Coastal Protection and Restoration Authority
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2017 Coastal Master Plan

Appendix A: Project Definitions

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Report: Version I

Date: July 2016

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Coastal Protection and Restoration Authority

This document was prepared in support of the 2017 Coastal Master Plan being prepared by the Coastal Protection and Restoration Authority (CPRA). CPRA was established by the Louisiana Legislature in response to Hurricanes Katrina and Rita through Act 8 of the First Extraordinary Session of 2005. Act 8 of the First Extraordinary Session of 2005 expanded the membership, duties, and responsibilities of CPRA and charged the new authority to develop and implement a comprehensive coastal protection plan, consisting of a master plan (revised every 5 years) and annual plans. CPRA's mandate is to develop, implement, and enforce a comprehensive coastal protection and restoration master plan.

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Executive Summary

As coastal Louisiana faces increasing threats from flooding and sea level rise, there is a great need to advance our scientific understanding of the coast and how coastal Louisiana will need to adapt to future conditions. The Coastal Protection and Restoration Authority (CPRA) is undertaking this challenge through 5-year updates of Louisiana's Comprehensive Master Plan for a Sustainable Coast. The 2017 Coastal Master Plan builds on past progress and establishes a clear vision for the future. It carries the 2007 and 2012 plans forward by improving the methods used to ensure projects are completed as efficiently and effectively as possible.

This document summarizes the process by which CPRA developed the list of candidate projects to evaluate for consideration in the 2017 Coastal Master Plan. Following development of the candidate projects list, specific project details were required to define project features affecting the landscape in the coastal system, as well as the economic analysis and prioritization of projects. This was accomplished by the development of specific attributes for each type of candidate project to provide physical and monetary parameters needed by the Integrated Compartment Model, the Coastal Louisiana Risk Assessment (CLARA) model, and the Planning Tool. This document presents the principal project attribute assumptions for each project type.

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List of Abbreviations

ASCE	American Society of Civil Engineers
BH	Barrier Island/Headland
BS	Bank Stabilization
cfs	cubic feet per second
CLARA	Coastal Louisiana Risk Assessment
CPRA	Coastal Protection and Restoration Authority
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
DEM	Digital Elevation Model
DI	Diversion
FEMA	Federal Emergency Management Agency
FMV	Fair Market Value
FWOA	Future Without Action
GIS	Geographic Information System
GIWW	Gulf Intracoastal Waterway
HP	Hurricane Protection
HR	Hydrologic Restoration
HSDRRS	Hurricane and Storm Damage Risk Reduction System
LCA	Louisiana Coastal Area
LGM	Larose to Golden Meadow
MC	March Creation
MRGO	Mississippi River Gulf Outlet
MRL	Mississippi River Levee
MR&T	Mississippi River and Tributaries
MtoG	Morganza to the Gulf
NAVD88	North American Vertical Datum of 1988

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NDV	Non-Depreciated Values
NOV	New Orleans to Venice
NRDA	Natural Resource Damage Assessment
NS	Nonstructural
O&M	Operations and Maintenance
OR	Oyster Barrier Reef
P/E&D	Planning/Engineering and Design
RC	Ridge Restoration
SP	Shoreline Protection
USACE	U.S. Army Corps of Engineers
UTM	Universal Transverse Mercator

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1.0 Introduction

1.1 Developing a List of Projects

As coastal Louisiana faces increasing threats from flooding and sea level rise, there is a great need to advance our scientific understanding of the coast and how coastal Louisiana will need to adapt to future conditions. The Coastal Protection and Restoration Authority (CPRA) is undertaking this challenge through 5-year updates of Louisiana's Comprehensive Master Plan for a Sustainable Coast.

The 2017 Coastal Master Plan builds on past progress and establishes a clear vision for the future. It carries the 2007 and 2012 plans forward by improving the methods used to ensure projects are completed as efficiently and effectively as possible.

This document describes the process by which CPRA developed the list of candidate projects and their associated costs and attributes to evaluate for consideration in the 2017 Coastal Master Plan.

