourche Parish near Galliano and Golden Meadow, Louisiana. The project site is divided into two distinct MCAs labeled as MCA-1, and MCA-2. The individual MCAs would have the following acreages (from MCA-1 to MCA-2): 3,973 acres; and 2,818 acres. The assumed water bottom elevations at the sites are as follows (in order from MCA-1 to MCA-2): -2.50 feet, and -3.80 feet. The target elevation for the entire site (including all MCAs) is +1.25 feet. To construct the marsh platform, material from two borrow areas in Little Lake, Bay Dosgris, Round Lake, Bay L'Ours, and Cat Bay would be dredged mechanically and pumped to the project site. To avoid oyster seed grounds and nearby pipelines, the overall borrow areas would be divided into multiple cells.

4.2.4.3.3 Three Mile Bay Brackish and Saline Marsh Project

This USACE-constructed site is situated in between Lake Borgne and Chandeleur Sound in the vicinity of the Biloxi State Wildlife Management Area, located in St. Bernard Parish near the Louisiana eastern state borderline. The project site is divided into two distinct marsh MCAs labeled as MCA-1, and MCA-2. The individual MCAs have the following acreages (from MCA-1 to MCA-2): 7,153 acres; and 1,575 acres. The assumed water bottom elevations at the sites are as follows (in order from MCA-1 to MCA-4): -4.80 feet, and -5.70 feet. The target elevation for the entire site (including all MCAs) is +1.25 feet. To construct the marsh platform, material from one large borrow area identified between Lake Borgne and the Mississippi Sound directly east of Grand Island would be dredged mechanically and pumped to the project site.

4.2.4.3.4 West Terrebonne Brackish and Saline Marsh Project

This USACE-constructed site is located within the Terrebonne watershed south of Theriot, Louisiana. The project site is divided into two distinct MCAs labeled as MCA-1, and MCA-2. The individual MCAs have the following acreages (from MCA-1 to MCA-2): 3,242 acres; and 3,188 acres. The assumed water bottom elevations at the sites are as follows (in order from MCA-1 to MCA-2): -2.80 feet, and -4.90 feet. The target elevation for the entire site (including all MCAs) is +1.25 feet. To construct the marsh platform, material from two borrow areas located within Lake Mechant, Mud Lake, and Caillou Bay would be dredged

mechanically and pumped to the project site. To avoid oyster seed grounds and nearby pipelines, the overall borrow areas have been divided into multiple cells.

4.2.4.3.5 Mitigation Bank Credits

See description under 4.2.1.

4.2.4.3.6 Combination of Mitigation Bank Credits & USACE Constructed Project (West Terrebonne) (TSP)

See descriptions under 4.2.1 and West Terrebonne.

4.2.5 NFS BLH/Swamp Sites

At the request of the NFS, the PDT will continue to consider the NFS sites (shown in Figure 4-3) for BLH/swamp habitat in the future as well as other reasonable alternatives. This would include additional plan formulation, engineering design, cost development, and alternative comparison similar to what has already been done for the current BLH/swamp final array. If changes to the current mitigation plan for BLH/swamp are identified, future additional NEPA and environmental compliance would be necessary.

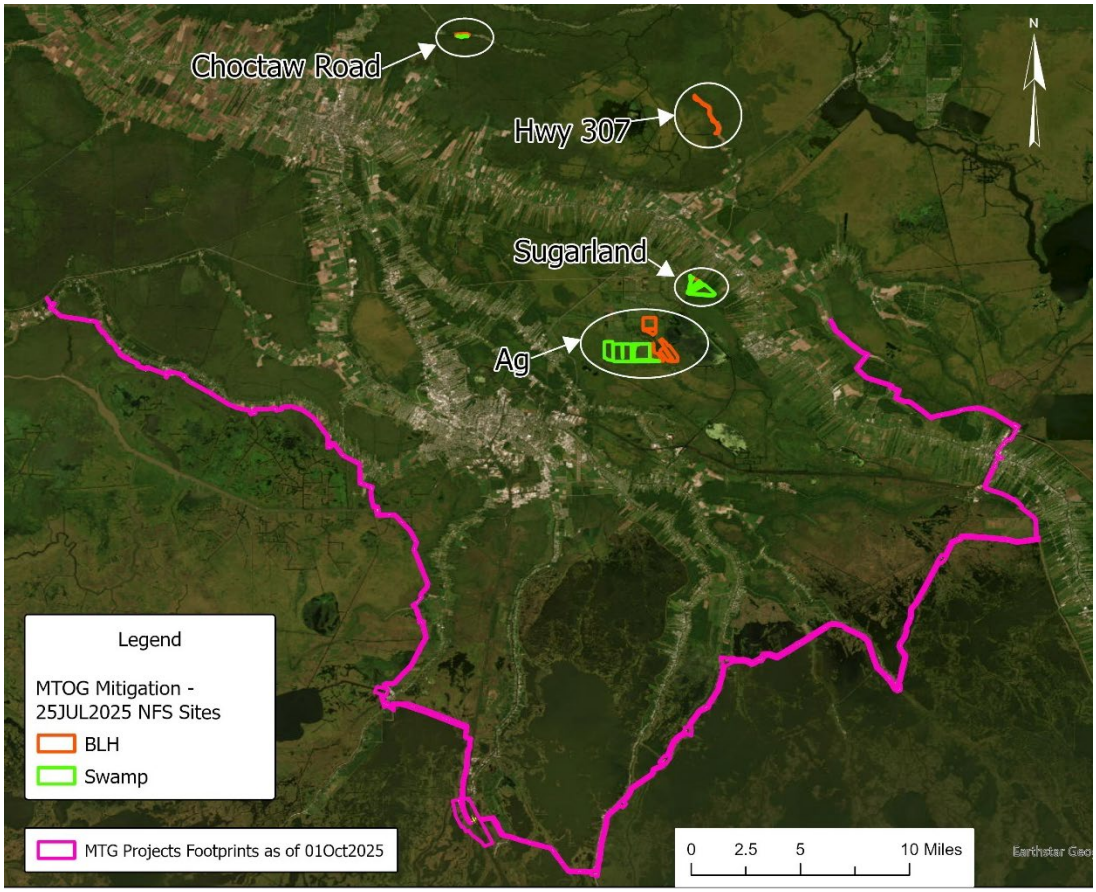


Figure 4-3. NFS Proposed BLH and Swamp Mitigation Sites

4.3 INDUCED FLOODING

Examining the potential for induced flooding is an integral part of the civil works process and is addressed in the planning phase and through design optimization. An inundation analysis typically describes the depth, duration, frequency, and velocity of the expected flooding during storm events to determine the area(s) potentially impacted by the project. The project design team is still evaluating data that would be required to determine if potential induced flooding impacts would require mitigation efforts.

The takings analysis and mitigation implementation (as appropriate) for induced flooding impacts would be completed during the final design phase of each project feature prior to certification of final plans and specifications before the initiation of construction. The NFS, in keeping with their LERRD responsibility per the PPA, would acquire the necessary real property interests related to mitigation for each contract concurrent with the acquisition of right-of-way for levee construction.

The USACE has developed maps based on 2025 CSTORM-MS modeling that show projected water levels in the project area for various intensities of storms (see Section 6.2). The CSTORM-MS modeling would be used by the USACE Real Estate Division, in consultation with the NFS, to identify properties that may be subject to project-induced flooding. How induced flooding is addressed may vary based on various sources of flooding and whether the flooding is temporary or reoccurring. Per ER 1105-2-103, if a project results in transferring risk by increasing damages within or outside the immediate study area, risk reduction should be investigated and recommended, if cost effective and appropriate. Reduction of induced flooding may be appropriate when the benefits exceed the costs or if there are overriding reasons of public safety, economic, or social concerns, or a determination of a real estate taking has been made.

The inundation analysis and property identification provide information for a required component of the civil works process, which must consider project-induced changes to hydrologic conditions that may require the acquisition of real property interests in private property for public use. The Fifth Amendment's Takings Clause states that private property cannot be taken for public use without just compensation. The Fourteenth Amendment guarantees due process and extends the Fifth Amendment's constraints on the power of eminent domain to state governments. The clause does not prohibit the government from acquiring property from private owners, but it does require just compensation. There are similar provisions as a matter of Louisiana law.

A Real Estate Plan will be prepared to address induced flooding by detailing the nature and extent of any anticipated flooding, whether additional land acquisition is necessary, and outlining any required physical takings analysis. Project-induced flooding attributed to the MTG Project would be addressed through mitigation measures. Engineering-based mitigation measures to address potential induced flooding could include (but would not be limited to) the following, all of which would require further NEPA evaluation:

- Levees
- Additional culverts, gravity outlets, and/or environmental control structures
- Drainage canals
- Ponding areas
- Pumps

Non-engineering-based measures could include (but would not be limited to):

- Acquisition of easements; and/or
- Acquisition of fee interests.

An easement in real estate is a legal right that allows someone to use another person's property for a specific purpose. Various easements could be utilized as non-engineering-

based mitigation measures to address potential induced flooding impacts. For example, one type of easement that could be utilized includes a flowage easement. A flowage easement could include the right to overflow, flood and submerge the land and may also include, if deemed necessary, the right to restrict structures for human habitation and/or the right to approve all other structures proposed for construction within the flowage easement. The acquisition of fee interest is the absolute ownership of real estate unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat. The NFS for this project is responsible for the acquisitions of real property interests for the construction, operation and maintenance of the project, along with relocation assistance for displaced persons. Any necessary relocations associated with acquisitions would be done in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs of 1970, Public Law 91-646, 1984 (42 USC 4601), as amended.

The project would be constructed in phases, with the earliest construction starting with the Reach J2 Levee in 2027. The induced flooding mitigation measures would be based on CSTORM-MS modeling conducted for the entire MTG system, which assumes all levees and structures are constructed and structure gates are closed during storm conditions. Induced flooding impacts from the construction of any single reach, before the full alignment is complete, are not expected to exceed those modeled for the entire system.

As described in Section 3.4.3, Project-induced flooding could increase water levels on the Larose to Golden Meadow levee system. It is anticipated that water levels would not impact the Larose to Golden Meadow levee system until the Reach L levee is raised to an elevation higher than the Larose to Golden Meadow levee system. If assessments conducted before construction indicate that project-induced increased water levels would have an impact on the Larose to Golden Meadow levee system, then mitigation efforts would be employed before or concurrent with construction of Reach L.

4.4 AVOIDANCE MEASURES AND BMPS FOR CONSTRUCTION IMPACTS

4.4.1 Water Quality and Avoidance of Contamination

Prior to initiation of any ground-disturbing activities, a Storm Water Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control, and Countermeasure (SPCC) plan would be prepared and implemented in accordance with LDEQ permitting regulations to prevent sediment, debris, and other pollutants from entering nearby water bodies during construction. The SWPPP and SPCC would include best management practices (BMPs) that construction contractors would be required to follow to minimize the introduction of suspended solids into surrounding waters. These BMPs include practices such as the use of siltation fences and hay bales to reduce erosion at construction sites. Requirements to

comply with the SWPPP and SPCC would be included in and made part of construction contracts.

4.4.2 Land-Based Transportation

Although construction access and haul routes for truck traffic have been designated to minimize residential disturbance to the maximum extent practicable, impacts to residential roads in some areas would occur, such as in the community of Larose. Streets that would serve construction-related traffic would be resurfaced, if needed and as appropriate, prior to initiation of construction activities, and maintenance of those streets would be provided during the construction period. Appropriate detour signage would be placed to preserve access to local streets during construction activities. Off-street parking would be provided for construction workers, and shuttle vans would be used to transport construction workers to the work sites, if necessary. Streets damaged by construction activities would be repaired.

4.4.3 Noise and Vibration

Noise along all segments of project construction could increase due to the temporary operation of equipment and vehicles used in the construction of the Proposed Action. Short-term noise impacts would be avoided, minimized or mitigated by use of the following BMPs:

- Noise and Vibration Monitoring Measures:
    - Noise level monitoring would be conducted to ensure compliance with contract specifications.
    - Pile driving activities related to pile-founded T-walls would be restricted to daylight hours only.
    - Vibration monitoring equipment would be utilized to measure surface velocity waves produced by construction equipment.
    - Monitoring would occur near residences and occupied buildings that may be susceptible to adverse effects from ground vibrations.
    - A vibration threshold would be established and approved in writing by USACE; monitoring would ensure this threshold is not exceeded.
- Construction equipment noise would be minimized by:
    - Muffling and shielding engine intakes and exhausts in accordance with manufacturer specifications.
    - Shrouding or shielding impact tools to reduce operational noise.
- All construction-related vehicles and equipment (including haul trucks and worker vehicles) would be shut off if idle for more than 30 minutes.

- Equipment warm-up areas, staging areas, water tanks, and storage locations would be situated as far from existing residences as practicable to minimize noise and disturbance.

4.4.4 Borrow Sources

Residents near the borrow sites may experience minor, temporary, adverse indirect impacts. Potential impacts to these communities include an increase in truck traffic accessing and leaving the borrow sites, noise, and dust. Truck traffic and noise along roads, highways and streets during borrow site excavation would cease following completion of work activities. There may also be a degradation of the transportation infrastructure, primarily local roads and highways, because of the wear and tear from transporting earthen material. Best management practices would be utilized to avoid, reduce, and contain temporary impacts to human health and safety. During the final design phase, the particulars of these impacts would be identified, including the approximate duration of activities involved in extracting material and the number of truck trips needed to deliver the material.

4.4.5 Protected Species

The USACE would implement BMPs to avoid and minimize potential construction impacts to threatened, endangered, and other protected species, as described in Section 6.7 and listed in Appendix N.

5 Affected Environment

5.1 GENERAL SETTING

5.1.1 Description of the Watershed

Most of the study area is situated within the Terrebonne Basin Watershed, with a small portion extending into the Barataria Basin Watershed (see Figure 5-1). The watershed is part of an abandoned delta complex characterized by a thick section of unconsolidated sediments and a network of old distributary ridges extending southward from Houma (CWPPRA Oct. 2025). The southern end of the watershed is defined by a series of narrow, low-lying barrier islands (Isles Dernieres and Timbalier chains), separated from the mainland marshes by a series of wide, shallow lakes and bays (for example, Lake Pelto, Terrebonne Bay, Timbalier Bay).

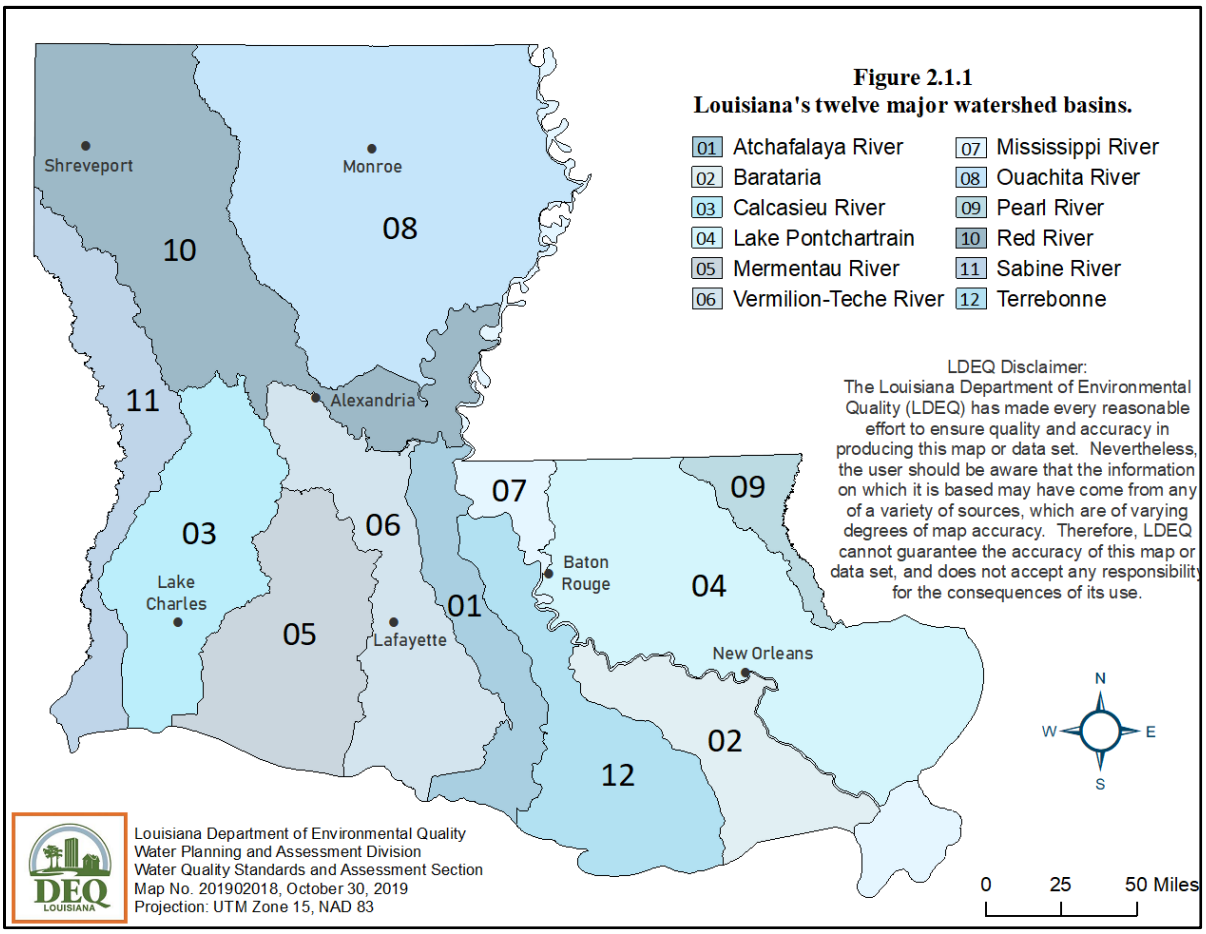


Figure 5-1. Louisiana's Watershed Basins

The Terrebonne Basin Watershed is divided into four subbasins – Timbalier, Penchant, Verret and Fields (see Figure 5-2). The Verret and Penchant Subbasins receive fresh water from the Atchafalaya River and Bay, while the Fields Subbasin gets fresh water primarily from rainfall. The Timbalier Subbasin gets fresh water from rainfall and from Atchafalaya River inflow to the GIWW via the HNC and Grand Bayou Canal; it has the most limited freshwater resources in the entire Deltaic Plain (CWPPRA Oct 2025).

5.1.2 Major Waterways in the Study Area

The major waterways that influence the study area include the Atchafalaya River, Bayou Black, Bayou du Large, Bayou Terrebonne, Bayou Lafourche, and Bayou Boeuf (see Figure 5-2). There are no scenic streams in the study area designated under the Louisiana Natural and Scenic River System. The HNC runs north and south mainly between Bayou du Large and Bayou Grand Caillou. The GIWW traverses the northern portion of the study area from east to west. Other significant features located within the study area include Lake Boudreaux and Lake Quitman, located south of Houma between Bayou Grand Caillou and Bayou Petit Caillou. In addition to these major water features, hundreds of smaller natural bayous and manmade canals are located within the study area.

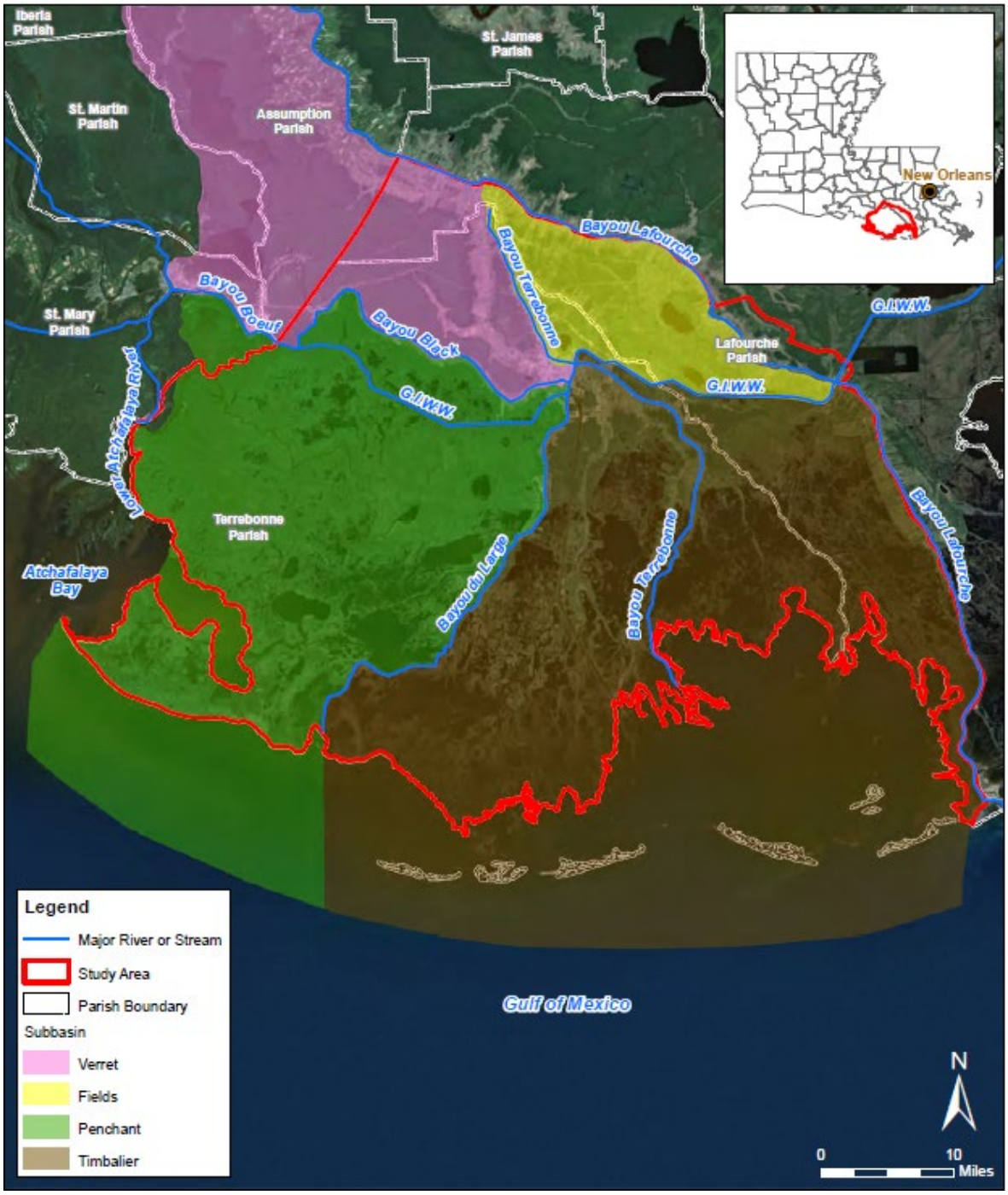


Figure 5-2. Lower Terrebonne Subbasins and Main Waterways in the Study Area

5.1.3 Land Use/Land Cover

Data from the USGS National Land Cover Database (2023) for the study area indicate that 51 percent of the study area is comprised of emergent herbaceous wetlands, which include fresh marsh in the northern portion of the study area transitioning to intermediate, brackish,

and saline marsh near the Gulf (see Table 5-1 and Figure 5-3).The second most prevalent land cover in the study area is open water, which includes lakes, numerous navigation channels, bayous, drainage canals, and shallow open water that historically consisted of marsh or land that has been lost due to saltwater intrusion, subsidence, sea level change, and a lack of sediment input. Woody wetlands make up approximately 11 percent of the study area and consist primarily of bald cypress/tupelo swamps and BLH forest (see Section 5.3 for more details about wetlands in the study area). Agricultural crops (mainly sugar cane) and developed areas comprise approximately 6 percent and 5 percent of the study area, respectively.

Table 5-1. Land Cover in the Study Area

Habitat type	Acres	% of Study Area
Emergent Herbaceous Wetlands	628,907	51%
Open Water	304,057	25%
Woody Wetlands	139,500	11%
Cultivated Crops	79,404	6%
Developed	65,707	5%
Herbaceous	3,672	< 1%
Mixed Forest	2,665	< 1%
Barren Land	1,082	< 1%
Shrub/Scrub	961	< 1%
Deciduous Forest	263	< 1%
Evergreen Forest	170	< 1%
Total	1,226,388	100%
Source: National Land Cover Database, USGS 2023		

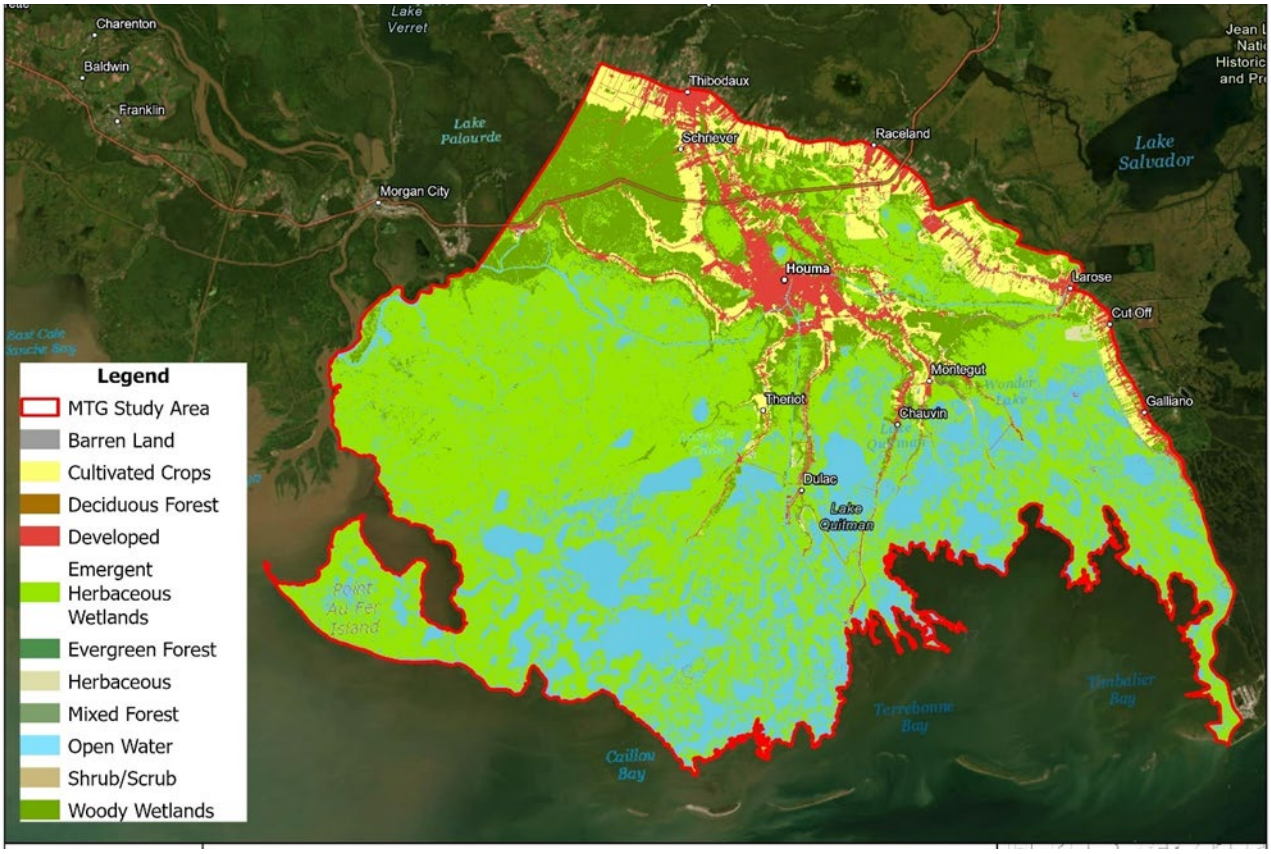


Figure 5-3. Land Use/Land Cover in the Study Area

5.1.4 Climate

The climate of the study area is mild, humid, and primarily subtropical with abundant precipitation. The summers are long and hot, and the winters are short and mild. The highest monthly average temperature is approximately 89 degrees Fahrenheit in July, and the lowest monthly average temperature is approximately 47 degrees Fahrenheit in January (Weather Atlas 2025). Average monthly rainfall varies from 0.7-inch in May to 3.8 inches in July (Weather Atlas 2025. According to the USACE Climate Hydrology Assessment Tool, minor increases in temperature and decreases in annual-accumulated precipitation are expected by 2099.

5.1.5 Sea Level Change

Global, or eustatic, sea level change and regional subsidence have affected and are projected to continue affecting the watershed. ER 1100-2-8162, Incorporating Sea Level Change in Civil Works Programs, states that potential relative sea level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence.

5.1.6 Geology and Soils

The geology of the area is primarily influenced by the Mississippi River and its delta plain, a complex of abandoned and active deltas of the Mississippi River. Three of four abandoned delta complexes shaped Terrebonne and Lafourche parishes as sediments were deposited on the Pleistocene Prairie. The Mississippi River laid down sediments from 100 to 200 meters (328 to 656 feet) thick at each delta (Penland et al. 1988). The abandoned deltas were formed generally from the west to the east in chronological sequence starting about 9,000 years before present and ending less than 100 years ago (Sevier 1990). The most recent sediments of an abandoned delta were laid down as part of the Lafourche delta.

The Lafourche delta complex in the study area, which includes Bayou Terrebonne, Bayou Black, Bayou Blue, Bayou Pointe aux Chenes, Bayous Grand and Petit Caillou, and Bayou du Large, began forming some 3,500 years ago. Delta development ended when the Mississippi River shifted to the east about 500 years ago to adopt its current configuration. From that time until about 100 years ago, overflows from the Mississippi River continued to maintain the Lafourche delta complex. The complex began to degrade when Bayou Lafourche was closed off early in the 20th century (Mossa et al. 1990).

Soils are a critical element of coastal habitats because they support vegetation growth and open-water benthic productivity. The study area lies entirely within the south-central region of the Mississippi River Delta Plain. It falls within two major land resource areas (MLRAs): MLRA 131 and MLRA 151. MLRA 131, the Southern Mississippi River Alluvium, makes up about 29 percent of the study area. MLRA 151, the Gulf Coast Marsh, makes up the remaining 71 percent of the study area (NRCS 2011). The soils formed from sediments deposited by former channels of the Mississippi River and its distributaries on the intermediate parts of the natural levees, and clayey soils are dominant on the lower parts of the natural levees and in backswamps. Elevations range from about 14 feet above mean sea level along the natural levee of Bayou Terrebonne in the northern part of the study area to about five feet below sea level in the former marshes and swamps that have been drained.

The Swamp and Marsh soil associations comprise approximately 80 percent of soils within the study area (McDaniel and Trahan 2007; Matthews 1984). These associations occur over a broad plain about level with the Gulf of America between the ridge areas and are frequently flooded. Marsh soils, both fresh and saline, generally have a semifluid peat or muck surface layer, up to four feet thick, over alluvial clays and silty clays. Soil associations include Fausse-Barbary, Harahan-Rita, Allemands-Kenner, Clovelly-Lafitte, Timbalier-Bellpass, and Scatlake. These soils are generally too wet and soft for any agricultural uses. The marsh soils' organic content decreases as conditions move from fresh to saline. Fresh marsh soils contain a mean of 52 percent organic matter, whereas saline soils contain only 18 percent organic matter (Chabreck 1982).

Soils in the swamp soil association are usually wet and frequently flooded. These soils, identified primarily as Barbary-Fausse soils, are level, very poorly drained soils that have a mucky or clayey surface layer and a clayey subsoil. Some acreage of former marshes and swamps have been leveed and drained and are used as pasture or for urban use. Rita-Harahan soils have been identified in these areas. Rita-Harahan soils are level, poorly drained soils that have a clayey or mucky surface layer and a clayey or loamy subsoil in former swamps and marshes. Uses include woodland, pasture, recreation, and campsites. The remaining 20 percent of soils in the study area are comprised of natural ridges, levees, and open water.

5.2 HYDROLOGY, INCLUDING FLOODING

5.2.1 Hydrodynamics

All project reaches contain or are immediately adjacent to some type of waterway. Canals and larger bayous typically range in depth from 4 or 5 feet, to over 15 feet. Some of the natural bayous in the study area include Bayou du Large, Bayou Grand Caillou, Bayou Terrebonne, Bayou Pointe aux Chenes, and Bayou Lafourche. These bayous and their natural levees were formed by overflows from the Mississippi River. Historically, freshwater inflows within the study area were driven by the Atchafalaya River and Bayou Lafourche. The connection between Bayou Lafourche and the Mississippi River was in the process of naturally closing when construction of the levees along the Mississippi River closed off that connection. With the closure at Bayou Lafourche, the inflow of fresh water into the central and eastern portions of the study area was limited to local runoff. The natural ridge along Bayou Black restricts the flow along the northern boundary of the study area.

Today, flows within the study area are driven by stages in the lower Atchafalaya River. The major flow channels in the study area are the Atchafalaya River, the GIWW, and the HNC. High stages in the lower Atchafalaya River force flows northeast through the Avoca Island Cutoff into the GIWW and Bayou Penchant. Additional flow enters the GIWW through Bayou Boeuf. Water travels eastward along the GIWW, with a portion of this water leaving the GIWW through channels and bayous, such as Bayou Copasaw. At Houma, the GIWW intersects the HNC. At this point, most flow travels down the HNC to the Gulf. Most of the study area is influenced by tidal movement from the Gulf of America. Due to the shallow nature of the bays and bayous in the system, along with the significant winds common for southern Louisiana, a high degree of mixing is prevalent in the system resulting in vertical homogeneity throughout most of the study area.

In addition to the anthropogenic changes that have influenced the natural hydrology, the study area continues to have land loss. Sea level change and subsidence affect study-area marshes by gradually inundating them; marsh would eventually convert to open water due to the depth of submergence (see Section 5.3 for more details about wetlands in the study area).

5.2.2 Storm Surge and Flooding

The highest flood stages and flood damages in the study area are influenced by storm surges and high tides due to tropical storms and hurricanes. Storm surges push seawater from the Gulf of America and increase the salinity in the study area. The following tropical storms have been most influential in the study area in terms of significant storm surge flooding (Roth 2010; NOAA 2025):

- Hurricane Flossy, September 24, 1956: Storm surge reached five to eight feet across the southeastern Louisiana coast. The highest storm surge was 13 feet at the Ostrica Lock. Rain totals were excessive across southeast Louisiana, with a maximum of 16.7 inches at Golden Meadow.
- Hurricane Hilda, October 23, 1964: Hurricane Hilda caused extensive tidal and headwater flooding in the study area. Storm surge caused a flood depth of 7.8 feet in Cocodrie and 10 feet at Point Au Fer.
- Hurricane Betsy, September 9-10, 1965: Storm surge reached 15.7 feet in Grand Isle, Louisiana. The Mississippi River rose more than 10 feet at New Orleans and crested at 15.5 feet at Baton Rouge. The highest recorded rainfall was 12.2 inches in New Orleans.
- Hurricane Carmen, September 7-8, 1974: Storm surge reached four to six feet in Terrebonne and Lafourche parishes. The highest recorded storm surge was 11.6 feet in Cocodrie.
- Hurricane Danny, August 15-16, 1985: Hurricane Danny strengthened into a hurricane on August 15th just offshore of Louisiana. Storm surge of eight feet was seen along the coast of south-central Louisiana.
- Hurricane Juan, October 27-31, 1985: Storm surge reached eight feet at Cocodrie. Levees were overtopped in Lockport, Marrero, Oswego, and Myrtle Grove.
- Hurricane Andrew, August 26, 1992: Storm surge of 7.65 feet NGVD 88 was recorded at Round Bayou at Deer Island and 6.8 feet at Morgan City.
- Tropical Storm Allison, June 4-11, 2001: Thibodaux recorded 29.9 inches of rainfall. Portions of Thibodaux, Lafayette, New Orleans, and Baton Rouge saw severe flooding.
- Hurricane Gustav, August 31-September 3, 2008: Storm surge of 9 – 10 feet was observed in southeast Louisiana. Heavy rains fell in south-central Louisiana. The highest recorded rainfall was 21 inches at Larto Lake.
- Hurricane Isaac, August 21-September 1, 2012: Storm surge of 11.03 feet was observed at Shell Beach; LaPlace saw 8-10 feet of storm surge. Rainfall peaked at 23.22 inches in Hammond.

- Hurricane Ida: August 26-September 1, 2021: Grand Isle had severe damage with more than 10 feet of storm surge; many areas west of Grand Isle saw more than 6 feet of surge. Port Fourchon had winds of more than 172 mph at landfall.

- Hurricane Francine: September 8-13, 2024: The highest storm surge flooding occurred across lower coastal St. Mary Parish with levels of 2.25 to 2.75 feet. feet. The highest rainfall of 8.56 inches was recorded in Stephensville, Louisiana.

5.3 WETLAND RESOURCES

Louisiana contains one of the largest expanses of coastal wetlands in the contiguous U.S.; however, coastal erosion, subsidence, sea level change, and other factors have resulted in the loss of greater than 1 million acres in coastal Louisiana since the late 19th century (Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF) and the Wetlands Conservation and Restoration Authority 1998)). Based on an analysis of aerial and satellite imagery between 1932 and 2016 in coastal Louisiana, approximately 1,866 square miles (4,833 square kilometers) of land have been lost. This amounts to a decrease of approximately 25 percent of the 1932 land area within the coastal Louisiana assessment area (Couvillion et al. 2017).

Coastal wetland types within the area include BLH forests, swamps, and marsh (fresh, intermediate, brackish, and saline). This ecosystem provides habitat for migratory birds, wildlife, finfish, shellfish, and other aquatic organisms including threatened or endangered species. In addition, Louisiana's coastal wetlands provide risk reduction from wave action, erosion, and storm damage and offer various consumptive and non-consumptive recreational opportunities.

5.3.1 Bottomland Hardwoods (BLH)

BLH forests are alluvial-forested wetlands typically found throughout southern Louisiana in the deltaic plain of the Mississippi River (Hodges 1997). A variety of plant species, including live oak (*Quercus virginiana*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), and Drummond red maple (*Acer rubrum drummondii*) occur in this habitat. Between the forested wetlands and marsh lies a thin band of scrub shrub habitat, and typical vegetation includes elderberry (*Sambucus sp.*), wax myrtle (*Myrica sp.*), buttonbush (*Cephalanthus occidentalis*), and red maple (Connor et al. 1976). In coastal BLH forests stressed by prolonged inundation, the less water tolerant tree species gradually senesce leaving the more water tolerant bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) present (Keim et al. 2006).

5.3.2 Swamps

Swamps are defined by their higher proportional representation of bald cypress and tupelo and a repetitive wet-dry cycle. The Louisiana swamps generally lack a mature tree canopy because of historic logging and have lower productivity where isolated from riverine influences (Shaffer et al. 2003). Bald cypress is an important indicator species of the health

of a swamp. It is a large deciduous conifer and has long been recognized for its decay resistant wood. It can grow to a height of 100 to 120 feet with a diameter of 3 to 5 feet. In the original, old grove forests of the south, virgin bald cypress averaged over 500 years old and could reach a diameter of 6 to 8 feet. Young bald cypress tree trunks are considerably tapered and support an open, narrowly pyramidal crown. As the tree ages, the trunk becomes more cylindrical, and the crown irregularly fattened. Older trunks often are ashy gray with swollen, fluted bases, and branches bearded with Spanish moss. Older bald cypress trees also have a very distinctive root system that consists of several descending roots, providing anchorage, and many wide-spreading roots commonly known as "knees." This type of root system makes the bald cypress exceptionally stable, even on the most unstable sites. Permanent inundation results in a loss of regeneration and eventually conversion to marsh (Hodges, 1997).

5.3.3 Marsh

Freshwater marsh is found surrounding bodies of open water and is in the northern portion of the study area along the GIWW (CPRA 2023). Freshwater habitats generally have salinities less than 0.5 parts per thousand (ppt) and form in accreting, sediment rich, high-energy environments typical for this region. Freshwater marsh is dominated by rush and reed plant species like cattails (*Typha sp.*) and arrowhead (*Sagittaria graminea*) and can form detached mats of vegetation, known as flotant, which encourage colonization by other plant species. Historically, wax myrtle trees would colonize the mat, which results in the entire mat sinking, allowing for more open water plants to infiltrate thick marshes. Freshwater marsh that does not float is more dramatically impacted by flood events and can be less productive.

Coastal marshes are unique types of wetlands found in the study area. These vegetative communities reflect shifts in salinity associated with proximity to marine environments (fresh to saline). Intermediate marshes lie in the middle part of the salinity gradient and have vegetative communities shifting from fresh to saline waters (0.5-5.0 ppt). Marsh species that are found in this zone are capable of withstanding spikes of salinity that are associated with tropical storm surge events. It is commonly a narrow band of vegetation when compared with other marsh types due to the large differences between freshwater and brackish salinities. Wildlife found within an intermediate marsh is less diverse than found in freshwater marshes, but more individuals may be present. Brackish and saline marshes are found farther down the salinity gradient adjacent to marine environments and are often influenced by tidal exchange. These marsh communities are characterized by a reduced sweet of plant species that can tolerate increased salinities.

Coastal wetlands have been affected by sea level change. Substantial losses of vegetated wetlands are expected to continue due to relative sea level change, geologic subsidence, erosion, storm surge, and insufficient sediment accretion.

5.4 AQUATIC RESOURCES INCLUDING FISHERIES

5.4.1 Benthic Resources

Coastal regions are among the most productive ecosystems in the world, and links between benthic and open water environments are important in the transfer of energy between these habitats (Valiela 1995, Marcus and Boero 1998). For example, marsh epifauna, such as periwinkles, graze on algae and fungi that grow on the stems of marsh vegetation and soils, support the production of organic matter and nutrient cycling within the marshes, and are prey for salt marsh predators such as blue and mud crabs, turtles, large fishes, and wading birds (Montague et al. 1981, Kemp et al. 1990, Sillman and Bertness 2002).

Benthic communities do not have a static structure and provide a residence for many sessile, burrowing, crawling, and even swimming organisms. Oysters and mussels from the epibenthic community provide commercial and recreational fisheries and create oyster reef habitats used by many marine and estuarine organisms. Estuarine benthic organisms include: macrobenthic (for example, mollusks, worms, large crustaceans); microbenthic (for example, protozoa); and meiobenthic (for example, microscopic worms and crustaceans) groups (Day et al. 1989). The benthic community stores organic matter and inorganic nutrients and is a site for many vital chemical exchanges and physical interactions. Primary consumer groups of the benthic habitat include bacteria and fungi, microalgae, meiofauna, and microfauna.

5.4.2 Fisheries

Fishery resources are a critical element of many valuable freshwater and marine habitats. They are an indicator of the health of various freshwater and marine habitats, and many species are important commercial resources. In 2022, Louisiana's fishery landings were over 912,343,648 million pounds (over $416,483,958 million dockside value). This represented 11 percent of the 2022 U.S. landings in terms of pounds and 7 percent in terms of dollars. Fishery landings in 2022 at ports in or near the study area were: Dulac-Chauvin with 36.2 million pounds ($59.4 million dockside value) and Golden Meadow-Leeville with 12.7 million pounds ($22.1 million dockside value) (National Marine Fisheries Service (NMFS) 2022).

Marshes provide nursery habitat for estuarine-dependent species important to recreational and commercial fisheries. The most abundant finfish species collected by the Louisiana Department of Wildlife and Fisheries (LDWF) otter trawls from 1998-2008 in the Lake Merchant area were bay anchovy (*Anchoa mitchilli*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), Gulf menhaden (*Brevoortia patronus*), and sand seatrout (*Cynoscion arenarius*) (USACE 2010). White shrimp (*Litopenaeus setiferus*), blue crab (*Callinectes sapidus*), and brown shrimp (*Farfantepenaeus aztecus*) were also collected by otter trawls. LDWF gill nets in the Catfish Lake area frequently collected spotted seatrout (*Cynoscion nebulosus*), Gulf menhaden (*Brevoortia patronus*), Atlantic croaker, hardhead catfish (*Ariopsis felis*), and black drum (*Pogonias cromis*). The most abundant species collected by LDWF seines in Lake Boudreaux were bay anchovy, inland silverside

(*Menidia beryllina*), naked goby (*Gobiosoma bosc*), Atlantic croaker, and Gulf killifish (*Fundulus grandis*). Grass shrimp (*Palaemonetes spp.*), brown shrimp (*Farfantepenaeus aztecus*), blue crab, and white shrimp were also commonly collected in the seines (USACE 2010).

Freshwater and intermediate marshes in and around the study area also provide habitat for freshwater recreational and commercial fisheries species. Freshwater species include largemouth bass (*Micropterus salmoides*), yellow bass (*Morone mississippiensis*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), warmouth (*L. gulosus*), blue catfish (*Ictalurus furcatus*), channel catfish (*I. punctatus*), buffalo (*Ictiobus sp*.), freshwater drum (*Aplodinotus grunniens*), bowfin (*Amia calva*), and gars (*Lepisosteus sp*.). Areas supporting stable freshwater fisheries occur in the northern portion of the Penchant Subbasin (see Figure 5-2, which shows the general location of this subbasin in the study area). Freshwater fishes may also utilize low-salinity areas (intermediate marsh zone), provided they have access to fresher areas during periods of high salinity.

Coastal marshes in the area support many commercially and recreationally important marine fish and shellfish species including red drum (*Sciaenops ocellatus*), black drum, sheepshead (*Archosargus probatocephalus*), striped mullet, southern flounder (*Paralichthys lethostigma*), Gulf menhaden, sand seatrout, gray snapper (*Lutjanus griseus*), Spanish mackerel (Scomberomorus *maculatus*), white shrimp, brown shrimp, blue crab, and Gulf stone crab (*Menippe adina*). 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 ppt.

5.5 ESSENTIAL FISH HABITAT (EFH)

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), which governs marine fisheries management in U.S. federal waters, was passed in 1976 to accomplish several objectives (NMFS 2007), including to:

- prevent over fishing;
- rebuild over-fished stocks;
- increase long-term economic and social benefits; and
- ensure a safe and sustainable supply of seafood.

The act requires federal agencies to consult with NMFS on activities that may adversely affect EFH. EFH is defined as those waters and substrate necessary to fish for spawning,

breeding, or growth to maturity for species regulated under a federal fisheries management plan. Regional fishery management councils are required to provide both text descriptions and maps of EFH, and to review EFH information every five years. The 1996 amendment to the MSFCMA mandates that regional fishery management councils delineate EFH for managed species (16 USC 1801 et seq.).

The project is located at least partially within an area identified as EFH. Specific categories of EFH in the study area include estuarine emergent marsh, mud/sand/shell/oyster substrates, submerged aquatic vegetation, and estuarine water column. The Gulf Fisheries Management Council (GFMC), in cooperation with NMFS, has delineated EFH for federally managed species identified in Gulf Fisheries Management Practices (GFMC 2016). Managed species in the study area are shown in Table 5-3. In addition, NMFS' Highly Migratory Species Division manages a Gulf Fisheries Management Practice for highly migratory species, including sharks, tuna, billfish, and swordfish, as they cross domestic and international boundaries. The study area includes EFH for the highly migratory species shown in Table 5-4. See Appendix N for correspondence with NMFS regarding EFH. NMFS has been and will continue to be an active member of this SEIS' HET in assessing Proposed Action impacts on EFH throughout the development of this SEIS and the WVA process.

Additionally, coastal wetlands provide nursery and foraging habitat that supports economically important marine fishery species such as spotted seatrout, southern flounder, Atlantic croaker, Gulf menhaden, striped mullet, and blue crab. These species serve as prey for other federally managed fish species such as mackerels, snappers, groupers, billfishes, and sharks.

Table 5-3. EFH Species found in the Study Area

Common Name	Life Stage	EFH
Red Drum	Adult	Estuarine sand/shell bottom, emergent marsh, soft bottom, and Submerged Aquatic Vegetation (SAV)
	Juvenile	Emergent marsh, soft bottom, and SAV
	Larvae/Post-Larvae	Emergent marsh, sand/shell bottoms, SAV, and soft bottom
Brown Shrimp	Juvenile	Emergent marsh, oyster reefs, sand/shell bottom, SAV, soft bottom
White Shrimp	Juvenile	Emergent marsh and soft bottoms
Gray Snapper	Adult	Estuarine soft bottoms, emergent marsh, and sand/shell bottoms
Lane Snapper	Juvenile	Estuarine sand/shell bottoms, SAV, soft bottoms,
	Post-Larvae	Estuarine SAV

Table 5-4. Highly Migratory Species EFH found in the MTG Watershed

Common Name	Life Stage	EFH State Waters Eco-Region 4
Blacktip Shark	Neonate & Juvenile	Estuarine waters of Terrebonne and Timbalier Bays; all nearshore and offshore waters
	Adult	Estuarine waters of Atchafalaya, Terrebonne and Timbalier Bays; all nearshore and offshore waters
Bull Shark	Juvenile	Nearshore waters of Terrebonne Bay to Mississippi River delta
Spinner Shark	Neonate	Terrebonne Bay and estuarine and nearshore waters to Grand Isle
	Juvenile	All nearshore waters between Vermilion and Atchafalaya Bays; Terrebonne and Barataria Bays.
Finetooth Shark	Neonate	Timbalier Bay and waters offshore Timbalier islands
	Juvenile & Adult	Estuarine and nearshore waters east of Terrebonne Bay
Atlantic Sharpnose Shark	Neonate	All nearshore and offshore waters of Atchafalaya, lower Terrebonne and Timbalier Bays, and Barataria Bay
	Juvenile & Adult	Estuarine and nearshore waters east of Terrebonne Bay

5.6 WILDLIFE

5.6.1 Birds

Over 400 bird species make use of Louisiana habitats throughout parts of the year, and coastal Louisiana can support up to two-thirds of the global and regional abundance of species that use coastal habitats (Gosselink et al. 1998, Remsen et al. 2019). The greatest number of bird species occurs in freshwater swamps. Louisiana's coastal wetlands provide crucial winter habitat for more than 50 percent of the Mississippi Flyway duck population. Migratory waterfowl such as snow geese (*Anser caerulescens*), gadwalls (*Mareca strepera*), pintails (*Anas acuta*), mallards (*Anas platyrhynchos*), teal (*Anas crecca* for green-winged teal, *Anas discors* for blue-winged teal), coots (*Fulica americana*), redheads (*Aythya americana*), lesser scaup (*Aythya affinis*), mergansers (*Mergus* spp.), wigeons (*Mareca penelope* for Eurasian wigeon and *Mareca americana* for American wigeon), canvasbacks (*Aythya valisineria*), and black ducks (*Anas rubripes*) make use of wetland habitats in the study area.

In addition, other avian species such as ibis, egrets, cormorants, terns, gulls, skimmers, pelicans, and various raptors rely on the diverse array of habitats present in the study area. Neotropical migrants also use the study area as essential stopover and breeding habitat during annual migrations (Zoller 2004, Wakeley and Roberts 1996).

Bald eagles (*Haliaeetus leucocephalus*) make seasonal use of both wetland and forested habitats in the study area. Bald eagles were removed from the FWS endangered species list on August 8, 2007 (Federal Register, Volume 72, Number 130, July 9, 2007) because their

populations recovered sufficiently. However, this species is still protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA; see Section 5.7 for more information about protected species in the study area).

Mudflats and shallow-water areas in the study area also provide crucial habitat for a wide variety of shorebirds (killdeer, avocet, stilt, dowitchers, snipe, and sandpipers), while seabirds such as gulls (*Larus* spp.), terns (*Sternula* spp.), and pelicans (*Pelecanus* spp.) are found more frequently in deeper water areas. The brown pelican was removed from the FWS endangered species list on December 17, 2009 (Federal Register, Volume 74, Number 220, November 17, 2009) due to successful recovery efforts. The brown pelican is still protected under the MBTA (see Section 5.7 for more information about protected species in the study area).

The BLH forests in the study area contain cavity nesters such as woodpeckers (family *Picidae*), and owls (order *Strigiformes*) make use of mature trees. Various raptors such as barred owls (*Strix varia*), red-shouldered hawks (*Buteo lineatus*), northern harriers (marsh hawks) (*Circus hudsonius*), American kestrels (*Falco sparverius*), and red-tailed hawks (*Buteo jamaicensis*) may be present. Passerine birds in the area may include sparrows, vireos, warblers, red-winged blackbirds (*Agelaius phoeniceus*), wrens, blue jays (*Cyanocitta cristata*), cardinals (*Cardinalis cardinalis*), and crows. Many of these birds are present primarily during spring and fall migrations.

5.6.2 Mammals

Populations of furbearers such as beavers (*Castor canadensis*), mink (*Neovison vison*), foxes (*Vulpes* spp. and *Urocyon cinereoargenteus*), and North American river otters (*Lontra canadensis*) have typically remained stable across the study area. White-tailed deer (*Odocoileus virginianus*), northern raccoons (*Procyon lotor*), skunks (*Mephitis* spp.), rabbits (*Sylvilagus* spp.), squirrels (*Sciurus* spp.), armadillos (*Dasypus novemcinctus*), and North American opossums (*Didelphis virginiana*) are found within the study area as well.

In addition, nutria—an invasive rodent that eats seedling cypress and other tree species, preventing regeneration (Shafer et al., 2016)—occur in the study area. Small mammals such as the marsh rice rat (*Oryzomys palustris*) and a few other species of the order *Rodentia* also occur in the study area.

Feral hogs (*Sus scrofa*) are an invasive ungulate species that inhabit the study area and have numerous adverse impacts to the local ecosystem, including the destruction of vegetation, the spread of wildlife diseases, and the disruption of shorebird nesting habitat.

5.6.3 Reptiles and Amphibians

The study area contains a wide range of amphibians and reptiles, including species of frogs, lizards, turtles, and snakes. The American alligator (*Alligator mississippiensis*) is abundant in the wetlands surrounding the study area.

Reptiles and amphibians that likely inhabit the study area typically include cottonmouths (*Agkistrodon piscivorus*), rat snakes (family *Colubridae*), western and southern water snakes (*Nerodia* spp.), snapping turtles (family *Chelydridae*), mud turtles (*Kinosternon* spp.), green frogs (*Lithobates* spp.), and green tree frogs (*Hyla cinerea*).

Amphibians in the study area may be impacted by chytridiomycosis, an infectious disease caused by a fungus. Chytridiomycosis may have significant impacts to amphibian populations and is likely to persist into the future.

5.7 THREATENED, ENDANGERED, AND PROTECTED SPECIES

5.7.1 Introduction

The purposes of the Endangered Species Act (ESA) are to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve [these] purposes" (16 USC 1531). All federal agencies are required to implement risk reduction programs for these designated species and use their authorities to further the purpose of the act. The lead agencies for implementing the ESA are NMFS and the FWS; NMFS is responsible for (nonbird) marine species and anadromous fishes while the FWS is responsible for terrestrial flora and fauna and freshwater species.

The ESA defines a threatened species as "a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" and an endangered species as "a species that is in danger of extinction throughout all or a significant portion of its range" (50 CFR 424.02). Section 3 of the ESA defines critical habitat as, "Specific areas within the geographical area occupied by a species at the time it is listed, that contain features essential to the species' conservation and may require special management; and specific areas outside the geographical area if the Secretary determines they are essential for conservation" (FWS 1973). When a species is listed as threatened or endangered, the ESA requires the designation of critical habitat unless designation would not be prudent, or the critical habitat is not determinable.

Informal coordination with the FWS was conducted through the FWS Information for Planning and Consultation (IPaC) system in January 2025 to identify protected species that may occur in the study area. The FWS developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 USC 1531 et seq.). Species that were identified as species of concern by the FWS or NMFS, as well as birds protected under the MBTA (that are not also covered under the ESA), are discussed in Section 5.7.3.

5.7.2 Threatened and Endangered Species

There are 13 federally listed threatened and endangered species and proposed or candidate species that are known to occur, or have the potential to occur, in the study area (see Table 5-5). The beaches surrounding the outlet of Bayou Lafourche in the most southeastern edge of the study area overlaps with critical habitat designated for the piping plover and the Rufa red knot. The 14 federally listed or proposed listed species with the potential to occur in the study area are discussed below. See Appendix N for documentation of ESA coordination.