1.1.1 Refinement of 2012 Coastal Master Plan Projects

Projects in the 2012 Coastal Master Plan or increments of projects included in the project list that have been constructed or have funding for construction as of January 1, 2015, will not be part of the list of candidate projects for 2017. They will instead be included as part of future without action (FWOA).[1] A list of all projects included in FWOA can be found in Attachment A-1. In total, 19 projects included in the 2012 Coastal Master Plan meet this criterion (Table 1).

Table 1: 2012 Projects (or Project Increments*) Moved to FWOA.

Project ID	Project Name	FWOA Project (or Project Increments)
001.CO.01	South Lake Lery Marsh Creation	South Lake Lery Shoreline and Marsh Restoration (BS-0016)
001.HR.01	Amite River Diversion Canal	Hydrologic Restoration of the Amite River Diversion (PO-0142)
001.SP.01*	Manchac Landbridge Shoreline Protection	Lake Pontchartrain Shoreline Protection (PO-0052)
002.BH.04*	Barataria Pass to Sandy Point Barrier Island Restoration	Shell Island West (BA-0111)

[1]Projects considered part of FWOA are either projects that have been constructed and will continue to have an effect on the landscape into the future or projects for which funding has been procured. FWOA projects will not compete for the potential future funding. The FWOA condition is the baseline against which candidate projects will be evaluated.

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Project ID	Project Name	FWOA Project (or Project Increments)
002.BH.05*	Belle Pass to Caminada Pass Barrier Island Restoration	Caminada Headland Beach and Dune Restoration (BA-0143)
002.CO.01	Grand Liard Marsh/Ridge Restoration	Grand Liard Marsh and Ridge Restoration (BA-0068)
002.HP.07*	Lafitte Ring Levee	Rosethorne Tidal Protection (BA-0075-2)
002.HP.08	Maintain West Bank Levees	West Bank and Vicinity (BA-0066)
002.MC.05e*	Large-Scale Barataria Marsh Creation – Component E	Mississippi River Sediment Delivery System (BA-0039); Long Distance Mississippi River Sediment Pipeline (BA-0043-EB); Bayou Dupont Marsh and Ridge Restoration (BA-0048)
03a.BH.03*	Isles Dernieres Barrier Island Restoration	Caillou Lake Headlands (TE-0100)
03a.DI.01*	Bayou Lafourche Diversion	Mississippi River Water Reintroduction into Bayou Lafourche (BA-0161)
03a.HP.02b*	Morganza to the Gulf	Morganza to the Gulf (TE-0064)
03a.HR.10	HNC Lock Hydrologic Restoration	Houma Navigation Canal Lock Complex (TE-0113)
03b.CO.01	North Lost Lake Marsh Creation	Lost Lake Marsh Creation and Hydrologic Restoration (TE-0072)
004.BS.01*	Grand Lake Bank Stabilization	Grand Lake Shoreline Protection (ME-0021-EB)
004.HR.18	Mermentau Basin Hydrologic Restoration (East of Calcasieu Lake)	West Big Burn Bridge Restoration (ME-0026)
004.MC.01*	South Grand Chenier Marsh Creation	South Grand Chenier Marsh Creation Project (ME-0020)
004.MC.04*	Mud Lake Marsh Creation	Oyster Bayou Marsh Creation and Terracing (CS-0059)
004.SP.08[2]	Calcasieu – Sabine Shoreline Protection – Component A	Cameron Parish Shoreline (CS-0033)

[2] Project identified as Calcasieu – Sabine Shoreline Protection – Component A (004.BS.04a) in the 2012 Coastal Master Plan.

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Eighteen 2012 Coastal Master Plan projects will not be included in the list of candidate projects based on new information gained since the 2012 Coastal Master Plan was developed (Table 2):