Table 5-5. Threatened and Endangered Species Potentially Occurring in the Study Area

Type	Common Name	Species	ESA status	Critical Habitat in the Study Area
Mammals	West Indian Manatee	*Trichechus manatus*	Threatened	No
	Tricolored Bat	*Perimyotis subflavus*	Proposed Endangered	No
Birds	Eastern Black Rail	*Laterallus jamaicensis ssp. jamaicensis*	Threatened	No
	Piping Plover	*Charadrius melodus*	Threatened	Yes
	Rufa Red Knot	*Calidris canutus rufa*	Threatened	Yes (proposed)
Marine Turtles	Alligator Snapping Turtle	*Macrochelys temminckii*	Proposed Threatened	No
	Green Sea Turtle	*Chelonia mydas*	Threatened	No
	Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	No
	Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	No
	Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	No
	Loggerhead Sea Turtle	*Caretta caretta*	Threatened	No
Fishes	Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	No
	Giant Manta Ray	*Mobula birostris*	Threatened	No
Insects	Monarch Butterfly	*Danaus plexippus*	Proposed Threatened	No

5.7.2.1 West Indian Manatee

Manatees are listed as threatened under the ESA and are protected under the Marine Mammal Protection Act (MMPA). Manatees inhabit coastal areas from Florida to the Greater Antilles and suitable habitats in Central and South America (FWS 2025a). While the West

Indian manatee has been observed in the coastal waters of Louisiana occasionally, it is unlikely that they would be found near the study area due to the lack of vegetation for foraging. Given the extensive areas of relatively undisturbed wetlands in the region and the paucity of food sources in the study area, it is unlikely for the manatee to frequent and utilize waterways within the study area. The study area does not contain West Indian manatee critical habitat.

5.7.2.2 Tricolored bat

The tricolored bat is a proposed threatened species under the ESA. The tricolored bat is a small insectivorous bat distinguished by its unique tricolored fur and often appears yellowish to nearly orange. The once common species is wide ranging across the eastern and central United States and portions of southern Canada, Mexico and Central America. During the winter, tricolored bats are often found hibernating in caves and abandoned mines, although in the southern U.S., where caves are sparse, tricolored bats are often found roosting or hibernating in road-associated culverts where they exhibit shorter torpor bouts and forage during warm nights. In the southern U.S., hibernation length is shorter compared to northern portions of the range and some tricolored bats exhibit shorter torpor bouts and remain active and feed during the winter, due to the south having a warmer climate (FWS 2021a). During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but may also be found in Spanish moss, pine trees, and occasionally human structures. Tricolored bats face extinction due primarily to the wide range impacts of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the continent (FWS 2025b). Tricolored bats are likely to occur in the study area where mature bottomland hardwood forests exist.

5.7.2.3 Eastern Black Rail

The eastern black rail is listed as a threatened species under the ESA. Eastern black rails are a subspecies of black rail that inhabit tidal salt marsh wetlands along the Atlantic and Gulf Coasts of the United States. The eastern black rail is very rare and difficult to detect, with low occupancy rates, low resilience to stochastic events, and high extinction probability across its extant range (McGowan et al. 2020). The eastern black rail has also undergone an apparent population collapse across large parts of its range in recent decades (Stevens and Conway 2022), likely due to wetland loss due to human development and sea level change. Consequently, the eastern black rail was listed as threatened under the ESA in 2020 (U.S. Department of the Interior 2020), and remains highly vulnerable to changes in sea level because of their reliance on tidal wetlands and the narrow range of water levels they tolerate (Stevens and Conway 2021).The eastern black rail prefers its habitat is high-elevation marshes and inland coastal prairies. Since the study area does not contain this habitat type, it is unlikely that the eastern black rail would be found within the study area.

5.7.2.4 Piping Plover

The piping plover is listed as threatened under the ESA. The piping plover breeds in northern latitudes and winters along the south Atlantic and Gulf coasts, including coastal Louisiana. Overwintering populations in Louisiana occur on intertidal beaches, sand flats, mud flats, algal flats, wash-over passes with sparse emergent vegetation; they also require unvegetated or sparsely vegetated areas for roosting in Cameron, Jefferson (Grand Terre Island and Grand Isle), Vermilion, Lafourche, Plaquemines and St. Bernard parishes. Additionally, they occur on the Isles Dernieres barrier island chain in Terrebonne Parish. The piping plover begins arriving on the wintering grounds as early as late July and remains until late March or April (USACE 2010). The study area covers potential areas in Lafourche. On July 10, 2001, the FWS designated critical habitat for breeding and wintering piping plovers (Federal Register Volume 66, No. 132). The barrier islands south of the study area in the Gulf of America have been designated as critical habitat for the piping plover. Their designated critical habitat identifies specific areas that are essential to the conservation of the species.

5.7.2.5 Rufa Red Knot

The Rufa red knot is listed as threatened under the ESA. Coastal habitats used by Rufa red knots in migration and wintering areas are similar in character: generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. Migration and wintering habitats include both high-energy ocean- or bay-front areas, as well as tidal flats in more sheltered bays and lagoons. Preferred wintering and migration habitats are muddy or sandy coastal areas, specifically, bays and estuaries, tidal flats, and unimproved tidal inlets (FWS 2020). Their designated critical habitat identifies specific areas that are essential to the conservation of the species. This project does not overlap the critical habitat associated with the bird; however, the bird may use certain parts of the project as a stopover point for resources while migrating.

5.7.2.6 Alligator Snapping Turtle

The alligator snapping turtle is listed as proposed threatened under the ESA. The study area contains suitable alligator snapping turtle habitat but does not include critical habitat. Snapping turtles' generally preferred habitat type consists of 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 or stone 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 America, coastal marshes and saline water are not their preferred habitat type (FWS 2021b).

5.7.2.7 Marine Turtles

The green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) sea turtles are listed as threatened and the Kemp's ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata),* and leatherback (*Dermochleys coriacea*) are listed as endangered under the ESA. All of these species are known to utilize the offshore and inshore areas of the Gulf of America near Cameron Parish, Louisiana. During their early years of life, sea turtles drift with the Sargassum and feed off living organisms associated with the seaweed. In 2014, the National Oceanic and Atmospheric Administration (NOAA) Fisheries designated Sargassum habitat in the Gulf of America as critical habitat for the Northwest Atlantic Ocean Distinct Population Segment (DPS) of the loggerhead sea turtle. This designated critical habitat is located approximately 4 miles off the coast of Louisiana and is well outside the study area.

Sea turtles have been known to get stranded on beaches of Louisiana. Contractors would be informed of the potential of encountering stranded turtles and would be directed to report any sitings to the LDWF at (337) 962-7092.

5.7.2.8 Pallid Sturgeon

The pallid sturgeon is listed as endangered under the ESA. Pallid sturgeon evolved in the diverse environments of the Missouri and Mississippi river systems. Floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters formed the large-river ecosystem that meet the habitat and life history requirements of pallid sturgeon and other native large-river fishes. This species is typically found in areas where relative depths (the depth at the fish location divided by the maximum channel cross-section depth expressed as a percent) exceed 75 percent. It is unlikely that pallid sturgeon would be found in any of the study areas, as they are mostly found in large rivers that are excessively turbid and have strong currents with sandy bottoms. Most of the study area has silt and clay water bottoms, which the Pallid sturgeon would avoid.

5.7.2.9 Giant Manta Ray

The giant manta ray listed as a threatened species under the ESA. It is the world's largest ray with a wingspan of up to 26 feet. They are filter feeders and eat large quantities of zooplankton. Giant manta rays are slow-growing, migratory animals with small, highly fragmented populations that are sparsely distributed across the world. The main threat to the giant manta ray is commercial fishing, with the species both targeted and caught as bycatch in a number of global fisheries throughout its range. Manta rays are particularly valued for their gill plates, which are traded internationally.

5.7.2.10 Monarch Butterfly

Monarch butterflies are listed as proposed threatened under the ESA. Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border

and covered with black veins. The bright coloring of a monarch serves as a warning to predators that eating them can be toxic. In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km (1,864 miles) and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again. The biggest threats to monarchs are herbicides, insecticides, and changing climate conditions (FWS 2025, MAFWA 2023, and WAFWA 2025). Milkweed is one of the primary food sources for Monarch butterflies and is an essential food source for their migration and in the study area it is unknown of the abundance or presence of milkweed. However, the range and habitat types that milkweed occurs makes it plausible to occur in the study area. The monarch butterfly is a proposed threatened species meaning that they are not protected by the take prohibitions of section 9 of the ESA until the rule to list is finalized under section 7(a)(4) of the ESA. USACE will coordinate with FWS and implement any recommended BMPs if the listing changes.

5.7.3 Species of Concern

In addition to the federally listed or proposed species under its purview, the FWS also identified species of concern including the bald eagle (delisted), brown pelican (delisted), and colonial nesting birds. Colonial nesting birds include a wide range of species that nest on small coastal islands – several species of cormorants, herons, egrets, ibises, gulls, skimmers, and the least tern. Marine mammals under NMFS purview such as the bottlenose dolphin are also a species of concern as they utilize coastal waters for foraging and nursery habitat. These species are discussed below. While federally identified species of concern were considered during Proposed Action planning and addressed in this assessment, only those species identified by the FWS and/or NMFS as threatened or endangered are afforded federal protection under the ESA.

5.7.3.1 Colonial Nesting Waterbirds

Coastal Louisiana contains habitats suitable for support of colonial nesting waterbirds which are protected under the MBTA. Louisiana is considered a hotspot for colonial wading bird and seabird nesting in all of the United States because of its position in the Mississippi Alluvial Valley and along the Gulf of America. It is estimated that the Louisiana coastal area is home to approximately 200 rookeries of wading birds and seabirds. The Proposed Action is in an area where colonial nesting waterbirds, such as anhingas, cormorants, great blue herons, great egrets, snowy egrets, little blue herons, tricolor herons, reddish egrets, cattle egrets, green herons, black-crowned night-herons, yellow-crowned night-herons, ibises, and roseate spoonbills occur. Ongoing trends affecting the Louisiana coast including subsidence

and sea level change, saltwater intrusion, and frequent tropical storms will continue to affect bird populations in the study area by reducing the amount of available colonial wading bird habitat, including marsh, barrier islands, beaches, and dredged spoil nesting habitat. Furthermore, in 2021 Avian influenza virus (HPAIV) was introduced in North America through Trans-Atlantic pathways via Migratory birds and this has caused mass mortalities by the virus (Harvey et al. 2023). There are active rookeries in the study area but not in the direct alignment of the levee.

Colonial nesting birds include a wide range of species which nest on small coastal islands – several species of cormorants, herons, egrets, ibises, gulls, skimmers, and the least tern. Based on information provided by USFWS and field surveys conducted by the USACE, there are existing bald eagle nests in the area however, all nests are beyond 650 feet from the Proposed Action. In addition, no active colonial nesting water bird rookeries were identified within 1,000 feet of the Proposed Action.

The USACE has surveyed the Proposed Action's footprint and vicinity for colonial wading bird nesting activities numerous times in coordination with the USFWS and LDWF. USACE biologists would re-survey specific study areas (for example, specific reach(es) or structure(s)) during the nesting season before construction. See Section 6.7 for information about impacts of the Proposed Action on protected species and species of concern, including what steps would be taken if nests are identified in future surveys.

5.7.3.2 Bald Eagle (Haliaeetus leucocephalus)

Although it is delisted, the bald eagle is still protected by the BGEPA and the MBTA. Bald eagles nest in Louisiana from October through May in mature trees (for example, bald cypress, sycamore, and willow) near fresh to intermediate marshes or open water. Nest sites typically include at least one perch with a clear view of the water or area where the eagles usually forage. Habitats suitable for use by the bald eagle are present throughout coastal Louisiana and can be found in the study area. There are active nests in the study areas but are not in the direct alignment for the levee or and the associated features.

5.7.3.3 Brown Pelican (Pelecanus occidentalis)

On November 17, 2009, the brown pelican was removed from the federal list of threatened and endangered species. However, the brown pelican is still protected under the MBTA and is a state listed species. Habitats suitable for use by the brown pelican are present throughout coastal Louisiana, including the study area.

5.7.3.4 Bottlenose Dolphin (*Tursiops truncatus*)

Bottlenose dolphins in the United States are not endangered or threatened under the ESA, but they are protected under the Marine Mammal Protection Act (MMPA). They are vulnerable to many stressors and threats including bycatch in commercial and recreational

fisheries, disease, biotoxins, pollution, habitat alteration including increased freshwater exposure, vessel strikes, illegal feeding and harassment, energy exploration and oil spills, and other types of human disturbance, such as underwater noise. Bottlenose dolphins are found in temperate and tropical waters around the world. They inhabit a wide variety of habitats, including harbors, bays, gulfs, and estuaries, as well as nearshore coastal waters, deeper waters over the continental shelf, and even far offshore in the open ocean. Bottlenose dolphins are likely to be observed where construction of the Proposed Action, especially marsh mitigation, would be taking place for this project (NOAA Fisheries 2025).

5.8 PRIME AND UNIQUE FARMLAND

The soils of the natural levees in Terrebonne Parish formed in sediments deposited by former channels of the Mississippi River and its distributaries on the Atchafalaya and Lafourche Delta Complex (McDaniel & Trahan 2007). Loamy soils are dominant on the high and intermediate parts of the natural levees, and clayey soils are dominant on the lower parts of the natural levees and in back swamps. The loamy soils, and the clayey soils that rarely flood, make up about 9 percent of the total land area of the parish. They are used mainly for cropland, urban, and industrial purposes. A few areas are in pasture and woodland. The clayey soils on the lowest parts of the landscape are subject to occasional or frequent flooding and make up about 6 percent of the total land area of the parish. They are used mainly for timber production, pasture, recreation, and wildlife. Some narrow, loamy, natural levee ridges in the southeastern and east central parts of the parish extend south into the Gulf Coast Marsh. These areas are subject to occasional flooding during tropical storms and are used mainly for camps, home sites, and activities associated with the seafood industry.

The Farmland Protection Policy Act of 1981 (FPPA) was enacted to minimize the extent that federal programs contribute to the unnecessary and irreversible conversion of prime or unique farmland to non-agricultural uses. The NRCS is responsible for designating prime or unique farmland protected by the act. Prime farmland, as defined by the act, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland could be cultivated land, pastureland, forestland, or other land, but not urban or built-up land or water areas. Unique farmland is defined by the act as land other than prime farmland that is used to produce specific high value food and fiber crops, such as citrus, tree nuts, olives, and vegetables.

Based on data accessed from the NRCS in 2025, approximately 291,462 (23 percent) of the total acreage in the study area meet the soil requirements for prime farmland (NRCS 2025). Unique farmland is not located in the study area. Prime farmland within the study area is limited to natural ridge tops and consists of the following soil associations: Cancienne silt loam, Cancienne silty clay loam, Commerce silt loam, Commerce silty clay loam, Grammercy silty clay loam, Schriever clay, Sharkey silty clay loam, Sharkey clay, and Vacherie silt loam. Not all prime farmland in the study area is used for agriculture. NRCS soil

surveys indicate nearly all prime farmland acreage in Terrebonne Parish is planted in crops, but only about half of the acreage in Lafourche Parish is agricultural. Sugar cane is the principal agricultural crop grown in the region (McDaniel and Trahan 2007; Matthews 1984). Corn is also a major crop. Soybeans, rice, vegetables, and pasture grasses are also grown.

Soils are a critical element of coastal habitats because they support vegetation growth and open-water benthic productivity. The study area lies entirely within the south-central region of the Deltaic Plain. It falls within two major land resource areas (MLRAs): MLRA 131 and MLRA 151. MLRA 131, the Southern Mississippi River Alluvium, makes up about 29 percent of the study area. MLRA 151, the Gulf Coast Marsh, makes up the remaining 71 percent of the study area (NRCS 2011). The soils formed from sediments deposited by former channels of the Mississippi River and its distributaries on the Atchafalaya and Lafourche Delta Complex. Loamy soils are dominant on the high and intermediate parts of the natural levees, and clayey soils are dominant on the lower parts of the natural levees and in backswamps. Elevations range from about 14 feet above mean sea level along the natural levee of Bayou Terrebonne in the northern part of the study area to about 5 feet below sea level in the former marshes and swamps that have been drained. Geologic subsidence, erosion, storm surge, saltwater intrusion, and sea level change currently threaten soils that comprise coastal habitats and agricultural land loss within study area and is expected to continue into the future.

The Swamp and Marsh soil associations comprise approximately 80 percent of soils within the study area (McDaniel and Trahan 2007; Matthews 1984). These associations occur over a broad plain about level with the Gulf of America between the ridge areas and are frequently flooded. Marsh soils, both fresh and saline, generally have a semifluid peat or muck surface layer, up to four feet thick, over alluvial clays and silty clays. Soil associations include Fausse-Barbary, Harahan-Rita, Allemands-Kenner, Clovelly-Lafitte, Timbalier-Bellpass, and Scatlake. These soils are generally too wet and soft for any agricultural uses. The marsh soils' organic content decreases as conditions move from fresh to saline. Fresh marsh soils contain a mean of 52 percent organic matter, whereas saline soils contain only 18 percent organic matter (Chabreck 1982). Soils in the swamp soil association are usually wet and frequently flooded. These soils, identified primarily as Barbary-Fausse soils, are level, very poorly drained soils that have a mucky or clayey surface layer and a clayey subsoil. Some acreage of former marshes and swamps have been protected, pumped-off, and drained and are used as pasture or for urban use. Rita-Harahan soils have been identified in these areas. Rita-Harahan soils are level, poorly drained soils that have a clayey or mucky surface layer and a clayey or loamy subsoil, in former swamps and marshes. Uses include woodland, pasture, recreation, and campsites. The remaining 20 percent of soils in the study area are comprised of natural ridges, levees, and open water.

The lower portions of the natural levees are formed by the Sharkey and Schriever soil associations. These soils are black to dark gray on the surface and have higher clay material and organic matter content than do soil associations on the highest portions of the natural

levees. They are subject to rare or occasional flooding, and support bottomland vegetation. Uses include woodland, pasture, recreation, campsites, and wildlife habitat. The highest parts of the natural levees along the bayous, including along Highway 57 to the south of Lake Boudreaux, contain soils of the Commerce and Cancienne-Grammercy associations. These level, somewhat poorly drained and poorly drained brown to grayish brown soils have a loamy or clayey surface layer and clayey subsoil or are loamy throughout. They rarely flood and are used mainly for cropland, pasture, woodland and urban purposes. Some narrow, loamy, natural levee ridges in the southeastern and east-central parts of Terrebonne Parish extend south into the Gulf Coast Marsh. These areas are subject to occasional flooding during tropical storms and are used mainly for camps, homesites, and activities associated with the seafood industry.

5.9 WATER QUALITY

Section 305(b) of the CWA requires each state to monitor and report on surface and groundwater quality, which the Environmental Protection Agency (EPA) synthesizes into a report to Congress. The LDEQ produces a Section 305(b) and Section 303(d) Water Quality Report every two years that provides a status report on the quality of Louisiana's surface water, and the methodology of data collection for surface water. It also identifies impaired water bodies. Section 303(d) of the CWA requires states to identify waterbodies that are impaired or in danger of becoming impaired due to exceedances of federally approved water quality standards. The State of Louisiana and the EPA have established surface water quality standards to assess ambient water quality conditions and to establish a priority ranking for such waters ((Louisiana Administrative Code (LAC), Title 33:IX.1101 et seq. (LAC 2021)). Most recently, the LDEQ released the 2024 Louisiana Water Quality Inventory: Integrated Report.

The LDEQ divides waterbodies into classifications for water quality assessment purposes. Eight designated uses were established for surface waters in Louisiana: Primary Contact Recreation (swimming), Secondary Contact Recreation (boating), Fish and Wildlife Propagation (fishing), Drinking Water Supply, Outstanding Natural Resource, Oyster Propagation, Agriculture, Limited Aquatic Life and Wildlife.

Once the waterbodies are classified for designed uses, the waterbodies are then labeled as either Fully Supporting - the assessed water body is fully supporting the designated use, Not Supporting - the assessed water body is not fully supporting the designated use, Insufficient data - there is insufficient data to make a reliable determination if the water body supports the designated use, No Data Collected - data was not collected on the assessed water body to make a determination if the water body supports the designated use, Not a Use - the designated use on the map does not apply to that assessed water body.

Based on LDEQ's most recent water quality assessment (LDEQ 2024), a list of the subsegments in the study area and a summary of suspected causes and sources of impairment are shown in Table 5-6.

Table 5-6. LDEQ Waterbody Subsegments and Designated Uses

Subsegment	Designated Uses	Impaired Uses and Causes
LA010901_00-Atchafalaya Bay and Delta and Gulf Waters to the State 3-mile limit	Secondary Contact Recreation	Primary Contact Recreation, Fish and Wildlife Propagation, Oyster Propagation Causes: Mercury-Fish consumption Advisory Fecal Coliform Enterococcus
LA020304_00-Lake Salvador	Primary Contact Recreation, Secondary Contact Recreation	Fish and Wildlife Propagation Cause: Turbidity
LA020801_00-Intracoastal Waterway-From Larose to Bayou Villars and Bayou Barataria (Estuarine)	Primary Contact Recreation, Secondary Contact Recreation	Fish and Wildlife Propagation Causes: Turbidity
LA020902_00-Little Lake (Estuarine)	Primary Contact Recreation , Secondary Contact Recreation, Oyster Propagation	Fish and Wildlife Propagation Causes: Turbidity
LA042003_00-Bayou La Loutre-From MRGO to Eloi Bay (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation	Primary Contact Recreation Cause: Enterococcus
		Oyster Propagation Cause: Fecal Coliform
LA042203_00-Bay Boudreau	Secondary Contact Recreation, Oyster Propagation	Primary Contact Recreation Cause: Enterococcus
		Fish and Wildlife Propagation Cause: Insufficient Data to make a reliable determination
LA120202_00-Bayou Black-From ICWW to Houma	Primary Contact Recreation, Secondary Contact Recreation	Fish and Wildlife Propagation Causes: Dissolved Oxygen, Nitrate/ Nitrite, Phosphorus
		Drinking Water Supply Cause: Color
LA120204_00-Lake Verret and Grassy Lake	Primary Contact Recreation, Secondary Contact Recreation, Fish and Wildlife Propagation	None
LA120206_00-Grand Bayou and Little Grand Bayou-From headwaters to Lake Verret	Primary Contact Recreation, Secondary Contact Recreation	Fish and Wildlife Propagation Causes: Dissolved Oxygen, Turbidity
LA120401_00-Bayou Penchant-From Bayou Chene to Lake Penchant	Primary Contact Recreation, Secondary Contact Recreation	Fish and Wildlife Propagation Cause: Turbidity Outstanding Natural Resource Cause: Turbidity

Subsegment	Designated Uses	Impaired Uses and Causes
LA120403_00-Intracoastal Waterway-From Bayou Boeuf Locks to Bayou Black in Houma; includes segments of Bayous Boeuf, Black, and Chene	Primary Contact Recreation, Secondary Contact Recreation, Drinking Water Supply	Fish and Wildlife Propagation Cause: Dissolved Oxygen
LA120405_00-Lake Hache and Lake Theriot	Primary Contact Recreation, Secondary Contact Recreation	Fish and Wildlife Propagation Cause: Dissolved Oxygen, Turbidity
LA120502_00-Bayou Grand Caillou-From Bayou Pelton to HNC (Estuarine)	Secondary Contact Recreation	Primary Contact Recreation Cause: Enterococcus Fish and Wildlife Propagation Cause: Dissolved Oxygen Oyster Propagation Cause: Fecal Coliform
LA120504_00-Bayou Petit Caillou-From La. Highway 24 bridge to Boudreaux Canal (Estuarine)	Secondary Contact Recreation	Primary Contact Recreation Cause: Enterococcus Fish and Wildlife Propagation Cause: Dissolved Oxygen Oyster Propagation Cause: Fecal Coliform
LA120506_00-Bayou Du Large-From Marmande Canal to 1/2 mile north of St. Andrews Mission (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation	Primary Contact Recreation Cause: Enterococcus Oyster Propagation Cause: Fecal Coliform
LA120508_00-HNC Canal-From Bayou Pelton to 1 mile south of Bayou Grand Caillou (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation	Primary Contact Recreation Cause: Enterococcus Oyster Propagation Cause: Fecal Coliform
LA120601_00-Bayou Terrebonne-From Houma to Company Canal (Estuarine)	Secondary Contact Recreation	Primary Contact Recreation Cause: Enterococcus Fish and Wildlife Propagation Cause: Dissolved Oxygen
LA120602_00-Bayou Terrebonne-From Company Canal to Humble Canal (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation	Primary Contact Recreation Cause: Enterococcus Oyster Propagation Cause: Fecal Coliform
LA120605_00-Bayou Pointe Au Chien-From headwaters to St. Louis Canal	Secondary Contact Recreation	Primary Contact Recreation Cause: Enterococcus Fish and Wildlife Propagation Cause: Chloride, Sulfate, Total Dissolved Solids (TDS)

Subsegment	Designated Uses	Impaired Uses and Causes
LA120606_00-Bayou Blue-From Grand Bayou Canal to Bully Camp Canal (Estuarine)	None	Primary Contact Recreation Cause: Enterococcus
		Secondary Contact Recreation Cause: Insufficient data to make reliable determination
		Fish and Wildlife Propagation Cause: Dissolved Oxygen
LA120701_00-Bayou Grand Caillou-From HNC Canal to Caillou Bay (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation, Oyster Propagation	Primary Contact Recreation Cause: Enterococcus
LA120703_00-Bayou Du Large-From 1/2 mile north of St. Andrews Mission to Caillou Bay (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation	Primary Contact Recreation Cause: Enterococcus
		Oyster Propagation Cause: Fecal Coliform
LA120704_00-Bayou Terrebonne-From Humble Canal to Lake Barre (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation, Oyster Propagation	Primary Contact Recreation Cause: Enterococcus
LA120705_00-HNC Canal-From 1 mile south of Bayou Grand Caillou to Terrebonne Bay (Estuarine)	Secondary Contact Recreation, Fish and Wildlife Propagation	Primary Contact Recreation Cause: Enterococcus
		Oyster Propagation Cause: Fecal Coliform
LA120706_00-Bayou Blue-From Bully Camp Canal to Lake Raccourci (Estuarine)	Primary Contact Recreation, Secondary Contact Recreation, Fish and Wildlife Propagation, Oyster Propagation	NA
LA120707_00-Lake Boudreaux	Primary Contact Recreation, Secondary Contact Recreation, Fish and Wildlife Propagation,	Oyster Propagation Cause: Fecal Coliform
LA120804_00-Lake Barre	Secondary Contact Recreation, Fish and Wildlife Propagation, Oyster Propagation	Primary Contact Recreation Cause: Enterococcus

5.10 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

An HTRW assessment was conducted in 2023-2024 along the Proposed Action alignment to identify any potential recognized environmental conditions (RECs) located in or adjacent to the Proposed Action that may have adversely impacted environmental conditions (see

Appendix I for the Phase I Environmental Site Assessment). As defined in the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments (ESAs), a REC indicates the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property under conditions that indicate an existing release, a past release, or a material threat of a future release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.

The ESA consisted of a desktop analysis with visual confirmation by aerial flight. The assessment identified several Resource Conservation and Recovery Act (RCRA) sites within one mile of the proposed alignment, including several very small quantity generators, small quantity generators, and large quantity generators. Several active and closed underground storage tank (UST) sites and Louisiana pollutant discharge elimination system (LPDES) sites were also identified within one mile of the Proposed Action alignment. Some small discharges or releases, consisting mostly of diesel fuel, were noted in the emergency response notification system but none were significant in size or an amount that would have a major negative effect on the study area. Several plugged and abandoned and dry and plugged oil/gas wells were identified within one-quarter to one mile of the Proposed Action alignment and numerous petroleum product pipelines were noted to be crossing the Proposed Action alignment in various locations. Neither the wells nor the pipelines are RECs that would affect the Proposed Action. Due to the remoteness of several locations in the Proposed Action alignment, site visits were not conducted for each reach of the alignment. An aerial flight along the entire reach of the Proposed Action alignment was conducted by USACE personnel on May 4, 2023. The aerial flight revealed the presence of several industrial areas, oil refining/storage facilities, and pipeline corridors in the study area. No RECs were identified during the flight. See Appendix I for the Phase I ESA report.

5.11 AIR QUALITY

5.11.1 National Ambient Air Quality Standards

The EPA, Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards, (NAAQS), for six principal pollutants, called “criteria” pollutants. They are carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), lead (Pb), particulates of 10 microns or less in size (PM-10 and PM-2.5), and sulfur dioxide (SO2). Ozone is the only parameter not directly emitted into the air, but it forms in the atmosphere when three atoms of oxygen are combined by a chemical reaction between oxides of nitrogen and volatile organic compounds in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of nitrogen and volatile organic compounds, also known as ozone precursors. Strong sunlight and hot weather can cause ground-level ozone to form in harmful concentrations in the air.

The EPA Green Book Nonattainment Areas for Criteria Pollutants (Green Book) maintains a list of all areas within the United States that are currently designated “nonattainment” areas

with respect to one or more criteria air pollutants. Nonattainment areas are discussed by county or metropolitan statistical area (MSA). MSAs are geographic locations, characterized by a large population nucleus, that are comprised of adjacent communities with a high degree of social and economic integration. MSAs are generally composed of multiple counties. Review of the Green Book and Louisiana Department of Environmental Quality Air Quality list of "nonattainment" areas indicates that Terrebonne and Lafourche Parishes are currently in attainment for all federal NAAQS pollutants. Table 5-7 describes NAAQS set by the EPA under 40 CFR part 50.

Table 7. National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3-month average	0.15 µg/m^3 (1)	Maximum arithmetic mean of 3 consecutive monthly means in a 3-year period
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	Annual 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	9.0 µg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	Annual 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	1 year	10 ppb	Annual mean, averaged over 3 years

[1] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
[2] The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.				
[3] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O3 standards.				
[4] The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table, 30 December 2024.				

5.12 NOISE AND VIBRATION

5.12.1 Definitions and Regulations

The Noise Control Act of 1972 establishes a national policy to regulate and promote an environment for all Americans free from noise that jeopardizes their health or welfare. The Act also establishes a means for effective coordination of federal research and activities in noise control, authorizes the establishment of federal noise emission standards for products distributed in commerce, and provides information to the public about the noise emission and noise reduction characteristics of such products. The Occupational Safety and Health Administration Standards (29 CFR Part 1910) set standards for risk reduction against the effects of noise exposure.

Sound is often generated by activities as a part of everyday life. Human response to sound varies depending on the type and characteristics of the sound, distance between the source and the receptor, sensitivity of the receptor, and the time of day the disturbance takes place. Sound becomes unwanted, referred to as noise, when it either interferes with normal activities, such as sleeping or conversation, or has a negative impact on the quality of life.

Sound varies by both intensity and frequency and the human ear responds differently to different frequencies. Hertz, (Hz), is the standard unit of frequency in the International System of Units (SI), and it is equal to one cycle per second. Sound intensity, described in decibels (dB), is the amount of energy in a confined space. Loudness refers to how audible sounds are perceived, but it is not directly proportional to sound intensity. How loud something sounds differs from the actual intensity of that sound, and even if two sounds have equal intensity, it does not mean they are equally loud. A sound that seems loud in a quiet room might not be noticeable while amid heavy traffic. The risk of hearing damage increases with the intensity of the sound, not the loudness of sound.

Day-Night Sound Level (DNL) is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 P.M. to 7 A.M.). DNL is a useful descriptor for noise because (1) it averages ongoing yet intermittent noise, and (2) it

measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level is often used to describe the overall noise environment. Leq is the average sound level in dB. Sounds encountered in daily life and their approximate levels in a-weighted decibels (dBA) are provided in Table 5-8.

Ambient noise is generated by a broad range of sources, both natural and anthropogenic. Natural noise sources include climatic sources, such as thunder, wind, and precipitation, as well as local wildlife such as birds. Potential sources of anthropogenic sound include commercial shipping, dredging and construction activities, agricultural activities, industrial activities, outdoor recreation (for example, hunting and fishing), and commercial and residential waterborne and highway traffic. No ambient noise monitoring appears to have been conducted in the study area; consequently, no quantitative data on noise levels within the study area are available for analysis.

Table 5-8. Common Noise Levels

Sound Level (dBa)	Indoor	Outdoor	Human Response
0	The softest sound that can be heard		Sounds at these levels typically don't cause any hearing damage.
10	Normal breathing	A leaf in the wind	
20	Ticking watch	Leaves rustling	
30	Whisper	Soft music	
40	Library	Babbling brook	
50	Refrigerator	Gentle rainfall	
60	Sewing Machine	Normal Conversation	
70	TV Audio	Freeway Traffic (50ft)	Some annoyance
80	Ringing Telephone	Downtown (large city)	Elevated annoyance
85	Blender	Gas lawnmower	Damage to hearing possible after 2 hours of exposure
90	Indoor concert	Motorcycle	
Source: https://noiseawareness.org/info-center/common-noise-levels/			

Typical construction activities can either result in continuous or single-impact (transient) vibration impacts. Typical equipment (see Table 5-9) or activities that could result in continuous vibration impacts include excavation equipment, traffic, vibratory pile drivers, and vibratory compaction equipment; examples of transient vibration sources include blasting and drop balls. Some construction activities, like jackhammers or impact pile drivers, can continually generate single transient events at a high frequency. However, for evaluation purposes, this equipment would be regarded as having frequent or continuous vibration

impacts. Damage thresholds for continuous sources are approximately half of the thresholds for transient sources.

Table 5-9 Weighted (dBA) Sound Levels of Construction Equipment and Modeled Attenuation at Various Distances

Noise Source	50 ft	100 ft	200 ft	500 ft	1,000 ft
Backhoe	78 dBA	72 dBA	68 dBA	58 dBA	52 dBA
Dump Truck	76 dBA	70 dBA	64 dBA	56 dBA	50 dBA
Excavator	81 dBA	75 dBA	69 dBA	61 dBA	55 dBA
Front End Loader	79 dBA	73 dBA	67 dBA	59 dBA	53 dBA
Dozer	82 dBA	76 dBA	70 dBA	62 dBA	56 dBA
Hydraulic Cutterhead Dredge	No data available	No data available	79 dBA	No data available	64dBA
Airboat	59 dBA	No data available	No data available	No data available	40 dBA

[1]The dBA at 50 ft is a measured noise emission. The 100- to 1,000-ft results are modeled estimates. Source: FHWA 2006. "Highway Construction Noise Handbook"

[2]https://www.tremr.com/007pandas/death-lax-regulations-noisy-airboats

[3]2003 Bayou Chene Bald Eagle Dredging Noise Coordination with USFWS

Vibration refers to ground-borne noise and perceptible motion. The most common impacts from ground-borne vibration include annoyance, movement of structure floors, rattling of windows, shaking of items on shelves or hanging on walls, disruption of vibration-sensitive operations or activities, and triggering of landslides. Vibrations caused by construction can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source due to spreading of the energy and frictional losses. Thus, ground-borne vibrations from most construction activities rarely reach the levels that can damage structures but can achieve the perceptible ranges in buildings very close to construction sites.

In extreme cases, the vibration can cause damage to buildings or equipment. In most circumstances, common ground-induced vibrations related to roadway traffic and construction activities pose no threat to buildings or structures, with the occasional exception of blasting and sheet pile-driving during construction. To assess the potential for structural damage associated with vibration, the vibratory ground motion near the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions,

typically in units of inches per second (in/sec). The PPV is defined as the maximum instantaneous peak of the vibration signal.

According to FTA guidelines (2018), the construction vibration damage criterion for non-engineered timber and masonry buildings is 0.2 in/sec, and that of structures or buildings constructed of reinforced-concrete, steel, or timber is 0.5 in/sec. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception. A vibration level that causes annoyance would be well below the damage threshold for normal buildings. Generally, ground-borne vibration does not provoke adverse human reaction to those who are outdoors as the effects associated with the shaking of building are absent. The root mean square amplitude is most frequently used to describe the effect of vibration on the human body. The root mean square amplitude is defined as the average of the squared amplitude of the signal and is approximately 70 percent of the PPV for a single frequency vibration. Vibration velocity level (Lv) in dB notation (VdB) is commonly used to measure root mean square. The dB notation acts to compress the range of numbers required to describe vibration and is referenced to one in one million in/sec in the United States. The threshold of perception for vibration is typically around 64 VdB.

5.12.2 Existing Noise in the Study Area

The study area is primarily agricultural and rural, but does include areas with urban and industrial development, including Houma, Thibodeaux, Raceland, and LaRose Metropolitan Statistical Areas (MSAs). Noise and vibration sources in the area can be broken into the following four general types: agricultural, recreational, general stationary, and general mobile.

- Agricultural Noise: The predominant land use near the study area is related to agricultural activities. Farm operations produce noise from a variety of sources including, heavy equipment for plowing and harvesting, crop-spraying aircraft, onsite processing equipment, and irrigation water pumps. Crop-spraying aircraft typically fly at low altitude and may cause loud temporary noise exceeding those of commercial aircraft. Crop-spraying is typically seasonal and short in duration at any given location. In addition to affecting the farmers and farm laborers, agricultural noise also affects those living in or near agricultural areas.

- Recreational Noise: Recreational noise can include hunting and boating noise. Hunting on private and public land (limited) for waterfowl, deer, pig, and fur bearer is common. There is regular boat traffic on the HNC which could produce noise greater than 86dB.

- General Stationary Noises: General stationary noises (i.e., those emanating from fixed locations) are associated with a variety of land uses. Stationary sources can include air conditioning units, power tools, motors, generators, appliances, and manufacturing and industrial facilities. There are few industrial facilities near the

study area with an unknown decibel level, and frequency of noise and vibration emanation. Therefore, contribution of general stationary noises to the ambient noise levels in the study area is minimal.

- General Mobile Noise: General mobile noise sources can include vehicles, aircraft, boats, and trains. Mobile noise is usually temporary and variable but can be intense and annoying because of its abruptness and intensity. In urban areas, these mobile sources contribute to the ambient noise. The closest mobile noise sources to the study area are mobile noise sources on Falgout Canal Road, boat traffic on the HNC, and agricultural equipment.

5.12.3 Noise and Vibration Sensitive Receptors

Places where quiet is an essential element of a land use's intended purpose qualify as a noise sensitive receptor, such as historical monuments with significant outdoor use. Places where people normally sleep, like residences, hotels, and hospitals, also qualify as noise-sensitive receptors. For these types of receptors, nighttime sensitivity to noise must be considered. Various institutional land uses where excessive noise could interfere with speech, meditation, and concentration also qualify as noise sensitive receptors. These land uses include schools, libraries, theaters, churches, cemeteries, monuments, and museums. Parks may also be considered noise sensitive receptors, but this classification is dependent on their use. For example, a park intended primarily for active recreation would not be considered a noise-sensitive receptor (FTA 2018). Noise-sensitive receptors may also have stationary noise sources at their locations.

5.13 AESTHETIC (VISUAL) RESOURCES

The study area includes southern portions of Lafourche and Terrebonne parishes (south of Houma) and is within three sub-ecoregions which define the study area's landscape visual characteristics. These ecoregions include the Southern Holocene Meander Belts, the Inland Swamps Ecoregion, and the Deltaic Coastal Marshes and Barrier Islands (Daigle et al. 2006).

The Southern Holocene Meander Belts Ecoregion includes developed land along the numerous bayous formed from sediments of abandoned Mississippi River deltas. These bayou ridges, or river terraces, are a prevalent landform and are considered high ground in the study area. Most of the communities in the study area are located along these landforms and adjacent roadways. Land use here includes cultivated crops, pastureland, marine industry, and rural residential development. Primary vistas within the study area are from these roadways which include U.S. Highway 90, State Highways 315, 57, 56, 55, 665, and Highway 1.

The landscape and vegetation between these waterways are primarily forested wetlands and uplands north of the GIWW with brackish and saline marshes south of the GIWW. Here, the Inland Swamps Ecoregion and the Deltaic Coastal Marshes and Barrier Islands Ecoregion are primarily viewed by boat. Access is limited to a few roadways and countless

straight channels and related spoil banks, which cut through the coastal marsh. These were most likely caused by navigation for petroleum, fisheries, pipelines, or other related resources.

The communities within the study area are very much connected to the water as evidenced by the many waterfront residents extend personal property into the waterways in the forms of docks, piers, camps, and homes. Water resources in the study area include the GIWW, Bayou Black, Bayou du Large, Bayou Grand Caillou, Bayou Petit Caillou, Bayou Terrebonne, Bayou Pointe aux Chenes, Bayou Lafourche, Bayou Blue, and the HNC. Other significant water resources located within the study area include Lake Boudreaux and Lake Quitman, located south of Houma between Bayou Grand Caillou and Bayou Petit Caillou. In addition to these major water features, hundreds of smaller natural bayous and manmade canals are located within the study area.

The following visual resources in the study area recognized by national or state designations are shown in Figure 5-4. The Houma Historic District consists of the city's central business district and two related residential areas. The Houma Historic District Terrebonne Parish Courthouse Square, surrounded by mature live oak trees, is the historic district center. Most of the commercial buildings are located along Main Street, which parallels Bayou Terrebonne. In its central portions, Main Street has a two-story scale consisting mainly of typical early-twentieth century commercial buildings with commercial space downstairs and residential space above. Historic residences of the district are primarily shotgun houses, bungalows, or cottages.

The Mandalay NWR is located approximately 6 miles southwest of Houma, Louisiana. Access to the interior is limited to boat travel. The 4,212-acre refuge is a stopping point for migratory birds. Recreation use includes wildlife observation and photography. The refuge also provides opportunities for environmental education and interpretation.

Pointe aux Chenes WMA is approximately 15 miles southeast of Houma. This area includes 34,488 acres. Access to the interior is limited to boat travel. The only timber stands are located on the Point Farm Unit of the area, or areas adjacent to natural bayous and older oil and gas canals. Recreation use includes nature study, camping, and picnicking. Portions of Reaches J1, J2, J3, K, and L would intersect this WMA.

The Wetlands Cultural Trail Scenic Byway is 282 miles in length and has two interconnected loops and three spurs; the spurs are primarily contained within the study area. The eastern spur extends along LA 182 between Houma and Gibson allowing access to Houma’s Downtown National Historical District and Mandalay National Wildlife Refuge. Two southern spurs descend from Houma to Cocodrie along LA 56 with a side route on LA 57 to Dulac. The Wetlands Cultural Trail Scenic Byway provides viewsheds along LA 182 from Houma to Gibson and along LA 56 south of Houma.

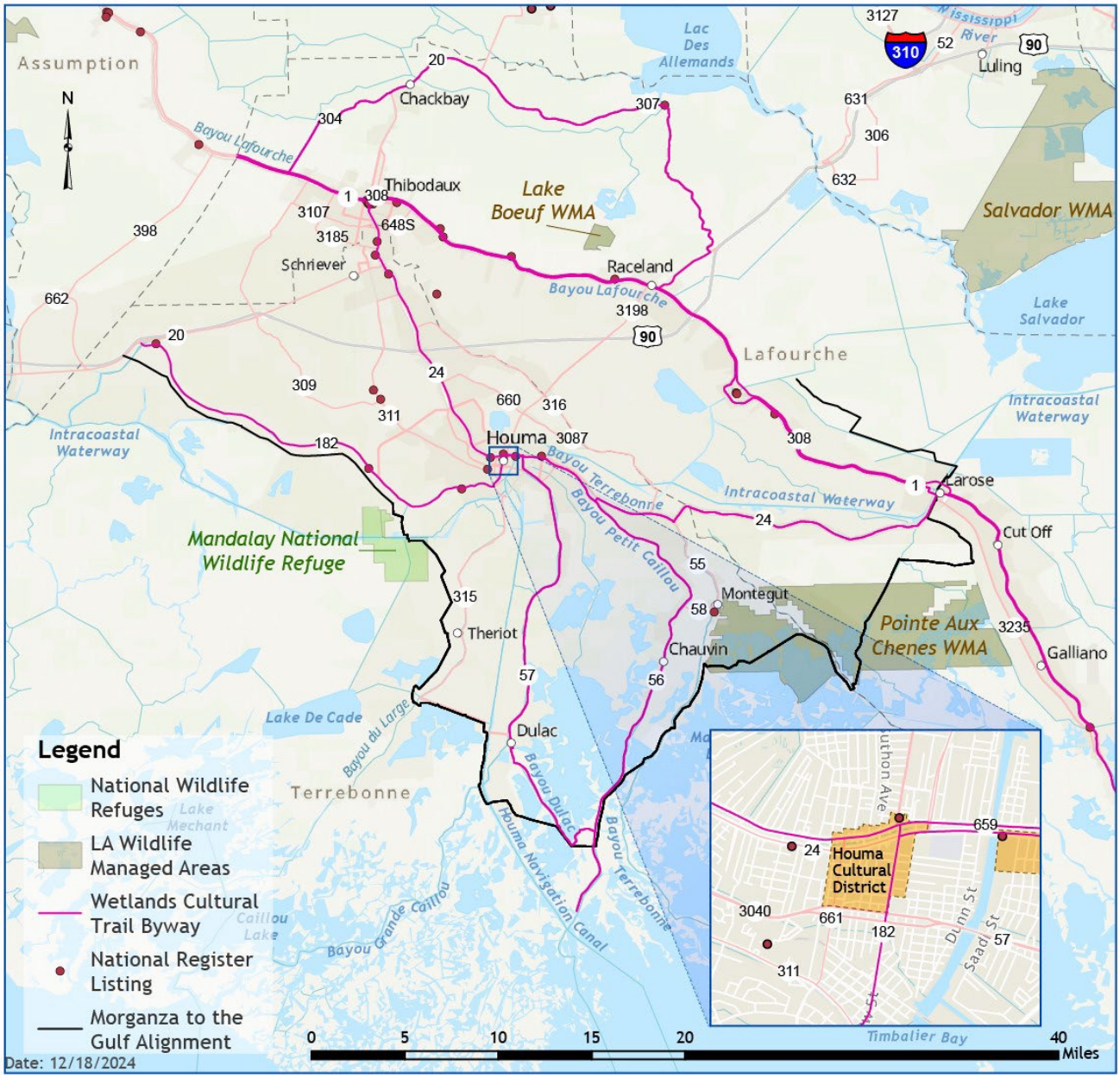


Figure 5-4. Visual Resources Contributing to the Study Area's Aesthetic Identity

5.14 RECREATION AND PUBLIC LANDS

The study area includes southern portions of Lafourche and Terrebonne parishes (south of Houma) and is within Region 3 of the Louisiana State Comprehensive Outdoor Recreation Plan (SCORP). Major bodies of water located in the study area include Lake Boudreaux, Lake Felicity, Bayou Terrebonne, Bayou Pointe aux Chenes, Bayou du Large, and many others including numerous oil field canals. The Mandalay NWR and the Pointe aux Chenes WMA are located within the study area. The Lower Atchafalaya Basin and the Wisner WMAs

are also located in the vicinity. Most of the study area is comprised of brackish and saline marshes with some forested wetlands and uplands. Recreational facilities include camps, marinas, boat launch ramps, and small neighborhood parks.

The 4,212-acre Mandalay NWR, which is managed by the FWS, is located approximately six miles southwest of Houma, Louisiana, and approximately 55 miles southwest of New Orleans. The refuge, established in1996 in Terrebonne Parish, Louisiana, is accessible only by boat and has a beautiful freshwater marsh with ponds, levees, and manmade canals. The 34,488-acre Pointe aux Chenes WMA, managed by the LDWF, is in Terrebonne and Lafourche parishes approximately 15 miles southeast of Houma. Portions of Reaches J1, J2, J3, K, and L would intersect this WMA.

The extensive swamp and marsh habitats within the study area have traditionally supported substantial consumptive and non-consumptive recreational uses. The most prominent recreational activities within the study area are consumptive uses: fishing and waterfowl hunting. Limited consumptive recreation uses include recreational crabbing, shrimping, and crawfishing. Natural ridges and wooded swamp lands are also utilized for deer and small game hunting. Non-consumptive recreational activities attract far fewer participants and include birdwatching, hiking, camping, wildlife observation, boating and photography.

Like much of coastal southeast Louisiana, much of the study area has experienced substantial coastal erosion, loss of wetlands, and increasing salinity levels. These conditions are due to numerous factors, such as extensive oil and gas exploration via a maze of canals and pipelines, subsidence, and coastal storm surges. Although the study area has traditionally provided excellent saltwater fishing, in recent years, because of the increased salinity levels, anglers have been able to catch saltwater species much farther inland than in the past.

Factors contributing to the high proportion of boating activity for fishing include the high quality of the recreational fishery, especially an abundance of red fish and trout. Pleasure boating occurs to a lesser degree than boat fishing. One indicator of the amount of recreational fishing occurring in the study area is the number of recreational boats registered in the two parishes. In 2019, within the parishes of Lafourche and Terrebonne, there were 26,666 registered boats, 52,487 resident fishing licenses, and nearly 9,510 resident hunting licenses issued by the State of Louisiana.

Tables 5-10 through 5-12 below show the number of fishing licenses, hunting licenses, and boat registrations, respectively, within the study area. The fishing and hunting license and boat registration data are provided by the Louisiana Department of Wildlife and Fisheries (2024).

Table 5-10. Fishing Licenses Sold in the Vicinity of the Study Area - Fiscal Year 2019

Parish	Resident Freshwater	Resident Saltwater	Non-resident Freshwater	Non-resident Saltwater
Lafourche	12,071	11,085	52	48
Terrebonne	14,960	14,371	89	87
State / Parish Average	5,049	3,106	37	29

Table 5-11. Active Boat Registrations in the Vicinity of the Study Area - Fiscal Year 2019

Parish	Boat Registrations
Lafourche	12,010
Terrebonne	14,656
State / Parish Average	4,716

Table 5-12. Hunting Licenses Sold in the Vicinity of the Study Area - Fiscal Year 2019

Parish	Resident	Non-resident	Resident Duck Only	Non-resident Duck Only
Lafourche	2,821	1	1,549	1
Terrebonne	3,216	2	1,924	2
State / Parish Average	2,032	3	682	2

5.15 SOCIOECONOMICS

5.15.1 Population

Population and household characteristics in the region determine consumption patterns, land use activities, and future development patterns. As shown in Table 5-13, throughout the 1970s, the Lafourche and Terrebonne Parishes experienced significant growth; from 1970 to 1980 populations grew by 20.8 percent and 24.8 percent respectively. Population continued to grow steadily through 2010 and was relatively stable from 2010 to 2020. Not all communities within Lafourche and Terrebonne parishes experienced population growth, however. For example, based on 2005-2009 U.S. Census Bureau data presented in the 2013 PACR/RPEIS, the population of smaller communities in the study area located closer to the coast including Lockport, Raceland, Chauvin, Dulac, and Montegut declined, while the population of larger communities farther from the coast including Houma, Thibodaux, and Shriever (see Figure 1-1) experienced population growth. These population trends were likely driven by major flooding and storm events that occurred during this time period (see Section 5.2.2). Overall parish populations are forecasted to continue to increase through 2040 (see Table 5-12). The largest population center in the study area is Houma. According to the American Community Survey 2023, the population of Houma was 32,760.

Table. 5-13. Populations and Households

Population (1,000s)								
Parish	1970	1980	1990	2000	2010	2020	2030	2040
Terrebonne	76.17	95.09	97.04	104.76	111.55	114.46	115.31	115.88
Lafourche	69.05	83.47	85.81	89.78	96.68	98.66	99.22	99.50
Number of Households (1,000s)								
Parish	1970	1980	1990	2000	2010	2020	2030	2040
Terrebonne	19.60	29.50	31.86	36.16	40.02	43.05	45.37	47.19
Lafourche	18.01	25.70	28.82	32.05	35.65	38.09	40.03	41.52
Source: U.S. Bureau of Economic Analysis (BEA); U.S. Census Bureau (BOC); Moody Analytics (ECCA) Forecast (2024)								

5.15.2 Households

Table 5-13 shows trends and forecasts in the number of households in Terrebonne and Lafourche parishes from 1970 to 2045. The number of households increased by an average of 4 percent every year between 1970 and 1980. In the following decades, the two parishes experienced steady growth, closely mirroring trends in population. In most recent years, the number of households in Lafourche Parish increased from 35,650 in 2010 to 38,090 in 2020 (6.8 percent increase) and the number of households in Terrebonne Parish increased from 40,020 in 2010 to 43,050 in 2020 (7.6 percent increase). According to the American Community Survey 2023, the number of households in Houma was 15,193. Projected data estimates that the number of households in the study area will continue to increase. The number of households in Lafourche Parish is expected to reach 41,520 by the year 2040 and the number of households in Terrebonne Parish is expected to reach 46,320.

5.15.3 Labor and Employment

5.15.3.1 Labor Force

Labor and employment numbers illustrate the level the economic activity in the two study-area parishes. The labor force includes all citizens over the age of 16 employed or actively seeking employment. Table 5-14 displays the total labor force in the parishes from 1990-2040. Employment trends in the parishes are strongly influenced by the oil and gas industry; meaning employment is highly sensitive to booms and busts in the oil and gas industry. For example, the price of oil declined sharply in the late 1990s and, in response, the labor force in Terrebonne Parish declined by 4 percent and the labor force in Lafourche Parish declined by 3 percent. Similar trends occurred in the years following a sharp decline in oil prices in 2008 and 2014. Moody Analytics predicts that the labor force will flatten out over the next 20 years.

Table 14. Labor and Employment

Labor Force (1,000s)						
Parish	1990	2000	2010	2020	2030	2040
Terrebonne	40.52	45.88	50.91	50.53	49.80	50.37
Lafourche	36.71	41.14	45.07	44.46	43.74	44.15
Unemployment Rate (%)						
Parish	1990	2000	2010	2020	2030	2040
Terrebonne	4.36	4.65	6.47	8.20	7.17	7.08
Lafourche	4.09	4.49	6.14	6.90	6.50	6.42
Louisiana	6.18	5.28	7.94	8.70	7.05	6.69
Source: U.S. Bureau of Economic Analysis; U.S. Census Bureau; Moody Analytics ECCA Forecast (2024)						

5.15.3.2 Unemployment Rate

The unemployment rate is the percentage of people that are unemployed out of the total labor force. The unemployment rate is another proxy for the overall health of the economy. Table 5-13 shows trends and forecasts in the unemployment rate for Terrebonne and Lafourche parishes as well as the total unemployment rate for state of Louisiana.

Overall, the unemployment rate in the study area is relatively low as compared to the unemployment rate of the state of Louisiana. As mentioned previously, historically, employment in Terrebonne and Lafourche parishes has been tied to the oil and gas industry, though the unemployment rate is much more sensitive to changes to the market than the labor force because people only drop out of the labor force when economic conditions are so bad that they stop seeking employment altogether. The spikes in unemployment correspond with an overall decline in the price of oil. There are significant increases in the unemployment rate in 1992, 2000, 2005, post-2008, 2015, and 2020. Moody's Analytics estimates that the unemployment will flatten out over the next 20 years.

5.15.3.3 Employment by Industry

The type of employment in the study area gives us an idea of what industries are important. Table 5-15 shows the employment by industry for Terrebonne and Lafourche parishes. The biggest industry is the trade, transportation, and utilities industry. Historically, Terrebonne Parish heavily relied on the natural resources and mining industry. After the collapse of oil in the 1980s, Terrebonne Parish began to diversify, and employment in industries like government, manufacturing, and health/education services became more popular. Popular industries in Lafourche Parish include government, manufacturing, and professional/ business services. The natural resource and mining industry pays the highest wages in the parishes. According to the 2023 American Community Survey, retail trade is the most common industry in Terrebonne Parish followed by healthcare/social assistance, mining, quarrying, oil and gas extraction, and food service industries. The most common industries

in Lafourche Parish include healthcare/social assistance, manufacturing, retail trade, and construction. Trade, transportation, and utilities are expected to remain the most popular industry in the parishes followed by healthcare/education services and government.