- The Bayou Sale Ridge Restoration (03b.RC.01), West Cote Blanche Bay Oyster Reef Restoration (03b.OR.02), and East Cote Blanche Bay Oyster Reef Restoration (03b.OR.03) projects were removed due to constructability issues/concerns.
- The Gulf Intracoastal Waterway Bank Stabilization (Freshwater Bayou to Calcasieu Ship Channel; 004.BS.03) and Calcasieu Ship Channel Bank Stabilization (Gulf to Calcasieu Lake; 004.BS.06) projects were removed due to CPRA's policy that bank line stabilization on federally navigable waterways is a federal responsibility, and thus no state dollars would be allocated to such projects. While the state will continue to support these projects and push for federal funding, they will not be modeled or competed for master plan funding.
- Berwick to Wax Lake (03b.HP.11) was removed based on analysis completed through the South Central Coastal Louisiana Flood Protection study, in which it was concluded that the elevations of the existing project are sufficient to provide 100-year protection over the next 50 years.
- Chacahoula Basin Hydrologic Restoration (03a.HR.04) was removed because existing hydraulic connectivity at the structure locations exceeds what was proposed for the project.
- Terrebonne Gulf Intracoastal Waterway Marsh Creation (03b.MC.05) was removed based on information gained through the Increase Atchafalaya to Terrebonne (TE-0110) study, which found that sufficient sediment is not available in the Gulf Intracoastal Waterway (GIWW) to construct the project. Beneficial use of any material dredged from the GIWW for the TE-0110 project will be further explored during engineering and design.
- Hackberry Ridge Restoration (004.RC.04) was removed because existing elevations are equal to or greater than those proposed for the project.
- Little Pecan Bayou Sill (004.HR.07), Sabine Pass Hydrologic Restoration (004.HR.08), Tom's Bayou Hydrologic Restoration (004.HR.12), Deep Lake Hydrologic Restoration (004.HR.13), Alkali Ditch Hydrologic Restoration (004.HR.14), Oyster Bayou Hydrologic Restoration (004.HR.17), Mermentau Basin Hydrologic Restoration: South of Grand Lake (004.HR.19), Mermentau Basin Hydrologic Restoration: South of White Lake (004.HR.20), and East Calcasieu Lake Hydrologic Restoration (004.HR.22) were not included in the National Ecosystem Restoration Tentatively Selected Plan for the Southwest Coastal Louisiana Study (USACE, 2015) and have been removed.

Table 2: 2012 Projects Removed from 2017 Consideration.

Project ID	Project Name	Reason for Removal
03a.HR.04	Chacahoula Basin Hydrologic Restoration	Existing hydraulic connectivity exceeds what was proposed for the project
03b.HP.11	Berwick to Wax Lake	Results of South Central Coastal Louisiana Flood Protection study

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Project ID	Project Name	Reason for Removal
03b.MC.05	Terrebonne GIWW Marsh Creation	Results of Increase Atchafalaya to Terrebonne feasibility study
03b.RC.01	Bayou Sale Ridge Restoration	Constructability issues/concerns
03b.OR.02	West Cote Blanche Bay Oyster Reef Restoration	Constructability issues/concerns
03b.OR.03	East Cote Blanche Bay Oyster Reef Restoration	Constructability issues/concerns
004.BS.03	GIWW Bank Stabilization (Freshwater Bayou to Calcasieu Ship Channel)	CPRA policy that bank line stabilization on federally navigable waterways is a federal responsibility
004.BS.06	Calcasieu Ship Channel Bank Stabilization (Gulf to Calcasieu Lake)	CPRA policy that bank line stabilization on federally navigable waterways is a federal responsibility
004.HR.07	Little Pecan Bayou Sill	Results of Southwest Coastal Louisiana Study
004.HR.08	Sabine Pass Hydrologic Restoration	Results of Southwest Coastal Louisiana Study
004.HR.12	Tom's Bayou Hydrologic Restoration	Results of Southwest Coastal Louisiana Study
004.HR.13	Deep Lake Hydrologic Restoration	Results of Southwest Coastal Louisiana Study
004.HR.14	Alkali Ditch Hydrologic Restoration	Results of Southwest Coastal Louisiana Study
004.HR.17	Oyster Bayou Hydrologic Restoration	Results of Southwest Coastal Louisiana Study
004.HR.19	Mermentau Basin Hydrologic Restoration (South of Grand Lake)	Results of Southwest Coastal Louisiana Study
004.HR.20	Mermentau Basin Hydrologic Restoration (South of White Lake)	Results of Southwest Coastal Louisiana Study
004.HR.22	East Calcasieu Lake Hydrologic Restoration	Results of Southwest Coastal Louisiana Study
004.RC.04	Hackberry Ridge Restoration	Existing elevations equal to or greater than proposed project elevations

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Twelve projects were modified based on availability of new information (Table 3):