Table 5-15. Employment by Industry (1,000s) 1970 - 2024

Terrebonne Parish				
Industry	**1970**	**1990**	**2010**	**2040**
Natural Resources and Mining	4.57	4.69	5.44	4.36
Construction	1.48	2.06	3.14	2.93
Manufacturing	2.98	2.75	5.94	4.39
Trade; Transportation; and Utilities	6.10	8.57	12.33	11.33
Information	0.50	0.44	0.40	0.39
Financial Activities	1.13	2.12	2.90	2.97
Professional and Business Services	0.94	1.70	5.62	6.30
Education & Health Services	0.94	3.31	5.47	8.37
Leisure and Hospitality	1.37	3.11	4.81	5.13
Other Services	0.65	1.12	1.84	1.39
Government	3.75	5.90	6.99	6.03
Lafourche Parish				
Industry	**1970**	**1990**	**2010**	**2040**
Natural Resources and Mining	1.18	1.24	1.50	1.26
Construction	0.57	0.67	2.15	1.79
Manufacturing	2.45	2.19	2.58	2.12
Trade; Transportation; and Utilities	4.79	6.50	11.79	10.34
Information	0.14	0.35	0.25	0.26
Financial Activities	1.01	2.03	1.92	1.53
Professional and Business Services	0.54	1.21	3.61	3.01
Education & Health Services	0.44	1.27	3.09	3.84
Leisure and Hospitality	0.52	1.10	2.70	2.81
Other Services	0.36	0.56	0.69	0.64
Government	2.92	4.93	7.24	7.44
Source: U.S. Bureau of Economic Analysis; U.S. Census Bureau; Moody Analytics ECCA Forecast (2024)				

5.15.3.4 Public Facilities and Services

Public and quasi-public facilities and services in the study area include medical facilities, schools, police stations/sheriff's offices, and fire stations. According to 2023 EPA data, there are eight hospitals in the study area. Lafourche Parish has five police stations/sheriff's offices, and a juvenile justice facility located within the study area and Terrebonne Parish has three police stations/sheriff's offices, according to 2018 ESRI data (ArcGIS ESRI Open Data). There are 48 fire stations located within the study area—18 in Lafourche Parish and 30 in Terrebonne Parish. Public and quasi-public facilities and services in the study area also include an extensive network of pumps and levees for flood risk reduction, and a series of navigation canals, including the GIWW, the HNC, and Bayou Lafourche.

5.15.4 Income Per Capita

Income per capita serves as a proxy for regional and community economic growth. Table 5-16 shows the income per capita for Terrebonne and Lafourche parishes for the years 1970, 1980, 1990, 2000, 2010, 2020, 2030, and 2040. Income per capita increased throughout the past 50 years in response to economic growth and inflation.

Table 5-16. Income Per Capita ($), 1970 - 2024

	1970	1980	1990	2000	2010	2020	2030	2040
Parish								
Terrebonne	2,953	9,571	13,307	20,821	38,788	50,482	71,469	103,019
Lafourche	2,829	9,200	13,239	23,485	40,391	50,061	65,374	86,354
Source: U.S. Bureau of Economic Analysis; U.S. Census Bureau; Moody Analytics (ECCA) Forecast								

5.15.5 Tax Revenues and Property Values

If hurricanes significantly impact businesses, industries, farms, property values, local employment, and income, the tax base created by these activities could be impacted as well. Existing local levees reduce risks associated with storm surge and flooding during tropical events, which has corresponding positive impacts on property values. However, because the existing levees do not provide hurricane and coastal storm damage risk reduction for significant storm events (up to the 1% AEP (100-year storm) event), property value growth could be limited in areas sensitive to storm damage. According to the U.S. Census Bureau, the average median value of owner-occupied homes in Lafourche Parish between 2019-2023 was estimated to be $190,800 (compared with the state average of $208,700 in 2023). The average median value of owner-occupied homes in Terrebonne Parish during this same period was estimated to be $189,100.

5.15.6 Community Cohesion

Community cohesion is the unifying force of a group due to one or more characteristics that provide commonality. These characteristics may include such commonality as race, education, income, ethnicity, religion, language, and mutual economic and social benefits. Community cohesion is the force that keeps group members together long enough to establish meaningful interactions, common institutions, and agreed upon ways of behavior. It is a dynamic process, changing as the physical and human environment changes. The changes brought about by water resource developments can impact community cohesion in different ways. For example, changing the alignment of a levee may divide a community; it may cause the dislocations of a significant number of residents; or it may require the relocation of an important local institution, such as a church or community center. On the other hand, a water resource development, such as construction of a levee, can represent an important public works project heavily supported by the local community.

The presence of social institutions such as libraries, places of worship, and schools provide residents an opportunity for civic participation and engagement, which increases community cohesion. The study area is comprised of settled communities with stable complements of places of worship, schools, and community interaction. According to 2023 EPA data, there are 31 schools and 98 places of worship in the study area.

5.15.7 Transportation

Several major highways are located within the study area. For example, in Terrebonne Parish, Highways 315, 661, 57, 56, and 55 run in a north-south direction through the study area boundaries while Highways 24, 90, 182, 309, 311, 316, 3040, 659, 660, and 58 run in an east-west direction. In Lafourche Parish, Highway 24 runs in an east-west direction through Proposed Action features. In addition, numerous smaller highways and local streets are within the study area. A series of navigation canals, including the HNC and the GIWW, are also located within the study area as well as the Port of Terrebonne. The HNC is Houma's 26-mile direct waterway route to the Gulf of America from the GIWW. The GIWW is a navigable inland waterway that passes through Terrebonne Parish in an east-west direction. The Port of Terrebonne, located in Houma roughly 26 miles north of the Gulf of America at the convergence of the HNC and GIWW, is classified as a medium draft port and has 400 acres of leasable, waterfront acres. The port is connected (via the HNC and GIWW) to ports and docks along the U.S. gulf coast and other markets. The Houma-Terrebonne Airport and Industrial Park is also located within the study area. The airport provides easy access to the Gulf of America and to the Central and South American markets.

5.16 CULTURAL RESOURCES

Cultural resources assessments and surveys have been conducted in lower Terrebonne Parish since 1926. The most recent and synthesized of these are Weinstein and Kelley

(1992), Brown et al. (2000), and Moreno et al. (2011). Numerous earthen mounds and shell middens have been located and recorded. Prehistoric settlement in lower Terrebonne Parish dates as early as the Marksville Period (A.D. 1 – 400) and includes mound sites, hamlets, and shell middens. Societies in the study area subsisted on marsh resources such as clams, fish, mammals, birds, and reptiles, while shellfish were also utilized as a food source and to provide a base on which to settle. By the Coles Creek Period (A.D. 700 – 1200), settlements in the region may have been organized as major mound sites surrounded by satellite villages and seasonal camps. Villages were concentrated on stable levee surfaces or at the confluence of distributaries. Both year-round occupation and seasonal movement have been suggested for the inhabitants of the area. During Plaquemine times (A.D. 1200 – 1700), the settlement pattern suggests a complex social hierarchy, with large ceremonial sites composed of multiple mounds surrounding a central plaza, and smaller villages and hamlets scattered throughout the area. Non-mound sites that have been located are on elevated natural levees and seem to have focused on the cultivation of crops. The majority of known prehistoric sites located in the vicinity of the study area date to this late prehistoric period and suggest a significant occupation of the region.

The early historic period in southeast Louisiana is marked by increasing settlement and European dealings with Native American Tribes. Early French writings describe a native cultural landscape of small tribal groups and shifting alliances. The most is known about the Chitimacha Indians, a federally recognized Native American Tribe that claims ties to much of south Louisiana as its ancestral homeland and is currently clustered around Charenton in St. Mary Parish. In addition to the many ancient Chitimacha village locations recorded in State Records, the Chitimacha Indians remember, respect, and maintain numerous traditional cultural properties within south Louisiana.

Although it is generally accepted that the Houma Indians were located near the confluence of the Red and Mississippi rivers during the early historic period, some historic accounts suggest that they were virtually wiped out by fighting and other causes of death during the years at the end of the 17th century and the beginning of the 18th century. By the middle of the 20th century, the Houma had grown and were settled in Terrebonne and Lafourche parishes. Descendants of these people are organized today as the United Houma Nation but are not federally recognized as a Native American Tribe.

After early European exploration of the area, the French began colonization efforts in the early 18th century. Settlement was sparse until the Acadians began arriving circa 1765, and their influence persisted throughout the Antebellum Era. The Civil War left the Proposed Action vicinity relatively unaffected, but after the Civil War, south Louisiana had a hard task of recovery following the abolition of slave labor and war-related destruction of levees. New plantations and new economies began to develop. By the late 19th century, small communities were emerging along the bayous. Population fluctuations took place as people of color, the predominant population before the Civil War, migrated outward to seek more opportunities.

The growth of the sugar industry was a boom to the area, and in 1917 the first commercial gas well struck near Montegut. Numerous oil and gas fields dot the region today. The shrimping industry grew as innovations occurred that allowed greater catches to be more easily retrieved and distributed. Canal systems and the GIWW have made a large portion of the Proposed Action vicinity navigable by water, which has aided in the distribution of all resources. Today, the Proposed Action vicinity is a vital economic area with diverse productive strategies and diverse peoples.

These prehistoric and historic peoples and activities have left behind many material remains throughout the study area. These signs of settlement or activity are collectively termed "historic properties" by the NHPA.

There are recorded historic properties throughout the alignment discussed in this SEIS. There may be other historic properties, not yet discovered or recorded, in areas that have not yet been surveyed by Phase 1 standards. A Phase 1 cultural resources survey for the Reach A EA (USACE 2024) was completed in late 2023, and a determination of No Historic Properties Affected was coordinated with the Louisiana State Historic Preservation Office (SHPO) and with federally recognized Tribes, dated December 15, 2023 . A Phase 1 cultural resource survey for Reach F and associated borrow pits was completed in mid-2025, and a determination of No Adverse Effect to Historic Properties was coordinated with the SHPO and federally recognized Tribes, dated July 17, 2025. Other Phase 1 cultural resource surveys are in planning stages to occur for levee alignments and/or for borrow sources, access, and similar features. A Programmatic Agreement will serve as the governing mechanism for anticipated NHPA Section 106 studies and surveys, as described in Section 6.16.

5.17 TRIBAL RESOURCES

In addition to cultural resources or historic properties considered eligible for the National Register of Historic Places, USACE's 2023 Tribal Consultation Policy requires the USACE to determine whether Tribal rights, Tribal lands, and protected Tribal resources would be significantly adversely affected by the Proposed Action (see Table 5-17). The USACE uses an inclusive approach to consultation and coordination. Five federally recognized Tribes have an aboriginal/historic interest in the watershed. The Tribes are: 1) the Chitimacha Tribe of Louisiana, 2) the Coushatta Tribe of Louisiana, 3) the Jena Band of Choctaw Indians, 4) the Mississippi Band of Choctaw Indians, and 5) the Tunica-Biloxi Tribe of Louisiana.

Table 5-17. 2023 USACE Tribal Consultation Policy Definitions.

Category	Definition
Tribal rights:	Those rights legally accruing to a federally recognized Tribe or Tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaties, statutes, judicial decisions, EOs or agreement and that give rise to legally enforceable

Category	Definition
	remedies.
Tribal lands	Any lands title to which is: either held in trust by the United States for the benefit of any federally recognized Indian Tribe or individual or held by any federally recognized Indian Tribe or individual subject to restrictions by the United States against alienation.
Protected Tribal resources	Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Tribal lands, retained by, or reserved by or for, federally recognized Tribes through treaties, statutes, judicial decisions or EOs.
Source: EO 13175, Section 7	

According to available government records, there are no tribal lands, nor are there specific tribal treaty rights related to access or traditional use of the natural resources in the watershed. There are, however, many protected tribal resources within the watershed representing pre-contact utilization of the landscape, burial practices, and continued historic period occupation. The Chetemaches (Chitimacha Tribe of Louisiana) is noted as having "old villages" along Bayou Lafourche and near present day Plaquemine Louisiana, but no detail is provided along Bayou Terrebonne. Native American occupation of the area clustered along the Bayou Grande and Petit Calliou and other older landforms in the area. There are resident state recognized Tribes located in the watershed, as discussed below.

To augment background research into the interested federally recognized Tribes and the types of tribal resources that have the potential to be within the watershed, the USACE consulted with federally recognized Indian Tribes on actions having the potential to significantly affect protected tribal resources, tribal rights, or Indian lands via the NHPA Section 106 consultation letter (see Appendix J). Coordination through the Section 106 consultation process revealed that cultural resources are the primary tribal concerns within the watershed; no new tribal lands or tribal treaty rights were identified.

The state recognized Tribes located within the watershed including the Bayou Lafourche, Grand Calliou/Dulac Band of Biloxi-Chitimacha-Choctaw, Isle de Jean Charles, Pointe-au-Chien, and United Houma Nation (see Figure 5-5). The State of Louisiana administers and maintains state tribal recognition through the Office of Indian Affairs Native American Commission and the State of Louisiana's Office of Community Development also frequently coordinates the Tribes, overseeing programs and community outreach efforts for state and federal projects. The Office of Community Development is overseeing the Isle de Jean Charles (IDJC) Resettlement, which is a U.S. Housing and Urban Development Community Block Grant funded-program to relocate Isle de Jean Charles tribal members from their island up to the inland town of Schriever. The U.S. Census Bureau also records and delineates the location of state recognized Tribe in coordination with the State of Louisiana's Office of Indian Affairs. The State Designated Tribal Statistical Areas (SDTSA) of the resident Tribes are depicted within the watershed in Figure 5-5. USACE engaged with the Grand Calliou/Dulac Band of Biloxi-Chitimacha-Choctaw, Pointe-au-Chien, and Grand

Bayou Indian Village state recognized Tribes and the Office of Community Development about Proposed Action on 8 May 2023. USACE then notified all state recognized Tribes within the watershed of the public scoping meetings held on 19 July 2023. Per the USACE Tribal Consultation Policy, 5 December 2023, and EO 13175, engagement with state recognized Tribes does not constitute consultation. The meeting documented comments from only two state recognized Tribes within the watershed, the United Houma Nation and the Grand Caillou/Dulac Band of Biloxi-Chitimacha-Choctaw. Representatives from both state recognized Tribes stated their interest in being informed of the proposed borrow pit locations and construction traffic routes so they could communicate the information to their Tribal members.

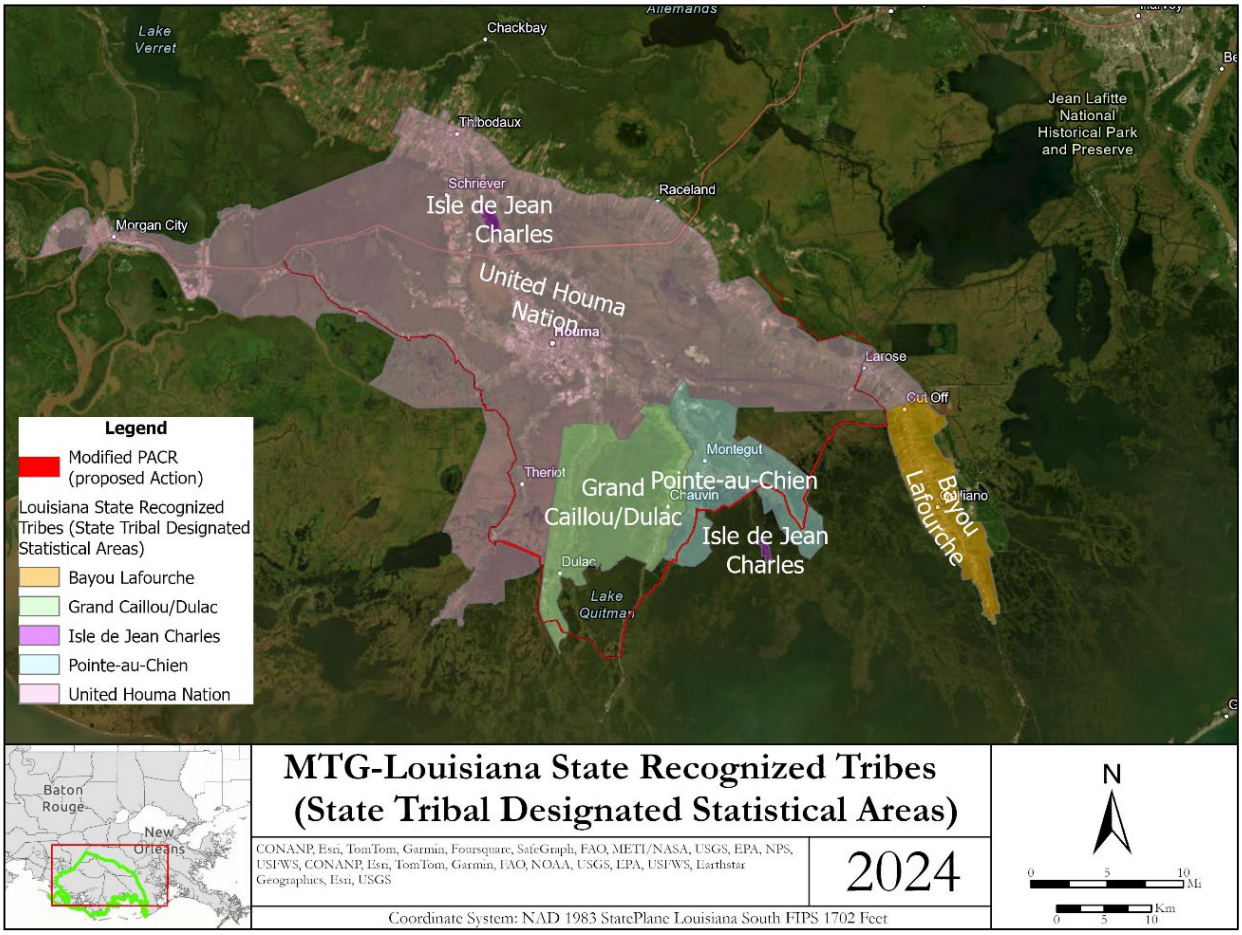


Figure 5-5. Louisiana State Recognized Tribes within the watershed and Morganza to the Gulf Study Area.

THIS PAGE INTENTIONALLY LEFT BLANK

6 Environmental Consequences

6.1 INTRODUCTION

This section analyzes the potential environmental impacts that may result from the construction, operation, and maintenance of the Proposed Action including levees, structures, borrow sites, access roads, staging areas, and compensatory mitigation sites. The impact analysis is a comparison between the No Action Alternative and the Proposed Action. Preparation of this SEIS began prior to the recission of the Council on Environmental Quality's former NEPA-implementing regulations (40 CFR Parts 1500-1508) and the former USACE NEPA ER 200-2-2. This SEIS was completed in accordance with the NEPA (42 USC Part 4321, et seq.) and was informed by new administration policies and Department of Defense implementing procedures.

6.1.1 Approach to Evaluation of Environmental Consequences

The analysis includes discussion of direct, indirect, and cumulative impacts*;* the relationship between short-term uses and long-term productivity; and any irreversible or irretrievable commitments of resources. This SEIS focuses on the footprint and operation of the proposed 2085 levee/structure designs to fully assess and mitigate for all potential project impacts.

Direct impacts assessed in this SEIS would arise during the construction of the Proposed Action (2027-2035) and shortly thereafter. For certain resources, such as wetlands and water quality, direct impacts specifically involve changes within the Proposed Action footprint and its immediate vicinity. For other resources, such as socioeconomics, direct impacts include effects such as increased traffic from haul trucks or other activities throughout the anticipated construction period. However, the timing of construction is contingent on availability of funds (as described in Section 3.3.6. As such, the duration of direct impacts may extend beyond 2035.

This SEIS also assesses the long-term, indirect impacts on hydrology, induced flooding, and habitats of the fully constructed MTG Project (including all reaches and structures). For most resources, these impacts would extend beyond the immediate construction area and last throughout the 50-year performance period.

Cumulative impacts are the effects on the environment that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from actions that individually are minor but collectively result in significant actions taking place over time. The cumulative impact analysis is provided in Section 6.18.

6.1.2 Overview of Modeling Conducted for Impact Analysis

Hydrologic modeling was conducted by the Engineer Research and Development Center (ERDC) and CEMVN to assess Proposed Action impacts to hydrodynamics and flooding. Table 6-1 and Sections 6.1.2.1 through 6.1.2.5 summarize the models used; refer to Appendix E for the modeling reports. The NFS has stated it would provide additional wetland impact modeling for the MTG Project. The CEMVN would evaluate the modeling for compliance with USACE technical and policy requirements and, if it satisfies those criteria, would consider using it to assess impacts to wetland resources.

Table 6-1. Summary of Modeling Conducting for Environmental Impact Analysis

Model	Description	Purpose
Adaptive Hydraulics Modelling (AdH)	Finite Element based model that can be used in combination with PTM (described below). Update of McAlpin et al., 2013.	Assess for salinity and discharge for historic (2004), existing (2020, but structures up to 2015), and future conditions (2035, 2085). Due to model domain constraints, only relative changes in salinity were used to inform impact analysis on biological/ecological resources in the SEIS
Particle Tracking Model (PTM)	PTM is a Lagrangian particle tracker that facilitates the simulation of particle transport processes. For this study, AdH hydrodynamic output served as the input for PTM. PTM specifically characterizes larval marine species particles as neutrally buoyant (passive particles) while integrating distinct behaviors.	Two month-long periods— March and September—were chosen. The goals were to address the questions below: 1. How does the updated proposed design impact larval aquatic organism recruitment? 2. How does the updated proposed design impact larval aquatic organism transport through the proposed structures? 3. How will this assessment differ if seal level change is considered?
HEC-RAS 2023)	A series of two-dimensional unsteady flow simulations using HEC-RAS version 6.3.1 were completed.	Determine the resulting inundation throughout the Morganza to the Gulf study area based on frequency precipitation, storm surge, and lateral Atchafalaya inflow for the 50%, 20%, 10%, 4%, 2%, 1%, 0.5%, and 0.2% AEP events. The model was analyzed for the No Action and Proposed Action alternatives.
Coastal Storm Modeling System (CSTORM-MS)	CSTORM-MS integrates the Advanced Circulation (ADCIRC) model and the Simulating Waves Nearshore (SWAN) model to simulate storm surge and wave dynamics.	Assess storm-induced flooding risks across both near-term (base year 2035) and long-term (future year 2085) periods of analysis.
HEC-RAS 2025 (Indirect Impacts)	HEC-RAS version 6.6 modeling was completed.	Determine the hydrologic and hydraulic changes in typical conditions that could have impacts to significant habitats. Two observed tidal periods were assessed: December 2023 because it had typical cold front patterns and April 2023 because it had typical spring tidal signals. Observed precipitation and wind were applied to both. The probabilistic 5%, 10%, and 20% AEP rainfall events were assessed.

6.1.2.1 Induced Flooding Impacts: CSTORM-MS

The CSTORM-MS model integrates the Advanced Circulation (ADCIRC) and the Simulating Waves Nearshore (SWAN) models to simulate storm surge and wave dynamics using a reduced storm suite of 100 synthetic tropical cyclones from the Coastal Hazards System for Louisiana (CHS-LA) database. Hydrodynamic simulations were performed on the No Action Alternative, Proposed Action, and historical conditions under two different sea level change scenarios using the ER 1100-2-8162 intermediate sea level change curve (2035 and 2085) and three different Mississippi River and Atchafalaya River flow rates for a combination of 18 different modeled scenarios and a total of 1,800 numerical model simulations (100 synthetic storms x 3 project conditions x 2 sea level change scenarios x 3 river flow rates). Additionally, the 100 simulations for each different modeled scenario are then used to generate probabilistic evaluations of storm surge and wave hazards to create Annual Exceedance Frequencies (AEFs) at each model node for each of the 18 different modeled scenarios. These annual AEFs are similar to AEPs and are often referred to as "-year storms". For instance, a 0.01 AFE is analogous to a 1% AEP and a 100-year storm. The model report is included in Appendix E.

6.1.2.2 Hydraulics inside the MTG System: HEC-RAS 2023

HEC-RAS model version 6.3.1 was used to analyze water levels in the vicinity of the MTG study area based on storm surge events and rainfall. Two terrain conditions were modeled, existing (circa 2019-2021), and proposed (MTG levee system) for two sea level change scenarios (2035 and 2085). It should be noted that the proposed condition terrain used proposed structure information from the 2013 PACR with updated designs in the 2021 EDR economic analysis (USACE 2021). Tropical storm events modeled included the 50%, 20%, 10%, 4%, 2%, 1%, 0.5%, and 0.2% AEP events. To estimate these events, a storm surge boundary hydrograph was developed from the peak frequency storm surge elevations in the 2020 Morganza to the Gulf Storm Surge Assessment Report for five locations spanning from Eastern Barataria Basin near Point a la Hache, LA to Grand Chenier, LA. Many local pump stations were added to the model using Google Earth Imagery and estimated pumping capacities based on site. These simulations had results on the interior and exterior of the system, but the results of the CSTORM-MS are likely more accurate for exterior conditions. The model report is included in Appendix E.

6.1.2.3 Hydrodynamic and Salinity Impacts: AdH

ERDC conducted Adaptive Hydraulics Modelling (AdH) modeling in 2024 with multiple year-long simulations using observed data from 2004. The purpose was to simulate hydrodynamic and salinity conditions for the historic (2004), existing (2020), but structures up to 2015) and Proposed Action conditions for two sea level change scenarios (2035 and 2085). It also assessed for effects of HNC Lock operation by modeling it as open or closed for existing and Proposed Action modeling, resulting in 10 model scenario runs (Table 6-2).

AdH is a Finite Element-based model, and these simulations were used in combination with PTM (See Section 6.1.2.4 for information about the PTM model). A long temporal period of resources; analyzes indirect impacts of structures built since 2004; assess historic (2004), existing (2020, but structures up to 2015), and future conditions (2035, 2085). All structures other than the HNC Lock Complex were open in all model scenarios. The model domain did not allow for an accurate assessment of potential project impacts east of Bayou Lafourche. Therefore, inference in flow and water surface elevation (WSE) outputs is limited. However, relative salinity outputs (i.e., a comparison of changes in salinity among simulations) from this modeling was used to assess Proposed Action indirect impacts to wetlands, aquatic resources, EFH, water quality, and protected species (see Sections 6.3 through 6.7). The model report is included in Appendix E.

Table 6-2. AdH Model Scenario Runs

Year (Sea Level Scenario)	HNC Lock Open/ Closed	Time Period
2035	N/A	Historic
2085	N/A	Historic
2035	Open	Existing
2085	Open	Existing
2035	Closed	Existing
2085	Closed	Existing
2035	Open	Proposed Action
2085	Open	Proposed Action
2035	Closed	Proposed Action
2085	Closed	Proposed Action

6.1.2.4 Aquatic Resources Modeling: PTM

ERDC completed modeling to assess impacts to larval aquatic organism transport using the Particle Tracking Model (PTM) based on WSEs and velocity input from AdH modeling (see Section 6.1.2.3). Larval transport impacts were compared for historic conditions, the No Action Alternative, and the Proposed Action with the HNC Lock Complex either open or closed. All model scenarios assumed that all other structures and environmental control structures were open. This modeling was used to assess Proposed Action indirect impacts to aquatic resources (see Section 6.4). The model report is included in Appendix E.

6.1.2.5 Indirect Wetland Habitat Impacts: HEC-RAS 2025

A series of two-dimensional unsteady flow simulations aimed at understanding potential changes in WSEs, drainage, and flow during typical tidal and meteorological conditions that could have impacts to significant habitat using HEC-RAS version 6.6 were completed for

typical observed data and probabilistic rainfall events. The probabilistic 4%, 10%, and 20% AEP rainfall events were used. Simulations for each of the scenarios discussed below were modeled for the Proposed Action and No Action Alternative conditions for the 2035 and 2085 sea level change scenarios. All structures were open.

Typical cold front and spring tidal events were modeled using observed data using observed water levels and meteorological data from December and April 2023, respectively. Observed daily flows from the USGS gage Atchafalaya River at Simmesport, LA (USGS 07381490), observed European Centre for Medium-Range Weather Forecast atmospheric reanalysis (ECMWF-ERA5) hourly winds, observed hourly precipitation from NOAA, and observed hourly water levels from the CRMS 0347 gage were used. The model report is included in Appendix E.

6.1.3 Impact Analysis of Habitat Mitigation Sites

Though the USACE would implement measures to avoid and minimize impacts to significant resources, construction and operation of the Proposed Action would result in adverse impacts to BLH, swamp, fresh/intermediate marsh, and brackish/saline marsh, as described in detail in Section 6.3 Wetlands. A compensatory habitat mitigation plan was developed to fully compensate for project impacts to wetland habitats. As summarized in Section 4.2, a final array of mitigation alternatives for each type of impacted habitat was developed and evaluated to identify a TSP mitigation alternative for each habitat type. The detailed mitigation plan is included in Appendix C and includes the methodologies, site selection criteria, and habitat assessment results used to select and evaluate the TSP mitigation plan. The TSP mitigation alternative for each habitat type consists of a combination of the purchase of mitigation bank credits and/or the implementation of a USACE-construction mitigation project. Mitigation bank credits would be purchased from USACE Regulatory Program-approved mitigation banks with perpetual conservation servitudes within the same watershed as the Proposed Action (see Section 4.2.1 for more information about this mitigation alternative). The direct and indirect impacts of purchasing mitigation bank credits is common for all habitat types and is described here. Because permitted banks exist under No Action Alternative conditions, no new direct, indirect, or cumulative impacts to hydrology, wetlands, fisheries, aquatic resources, EFH, wildlife, protected species, farmland, water quality, HTRW, air quality, noise and vibration, aesthetic resources, recreation and public lands, socioeconomics, and cultural and tribal resources would be incurred from the purchase of mitigation bank credits for Proposed Action mitigation. As such, this alternative is not further assessed in the following sections.

6.2 HYDROLOGY, INCLUDING STORM SURGE AND FLOODING

6.2.1 Storm Surge and Flooding during Storm Events

6.2.1.1 No Action Alternative

Based on a comparison of historic conditions and No Action Alternative conditions modeled in the CSTORM-MS (Appendix E), the natural hydrologic condition of the study area has been significantly impacted by the construction of NFS levees. Historically, prior to the construction of NFS levees, stormwater was able to disperse broadly across the landscape. The current NFS levee configurations cause water to accumulate—or "stack"—along the exterior of the levees during certain storm events, resulting in higher water levels on the flood side compared to historical conditions. Projections for future subsidence and sea level conditions in the years 2035 and 2085 indicate that storm surge intensity will increase across the study area (see Figure 6-1). Overtopping of NFS levees has occurred in the past and is likely to continue to occur during tropical storms and hurricanes, causing flooding during storm events inside the NFS levees (see Appendix E).

Three different storm events—1% AEP (100-year), 5% AEP (20-year), and 50% AEP (2-year)—were assessed for the No Action Alternative for the future 2085 sea level change condition. The storm surge water levels simulated for year 2085 are expected to have higher storm surge and wave heights compared to 2035 conditions for similar return periods primarily because relative sea level change and land subsidence is expected to increase between 2035 and 2085. For example, storm surge elevations during a 1% AEP (100-year) storm event would be higher in 2085 than in 2035 due to relative sea level changes.

6.2.1.1.1 1% AEP (100-Year) Storm Event in Year 2085

For the 1% AEP (100-year) storm event in 2085, much of the interior of the NFS levees is projected to be inundated with 8 to 12 feet of water under No Action Alternative conditions, with maximum water levels on the interior of up to approximately 15 feet (see Figure 6-1). There is an area immediately interior of the NFS levee, west of the Larose to Golden Meadow levee, that is not projected to be inundated with water during 1% AEP (100-year) storm events in 2085 (see Figure 6-1). Water levels on the flood side of NFS levees would be between 12 and 15 feet from the Dularge, Louisiana area east to the Larose to Golden Meadow levee and extending 10 miles toward the Gulf during 1% AEP storm events in 2085.

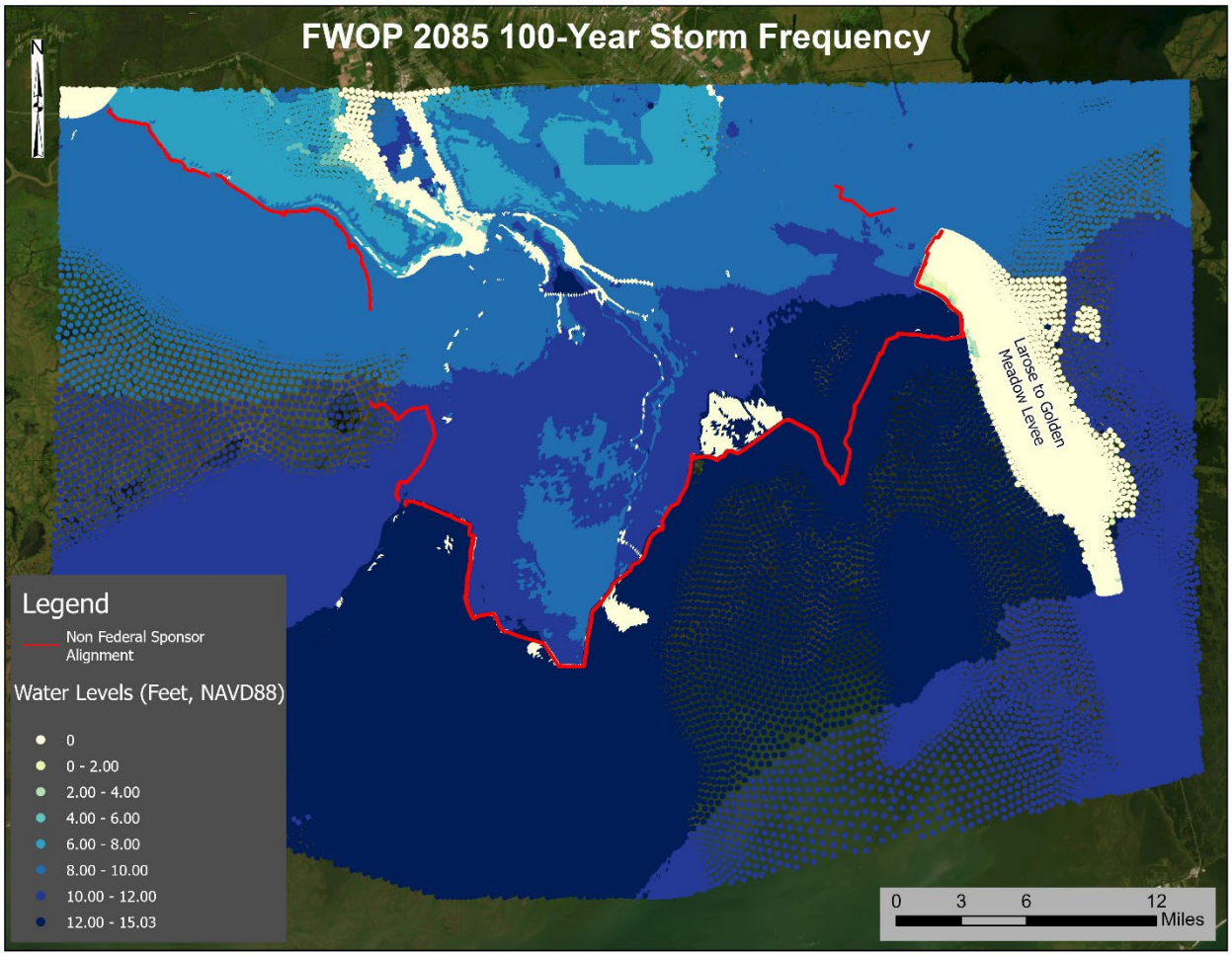


Figure 6-1. No Action Alternative Water Levels, 1% AEP (100-Year) Storm Event, 2085

6.2.1.1.2 5% AEP (20-Year) Storm Event in Year 2085

Overall, there would be lower water levels observed under the No Action Alternative condition in the 5% (20-year) storm events compared to the 1% AEP (100-year) storm event (see Figures 6-1 and 6-2). The geographic extent of inundation during 5% AEP (20-year) and 1% AEP (100-year) storm events would be similar on both the flood side and land side of the NFS levees, but maximum water levels would be lower by approximately 2 to 6 feet during 5% AEP storms as compared to 1% AEP storms. Similar to the 1% AEP event, inundation would not occur in certain areas on the flood side and land side of the NFS levees during 5% AEP storm events (see Figure 6-1 and 6-2)

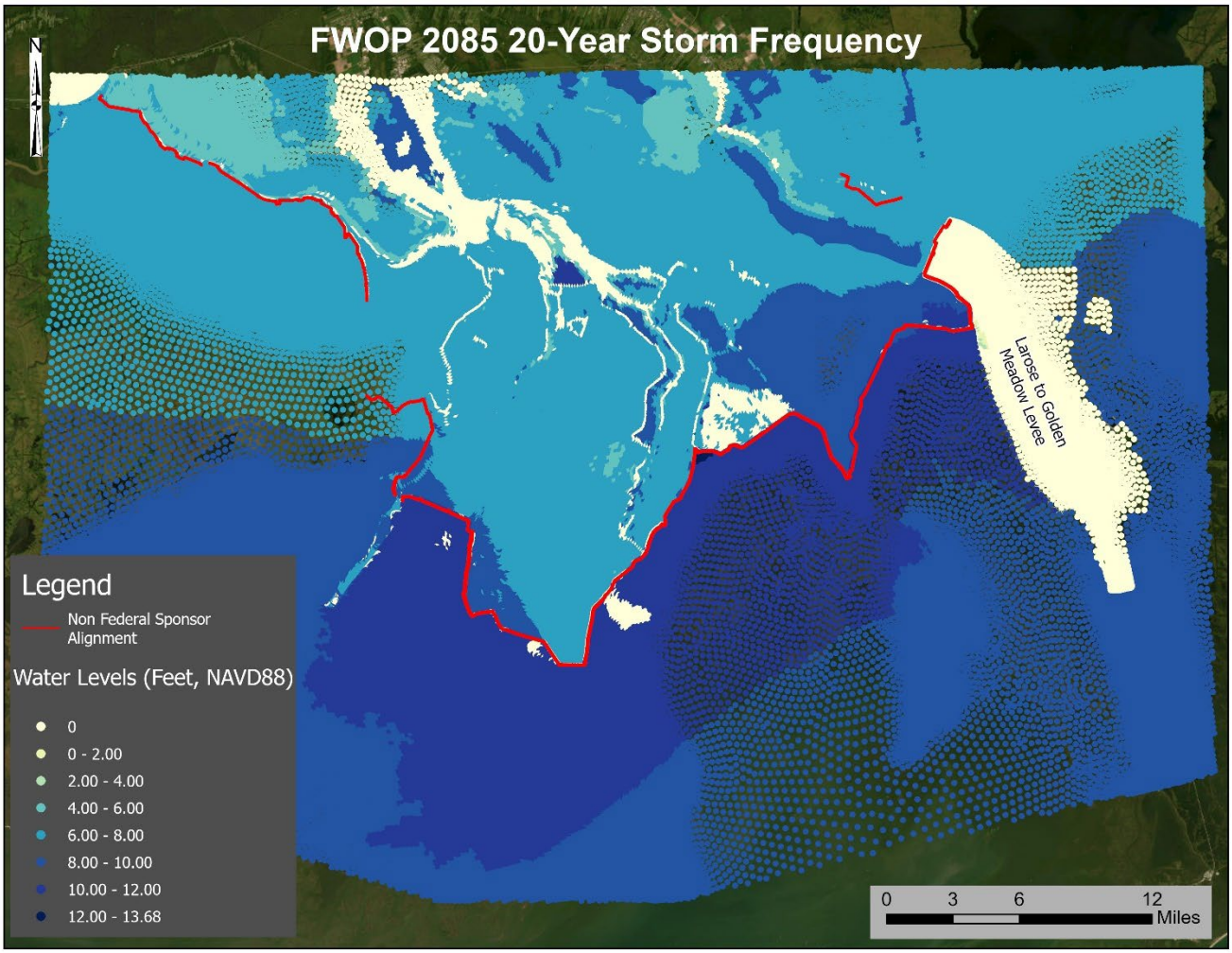


Figure 6-2. No Action Alternative Water Levels, 5% AEP (20-Year) Storm Event, 2085

6.2.1.1.3 50% AEP (2-Year) Storm Event in Year 2085

Overall, water levels would be lower during 2085 50% AEP (2-year storm) events as compared to water levels during 1% AEP (100-year) and 5% AEP (20-year) storm event scenarios (see Figure 6-1, 6-2, and 6-3). Maximum water levels would reach 9.66 feet during 50% AEP events, while maximum water levels would reach 13.68 and 15.03 feet during 5% AEP and 1% AEP storm events, respectively. As with the 1% and 5% AEP events, inundation would not occur in certain areas on the flood side and land side of the NFS levees during 50% AEP storm events (see Figures 6-1, 6-2, and 6-3), but more areas would not be inundated both on the flood and land sides of the NFS levees under the 50% AEP storm event as compared to the 1% and 5% AEP storm events..

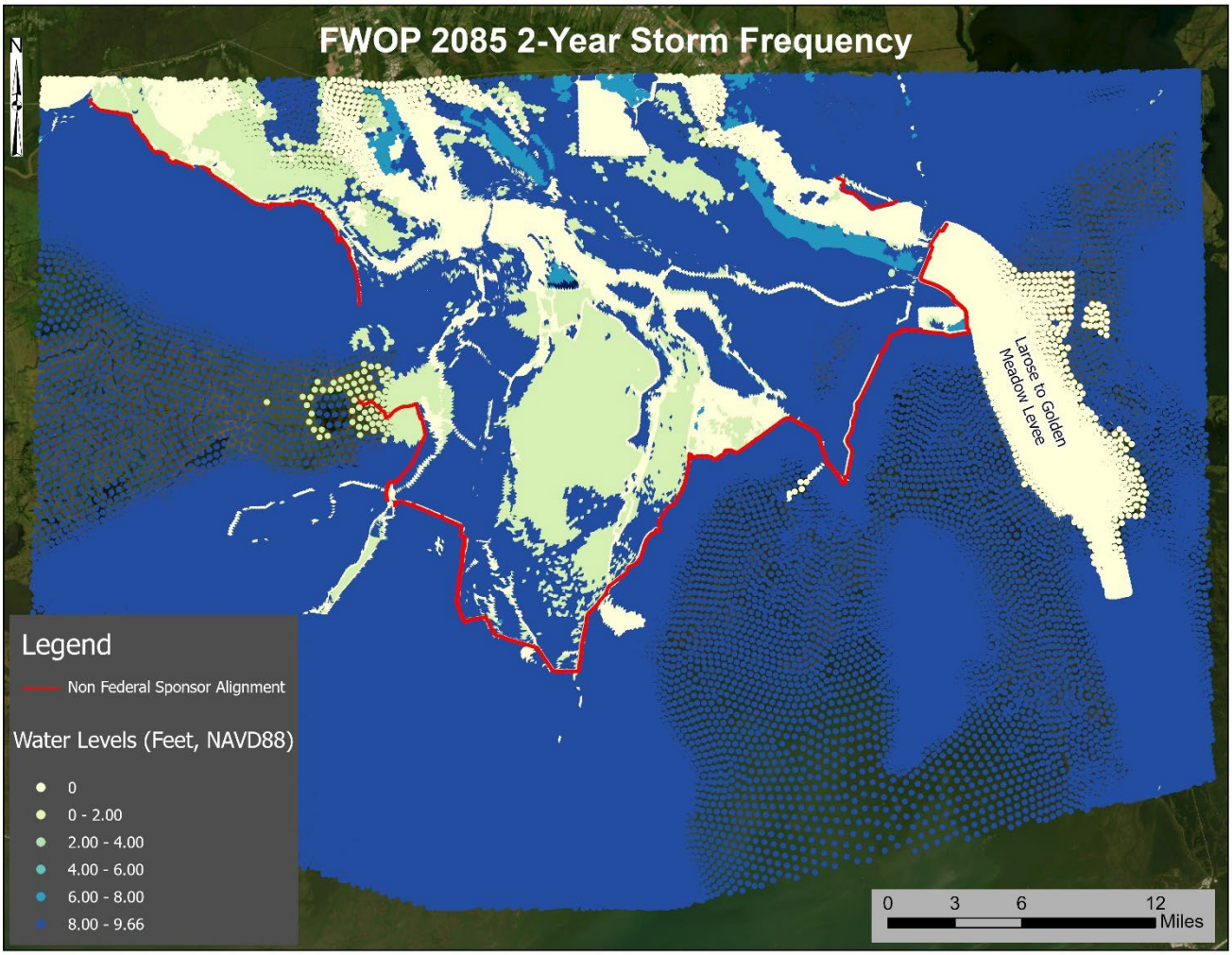


Figure 6-3. No Action Alternative Water Levels, 50% AEP (2-Year) Storm Event, 2085

6.2.1.2 Proposed Action

The purpose of the Proposed Action is to reduce the risk of catastrophic hurricane and tropical storm damages, up to the 1% AEP (100-year) storm event, by implementing an effective, comprehensive system of structural features including levees, floodwalls, gates, drainage structures, and fronting protection of existing pump stations. The Proposed Action levees would be constructed to elevations designed to prevent overtopping under these conditions, as shown in Table 1-1. A consequence of this would be increased "stacking" of storm water on the flood side of the Proposed Action levee system, compared to the No Action Alternative, during some storm events.

During storm events when the proposed levee system structures would be closed, the Proposed Action would cause increased water levels on the flood side of the levee system

for approximately 12 to 48 hours during and immediately following certain storm events that would be higher than under the No Action Alternative. Water levels would significantly decrease during these events (as compared to the No Action Alternative) inside the system because storm surge and waves would not overtop proposed levees and or flow through open structures during storms as significant as 1% AEP (100-year) storm events.

The CSTORM-MS modeling assesses many different scenarios (see report in Appendix E). The analysis presented in this section focuses on the differences between the Proposed Action and No Action Alternative conditions for three storm events, the 1% AEP (100-year), 5% AEP (20-year), and 50% AEP (2-year), to represent low, medium, and high frequency events for the 2035 and 2085 sea level change scenarios. The storm surge water levels simulated for year 2085 are expected to be higher than storm surge levels in year 2035 for similar return periods primarily because relative sea level change and land subsidence is expected to increase water levels between 2035 and 2085. See Appendix E for a detailed analysis of other scenarios.

See Section 6.15 Socioeconomics for further information about project-induced flooding impacts to communities on the flood side of the proposed MTG levee system. See Section 6.18 for information about coordination that would occur with the Isle de Jean Charles community, which would be impacted by project-induced flooding during storms and is home to members of the Isle de Jean Charles Indian Tribe. Induced flooding mitigation measures would be implemented before construction of the Proposed Action (see Section 4.3 for information about induced flooding mitigation).

6.2.1.2.1 1% AEP (100-Year) Storm Event in Years 2035 and 2085

Figures 6-4 and 6-5 show the net different in water levels between the No Action Alternative and the Proposed Action. (To further explain these maps, during and immediately following a 1% AEP (100-year) storm event, if water levels are 2.0 feet under the No Action Alternative and 3.0 feet under the Proposed Action, this would indicate that the Proposed Action would cause (induce) an increase in water levels of 1.0 foot, and the figures would show a value of +1.00 foot.)

During and immediately following 1% AEP (100-year) storm events in 2035 and 2085, water levels would be lower inside the proposed levee system but would be higher in some areas on the flood side of the proposed levee system as compared to the No Action Alternative (see Figures 6-4 and 6-5). In 2035, maximum differences in water levels on the flood side of the proposed levee system between the Proposed Action and No Action Alternatives (referred to as FWP and FWOP in the figures) during 1% AEP storm events would be approximately 4.00 feet. Modeling indicates that these maximum water level increases would occur in relatively limited areas on the flood side of Reaches E, K, and L.

By 2085, the maximum project-induced water level would be approximately 4.2 feet higher on the flood side of the proposed alignment near Reaches K and L, as compared to the No Action Alternative. Increases in water levels of at least 1.25 feet (as compared to the No

Action Alternative) are projected to extend up to approximately 5 miles Gulfward on the flood side of the Reach I, J, and K levee alignments. These maximum water level increases would be in small areas on the flood side of Reaches E, K, and L.

There are some areas where the project would not increase water levels (as compared to the No Action Alternative) on the flood side of Reaches G, H, I, and L, and much of the area within the Larose to Golden Meadow levee system. The project would decrease water levels in large areas in the Barataria Basin east of the Proposed Action (see Figure 6-4).

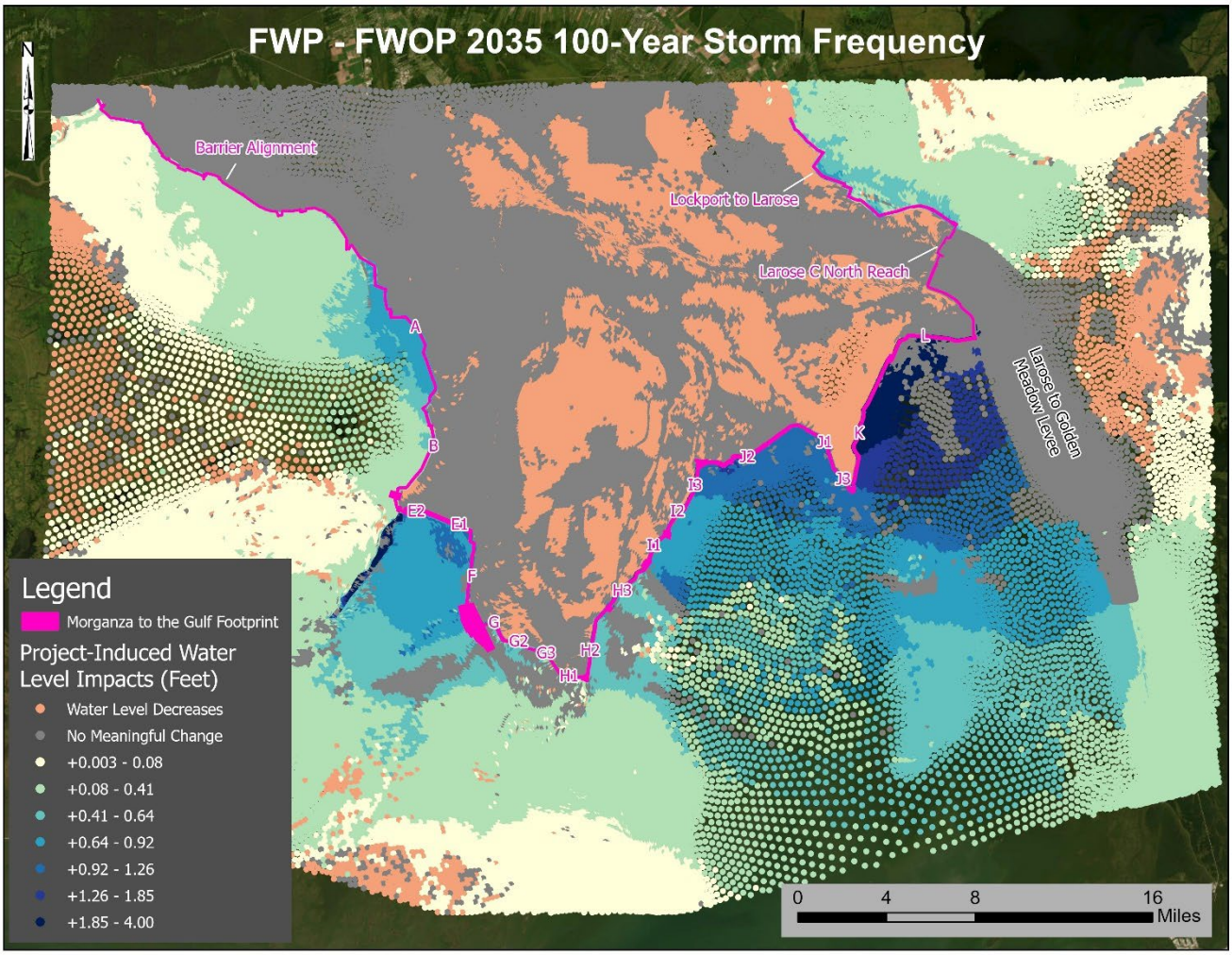


Figure 6-4. Project-Induced Water Level Impacts, 1% AEP (100-Year) Storm Event, 2035

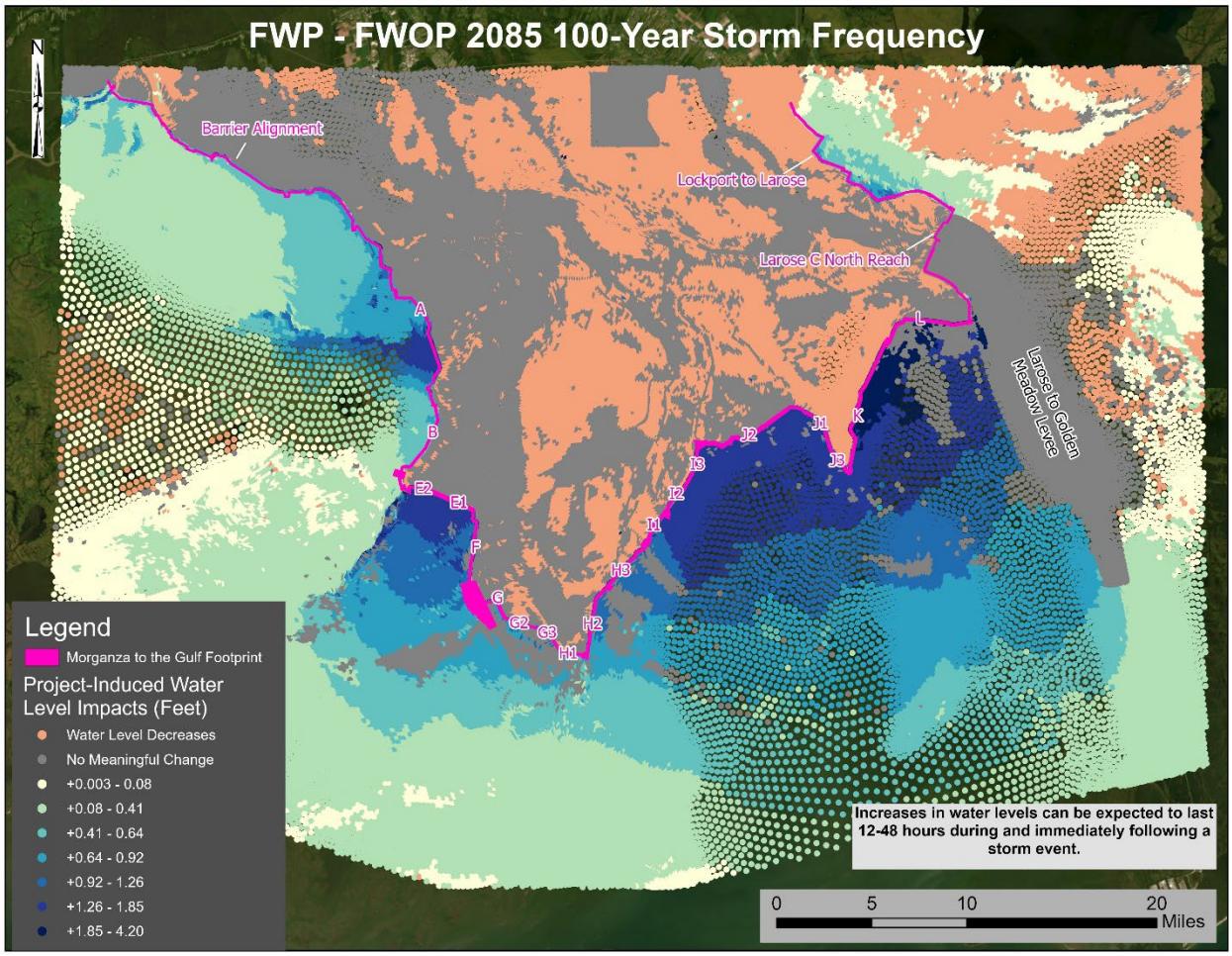


Figure 6-5. Project-Induced Water Level Impacts, 1% AEP (100-Year) Storm Event, 2085

Tables 6-3 and 6-4 below summarize the acres of land (categorized by land use type) that would be impacted by project-induced temporary water level increases (compared to the No Action Alternative) of 1 mm (0.003 foot; see Table 6-3) and 6 inches (0.5-foot) or greater in 2085 (see Table 6-4).

Table 6-3. Acreage of Land Cover Type Impacted by Project-Induced Water Level Increases of 1mm (0.003 foot), Flood Side of MTG System (1% AEP in 2085)

Land Cover Type	Acres
Herbaceous Wetlands	446,408
Woody Wetlands	31,078
Grassland/Pasture	5,048
Developed/Low Intensity	2,302
Sugarcane	2,296

Land Cover Type	Acres
Developed/High Intensity	1,241
Developed/Medium Intensity	1,073
Fallow/Idle Cropland	634
Developed/Open Space	170
Soybeans	16
Source: United States Agricultural Statistics Service Cropland Data Layer 2024; CSTORM-MS 2025 (Appendix E)	

Table 6-4. Acreage of Land Cover Type Impacted by Project-Induced Water Level Increases of 6 Inches (0.5 foot) or More, Flood Side of MTG System (1% AEP in 2085)

Land Type	Acres
Herbaceous Wetlands	87,862
Woody Wetlands	3,255
Grassland/Pasture	1,191
Developed/Low Intensity	533
Sugarcane	164
Fallow/Idle Cropland	148
Developed/Medium Intensity	107
Developed/High Intensity	37
Developed/Open Space	23
Source: United States Agricultural Statistics Service Cropland Data Layer 2024; CSTORM-MS 2025 (Appendix E)	

Maximum water levels during 1% AEP storm events in 2085 were assessed for specific locations near the communities of Gibson, Dulac, Cocodrie, Isle de Jean Charles, and the interior and exterior of the Dularge and Larose to Golden Meadow levees (see Figure 6-6 for locations).

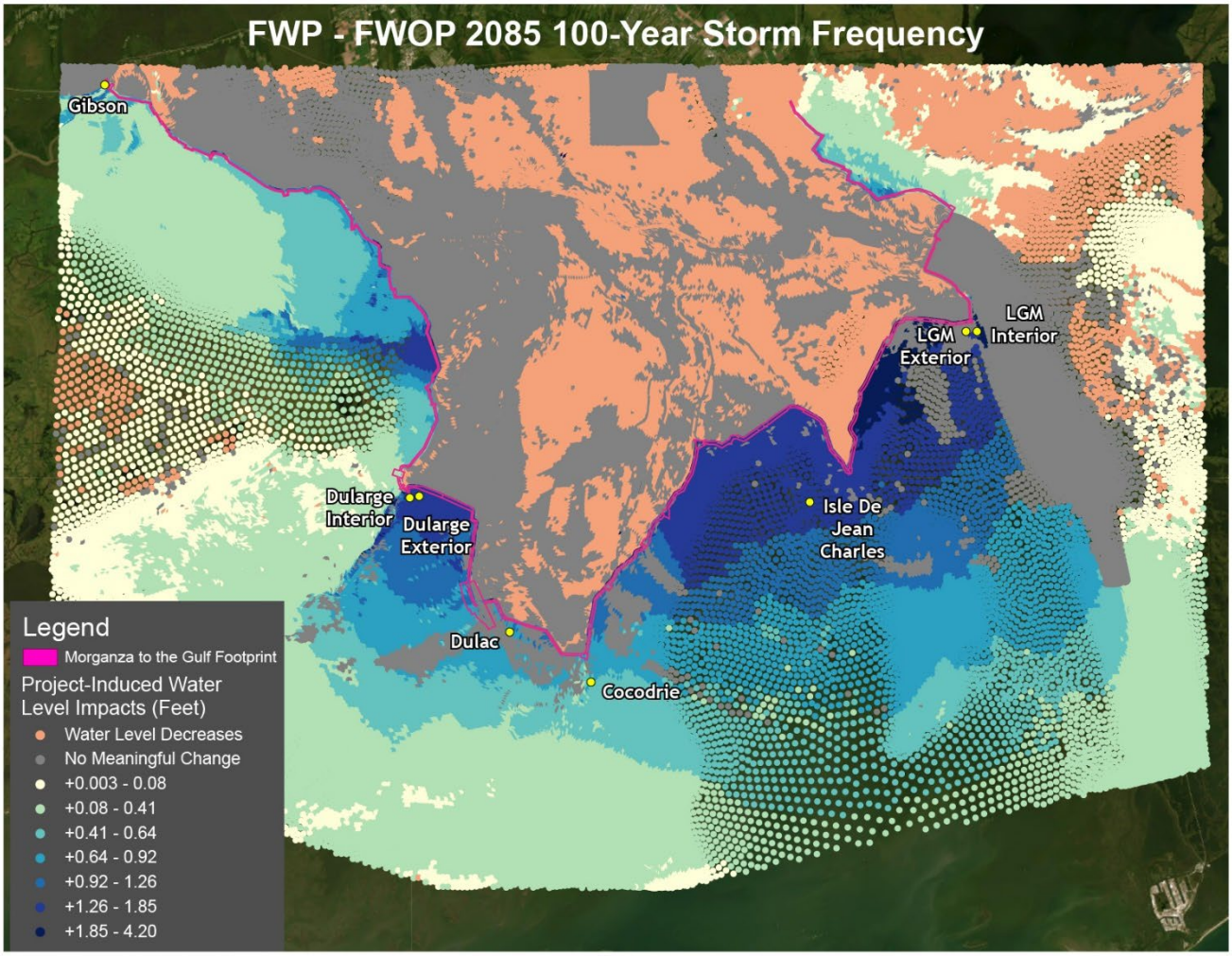


Figure 6-6. Locations of Communities on the Flood Side of the Proposed Action, 1% AEP (100-Year) Storm Events, 2085

Figures 6-7 and 6-8 compare the No Action Alternative and the Proposed Action (referred to as FWOP and FWP, respectively, in the figure) maximum water levels at these locations during or immediately following 1% AEP (100-year) storm events in 2085 sea level change conditions. In all of these locations, water levels are projected to be higher under the Proposed Action as compared to the No Action Alternative. Gibson is projected to have the lowest difference in water levels of +0.2 feet (see Figure 6-6). Larose to Golden Meadow Interior is projected to have the largest difference of +2.0 feet (see Figure 6-7). This may be because under the Proposed Action (with the Proposed Action levees in place), the northwestern segment of the Larose to Golden Meadow levee would be overtopped during 1% AEP (100-year) storm event conditions (based on Larose to Golden Meadow levee elevations in 2025).

The Isle de Jean Charles community, which is one of the communities that would be impacted by project-induced flooding during storms, is home to members of the Isle de Jean Charles Indian Tribe (see Figure 6-9). See Section 6.15 Socioeconomics for further information about project-induced flooding impacts to communities on the flood side of the proposed MTG levee system. See Section 6.17 for information about coordination that would occur with the Isle de Jean Charles Indian Tribe.

Figure 6-7. Bar Graphs Depicting Changes in Water Levels at Four Communities on the Flood Side of the Proposed Action (1% AEP, Year 2085, NAVD88)

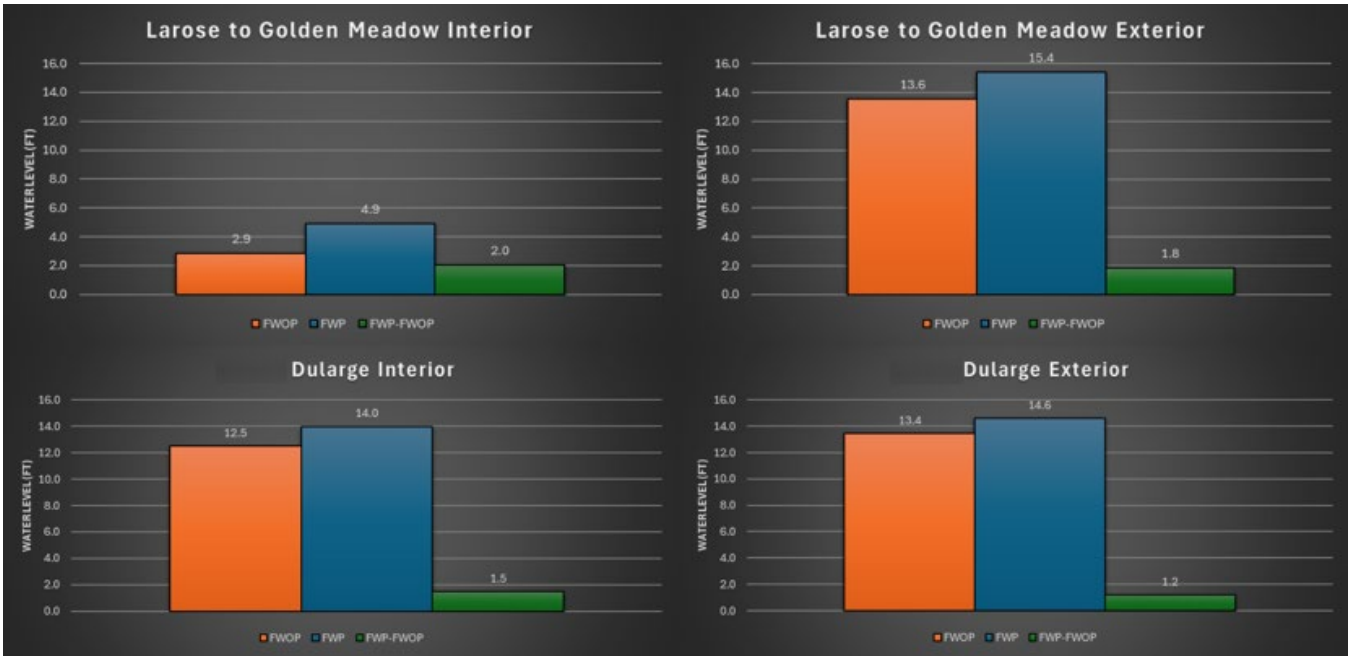


Figure 6-8. Bar Graphs Depicting Changes in Water Levels Inside and Outside the Dularge and Larose to Golden Meadow Levees (1% AEP, Year 2085, NAVD88)

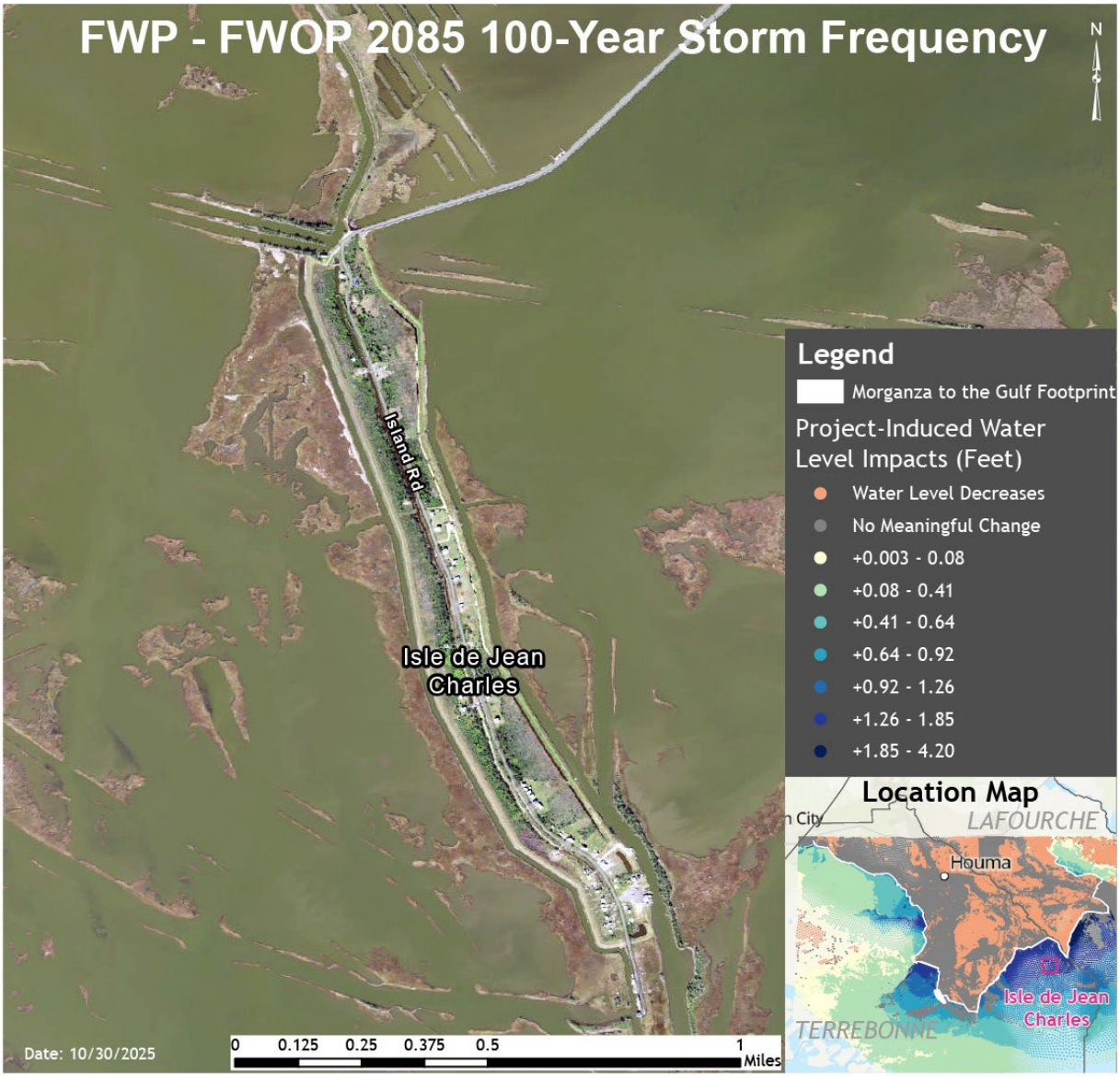


Figure 6-9. Map of the Isle de Jean Charles Community, 1% AEP Storm Events, Year 2085

6.2.1.2.2 5% AEP (20-Year) Storm Event in Year 2035 and 2085

Figures 6-10 and 6-11 show the net difference in water levels between the No Action and Proposed Action alternatives. Project-induced water level increases during and immediately after 5% AEP storm events would be less than those associated with 1% AEP events. In 2035 and 2085, maximum increases (as compared to the No Action Alternative) of approximately 3.60 feet and 3.90 feet, respectively, are projected to occur in limited areas on the flood side of the levee system (see Figure 6-10 and 6-11). In 2035, these increases would be confined primarily to small areas adjacent to Reaches E and L. By 2085, sea level

change would result in a larger geographic extent of effects, with localized increases of up to 3.90 feet projected on the flood side of proposed Reaches A, E, K, and L (see Figure 6-11). Across most areas on the flood side, however, project-induced increases in water levels during 5% AEP storm events would remain 0.41 feet or less in both 2035 and 2085.

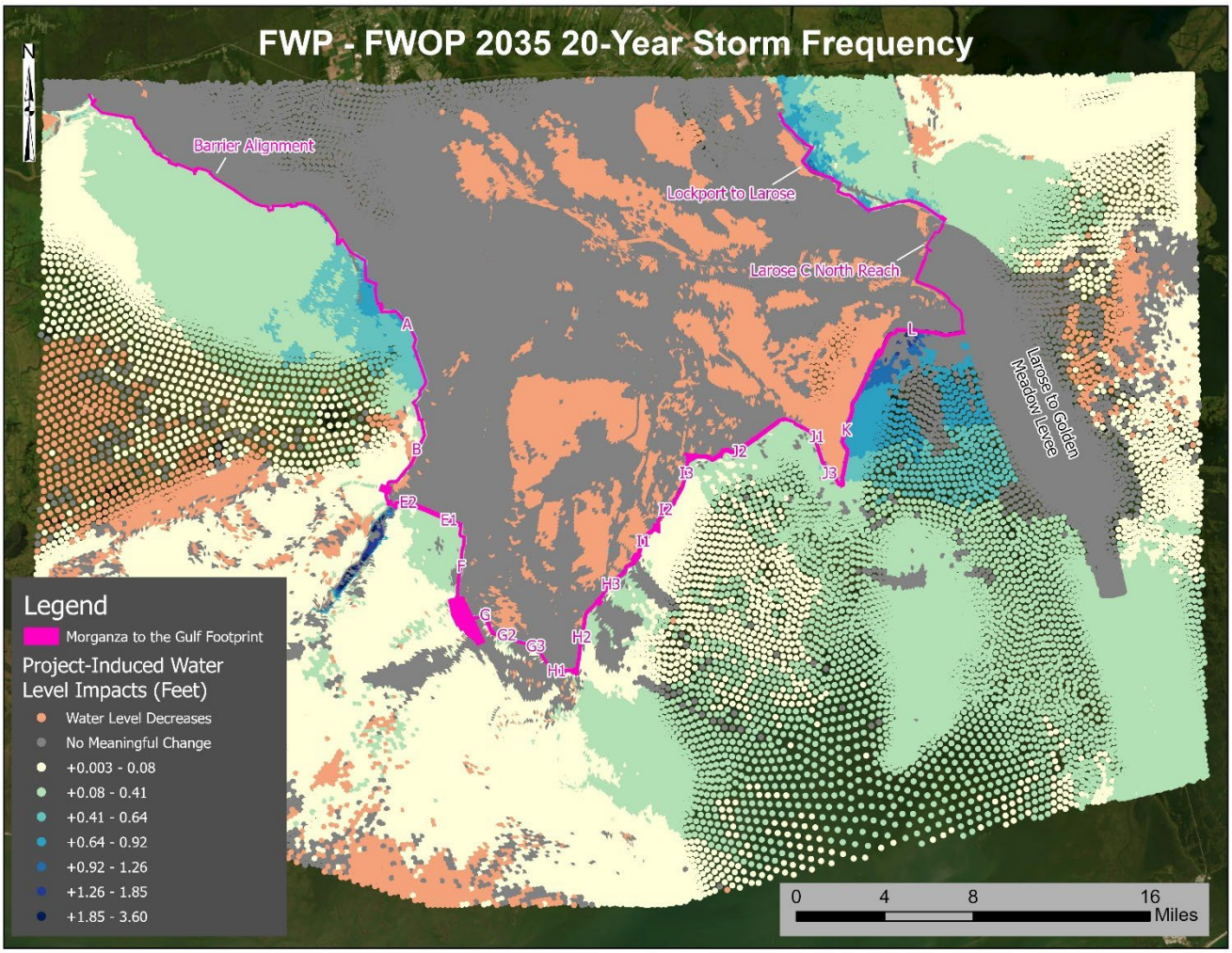


Figure 6-10. Project-Induced Water Level Impacts, 5% AEP (20-Year) Storm Event, 2035

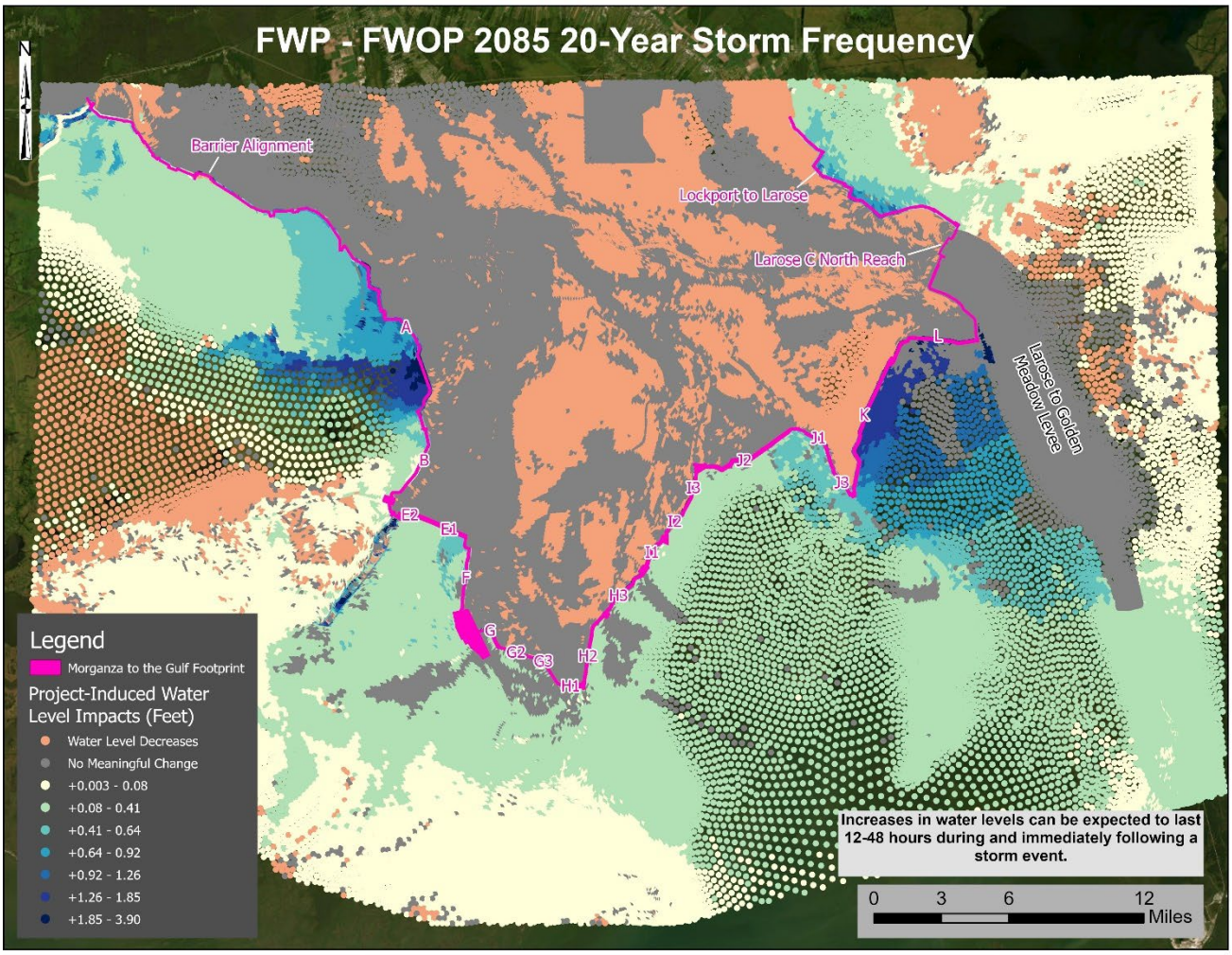


Figure 6-11. Project-Induced Water Level Impacts, 5% AEP (20-Year) Storm Event, 2085

6.2.1.2.3 50% AEP (2-Year) Storm Event in Year 2035 and 2085

Figures 6-12 and 6-13 show the net difference between the No Action Alternative and the Proposed Action Alternatives. During and immediately following 50% AEP (2-year) storm events, the project is projected to induce maximum water level increases (as compared to the No Action Alternative) of approximately 1.20 feet in 2035 and 1.40 feet in 2085 on the flood side of the proposed levee system (see Figures 6-12 and 6-13). These increases are substantially lower than those modeled for less frequent storm events; by comparison, 1% and 5% AEP storms are projected to produce maximum project-induced increases of up to 4.20 and 3.60 feet in 2035 and 4.20 and 3.90 feet in 2085, respectively, relative to the No Action Alternative.

In 2035, as compared to the No Action Alternative, the project would cause negligible or even reduced water levels during 50% AEP events in most areas on the flood side of the system, with localized increases occurring primarily near Reaches A, B, H, K, , and Lockport to Larose. By 2085, maximum project-induced water level increases during 50% AEP events would occur along Reaches A and B, while increases of up to approximately 0.41 feet (about 5 inches) would occur in limited areas along the Barrier Reach and Reaches E, F, H, J, K, L, and Lockport to Larose. CSTORM-MS modeling also indicates that portions of the Barrier Reach, Reach B, E, F, G, H, J, L, Larose C North, and Lockport to Larose, would experience negligible or decreased water levels compared to the No Action Alternative.

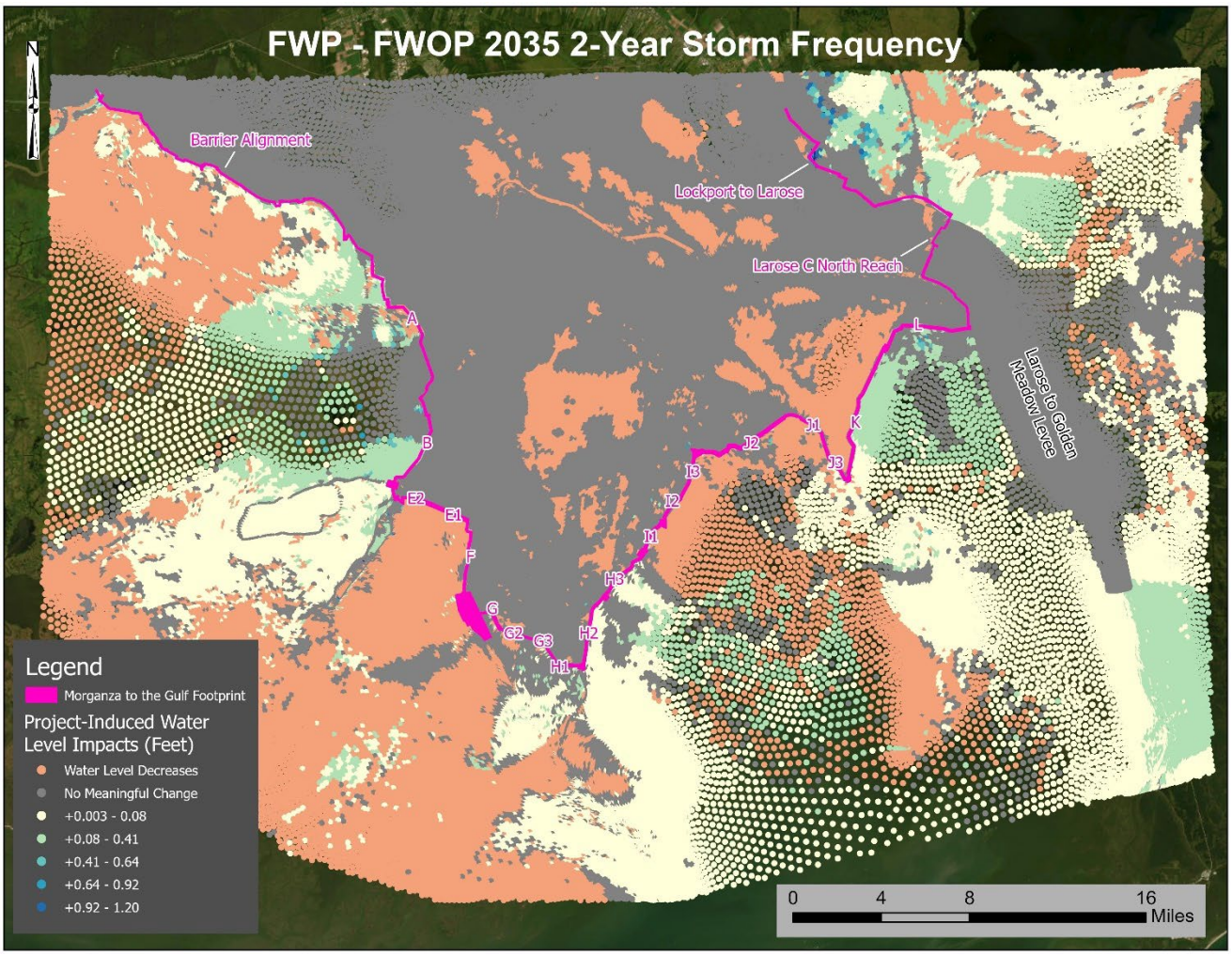


Figure 6-12. Project-Induced Water Level Impacts, 50% AEP (2-Year) Storm Event, 2035

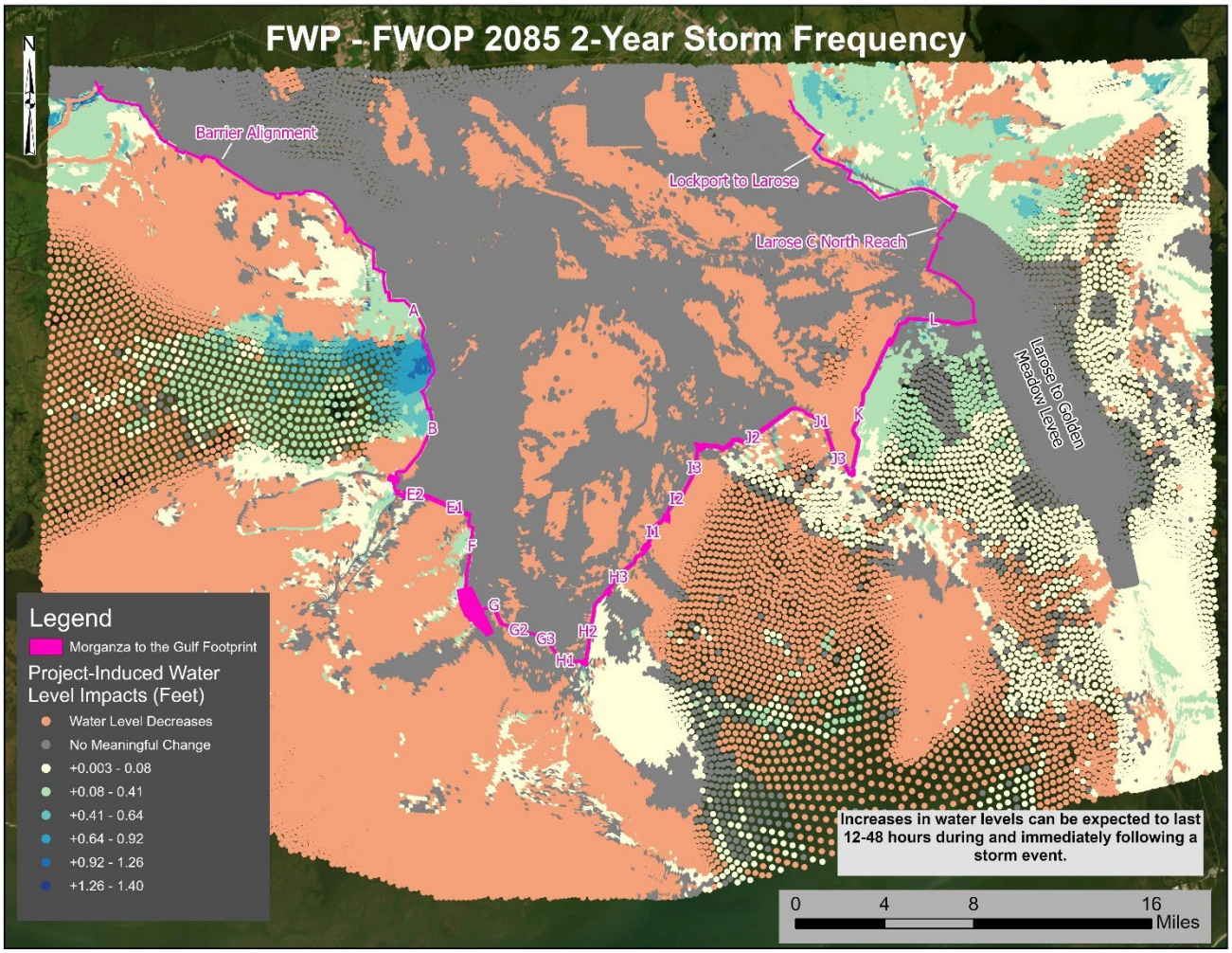


Figure 6-13. Project-Induced Water Level Impacts, 50% AEP (2-Year) Storm Event, 2085

6.2.2 Induced Flooding During Precipitation and Seasonal Tidal Conditions

The Proposed Action levees and structures would block storm surge and waves from entering the land side of the proposed levee system during storm events up to and including 1% AEP (100-year) events. HEC-RAS 2025 modeling analyzed potential impacts of the project on water levels inside the proposed levee system during 5%, 10%, and 25% AEP storm events based on rainfall alone (as the proposed levee system would block storm surge and wave action

The modeling results indicate that the Proposed Action would cause negligible impacts to flooding inside the levee system during moderate storm events (5%, 10%, or 25% AEP storm events) under both 2035 and 2085 future conditions. These rainfall-only simulations

also showed negligible differences in the duration of rainfall-driven water levels inside the system when comparing the No Action Alternative and the Proposed Action.

HEC-RAS 2025 modeling was also used to analyze the potential impacts of the project on water levels during typical seasonal tide and weather conditions, including spring–neap tides (the regular monthly cycle of higher-than-normal and lower-than-normal tides that occur due to the position of the sun and moon) and a winter cold front event (the biggest meteorologically-driven tidal events that are indicative of a dynamic environment). During normal day-to-day and typical seasonal tide weather conditions, all floodgates and structures under the Proposed Action would be open. During spring–neap tide conditions in 2085, the project would cause localized water level increases of approximately 0.3 feet on the flood side of proposed Reach L, and a decrease in water levels of approximately 0.55 foot on the land side of proposed Reach L. Comparably the cold front 2085 condition with sea level rise showed negligible impacts on water levels on the interior of Reach L and an increase in water levels on the flood side of Reach L by approximately .4 feet. The Spring Neap Tides data also indicated the project would cause isolated pockets of increased water levels of up to 1 foot for both the 2035 and 2085 scenarios along the Barrier reach. All other impacts were negligible.

See the induced flooding analysis provided in Appendix H and the 2025 HEC-RAS modeling report in Appendix E for more details.

6.2.3 Water Flow During Non-Storm Conditions

6.2.3.1 No Action Alternative

Non-federal entities have constructed hurricane and storm damage risk reduction levees that differ in elevation, composition, and width; however, these levees do not form a continuous or fully enclosed system. Figure 3-1 depicts the No Action Alternative levee alignment extent within the project study area.

6.2.3.2 Proposed Action

HEC-RAS modeling was conducted to simulate potential water flow impacts of the Proposed Action (once constructed) for 2035 and 2085 sea level change scenarios (see Appendix E). Modeling results indicate that when storms are not approaching and proposed floodgates and environmental control structures are open, differences in water levels between the No Action and Proposed Action alternatives would be negligible (see Appendix E). The proposed floodgates and environmental control structures under the Proposed Action would provide the same amount of water flow through the levee system as the No Action Alternative under typical weather and water level conditions. See Appendix E for details.

A preliminary draft water control plan was prepared for all structures under the Proposed Action that directs operators to close structures under specific water level conditions outside of storm events (see Appendix M for the preliminary draft plan). As described in Section

3.3.7, the USACE is responsible completing the water control plan in accordance with ER 1110-2-24, EM 1110-2-3600, DIVR 1110-2-240, and ER 1165-2-240. The USACE, MVD would review the water control plans and/or manual, and approval would be required within 1 year after full-scale operations of the proposed structures. An analysis was completed to determine if closures would have been triggered by this plan in the past 5 years. Structures would be closed between 0 and 2.5 days per year based on this analysis, therefore only minor, temporary changes in hydrology would be expected. However, with sea level change, it is anticipated that structure closures outside of storm events would become more common. Sea level change is an uncertain phenomenon, both temporally and in magnitude. The operator of each structure would be required to submit an annual report of daily operations that would be reviewed by USACE to be able to assess and monitor how future sea level changes may be affecting closure rates. Once a threshold of 30 total days per year of operation is met, this would trigger a re-analysis of potential impacts to hydrology in non-storm conditions. If this analysis identifies potential impacts beyond the scope of this SEIS, supplemental NEPA would be implemented to include a re-evaluation of impacts to significant habitats and mitigation.

6.2.4 Borrow Sites, Access Roads, and Staging Areas

There would be no significant impacts to hydrology associated with staging areas. Staging areas would not be permanent features of the Proposed Action, would not require significant ground disturbing activities, and would be expected to return to near pre-construction condition following their use for the Proposed Action. There could be some minor, temporary impacts associated with vegetation and debris clearing that could last for a few years following construction, but this is not expected to significantly alter hydrology even within the proposed staging areas. Vegetation clearing is expected to be minimal and therefore, for the majority of staging areas, there would be no impact to hydrology.

There would be no significant impacts to hydrology associated with access roads. The vast majority of access for the Proposed Action would involve the use of existing roadways and agricultural areas, and all would be in non-wetland areas with one exception: an access road would be constructed near the Lockport to Larose Reach that would impact less than 1 acre of wetland habitat (see Section 6.3.2 for information about wetland impacts of the Proposed Action). Any improvements to existing roads and construction of new roads would result in a higher elevation that could result in minor changes to hydrology. Potential minor changes in hydrology would be reduced and minimized by the inclusion of culverts, temporary bridges, and other structures designed and sited to maintain existing water flow.

Borrow site construction for the levee system would incur local impacts to hydrology that would be significant within their footprint. Construction of these features would include excavation in predominately agricultural lands or pasture. Within the borrow pit's footprint, there would be significantly more ponding of rainwater, as the excavation would no longer allow drainage of rainwater to run off, creating temporary ponds. Some of these ponds could

be semi-permanent or permanent, depending on rainfall amounts and groundwater recharge rates. Interruptions in hydrology are expected to be limited to within the borrow pit itself as BMPs would be employed to minimize any impacts to hydrology outside of their footprint. There would be many new borrow pits created throughout the watershed, but it is not expected that there would be enough excavation to significantly alter natural drainage patterns and hydrology.

6.2.5 Habitat Mitigation Plans

There are no anticipated significant negative impacts to hydrology associated with any of the habitat mitigation plan alternatives. BLH and swamp mitigation features would involve converting agricultural land to forested habitat types and would not involve major grading or hydrologic manipulations that would incur significant negative impacts.

Fresh/intermediate and Brackish/saline marsh mitigation features would involve altering existing bathymetry/topography, but these would only incur minor, insignificant impacts to hydrology. Marsh mitigation features would include dredging for borrow material that would deepen areas and marsh platforms that change existing water bottoms to marsh elevations. These excavation and deposition activities were considered and are not expected to result in significant changes to hydrology within the study area, as they would occur exclusively in the tidal areas and would not result in significant enough alterations in the landscape to incur measurable changes in hydrology.

6.3 WETLANDS

6.3.1 No Action Alternative

The USACE, in coordination with an interagency HET, analyzed the quantity and quality of wetlands under the No Action Alternative using WVAs. Throughout most of the study area, substantial losses of vegetated wetlands are expected to continue due to sea level change, subsidence, erosion, and insufficient sediment accretion. Salinity regimes would likely progress northward, converting fresh and intermediate marshes into brackish marshes. Brackish/saline marshes and submerged aquatic vegetation (SAV) would likely be lost and transition to open water. Bottomland hardwood (BLH) stands and swamps in the area would likely decrease in quality and quantity due to sea level change subsidence, and inland progression of salinity regimes. Where higher elevations occur in the northern portions of the Terrebonne/Barataria watershed, forested BLH areas may persist. For much of the area, increased flooding of BLH stands would likely reduce the establishment of BLH species and favor the establishment of flood tolerant swamp species such as cypress and tupelo. As flooding and salinity impacts increase, canopy tree species and shrub mortality would increase, and eventually be converted to open water. A description of the WVA methodology, analysis, and assumptions made by the HET may be found in Appendix D.

Under the No Action Alternative, the NFS would likely continue to build first-lift levees as well as structures of its own accord. Environmental compliance would continue to be coordinated through USACE Regulatory permits.

6.3.2 Proposed Action

The acreages listed in Tables 6-5 through 6-7 are based on the current level of design for project features and are likely larger than the right-of-way that would be acquired based on final designs. These acreages would be adjusted during final design of each feature once the actual footprint of wetland impact is known and adjustments to mitigation features made as necessary to ensure full satisfaction of the compensatory mitigation requirement.

6.3.2.1 Direct Impacts

6.3.2.1.1 Levees, Structures, and Access/Haul Routes

Major, adverse impacts to wetlands associated with construction of the Proposed Action would occur where wetlands are within the Proposed Action construction footprint. Wetland functions and values within the footprint of the levee system would be permanently lost. The quantity and quality of wetlands within the proposed construction footprint were assessed through surveys and WVAs conducted by the USACE and an interagency HET. A description of the WVA methodology, analysis, and assumptions made by the HET may be found in Appendix D. Appendix D also includes maps of wetland habitats affected by the Proposed Action.

Construction of the Proposed Action would convert a total of approximately 4,574 acres (-1,365.3 AAHUs) of forested and marsh wetlands to MTG Project features (earthen levees, structures, floodwalls, and constructed haul routes; see Tables 6-5 through 6-7). The majority of wetland impacts would be attributed to construction of the proposed levees and structures (see Tables 6-6 and 6-7, which break out wetland impacts by project reach and haul route).

Construction of the Proposed Action would cause the loss of 4,072 acres (-1,097.6 AAHUs) of marsh habitats (fresh, intermediated, brackish, saline; see Table 6-5), 178 acres (-120.4 AAHUs) of swamp habitats (see Table 6-7), and 324 acres (-147.3 AAHUs) of BLH habitats (see Table 6-7). A mitigation plan has been completed to compensate for unavoidable wetland impacts caused by the Proposed Action in compliance with Section 1163 of WRRDA 2016. An impact assessment of potential impacts associated with construction of the final array of mitigation alternatives is provided in Section 6.4.3. The mitigation plan is provided in Appendix C and summarized in Section 4.2.

Impacts to wetlands associated with the use of existing haul routes would be negligible. However, one haul route would need to be constructed to transport borrow material from the A184 borrow site to the Lockport to Larose Reach (see Section 3.3.5 for further details).

Minor impacts to wetland vegetation (~ -0.1 AAHU) would be incurred by construction of the new gravel haul road. This impact is included in Tables 6-5 through 6-7.

Table 6-5. Wetlands Lost within the Proposed Action Construction Footprint

Wetland Habitat Classification	Acres	AAHUs
BLH	324	-147.3
Swamp	178	-120.4
Fresh/Intermediate Marsh	1,516	-421.6
Brackish marsh	379	-55.8
Saline Marsh	2,177	-620.2
Total	**4,574**	**-1365.3**
Note: The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.		

Table 6-6. Direct Impacts to Marsh Habitat within the Proposed Action Construction Footprint by Reach and Marsh type.

Reach	Habitat	AAHU	Existing Wetland Habitat Acres
Barrier	Fresh/Int	-98.2	222
B	Fresh/Int	-80.8	245
E	Fresh/Int	-41.3	254
G	Saline	-391.8	1050
G	Brackish	-7.2	28
H	Fresh/Int	-5.5	19
H	Saline	-116.4	365
I	Saline	-59.6	376
J	Fresh/Int	-16.8	141
J	Saline	-52.4	386
K	Brackish	-48.6	351
L	Fresh/Int	-82.8	395
Lockport to Larose	Fresh/Int	-88.1	191
Lockport to Larose Haul Route	Fresh/Int	-0.1	Less than 1
Larose C-North	Fresh/Int	-8.0	49
Total Direct Fresh/ Int Marsh		**-421.6**	**1,516**
Total Direct Brackish Marsh		**-55.8**	**379**
Total Direct Saline Marsh		**-620.2**	**2,177**

Reach	Habitat	AAHU	Existing Wetland Habitat Acres
Total Direct Marsh		**-1,097.6**	**4,072**
Note: The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.			

Table 6-7. Direct Impacts to Forested Habitat within the Proposed Action Construction Footprint by Reach and Habitat Type.

Reach	Habitat	AAHU	Existing Wetland Habitat Acres
Barrier	BLH	-80.1	170
Barrier	Swamp	-50.8	84
B	BLH	-2.2	8
E	BLH	-4.0	9
G	BLH	-0.4	3
H	BLH	-8.4	21
I	BLH	-1.1	4
J	BLH	-0.1	1
Lockport to Larose	Swamp	-67.2	90
Lockport to Larose	BLH	-50.5	107
Lockport to Larose Haul Route	BLH	-0.1	Less than 1
Larose C-North	Swamp	-2.3	4
Larose C-North	BLH	-0.2	1
Total Direct BLH	**BLH**	**-147.3**	**324**
Total Direct Swamp	**Swamp**	**-120.4**	**178**
Total Forested Direct	**BLH and Swamp**	**-267.6**	**502**
Note: The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the sum of the addends.			

6.3.2.1.2 Borrow Sites and Staging Areas

Proposed borrow areas and staging areas have been identified and screened to avoid wetland habitats. Prior to construction, a field survey would be performed to confirm the

absence of wetland habitat in the proposed borrow and staging areas. If identified, these areas would be re-designed to avoid impacts to wetlands and other significant habitats. For details about proposed borrow and staging areas, see Section 3.3.4.

6.3.2.2 Indirect Impacts

During operations (years 2035 – 2085), the area of potential wetland impacts would extend throughout the study area, both inside and outside of the proposed levee system, due to potential Proposed Action impacts to water levels and salinities. The proposed floodgates and environmental control structures are intended to provide the same amount of water flow through the levee system as the existing condition (No Action Alternative) under typical weather and water level conditions (see the HEC-RAS hydraulic modeling report in Appendix E). High water levels and high salinity (which may occur at the HNC Lock Complex only) would trigger structure closures (see Section 3.3.7 and Appendix M for information about the draft water control plan).

When all gates and structures are open, impacts to hydrologic flow would be minor and would indirectly cause minor impacts to the functions and value of wetland habitats. An assessment to quantify long-term indirect impacts to wetland habitats was conducted using hydrologic and salinity data inputs from HEC-RAS and AdH modeling (see Appendix D). This analysis estimates that up to approximately 1,059 additional acres of significant habitats (BLH, swamp; and intermediate, brackish, and saline marshes) could be negatively impacted due to long-term hydrologic shifts once during the 50-year period of analysis (see Table 6-8). WVAs to further quantify the long-term, indirect impacts to wetland habitats are discussed in Section 6.3.2.2.2.

Table 6-8. Indirect Impacts to significant habitat.

Habitat	Acres
Forest (combination of BLH and Swamp)	179
Fresh Marsh	214
Intermediate Marsh	621
Brackish Marsh	23
Saline Marsh	22
Total Marsh	**880**
Total Habitat	**1059**

6.3.2.2.1 Salinity

ERDC conducted AdH modeling in 2024 to simulate hydrodynamic and salinity conditions for the No Action and Proposed Action alternatives (see Section 6.1.2.3 and Appendix E for details about AdH modeling for the Proposed Action; see Section 6.9 for further information about project impacts to salinity). Model runs were conducted for all gates in the open

position and with the HNC Lock Complex both open and closed. Results indicate that when all gates are open, and regardless of whether the HNC Lock Complex is open or closed, the Proposed Action would cause a mix of increased and decreased salinity throughout the levee system by an average 1-2 ppt. Maximum increases of 5ppt in 2035 and 10ppt in 2085 were projected in the far eastern edge of the study area where model results are most uncertain. Overall, the project is expected to cause only negligible to minor changes in salinity, which in turn would have negligible to minor effects on marsh vegetation in the study area. This is because estuarine marsh habitats—including fresh, intermediate, brackish, and saline marshes—are naturally adapted to changing salinity levels due to both freshwater inflows and saltwater from the Gulf. Marsh habitats are anticipated to be resilient to modeled salinity changes. However, swamp and particularly BLH wetlands are less tolerant to increases in salinity and could decline in areas where even small (1-2 ppt) increases are anticipated, hastening conversion to other habitat types or open water.

6.3.2.2.2 WVA Modeling

Long-term, indirect impacts to wetlands due to the Proposed Action performance period (2035-2085) are being assessed in coordination with the HET using WVA models. The WVAs would quantify the indirect impacts associated with FWP hydrologic changes and dictate whether additional mitigation actions are necessary before construction begins. It is anticipated that compensatory habitat mitigation plans completed to date can sufficiently compensate for both direct and indirect wetland habitat impacts. Upon completion of WVAs, if results indicate that compensatory habitat mitigation plans would not fully mitigate for both direct and indirect habitat impacts (total AAHUs from both direct and indirect WVAs), re-evaluation of the mitigation sites would be completed to see if expansion of the sites is possible to mitigate all indirect and direct impacts. If not, mitigation planning may be reopened to identify new sites that could mitigate for 100 percent of impacts by habitat type. Changes to the mitigation plan could be added to the SEIS and a second public review completed for the SIES or a supplemental NEPA document for the changes would be prepared as necessary. See Section 4.2 and Appendix C for information about the habitat mitigation plan.

6.3.2.2.3 Storm Surge Flooding

CSTORM-MS modeling was used in 2025 to evaluate the area where project-induced increases in water levels are greater than 1.0 mm (0.003 foot) (see Section 6.2.1). Once the project is constructed and in operation, water levels during storm events would be higher in some areas on the flood side of the MTG system as compared to No Action conditions see Section 6.2). Water levels would decrease inside the MTG levee system compared to the No Action Alternative. Project-induced increases in water levels on the flood side would last 12 to 48 hours during and immediately following storm events. Coastal wetlands are adapted to experience short term inundation increases associated with tropical storm events. Most of the habitat directly flood side of proposed levee reaches predicted to experience more than

1 foot of storm surge flooding is marsh habitat. An additional approximately 1 foot of water 12 to 48 hours during and immediately following storm events could cause minor impacts to marsh habitat as compared to the same events under the No Action Alternative scenario. Should areas of BLH be subjected to increased storm surge resulting from the project, it is possible that a young class of saplings could experience mortality from submergence caused by project-induced increases in inundation. Mortality of those individuals would not likely alter overall BLH habitat in the study area. Wetlands could experience insignificant, temporary impacts from flooding associated with events in both the future with project and the no action condition.

6.3.3 Habitat Mitigation Alternatives

The indirect impacts of implementing USACE-constructed mitigation projects would be the same for all habitat mitigation alternatives. Implementation of these mitigation projects would prevent an overall loss in the basin of BLH, swamp, and marsh habitat. Each mitigation project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin, would help slow the loss of wetlands. Direct impacts are described for each mitigation project below.

6.3.3.1 BLH

6.3.3.1.1 Napoleonville BLH Project (TSP)

Approximately 534 acres of agricultural land would be converted to BLH habitat to compensate for negative impacts to BLH incurred by the Proposed Action.

6.3.3.1.2 Supreme BLH Project

Approximately 533 acres of agricultural land would be converted to BLH habitat to compensate for negative impacts to BLH incurred by the Proposed Action.

6.3.3.2 Swamp

6.3.3.2.1 Napoleonville Swamp Project (TSP)

Approximately 962 acres of agricultural land would be converted to swamp habitat to compensate for negative impacts to swamp incurred by the Proposed Action.

6.3.3.2.2 Supreme Swamp Project

Approximately 958 acres of agricultural land would be converted to swamp habitat to compensate for negative impacts to swamp incurred by the Proposed Action.

6.3.3.3 Fresh/Intermediate Marsh

6.3.3.3.1 Lake Salvador Marsh Project

Approximately 255 acres of open water would be converted to marsh habitat to compensate for negative impacts to fresh intermediate marsh incurred by the Proposed Action.

6.3.3.3.2 Delta Farms Marsh Project

Approximately 250 acres of open water would be converted to marsh habitat to compensate for negative impacts to fresh intermediate marsh habitat incurred by the Proposed Action.

6.3.3.3.3 GIWW Marsh Project

Approximately 320 acres of open water would be converted to marsh habitat to compensate for negative impacts to fresh intermediate marsh habitat incurred by the Proposed Action.

6.3.3.3.4 Avoca Island Marsh Project

Approximately 520 acres of open water would be converted to marsh habitat to compensate for negative impacts to fresh intermediate marsh habitat incurred by the Proposed Action.

6.3.3.3.5 Brackish/Saline Marsh

6.3.3.3.6 West Terrebonne Marsh Project

Approximately 6,431 acres of open water would be converted to marsh habitat to compensate for negative impacts to marsh habitat incurred by the Proposed Action.

6.3.3.3.7 North Barataria Bay Marsh Project

Approximately 6,791 acres of open water would be converted to marsh habitat to compensate for negative impacts to marsh habitat incurred by the Proposed Action.

6.3.3.3.8 3 Mile Bay Marsh Project

Approximately 8,728 acres of open water would be converted to marsh habitat to compensate for negative impacts to marsh habitat incurred by the Proposed Action.

6.3.3.3.9 Isle de Jean Charles Marsh Project

Approximately 16,709 acres of open water would be converted to marsh habitat to compensate for negative impacts to marsh habitat incurred by the Proposed Action.

6.4 FISHERIES AND AQUATIC RESOURCES

6.4.1 No Action Alternative

Throughout most of the study area, substantial losses of fisheries habitat are expected to continue due to sea level change, subsidence, and insufficient sediment accretion caused by the channelization of major rivers in the watershed outside of the study area. Salinity regimes would likely move northward, converting fresh and intermediate marshes into brackish marshes. Brackish and saline marshes are expected to become dominated by large lakes and bays with little, if any, SAV.

Marshes undergoing fragmentation and subsidence would initially benefit fishery resources by increasing edge habitat and contributing organic matter from decaying vegetation, which supports the base of the food web (Browder et al. 1989). However, as open water areas expand beyond the extent of marsh habitat, edge habitat would decline, ultimately leading to reduced marsh productivity over time (Browder et al. 1985, Minello and Rozas 2002). Expected salinity increases in the study area would increase the amount of estuarine area available to estuarine and marine fishery species (Chesney et al. 2000, Zimmerman et al. 2000), but it would also likely exacerbate marsh loss (Chabreck and Linscombe 1982, McKee and Mendelssohn 1989). Increasing salinities could shrink the zone for optimal oyster production in areas away from the freshwater influence of the Atchafalaya River via the GIWW West floodgate.

Under the No Action Alternative, the NFS may continue to build first-lift levees as well as structures of its own accord. Environmental compliance would continue to be coordinated through USACE Regulatory permits.

6.4.2 Proposed Action

6.4.2.1 Levees and Structures

6.4.2.1.1 Direct Impacts

Construction activities using earthen materials along the proposed right of way could cause turbidity or sudden salinity changes. Sessile and slow-moving aquatic invertebrates would be disturbed by the dredge or excavation activities or buried by the placed material. Construction activities would temporarily increase turbidity, water temperatures, and biological oxygen demand (BOD), and decrease dissolved oxygen. These temporary conditions would likely displace more mobile fisheries species from the construction area. Non-mobile benthic organisms could be smothered.

6.4.2.1.2 Indirect Impacts

6.4.2.1.2.1 Salinity and Waterflow

As described in Sections 6.2.2 and Section 6.9.2.1, AdH modeling indicates that once the Proposed Action is constructed and in operation, potential impacts to water discharges and salinities when all gates and structures are open would be minor. Salinity differences between the No Action and Proposed Action alternatives would average approximately 1-2 ppt, with maximum differences of 5ppt in 2035 and 10ppt in 2085 in the eastern and western boundaries of the study area. Most aquatic resources within the study area are estuarine species and would be resilient to these salinity changes. Modeled impacts to fisheries would be considered minor in intensity and long term in duration. The young of species such as Gulf menhaden, blue crab, white shrimp, and red drum that commonly use low to medium salinity areas and SAV habitats and freshwater species, such as crayfish, freshwater catfish, largemouth bass, and other Centrarchids could slightly benefit in areas where salinities slightly decrease from implementation of the Proposed Action. Conversely, in areas where salinities slightly increase, the young of species that prefer higher salinities could move slightly inland. Minor reductions in salinity due to the Proposed Action would likely have minor effects on oysters. While oysters can tolerate a wide range of salinities, they experience a higher rate of mortality at lower salinity levels for extended durations.

6.4.2.1.2.2 Organism Access

A Particle Tracking Model was used to predict movement of aquatic larval organisms in and out of the MTG system for historical, existing (No Action Alternative), and Proposed Action scenarios. Organism access to marsh and open-water areas within and outside of the proposed levee system would be impeded when proposed structures are closed during storm and flood events (see Section 3.3.7 and Appendix M for information about the Proposed Action draft water control plan). When all structures are open, variation between the No Action and Proposed Action alternatives would be minor. The overall recruitment of larval organism into the system would not change significantly when the structures, including the HNC Lock Complex, is closed. The HNC Lock Complex operations would be based not only on water level conditions but also based on salinity conditions (see Draft Water Control Manual Plan in Appendix M). When the HNC Lock Complex is closed (due to salinity triggers) and the other proposed structures are open, particles would be able to enter the system through Bayou Grand Calliou, bypassing the HNC Lock Complex. See Appendix E for the Particle Tracking Model.

6.4.2.1.2.3 Induced Flooding Outside the Levees

Once the project is constructed and in operation, water levels during storms would temporarily increase (within 12 to 48 hours during and immediately following storms) on the flood side of the MTG system, as compared to No Action conditions (see Section 6.2.1). Temporary increases in water levels could increase access of fisheries species to marsh

surfaces that were previously above water. This disruption in fisheries distribution would be minimal and temporary. Increased water levels in some areas may also result in temporary stagnation and algae blooms. However, these conditions should be temporary and have minor impacts to fisheries species.

6.4.2.2 Borrow Sites, Access, and Staging

Most haul routes for delivering construction materials and equipment for levee construction would utilize existing roadways, resulting in negligible impacts to aquatic resources. However, construction of a new haul route would be required to transport borrow material from the A184 borrow site to the Lockport to Larose Reach (see Section 3.3.5 for additional details). This route would traverse the 40 Arpent Canal corridor and an adjacent agricultural field. Construction of the gravel haul road is expected to result in minor impacts to wetland vegetation, estimated at approximately 1 AAHU, as documented in Tables 6-5 through 6-7. Temporary habitat disturbance may lead to short-term displacement of mobile aquatic species; however, these populations are expected to recolonize the area following construction.

Proposed borrow and staging areas have been carefully identified and screened to avoid wetlands and habitats potentially used by aquatic species. Prior to the start of construction, field surveys would be conducted to verify the absence of wetland habitat within these designated areas. If wetlands or other significant aquatic habitats are identified, the project design would be revised to avoid impacts. For additional information on proposed borrow and staging areas, refer to Section 3.3.4.