- The West Shore Lake Pontchartrain (001.HP.05)[3] alignment was modified based on the U.S. Army Corps of Engineers (USACE) West Shore Lake Pontchartrain Study (2014).
- The Upper Breton Diversion 250,000 cubic feet per second (cfs) (001.DI.17) project location was modified based on the results of recent modeling analysis from ongoing Mississippi River studies.
- Alignments for four Structural Protection projects were modified based on additional modeling and analysis completed through the South Central Coastal Louisiana Flood Protection Study
    - Morgan City Back Levee (03b.HP.10)
    - Franklin and Vicinity Hurricane Protection (03b.HP.12)
    - St. Mary/Iberia Upland Levee (03b.HP.14)
    - Abbeville and Vicinity (004.HP.15)
- The Morganza to the Gulf (03a.HP.02b) alignment was updated based on the new alignment identified in the USACE Post Authorization Change Report for Morganza to the Gulf (USACE, 2013a).
- Central Terrebonne Hydrologic Restoration (03a.HR.02) was modified based on Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) Phase I analysis (Natural Resources Conservation Service, 2014).
- The Belle Pass to Golden Meadow (03a.MC.07) project area was modified based on input from Lafourche Parish.
- The Bayou Chene Floodgate (03b.HP.13) project was modified based on input from the St. Mary Levee District.
- Calcasieu Ship Channel Salinity Control Measures (004.HR.06) project features were updated based on the Calcasieu Ship Channel Salinity Control Measures Project Planning and Feasibility Decision Report (CPRA, 2015a).
- In addition, due to the ongoing work with the River Reintroduction into Maurepas Swamp (PO-0029) project and the existing Louisiana Coastal Area (LCA) Small Diversion at Convent/Blind River (PO-0068) project, the 2012 Coastal Master Plan West Maurepas Diversion (5,000 cfs; 001.DI.29) project has been separated into East Maurepas Diversion (2,000 cfs; 001.DI.21) and West Maurepas Diversion (2,000 cfs; 001.DI.29).
- In total, 80 projects from the 2012 Coastal Master Plan will be evaluated as part of the 2017 Coastal Master Plan (Figure 1).

Table 3: 2012 Projects with Revised Footprints.

Project ID	Project Name	Reason for Revision
001.HP.05	West Shore Lake Pontchartrain	New alignment identified in USACE West Shore Lake Pontchartrain Study

[3] Project identified as Greater New Orleans LaPlace Extension (001.HP.05) in the 2012 Coastal Master Plan.

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Project ID	Project Name	Reason for Revision
001.DI.17	Upper Breton Diversion	Results of recent modeling analysis conducted for the Mississippi River
001.DI.29	West Maurepas Diversion	Separation of 001.DI.29 into two projects based on new information gained since 2012
03a.HP.02b	Morganza to the Gulf	New alignment identified in USACE Post Authorization Report for Morganza to the Gulf
03a.HR.02	Central Terrebonne Hydrologic Restoration	Revised project features based on CWPPRA Phase I analysis
03a.MC.07	Belle Pass to Golden Meadow	Parish input
03b.HP.10	Morgan City Back Levee	Results of South Central Coastal Louisiana Flood Protection study (previously 03b.HP.14 in 2012 Coastal Master Plan)
03b.HP.12	Franklin and Vicinity	Results of South Central Coastal Louisiana Flood Protection study
03b.HP.13	Bayou Chene Floodgate	Results of St. Mary Levee District Preliminary Report
03b.HP.14	St. Mary/Iberia Upland Levee	Results of South Central Coastal Louisiana Flood Protection Study
004.HP.15	Abbeville and Vicinity	Results of South Central Coastal Louisiana Flood Protection study (previously 004.HP.04 in 2012 Coastal Master Plan)
004.HR.06	Calcasieu Ship Channel Salinity Control Measures	Results of Calcasieu Ship Channel Salinity Control Measures Project Planning and Feasibility Decision Report