6.4.3 Habitat Mitigation Plans

6.4.3.1 BLH

6.4.3.1.1 Napoleonville (TSP) and Supreme BLH Projects

These USACE constructed mitigation sites would both be located on agricultural fields. No fisheries or aquatic resources are present and would not be impacted.

6.4.3.2 Swamp

6.4.3.2.1 Napoleonville (TSP) and Supreme Swamp Projects

Wetlands act as filtering systems removing sediment, nutrients and pollutants from water thereby helping sustain the water quality. Converting crop land to forested wetlands would be of benefit to fisheries and aquatic resources by restoring these functions to the study area and therefore enhancing water quality. Since these proposed projects are not adjacent to open water, fish inhabiting it is unlikely. However, amphibians would likely colonize in the area due to the introduction of water and cover.

6.4.3.3 Fresh/Intermediate Marsh

6.4.3.3.1 Lake Salvador Marsh Project

Construction and dredging associated with borrow and marsh building activities would have temporary minor negative impacts to fisheries. Mobile species would be displaced, and slow-moving or sessile species may experience mortality from dredging activities and placement of new material. Additionally, local increases of turbidity and groundwater run off due to construction and dredging activities would cause minor temporary negative impacts to fisheries including decreases in dissolved oxygen (DO) and increases in ultimate carbonaceous biochemical oxygen demand (CBODU), total nitrogen (TN), ammonia-nitrogen (NH3-N), nitrate-nitrite (NOX), organic nitrogen (Org-N), total phosphorus (TP), orthophosphate (PO4), organic phosphorus (Org-P), phytoplankton chlorophyll-a, and total suspended solids (TSS).

It would be beneficial in both preserving the species biodiversity and combating the current trend of conversion of coastal wetlands to open water, which could be accelerated due to sea level change. Overall, the conversion of less valuable more abundant open water habitat to more valuable less abundant marsh would be a net benefit to fisheries and aquatic species.

6.4.3.3.2 Delta Farms (TSP), GIWW, and Avoca Island Marsh Projects

Implementation of these projects would result in the same impacts as discussed for the Lake Salvador project.

6.4.3.4 Brackish/Saline Marsh

The four brackish/saline marsh mitigation projects would convert mostly open water habitat to brackish/saline marsh and would result in similar impacts as discussed for the Lake Salvador project.

6.5 ESSENTIAL FISH HABITAT

6.5.1 No Action Alternative

Much of the marsh habitat in the study area is designated as EFH. Ongoing sea level change and subsidence would continue to cause the conversion of estuarine marsh and SAV in the study area to open water (see Section 6.3). Decreases in the quality of EFH in the study area would reduce the area's ability to support federally managed species. Population reductions of directly affected species such as brown and white shrimp would indirectly affect species dependent on shrimp for food. As marsh, barrier islands, and other EFH are lost, less risk reduction would be available to the remaining EFH, and these areas

would be more susceptible to storm, wind, and wave erosion. A decrease in species productivity would result as populations are stressed by habitat displacement and reduction.

Under the No Action Alternative, the NFS would continue to build first-lift levees and structures of its own accord. Constructed levees would likely continue to reduce fishery species access to EFH. Environmental compliance would continue to be coordinated through USACE Regulatory permits.

6.5.2 Proposed Action

6.5.2.1 Levees and Structures

6.5.2.1.1 Direct Impacts

EFH consultation is required for federal actions that may adversely impact EFH. Adverse impacts to EFH are defined as any reduction in the quantity or quality of EFH and may include direct or indirect physical, chemical, or biological alterations of the water or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. In parallel with the preparation of this SEIS, consultation was initiated with the NMFS Southeast Regional Office, Habitat Conservation Division in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Additionally, the Wetland Value Assessment (WVA) models were used to evaluate potential impacts to EFH. See Appendix N for documentation of coordination with NMFS.

All EFH habitat that would be affected by the Proposed Action consists of estuarine marsh habitat. Construction of the proposed levee and structures under the Proposed Action would cause permanent, major, adverse impacts to EFH by causing the permanent loss of estuarine marsh in the construction footprint (see Table 6-5 in Section 6.3.2). The managed EFH species that use this habitat would be buried or displaced. The effects of the Proposed Action on marsh habitats are quantified through WVA modeling (see Section 6.3.2 and Appendix D).

6.5.2.1.2 Indirect Impacts

After construction and during the 50-year performance period of the Proposed Action (2035-2085), indirect impacts to wetlands, fisheries, and EFH likely would result from ponding stress on wetland vegetation and reduction or elimination of estuarine-dependent fishery species access to nursery and foraging habitat. Aquatic habitats support various life stages of fish species and their prey, including spawning, breeding, feeding, and growth to maturity.

According to AdH modeling (see Appendix E), when all gates and structures are open, Project-induced impacts to salinity would be minor, with average salinity differences of 1 ppt as compared to No Action Alternative conditions (see Section 6.9.2.1.2 in Water Quality). Negligible to minor impacts to salinity would likely cause negligible to minor impacts to marsh vegetation species within the study area because estuarine marsh (inclusive of

fresh/intermediate, brackish, and saline marshes) is adapted to fluctuating salinity levels from both freshwater inputs and saltwater influences from the Gulf.

Estuarine-dependent fishery species' access to nursery and foraging habitat has been impeded by the construction of NFS levees. Proposed environmental control structures and barge gates could minimize the extent of these impacts as long as they remain open. Once the project is constructed and in operation, water levels during storms would temporarily increase (within 12 to 48 hours during and immediately following storms) on the flood side of the MTG system, as compared to No Action Alternative conditions (see Section 6.2.1). Temporary increases in water levels could increase access of fisheries species to marsh surfaces that were previously above water. This disruption in fisheries distribution would be minimal and temporary. Increased water levels in some areas may also result in temporary stagnation and algae blooms. However, these conditions should be temporary and have minor impacts to fisheries species.

6.5.2.2 Borrow Sites, Access, and Staging Areas

Borrow sites and staging areas are located on agricultural land and would be established under temporary work area easements. Impacts to significant habitats including EFH would be avoided. Habitat surveys would be conducted during the development of final project designs and borrow, and staging areas sites would be re-designed to avoid impacts. Upon expiration of the easements, the land would revert to the underlying fee owner, and decisions regarding use of the land or pit would be at the discretion of the owner.

6.5.3 Habitat Mitigation Plans

6.5.3.1 BLH

6.5.3.1.1 Napoleonville (TSP) and Supreme BLH Projects

These mitigation study areas contain no EFH. Therefore, their implementation would have no impacts to EFH.

6.5.3.2 Swamp

6.5.3.2.1 Napoleonville (TSP) and Supreme Swamp Projects

These mitigation study areas contain no EFH. Therefore, their implementation would have no impacts to EFH.

6.5.3.3 Fresh/Intermediate Marsh

6.5.3.3.1 Lake Salvador Marsh Project

Construction and dredging associated with borrow and marsh building activities would have temporary minor negative impacts to EFH. Construction and dredging activities could bury EFH substrates and temporarily change environmental conditions, such as increased turbidity. Additionally, local increases of groundwater run off due to construction and dredging activities could cause minor temporary negative impacts to fisheries including decreases in dissolved oxygen (DO) and increases in ultimate carbonaceous biochemical oxygen demand (CBODU), total nitrogen (TN), ammonia-nitrogen (NH3-N), nitrate-nitrite (NOX), organic nitrogen (Org-N), total phosphorus (TP), orthophosphate (PO4), organic phosphorus (Org-P), phytoplankton chlorophyll-a, and total suspended solids (TSS) .

This mitigation project would be beneficial in both preserving the species biodiversity and combating the current trend of conversion of coastal wetlands to open water, which could be accelerated due to sea level change. Overall, the conversion of less valuable and more abundant open water habitat to more valuable less abundant fresh/intermediate marsh would be a net benefit to EFH.

6.5.3.3.2 Delta Farms (TSP), GIWW, and Avoca Island Marsh Projects

Implementing these projects would result in the same impacts as discussed for the Lake Salvador Project.

6.5.3.4 Brackish/Saline Marsh Projects

The construction and implementation of the four brackish/saline marsh mitigation projects would be similar to impacts described for the Lake Salvador Marsh Project. Implementing these projects would convert mostly open water habitat to brackish/saline marsh.

6.6 WILDLIFE

6.6.1 No Action Alternative

Throughout most of the study area, wildlife abundance is expected to decline under the No Action Alternative. This projection is based primarily on the ongoing conversion of marsh to open water and the gradual subsidence of forested habitat (LCWCRTF and WCRA 1998). The abundance of seabirds, wading birds, shorebirds, raptors, and other birds using marsh and open water habitats is expected to decrease in deteriorating wetland areas. Waterfowl populations, such as puddle ducks, diving ducks, and coots; and migratory species, such as rails and gallinules, are expected to decline in eastern and central Terrebonne Parish. Furbearer and alligator populations are expected to decrease in deteriorating wetlands of the Terrebonne-Timbalier Bay area and near lakes Merchant and de Cade.

The abundance of raptors and other birds using hardwood forests is expected to decrease because of expected subsidence, increasing water levels, and decreasing diversity in forested communities. Squirrel, rabbit, and white-tailed deer numbers are expected to decline as well, primarily because of the ongoing conversion of marsh to open water in the study area.

6.6.2 Proposed Action

6.6.2.1 Levees and Structures

6.6.2.1.1 Direct Impacts

Construction of the Proposed Action levees and structures would directly and permanently convert BLH forest; swamp; and fresh, intermediate, brackish, and saline marsh habitat to uplands and project features (see Table 6-5). This loss of wetland would cause several wildlife species to relocate to other suitable habitat, which could cause a strain on resources for existing wildlife populations in those areas. Wildlife that cannot relocate would perish. Noise and equipment lights during construction would disrupt normal behaviors for wildlife, causing them to avoid the area.

6.6.2.1.2 Indirect Impacts

Once the project is constructed, it would cause temporary increases in water levels in some areas on the flood side of the proposed levee system (for 12-48 hours during and immediately following storm events), and temporary, beneficial impacts inside the system during storm events (due to the prevention of levee over topping up to the 1% AEP (100-year) storm event (see Section 6.2). Water level impacts would be less significant during more frequent storm events (see Section 6.2.2 for information about project impacts on flooding). Increased flooding could adversely affect terrestrial wildlife species such as deer, racoons, and coyotes that cannot swim great distances from accessing essential resources for their habitat. Species of wildlife such as the mink, river otter, nutria, beaver, and waterfowl could temporarily relocate to other refugia while the storm event occurs. Within the levee system, risk reduction from storm surges would help reduce impacts to wildlife species from water surface elevation changes.

6.6.2.2 Borrow Sites, Access, and Staging Areas

6.6.2.2.1 Direct impacts

Borrow sites and staging areas are mainly located on agricultural fields with isolated forested areas. Excavation of these lands to establish borrow pits would directly and permanently convert them to open pits that may fill with water over time. Staging areas would be cleared of all vegetation and graded to create a level surface. Wildlife present at the time of construction would be displaced to adjacent habitats due to noise, movement, and vibration.

Some slower moving animals (e.g. mice, moles) may experience demise during construction in the borrow pit and staging areas. Birds such as cattle egrets and the American crow that use the agricultural areas for food would find other areas to forage. Creation of open water areas may result in additional habitat for birds and mammals that utilize open water and water edge. Habitat surveys would be conducted prior to construction to ensure that borrow sites avoid forested and estuarine wetlands. If surveys identify wetland habitats in the proposed borrow sites, borrow sites would be re-designed to avoid these habitats, or compensatory mitigation would be implemented through the proposed compensatory mitigation plan (see Appendix C). If additional compensatory mitigation is required beyond the Appendix C mitigation plan, mitigation planning would re-commence and an additional public review or supplemental NEPA document would be prepared. Overall, there would be minor impacts to wildlife because the sites that would be used as borrow pits and staging areas currently support a low abundance and low diversity of wildlife, but species would no longer be able to use the areas once the borrow pits and staging areas are constructed.

The majority of the access routes for construction traffic are existing public or private roads. Increased truck traffic on existing roadways would have minimal impacts to wildlife. However, one of the access roads for the Lockport to Larose Reach would impact 0.1 acre of forested habitat (see Section 6.3 for information about wetland impacts of the project). Most wildlife species that occupy the 0.1 acres of forested habitat would relocate to surrounding forested areas, but some slower moving species may experience demise.

6.6.2.2.2 Indirect Impacts

Once the borrow sites and staging areas are constructed, they could create a barrier for some wildlife movements. Wildlife encountering these barriers would have to travel greater distances to reach desired habitat.

6.6.3 Habitat Mitigation Plans

6.6.3.1 BLH

6.6.3.1.1 Napoleonville BLH Project (TSP)

Direct Impacts

Approximately 588 acres of agricultural field would be converted from sugarcane field back to forested wetlands. Wildlife present at the time of construction would be temporarily displaced to adjacent habitats due to noise, movement and vibration. Some slower moving animals (e.g. mice, moles) may experience demise during construction. It is anticipated that displaced animals would return once construction is complete. High-quality forested wetland habitat would provide additional area for the expansion of existing species populations.

Indirect Impacts

With the restoration of approximately 588 acres, species that historically populated the area, and currently populate the adjacent forested areas, would again utilize the area. Wildlife abundance and diversity would increase in the area as a monoculture of sugar cane would be replaced by a diversity of BLH species that would provide a variety of ecological niches for colonization. It would also result in the creation or restoration of wetland habitat used by wildlife species for nesting, refugia, rearing of young, resting, and foraging activities, once wetland habitat is created.

6.6.3.1.2 Supreme BLH Project

Direct Impacts

Approximately 616 acres of agricultural field would be converted back to forested wetlands. Impacts similar to Napoleonville BLH would occur.

Indirect Impacts

With the restoration of approximately 616 acres, species that historically populated the area, and currently populate the adjacent forested areas, would again utilize the area. Impacts would be similar to Napoleonville BLH would occur.

6.6.3.2 Swamp

6.6.3.2.1 Napoleonville Swamp Project (TSP)

Direct Impacts

Approximately 1,063 acres of agricultural field would be converted back to swamp habitat. Wildlife present at the time of construction would be temporarily displaced to adjacent habitats due to noise, movement and vibration. Some slower moving animals (e.g. mice, moles) may experience demise during construction. It is anticipated that displaced animals would return once construction is complete. The construction of high-quality forested wetland habitat would provide additional area for the expansion of existing species populations.

Indirect Impacts

With the restoration of approximately 1063 acres, species that historically populated the area, and currently populate the adjacent forested areas, would again utilize the area. Wildlife abundance and diversity would increase in the area as a monoculture of sugar cane would be replaced by a diversity of BLH and/or swamp species that would provide a variety of ecological niches for colonization. It would also result include the creation, restoration, and risk reduction of wetland habitat used by wildlife species for nesting, refugia, rearing of young, resting, and foraging activities, once wetland habitat is created.

6.6.3.2.2 Supreme Swamp Project

Direct Impacts

Approximately 1105 acres of agricultural field would be converted back to swamp habitat. Similar impacts to Napoleonville Swamp would occur.

Indirect Impacts and Cumulative Impacts

With the restoration of approximately 1105 acres, species that historically populated the area, and currently populate the adjacent forested areas, would again utilize the area. Similar impacts to Napoleonville Swamp would occur.

6.6.3.3 Fresh/Intermediate Marsh

6.6.3.3.1 Lake Salvador Marsh Project

Direct Impacts

Construction and dredging associated with borrow and marsh building activities would have temporary minor negative impacts to wildlife. Aquatic birds, and mammals (i.e. pelicans, ducks, river otters, musk rat, and mink) could be temporarily displaced to adjacent habitats due to noise, movement, and vibration. Additionally, local increases of turbidity due to construction and dredging activities would cause minor temporary negative impacts to some wildlife habitat such as submerged aquatic vegetation.

Indirect and Cumulative Impacts

With the restoration of marsh in this area, species that historically populated the area, and currently populate the adjacent marshes, would again utilize the area. Wildlife species that utilize open water would be replaced by species utilizing marsh habitat. It would provide higher value wetland habitat for nesting, refugia, rearing of young, resting, and foraging activities. It would be beneficial in both preserving the species biodiversity and combating the current trend of conversion of coastal wetlands to open water, which could be accelerated due to sea level change. Overall, the conversion of less valuable open water habitat to more valuable fresh/intermediate marsh would be a net benefit to wildlife communities.

6.6.3.3.2 Delta Farms, GIWW, and Avoca Island Marsh Projects

Impacts to wildlife as a result of implementation of these fresh/intermediate marsh creation projects would be similar to those incurred with construction and implementation of the Lake Salvador marsh mitigation project.

6.6.3.4 Brackish/Saline Marsh

Impacts to wildlife as a result of implementation of the four brackish/saline marsh mitigation projects would be similar to those incurred with construction and implementation of the Lake Salvador marsh mitigation project.

6.7 THREATENED, ENDANGERED, AND PROTECTED SPECIES

6.7.1 No Action Alternative

Under the No Action Alternative, the study area is expected to continue to experience periodic storm surges, sea level change, and coastal land loss. The deterioration and loss of habitat due to storm surges and sea level change over time may adversely affect listed species that could be found in the study area. The NFS would continue to build first-lift levees and structures, which would have similar impacts as listed in the Proposed Action for the potential habitat of each of the listed threatened and endangered species.

6.7.2 Proposed Action

6.7.2.1 Levees and Structures

6.7.2.1.1 Direct Impacts

Due to the lack of preferred habitat in the project area, the following listed species would not be impacted by construction of the Proposed Action and are not discussed in detail: piping plover, Rufa red knot, all listed sea turtles, pallid sturgeon, and giant manta ray. The preferred habitat for the piping plover and the rufa red knot is sandy shorelines located along and in the Gulf, and the preferred habitat for the listed sea turtles and giant manta ray is the Gulf. The Proposed Action is farther inland and would not affect these habitats. It is unlikely that the pallid sturgeon would be found in areas affected by the Proposed Action because this species occurs in large rivers that are excessively turbid with strong currents and sandy bottoms. Most of the study area has silt and clay water bottoms, which the Pallid sturgeon would avoid. The proposed action would not impact these habitats. Therefore, impacts to these species are not further discussed.

Based on review of existing data, preliminary field surveys, and the use of minimization measures described below, the USACE has determined that the levees and structures component of the Proposed Action would not likely adversely affect the West Indian manatee, tricolored bat, eastern black rail, alligator snapping turtle, monarch butterfly, bald eagles, or colonial nesting water birds (see Table 6-9). FWS guidelines and NMFS BMPs would be utilized during construction of the Proposed Action to avoid and minimize any potential impacts to species, if encountered, as described below. Please see information in the following sections that support a determination of NLAA for these species. USFWS

provided a letter to USACE on November 20, 2025 confirming the determinations (Appendix N).

Table 6-9. Effect Determinations on Threatened and Endangered Species for all Aspects of the Proposed Action.

Type	Common Name	Species	ESA status	Determination
Mammals	West Indian Manatee	*Trichechus manatus*	Threatened	Not Likely to Adversely Affect (NLAA)
	Tricolored Bat	*Perimyotis subflavus*	Proposed Endangered	NLAA
Birds	Eastern Black Rail	*Laterallus jamaicensis ssp. jamaicensis*	Threatened	NLAA
	Piping Plover	*Charadrius melodus*	Threatened	NLAA
	Rufa Red Knot	*Calidris canutus rufa*	Threatened	NLAA
Reptiles	Alligator Snapping Turtle	*Macrochelys temminckii*	Proposed Threatened	NLAA
	Green Sea Turtle	*Chelonia mydas*	Threatened	NLAA
	Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	NLAA
	Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	NLAA
	Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	NLAA
	Loggerhead Sea Turtle	*Caretta caretta*	Threatened	NLAA
Fishes	Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	NLAA
	Giant Manta Ray	*Mobula birostris*	Threatened	NLAA
Insects	Monarch Butterfly	*Danaus plexippus*	Proposed Threatened	NLAA

6.7.2.1.1.1 West Indian Manatee

Manatees are unlikely to occur in the study area due to lack of foraging habitat. If manatee were in the open water near the study area during construction, construction related noise would cause them to temporarily relocate to nearby suitable habitat. If any manatee were spotted in the study area, USACE would implement standard manatee risk reduction measures developed by the FWS (see Appendix N) to prevent direct impacts to the species.

6.7.2.1.1.2 Tricolored Bat

It is plausible that tricolored bats could occur in the study area and be potentially impacted from the alignment construction by increased noise and lighting that would cause them to

temporarily avoid the construction area. Forested habitat loss from construction of levees and structures could cause permanent relocation of individuals; however, there is suitable habitat nearby and impacts to the species' overall population is not anticipated. Additional impacts could occur from the removal of large mature trees with cavities during hibernation season. However, if the large mature trees are removed during hibernation season, then USACE expects that the bats would rouse from hibernation and relocate to nearby suitable habitats. The tricolored bat is a proposed species not yet protected by take prohibitions. If prior to construction, the status changes from proposed to threatened or endangered, then USACE would re-coordinate with FWS.

6.7.2.1.1.3 Eastern Black Rail

Because there is a potential for suitable foraging and cover habitat Eastern black rail could be found in Reaches B and L. As such, a habitat survey was conducted on July 2025 and a biological evaluation completed. Results of that survey are documented in the BE and showed that (Appendix N). USACE anticipates the noise caused by machinery would cause them to avoid the area during construction. Loss of foraging and cover habitat from construction of the levees and structures could cause permanent relocation of individuals; however, there is suitable habitat nearby and impacts to the species' overall population is not anticipated. Additionally, BMPs would be implemented to avoid any potential adverse impacts to this species (see Appendix N).

6.7.2.1.1.4 Alligator Snapping Turtles

It is plausible that this species could occur in the study area due to suitable habitat (swamp) and could be potentially adversely impacted from levee construction. If present in the construction footprint, individuals may be permanently removed from the population. However, the impacted habitat would be replaced by construction of swamp mitigation project(s), which could allow the overall population to rebound over time. The alligator snapping turtle is a proposed species not yet protected by take prohibitions. If prior to construction, the status changes from proposed to threatened or endangered, then USACE would re-coordinate with FWS.

6.7.2.1.1.5 Monarch Butterfly

This insect may occur in the study area depending on the availability of nectar producing flowers and/or milkweed. Construction machinery could result in mortality by collision; however, these numbers are expected to be insignificant because the construction machinery would be slow moving. Project construction may result in permanent loss of habitat supporting nectar producing flowers and milkweed, which would cause permanent relocation of individuals; however, there is suitable habitat nearby and recolonization of temporary access and staging areas by nectar producing plants could occur once construction is complete. As such, impacts to the species' overall population are not anticipated.

The monarch butterfly is a proposed species not yet protected by take prohibitions. If, prior to construction, the status changes from proposed to threatened or endangered, then USACE would re-coordinate with FWS.

6.7.2.1.1.6 Protected Species

Protected species that could be present within the study area include the bald eagle, brown pelican, colonial nesting birds, and the bottlenose dolphin. If any protected species happened to be in the study area during construction, they could experience temporary noise impacts but would be able to easily move out of the noise impact radius into nearby suitable habitat. If bald eagle nests are discovered near the study area or new nests become built in the study area, the National Bald Eagle Management Guidelines would be followed during construction to avoid and minimize impacts to this species (Appendix N). If waterbird nesting colonies become established in the area, the 1,000-foot buffer must be maintained unless coordination with the FWS indicates that the buffer zone may be reduced based on the species present or an agreement is reached with FWS that allows a modified process to be adopted. USACE would continue to coordinate with FWS and LDWF. Protected Marine Species Entrapment Prevention Measures would be followed as described in Appendix N for Bottlenose dolphins. No direct impacts to protected species are anticipated with implementation of these guidelines.

6.7.2.1.2 Indirect Impacts

Due to the lack of preferred habitat, the following listed species would not be indirectly impacted by construction of the proposed levee and structures and are not discussed in detail: piping plover, rufa red knot, all listed sea turtles, pallid sturgeon, and giant manta ray.

Based on review of existing data, preliminary field surveys, and the use of minimization measures described below, USACE has determined that the levees and structures component of the Proposed Action would not likely adversely affect the West Indian manatee, tricolored bat, eastern black rail, alligator snapping turtle, monarch butterfly, bald eagles, colonial nesting water birds, or bottlenose dolphins (see Table 6-9). FWS guidelines and NMFS BMPs would be utilized during construction of the Proposed Action to avoid and minimize any potential impacts to listed species, if encountered, as described below.

Once the Proposed Action is constructed, it would cause temporary increases in water levels on the flood side of the proposed levee system (for 12-48 hours during and immediately following storm events), and temporary, beneficial impacts inside the system during storm events (due to the prevention of levee over topping up to the 1% AEP (100-year) storm event (see Section 6.2). This could have impacts on habitat for listed species, as described below.

6.7.2.1.2.1 West Indian Manatee

Manatees are unlikely to occur in the study area due to lack of foraging habitat. No indirect impacts to West Indian Manatee are anticipated from construction of the levees and structures.

6.7.2.1.2.2 Eastern Black Rail

Project construction would increase water levels during storms outside the levee system which would temporarily degrade exterior marshes and cause the Eastern black rail to temporarily relocate. If the water level increases during nesting season this may cause nests to be destroyed or abandoned. Alternately, marshes inside the levee system would benefit by having reduced water levels during storms.

6.7.2.1.2.3 Tricolored Bat

Project construction would increase water levels during storms outside the levee system which could temporarily degrade exterior BLH and cause the tricolored bat to temporarily or even permanently relocate. However, BLH forests inside the levee system would benefit by having reduced water levels during storms that could result in the persistence of nearby forests.

6.7.2.1.2.4 Alligator Snapping Turtle

If alligator snapping turtles happen to be in the study area during construction, they could experience impacts in the form of stress from noise and vibration, which may result in a decrease in body condition and nest abandonment. Also, lower water quality during construction would limit foraging opportunities by reducing the abundance of prey species, which may result in decreased body condition and relocation to nearby suitable habitat. However, the impacted habitat would be replaced by construction of swamp mitigation project(s), which would allow the population to rebound from any indirect impacts.

No impacts from increases in water levels and salinity are anticipated for this species, because the swamp habitats are already experiencing changes in salinities and water levels during storm surges and increases in water levels would not appreciatively change the quality of habitat. Significant declines in swamp habitat from increases in water levels during storms are not expected.

6.7.2.1.2.5 Monarch Butterfly

Project construction would increase water levels during storms outside the levee system which could temporarily degrade the abundance of nectar producing flowers and milkweed which could result in egg destruction and cause the monarch butterfly to temporary relocate to nearby suitable habitat for foraging and reproduction. Alternately, nectar producing

flowers and milkweed inside the levee system would benefit by having reduced water levels during storms.

6.7.2.1.2.6 Protected Species

Though some permanent loss of nesting habitat for brown pelicans, colonial nesting birds, and bottlenose dolphins may occur with construction of the levees and structures, suitable adjacent habitat exist such that adverse impacts to these populations are not anticipated.

6.7.2.2 Borrow Sites, Access, and Staging Areas

Due to the lack of preferred habitat, the following species would not be impacted by the construction of the proposed borrow sites, access, and staging areas and are not discussed in detail: West Indian manatee, piping plover, rufa red knot, all sea turtles, pallid sturgeon, bottlenose dolphin, and the giant manta ray.

6.7.2.2.1 Direct impacts

Based on review of existing data, aerial photography, and the use of minimization measures described below, USACE has determined that the borrow sites, access, and staging areas component of the Proposed Action is not likely to adversely affect the tricolored bat, eastern black rail, alligator snapping turtle, monarch butterfly, bald eagles, and colonial nesting birds.

Excavation of the borrow pits would directly and permanently convert existing agricultural fields to open water. There are some forested habitats within the proposed borrow pit locations; therefore, USACE would avoid adverse impacts to these significant habitats. Site visits would be performed prior to excavation and adverse impacts to significant habitats would be avoided.

The majority of the access routes are already public or private roads and would have minimal direct impacts to listed species. However, construction of the access route for the Lockport to Larose levee reach would impact .1 acres of forested habitat, and 0.2 acres of marsh habitat.

6.7.2.2.1.1 Tricolored Bats

Since there are some forested areas in the borrow pits and near the borrow pits, staging areas, and access roads, Tricolored bats could experience temporary construction related impacts due to noise and nighttime lighting causing them to avoid the area. However, nearby similar habitat is available for their use and impacts to the species is not anticipated. The tricolored bat is a proposed species not yet protected by take prohibitions. If prior to construction, the status changes from proposed to listed, then USACE would re-coordinate with FWS.

6.7.2.2.1.2 Eastern Black Rail

Eastern black rail habitat does not occur within the borrow pits, staging areas, and access roads. However, near the borrow pits for Reaches B and L there is suitable foraging habitat and cover for this species. Construction related noise may cause them to avoid the area temporarily during the period of construction. BMPs would also be implemented to prevent any potential impacts (see Appendix N).

6.7.2.2.1.3 Alligator Snapping Turtle

There is no suitable habitat for alligator snapping turtle within the borrow pits, staging areas, or access routes. However, nearby creeks and streams where forested canopies overhang could be utilized by alligator snapping turtles. They could experience impacts in the form of stress from noise and vibration, which may result in a decrease in body condition and nest abandonment. However, these impacts would be temporary during construction.

6.7.2.2.1.4 Monarch Butterfly

There could be potential habitat for the monarch butterfly in some of the borrow pits, and staging areas based on the availability of nectar producing flowers and/or milkweed. Construction machinery could result in mortality by collision; however, these numbers are expected to be insignificant because the construction machinery would be slow moving. The monarch butterfly is a proposed species not yet protected by take prohibitions. If, prior to construction, the status changes from proposed to listed, then USACE would re-coordinate with FWS.

6.7.2.2.1.5 Protected Species

There are no protected species present within the borrow pits, staging areas, or access roads. Although there are no documented bald eagle nests at this time, there is suitable habitat nearby the borrow pits that could be used for bald eagle nesting. The USACE would continue to coordinate with FWS and LDWF to avoid and minimize impacts to any Bald eagles that may move into the area nearby prior to or during construction.

6.7.2.2.2 Indirect Impacts

No indirect impacts to T&E or protected species are anticipated from use of the proposed borrow pits, staging areas, and access routes since project related activities in these areas would cease once construction is complete.

6.7.3 Habitat Mitigation Plans

6.7.3.1 BLH Mitigation

Due to the fact that this project component for BLH mitigation is strictly land based, none of the sea turtles, giant manta ray, pallid sturgeon, bottlenose dolphin, or manatees would be

impacted due to their aquatic nature. Due to lack of preferred habitat in this project component, the rufa red knot, piping plover, eastern black rail, alligator snapping turtle, and monarch butterfly would not be present; therefore, none of these species are discussed below. However, the tricolored bat and the bald eagle could benefit from the BLH mitigation creation; therefore, they are discussed below.

6.7.3.1.1 Napoleonville BLH Project (TSP)

6.7.3.1.1.1 Tricolored Bats

The proposed BLH mitigation creation area does not contain any habitat for tricolored bats, because it is currently a sugarcane field. Once construction is complete and the BLH forest matures, this site may become suitable for tricolored bats to colonize.

6.7.3.1.1.2 Protected Species

There are no protected species present in the Napoleonville BLH study area; however, there could be suitable habitat for nesting bald eagles nearby. USACE would continue to coordinate with FWS and LDWF to avoid and minimize direct or indirect impacts to any bald eagles that may move into the surrounding area prior to, or during, construction. Once construction is complete and the BLH forest matures there is a possibility that this site may become suitable for bald eagles to nest in and colonize.

6.7.3.1.2 Supreme BLH Project

Impacts would be similar to those described for the Napoleonville BLH Project except approximately 616 acres of open sugarcane land would be converted to BLH.

6.7.3.2 Swamp

Due to the fact that this project component for Swamp mitigation is strictly land based, none of the sea turtles, giant manta ray, pallid sturgeon, bottlenose dolphin, or manatee will be discussed, due to their aquatic nature. Due to lack of preferred habitat in this project component, the rufa red knot, piping plover, eastern black rail, and monarch butterfly would not be present; therefore, none of these species are discussed below. However, the tricolored bat, alligator snapping turtle, and other protected species could benefit from the swamp mitigation creation; therefore, they are discussed below.

6.7.3.2.1 Napoleonville Swamp Project (TSP)

6.7.3.2.1.1 Tricolored Bats

The proposed swamp creation area does not contain any habitat for tricolored bats, because it is currently a sugarcane field. Once construction is complete and the swamp matures, this site may become suitable habitat for tricolored bats.

6.7.3.2.1.2 Alligator Snapping Turtle

The proposed swamp creation area does not contain habitat for the alligator snapping turtle. Once construction is complete and the habitat matures, alligator snapping turtles may colonize the area.

6.7.3.2.1.3 Protected Species

There are no documented occurrences of protected species within the Napoleonville Swamp study area; however, suitable habitat for nesting bald eagles may be present in the vicinity. USACE would continue to coordinate with FWS and LDWF to avoid and minimize impacts to any eagles that may move into the area nearby prior to or during construction. Once construction is complete and the swamp matures, the site may become suitable for bald eagles and colonial nesting birds to nest and roost in.

6.7.3.2.2 Supreme Swamp Project

Impacts would be similar to those described for the Napoleonville Swamp Project except approximately 1105 acres of open sugarcane land would be converted to swamp.

6.7.3.3 Fresh/Intermediate Marsh

Due to lack of preferred habitat, the following listed species would not be impacted by the creation of the proposed fresh/Intermediate marsh mitigation; therefore, they are not discussed in detail: the rufa red knot, piping plover, tricolored bat, alligator snapping turtle, pallid sturgeon, monarch butterfly, hawksbill sea turtle, leatherback sea turtle, and giant manta ray.

Based on review of existing data, preliminary field surveys, and the use of minimization measures described below, USACE has determined that the fresh/intermediate marsh mitigation component of the Proposed Action would not likely adversely affect the West Indian manatee, eastern black rail, the Kemp's ridley turtle, loggerhead turtle, green sea turtles, and protected species. FWS guidelines and NMFS BMPs would be utilized during construction of the Proposed Action to avoid and minimize any potential impacts to species, if encountered, as described below.

6.7.3.3.1 Lake Salvador Marsh Project

6.7.3.3.1.1 Sea Turtles

Construction of the Lake Salvador marsh project would result in a no net loss of wetlands by converting open water habitat to marsh. This would permanently remove foraging habitat for the Kemp's ridley, loggerhead, and green sea turtles. However, impacts to these species would be negligible due to the availability of similar habitat nearby. The presence of construction-related activity, machinery, and noise is expected to cause these species to avoid the study area during construction. Additionally, direct impacts to sea turtles from

construction related activities are not anticipated as hydraulic cutterhead dredges are slow moving and there have been no recorded takes of these animals from hydraulic cutterhead dredges. Impacts to sea turtles would further be avoided by implementation of risk reduction measures developed by the FWS and protected species construction conditions developed by NMFS (Appendix N).

Temporary impacts to local water quality within Lake Salvador could also occur during construction and dredging of the borrow pit within Lake Salvador. Changes to temperature, dissolved oxygen (DO), ultimate carbonaceous biochemical oxygen demand ($CBOD_U$), total nitrogen (TN), ammonia-nitrogen (NH3-N), nitrate-nitrite (NOX), organic nitrogen (Org-N), total phosphorus (TP), orthophosphate (PO4), organic phosphorus (Org-P), phytoplankton chlorophyll-a, and total suspended solids (TSS) could produce conditions that would reduce the availability of prey items for T&E species. However, these water quality changes are expected to be negligible due to the small size of the borrow pit compared to the overall size of the Lake Salvador and high flushing rate of the lake.

6.7.3.3.1.2 West Indian Manatee

Manatees are unlikely to occur in the study area due to lack of foraging habitat. Direct impacts to manatees from construction are not anticipated as hydraulic cutterhead dredges are slow moving and there have been no recorded takes of these animals from hydraulic cutterhead dredges. Manatees could experience temporary noise impacts but would be able to easily move out of the noise impact radius into nearby suitable habitat. Additionally, the USACE would implement standard manatee risk reduction measures developed by the FWS (see Appendix N) to avoid any direct impacts.

6.7.3.3.1.3 Eastern Black Rail

There is no suitable habitat for eastern black rail within the proposed marsh creation area. However, the nearby marshes may have suitable habitat for eastern black rail. Construction related noise may cause them to avoid the area temporarily. BMPs would be implemented to reduce any potential impacts (See Appendix N). Once construction is complete and the mitigation site vegetated, it may produce habitat suitable for eastern black rail to utilize.

6.7.3.3.1.4 Protected Species

The only protected species that could be found in the Lake Salvador Marsh mitigation study area would be the bottlenose dolphin. There would be no adverse impacts to dolphins from implementation of this project, although construction related noise could cause them to temporarily relocate to nearby suitable habitat. There could be suitable habitat for bald eagles and colonial nesting bird rookeries in the surrounding area. The USACE would continue to coordinate with FWS and LDWF to avoid and minimize impacts to any bald eagles or rookeries that may be in the vicinity of the project prior to or during construction.

6.7.3.3.2 Delta Farms, GIWW, and Avoca Island Marsh Projects

Impacts would be similar to those described for the Lake Salvador Marsh Project except more acres of open water habitat would be converted to fresh intermediate marsh.

6.7.3.4 Brackish/Saline Marsh

Due to lack of preferred habitat, the following listed species would not be impacted by the creation of brackish/saline Marsh mitigation; therefore, they are not discussed in detail: tricolored bat, alligator snapping turtle, piping plover (except 3 Mile Bay), rufa red knot (except 3 Mile Bay), giant manta ray, pallid sturgeon, and monarch butterfly.

Based on review of existing data, preliminary field surveys, and the use of minimization measures described below, the USACE has determined that the brackish/saline marsh mitigation component of the Proposed Action would not likely adversely affect the West Indian manatee, eastern black rail, piping plover (for 3 Mile Bay), rufa red knot (for 3 Mile Bay), all sea turtles, and protected species. FWS guidelines and NMFS BMPs would be utilized during construction of the Proposed Action to avoid and minimize any potential impacts to species, if encountered, as described below.

6.7.3.4.1 West Terrebonne Marsh Project

6.7.3.4.1.1 Sea Turtles

Sea turtles have the potential to be found in the proposed West Terrebonne marsh study area. The presence of construction-related activity, machinery, and noise is expected to cause these species to avoid the study area during the construction period. Direct impacts to sea turtles from construction related activities are not anticipated, as hydraulic cutterhead dredges are slow moving and there have been no recorded takes of these animals from hydraulic cutterhead dredges. Impacts to sea turtles would further be avoided by implementation of protected species construction conditions developed by NMFS (Appendix N).

Construction of the West Terrebonne marsh project would result in a no net loss of wetlands by converting open water habitat to marsh. This would permanently remove foraging habitat for listed sea turtles in the area. However, this would be negligible due to the availability of similar habitat nearby. Temporary impacts to local water quality within West Terrebonne Marsh study area could also occur during construction and dredging of the borrow pit. Changes to temperature, dissolved oxygen (DO), ultimate carbonaceous biochemical oxygen demand (CBODU), total nitrogen (TN), ammonia-nitrogen (NH3-N), nitrate-nitrite (NOX), organic nitrogen (Org-N), total phosphorus (TP), orthophosphate (PO4), organic phosphorus (Org-P), phytoplankton chlorophyll-a, and total suspended solids (TSS) could produce conditions that would reduce the availability of prey items for T&E species. However, these changes to water quality are expected to be negligible due to the small size

of the borrow pit compared to the overall size of the body of water the project occupies. Impacts to threatened and endangered species associated with alteration of local water quality would also be reduced through use of BMPs (Appendix N).

6.7.3.4.1.2 West Indian Manatee

Manatees are unlikely to occur in the study area due to lack of foraging habitat. Direct impacts to manatees from construction are not anticipated as hydraulic cutterhead dredges are slow moving and there have been no recorded takes of these animals from hydraulic cutterhead dredges. Manatees could experience temporary noise impacts but would be able to easily move out of the noise impact radius into nearby suitable habitat and could return to the area after construction was complete. Additionally, USACE would implement standard manatee risk reduction measures developed by the FWS to avoid impacting this species (See Appendix N).

6.7.3.4.1.3 Eastern Black Rail

There is no suitable habitat for the eastern black rail within the proposed marsh creation area. However, the nearby, marshes may have suitable habitat for the eastern black rail. Construction related noise may cause them to avoid the area temporarily. BMPs would be implemented to reduce any potential impacts (See Appendix N).

6.7.3.4.1.4 Protected Species

The only protected species that could be found in the footprint of the West Terrebonne Marsh mitigation site would be the bottlenose dolphin. There would be no adverse impacts to dolphins from implementation of this project as there is bountiful adjacent habitat. There could be suitable habitat for bald eagles and colonial nesting bird rookeries in the surrounding area. USACE would continue to coordinate with FWS and LDWF to avoid and minimize impacts to any Bald eagles or rookeries that may be in the vicinity of the project prior to or during construction.

6.7.3.4.2 North Barataria Bay Marsh Project

Implementation of the North Barataria Bay marsh project would incur similar impacts as those identified for the West Terrebonne marsh project except approximately 6,791 acres of open water habitat would be converted to marsh. The West Terrebonne marsh project would convert 6,431 acres of open water to marsh habitat.

6.7.3.4.3 3 Mile Bay Marsh Project

Implementation of the 3 Mile Bay Marsh project would incur similar impacts as those identified for the West Terrebonne marsh project except approximately 8,728 acres of open water habitat would be converted to marsh and nearby potential suitable habitat for the Piping plover and Rufa red knot exists.

6.7.3.4.3.1 Piping Plover and Rufa Red Knot

There is no piping plover or Rufa red knot critical habitat in the study area, nor is construction likely to adversely affect the other habitat that they utilize. Construction related noise may cause them to avoid the area temporarily. However, there is potential suitable habitat nearby that could serve as a stopover point during migration or for foraging.

6.7.3.4.4 Isle de Jean Charles Marsh Project

Implementation of the Ise de Jean Charles marsh project would incur similar impacts as those identified for the West Terrebonne marsh project except approximately 16,709 acres of open water habitat would be converted to marsh.

6.8 PRIME AND UNIQUE FARMLAND

6.8.1 No Action Alternative

Under the No Action Alternative, hurricane and tropical storm tidal surges would continue to cause damage to prime farmland located throughout Terrebonne and Lafourche parishes. Additionally, due to continuing land loss in the study area, levees protecting prime farmland would become increasingly vulnerable to storm damage.

6.8.2 Proposed Action

6.8.2.1 Levees and Structures

6.8.2.1.1 Direct Impacts

Approximately 1,102 acres (less than 1 percent) of soils in the proposed construction footprint are classified as prime farmland soils. These prime farmland soils would be buried by levees, structures, and staging areas and would no longer be available for agricultural purposes. In compliance with the Farmland Policy Protection Act, coordination with the NRCS will progress during the public commenting period of the draft SEIS. Prime farmland soil types, ratings, and associated acreages will be provided in Appendix P in the final SEIS.

6.8.2.1.2 Indirect Impacts

Once the Proposed Action is constructed and in operation, prime farmlands inside the proposed levee system would benefit from reduced frequency of flooding and storm surge impacts. Agricultural activities on prime farmland would be unimpeded by road closures and damages associated with flooding up to the up to the 1% AEP (100-year) storm event.

6.8.2.2 Borrow Sites, Access, and Staging Areas

It is estimated that converting agricultural land to borrow sites and, to a lesser extent, staging areas would directly impact approximately 2,631 acres of total agricultural land in the

study area due to construction. Borrow site areas were chosen to avoid impacts to wetlands and other resources by using agricultural property to acquire borrow material wherever practicable. The hurricane and storm damage risk reduction benefits provided to remaining farmland in the area would outweigh the direct impacts from construction and mitigation efforts with either alternative. Therefore, the overall impact to agricultural land, and prime and unique farmland in particular, is not considered significant. Potential impacts to prime and unique farmland as a result of any project feature would be coordinated with NRCS during the public review period of the Draft SEIS. Farmland conversion impact rating forms would be coordinated with the NRCS at that time.

Access routes that are planned to occur on existing roads would not impact prime farmland. Construction of the Lockport to Larose access and haul road would convert 1.7 acres of prime farmland.

6.8.3 Habitat Mitigation Plans

6.8.3.1 BLH

6.8.3.1.1 Napoleonville BLH Project (TSP)

Approximately 587.3 acres of prime farmland would be impacted by this project. Once the site is developed for mitigation, this area could not be used as productive farmland in the future. This would represent a negligible impact because according to 2023 USGS data, the study area includes a total of nearly 80,000 acres of cultivated crops (see Section 5.1.3). The loss of 587.3 acres would represent less than 1 percent (0.0007) of cultivated crops in the study area.

6.8.3.1.2 Supreme BLH Project

The impacts from constructing and implementing the Supreme BLH mitigation project would be similar to those associated with constructing and implementing the Napoleonville BLH Project, except that the Supreme BLH Project would convert approximately 617.4 acres of prime farmland to BLH habitat. According to 2023 USGS data, the study area includes a total of nearly 80,000 acres of cultivated crops (see Section 5.1.3). The loss of 587.3 acres would represent less than 1 percent (0.0008) of cultivated crops in the study area.

6.8.3.2 Swamp

The impacts from constructing and implementing the Napoleonville and Supreme swamp mitigation projects would be similar to those associated with constructing and implementing the Napoleonville BLH Project, except that the Napoleonville swamp project would convert approximately 1,059.9 acres of prime farmland to swamp habitat, and the Supreme swamp project would convert approximately 1,097.8 acres of prime farmland to swamp habitat.

6.8.3.3 Fresh/Intermediate and Brackish/Saline Marsh Projects

There would be no impacts to Prime or Unique Farmland from implementation of the four fresh/intermediate and the four brackish/saline marsh projects as there is no identified Prime or Unique Farmland in these areas.

6.9 WATER QUALITY

6.9.1 No Action Alternative

Under the No Action Alternative, construction of the Proposed Action would not occur. The ambient water quality and sediment quality conditions in the study area would continue as described in Section 5.9. Ongoing trends of sea level change and increasing salinities would continue.

6.9.2 Proposed Action

6.9.2.1 Levees and Structures

6.9.2.1.1 Direct Impacts

Construction activities such as excavating and transporting fill would disturb soils and may cause temporary impacts to water quality in surface waters adjacent to or within construction areas. Though fill material would not be discharged into nearby waterbodies, construction activities could cause temporary increases in turbidity and suspended solids within adjacent water bodies. The nature of impacts to the surrounding ecosystem would be minor and temporary; increased turbidity and suspended solids would not violate water quality standards or criteria or exacerbate existing water quality impairments in the GIWW, Minors Canal, Dularge, or neighboring water bodies. To minimize impacts to surface waters during construction, a SWPPP would be required from construction contractors prior to the initiation of construction that would include best management practices to minimize and prevent erosion of soils and contaminants into adjacent waterbodies. With the implementation of the SWPPP, impacts to study area water quality would be minor and temporary, and water quality conditions would return to return to pre-construction conditions once construction is completed.

The Proposed Action is currently being evaluated under Section 404(b)(1) of the CWA. The purpose of Section 404(b)(1) is to protect the integrity of U.S. waters by documenting and regulating the potential discharge of dredged or fill material into water bodies near the study area. To comply with Section 401 of the CWA, a Louisiana Water Quality Certificate would be obtained from LDEQ before construction. The purpose of the Section 401 of the CWA is to submit documentation regarding potential discharges to local waterways to state agencies for their review.

6.9.2.1.2 Indirect Impacts

6.9.2.1.2.1 Tidal Exchange/Mixing

Once the Proposed Action is constructed and operational, tidal exchange from the land side of the levee to the flood side of the levee would be significantly interrupted when floodgates and structures are closed during storm and flooding conditions. A reduction in tidal exchange has the potential to cause stagnation of water on the land of the levee system, but this would impact would be temporary; tidal exchange would return when proposed gates are open during non-storm conditions, and water quality would return to pre-closure conditions (stagnation impacts would diminish). See Sections 6.2, 6.3, and 6.4 for discussions about how the Proposed Action would impact hydrology, wetlands, and aquatic resources, respectively.

6.9.2.1.2.2 Salinity During Non-Storm Conditions

AdH modeling was conducted to simulate potential water flows and salinity impacts of the Proposed Action (once constructed) for 2035, and 2085 sea level scenarios (see Appendix E). Model simulations assumed that all structures were in the open position, with the HNC Lock Complex open or closed. Some caveats and limitations to that study include: the potential loss of accuracy toward the east side of the modeled area (GIWW East floodgate), the model only considered the system to have all water control structures open, some structures were excluded, some structures were incorporated as bidirectional culverts where flap gates exists, uncertainty of sea level change predictions, and salinity estimates should only be used for relative comparisons (see Appendix E).

The results indicate that when all structures are open and the HNC Lock Complex is either in the closed or open position, the impacts of the Proposed Action on flows and salinities would be overall negligible to minor. More specifically, salinity differences would average within +/- 1-2 parts per thousand (ppt) with maximum differences of +/-10 ppt in 2035 and 2085. The largest difference in salinity would be near the eastern end of the model boundary where there would be increased flow. It would be expected that salinity reductions (rather than increases) would occur where increased flows occur. This model finding could simply be a model error because of amplified model uncertainty at the edges of the model boundary, or the salinity increase could mean that saline tidal flow from the Gulf would enter the MTG system under the Proposed Action condition in places where tidal flow was not entering without the levee in place. Further, the area of the largest difference in salinity is primarily brackish/saline habitat which would be minimally impacted by the modeled changes in salinity. See Sections 6.3 through 6.7 for discussion about how these hydrodynamic impacts would affect habitats, animals, and protected species.

6.9.2.2 Borrow Sites, Access, and Staging Areas

The clearing and excavation of the proposed borrow sites could result in a temporary discharge of material from the borrow site into surrounding waterbodies due to surface water

runoff during rain and storm events. Groundwater would be removed from the excavated borrow site. The water collected would be pumped out into adjacent areas and would likely drain into the Gulf Intracoastal Waterway or neighboring streams/bayou near the proposed borrow site. It is expected that there would be a temporary increase in turbidity within the water bodies directly surrounding any areas of the runoff or groundwater pumping operations. Any increases in turbidity would likely be diminished by the moving currents of the waterbodies, and any free-floating sediment would likely settle.

6.9.3 Habitat Mitigation Plans

6.9.3.1 BLH

6.9.3.1.1 Napoleonville and Supreme (BLH)

The conversion of agricultural land to BLH may cause temporary impacts to water quality in adjacent water sources during the conversion of the site. These impacts may be minimal due to best management practices that would be outlined within the SWPPP.

6.9.3.2 Swamp

6.9.3.3 Napoleonville and Supreme (Swamp)

The conversion of agricultural land to swamp may cause temporary impacts to water quality in adjacent water sources during the conversion of the site. These impacts may be minimal due to best management practices that would be outlined within the SWPPP. When the conversion occurs, the potential inundation of the converted site would not increase the risk of water quality issues; water quality may improve for the site and surrounding water bodies due to the natural filtration qualities swamps provide.

6.9.3.4 Fresh/Intermediate Marsh

6.9.3.4.1 Lake Salvador Marsh Project

Construction and dredging associated with borrow and marsh building activities would have temporary minor negative impacts to water quality. The temporary impacts to water quality would come from the placement of fill material, the transportation of material within the study area, construction of dikes, armoring, platforms, containment dikes, and other construction activities. Though temporary turbidity and suspended solids could result from the construction of the above referenced measures, the nature of impacts to the surrounding ecosystem would be minimal in nature and would not violate water quality standards or criteria or exacerbate existing water quality impairments in the GIWW, Minors Canal, Dularge, or neighboring water bodies. Once construction is complete, the temporarily affected waterways would revert to their pre-construction conditions as the influencing factors causing the impacts would no longer be present.

6.9.3.4.2 Delta Farms, GIWW, and Avoca Island Marsh Projects

These projects would result in the same impacts as discussed for the Lake Salvador project.

6.9.3.5 Brackish/Saline Marsh

6.9.3.5.1 West Terrebonne Marsh Project

Construction and dredging associated with the West Terrebonne mitigation project

would have temporary minor negative impacts to water quality. The temporary impacts to water quality would come from the placement of fill material, the transportation of material within the study area, construction of dikes, armoring, platforms, containment dikes, and other construction activities. Once construction is complete, the temporarily affected waterways would revert to their pre-construction conditions as the influencing factors causing the impacts would no longer be present.

6.9.3.5.2 North Barataria Bay, 3 Mile Bay, and Isle de Jean Charles Marsh Projects

These projects would result in the same impacts as discussed for the West Terrebonne marsh project.

6.10 HTRW

6.10.1 No Action Alternative

The No Action Alternative is not anticipated to affect or contribute to HTRW in the area. In absence of the Proposed Action, the NFS may continue to build first-lift levees as well as structures of its own accord. Construction activities would be required to comply with applicable local, state, and federal laws.

6.10.2 Proposed Action

6.10.2.1 Levees and Structures

As described in Section 5.10 and Appendix I, a Phase I ESA conducted in 2023-2024 along the Proposed Action alignment determined that there is a low probability of encountering HTRW during construction of the Proposed Action. The ESA consisted of a desktop analysis with visual confirmation by aerial flight. No potential REC sites were identified within or adjacent to the Proposed Action alignment (see Section 5.10 and Appendix I for details about the HTRW assessment). The aerial flight inspection conducted by USACE personnel did not identify evidence of RECs such as stressed soils or hazardous waste spills along the proposed alignment. Natural gas pipelines cross the Proposed Action alignment and are not RECs that would affect the Proposed Action. Interstate natural gas pipelines are regulated by the Pipeline and Hazardous Materials Safety Administration to ensure they meet safety standards.

In accordance with ER 405-1-12, the NFS is tasked with the responsibility of utility/facility relocations to fulfill its obligation to provide a project right-of-way that is free and clear of interfering facilities or any other obstructions or encumbrances, per the MTG Project PPA. During construction, contractors would be made aware of the existence of pipelines in the work areas and would take appropriate actions to avoid impacts to them or to relocate them. Contractors would be required to contact the national "Call Before You Dig" hotline before any digging or excavation to identify and avoid underground pipelines and utilities.

6.10.2.2 Borrow Sites, Access, Staging Areas, and Habitat Mitigation Sites

Based on a desktop analysis, the risk of encountering HTRW throughout the borrow sites, staging areas, constructed haul road, and habitat mitigation sites of the Proposed Action was determined to be low. Overall, it was determined that no HTRW issues currently exist within these project features. During the development of final designs before construction of the project, a Phase I ESA would be executed to ensure that HTRW risks are not present or are avoided. Contractors would be made aware of the existence of pipelines in the work areas and would take appropriate actions to avoid impacts to them or to relocate them.

6.10.2.2.1 Oil & Gas Wells

No active-producing wells were identified at any of the proposed sites.

The analysis identified several plugged and abandoned (P&A) oil & gas wells within the boundaries of proposed borrow and mitigation sites:

- Borrow Sites with P&A Wells: A216, A25, A32, A46, A208, A208.1, A209, J1, A211, A213
- Mitigation Sites with P&A Wells: Napoleonville Swamp, Lake Salvador Fresh Intermediate, Isle de Jean Charles Brackish Saline, West Terrebonne Brackish Saline
- Additionally, three orphaned wells were in Borrow Site A46 and one "expired permit" well is located at Borrow Sites J1 and A212.

6.10.2.2.2 Petroleum Pipelines

Petroleum pipelines were found crossing the boundaries of various proposed sites:

- Borrow Sites with Pipelines: A216, A215, A1, A2, A25, A32, A46, A208, A209, A210, J1, A211, A213, A214
- Staging Sites with Pipelines: S1 (north of A215), S2 (at A2), S5 (at A46)
- Haul Road: At Borrow Site A184

- Mitigation Sites with Pipelines in the Vicinity: Napoleonville Swamp, Supreme Swamp, Avoca Island Fresh Intermediate, Isle de Jean Charles Brackish Saline, and several others

6.10.2.2.3 RCRA Facilities

Resource Conservation and Recovery Act (RCRA) listed facilities were found within one mile of the proposed sites:

- Borrow Sites: A184, A2, A25, A32, A209, A210, J1, A211, A212, A213
- Staging Sites: S2 (at A2 and A209), S5 (at A213)
- Haul Road: Near Borrow Site A184
- Mitigation Site: Napoleonville Swamp

6.10.2.2.4 Historical Environmental Concerns (HREC)

One historical recognized environmental condition (HREC) was identified within one mile of Borrow Site A184 and the proposed haul road.

6.10.2.2.5 Recommendations and Conclusions

The P&A oil/gas wells and pipelines are not considered RECs. See Section 6.10.2.1 for further information about how impacts to wells and pipelines would be avoided. A Phase I Environmental Site Assessment would be conducted prior to construction of all project features to ensure that HTRW is avoided.

6.11 AIR QUALITY

6.11.1 No Action Alternative

Without implementation of the Proposed Alternatives, no direct, indirect, or cumulative impacts to ambient air quality would occur.

6.11.2 Proposed Action

6.11.2.1 Levees and Structures

6.11.2.1.1 Direct Impacts

During construction of this Proposed Action, an increase in air emissions could be expected. These emissions could include 1) exhaust emissions from operations of various types of non-road construction equipment and 2) airborne dust due to earth disturbance. Emission of fugitive dust near the construction area is not anticipated to be a problem as the site is rural and not highly populated.

Any site-specific construction effects would be temporary and dust emissions, if any, would be controlled using standard BMPs. Air quality would return to pre-construction conditions shortly after the completion of construction activities. The use of on-road vehicles for transporting materials, supplies, accessing sites, and implementing construction measures may lead to localized air quality impacts. However, these emissions are expected to be minimal, and air quality is anticipated to return to pre-construction levels once the project is completed. Therefore, the Proposed Action would have negligible impacts on air quality. The proposed MTG Project is in parishes that are currently in attainment of NAAQS; therefore, a conformity determination is not required.

6.11.2.1.2 Indirect Impacts

There would be no adverse indirect impacts to air quality in the parish with construction and operation of the Proposed Action.

6.11.2.2 Borrow Sites, Access, and Staging Areas

6.11.2.2.1 Direct Impacts and Indirect Impacts

Similar to the construction of the levees and structures, construction of the borrow sites and staging areas would require the use of construction vehicles and gas-powered equipment, and the movement of soil would create temporary air borne dust impacts. The direct, indirect, and cumulative impacts would be the same as described in Section 6.11.2.1 above.

6.11.3 Habitat Mitigation Plans

The direct and indirect impacts of constructing and implementing the BLH, swamp, and marsh mitigation projects would be similar, with no notable differences in impacts. During construction, an increase in air emissions could be expected. These emissions could include 1) exhaust emissions from operations of various types of non-road construction equipment and 2) airborne dust due to earth disturbance. Emission of fugitive dust near the construction area is not anticipated to be a problem as the site is rural and not highly populated.

Any site-specific construction effects would be temporary and dust emissions, if any, would be controlled using standard BMPs. Air quality would return to pre-construction conditions shortly after the completion of construction activities. These projects would occur in parishes that are currently in attainment of NAAQS; therefore, a conformity determination is not required. There would be no adverse indirect impacts to air quality in the parishes due to construction and implementation of these mitigation projects.

6.12 NOISE AND VIBRATION

6.12.1 No Action Alternative

Under the No Action Alternative, construction of the Proposed Action would not occur. The ambient sound levels would be expected to continue as described in Section 5.12. It is likely that the NFS would continue to construct first-lift levees and other features to reduce flooding and storm surge risks in the study. Proponents of future construction activities would be required to comply with local noise ordinances and federal guidelines.

6.12.2 Proposed Action

6.12.2.1 Levees and Structures

6.12.2.1.1 Direct Impacts

Construction activities could result in nuisance noise that varies depending on proximity. Noise generated from construction equipment would be of varying levels, ranging anywhere from 80dB, up to 130dB. Depending on the distance of people and property to construction areas, heavy machinery associated with construction could result in nuisance noise. One construction activity, pile driving, may cause temporary noise impacts above 70dB. Given the proximity of some Proposed Action features to developed areas, residential and commercial properties may be exposed to adverse impacts from construction noise. Noise producing construction activities, such as pile driving, would likely be limited to daylight hours. To protect construction workers from hearing impairment, regulations for Occupational Noise Exposure (29 CFR Part 1910.95) under the Occupational Safety and Health Act of 1970, as amended, would be followed. This section mandates that noise levels emitted from construction equipment be below 90 dB for exposures of 8 hours per day or more. Construction of each levee reach to the 2035 design elevation is expected to last approximately 24-36 months for each reach. Construction of structures such as floodgates is expected to last approximately 24-48 months each, depending on the size and complexity of the structure. Localized and temporary noise impacts would likely result in wildlife and fishery resources temporarily leaving construction areas during construction activities. Overall, the impacts to noise levels would be short-term, minor, and adverse during the construction period.

6.12.2.1.2 Indirect Impacts

Operation of the Proposed Action would have negligible to minor impacts to noise. Airborne impacts to ambient sound levels would be limited to those generated by the intermittent operation of the proposed gates and potential use of generators. There would also be intermittent disturbance from ongoing maintenance activities (such as dredging and mowing of vegetation). These noises would be consistent with the existing stationary and mobile noises in the study area (see Section 5.12).

6.12.2.2 Borrow Sites, Access, and Staging Areas

Temporary noise would occur during levee and haul road construction and hauling activities associated with equipment, such as bulldozers, excavators, and dump trucks. It is assumed that excavation and hauling would be limited to daylight hours (10 – 14 hours per day) seven days a week. However, this may change due to construction schedules and weather conditions. Nearby residential areas may be temporarily impacted by elevated noise levels due to excavation and hauling. Actual noise impacts would depend on locations of borrow areas relative to sensitive receptors, construction schedules, which are dependent on weather conditions and specific borrow area characteristics.

Based on the initial locations of proposed borrow sites, staging areas, and access routes, temporary noise impacts are anticipated to be concentrated within urbanized areas adjacent to major roadways. The communities of Houma, Theriot, Montegut, and Cutoff are among the most densely populated areas expected to be in proximity to these proposed locations.

After completion of the Proposed Action, noise levels would be expected to return to pre-action levels. Future maintenance activities could result in a slight temporary increase in noise levels from maintenance equipment, such as mowers, but would be the same as existing conditions.

6.12.3 Habitat Mitigation Plans

6.12.3.1 BLH and Swamp Mitigation Projects

The direct and indirect impacts of constructing and implementing the Napoleonville and Supreme BLH and swamp mitigation projects would be similar, with no notable differences in impacts. Construction of the initial project phase would require equipment such as dump trucks, bulldozers, tractors, and graders. Table 5-9 in Section 5.12 presents the anticipated noise emission levels for this equipment, based on data from the Federal Highway Administration (FHWA 2006). These noise levels may result in temporary displacement of wildlife from the study area during construction.

These mitigation projects are primarily located in agricultural fields, minimizing proximity to residences. While a limited number of nearby residences may experience temporarily elevated noise levels due to construction traffic, these levels would be restricted to daylight hours and would cease upon project completion.

Construction of these projects would have negligible to minor, temporary impacts to noise in the region as the construction activities would be temporary during the period of construction, restricted to daylight hours. Avoidance of the study area by wildlife normally occurs from the movement of agricultural machinery in the area even without the additional noise.

6.12.3.2 Fresh/Intermediate and Brackish/Saline Marsh Mitigation Projects

The direct and indirect impacts of constructing and implementing the fresh/intermediate and brackish/saline marsh mitigation projects would be similar, with no notable differences in impacts. Noise levels would temporarily increase in the area due to the operation of equipment and vehicles used during construction of the project. While noise impacts may cause a temporary inconvenience to facilities and recreational activities in the immediate area, noise levels associated with construction activities would be temporary and monitored to ensure acceptable standards are maintained.

Noise levels associated with construction activities have the potential to temporarily impact wildlife that may be present in the area but would not be significantly different from noise associated with other human (industrial) activities that occur daily in the area and would not be likely to incur any cumulative impacts. Noise levels may be impacted by the dredging and disposal of dredged material but should return to pre-action levels post construction.

6.13 AESTHETIC (VISUAL) RESOURCES

6.13.1 No Action Alternative

Visual resources in the study area would be directly impacted under the No Action Alternative. Adverse indirect impacts to visual resources in the study area under the No Action Alternative would be due to the incremental loss of wetlands and the natural ridges due to sea level change, subsidence, and erosion. Wetland and shoreline erosion and associated wetland fragmentation's conversion to open water may adversely affect visual elements including landform, water, vegetation, land use, and user activity. The region's scenic character, as observed within Mandalay NWR, Pointe aux Chenes WMA, and along the southern portions of the Wetlands Cultural Trail Scenic Byway would transform. Opportunities for wildlife observation, environmental interpretation, and cultural awareness would diminish if the marsh and natural ridges erode.

Flooding due to coastal storm surge would reduce accessibility to the Wetlands Cultural Trail Scenic Byway; this impact is temporary, and its severity is based on the duration of the storm event. In the absence of the proposed federal project, it is likely that the NFS and other entities may continue to construct levees and implement other hurricane and flood risk reduction measures.

6.13.2 Proposed Action

6.13.2.1 Levees and Structures

6.13.2.1.1 Direct Impacts

Visual resources in the study area would be directly adversely impacted as the result of levee construction where the levee alignment crosses the Wetlands Cultural Trail Scenic Byway south of Chauvin. The levee would become the dominant landform in this area and

become part of the rural viewshed inherent to the Wetlands Cultural Trail Scenic Byway. In particular, the levee would become the southward backdrop near the rural community of Waterproof when viewed from LA182, and the westward backdrop along rural segments of LA 315 (see Section 5.13, Figure 5-4). While these rural viewsheds would transition, the magnitude of adverse and/or beneficial impacts to visual resources may be likened to other regional and local levees which are prevalent landforms in the study area.

6.13.2.1.2 Indirect Impacts

Visual resources within the levee system would be beneficially indirectly impacted under the Proposed Action due to an enhanced hurricane and storm damage risk reduction project. In particular, the enhanced hurricane and storm damage risk reduction project would improve accessibility to the Wetlands Cultural Trail Scenic Byway during storms. Visual resources outside and adjacent to the levee system would continue to be subject to flooding due to coastal storm surge; this impact is temporary, and its severity is based on the duration of the storm event.

6.13.2.2 Borrow Sites, Access, and Staging Areas

Visual resources could be temporarily impacted by construction activities related to the project features and include excavating existing and proposed borrow areas for work on existing levees and transporting equipment and materials to and from the site. However, this temporary impact would most likely affect visual resources only from the immediate roadways. Visual elements including landform, water, vegetation, and land use would change at the proposed borrow sites. Proposed construction includes stripping vegetation and excavating borrow, thereby exposing areas of bare sediment. Most borrow areas would be deep enough to hold water year-round and would be surrounded by vegetation once they naturalize, depending on how the landowner manages the land. Borrow sites are a common landform in the region and over time and through natural succession, these borrow areas could be viewed as scenic.

6.13.3 Habitat Mitigation Plans

6.13.3.1 BLH and Swamp Mitigation Projects

The visual resources of the BLH and swamp mitigation sites would be temporarily impacted by construction activities and by construction traffic needed to move equipment and materials to and from the sites. However, these temporary impacts would most likely be restricted to visual resources seen from the immediate roadway. Flora and fauna that historically populated the area, and currently populate the adjacent/nearby forested areas, would again be established on the area. The pastoral and agricultural viewsheds from the immediate roadway would be replaced with native forests rich with biodiversity.

Visual resources to would continue to increase on the sites as the habitat matures over time and would be maintained with perpetual conservation of the site. Other similar activities in the vicinity have and would continue to affect visual quality in the region. Projects of this scope would serve to impact the region in a positive way by contributing renewed natural scenery and wildlife habitat in significant contrast to man-made land use patterns that involve stripping natural landscape features.

6.13.3.2 Fresh/Intermediate and Brackish/Saline Marsh Projects

The direct and indirect impacts of constructing and implementing the fresh/intermediate and brackish/saline marsh mitigation projects would be similar to those described for the BLH and swamp mitigation sites, with one notable difference—the marsh mitigation sites would only be accessible by boat.

6.14 RECREATION AND PUBLIC LANDS

6.14.1 No Action Alternative

Recreational resources in the study area would likely be impacted under the No Action Alternative by inundation from coastal storm surges and loss of wetlands and habitat diversity as well as substantial salinity changes. Over time, land and habitat loss and associated changes in salinity levels encroaching from the southeast could begin to negatively affect both freshwater- and saltwater- based fishing, and waterfowl hunting. Further, land-based recreational resources such as boat ramps and parks could be affected more frequently by flooding. In the absence of the proposed federal project, it is likely that the NFS and other entities may continue to construct levees and implement other risk reduction measures.

As marsh habitat decreases, areas for fish spawning decrease and ultimately the populations and diversity of fish species would diminish, which would affect recreational fishing opportunities negatively. Similarly, with less freshwater and intermediate marsh habitat, waterfowl hunting opportunities would likely decrease. Ridge habitat would also likely continue to decline, reducing opportunities for deer and other small game hunting.

6.14.2 Proposed Action

6.14.2.1 Levees and Structures

6.14.2.1.1 Direct Impacts

There would be no direct impacts to recreational facilities, such as boat launches and marinas, as the proposed levee alignment avoids these features. The sole exception to this would be existing docks in the J2 reach that may be removed during construction and replaced within the project footprint (See appendix B Project Description for these features). Temporary impacts to recreational fishing and hunting could occur in the work zone as construction disturbs marshes and open water increasing turbidity and temporarily causing

recreational species to shift away from these areas. Terrestrial, marsh, and fishing habitats and values within the levee system footprint would be adversely affected by the Proposed Action. For more information regarding impacts to recreational species, refer to the wetlands, aquatic resources, EFH, and wildlife resource sections in this report.

An expanded levee system would have both beneficial and detrimental effects to recreation areas and to recreational opportunities. Constructing levees would benefit recreation areas by providing additional risk reduction to the structures and utility systems at recreational areas, which would decrease the amount of time that the areas cannot be used following severe storms. Additional levees would also be beneficial to recreation by providing new recreational opportunities such as the development of walking trails along the levees that may connect with existing trails.

In its FWCAR recommendations (see Section 8.1), the FWS recommended avoiding impacts to all NWRs and WMAs. If direct and indirect impacts to NWRs cannot be avoided, impacts would need to be mitigated on site of the NWR impacted. The Mandalay NWR is located along Reach A on the western end of the proposed MTG Project alignment. As explained in Section 1.7, construction of Reach A is addressed in a separate EA (USACE 2024). In that EA, the USACE committed to continue to look for opportunities to avoid and minimize impacts to the Mandalay NWR. This SEIS does not address NEPA requirements for the construction of Reach A, and no other reaches under the Proposed Action would have direct impacts on the Mandalay NWR.

The Point-Aux-Chenes WMA would be adversely impacted because the existing local levee that dissects the WMA would be widened (reaches J1, J2, J3, K, and L), reducing the amount of contiguous hunting acres (see Figure 6-14). Construction activities along the proposed right of way would result in unfavorable conditions for game species by disrupting wildlife nesting, foraging, and other activities. Many of these species, if mobile, would be displaced and likely relocate to adjacent areas. The levees would provide a linear walking path and improve access for hunters and sightseers within the WMA.

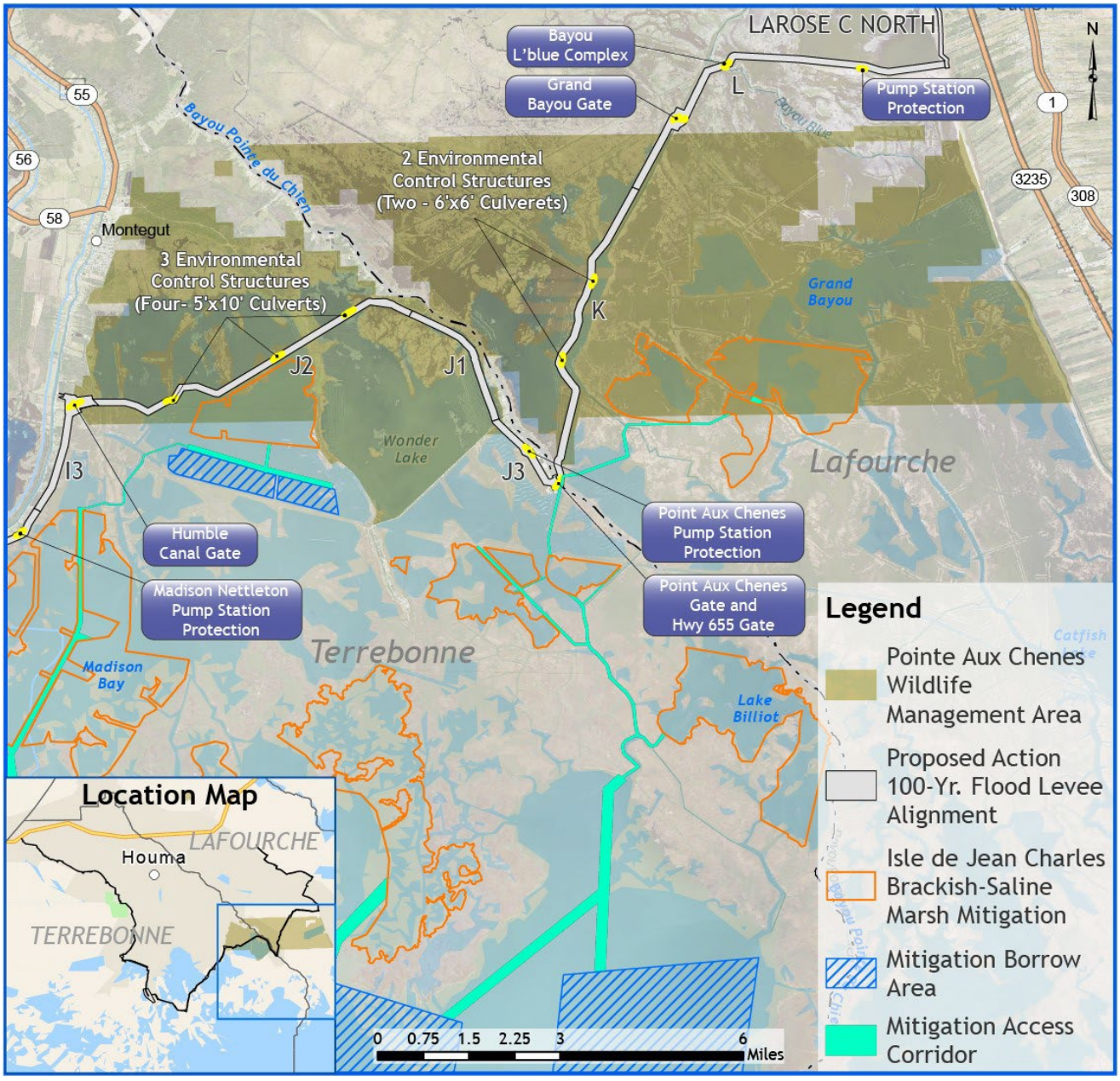


Figure 6-14. Project Features at Point Aux Chenes WMA

USACE has coordinated with LDWF regarding the design of Reach J levee and associated environmental control structures, which fall within the boundary of the Point-aux-Chenes WMA. As a coordinating NEPA agency for the SEIS, LDWF has participated in bi-weekly project update meetings throughout the development of this SEIS. Additionally, the USACE has and would continue to coordinate regularly with LDWF in the design of Reach J (which passes through the WMA) to accommodate LDWF's continued operation of existing water control structures within Reach J and to reduce the risk of damage to the function of structures from storm surge for the continued benefit of wildlife habitat in the WMA. Any

necessary coordination with LDWF related to acquiring real property rights for construction of the Reach J levee and associated structures would be performed by the NFS, as it is their responsibility to deliver the required LERRDs for the project in accordance with the PPA. The NFS may establish agreements with LDWF for real property interests to support the project where USACE requested rights-of-way for construction cross the WMA.

Recreational boat passage through adjacent canals and bayous may be adversely impacted during construction. However, these impacts would be short term and would cease once construction is complete.

6.14.2.1.2 Indirect Impacts

Once the Proposed Action is constructed, adverse impacts to recreation mostly relate to access to fishing areas via smaller canals, bayous, and waterways that may be both temporarily and permanently impacted by construction. The floodgates and locks would remain open most of the time, closing only in times of storms and high tides. Floodgates and other structure features would allow for recreational boating passage through larger canals and bayous. When the system floodgates and HNC lock are open, there would be no impact on recreational boats, however when these features are in operation during storm events, local authorities would provide emergency guidance and preparation instructions to boaters.

Indirect impacts from structural features include positive freshwater flow benefits to the vegetative and fishery communities by closing the environmental control structures in times of high tides, thereby restricting saltwater intrusion. Improved vegetative growth provided by way of the environmental control structures would benefit the marsh, which in turn would provide suitable food and cover for game species. Fisheries also benefit by improved estuarine conditions and increased food sources. The proposed floodgates, environmental control structures, and lock would provide similar benefits by restricting saltwater flow when necessary.

Indirect impacts to recreational fishing and hunting could result from changes in salinity levels in the study area because of water control structures. The slight changes in salinities would likely have minor effects on the distribution of fish and shellfish species. Reduced salinity levels would help to stabilize fresh, intermediate, and brackish marsh in and around Lake Boudreaux and the Central region, stabilizing and improving habitat for waterfowl, which in turn, would enhance waterfowl hunting opportunities. Freshwater based recreational fishing would improve and current levels of recreational saltwater fishing would be maintained.

Features with a potentially beneficial influence on fish access include environmental control structures along Falgout Canal in Reach B, along Grassy Bayou in Reach H-1 and a structure just to the east of Bayou Pointe aux Chenes in Reach K (see maps of the alignment in Appendix A for locations of these features). In some areas, the proposed levee

would restrict fish access to navigable and environmental structures only. The modified operation of the lock complex would block organism movement in the HNC; however, other migration routes (for example, Bayou Grand Caillou) would remain open. Effects of water control structures depend on the type of structure and how they are operated, and salinities and water depths upstream and downstream of the structure. Higher salinity water from storm surges can become trapped behind structures; in other cases, salinities behind structures can become fresher. See Section 6.4 for information about project impacts to aquatic resources.

6.14.2.2 Borrow Sites, Access, and Staging Areas

For the borrow sources identified, the proposed measures would not directly or indirectly impact existing recreation resources in the region. In some cases, depending on how the end site is left, the habitat may be suitable to support some recreational activities (i.e., wildlife viewing and fishing), but these benefits are expected to be minimal, and sites would not be open to public access.

6.14.3 Habitat Mitigation Plans

6.14.3.1 BLH and Swamp Mitigation Projects

Flora and fauna that historically populated the area, and currently populate the adjacent/nearby forested areas, would again be established on the area once construction of this project is complete. Recreational resources such as wildlife viewing would be created as few opportunities for recreation currently exist on this site.

Recreational opportunities would continue to increase on the site as the habitat matures over time and would be maintained with perpetual conservation of the site. Other similar activities in the vicinity have and would continue to affect recreational quality in the region. Projects of this scope would serve to impact the region in a positive way by contributing renewed natural scenery and wildlife habitat which promote recreation opportunities.

6.14.3.2 Fresh/Intermediate and Brackish/Saline Marsh Mitigation Projects

The direct and indirect impacts of constructing and implementing the fresh/intermediate and brackish/saline marsh mitigation projects would be similar to those described for the BLH and swamp mitigation sites, with one notable difference—the marsh mitigation sites would only be accessible by boat.

6.15 SOCIOECONOMICS

6.15.1 No Action Alternative

6.15.1.1 Population and Housing

The No Action Alternative would not prevent levee overtopping during a 1% AEP (100-year) storm event. Although population and housing in Terrebonne and Lafourche parishes are forecasted to increase through 2040 (see Section 5.15), population and housing patterns would likely shift within the parishes; residents in small coastal communities would likely continue to migrate to larger communities farther away from the coast (such as Houma and Thibodaux) for coastal storm and flood risk reduction benefits afforded by the non-federal levees and floodgates. However, even these larger communities would experience flooding impacts from levee overtopping during significant storm events under the No Action Alternative. Terrebonne and Lafourche parish population and housing growth may decrease as residents continue to move to areas with lower flood risk.

6.15.1.2 Labor and Employment

Because non-federal levees and structures would not prevent levee overtopping during significant storm events, there would be significant adverse direct impacts to businesses, industry, labor, and employment activity in the area during significant storm events. During a significant flooding event, there may be temporary impacts to labor and employment if businesses are not able to operate.

There is a higher potential for businesses to relocate to areas outside the study area that have lower flood risk. Major industries in the study area such as oil, gas, energy, fisheries, and agriculture would specifically experience disruptions during flood events. This would lead to a decrease in employment opportunities and therefore labor activity.

6.15.1.3 Public facilities and services

During significant coastal storm events there may be adverse impacts if facilities are damaged, and the services are not able to continue during recovery. Due to the increased potential for disruption to public facilities and services in the study area, public facilities would need to implement measures for flood risk reduction and repair during and after significant flood events.

6.15.1.4 Transportation

During major flooding events, infrastructure may sustain damage and transportation routes can be disrupted. As a result, the increased risk of flood-related impacts to transportation systems would lead to higher costs for maintenance and reconstruction both during and after such events.

6.15.1.5 Tax Revenues and Property Values

Since non-federal levees and structures would not offer adequate risk reduction against significant coastal storms and flooding, the area would face a higher risk of flood damage. As a result, property values would likely decline, leading to reduced tax revenues for local communities. Residents and businesses may begin relocating to areas with lower flood risk, further accelerating the drop in property values and tax income. Over time, this would erode the economic vitality of the study area under this alternative.

6.15.1.6 Community Cohesion

Under the No Action Alternative, risk-reduction benefits would not occur during 1% AEP (100-year) storm events. During significant flooding and storm events, there could be temporary impacts to the community cohesion as civic infrastructure gets damaged. With a larger risk of civic infrastructure in the area getting damaged along with residents relocating to areas with lower risk of flooding, there could be a decline in community cohesion in the area due to a high risk of flooding during storm events.

6.15.1.7 Navigation

Navigation trends are expected to continue as described in Section 5.15 (Affected Environment).

6.15.2 Proposed Action

6.15.2.1 Induced Flooding Impacts

Within 12 to 48 hours during and immediately following storms, the Proposed Action levee system is projected to cause adverse flooding impacts to population and housing in communities located on the flood side of the proposed levees, with temporary, minor impacts during 50% AEP (2-year) storm events and more significant impacts during 1% AEP (100-year) storm events (see Section 6.2). Using 2025 CSTORM-MS modeling data (see Section 6.1.2.1 for information about the CSTORM-MS model) along with structure inventory data developed by USACE for the 2021 EDR and Economic Revaluation report (USACE 2021), a preliminary assessment was conducted to determine the scope of project-induced flooding of residential and commercial structures on the flood side of the proposed levees during and immediately follow 1% AEP (100-year) storm events. The modeling projected that structures that would be impacted by flooding under the Proposed Action would already be affected by flooding under the No Action Alternative. However, the modeling projected that the Proposed Action would increase flooding during 1% AEP storm events in the communities of Gibson, Dularge, Dulac, Cocodrie, and Isles De Jean Charles (see Figure 6-15). Project-induced flooding impacts would be less substantial during more frequent flood events (see Section 6.2)

To analyze project-induced flooding impacts to residential and commercial structures during 1% AEP (100-year) storm events (as a preliminary structure-impact analysis for this report),

two thresholds of increased water levels (as compared to No Action Alternative conditions) were evaluated to develop an inventory of potentially impacted structures: 1 millimeter (0.003 feet) and 6 inches (0.5 feet) or greater. As compared to the No Action Alternative, during and immediately following 1% AEP (100-year) storm events, the Proposed Action would increase water levels by 1 millimeter (0.003 foot) at 752 structures (see Table 6-10) and would increase water levels by 6 inches or more at 488 structures (see Table 6-11) on the flood side of the proposed federal levee system in year 2085. See Section 6.2.1.2 for further information about water levels at specific model nodes in or near these communities during storm conditions. See Section 6.17 for information about coordination that would occur with the Isle de Jean Charles community, which is one of the communities that would be impacted by project-induced flooding during storms and is home to members of the Isle de Jean Charles Indian Tribe.

Due to the large scale of the MTG Project, it would be constructed in phases. Measures to mitigate induced flooding impacts would be developed and implemented prior to construction of each reach. The induced flooding mitigation measures would be based on CSTORM-MS modeling conducted for the entire MTG system, which assumes all levees and structures are constructed and structure gates are closed during storm conditions. Induced flooding impacts from the construction of any single reach, before the full alignment is complete, are not expected to exceed those modeled for the entire system. See Section 4.3 for more information about the process that the USACE would implement to mitigate induced flooding impacts to structures and communities. Mitigation measures would be implemented before construction of any features of the Proposed Action.

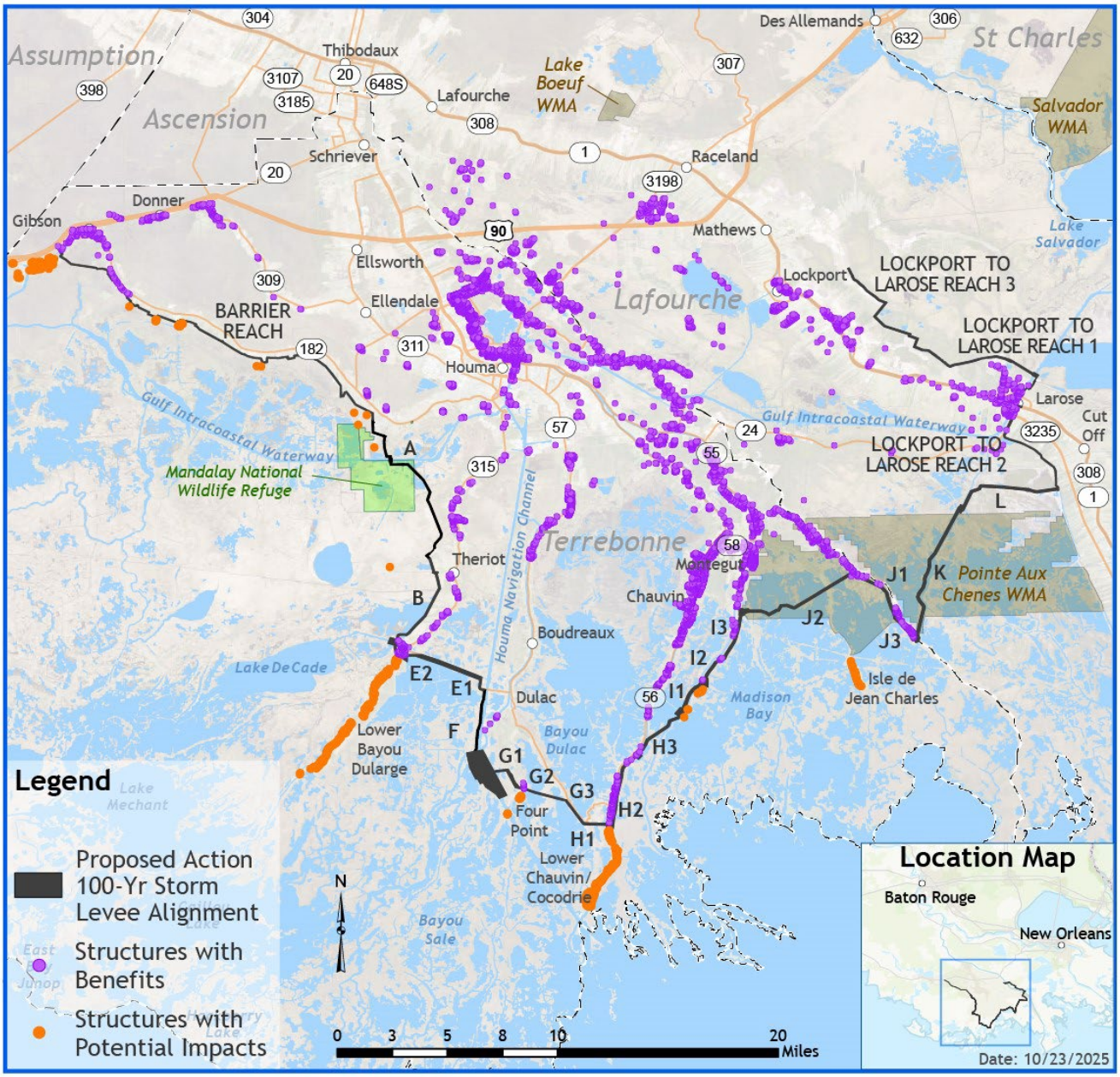


Figure 6-15. Map of Interior Structures with Reduced Flooding and Exterior Structures with Increased Flooding Under the Proposed Action (1% AEP (100-Year) Storm Event Conditions in Year 2085)

Table 6-10. Number and Occupancy Type of Structures Impacted by Project-Induced Water Level Increases of 1mm (0.003 ft) During 1% AEP (100-Year) Storm Events in Year 2085

Occupancy Type	Number of Structures Impacted
Single-family Residential	496

Occupancy Type	Number of Structures Impacted
Multi-Family Residential	1
Mobile Home	114
Public	15
Warehouse	118
Retail	2
Professional	4
Grocery	1
Restaurant	1
Total	**752**

Table 6-11. Number and Occupancy Type of Structures Impacted by Project-Induced Water Level Increases of 6 Inches (0.5 ft) Or Greater During 1% AEP (100-Year) Storm Events in Year 2085

Occupancy Type	Number of Structures Impacted
Single-family Residential	344
Multi-Family Residential	1
Mobile Home	76
Public	8
Warehouse	58
Retail	1
Total	**488**

6.15.2.2 Levees, Structures, and Borrow/Access/Staging Areas

Existing non-federal levees within the study area offer a degree of risk reduction against storm surge associated with tropical storms; however, the Proposed Action would increase the level of flood risk reduction for events up to the 1% AEP (100-year) storm event. The Proposed Action would help reduce the risk of flooding of homes, utilities, hospitals, and emergency response facilities inside the levee system caused by hurricane storm surges, thereby lowering risks to public health and safety as compared to the No Action Alternative . It would also mitigate flooding and erosion along transportation routes, including key hurricane evacuation routes. These improvements would enhance evacuation efficiency and ensure quicker post-storm access for emergency responders, repair crews, and other

essential services. Overall, the construction and operation of the Proposed Action are expected to significantly reduce public health and safety risks.

As compared to the No Action Alternative, indirect impacts include an increase in community cohesion due to an increased reduction in flood risk (see Section 6.15.2.2.7). Both residential structures and civic infrastructure in the study area would experience an increased reduction in flood risk. With lower incidences of flooding, communities would be better able to focus on engaging the community and participating in community building activities and events.

6.15.2.2.1 Population and Housing

There would be negligible impacts to population growth and housing trends in the study area during construction of the Proposed Action. All levee reaches that comprise the Proposed Action are in areas that are either remote or are not located directly adjacent to residential housing.

Noise along all construction areas would increase due to the temporary operation of equipment and vehicles used during construction. While noise impacts may cause a temporary inconvenience to residents and facilities closest to the site, noise levels associated with construction activities would be temporary and monitored to ensure acceptable standards are maintained. Construction-related noise impacts would be would short-term, lasting only as long as construction activities (see Section 6.12.2 for further information about noise impacts)BMPs would be utilized to avoid, reduce, and contain temporary impacts to human health and safety and are presented in Section 4.4. With improved hurricane and storm damage risk reduction in the study area, indirect impacts to population and housing inside the proposed levee system would be beneficial and long-term. With a lower flood risk, population size could grow as the study area becomes more desirable to live in. For the population on the outside of the proposed system, potential population loss could occur if residents choose to relocate farther inland. .

6.15.2.2.2 Labor and Employment

Under this alternative, there may be direct and temporary impacts to businesses near the proposed construction activities due to increased traffic and navigation congestion during construction. With regards to navigation, impacts would be specific to businesses that rely on navigable channels for the transportation of goods. Additionally, there may be a temporary increase in employment during construction. The indirect impacts to labor and employment would be beneficial due to increased hurricane and storm damage risk reduction for businesses and industries within the study area.

6.15.2.2.3 Public Facilities and Services

Under this alternative, there may be temporary direct impacts to the public facilities and services in proximity to the proposed construction areas due to construction activity and

increased traffic congestion. Indirect impacts include increased risk reduction from flooding for the public facilities in the area.

6.15.2.2.4 Transportation

Under this alternative, there would be temporary direct impacts to transportation due to increased truck traffic on roads, highways, and streets during construction (see maps of proposed haul routes in Figure 3-6 and in Appendix A). The impacts would be moderate as the impacts would only last as long as construction activities occur. Indirect impacts to transportation include degradation of transportation infrastructure due to wear and tear from transporting the construction materials. Because construction would occur from approximately 6:00 am to 9:00 pm daily, construction vehicles including dump trucks hauling borrow material may pass through school zones during speed-restricted time frames, unless prohibited by local governing entities.

6.15.2.2.5 Navigation

No significant impacts to navigation safety are expected. ERDC evaluated potential impacts to proposed structures on navigation safety and efficiency. The GIWW East Floodgate, GIWW West Floodgate, and Shell Canal floodgate were included in the simulation due to navigation safety concerns associated with the geometry of the GIWW and Shell Canal and the proximity of oil and gas infrastructure. The Minor's Canal Floodgate had a limited ship simulation to ensure vessels could safely transit the small distance from the GIWW West Floodgate north into Minor's Canal. In coordination with ERDC, it was determined that other floodgates did not require a simulation at that time because they were not on federal channels and the preliminary design for these gates did not raise concerns regarding velocity and navigation safety. As described in Section 3.3.5.2, two temporary floating pontoon bridges would be installed during construction of Reach B to provide haul truck access across Thibodeaux Canal. Thibodeaux Canal is a drainage canal and not used for navigation; therefore, no impacts to navigation would occur due to the installation of these temporary pontoon bridges for construction access.

Disruptions to navigation traffic could occur during construction of floodgates and lock structures. These impacts are expected to be moderate but temporary, lasting only as long as construction activities.

6.15.2.2.6 Tax Revenues and Property Values

Under this alternative, property values near the construction sites may decrease due to increased traffic and construction noise. This impact would be short-term, lasting as long as construction occurs and shortly thereafter. Once the Proposed Action is constructed and in operation, increases in tax revenue and property values could occur as a result of improved flood risk reduction for residences and businesses. With the lower flood risk, additional economic growth in the region could also occur.

6.15.2.2.7 Community Cohesion

Under this alternative, there may be temporary impacts to community cohesion during construction due to increased traffic congestion, specifically for community members to be able to easily access civic infrastructure and be able to get to community events in the area. Once the Proposed Action is constructed and in operation, indirect impacts could be detrimental for communities outside of the proposed system. If residents choose to relocate farther inland to be inside of the proposed system as part of the mitigation plan, existing patterns of interaction could be disrupted, potentially to the point that the relocated population would need to integrate within new communities. The Proposed Action would benefit community cohesion inside the proposed levee system by reducing disruptions related to the flooding of roads, residential properties, and community meeting places during storm events.

6.15.2.3 Borrow Sites, Access, and Staging Areas

With the proposed alignment, there would be temporary direct impacts to transportation due to increased truck traffic on roads, highways, and streets during construction. The impacts would only last as long as construction activities occur. Indirect impacts to transportation include degradation of transportation infrastructure due to wear and tear from transporting the construction materials. There should be no adverse impacts from trucks spilling borrow material since watertight trucks would be used to haul the borrow.

6.15.3 Habitat Mitigation Plans

The impacts of construction and implementation of USACE-construction mitigation projects on socioeconomics would be negligible. Since the overall borrow areas have been divided into multiple cells to avoid oyster seed grounds, there would not likely be any significant adverse impacts to oyster farming in the areas targeted for marsh creation.

6.16 CULTURAL RESOURCES

6.16.1 No Action Alternative

Over the long-term, cultural resources located within wetlands in the study area would be impacted by ongoing sea level change, erosion, subsidence, flooding, wave activity, saltwater intrusion, and damaging wind and storm surge during tropical storms. In the absence of the proposed federal project, it is likely that the NFS and other entities may continue to construct levees and implement other risk reduction measures. Cultural resources that have not been discovered or adequately documented face risks of damage or destruction if construction activities impact them. It is reasonable to assume that any future man-made development would be required to comply with applicable local, state, and federal laws and regulations.

6.16.2 Proposed Action

Because of the large size of the MTG Project, the USACE as lead federal agency has not yet fully determined the location of historic properties, or how the Proposed Action may affect these historic properties The agency is in the process of developing a project-specific Programmatic Agreement pursuant to 36 CFR 800.14(b) in consultation with stakeholders in furtherance of the USACE's Section 106 responsibilities for this undertaking. The USACE sent a letter to all consulting parties and Tribes on December 12, 2024, inviting them to participate in developing the Programmatic Agreement (see Appendix J). The Programmatic Agreement is being prepared to provide measures to conduct historic property identification and evaluation for listing in the National Register of Historic Places as well as setting out steps to avoid, minimize, and/or mitigate any potential impacts to cultural resources by the Proposed Action. The Programmatic Agreement will also contain an unanticipated discovery plan that outlines a protocol if cultural resources, historic properties, or human remains are discovered during construction activities

The goal of this Section 106 consultation is to create a framework for addressing the Proposed Action and establish protocols for continuing consultation with the SHPO, Tribal governments, and other stakeholders. The Programmatic Agreement would:

- Identify consulting parties, define applicability or identification, avoidance, minimization of impacts, or mitigation when necessary
- Establish review timeframes, stipulate roles and responsibilities of stakeholders
- Include Tribal consultation procedures, consider the views of the SHPO/Tribal Historic Preservation Officer (THPO) and other consulting parties
- Allow for public participation via notifications to consulting parties and other interested parties
- Develop programmatic allowances to exempt certain actions from Section 106 review
- Outline a standard review process for plans and specifications as they develop
- Detail how the USACE would consult with stakeholders if changes to the Area of Potential Effect (APE) are necessary
- Determine an appropriate level of field investigation required to identify and evaluate historic properties within the APE and determine the potential to affect historic properties and/or sites of religious and cultural significance
- Streamline the assessment and resolution of Adverse Effects through avoidance, minimization, and programmatic treatment approaches for mitigation

- Establish schedules for reporting
- Outline a protocol to address any unexpected discoveries and unmarked burials during construction
- Include procedures for implementing the Programmatic Agreement and amending, terminating, or resolving disputes related to the Programmatic Agreement or cultural resource compliance

The Programmatic Agreement would be executed prior to the conclusion of the NEPA process. The Programmatic Agreement would then govern the USACE's subsequent NHPA compliance efforts.

6.16.2.1 Levees and Structures

6.16.2.1.1 Direct Impacts

Under the Proposed Action, undocumented cultural resources could be damaged or destroyed during construction. Section 106 consultation was initiated with the SHPO and Tribal Nations on December 12, 2024. USACE has elected to fulfill its obligations under Section 106 of the NHPA, as amended, through the execution and implementation of a Programmatic Agreement (as described in Section 6.16.2 above). The draft Programmatic Agreement is provided in Appendix J.

Some constructible components of the MTG system have been previously coordinated for effects to historic properties. Reach A was coordinated for a No Historic Properties Affected, in January 2024. Reach F was coordinated for a No Adverse Effect to Historic Properties, in August 2025. The Humble Canal Preload Construction was coordinated for No Historic Properties Affected, in June 2021. A Phase 1A Literature Search and Records Review by Goodwin and Associates in 2011 found that the majority of the existing and proposed federal J2 alignment are considered low potential for intact cultural resources.

6.16.2.1.2 Indirect Impacts

Implementing the Proposed Action could have beneficial indirect impacts to cultural and historical resources by providing an added level of hurricane and storm damage risk reduction to known and unknown archaeological sites inside the Proposed Action levee system, thereby reducing the damage caused by storm events. Erosion of ground deposits during storm events can result in severe damage and destruction of archaeological sites.

The construction and enlargement of levees could include the introduction of new visual elements (levee lifts and floodwall modifications and replacements) to the study area's viewshed that have the potential to indirectly impact known and previously undocumented cultural resources that may be listed or eligible for listing in the NRHP. The introduction of new visual elements that are inconsistent with the historic or cultural character of these resources could indirectly diminish the integrity of the property's setting, feeling, or

association and/or cause changes to the integrity of feeling or character associated with a historic resource or Traditional Cultural Property (TCP). USACE would continue to coordinate with stakeholders to ensure impacts to cultural resources are avoided and minimized to the greatest extent practicable, and, as required, any impacts would be addressed through mitigation.

6.16.2.2 Borrow Sites, Access, and Staging Areas

All borrow sites, access, and staging areas would comply with stipulations written within the Programmatic Agreement that is being coordinated with interested parties. A review of each borrow area will occur and will be shared with signatories of the Programmatic Agreement and other agreed parties. A recommendation would be offered for investigation of the borrow, or that further investigation is not necessary. Discovered cultural resources would first be avoided, and if avoidance is not possible then mitigation would occur, as required by stipulations of the PA.

Further data review and coordination through the Programmatic Agreement may result in different actions in compliance with the NHPA.

Most proposed borrow sites and staging areas have not been surveyed for cultural resources. Many of these locations have a high probability that cultural resources exist due to their location near natural bayous where historic and tribal activities may have likely occurred. Phase I cultural resource surveys and coordination with SHPO and federally recognized Tribes of any cultural resource findings would occur before borrow material is taken from these sources. Table 6-12 lists the status cultural resource compliance for each proposed borrow site as of October 2025. Further data review and coordination per the Programmatic Agreement may result in different recommendations in compliance with the NHPA.

Table 6-12. Status of Cultural Resource Compliance of Proposed Borrow Sites

Survey Status	Site IDs
Surveyed. No historic properties found. Coordinated with SHPO and Tribes.	A82, A203
Surveyed. Historic Property 16TR381 recorded, site avoided by redefining boundaries.	DE-6
Discussed in Phase I report for this site. The USACE coordinated with the SHPO and Tribes, and it was determined that because this borrow site has been a long-used borrow site, the presence of cultural resources is unlikely, a Phase I cultural resource survey is not needed.	J1
Not surveyed. Near a natural bayou, high probability for cultural resources. Phase I survey required before use. Coordination with SHPO and Tribes would be conducted.	A1, A2, A25, A32, A46, A204, A205, A88, A89, A93, A211, A210, A209, A208, A208.1, A216, A184

Survey Status	Site IDs
Not surveyed. Near urban area and bayous, high probability for cultural resources. Phase I survey required before use. Coordination with SHPO and Tribes would be conducted	A213
Not surveyed, abuts cultural resources survey with no findings. Near urban area and bayou, high probability for cultural resources. Phase I survey required before use. Coordination with SHPO and Tribes would be conducted.	A212
Not surveyed. Not near bayous, lower probability for cultural resources. Phase I survey may occur before use. Coordination with SHPO and Tribes would be conducted	A214, A215, A215.1

6.16.3 Habitat Mitigation Plans

6.16.3.1 BLH and Swamp Mitigation Projects

6.16.3.1.1 Napoleonville BLH Project (TSP), Supreme BLH Project, and Napoleonville Swamp Project (TSP)

USACE would follow its Section 106 procedures, described in Section 6.16.2, if any of these mitigation projects are carried forward as the TSP. Activities associated with these projects have the potential to directly impact existing and previously undocumented cultural resources that may exist within the study area. If significant historic properties are identified within this proposed mitigation site, strategies would be developed through the Programmatic Agreement to avoid those resources or to minimize or mitigate for adverse effects.

6.16.3.1.2 Supreme Swamp Project

The USACE has determined that that the proposed undertaking includes ground disturbing activities that have the potential to effect historic properties in a way that would directly or indirectly affect the characteristics that make the property eligible for the NRHP. However, no determination of effect under the NHPA pursuant to 36 CFR 800.4(d) is being made at this time. Given the proximity to natural waterways, it is possible that unidentified cultural resources exist within the Napoleonville Swamp area. Further Section 106 coordination is required. The CEMVN would consider ways to revise the Scope of Work (SOW) to substantially conform to the standards, and/or avoid or minimize adverse effects for NR listed or eligible historic properties and/or sites of religious or cultural Tribal significance.

6.16.3.2 Fresh/Intermediate and Brackish/Saline Marsh Mitigation Projects

Cultural resource surveys have not been conducted for any of the four fresh/intermediate or four brackish/saline mitigation projects. Existing data does suggest that these sites are low probability areas to contain historic properties, but these areas have subsided, and cultural resources may still exist. Further Section 106 coordination would be conducted before implementation of any of these mitigation projects.

6.17 TRIBAL RESOURCES

6.17.1 No Action Alternative

Without the implementation of the Proposed Action, tribal cultural resources within the study area would remain at risk of repeated flooding and inundation.

6.17.2 Proposed Action

6.17.2.1 Levees and Structures

6.17.2.1.1 Direct Impacts

Under the Proposed Action, excavation and movement of soils in preparation for the construction of structural features have the potential to harm tribal cultural resources such as archeological sites. In addition, the construction of structural features could include the introduction of new visual elements (i.e., levee lifts, floodwalls, upgraded floodgates) to the viewshed, which may impact known and previously undocumented tribal cultural resources. The introduction of new visual elements that are inconsistent with the historic or cultural character of these resources could diminish the integrity of the property's setting, feeling, or association and/or cause changes to the integrity of feeling or character associated with a historic resource or Traditional Cultural Property. Therefore, a Programmatic Agreement is being developed by the USACE to identify and document potential tribal cultural resources within all impact areas of the Proposed Action, and to commit to undertaking all required cultural resource surveys and investigations during the development of final designs and before construction. The Programmatic Agreement would also include a mitigation plan that would be implemented for unavoidable impacts to cultural tribal resources. Throughout construction and operation of all phases of the MTG Project, USACE will continue to coordinate with consulting parties to ensure that impacts to tribal cultural resources are avoided and minimized to the greatest extent practicable throughout the NHPA Section 106 process or mitigate adverse effects should they be anticipated.

Direct impacts would occur within the State Tribal Designated Statistical Areas (STDSA) delineated for resident state recognized Tribes (see Figure 5-2 in Section 5.18). Levees and structures are proposed within all STDSAs except the Bayou Lafourche and the Isle de Jean Charles tribes. In order to provide early input on the project from the state recognized Tribes, USACE coordinated meetings with the state recognized Tribes during the 2023 public scoping process (see Section 5.18 for a complete timeline of coordination). The largest reported concern related to traffic congestion along access routes, which is discussed below.

6.17.2.1.2 Indirect Impacts

Implementing the Proposed Action may have beneficial indirect impacts to archaeological resources located inside the proposed levee system by reducing the frequency and duration of inundation. Erosion of ground deposits during inundation is a well-documented cause of adverse impacts to coastal terrestrial archaeological resources. Conversely, implementing the Proposed Action is anticipated to cause some inducements that would increase the duration of flooding and inundations in areas outside (on the flood side) of the proposed levee system. Tribal cultural resources located within induced flooding areas may potentially incur adverse impacts. Therefore, the Programmatic Agreement will account for the identification of potential tribal cultural resources within all areas that are anticipated to have indirect impacts and mitigate adverse impacts should be anticipated. See Section 6.16 for further information about the Programmatic Agreement process.

Due to its vast size, the Proposed Action would be constructed in phases, with construction of the Reach J levee anticipated to begin in 2027. Isle de Jean Charles is located south of the proposed Reach J levee. Though the Office of Community Development's IDJC Resettlement program did provide a voluntary grant program to relocate tribal members north to Schriever, some tribal members remain within the watershed. The remaining Isle de Jean Charles would be impacted by water level increases during storms as a result of construction and operation of the Proposed Action, with water level increases of up to 1.3 feet during 1% AEP (100-year) storm events (see Section 6.2.1). Project-induced flooding would be minor during more frequent storms (see Section 6.2 for additional information about project-induced flooding). The induced flooding mitigation measures would be based on CSTORM-MS modeling conducted for the entire MTG system, which assumes all levees and structures are constructed and structure gates are closed during storm conditions. Induced flooding impacts from the construction of the Reach J levee reach alone, before the full alignment is complete, is not expected to exceed those modeled for the entire system. See Section 4.3 for more information about the process that the USACE would implement to mitigate induced flooding impacts to structures and communities.

6.17.2.2 Borrow Sites, Access, and Staging Areas

Under the Proposed Action, excavation, ground disturbance, and soil movement as part of borrow site establishment and use, or in preparation for access and staging, have the potential to harm tribal cultural resources. Therefore, the Programmatic Agreement will account for the identification of potential tribal cultural resources within all areas that are anticipated to have direct and indirect impacts. The USACE will continue to coordinate with consulting parties to ensure that impacts to tribal cultural resources are avoided and minimized to the greatest extent practicable throughout the NHPA Section 106 process or mitigate adverse effects should they be anticipated.

During the 2023 public scoping meeting, state recognized Tribes stated concern for traffic congestion along access routes within their STSDAs. Under the Proposed Action, there would be temporary direct impacts to transportation due to increased truck traffic on roads,

highways, and streets during construction. However, the impacts would only last as long as construction activities occur.

6.17.3 Habitat Mitigation Plans

The impacts to tribal resources would be consistent for all mitigation projects. Activities associated with the implementation of the mitigation projects have the potential to impact existing and previously undocumented tribal cultural resources that may exist within the mitigation projects. Therefore, the Programmatic Agreement will account for the identification of potential tribal cultural resources within all areas that are anticipated for implementation before they are implemented. The USACE will continue to coordinate with consulting parties to ensure that impacts to tribal cultural resources are avoided and minimized to the greatest extent practicable throughout the NHPA Section 106 process or mitigate adverse effects should they be anticipated.

6.18 CUMULATIVE IMPACTS

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

With respect to past actions, Section 5 Affected Environment characterizes the natural and human environment of the study area and the past and present actions and trends that shaped it. Sections 6.2 through 6.17 assess how past, present, and future actions and trends would continue to impact each resource 50 years into the future (2035 through 2085). In those sections, past, present, and ongoing actions and trends are factored into the No Action Alternative, which served as the baseline conditions against which the impacts of the Proposed Action were assessed.

The cumulative impacts analysis provided below builds upon the discussions in Sections 5 and 6 by assessing potential impacts of additional projects that may contribute to impacts to study area resources. The analysis focuses on the overall cumulative impacts of the Proposed Action when added to the impacts of relevant past, present, and reasonably foreseeable future projects that could continue to impact the same resources in the same approximate spatial extent and timeframe.

6.18.1 Methodology

The four-step methodology for conducting this analysis is described below.

6.18.1.1 Step 1: Identify Resources Affected

Resources expected to be more than negligibly impacted by the Proposed Action were chosen for the analyses. Based on these criteria, the following resources were identified as target resources for the cumulative effects analysis.

- Wetlands
- Aquatic Resources and EFH
- Protected Species
- Storm Surge and Flooding
- Socioeconomics
- Cultural and Tribal Resources

6.18.1.2 Step 2: Establish Spatial and Temporal Boundaries

Only projects or actions that contribute impacts to a resource within the same geographic area and within the same timeframe as the Proposed Action (overlapping in space and time) were included in the analysis. The spatial area for the analysis is the geographic area within and adjacent to the boundaries of the study area, which is described in Section 1.4 and shown in Figure 1-1. Projects that would have direct or indirect impacts to resources within the study area were included in the cumulative impacts analysis. The temporal boundaries established for the assessment of cumulative impacts of the Proposed Action were years 2027 to 2035 for construction activities and 2035 to 2085 for operations.

6.18.1.3 Step 3: Identify the Projects and Actions to be Considered

In this step, the past, present, and reasonably foreseeable future actions to be included in the cumulative impacts analysis were determined. These projects and actions are detailed below.

6.18.1.3.1 Past, Present, and Ongoing Actions and Trends

In Sections 6.2 through 6.17, key past, present, and future ongoing actions and trends were quantitatively or qualitatively factored into the No Action Alternative, and their contribution to study area resources is reflected in the data presented therein. Actions and trends that continue to impact the study area resources include, but are not limited to, the following (see the No Action Alternative discussion in Sections 6.2 through 6.17 for further details):

- Channelization of rivers and bayous: levees constructed by the USACE and other entities throughout south Louisiana have played a major beneficial role in reducing the risk of storms and flooding for communities. Levees have also caused widespread, adverse, permanent impacts to wetlands by altering natural sediment transport from the rivers and bayous into adjacent waterbodies, removing the

source of sediment and fresh water that built and maintained wetlands and marshes.

- Subsidence and sea level change: these ongoing trends continue to be a primary cause of major, adverse, permanent impacts to study-area wetlands by increasing flooding frequency and duration, marsh vegetation break up, and erosion (BTNEP 2010; USGS 2016).

- Storm and hurricane events: these ongoing major, adverse events will continue to cause loss of life, major economic damages, and outmigration of residents and businesses. They also convert wetlands to open water from erosion when large storm surges bring salt water inland (Day et al. 2007).

- Restoration projects: successful habitat restoration projects have been completed in the study area. The hydrologic modeling and WVAs completed for this SEIS reflect the bathymetric and natural habitats that have been sustained in part by restoration projects completed by CPRA, NOAA, and other governmental and non-governmental entities. These conditions are captured in the baseline conditions described under the No Action Alternative for each resource (see Sections 6.2 through 6.17).

6.18.1.3.2 Reasonably Foreseeable Future Projects

The determination of whether a potential future project is reasonably foreseeable was based on the stage of development that each project had reached at the time the Draft SEIS was being prepared. This cumulative impacts analysis was prepared in January 2025. Courts have generally accepted the idea that “reasonably foreseeable” projects include those that are proposed rather than contemplated, and that reasonably foreseeable projects should not be speculative or remote (Weinberger v. Catholic Action of Hawaii, 454 US 139, 70 E.Ed.2d 298, 1981; Kleppe v. Sierra Club, 427 US 390, 1976).

Reasonably foreseeable projects that were considered for the analysis include projects that are in the engineering, design, or construction phase; have pending or approved permits; are currently being assessed through the NEPA planning process; or have been approved for funding. Reasonably foreseeable projects were identified through publicly available information such as USACE NEPA and feasibility studies, CPRA’s annual 3-year expenditure projections (CPRA 2024), and parish websites. The LDNR SONRIS database was searched for active and pending permits to help identify planned projects in the study area. The Federal Energy Regulatory Commission website was searched to help identify pending gas pipeline and storage projects under its purview. These methods helped identify projects with a realistic rather than speculative likelihood of happening. The criteria described above was then applied to identify which projects and actions may affect resources within the same temporal and geographic scope as the construction and operation of the Proposed Action.

6.18.1.4 Step 4: Assess Potential Cumulative Impacts to Each Resource

Figure 6-16 shows the location of the reasonably foreseeable projects and activities considered in this cumulative impact analysis based on information available at the time this SEIS was prepared (January 2025). Project descriptions are listed in Table 6-13. Descriptions of potential cumulative impacts are presented in Sections 6.18.2 through 6.18.7.

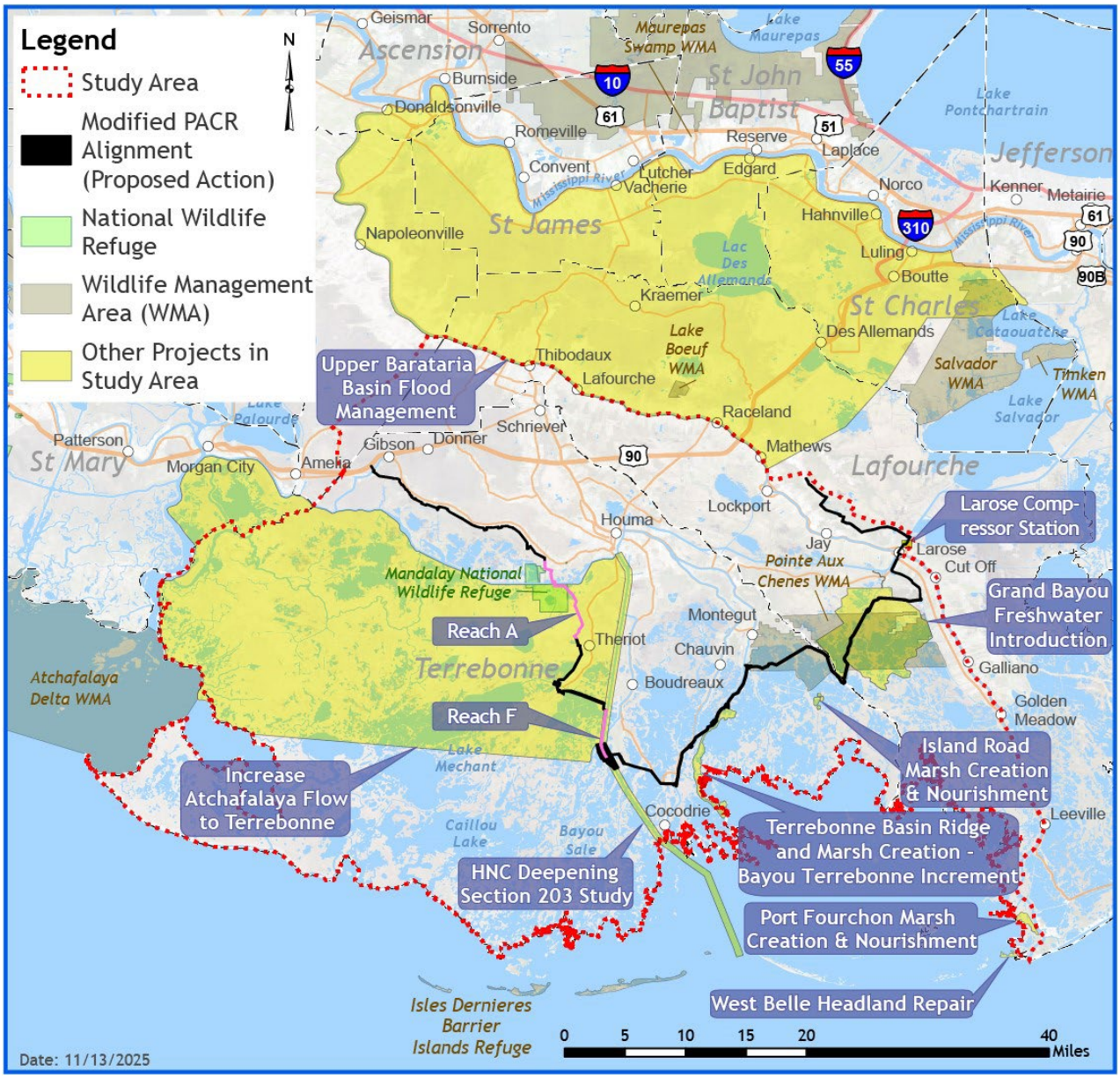


Figure 6-16. Map of Reasonably Foreseeable Future Projects

Table 6-13. Reasonably Foreseeable Future Projects

Project Proponent	Name	Type	Status	Description
CPRA	Island Road Marsh Creation & Nourishment (TE-0117)	Restoration-Marsh	Engineering & Design	This project would create 365 acres and nourish approximately 19 acres of marsh.
CPRA	Terrebonne Basin Ridge and Marsh Creation - Bayou Terrebonne Increment (TE-0139)	Restoration-Ridge	Construction	Located along the east bank of Bayou Terrebonne in western Terrebonne Parish, this project would create 80 acres of ridge using sediment dredged from Bayou Terrebonne and 1,430 acres of marsh using sediment dredged from Terrebonne Bay.
CPRA	Grand Bayou Freshwater Introduction (TE-0145)	Restoration-Hydrologic	Engineering & Design	The project would complete engineering and design of a project that would ultimately increase the flow of fresh water down Grand Bayou Canal from the GIWW.
CPRA	Port Fourchon Marsh Creation (TE-0171)	Restoration-Marsh	Engineering & Design	The project is located between Bayou Lafourche and Timbalier Bay and would create 513 acres and nourish 91 acres of marsh using dredged material from Belle Pass.
CPRA	West Belle Headland Repair (TE-0176)	Restoration-Barrier Island	Engineering & Design	Located on the far eastern edge of the study area, this project would restore beach, dune, and intertidal marsh habitat.
CPRA/ NOAA	Increase Atchafalaya Flow to Eastern Terrebonne (TE-0110)	Restoration-Hydrologic	Engineering & Design	The project would dredge the GIWW east of the Atchafalaya River and install a bypass structure at the Bayou Boeuf Lock to increase freshwater and sediment flows from the Atchafalaya River to Terrebonne Basin marshes.
USACE/ CPRA	Upper Barataria Basin Risk Reduction	Hurricane & Flood Risk Reduction	Engineering & Design	Construction of a 30.6-mile levee alignment extending from the MTG levee in Raceland, Louisiana to Luling, Louisiana in St. Charles Parish to the east.

Project Proponent	Name	Type	Status	Description
USACE/ NFS	MTG Project: Reach A Levee and Structures	Hurricane & Flood Risk Reduction	Engineering & Design	Combination of both programmatic and constructible features, including 7.16 miles of 1% AEP earthen levees and 0.22-mile floodwall designed to a +17-foot and +16.5-foot elevation, respectively; 11 environmental control structures; two collector canals; a 56-foot-wide barge type floodgate on the Minors Canal north of the GIWW; and a 125-foot to 225-foot-wide sector gate on the GIWW (GIWW-West). See Figure 3-2.
USACE/ NFS	MTG Project: Reach F Levee	Hurricane & Flood Risk Reduction	Planning	The proposed project would construct a 1% AEP levee in Reach F. See Figure 3-2.
TLCD/ TPC/ Terrebonne Parish/ Private Landowners	Ongoing Non-Federal Risk Reduction Projects	Hurricane & Flood Risk Reduction	Varies	Non-federal entities currently maintain and operate miles of forced drainage levees along with several pump stations and flood control structures. Private landowners have also constructed levee systems to protect their land from frequent flooding. These actions are likely to continue into the foreseeable future.
USACE/NFS	Surveys and Borings for MTG proposed alignment	Hurricane & Flood Risk Reduction	Planning	This project entails conducting soil borings and surveys along the proposed MTG alignment to aid in designing of the levees and structures (Draft EA #597 (FONSI not yet signed).
USACE/ DOTD/ TLCD/ TPC	HNC Deepening Project	Navigation	Engineering & Design	This project would entail deepening the HNC channel to −20 feet compared to the currently authorized channel depth of -15 feet.
Texas Eastern Transmission LP	Larose Compressor Station	Energy	Permitted with special conditions	Proposed modification and expansion of existing above- ground compressor/facility station and laydown yards.

6.18.2 Wetlands

6.18.2.1 Past, Present, and Reasonably Foreseeable Future Projects and Trends

The past and present projects and trends that would continue to influence wetlands in the study area include sea level change, subsidence, storms, completed restoration projects, and existing levees along waterbodies, as described briefly in Section 6.18.1.3.1 above, and in more detail in Affected Environment Section 5 and baseline conditions (No Action Alternative) described in Section 6. As of October 2025, more than 1,000 acres of wetlands and water bottoms were impacted by the construction of levees and structures by the NFS.

These impacts have been and are continuing to be mitigated through marsh or terrace creation and mitigation banks through the USACE Regulatory Program (see Section 2.4 and Appendix O). These prior impacts form the basis of the Affected Environment (see Chapter 5).

The reasonably foreseeable marsh, ridge, and hydrologic restoration projects in the study area would have major, beneficial impacts to wetland habitats throughout the study area, both inside and outside of the proposed levee system. The Increase Atchafalaya Flow to Eastern Terrebonne Project would convey freshwater and sediment from the Atchafalaya River to sustain and create marsh in the western portion of the study area. The Grand Bayou Freshwater Reintroduction Project would increase the flow of fresh water down Grand Bayou Canal from the GIWW.

Construction of the reasonably foreseeable MTG Projects Reach A and Reach F and the Larose Compressor Station project would have adverse impacts to wetlands, but these adverse impacts would be compensated through required wetland mitigation, making direct net impacts to wetlands negligible. The constructible features assessed for wetland impacts in the Reach A EA covered the construction of a total alignment length of 3.3 miles, including 2.8 miles of earthen levee and five culverts as well as one temporary timber mat pipeline crossing. Wetland impacts for the constructible features include approximately 147.8 acres (73.02 AAHUs) of fresh/intermediate marsh and BLH/swamp habitat (USACE 2024). Compensatory mitigation through the purchase of BLH/swamp mitigation bank credits has been completed and fully compensates these negative habitat impacts. USACE-constructed mitigation design for fresh/intermediate marsh habitat impacts is in progress.

The Reach F EA is in progress but is estimated to impact approximately 115.9 acres (48.53 AAHUs) of brackish/saline marsh and BLH habitat. The TSP wetland mitigation alternative for these impacts is the combination of in-kind mitigation bank purchases and the implementation of the USACE-constructed West Terrebonne mitigation project.

The HNC Deepening Project may increase saltwater intrusion into the interior levee system, thereby increasing salinities. Increased salinity may adversely impact wetland species assemblages within the system. Potential impacts to wetland habitats from the proposed deepening project would be assessed and if necessary, a mitigation plan developed during supplemental NEPA.

6.18.2.2 Combined Cumulative Impacts

A combined total of 4,857 acres of wetland habitat would be directly impacted by construction of the MTG Project. This includes 4,574 acres of wetland habitats that would be impacted by construction of the Proposed Action (which would raise and widen the existing NFS levees). The additional components of the MTG Project assessed through separate NEPA documents (for example, the Reach A EA (USACE 2024), Reach F EA

(USACE 2025-in process), and the Surveys and Borings EA (USACE 2025-in process) would add to this total (see Table 6-14). Compensatory habitat mitigation through the purchase of mitigation bank credits and UASCE-construction of a mitigation project would be completed prior to or during construction to offset these wetland impacts such that the net loss of wetland habitats would be 0. Reasonably foreseeable wetland restoration projects would contribute major, beneficial impacts to wetlands. Sediment and freshwater inputs from the reasonably foreseeable project Increase Atchafalaya River Flow to Eastern Terrebonne would benefit wetlands inside and outside of the MTG Project levee alignment when structures and gates in Reach A are open during non-storm conditions.

Table 6-14. Cumulative Wetland Impacts

Action/Project	Total Wetland Acres[1] Impacted	Compensatory Mitigation Strategy/ Status
Proposed Action	4,574	Mitigation Bank Credits and USACE-Constructed Mitigation Projects (see Appendix C)/Not Initiated (this SEIS is in process)
Reach F (USACE 2025, in process)	116[2] (estimated)	Combination Purchase of Mitigation Bank Credits and USACE-Constructed Mitigation Projects/Not Initiated (EA still in process)
Reach A[3] (USACE 2024)	148	Purchase of Mitigation Bank Credits/Not Completed-In Process
Survey and Borings (USACE 2025, in process)	19	Purchase of Mitigation Bank Credits/Not Completed-In Process
Total	**4,857**	

[1]Rounded to the nearest 1 acre.

[2]The estimates of acreage impacts may change slightly once NEPA compliance is completed.

[3]These acres are the impacts of the Reach A constructible features. Programmatic features will be assessed for wetland impacts and habitat mitigation in a separate NEPA document.

Over the long-term, the ongoing loss of wetland habitat due to sea level change and subsidence even with the presence of the reasonably foreseeable restoration and mitigation projects would result in significant adverse impacts to wetland habitats in the study area. There is potential that ongoing sea level change and subsidence would create the need to close the Proposed Action gates and structures in the future, which could inhibit exchange and tidal flow for wetland habitats within the study area. The water control plan for the structures would be revised at least every 5 years to account for changes in sea level and subsidence (see Section 3.3.7 and Appendix M for information about the draft water control plan).

6.18.3 Aquatic Resources and EFH

6.18.3.1 Past, Present, and Reasonably Foreseeable Future Projects and Trends

The past and present projects and trends that would continue to influence aquatic resources and EFH in the study area include sea level change and subsidence, storms, and channelized rivers and bayous, as described briefly in Section 6.18.1.3.1 above, and in more detail in Section 5 and baseline conditions (No Action Alternative) described in Section 6. The additional impacts of the reasonably foreseeable projects are described here.

The reasonably foreseeable future marsh restoration projects would result in decreased water depth at targeted locations, as well as decreased wave action adjacent to these locations, both of which may allow for localized benefits to aquatic vegetation. The creation or restoration of marsh in the study area would result in benefits to the benthic community and EFH.

6.18.3.2 Combined Cumulative Impacts

Hydrologic and larval fish transport modeling conducted for the MTG Project in 2024 assessed the potential indirect impacts of operations of all reaches and structures (including reasonably foreseeable future Reach A and Reach F) with all gates and structures open. Results indicate that when gates and structures are open, negligible impacts to discharges, salinities, and particle (fish) transport would occur. As compared to the No Action Alternative, increases and decreases on salinities would average 1-2 ppt across the study area, causing negligible to minor, adverse impacts to aquatic resources and EFH. Patterns in larval fish movement and access would change, but impacts would not be significant. It should be noted that these model results are limited to non-storm conditions and may not apply to conditions that would occur when all gates and structures are in the closed position. The frequency and duration of gate closures would be temporary (12 to 24 hours) and intermittent (when named storms approach the study area and when water levels at structures reach 2.5 to 3.0 feet, which is estimated to occur every 2 to 5 years based on existing sea level change and subsidence rates. The water control plan would be updated every 5 years to account for changing sea level change/subsidence rate changes. See Section 3.3.7 and Appendix M for more details about the water control plan).

Over the long-term, the ongoing loss of wetland habitat due to sea level change and subsidence would occur regardless of the presence of the Proposed Action and reasonably foreseeable projects. Wetland loss is expected to result in significant adverse impacts to aquatic resources and EFH over time.

6.18.4 Protected Species

6.18.4.1 Past, Present, and Reasonably Foreseeable Future Projects and Trends

The past and present projects and trends that would continue to influence protected species habitats in the study area include sea level change and subsidence, storms, and habitat loss, as described briefly in Section 6.18.1.3.1 above, and in more detail in Section 5 and baseline conditions (No Action Alternative) described in Section 6. The additional impacts of the reasonably foreseeable projects are described here.

Construction and operation of the reasonably foreseeable future projects may affect protected species and species of concern where their habitat is present in proposed construction rights-of-way. Project sponsors would be required to consult with the FWS through NEPA or USACE Regulatory permitting regarding any potential impacts to protected species, such that allowable impacts would not jeopardize their continued existence. Reasonably foreseeable restoration projects would beneficially affect species by restoring suitable habitat.

6.18.4.2 Combined Cumulative Impacts

The cumulative impacts to protected species from implementation of the Proposed Action and reasonably foreseeable future projects would likely be adverse over the long-term as suitable habitats decline because of ongoing sea level change and subsidence. Impacts to protected species that prefer increased salinities would be less adverse.

6.18.5 Flooding and Storm Surge

6.18.5.1 Past, Present, and Reasonably Foreseeable Future Projects and Trends

The past and present projects and trends that would continue to influence flooding and storm surge impacts in the study area include sea level change and subsidence, storms, completed restoration projects, and flooding/storm risk reduction projects completed by the NFS and other entities, as described briefly in Section 6.18.1.3.1 above, and in more detail in Section 5 and baseline conditions (No Action Alternative) described in Section 6. The additional impacts of the reasonably foreseeable projects are described here.

The construction and operation of Reach A, Reach F, and the HNC Lock Complex; and ongoing flood/storm risk reduction projects implemented by the NFS would contribute moderate to major, long-term impacts to flooding and storm surge impacts to population centers. However, the flood and storm-surge risk reduction benefits would be limited to adjacent areas because storm surge and waves would continue to overtop the other reaches of the levee alignment during 1% AEP (100-year) storm events because existing NFS levees do not provide hurricane and storm damage risk reduction for storm events of this magnitude. The Upper Barataria Basin Risk Reduction Project would contribute major, long-term benefits on hurricane and storm damage risk reduction for population centers along the

northeastern edge of the study area through construction of a 30-mile-long levee from Larose to Luling, Louisiana.

The reasonably foreseeable marsh, island, and ridge restoration projects in the study area would contribute minor, beneficial impacts to flooding and storms risk reduction. These restoration initiatives would build up bathymetry and convert open water habitats to marsh and ridge habitat, which would help to attenuate waves and storm surges. However, these benefits would not be permanent; as sea levels change and subsidence increase over the 50-year performance period, some of these benefits may decline as marsh habitats are flooded and converted to open water (see Section 6.3).

6.18.5.2 Combined Cumulative Impacts

Construction of the Proposed Action combined with construction of Reach A, Reach F, and the HNC Lock Complex would form a completely intact levee system that would have major, long-term benefits for population centers within the system. Once constructed, the completed alignment would provide risk reduction for 1% AEP (100-year) storm events and more frequent storm events. HEC-RAS modeling was conducted for the study to assess potential impacts to induced flooding once the entire MTG Project is completed, including the Proposed Action, Reaches A and F, and the HNC Lock Complex. The MTG Project would increase water levels to varying degrees during storm events (see Section 6.2 for results of this analysis). The proposed HNC deepening was not included in the modeling. Combined with the Upper Barataria Basin Project, proposed habitat restoration projects, and risk reduction projects completed by the NFS, overall cumulative impacts to flood and storm damage risk reduction would be long-term, major, and beneficial inside the system and long-term, moderate, and adverse in communities immediately outside the system.

6.18.6 Socioeconomics

6.18.6.1 Past, Present, and Reasonably Foreseeable Future Projects and Trends

The past and present projects and trends that would continue to influence flooding and storm surge impacts in the study area include sea level change and subsidence, storms, and risk reduction projects completed by the NFS and other entities, as described briefly in Section 6.18.1.3.1 above, Section 5, and baseline conditions (No Action Alternative) described in Section 6. The additional impacts of the reasonably foreseeable projects are described here.

Construction of the Larose Compressor Station, HNC Lock Complex, Reaches A and F Project, and the Upper Barataria Basin Risk Reduction Project would be temporary and adverse during construction, causing increased traffic congestion from haul trucks and workforce commutes, dust, and noise and vibration from pile driving and other equipment. Reasonably foreseeable hurricane and flooding risk reduction projects would have long-term, major benefits on economic growth and community cohesion due to lower flooding

risks. The HNC Deepening Project could have major economic benefits associated with deep-draft navigation, including increased regional trade and economic development. The reasonably foreseeable restoration projects could benefit economic activities associated with fishing and eco-tourism.

6.18.6.2 Combined Cumulative Impacts

Short-term, adverse cumulative impacts during construction of the Proposed Action and reasonably foreseeable projects include noise and vibration from pile driving and other construction activities, dust, and increased traffic volumes from haul trucks and workforce commutes. These impacts could be major if construction timeframe of proposed projects overlap. Cumulative impacts over the long term would be major and beneficial for socioeconomic resources and populations located inside the proposed levee system due to increased employment opportunities, property values, community cohesion, and economic growth through increased risk reduction to residents, businesses, and industries in the area. Cumulative impacts to socioeconomic resources and populations located on the flood side of risk reduction projects would be adverse over the long-term due to increased flooding during storms.

6.18.7 Cultural and Tribal Resources

6.18.7.1 Past, Present, and Reasonably Foreseeable Future Projects and Trends

The past and present projects and trends that would continue to influence cultural and tribal resources are described in Section 5 and baseline conditions (No Action Alternative) in Section 6. The additional impacts of the reasonably foreseeable projects are described here.

The reasonably foreseeable hurricane and flood risk reduction projects would reduce potential flooding and storm damages to cultural and tribal resources. However, the construction or enlargement of proposed levees and structures could introduce new visual elements inconsistent with historic or cultural character and could indirectly diminish the integrity of character associated with historic resources or Traditional Cultural Properties. The reasonably foreseeable projects would require mitigation for any cultural or tribal impacts as part of NEPA or permitting procedures.

6.18.7.2 Combined Cumulative Impacts

Cumulative impacts to cultural and tribal resources inside the MTG and UBB system would be beneficial; reduced hurricane and storm damage risks may reduce harm to cultural resources across a larger portion of coastal low-lying areas. Federal projects, or those funded by federal sources, must comply with NHPA Section 106 guidelines and processes under the NHPA. This requires federal entities to assess the potential effects of their projects on cultural resources, which include any prehistoric or historic district, archaeological site, structure, or object that is listed or eligible for listing on the National Register of Historic Places (NRHP). As such, all federal hurricane and storm damage risk reduction, flood risk

reduction, coastal and wetland restoration, and transportation projects must adhere to these guidelines, ensuring that they do not cumulatively harm cultural resources.

6.19 ADDITIONAL CONSIDERATIONS IN PLANNING

6.19.1 Unavoidable Adverse Effects

Though efforts were taken to avoid and minimize impacts to the natural and human environment, the Proposed Action would impact wetland habitats and temporarily increase water levels during storm events (as described below and in Section 6.2) in communities and undeveloped lands outside (on the flood side) of the proposed MTG levee system.

A total of approximately 4,574 acres (approximately 1,365 AAHUs) of forested and herbaceous wetlands (i.e., bottomland hardwood (BLH), swamp, fresh/intermediate marsh, and brackish/saline marsh) would be impacted directly by construction of the Proposed Action. Up to approximately 1,059 additional acres of significant habitats (BLH, swamp, and intermediate, brackish, and saline marshes) could be negatively impacted due to long-term hydrologic shifts once the MTG Project is completed and near-term operation of the Proposed Action is implemented. This SEIS includes a compensatory habitat mitigation plan (see Appendix C) for compensating these losses through the purchase of mitigation bank credits and/or the construction of BLH, swamp, and marsh habitats within the Barataria-Terrebonne watershed and Mississippi Deltaic Plain. Monitoring for potential additional negative indirect impacts would be required to determine if adaptive management actions, such as changes in operations, could be instituted to avoid impacts or if additional mitigation actions would be necessary. Additional assessments, compensatory mitigation, environmental compliance, and NEPA documentation could be necessary if future changes in operations indicate hydrologic shifts that would incur indirect impacts to significant habitat beyond what is described in this SEIS.

Based on 2025 Coastal Storm Modeling System (CSTORM-MS) results for years 2035 and 2085, during storm events when the proposed levee system gates are closed, the levees would serve as storm surge barriers, forcing stormwater to “stack” on the exterior side of the levees. The model results indicate that some areas outside the MTG levee system would experience increased water levels during storm conditions, as compared to the No Action Alternative. These areas include Gibson, Isle de Jean Charles, Dulac, Cocodrie, the areas inside of the Larose to Golden Meadow levee, and Dularge. Project-induced water level increases would be more substantial near the proposed MTG levees and would decrease farther from the MTG levees. The duration of impacts would be limited to 12 to 48 hours during and immediately following storm events. Minor impacts would occur during frequent storm events, but water level increases would be more significant during infrequent storm events, including 5% AEP (20-year) and 1% AEP (100-year) storm events. Mitigation strategies would be developed based on detailed analysis during the final design phase, with considerations for both economic and social impacts. Implementation of mitigation measures

(as appropriate) would be completed prior to certification of final plans and specifications and before the initiation of construction of any reaches of the Proposed Action. The NFS, in keeping with their LERRD responsibility per the PPA, would acquire the necessary real property interests related to mitigation for each contract concurrent with the acquisition of right-of-way for levee construction.

6.19.2 Relationship of Short-Term Uses and Long-term Productivity

NEPA Section 102(2)(c)(iv) requires that an EIS include a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. This section describes how the Proposed Action would affect the short-term use and the long-term productivity of the environment.

In reference to the Proposed Action, “short term” refers to the temporary phase of construction of the Proposed Action, while “long term” refers to the operational life of the Proposed Action and beyond. Section 6 of this document evaluates the direct, indirect and cumulative effects that could result from implementation of the Proposed Action.

Construction of the Proposed Action would result in short-term construction-related impacts and would include, to some extent, interference with local traffic, minor limited air emissions, increases in ambient noise levels, dust generation, disturbance of wildlife and listed and protected species, and disturbance of recreational and other public facilities. These impacts would be temporary and would occur only during construction and are not expected to alter the long-term productivity of the natural environment.

Operation of the multiple proposed floodgates and structures would result in long-term impacts and would include, to some extent, disturbance of wildlife and listed and protected species. Coordination with FWS is ongoing.

Over the long-term, the Proposed Action would reduce the risk of flooding of homes, utilities, hospitals, and emergency response facilities inside the levee system caused by hurricane storm surges, thereby lowering risks to public health and safety as compared to the No Action Alternative. It would also mitigate flooding and erosion along transportation routes, including key hurricane evacuation routes. These improvements would enhance evacuation efficiency and ensure quicker post-storm access for emergency responders, repair crews, and other essential services. Overall, the construction and operation of the Proposed Action are expected to significantly reduce public health and safety risks. Both residential structures and civic infrastructure in the study area would experience an increased reduction in flood risk. Long-term impacts to labor and employment would be beneficial due to increased hurricane and storm damage risk reduction for businesses and industries within the study area. With lower incidences of flooding, communities would be better able to focus on engaging the community and participating in community building activities and events.

6.19.3 Irreversible and Irretrievable Commitments of Resources

NEPA requires that environmental analysis include identification of “any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented.” Irreversible commitments of resources are those resulting from impacts to resources such that they cannot be completely restored to their original condition. Irretrievable commitments of resources are those that occur when a resource is removed or consumed and would therefore never be available to future generations for their use.

The Proposed Action would require irreversible and irretrievable commitments of resources, including the expenditure of funding, energy, labor, and materials. The Proposed Action would also irreversibly and irretrievably commit some lands, including wetlands, to uplands or developed lands for the construction of project features.

THIS PAGE INTENTIONALLY LEFT BLANK

7 Public and Agency Coordination

7.1 INTRODUCTION

Public involvement is an important part of planning and decision-making. NEPA provides people, organizations, and governments the opportunity to review and comment on proposed major federal actions. Engaging and receiving input from the public, interested parties, stakeholders, government agencies, and nongovernmental organizations regarding the content of this SEIS in all stages is critical to achieving the USACE objective of enhancing trust and understanding with customers, stakeholders, teammates, and the public through strategic engagement and communication.

7.2 NEPA COOPERATING AND PARTICIPATING AGENCIES AND TRIBES

In a letter dated September 6, 2024, the USACE invited several agencies to participate as cooperating agencies in the development of the SEIS. Agencies that agreed to participate as cooperating agencies include the FWS, EPA, NMFS, Louisiana Department of Conservation and Energy (LDCE) and LDWF (see Appendix F). As cooperating agencies, they were invited to participate in team meetings and assist where applicable in the impact analysis. The following federally recognized Tribes that have historic interest in Louisiana and the study area were also invited to participate in the planning process: Alabama-Coushatta Tribe of Texas, the Choctaw Nation of Oklahoma (CNO), the Coushatta Tribe of Louisiana (CT), the Jena Band of Choctaw Indians (JBCI), Mississippi Band of Choctaw Indians, and Tunica-Biloxi Tribe of Louisiana (TBTL).

7.3 SCOPING

Scoping is a critical component of the overall public involvement process to solicit input from the affected public, federal, state, and local agencies, federally recognized Tribes and interested stakeholders. The NEPA scoping process provides an early and open means for determining the scope of the problems and the need for the project, as well as opportunities to address the needs within the study area in this NEPA document. A Notice of Intent (NOI) to prepare a SEIS was published in the Federal Register on June 20, 2024, with an initial 30-day comment period. The comment period was then extended to August 26, 2024, to afford ample time to conduct public meetings in multiple locations within the study area.

Public scoping meetings were held on July 30, 2024 in Raceland, LA; August 1, 2024 in Montegut, LA and August 5, 2024 in Houma, LA. A scoping presentation was posted to the MTG website (https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf). Each meeting featured a short presentation and open house where the public could ask questions of and give feedback to USACE subject matter experts.

A virtual meeting was broadcast from the CEMVN office, and the public was notified about the meetings through publication of the NOI, as well as through multiple social media channels and local newspaper. The meeting videos are available on the CEMVN YouTube Channel, Facebook, and the project website. See Appendix L for the public notices, coordination letters, scoping report, and public comments received to date.

Approximately 21 people attended the scoping meetings, and two attendees provided comments. Additionally, Taproot Earth, the FWS, and the EPA provided scoping comments via mail. The comments submitted are summarized in Table 5-1. See Appendix L for the full comments.

Table 7-1. Summary of Scoping Comments

Commenter	Summary of Comments
Taproot Earth	The USACE should obtain the free prior and informed consent and right of first refusal from Tribal Communities. Prioritize habitat restoration and natural infrastructure. Democratize public research on the impacts of the current flood mitigation systems.
Mr. Jesse Billiot, Pointe Au Chien Tribe	"Currently, large pits are being dug to farm material for the levee systems. Some of these pits are in areas where land is already scarce. What is the plan to refill these pits?"
Rev. C. Kirby Verret, Former United Houma Nation Tribal Chairman	"One nation under God, indivisible, with Liberty and justice for ALL. We need to protect our environment, people and property, we live in a very special place where people work hard to make a living. We do not need delays but to continue to move forward on this project. Our Levee District took action to move Morganza forward. Our citizen taxed themselves to fund this project and match money. I've had to fight to be included, and we know if you do not protect, everyone loses."
FWS, Louisiana Ecological Services Office	Comments regarding significant fish and wildlife resources to be considered, significant habitats, and National Wildlife Refuges were provided as an early planning aid in accordance with provisions of the Fish and Wildlife Coordination Act 48 Stat. 401, as amended; 16 USC 661 et seq.), NEPA, and the ESA.
EPA, Region 6	The EPA provided recommendations to be considered regarding air quality; hazardous materials, hazardous waste, and solid waste; water resources and water quality; impact communities; consultation with Tribal Governments; children's health and safety; pesticides; and general comments.

7.4 PUBLIC REVIEW

A Notice of Availability announcing the release of the draft SEIS for public review and comment was published in the *Federal Register* and provided to cooperating agencies, the public, and interested parties on December 5, 2025. This notice provided a description of the Proposed Action features, points of contact to obtain more information regarding the draft SEIS, and methods for commenting on the draft SEIS. A public notice was shared through announcements on Facebook, Instagram, and through media outlets.

7.5 COMMUNITY OUTREACH

Community engagement meetings were held on Wednesday, July 19, 2023, at 1:00pm and 6:00pm at the Folklife Museum at, 317 Goode St. Houma, LA 70360. The meetings were "in-person" meetings and available on Webex. The purpose of the meetings was to describe the overall Proposed Action, as well as the proposed borrow pits and access routes for levee reaches A & F. Public Outreach focused on civic and environmental organizations that served residents in Houma, Gibson, Bourg, Lockport, Dulac, Montegut, Larose, and Chauvin. See Appendix L for the meeting sign-in sheet of attendees.

Initial and follow up calls were made to 48 churches (20 of which agreed to inform their members of the meeting), 7 local libraries, 2 food banks, 4 civic organizations, and 3 environmental non-profits. Tribes in the area were also made aware of the meetings, including, Grand Caillou/Dulac Band of Biloxi-Chitimacha-Choctaw, Point-au-Chein Indian Tribe, Isle de Jean Charles, United Houma Nation, and Chitimacha Tribe of Louisiana. Letters received from several bayou Tribes include, in part, the following questions:

- Will borrow pits be located near housing, and will they be backfilled after excavation?
    - The group voiced concerns that post-excavation pits fill up with water/gators and pose a hazard/attractive nuisance to residents and children.
- Do borrow pits weaken the surrounding lands and pose a greater flood risk for those nearby?
- Can USACE provide the borrow pit trucking access routes and times of day hauling will occur?
- How will local traffic be affected and for how long?
- Will trucks be on the road during school drop-off and pick-up times?
    - The group voiced concerns that borrow pit trucking may tear up local roadway – how will this be addressed?

THIS PAGE INTENTIONALLY LEFT BLANK

8 Compliance with Laws, Regulations, and Executive Orders

Coordination and evaluation of required compliance with specific federal acts, EOs, and other policies for the various alternatives is achieved, in part, through the coordination of this document with appropriate agencies and the public. A summary and status of compliance with the acts, EOs, and policies relevant to the Proposed Action is provided here.

8.1 FISH AND WILDLIFE COORDINATION ACT

The Fish and Wildlife Coordination Act (FWCA) provides authority for the FWS and NMFS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires federal agencies that construct, license, or permit water resource development projects to first consult with the FWS, NMFS, and state resource agencies regarding the impacts to fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the FWS to produce a Coordination Act Report (CAR) that details existing fish and wildlife resources in a study area and potential impacts of and recommendations for a proposed project. Draft CAR recommendations were received on October 31, 2025 and is included in Appendix G. The FWS' draft recommendations are provided below along with USACE responses**.** FWS correspondence and the final CAR will be included in Appendix G.

"The Service provides the following recommendations for conservation of fish and wildlife resources and mitigation for unavoidable impacts to those resources. The Service does not object to the Proposed Action on the condition that the USACE report recommends completing all indirect impacts analyses, and the following recommendations are considered and implemented to the extent that is satisfactory to fulfill Service responsibilities under the FWCA.

1. 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). The Service recommends that losses of high-value habitats, which are becoming scarce, be avoided or minimized to the greatest extent possible. The Service recommends unavoidable losses of such habitats should be fully compensated by replacement of the same kind of habitat value; this is called "in-kind" mitigation. The Service should be consulted in the development of plans and specifications for mitigation of unavoidable impacts to coastal marshes and forested wetlands.

2. CEMVN Response: Concur. The CEMVN has and would continue to consider measures that avoid and/or minimize impacts on high-value habitats as demonstrated by shifting the Proposed Action alignment along existing levees. For the currently unavoidable habitat impacts, a compensatory mitigation plan has been completed as described in Section 4 and Appendix C of the SEIS. The CEMVN would continue to coordinate with the FWS and NMFS for in-kind mitigation projects. To the greatest extent possible, design (e.g., implementation of "T"-walls, sheet-pile, and/or cement floodwall in levee designs) and position flood risk reduction features so that adverse impacts to forested and emergent wetlands are avoided or minimized.

USACE Response: Concur. The CEMVN has and would continue to coordinate with the USFWS as engineering, design, and analysis of the programmatic features progress. Avoidance and minimization measures would be considered to the greatest extent practicable while allowing the Proposed Action to meet the project purpose and need.

3. The USACE should provide mitigation for habitat directly impacted by the construction of earthen levees, floodwalls, ROW, haul route roads, floodgates, sector gates, and environmental control structures throughout the levee alignment estimated as follows: 2,177 acres (-620.2 AAHUs) saline marsh, 464 acres (-88.3 AAHUs) brackish marsh, 1,516 acres (-421.6 AAHUs) fresh/intermediate marsh, 324 acres (-147.3 AAHUs) BLH, and 178 acres (-120.4 AAHUs) of swamp. Those estimated AAHUs should be considered highly accurate but provisional until the impacts analyses are reviewed by the HET. Final post-review AAHUs required for all habitat types should be completed and included in the Final SEIS, FONSI, ROD, and Final FWCA report.

USACE Response: Concur. The CEMVN has prepared a mitigation plan to compensate for all impacts to significant habitats (Appendix C). CEMVN will continue its frequent and regular coordination with the FWS and HET, and the acreages/AAHUs reflecting project impacts to significant habitats will be revised as needed based on that coordination. If revisions indicate that compensatory habitat mitigation plans would not fully mitigate for both direct and indirect habitat impacts (total AAHUs from both direct and indirect WVAs), re-evaluation of the mitigation sites would be completed to see if expansion of the sites is possible to mitigate all indirect and direct impacts. If not, mitigation planning may be reopened to identify new sites that could mitigate for 100 percent of impacts by habitat type. If an adjustment to the SEIS's mitigation plan is needed, subsequent NEPA may be completed and released for public review.

4. The results of hydrologic models are now available and have been analyzed for most, but not all, aspects of the effects of the Proposed Action. The modeling has provided enough information to indicate potential areas of indirect wetland impacts. Preliminary review indicates nearly 6,000 acres of forested wetlands and just under 14,700 acres of marsh may be indirectly impacted. However, time did not allow for appropriate impacts analysis yet, which will be completed prior to the Final SEIS. The Service recommends the USACE continue to coordinate with our office and other resource agencies on indirect

impacts analysis. Mitigation for those indirect impacts would be added to the direct impacts previously mentioned (reference recommendations 3) to determine the total impacts of the Proposed Action.

USACE Response: Concur. It is anticipated that the completed compensatory habitat mitigation plan as described in this SEIS would sufficiently offset both direct and indirect wetland habitat impacts. Upon completion of WVAs for indirect wetland impacts, if results indicate that compensatory habitat mitigation plan would not fully mitigate for both direct and indirect habitat impacts, re-evaluation of the mitigation sites would be completed to see if expansion of the sites is possible to mitigate all indirect and direct impacts. If not, mitigation planning may be reopened to identify new sites that could mitigate for 100 percent of impacts by habitat type and additional NEPA/environmental compliance may be needed. USACE would continue coordination with the resource agencies throughout this process to ensure full satisfaction of the mitigation requirement.

5. The FONSI and SEIS should clearly reiterate that features of the Proposed Action would be designed to maintain existing freshwater inflows from the Atchafalaya River via the GIWW, and will be designed, operated, and monitored to achieve coastal wetland conservation through improved re-distribution of freshwater flows to wetlands wherever feasible (i.e., in a manner that does not compromise hurricane protection, minimizes impacts to navigation and aquatic resources and does not induce flooding).

USACE Response: Floodgates on the GIWW would only be closed during impending named storm events in the Gulf or when water surface elevations at the structure reach 3.0 ft. NAVD88, which corresponds to 50% (2-year) and 20% (5-year) annual exceedance probabilities. See the draft water control plan for all proposed structures, including the GIWW East and West Floodgates, in Appendix M of the SEIS. Supplemental Environmental Assessment for Reach A would be prepared to assess the GIWW West floodgate (in addition to Reach A Levee, ECS, and Minor's Canal Floodgate) full project engineering and design details as they are developed and potential associated impacts resulting from the project. If the draft water control plan for the water control structures and floodgates changes, the impacts resulting from that change would be assessed in a supplemental NEPA document(s). The CEMVN would continue to coordinate closely with the USFWS as the project develops. A draft water surface elevation monitoring plan is included in Appendix D . It would be implemented to monitor for any unforeseen consequences. The development of this plan would continue to be coordinated with the USFWS.

6. GIWW Floodgate sluice gates should be kept open, except in the event of a tropical storm, to allow exchange and tidal flow within the system. Operational plans for floodgates and water control structures should be developed to maximize the open cross-sectional area for as long as possible. Water control structure operation manuals or plans should be developed in coordination with the Service and other natural resource agencies.

USACE Response: Both the GIWW East and West Floodgates would only be closed during impending named storm events in the Gulf or if water surface elevations at the floodgates reaches +3.0 ft NAVD88 (see the draft water control plan for all proposed Morganza to the Gulf structures, including the GIWW East and West Floodgates, in Appendix M of the SEIS). Supplemental Environmental Assessment for Reach A would be prepared to assess the GIWW West floodgate (in addition to Reach A Levee, ECS, and Minor's Canal Floodgate) full project engineering and design details as they are developed and potential associated impacts resulting from the project. If the draft water control plan for the water control structures and floodgates changes, the impacts resulting from any changes would be assessed in a supplemental NEPA document. The CEMVN would continue to coordinate closely with the USFWS as the project develops. A draft water surface elevation monitoring plan is included in Appendix D. It would be implemented to monitor for any unforeseen consequences. The development of this plan would continue to be coordinated with the USFWS.

7. The environmental control structures and floodgates of the system will be closed when the water level reaches either 2.5 ft NAVD88 or 3.0 ft NAVD88, depending on the structure location and type. Currently, the trigger for structure and gate closures would likely be in anticipation of tropical storm events, therefore, it is not expected that the Proposed Action would cause the closure of the system more often due to higher daily water level fluctuations. It is unknown at present how water levels within the system would be managed if a change in operation due to relative sea level change is realized. Increased closures have not been assessed for hydrologic or wetland impacts. Hence, we are concerned that there is a potential for substantial additional indirect impacts to wetland habitat and fish and wildlife resources to occur. The Service recommends the USACE continue to coordinate with our office on new studies in regard to operations of structures and gates. The Service requests that the USACE provide annual reports on structure operations indicating the number of days per year (and season) that structures and gates are closed. If structures are closed more than 30 times a year (nonconsecutively), the USACE should study the need for potential operational changes, assess additional wetland impacts, and the need for more mitigation while continuing to coordinate with the Service.

USACE Response: The USACE is responsible for completing water control plans for navigation and flood-control structures constructed wholly or in part with federal funds (Engineer Regulation (ER) 1110-2-24). The USACE would determine structure types and associated water control plan/manual requirements during the final design phase. CEMVN commits to coordinating with the FWS regarding structure and gate operations and providing annual reports on structure operations indicating the number of days per year (and season) that structures and gates are closed. If structures are closed more than 30 times a year (nonconsecutively), CEMVN will study the need for potential operational changes, assess potential wetland impacts, and will re-initiate mitigation planning as required to compensate for impacts to significant habitats. If an additional mitigation plan is needed, it would be assessed in a subsequent NEPA document and released for public review.

8. Project features contained in the SEIS are considered constructable. Note this does not include or apply to Reach A, Segment 2 near Mandalay NWR where the USACE has committed to first looking for opportunities to avoid impacting Mandalay NWR. Impacts from project features in the SEIS should have adequate mitigation planned at the time this draft report is submitted. Impacts analyses may be incomplete, or project features may be revised by the time this draft report is submitted. Once any habitat impacts revisions are concluded, they should be included in the Final SEIS, Final FWCA report, FONSI, and ROD that includes the MTG constructible features.

USACE Response: CEMVN concurs that this SEIS does not address NEPA compliance for construction of Reach A, including Segment 2 near the Mandalay NWR as that compliance will be addressed in a forthcoming NEPA document. However, USACE is still committed to first looking for opportunities to avoid impacting Mandalay NWR. The CEMVN has prepared a mitigation plan for this SEIS to compensate for all impacts to significant habitats.

9. 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. Detailed conservation measures are included in this FWCA report. For more detail on avoiding contact with manatees contact this office. Should a Proposed Action directly or indirectly affect the West Indian manatee, consultation with this office will be necessary.

USACE Response: Concur. All personnel associated with project in-water work areas would be notified about the potential presence of manatees and the civil and criminal penalties for harming, harassing, or killing manatees. Personnel would be instructed to comply with speed zones, avoid collisions with manatees, and not attempt to feed or otherwise interact with manatees. The USACE would consult with the FWS should a Proposed Action potentially directly or indirectly affect the West Indian manatee.

10. The eastern black rail may be present in the project vicinity. The contractor shall instruct all personnel associated with the project of the potential presence of the eastern black rail in the area, and the need to avoid contact with the species. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing eastern black rails, which are protected under the Endangered Species Act of 1973 and the Migratory Bird Treaty Act. Detailed conservation measures are included in this FWCA report.

USACE Response: Concur. The CEMVN would ensure that all personnel including contractors are informed about the potential presence of the eastern black rail and the need to avoid or not harm these species.

11. 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 a bald eagle nest occurs or is discovered within 1,500 feet of the proposed study area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line using the Service's guidance and determination tool. 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.

USACE Response: Concur. The CEMVN has surveyed the Proposed Action's footprint and vicinity for bald eagle nests numerous times in coordination with the USFWS and LDWF. The CEMVN biologists would re-survey specific study areas (e.g., specific reach(es) or structure(s)) during the nesting season before construction to ensure impacts to bald eagles and their nesting habitat are avoided to the extent possible. If a bald eagle nest occurs or is discovered within 1,500 feet of the proposed study area, CEMVN would conduct an online evaluation using the Service's guidance and determination tool. The CEMVN would continue to coordinate eagle nest surveys for this project with FWS and LDWF.

12. 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 nesting colonies during the nesting season (September 1 through February 15).

USACE Response: Concur. The CEMVN has surveyed the Proposed Action's footprint and vicinity for colonial wading bird nesting activities numerous times in coordination with the USFWS and LDWF. The CEMVN biologists would re-survey specific study areas (e.g., specific reach(es) or structure(s)) during the nesting season before construct. If an active colonial nesting water bird rookery occurs within 1,000 feet of the Proposed Action, coordination with the USFWS to avoid adverse impacts to colonial wading birds to the maximum extent practicable. The SEIS would be updated to reflect this.

13. 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.

USACE Response: Concur. Reference Section 6.7 and Appendix N of the SEIS for discussion on alligator snapping turtles and Best Management Practices for avoiding and minimizing impacts to the alligator snapping turtle.

14. The Service recommends avoiding impacts to the Mandalay National Wildlife Refuge and any other National Wildlife Refuges (NWRs), LDWF Wildlife Management Areas, and CWPPRA projects. If direct and indirect impacts to NWRs cannot be avoided after coordination with the Service Refuge Project Leader, impacts will need to be mitigated on site of the NWR impacted. In addition, project features on refuge land would need a special use permit. If the project features are determined not compatible with the Refuge purpose(s), land would need to be purchased and exchanged with the refuge. These exchanged lands must be within the congressionally approved refuge acquisition boundary. The applicant would then own the lands needed to build and maintain flood control features. All project related activities on the refuge must be coordinated with Refuge Project Leader. Close coordination by the applicant must be maintained with the Refuge Project Leader.

USACE Response: CEMVN Response: This SEIS does not address construction of Reach A. The construction impacts addressed with this SEIS would not impact the Mandalay NWR. The CEMVN has and will continue to coordinate with the NWR, WMAs, and CWPPRA project proponents to avoid and mitigate impacts. The CEMVN would consider FWS recommendations on mitigation projects and land purchases to mitigate impacts.

15. To minimize impacts to fisheries, flood risk reduction water control structures in any watercourse should maintain pre-project cross section in width and depth to the maximum extent practicable. Water control structures within a waterway should include shoreline baffles and/or ramps (e.g., rock rubble, articulated concrete mat) that slope up to the structure to enhance organism passage. Various ramp designs should be considered. Please coordinate with the NMFS, Craig Gothreaux (craig.gothreaux@noaa.gov) on this issue.

USACE Response: Concur. The CEMVN would look for opportunities to minimize impacts to fisheries and aquatic organisms. The CEMVN would, at a minimum, maintain pre-project cross sections in width and depth to the maximum extent practicable. For flood risk reduction water control structures, the CEMVN would strive to minimize increases in waterway velocity through proposed structures to the maximum extent practicable. The CEMVN has and would continue to coordinate with NMFS and other resource agencies as the project develops.

16. 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.

USACE Response: Concur. NMFS has a “finding” with the CEMVN on the fulfillment of coordination requirements under provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). In those findings, the CEMVN and NMFS have agreed to complete EFH coordination requirements for federal civil works projects through the review and comment on NEPA documents prepared for those projects. This draft SEIS would be provided to NMFS for review and comment during the public review period.

17. If soils must be removed prior to levee construction, those soils should be used to create or restore emergent wetlands to the greatest extent possible or be used for levee construction as suggested by USACE.

USACE Response: The CEMVN would work with FWS to determine the feasibility of this recommendation prior to construction.

18. Material from dredging or borrow pits should not be piled outside of or allowed to erode outside the ROW.

USACE Response: Concur. The CEMVN would not stockpile materials outside of the designated ROW. Unsuitable soils would be placed in the borrow pits when excavation is complete. Waste materials would be removed and hauled to facilities designated to handle such materials.

19. Disturbed areas should be revegetated 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.

USACE Response: Partially concur. Planting of the levees with specific grass species is meant to support the integrity and longevity of the levees. Establishment of nectar producing plants wouldn’t be prevented in these areas, but natural colonization and persistence of nectar producing plants would be affected by maintenance of the levees. Excavated borrow pits would remain in the condition that exists after excavation and may not be conducive to the establishment of nectar producing plants, though natural colonization by such species would not be prevented. All temporary staging and access areas would be restored to pre-existing conditions. The use of native plant species when restoring temporary staging and access areas would be considered when restoring to pre-existing conditions.

20. 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 250 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.

USACE Response: Concur. Access and haul routes for construction of the Proposed Action would use existing roadways with the exception of one new gravel haul route that would be constructed for the Lockport to Larose Reach (see details in Section 3.3 of the SEIS). The gravel road would traverse along the 40 Arpent Canal levee and cross a portion of an agricultural field. The new gravel haul route would impact less than 1 acre (0.2 AAHU) of wetland habitat. This impact would be compensated through the purchase of mitigation bank credits/construction of mitigation sites (see Section 6.3 of the SEIS for details). There would be no stream crossings with this new access road.

21. Please include this office in future considerations of any additional project features and any planned levee lifts as additional consultation will likely be necessary.

USACE Response: Concur. The CEMVN will continue to closely coordinate with the USFWS and other Resource Agencies as engineering, design, modeling, and further NEPA analysis occurs.

22. To avoid unplanned shortfalls in mitigation acreage, the Service recommends that the target marsh acreage be calculated to exclude any internal borrow areas used for construction of the marsh creation area containment dikes.

    a. Marsh creation projects must provide at least the required acreage within 3 years of project implementation to be considered as having achieved the intended mitigation. This will depend on achieving a settled disposal area elevation conducive to growth of marsh vegetation.

USACE Response: Concur. A compensatory habitat mitigation plan has been completed for unavoidable project impacts (see Appendix C of the SEIS). The mitigation plan includes a monitoring and adaptive management plan that provides the required acreage within 3 years of mitigation project implementation.

23. With the new definition of the Waters of the United States (WOTUS, published Aug 29, 2023) all enclosed (protected side) wetlands may be redefined as non-jurisdictional wetlands because of this project, thus impacting all enclosed wetlands. There is concern that this would increase developmental pressures on enclosed wetlands. The Service recommends the USACE coordinate with us once they receive guidance on how they will implement that new rule to ensure protection of enclosed wetlands. Enclosed wetlands will still be connected hydrologically, and thus will still be tidally influenced via the planned major structures (i.e., floodgates) and any additional environmental structures and/or culverts, etc. For this reason, it is the Service's and the NMFS's opinion that the enclosed wetlands in question should be exempt from redefinition implications.

USACE Response: The CEMVN would continue to work closely with the Service on this project and coordinate regarding implementation of the Proposed Action. Should there be

additional impacts beyond what has been disclosed in this SEIS, a supplemental NEPA document would be prepared as appropriate prior to construction.

24. If it becomes necessary to use borrow sources other than the previously proposed environmentally cleared sites, the Service recommends the USACE begin investigating potential borrow sources in coordination with the Service. Borrow sites to be considered should have minimal impacts to fish and wildlife resources. The Service identified a priority selection process and list for borrow sites in our November 15, 2023, Planning-aid letter to USACE (Appendix 1). That prioritization process should be utilized if additional borrow sites are needed (please contact Cathy Breaux (337) 291-3122 for more information).

USACE Response: Concur. The CEMVN has and would continue to coordinate with the USFWS regarding borrow sources. The CEMVN is utilizing the FWS' priority selection process when determining borrow sources for this project.

25. NEPA evaluations for some portions of the MTG Project have occurred previously or are concurrent with the MTG SEIS (Reach A, Reach F). Please refer to the coordinating FWCA reports associated with those projects for our specific recommendations for those actions as they are also a part of the MTG Project. Specifically reference our FWCA report for Reach A Recommendation #7 regarding Mandalay National Wildlife Refuge and the USACE response (copied here for your convenience):

> *The Service recommends avoiding impacts to the Mandalay National Wildlife Refuge (NWR). If impacts cannot be avoided, impacts will need to be mitigated for on the Mandalay NWR. Please coordinate all activities with refuge staff and with Mr. Pon Dixon, Project Leader of the Bayou Sauvage Urban NWR Complex (985/882-2014).*

USACE Response: Concur. The Proposed Action in this SEIS would not impact the NWR. CEMVN will continue to look for opportunities to avoid and minimize impacts to the Mandalay NWR through the Reach A SEA process. At the current level of design for Reach A, a portion of the programmatic levee in the Proposed Action described in EA #598 would cross the NWR. The information we have to date is preliminary and additional engineering and design is necessary to fully inform the design of programmatic features of the Proposed Action its potential impacts to the NWR. Supplemental NEPA analysis would be conducted prior to impacting and constructing on the NWR. The CEMVN has and will continue to coordinate with the NWR.

26. NEPA evaluation and mitigation for the MTG surveys and borings work should be completed, and all mitigation requirements for impacts described in the Service's January 5, 2024, draft FWCA report should be fulfilled.

USACE Response: Concur. Mitigation for the MTG surveys and borings work would be completed and all mitigation requirements would be fulfilled for impacts discussed in EA #597.

27. The FWS 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.

USACE Response: Concur. The CEMVN has and would continue to coordinate with the resource agencies, including FWS, if the proposed project changes in scope or location; new information becomes available that affects listed species or their designated habitat; if the action is modified in ways that affect listed species; or if new species become listed or habitats are designated as critical habitat.

8.2 EXECUTIVE ORDER 11988: FLOODPLAIN MANAGEMENT

EO 11988 directs federal agencies to reduce flood loss risk; minimize flood impacts to human safety, health, and welfare; and restore and preserve the natural and beneficial values served by flood plains. Agencies must consider alternatives to avoid adverse and incompatible development in the flood plain. If the only practical alternative requires action in the floodplain, agencies must design or modify their action to minimize adverse impacts. Some Proposed Action features would extend into floodplains; however, the Proposed Action would not promote future development within the floodplain that otherwise would not occur. The Proposed Action is compliant with EO 11988.

8.3 EXECUTIVE ORDER 11990: PROTECTION OF WETLANDS

EO 11990 directs federal agencies to assess the likely impacts to wetlands associated with any Proposed Action, This is met through the following: (a) avoid long and short term adverse impacts associated with the destruction or modification of wetlands; (b) avoid direct or indirect support of new construction in wetlands; (c) minimize the destruction, loss or degradation of wetlands; (d) preserve and enhance the natural and beneficial values served by wetlands; and (e) involve the public throughout the wetlands protection decision-making process. The Proposed Action was developed to avoid and minimize impacts to wetlands where practicable within the constructible reach. During the final design phase of the project, Proposed Action designs would be developed with consideration of ways to avoid and minimize impacts to wetlands to the maximum extent possible. If additional unavoidable impacts are assessed, such assessment and additional compensatory mitigation as needed would be presented in subsequent NEPA documents and released to the public for

comment. A mitigation plan has been developed to compensate for all habitat impacts incurred from constructing and operating the Proposed Action.

8.4 CLEAN AIR ACT OF 1970, AS AMENDED

The Clean Air Act (CAA) sets goals and standards for the quality and purity of air and requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. The study area is currently in attainment of NAAQS. No general conformity determination is required. The proposed project is in Terrebonne and Lafourche Parishes, Louisiana. Both Parishes are in attainment of NAAQS. A general conformity determination is not required.

8.5 CLEAN WATER ACT OF 1972, AS AMENDED – SECTIONS 401, 402 AND 404

The CWA sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification (WQC) from the LDEQ that a proposed project does not violate established effluent limitations and water quality standards. The application for the State WQC will be provided to the LDEQ once the final SEIS is prepared in accordance with LAC 33:IX.

As required by Section 402 of the CWA, LPDES permit coverage for the Proposed Action would be obtained prior to construction via the General Permit for Discharges of Storm Water from Construction Activities Five Acres or More from the LDEQ. Section 404 of the CWA requires authorization from the Secretary of the Army, acting through the USACE, for the discharge of dredged or fill material into all waters of the United States, including wetlands. A draft 404(b)(1) evaluation will be released for a 30-day comment period that will include an assessment of the Least Environmentally Damaging Practicable Alternative. The final version of the 404(b)(1) evaluation will be provided as an appendix to the SEIS.

8.6 COASTAL ZONE MANAGEMENT ACT OF 1972

The Coastal Zone Management Act requires that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." The USACE will complete coordination of the Proposed Action with LDCE after the Draft SEIS goes out for public review**.**

8.7 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended, addresses the protection of EFH by NMFS in association with regional Fishery Management Councils. NMFS has a findings determination with the CEMVN on the fulfillment of coordination requirements under provisions of the Magnuson-Stevens Fishery Conservation and Management Act. In those findings, the CEMVN and NMFS have agreed to complete EFH coordination requirements for federal civil works projects through the review and

comment on NEPA documents prepared for those projects. See 50 CFR 600.920(f) (allowing use of existing environmental review procedures). This SEIS will be provided to NMFS at the start of the 45-day public review. Their comments will be included in this section.

8.8 MARINE MAMMAL PROTECTION ACT OF 1972

The Marine Mammal Protection Act of 1972 (16 USC 1361 et seq.) (MMPA) established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. In the MMPA, "take" is defined "as harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." The Department of Commerce, through NOAA-NMFS, is charged with protecting species that are known to occur in the Gulf region such as whales, dolphins, and porpoises. Manatees are protected by the Department of the Interior through the FWS. NOAA-NMFS is a NEPA cooperating agency for the SEIS. Email correspondence with FWS in January 2025 indicated that the Proposed Action would "not likely adversely affect" the West Indian manatee, due to the lack of suitable habitat and the lack of documented occurrences of this species in the study area. Coordination with the FWS and NMFS is ongoing. Although unlikely to occur in the study area, the USACE would implement standard manatee protection measures developed by the FWS if activities are proposed that would impact habitat where manatees could occur (see Appendix N).

8.9 ENDANGERED SPECIES ACT OF 1973

The Endangered Species Act is designed to protect and recover T&E species of fish, wildlife, and plants. Compliance requires coordination with the FWS and NMFS to determine if any threatened, endangered, or proposed threatened or endangered species or their critical habitat would be impacted by the Project.

USACE conducted a USFWS IPaC search on March2024) which generated a list of species that should be considered. USFWS confirmed that list of species on March 2024. An additional IPaC search was conducted October 2025 to confirm no changes to the listed species. USACE conducted a NMFS species mapper search on DATE which generated a list of species to consider. USACE has reviewed literature and conducted impact analysis on the listed species generated by each of those searches. USACE’s determinations can be found in Section XX of this EIS. Coordination under the ESA is ongoing and a ROD will not be signed until coordination is complete. USFWS sent a letter to USACE on November 20, 2025 confirming the NLAA determinations (appendix N).

8.10 FARMLAND PROTECTION POLICY ACT OF 1981

The Farmland Protection Policy Act of 1981 is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. The USDA-NRCS is responsible for designating prime or unique farmland protected by the act. Prime farmland is land with the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops that is available for these uses. It can be cultivated land, pastureland, forestland, or other land, but is not urban or built-up land or water areas. Unique farmland is land other than prime farmland that is used to produce specific high value food and fiber crops, such as citrus, tree nuts, olives, and vegetables. Construction of the Proposed Action associated borrow areas are expected to impact prime and unique farmland, and the impacts are expected to be significant although there would be benefits from implementation of the Proposed Action to remaining farmlands in the area. . The USACE is coordinating with the NRCS regarding the Proposed Action and the potential impacts to prime and unique farmland. On 05 January 2024, NRCS provided CPA-106 Farmland Conversion Impact Rating for Corridor Type Projects. The draft SEIS was provided to NRCS on 01 March 2024. NRCS confirmed via email on 12 April 2024 that they had no additional comments on the Proposed Action.

8.11 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

The USACE is obligated under ER 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all HTRW contamination within the vicinity of proposed projects. ER 1165-2-132 requires that proposed projects with potential HTRW issues, an HTRW initial assessment should be conducted as a priority. USACE HTRW policy is to avoid the use of project funds for HTRW removal and remediation activities. If the initial assessment indicates the potential for HTRW, testing, as warranted and analysis like a feasibility study should be conducted prior to proceeding with the proposed design. The NFS would be responsible for planning and accomplishing any HTRW response measures and would not receive credit for the costs incurred.

A Phase I Environmental Site Assessment (ESA), HTRW 23-11, was completed in accordance with the scope and limitations of ASTM Practice E 1527-13 for the Proposed Action in December 2024 and concluded that there is a low probability of encountering HTRW during construction of the Proposed Action. This included an environmental records review, inspections via aerial fly over of the levee alignment on 4 May 2023, and a site visit to the borrow and staging areas on 29 November 2023. No further investigation at the site is necessary. If the design or footprint of the Proposed Action changes significantly, HTRW would need to be re-investigated under a new Phase I ESA. The Phase I ESAs are available in Appendix I.

8.12 MIGRATORY BIRD TREATY ACT, AS AMENDED

The MBTA is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits taking, killing, or possessing of migratory birds unless permitted by regulations promulgated by the Secretary of the Interior. The FWS and the Department of Justice are the federal agencies responsible for administering and enforcing the statute. The study area is known to support colonial nesting wading/water birds (for example, herons, egrets, ibis, night-herons and roseate spoonbills) and shorebirds (terns and gulls). FWS and USACE biologists would survey the area before construction to confirm no nesting activity as suitable habitat and the potential for nesting exist within the area. If active nesting exists within 1,000 feet (water birds) or 1,300 feet (shorebirds) of construction activities then USACE, in coordination with FWS, would develop specific measures to avoid adverse impacts to those species. A detailed nesting prevention plan may be necessary to deter birds from nesting within the buffer zones of the area footprints to avoid adverse impacts to these species. If a nesting prevention plan is necessary, it would be prepared in coordination with FWS.

The bald eagle is protected under the BGEPA and the MBTA. FWS developed the National Bald Eagle Management Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential Proposed Action impacts to bald eagles, particularly where such impacts may constitute a “disturbance,” which is prohibited by the BGEPA. A copy of the National Bald Eagle Management Guidelines is provided in Appendix N.

8.13 NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED

Section 106 of the NHPA, as amended, requires federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The procedures in 36 CFR Part 800 define how federal agencies meet these statutory responsibilities. The Section 106 process seeks to accommodate historic preservation concerns with the needs of federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties, including the SHPO or THPO and any Tribe that attaches religious or cultural significance to historic properties that may be affected by an undertaking. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. NHPA coordination pursuant to Section 106 is ongoing through a Programmatic Agreement (see Section 6.16).

In compliance with NHPA Section 106, CEMVN has initiated Section 106 consultation for the Proposed Action (Proposed Undertaking) as described in the CEMVN correspondence dated December 12, 2024 to the SHPO. USACE is developing a Programmatic Agreement that would establish procedures to satisfy the USACE’s Section 106 responsibilities pursuant

to 36 CFR Part 800.14(b). The final Programmatic Agreement would be contained in the final SEIS and signed before the ROD is signed.

The Programmatic Agreement allows the USACE to coordinate Section 106 reviews with its evaluation of the Proposed Action's potential for significant impacts to the human and natural environment required by NEPA, as amended (42 USC 4321 et seq.). The Programmatic Agreement would address the potential to affect historic properties that are eligible for or listed in the NRHP, including archaeological sites, districts, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and/or sites of religious and cultural significance on or off Tribal Lands (as defined in 36 CFR) that may be affected by this undertaking. USACE would continue to develop a project-specific Programmatic Agreement in furtherance of USACE's Section 106 responsibilities for this undertaking. The Programmatic Agreement would then govern USACE's subsequent NHPA compliance effort.

8.14 TRIBAL CONSULTATION

It is the policy of the federal government to consult with federally recognized Tribal governments on a government-to-government basis as required in EO 13175 ("Consultation and Coordination with Indian Tribal Governments;" U.S. President 2000). The requirement to conduct coordination and consultation with federally recognized Tribes on and off Tribal lands for "any activity that has the potential to significantly affect protected tribal resources, tribal rights (including treaty rights), and Indian lands" finds its basis in the constitution, Supreme Court cases, and is clarified in later planning laws (Table 5-17 in Section 5). The USACE Tribal Consultation Policy, 5 December 2023, specifically implemented this EO and later Presidential guidance. The 2023 USACE Tribal Consultation Policy and Related Documents provide definitions for key terms, such as tribal resources, tribal rights, Indian lands, consultation, as well as guidance on the specific trigger for consultation.

While Terrebonne Parish has a long history of occupation by Native American communities, prior to its establishment and throughout its history, there are currently no protected tribal resources, tribal rights, or Indian lands that have the potential to be significantly affected by the Proposed Actions within in the watershed. However, in accordance with CEMVN's responsibilities under the NHPA Section 106 process and EO 13175, CEMVN has offered the following federally recognized Tribes the opportunity to review and comment on the Proposed Action in letters dated 15 December 2023: 1) the Chitimacha Tribe of Louisiana, 2) the Coushatta Tribe of Louisiana, 3) the Jena Band of Choctaw Indians, 4) the Mississippi Band of Choctaw Indians, and 5) the Tunica-Biloxi Tribe of Louisiana. No responses were received. See Appendix J for documentation of NHPA Coordination.

8.15 WILD AND SCENIC RIVERS ACT

There are no federally designated Wild and Scenic Rivers under the federal Wild and Scenic Rivers Act, 16 USC 1271, *et seq* within the study area.

9 List of Preparers and Certifications

9.1 LIST OF PREPARERS

Table 10-1 provides a list of individuals involved in preparation of the document and significant supporting information.

Table 10-1. SEIS List of Preparers

Name	Office	Discipline/Role
Regional Planning and Environmental Division South (RPEDS)		
Patrick Smith	RPEDS Environmental Planning Branch	Senior Environmental Manager, Hydrology
Laura Carnes	RPEDS Environmental Planning Branch, Contractor	Environmental Manager
Elizabeth Behrens	RPEDS Environmental Planning Branch	Coastal Environmental Studies Section Chief, Habitat Mitigation
Tammy Gilmore	RPEDS Environmental Planning Branch	Senior NEPA Specialist, T&E Species
Jack Milazzo	RPEDS Environmental Planning Branch	Landscape Architect, Aesthetics, Recreation, Figures
David Day	RPEDS Environmental Planning Branch	Air Quality, Water Quality
Geoffrey Udoff	RPEDS Environmental Planning Branch	Aquatic Resources, EFH, Wetlands, WVAs
Paul Hughbanks	RPEDS Environmental Planning Branch	Cultural Resources
Joseph Musso	RPEDS Environmental Planning Branch	HTRW
Thomas Sevick	RPEDS Environmental Planning Branch	Noise, Aquatic Resources, EFH, WVAs
Ben Logan	RPEDS Environmental Planning Branch	Socioeconomics
Jordan Logarbo	RPEDS Environmental Planning Branch	Prime and Unique Farmlands, T&E Species
Brian Ostahowski	RPEDS Environmental Planning Branch	Tribal Resources
Kristen Butcher	RPEDS Environmental Planning Branch	Wetlands, WVAs
Wyatt Bagwell	RPEDS Environmental Planning Branch	Habitat Mitigation, Wildlife Resources, T&E Species, WVAs
Samuel Kosiborod	RPEDS Environmental Planning Branch	Wildlife Resources
Kristina Leggas	RPEDS Environmental Planning Branch	WVAs/Habitats

Name	Office	Discipline/Role
Demetria Christo	RPEDS Plan Formulation Branch	Acting Ecosystem Restoration Section Chief, Induced Flooding
Elizabeth Manuel	RPEDS Plan Formulation Branch	Habitat Mitigation, Induced Flooding
Brittany Roberts	RPEDS Plan Formulation Branch	Habitat Mitigation
Project Management		
Lacy Shaw	Project Management Division	Sr. Project Manager
Lee Walker	Project Management Division, Contractor	Project Manager
Engineering		
Charles Brandstetter	Engineering Design, Office of the Chief	Project Technical Lead and Structural Engineer
Dennis Roberts	Hydrology, Hydraulics and Coastal Engineering Branch	Lead Hydraulic Engineer
Julio Vidal Salcedo	Hydrology, Hydraulics and Coastal Engineering Branch	404(b)1 Analysis
Jason Binet Alice Kerl	Engineering Design, Waterways	Mitigation Project Design
Real Estate		
Stephanie Robins Scott Saladino Jessica Netto	Real Estate Division	Real Estate Specialist
District Quality Control Review		
Jennifer Vititoe	RPEDS	Chief
Shawn Vicknair	RPEDS	Deputy Chief
Jason Emery	RPEDS Environmental Planning Branch	Branch Chief
Tim Axtman	RPEDS Plan Formulation	Branch Chief
Mark Smith	RPEDS Environmental Compliance Branch	Branch Chief
Leslie Prochaska	RPEDS Plan Formulation	Senior Plan Formulator
Joshua Koontz	RPEDS Environmental Planning Branch	NEPA Specialist
Visual Information Services		
Julia McDow	Information Management	Visual Information Specialist

9.2 CERTIFICATIONS

As required by the DoD NEPA Implementing Procedures, Part 2.4, a responsible official has certified that:

1. The [DoW] has considered the factors mandated by NEPA;
2. This project meets the standard of “Extraordinary Complexity” as required by 42 USC § 4336a(e)(1)(B) and DOD NEPA IP Part 2.4, to exceed the typical limit of 150 pages set by Congress.
3. This SEIS represents [DoW’s] good-faith effort to prioritize documentation of the most important considerations required by the statue within the congressionally mandated page limit of 300 pages, excluding references and appendices.
4. This prioritization of important considerations reflects [DoW’s] expert judgment; and
5. Any considerations addressed briefly or left unaddressed, beyond those identified in Section 3.5, Data Gaps, Risk, and Uncertainty, were, in [DoW’s] judgment, comparatively unimportant or frivolous.

10 References

Adkins, G. 1972. A study of the blue crab fishery in Louisiana. Technical Bulletin No. 3. Louisiana Wildlife and Fisheries Commission. New Orleans, LA.

Bahr, L.M., Jr., R. Costanza, J.W., Day Jr., S.E. Bayley, C. Neill, S.G. Leibowitz, and J. Fruci. 1983. Ecological characterization of the Mississippi Deltaic Plain Region: a narrative with management recommendations. FWS/OBS-82/69. FWS, Washington, D.C.

Barras, J.A. 2006. Land area change in coastal Louisiana after the 2005 hurricanes--a series of three maps. U.S. Geological Survey Open-File Report 2006-1274. http://pubs.usgs.gov.

Baxter, K.N. and W.C. Renfro. 1967. Seasonal occurrence and size distribution of post larval brown and white shrimp near Galveston, Texas, with notes on species information. U.S. Fish and Wildlife Service. Fisheries Bulletin 66:149-158.

Browder, J.A., Bartley, H.A., & Davis, K.S. 1985. A probabilistic model of the relationship between marshland-water interface and marsh disintegration. Ecological Modelling. 29(1-4), 245-260.

Browder, J.A., May Jr, L.N., Rosenthal, A., Gosselink, J. G., & Baumann, R. H. 1989. Modeling future trends in wetland loss and brown shrimp production in Louisiana using thematic mapper imagery. Remote sensing of environment. 28:45-59.

Brown, Clifford T., Dave D. Davis, Julian Granberry, Roger Saucier, Lynn A. Berg, Christine Herman, J. Cinder Griffin Miller, Jeremy Pincoske, Susan Barrett Smith, Patrick P. Robblee, and William P. Athens. 2000. Morganza to the Gulf Feasibility Study: Cultural Resources Literature and Records Review, Terrebonne and Lafourche Parishes, Louisiana. Submitted by R. Christopher Goodwin and Associates, Inc., New Orleans, to the U.S. Army Corps of Engineers, New Orleans District.

Brown, H.M., A. Bride, T. Stokell, F.J. Griffin, and G.N. Cherr. 2004. Thermotolerance and HSP70 profiles in adult and embryonic California native oyster, (*Ostereola conchaphilla*). J. Shellfish Res. 23:135-141.

Brown, K.M., G.W. Peterson, P.D. Banks, B. Lezina, C. Ramcharan, and M. McDonough. 2003. Olfactory deterrents to black drum predation on oyster leases. J. Shellfish Res. 22:589-595.

Butler, P. 1985. Synoptic review of the literature on the southern oyster drill (*Thais haemastoma floridana*). NOAA Technical Report NMFS 35, 12pp.

Butler, P.A. 1954. The southern oyster drill. Proceedings of the National Shellfish Association 44:67-75.

Buzan, D., W. Lee, J. Culbertson, N. Kuhn, and L. Robinson. 2009. Positive relationship between freshwater inflow and oyster abundance in Galveston Bay, Texas. Estuaries and Coasts 32:206-212.

Chabreck, R.H. 1982. The effect of coastal alteration on marsh plants. pp. 92-98 In: D.F. Boesch ed., Conference on Coastal Erosion and Wetland Modification in Louisiana: Causes, Consequences, and Options. FWS/OBS-82/59. U.S. Fish and Wildlife Service, Washington, DC.

Chabreck, R.H. 1971. The foods and feeding habits of alligators from fresh and saline environments in Louisiana. Proceedings of the 25th Annual Conference of the Southeast Association of Game and Fish Commissioners.

Chabreck, R.H and R. E. Condrey. 1979. Common Vascular Plants of the Louisiana Marsh. Sea Grant Publication No. LSU-T-79-003. LSU Center for Wetland Resources, Baton Rouge, Louisiana.

Chesney, E.J., Baltz, D.M., and Thomas, R.G. 2000. Louisiana estuarine and coastal fisheries and habitats: perspectives from a fish's eye view. Ecological Applications. 10: 350–366.

Chu, F.E. and J.F. La Peyre. 1993. *Perkinsus marinus* susceptibility and defense-related activities in eastern oysters (*Crassostrea virginica*): temperature effects. Diseases of Aquatic Organisms 16:223-234.

Chu F.L.E., J.F. La Peyre, C. Burreson. 1993. *Perkinsus marinus* infection and potential defense-related activities of eastern oysters, (*Crassostrea virginica*): salinity effects. J. Invertebr. Pathol. 62:226-23.

Coalition to Restore Coastal Louisiana. 2011. www.crcl.org, accessed May, 2011.

Coastal Protection and Restoration Authority of Louisiana (CPRA). 2018b. State of Louisiana Coastal Protection and Restoration Authority Mid-Barataria Sediment Diversion (MBSD) Project State Project No. BA-153 Lagov No. 4400010386.

Coastal Protection and Restoration Authority of Louisiana (CPRA). 2019c. Attachment C Mid-Barataria Sediment Diversion (MBSD): Communities inundation estimates in the Mid-Barataria Basin. Prepared by Raffaele Marino. December 13, 2019.

Cole, G.A. 1975. Textbook of Limnology. C.V. Mosby Co. 283 pp.

Condrey, R.P., P. Kemp, J. Visser, J. Gosselink, D. Lindstedt, E. Melancon, G. Peterson, and B. Thompson. 1995. Status, Trends, and Probable Causes of Change in Living Resources in the Barataria and Terrebonne Estuarine Systems. Publication No. 21, Barataria Terrebonne National Estuary Program, Thibodaux, LA.

Connor, W.H. and J.W. Day. 1987. The ecology of Barataria Basin, Louisiana: an estuarine profile. FWS Biol Rept 85. 164 pp.

Couvillion, B.R., Beck, Holly, Schoolmaster, Donald, and Fischer, Michelle, 2017, Land area change in coastal Louisiana 1932 to 2016: U.S. Geological Survey Scientific Investigations Map 3381, 16 p. pamphlet, https://doi.org/10.3133/sim3381.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. Laroe. 1979. Classification of Wetlands and Deepwater Habitat of the United States. U.S. Fish and Wildlife Service. Washington D.C.

Cropley, P., W.C.J. Boyko, N. Heller, E. Meaden, S.B. Smith, and R. Bowen. 2020. Cultural Resources Investigations of the Mid-Barataria Sediment Diversion (MBSD) Construction Impacts APE and the MBSD Operations Impacts APE in Plaquemines and Jefferson Parishes, Louisiana. Prepared for Royal Engineers and Consultants, LLC. Prepared by R. Christopher Goodwin and Associates, Inc. SHPO Report No. 22-6421.

CWPPRA. October 2025. "The Terrebonne Basin." Website. https://lacoast.gov/new/about/Basin_data/te/Default.aspx

Daigle, J.J., G.E. Griffith, J.M. Omernik, P.L. Faulkner, R.P. McCulloh, L.R. Handley, L.M. Smith, and S.S. Chapman. 2006. Ecoregions of Louisiana (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,000,000).

Darnell, R.M. 1959. Studies of the life history of the blue crab (*Callinectes sapidus Rathbun*) in Louisiana waters. Transactions of the American Fisheries Society 88(4):294-304.

Day, J.W., Jr., C.A.S. Hall, W.M. Kemp, and A. Yanez-Arancibia. 1989. Estuarine Ecology. John Wiley and Sons, New York.

DeLaune, R.D., J.A. Nyman, and W.H. Patrick, Jr. 1994. Peat collapse, ponding and wetland loss in a rapidly submerging coastal marsh. J. Coast. Res. 10:1021-1030.

Environmental Protection Agency. (2025). *National primary and secondary ambient air quality standards*, 40 C.F.R. § 50. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-50

Eherhardt A., D. Burdick, M. Dionne. 2011. The effects of Road Culverts on Nekton in New England Salt Marshes: Implications for Tidal Restoration. Restoration Ecology Vol. 19, No. 6, pp. 776–785.

Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. FTA Report No. 0123. Prepared by John A. Volpe, National Transportation Systems Center U.S. Department of Transportation.

Fox, M.D. & Fox B.J. 1986. The susceptibility of natural communities to invasion. In: R.H. Groves & J.J. Burdon (eds.), *Ecology of biological invasions: An Australian perspective*. Australian Academy of Science, Canberra, pp. 57-66.

Fuller, D.A., J.G. Gosselink, J. Barras, C.E. Sasser. 1995. Status and trends in vegetation and habitat modifications. In: D.A. Reed (ed.). Status and trends of hydrologic

modification, reduction in sediment availability, and habitat loss/modification in the Barataria-Terrebonne estuarine system. Publication No. 20. Barataria-Terrebonne National Estuary Program, Thibodaux, Louisiana.

FWS. Save the monarch | U.S. Fish & Wildlife Service. (n.d.). FWS.gov. https://www.fws.gov/initiative/pollinators/save-monarch

Gagliano, S. M. 1999. Faulting, Subsidence, and Land Loss in Coastal Louisiana. Contract No. 68-06-0067. Prepared for U.S. Environmental Protection Agency, Dallas, TX.

Garrison, L.P, J. Litz, and C. Sinclair. 2020. Predicting the effects of low salinity associated with the MBSD project on resident common bottlenose dolphins (Tursiops truncatus) in Barataria Bay, LA. NOAA Technical Memorandum NOAA NMFS-SEFSC-748: 97 p.

Gauthier, J.D., T.M. Soniat, and J.S. Rogers. 2007. A parasitological survey of oysters along salinity gradients in coastal Louisiana. Journal of the World Aquaculture Society 21(2): 105-115.

Goodwin and Associates, Inc. 2012. Update on the Cultural Resource Investigations for Morganza to the Gulf, Hurricane Protection Extending Through Terrebonne and LaFourche Parishes in Southeast Louisiana, Constructible Features, Phase I Cultural Resources Survey of Reaches F1, F2, G1, the Houma Navigational Canal Lock Complex, and the Bayou Grand Caillou Floodgate and National Register Testing and Evaluation at Site 16TR71 and an Uncharacterized Shell Concentration on Reach E near Falgout Canal. Management Summary prepared for United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana.

Goodwin and Associates, Inc. 2011. Predictive Model for the Morganza to the Gulf Proposed 77 Miles of Hurricane Protection Levee Extending Through Terrebonne and Lafourche Parishes in Southeast Louisiana. Management Summary prepared for United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana.

Goodwin and Associates, Inc. 2010. Update on the Cultural Resource Investigations for Morganza to the Gulf, 64 Miles of Hurricane Protection Extending Through Terrebonne and LaFourche Parishes in Southeast Louisiana, Phase Ib Testing of Reaches A, E, and L. Management Summary prepared for United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana.

Gornitz, V., S. Lebedeff, and J. Hansen. 1982. Global sea level trend in the past century. Science 215: 1611-1614.

Gosselink, J.G. 1984. The Ecology of Delta Marshes of Coastal Louisiana: A Community Profile. FWS/OBS-84/09. U.S. Fish and Wildlife Service, Washington, D.C.

Gosselink, J.G. and C.E. Sasser. 1991. An ecological overview of the Barataria-Terrebonne estuary: Processes, scales, and management principles. In Scientific-Technical Committee Data Inventory Workshop Proceedings. BTNEP Publication No. 5. p. 20-47. Barataria Terrebonne National Estuary Program, Thibodaux, LA.

Gulf of Mexico Fisheries Management Council (GFMC). 2016. Final Report 5-Year Review of Essential Fish Habitat Requirements. Including Review of Habitat Areas of Particular Concern and Adverse Effects of Fishing and Non-Fishing in the Fishery Management Plans of the Gulf of Mexico.

Gunter, G. 1953. The relationship of the Bonnet Carré Spillway to oyster beds in Mississippi Sound and the "Louisiana Marsh", with a report on the 1950 opening. Publications of the Institute of Marine Science, Univ. Texas 3(1):17-71.

Harvey, Johanna A, Jennifer M. Mullinax, Michael C. Runge, and Diann J. Prosser. 2023. The changing dynamics of highly pathogenic avian influenza H5N1: Next steps for management & science in North America, Biological Conservation, Volume 282, 110041, ISSN 0006-3207, https://doi.org/10.1016/j.biocon.2023.110041.

Hawes, S.R. and H.M. Perry. 1978. Effects of 1973 floodwaters on plankton populations in Louisiana and Mississippi. Gulf Research Reports 6(2):109-124.

Herke, W.H. 1995. Natural fisheries, marsh management, and mariculture: complexity and conflict in Louisiana. Estuaries 18:10-17.

Herke, W.H. 1971. Use of natural, and semi-impounded, Louisiana tidal marshes as nurseries for fishes and crustaceans. Ph.D. Dissertation, Louisiana State University, Baton Rouge, LA.

Jefferson, T.A., S. Leatherwood, L.K.M. Shoda, and R.I. Pitman. 1992. Marine mammals of the Gulf of Mexico: A field guide for aerial and shipboard observers. College Station, TX: Texas A&M University Printing Center. 92 p.

Joanen, T. and L. McNease. 1972. Population distribution of alligators with special reference to the Louisiana coastal marsh zones. Unpublished Symposium of the American Alligator Council, Lake Charles, LA.

Keithly, W.R. Jr. and K.J. Roberts. 1988. The Louisiana oyster industry: economic status and expansion prospects. Journal of Shellfish Research 7:515-525.

Kelley, David B. 2009. Cultural Resources Records Check of Alternative Levee Alignments for the Donaldsonville to the Gulf of Mexico Flood Control Project, Southeast Louisiana. Records Check prepared for the United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana.

Kemp, P.F., S.Y. Newell, and C.S. Hopkinson. 1990. Importance of grazing on the saltmarsh grass Spartina alterniflora to nitrogen turnover in a macrofauanal consumer, Littorina irrorata, and to decomposition of standing-dead Spartina. Marine Biology 104(2): 311-319.

Knox, G.A. 2001. The ecology of seashores. CRC Press LLC, Boca Raton, Florida. 557 pp.

Kuecher, G.J. 1994. Geologic Framework and consolidation Settlement Potential of the Lafourche Delta, Topstratum Valley Fill; Implications for Wetland Loss in Terrebonne and

Lafourche Parishes, Louisiana. Doctor of Philosophy Dissertation. Louisiana State University, Baton Rouge, LA.

Lassuy, D.R. 1983. Species Profiles: Life Histories and Environmental Requirements (Gulf of Mexico) Brown Shrimp. FWS/OBS-82/11.1. U.S. Fish and Wildlife Service, Washington, DC.

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1998. Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 161p. http://www.coast2050.gov/2050reports.htm

Louisiana Coastal Wetlands Conservation and Restoration Task Force. 2006. Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA): A Response to Louisiana's Land Loss. http://lacoast.gov.

Louisiana Department of Environmental Quality. 2022 Louisiana Water Quality Inventory: Integrated Report. Fulfilling Requirements of the Federal Clean Water Act, Sections 305(b) and 303(d). https://safe.menlosecurity.com/doc/docview/viewer/docN489F7836F6FFdfeae60e0f6b59435c7469e4f95facd5aee15b3b8a3c4cba58bec063a4f7db16

Louisiana Department of Environmental Quality. (2024). *2024 Water Quality Inventory: Integrated Report (305(b)/303(d))* [Webpage].

Louisiana Department of Wildlife and Fisheries. 2024. Recreational Fishing Licenses. Accessed online on December 2024 at https://www.wlf.louisiana.gov/resources.

Louisiana Department of Wildlife and Fisheries. 2005. State management plan for aquatic invasive species in Louisiana. Center for Bioenvironmental Research at Tulane and Xavier Universities. 81pp.

Louisiana Speaks. 2011. http://www.louisianaspeaks-parishplans.org, accessed June, 2011.

McDaniel, D.R. and G.J. Trahan. 2007. Soil Survey of Terrebonne Parish, Louisiana. United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with Louisiana Agricultural Experiment Station and Louisiana Soil and Water Conservation Committee.

Marcus, N.H. and F. Boero. 1998. Production and plankton community dynamics in coastal aquatic systems: the importance of benthic– pelagic coupling and the forgotten role of life cycles. Limnology and Oceanography 43:763– 768.

Matthews, S.D. 1984. Soil Survey of Lafourche Parish, Louisiana. U.S. Soil Conservation Service. Washington, DC.

McAlpin, T., J. Letter, and F. Carson. 2012. Comparison of Plan Alternatives for the Morganza to the Gulf of Mexico Levee System. U.S. Army Corps of Engineers, Engineer Research and Development Center. Coastal and Hydraulics Laboratory.

McIntire, William G., Donald W. Davis, William H. Conner, and Randall A. Detro. 1981. A Cultural Resource Survey of the Larose to Golden Meadow Hurricane Protection Levee Sections “F” First Lift and “A” East First Lift. Conducted for USA Engineer District, New Orleans. (22-723).

McGowan, .P., N.F. Angeli, W.A. Beisler, C. Snyder, N.M. Rankin, J.O., Woodrow, J.K., Wilson, E., Rivenbark, A., Schwarzer, C.E., Hand, R., Anthony, R.K. Griffin, K.Barrett, A.A.Haverland, N.S. Roach, T. Schneider, A.D. Smith, F.M. Smith, J.D.M. Tolliver, B.D. Watts. 2020. Linking monitoring and data analysis to predictions and decisions for the range-wide eastern black rail status assessment Endangered Species Res., 43 (2020), pp. 209-222

Meselhe, E., J. Pereira, H.S. Jung, A. Khadka, and S. Kazi. 2014. Mid-Barataria Sediment Diversion Report (Draft). MBSD TO21. The Water Institute of the Gulf. Prepared for and funded by the Coastal Protection and Restoration Authority. Baton Rouge, LA.

Meselhe, E.A., M.M. Baustian, and M.A. Allison (eds.). 2015. Basin wide model development for the Louisiana Coastal Area Mississippi River hydrodynamic and delta management study. MBSD TO27. The Water Institute of the Gulf. Prepared for and funded by the Coastal Protection and Restoration Authority. Baton Rouge, LA.

MAFWA. 2023. Mid-America Monarch Conservation Strategy | MAFWA. (n.d.). http://www.mafwa.org/?page_id=2347

Minello, T. J. and L. P. Rozas. 2002. Nekton in Gulf Coast wetlands: fine-scale distributions, landscape patterns, and restoration implications. Ecological Applications 12: 441–55.

Montague, C.L., S.M. Bunker, E.B. Haines, M.L. Pace, and R.L. Wetzel. 1981. Aquatic macroconsumers. In The Ecology of a Salt Marsh by Pomeroy, L. R., Wiegert, R. G. (eds.). Springer-Verlag: New York. pp 69−85.

Moreno, M. A., S. B. Smith, D. D. Davis, and R. C. Goodwin. 2011. Phase IA Literature Search and Records Review of Previously Recorded Cultural Resources Located within the Proposed Project Area Associated with the Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana. Submitted by R. Christopher Goodwin and Associates, Inc. to the U.S. Army Corps of Engineers, New Orleans District.

Michot, T.C., C.W. Jeske, J.C Mazourek, W.G. Vermillion, and R.S. Kemmerer. 2003. Final draft. Atlas and census of wading birds and seabird nesting colonies in south Louisiana, 2001 BTNEP Publication.

Mitchell, K. 1991. Wildlife Resources of the Barataria-Terrebonne Estuary. pp. 339-346. In: Barataria-Terrebonne National Estuary Program Scientific-Technical Committee Data Inventory Workshop Proceedings. BTNEP Publication 5, Thibodaux, LA.

Mitsch, W. and J. Gosselink. 2000. Wetlands. John Wiley & Sons 3rd edition. New York, New York. 722 pp.

Mossa, J. D.M. Lindstedt, D. Cahoon, and J. Barras. 1990. Environmental Characteristics and Habitat Change for the Louisiana Coastal Zone. pp. 167-204. In: D.R. Cahoon and C.G. Groat (eds.) A study of Marsh Management Practice in Coastal Louisiana, Volume II, Technical Description. Final report submitted to U.S. Minerals Management Service, New Orleans, LA. OCS Study/MMS 90-0075.

Muncy, R.J. 1984. Species Profiles: Life Histories and Environmental Requirements (Gulf of Mexico) White Shrimp. FWS/OBS-82/11.20. U.S. Fish and Wildlife Service, Washington, DC.

National Land Cover Data Base. 2023. United States Geological Survey. https://www.usgs.gov/centers/eros/science/national-land-cover-database

National Marine Fisheries Service. 2022. Annual Commercial Landings Statistics. National Oceanic and Atmospheric Administration. United States Department of Commerce. Silver Spring, Maryland. Queried 8/31/23. http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html

National Marine Fisheries Service. 2011. Annual Commercial Landings Statistics. National Oceanic and Atmospheric Administration. United States Department of Commerce. Silver Spring, Maryland. Queried 6/30/11. http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992. Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991a. Recovery Plan for U.S. Population of Loggerhead Turtle. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991b. Recovery Plan for U.S. Population of Atlantic Green Turtle. National Marine Fisheries Service, Washington, D.C.

National Oceanic and Atmospheric Association. 2025. National Weather Service. Hurricane Francine. Accessed online in January 2025 at https://www.weather.gov/lch/2024Francine.

National Oceanic and Atmospheric Association. 2011a. Global Climate Normals 1961-1990. http://www.climatecharts.com, accessed June, 2011.

National Oceanic and Atmospheric Association. 2011b. National Hurricane Center. http://www.nhc.noaa.gov/, accessed June, 2011.

National Oceanic and Atmospheric Administration (NOAA) Fisheries. 2025. Common Bottlenose Dolphin Species Directory. https://www.fisheries.noaa.gov/species/common-bottlenose-dolphin

Natural Resources Conservation Service. 2025. Prime and Unique Farmland data from Websoil Survey. Accessed online in February 2025 at: (http://websoilsurvey.nrcs.usda.gov).

Natural Resources Conservation Service. 2011. Major Land Resource Areas in Louisiana. www.mo15.nrcs.usda.gov/technical/mlra_la.html, accessed July, 2011.

Olszak J.,F. Burks, M. Sullivan, O. Best, S. Miller, D. Simmons. 2023. Waterfowl Population Estimates in Louisiana's Coastal Zone Below U.S. Highway 90 and on Little River Basin. Louisiana Department of Wildlife & Fisheries.

O'Neil, T. 1949. The muskrat in the Louisiana coastal marsh. Louisiana Department of Wildlife and Fisheries. New Orleans, LA.

Owen, H.M. and L.L. Walters. 1950. What the spillway really did. Louisiana Conservation Review 2:16-19, 26-27.

Penland, S., Ramsey, K.E., McBride, R.A., Moslow, T.F., and Westphal, K.A. 1989. Relative sea level rise and subsidence in Louisiana and the Gulf of Mexico, Louisiana Geological Survey. Baton Rouge, Coastal Geology Technical Report 3. 65 p.

Penland, S., K.E. Ramsey, R.A. McBride, J.T. Mestayer, and K.A. Westphal. 1988. Relative sea level rise and delta-plain development in the Terrebonne Parish Region. Coastal Geology Technical Report No. 4. Louisiana Geological Survey, Baton Rouge, LA.

Penland, S., K.E. Ramsey, R.A. Mcbride, J. T. Mestayer, and K A. Westphal. 1987. Relative sea level rise, delta plain development subsidence, and wetland sedimentation in the Teche and Lafourche delta complexes: Terrebonne Parish region, Louisiana. Coastal Geology Bull. No. 2, Louisiana Geological Survey, Baton Rouge, Louisiana. 130 p.

Perry, H.M. and T.D. McIlwain. 1986. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Gulf of Mexico) Blue Crab. FWS/OBS-82/11.55. U.S. Fish and Wildlife Service, Washington, DC.

Perry, H.M. 1975. The blue crab fishery in Mississippi. Gulf Research Reports. 5:39-57.

Platt, S.G., C.G. Brantley, and L.W. Fontenot. 1989. Herpetofauna of the Manchac Wildlife Management Area, St. John the Baptist Parish, Louisiana. Proc. Louisiana Acad. Sci. 52:22-28.

Poplin, Eric C., Kenneth G. Kelly, Donald Bascle, and R. Christopher Goodwin. 1986. A Cultural Resources Survey of the Western Sections of the Larose to Golden Meadow Hurricane Protection Project, Lafourche Parish, Louisiana. Prepared R. Christopher Goodwin and Associates, Inc., for Department of the Army, USACE, New Orleans District, New Orleans, Louisiana.

Remsen JV Jr, Wallace BP, Seymour MA, O'malley DA, Johnson EI (2019) The regional, national, and international importance of Louisiana's coastal avifauna. The Wilson Journal of Ornithology 131(2):221–434

Rejmanek, M., and D. Richardson. 1996. What attributes make some plant species more invasive? Ecology **77**:1655–1661.

Ritchie, W., K.A. Westphal, R.A. McBride, and S. Penland. 1995. Costal sand dunes of Louisiana, the Bayou Lafourche Barrier Shoreline. Costal Geology Rept No. 9, La Geol. Surv. and Univ of Aberdeen.

Ritchie, W. and S. Penland. 1990. Coastal erosion and wash over penetration along the Bayou Lafourche shoreline between 1978 and 1985 with special reference to hurricane impacts. O'Dell Memorial Monograph No. 3. Dept. Of Geography, Univ of Aberdeen.

Robblee, Patrick P., Matthew J. Keelean, Colleen Hanratty, Jeremy Pincoske, and William P. Athens. 2000. Morganza to the Gulf Feasibility Study: Cultural Resources Sample survey, Terrebonne and Lafourche Parishes, Louisiana. Report prepared by R. Christopher Goodwin and Associates, Inc., New Orleans, Louisiana for the United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana. (22-2133).

Rogers, D.R., B.D. Rogers, J.A. deSilva, and V.L. Wright. 1997. Effectiveness of four industry-designed bycatch reduction devices in Louisiana's inshore waters. Fishery Bulletin 95(3): 552-565.

Rogers, D.R., B.D. Rogers, J.A. de Silva, and V.L. Wright. 1994. Evaluation of shrimp trawls designed to reduce bycatch in inshore waters of Louisiana. School of Forestry, Wildlife, and Fisheries, Louisiana State University Agricultural Center, Final Report submitted to NMFS, St. Petersburg, FL. NOAA Award No. NA17FF0375-01, 230 p. Available from LSU Library.

Rogers, D.R., B.D. Rogers, and W.H. Herke. 1992. Effects of a marsh management plan on fishery communities in coastal Louisiana. Wetlands 12(1): 53-62.

Rogers, D.R, B.D. Rogers, and W.H. Herke, 1990. Effects of the Fina Laterre Marsh Management Plan on Fishers and Microcrustaceans. P. 482 In: D.R Cahoon and C.G. Groat (eds.) A Study in Marsh Management Practice in Louisiana, Vol. III, Ecological Evaluation. USGS, New Orleans. LA.

Roth, David. 2010. Louisiana hurricane history. National Weather Service Hydrometeorological Prediction Center. http://www.hpc.ncep.noaa.gov/research/.

Rounsefell, G.A. 1975. Ecology, utilization, and management of marine fisheries. The C.V. Mosby Company, St. Louis, Missouri.

Sasser, C.E., J.G. Gosselink, E.M. Swenson, C.M. Swarzenski, and N.C. Leibowitz. 1996. Vegetation, Substrate and Hydrology in Floating Marshes in the Mississippi River Delta Plain Wetlands, USA. Vegetation 122: 129-142.

Sasser, C.E., J.G. Gosselink, E.M. Swenson, and D.E. Evers. 1995. Hydrologic, vegetation, and substrate characteristics of floating marshes in sediment-rich wetlands of the Mississippi River Delta Plain, Louisiana, USA. Wetlands Ecology 3(3): 171-187.

Sasser, C.E., G.W. Peterson, D.A. Fuller, R.K. Abernathy, and J.G. Gosselink. 1982. Environmental monitoring program. Louisiana off-shore oil port pipeline. Coastal

Ecology Laboratory Center for Wetland Resources, Louisiana State University, Baton Rouge, LA.

Sevier, M.B. 1990. Land Uses of Terrebonne Parish: An Historical Geography, Master of Arts Thesis. University of Southwestern Louisiana, Lafayette, LA

Shaffer, G. P., Day, J. W., Kandalepas, D., Wood, W. B., Hunter, R. G., Lane, R. R., & Hillmann, E. R. (2016). Decline of the Maurepas Swamp, Pontchartrain Basin, Louisiana, and approaches to restoration. Water, 8(3), 101.

Silliman, B. R., & Bertness, M. D. (2002). A trophic cascade regulates salt marsh primary production. *Proceedings of the national Academy of Sciences*, *99*(16), 10500-10505.

Snedden, G.A., G.D Steyer. 2013. Predictive occurrence models for coastal wetland plant communities: Delineating hydrologic response surfaces with multinomial logistic regression. Estuarine, Coastal and Shelf Science.

Stanley, J.G. and M.A. Sellers. 1986. Species profile: Life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico)—American oyster.

Stevens, B.S., C.J. Conway Mapping habitat quality and threats for eastern black rails (Laterallus jamaicensis jamaicensis) Waterbirds, 44 (2021), pp. 245-256

Turner, R.E. and D.R. Cahoon 1987. Causes of wetland loss in the coastal central Gulf of Mexico. Volume II: Technical narrative. Final report submitted to Minerals Management Service, New Orleans. Contract No. 14-12-001-3052. OCS Study/MMS 87-0120. 400 pp.

Turner, R.E. and V.S. Rao. 1990. Relationships between wetland fragmentation and recent hydrologic changes in a deltaic coast. Estuaries 13:272-281.

U.S. Army Corps of Engineers. 2024. Reach A EA, Hurricane and Storm Damage Risk Reduction Project, MTG, Terrebonne Parish, Louisiana. FONSI: Programmatic EA #598 May 9, 2024.

U.S. Army Corps of Engineers. 2022. Humble Canal Pre-Load and Mitigation EA. Hurricane and Storm Damage Risk Reduction Project, MTG, Terrebonne Parish, Louisiana. FONSI: EA #583 April 3, 2022.

U.S. Army Corps of Engineers. 2021. Morganza to the Gulf of Mexico, Louisiana Engineering Design Documentation Report. P2# 323234. Available online at: https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf/

U.S. Army Corps of Engineers. 2013. Morganza to the Gulf of Mexico, Louisiana, Post Authorization Change Report/Revised Programmatic Environmental Impact Statement. New Orleans District. Available online at: https://www.mvn.usace.army.mil/About/Projects/Morganza-to-the-Gulf/

U.S. Army Corps of Engineers. 2011. Barataria Basin Barrier Shoreline Restoration, Draft Construction Report and Draft Environmental Impact Statement. New Orleans District.

U.S. Army Corps of Engineers. 2010. Final Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock Lafourche, Terrebonne, St. Mary Parish, Louisiana. New Orleans District.

U.S. Army Corps of Engineers. 2008. Programmatic Cost Estimate and Supporting Documentation for Mississippi River and Tributaries, Morganza to the Gulf of Mexico, Terrebonne and Lafourche Parishes, Louisiana Hurricane Protection for 1 percent Storm. New Orleans District.

U.S. Army Corps of Engineers. 2005. Reach J1 EA. Hurricane and Storm Damage Risk Reduction Project, MTG, Terrebonne Parish, Louisiana. FONSI: EA #406 July 29, 2005.

U.S. Army Corps of Engineers. 2004. Louisiana Coastal Area, Final Near-Term Study Report. Final Volume 2: Programmatic Environmental Impact Statement. New Orleans District. 918 pp.

U.S. Army Corps of Engineers. 2002. Final Programmatic Environmental Impact Statement for Morganza, Louisiana to the Gulf of Mexico Hurricane Protection. New Orleans District.

U.S. Census bureau. 2020. Decennial Census, 2020 Demographic and Housing Characteristics. Available online at: https://data.census.gov. Accessed July 2025.

U.S. Department of the Interior. 2020. Endangered and Threatened Wildlife and Plants; Threatened Species Status for Eastern Black Rail with a Section 4(d) Rule (Federal Register, 85 (2020), pp. 63764-63803

U.S. Fish and Wildlife Service. 2020. Species status assessment report for the rufa red knot (Calidris canutus rufa). Version 1.1. Ecological Services New Jersey Field Office, Galloway, New Jersey.

U.S. Fish and Wildlife Service. 2021a. Species Status Assessment Report for the Tricolored Bat (Perimyotis subflavus), Version 1.1. December 2021. Hadley, MA.

U.S. Fish and Wildlife Service. 2021b. Species status assessment report for the alligator snapping turtle (Macrochelys temminckii), Version 1.2. March 2021. Atlanta, GA.

U.S. Fish & Wildlife Service. 2025a. Species Profile: Manatee. https://www.fws.gov/species/manatee-trichechus-manatus.U.S. Fish & Wildlife Service. 2025b. Tricolored Bat (Perimyotis subflavus). FWS.gov. https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus

U.S. Fish and Wildlife Service. 2010. Draft Feral Hog Management Plan. Decision Documents for Sabine National Wildlife Refuge Draft 2010. http://www.fws.gov/swlarefugecomplex/pdf/Sabine2010HogPlan.pdf

U.S. Fish and Wildlife Service. 2009. Draft Comprehensive Conservation Plan and Environmental Assessment for Mandalay National Wildlife Refuge. U.S. Department of the Interior, Fish and Wildlife Service. Southeast Region. Atlanta, Georgia.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1992. Recovery Plan for the Kemp's Ridley Sea Turtle (Lepidochelys kempii). National Marine Fisheries Service, St. Petersburg, Florida.

U.S. Fish and Wildlife Service. (1973). Endangered Species Act of 1973, Section 3 - Definitions. 16 USC 1532. Available at: https://www.fws.gov/laws/lawsdigest/esact.html

U.S. Geological Survey. 2000. Nutria-Eating Louisiana's Coast. National Wetlands Research Center. Fact sheet. http://www.nwrc.usgs.gov/factshts/020-00/020-00.htm, accessed June, 2011.

U.S. Geological Survey. 2023. National Land Cover Database. http://landcover.usgs.gov/, accessed June, 2025.

U.S. Geological Survey. 2007. Science and the Storms: the USGS Response to the Hurricanes of 2005. USGS Circular 1306. http://pubs.usgs.gov/circ/1306/. Last accessed on April 19, 2012.

Valiela I. 1995. Trophic Structure 1: Controls in Benthic Food Webs. In: Marine Ecological Processes. Springer, New York, NY. Available online at: https://doi.org/10.1007/978-1-4757-4125-4_8.

WAFWA. 2025. Western Monarch & Native Insect Pollinator Working Group – WAFWA. (n.d.). https://wafwa.org/committees-working-groups/monarch-working-group/

Wakeley, J. S., & Roberts, T. H. (1996). Bird distributions and forest zonation in a bottomland hardwood wetland. *Wetlands*, *16*(3), 296-308.

Weather Atlas. 2025. Average Temperature and Rainfall for Houma, Louisiana. Accessed online in November, 2025 at: https://www.weather-atlas.com/en/louisiana-usa/houma-climate.

Weinstein, Richard, and David B. Kelley. 1992. Cultural Resources Investigations in the Terrebonne Marsh, South-Central Louisiana. Submitted by Coastal Environments, Inc. Baton Rouge, to the U.S. Army Corps of Engineers, New Orleans District.

White, W.A. and R.A. Morton. 1997. Wetland losses related to fault movement and hydrocarbon production, southeastern Texas coast. Journal of Coastal Research. 13:1305-1320.

White, C.J. and C.J. Boudreaux. 1977. Development of an aerial management concept for Gulf penaeid shrimp. Louisiana Wildlife and Fisheries Commission Technical Bulletin 22.

Wiley, M.P. 2007. Population Density and Over-Wintering of an Exotic Lizard, the Brown Anole Anolis Sagrei, and an Evaluation of Anole Distribution in Lafourche and Terrebonne Parishes, Louisiana. M.S. Thesis, Nicholls State University. 71 pp.

Wiseman, W.J., Jr., J.N. Suhayda, F. Wang. 1991. Channel processes, subsidence, and the case for salinity intrusion in the Barataria - Terrebonne Estuary. Pages 141-150, in St. Pe et al. eds., Barataria-Terrebonne National Estuary Program: Scientific Technical Committee Data Inventory Workshop. Barataria-Terrebonne National Estuary Program, BTNEP Pub. - 5. Thibodaux, LA. 456 pp.

Zimmerman, R.J., Minello, T.J., and L.P. Rozas. 2000. Salt marsh linkages to productivity of penaeid shrimps and blue crabs in the northern Gulf of Mexico. p. 293–314. *In* M. P. Weinstein and D. A. Kreeger (eds.) Concepts and controversies in tidal marsh ecology. Kluwer Academic Publishers, The Netherlands.

Zoller, J. A. (2004). Seasonal differences in bird communities of a Louisiana swamp and manipulation of the breeding density of Prothonotary Warblers. Southeastern Louisiana University.

11 List of Acronyms and Abbreviations

AAHU	Average Annual Habitat Units
ADCIRC	Advanced Circulation
AdH	Adaptive Hydraulics
AEP	Annual Exceedance Probability
AMM	Adaptive Management and Monitoring
APE	Area of Potential Effect
BGEPA	Bald and Golden Eagle Protection Act
BLH	Bottom Land Hardwood
BMP	Best Management Practices
BOD	Biological Oxygen Demand
CE/ICA	Cost Effectiveness and Incremental Cost Analysis
CEMVN	Corps of Engineers New Orleans District
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CPRA	Coastal Protection and Restoration Authority
CPRAB	Louisiana Coastal Protection and Restoration Authority Board
CSTORM	Coastal Storm Modeling System
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
dB	Decibels
dBA	A-Weighted Decibels
DIVR	Department of Interior's Division of Resources Reviews
DNL	Day-Night Average Sound Level
DOTD	Louisiana Department of Transportation and Development
EA	Environmental Assessment
EDR	Engineering Documentation Report
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EM	Engineering Manual
EPA	Environmental Protection Agency
ER	Engineering Regulation
ESA	Endangered Species Act/Environmental Site Assessment
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FWS	United States Fish and Wildlife Service
GIWW	Gulf Intracoastal Waterway
GFMC	Gulf Fisheries Management Council
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HET	Habitat Evaluation Team
HNC	Houma Navigation Canal

HTRW	Hazardous, Toxic, Radioactive Waste
Hz	Hertz
In/sec	Inches per Second
IPaC	Information for Planning and Consultation
LAC	Louisiana Administrative Code
LDCE	Louisiana Department of Conservation and Energy
LDEQ	Louisiana Department of Environmental Quality
LDWF	Louisiana Department of Wildlife and Fisheries
LERRD	Lands, Easements, Rights of Way, Relocations, and Disposal
LPDES	Louisiana Pollutant Discharge Elimination System
Lv	Vibration velocity level
MBTA	Migratory Bird Treaty Act
MCA	Marsh Creation Areas
MLRA	Major Land Resource Area
MMPA	Marine Mammals Protection Act
MSA	Metropolitan Statistical Area
MTG	Morganza to the Gulf, Louisiana, Project
MVD	Mississippi Valley Division
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NIHL	Noise Induced Hearing Loss
NLAA	Not Like to Adversely Affect
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NO2	Nitrogen Dioxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O3	Ozone
OMRR&R	Operations, Maintenance, Repair, Replacement, Rehabilitation
PACR	Post Authorization Change Report
Pb	Lead
PDT	Project Development Team
PEA	Programmatic Environmental Assessment
PED	Pre-Construction Engineering and Design
PEIS	Programmatic Environmental Impact Statement
P&G	Principles & Guidelines
PL	Public Law
PM-10	particulates of 10 microns or less in size
PM 2.5	particulates of 2.5 microns or less in size
PPA	Project Partnership Agreement
PPV	Peak Particle Velocity
RCRA	Resource Conservation and Recovery
REC	Recognized Environmental Conditions

RMP	Risk Management Plan
ROW	Right of Way
RPEDS	Regional Planning and Environment Division South
RPEIS	Revised Programmatic Environmental Impact Assessment
SAV	Submerged Aquatic Vegetation
SCORP	Louisiana State Comprehensive Outdoor Recreation Plan
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SO2	Sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SO2	Sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TBTL	Tunica-Biloxi Tribe of Louisiana
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Officer
TLCD	Terrebonne Levee and Conservation District
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TON	Total Organic Nitrogen
TSP	Tentatively Selected Plan
URA	Uniform Relocation Assistance
USACE	United States Army Corps of Engineers
USC	U.S. Code
USGS	United States Geological Survey
UST	Underground Storage Tank
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WRRDA	Water Resources and Reform Development Act
WVA	Wetland Value Assessment