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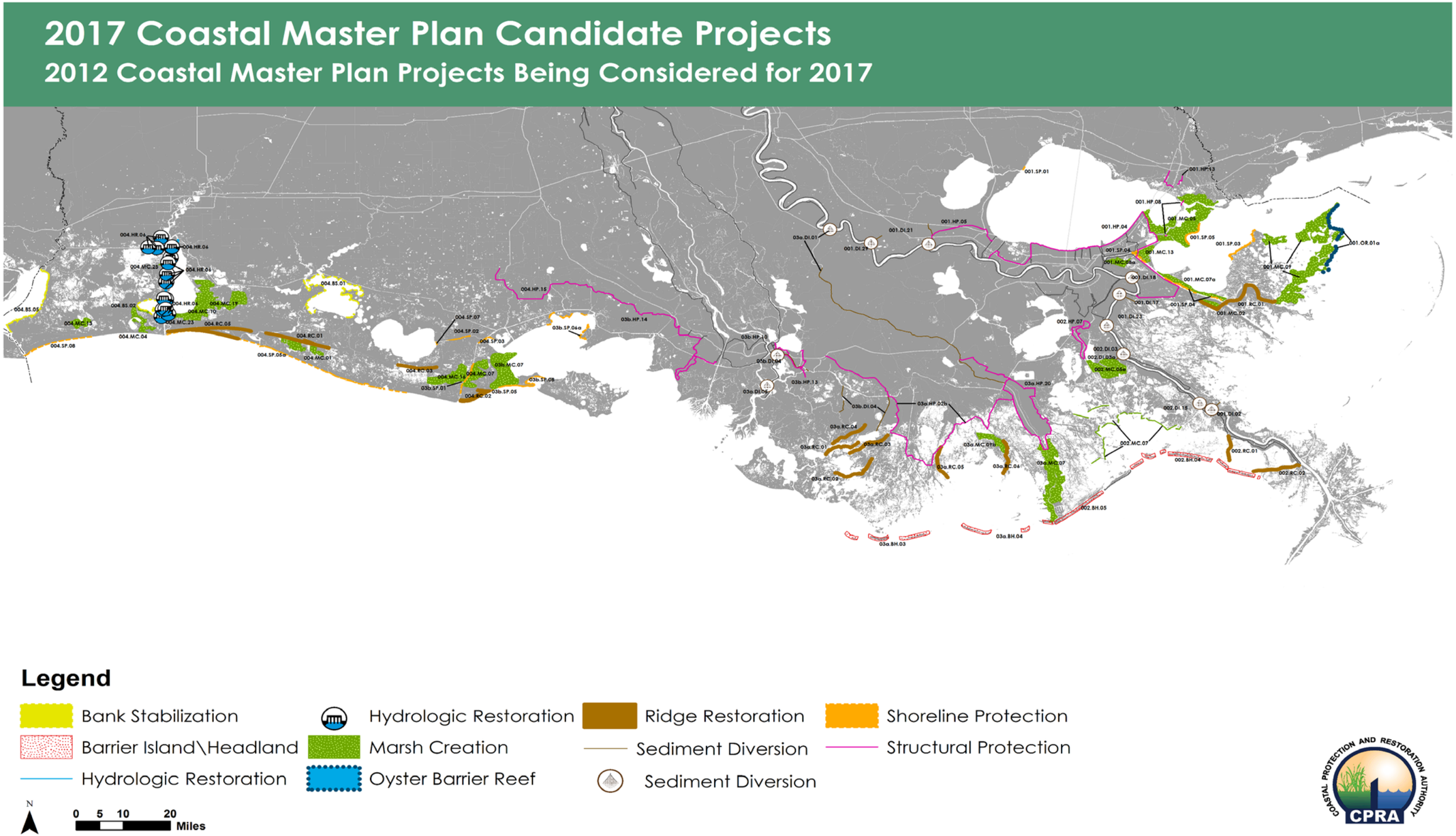

Figure 1: 2012 Coastal Master Plan Projects Being Considered for 2017.

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1.1.2 2017 New Project Development Program

Over the course of two solicitation periods totaling 140 days, CPRA accepted proposals for new projects to be considered in the 2017 Coastal Master Plan. New projects could be proposed by any source, including academia, parishes, elected officials, agencies, non-governmental organizations, landowners, business/industry, and the general public. New projects could be proposed that build and/or sustain land, provide significant flood risk reduction, address radical shifts in the coastal landscape, or confront future uncertainty challenges. Each project submission was screened using the following criteria:

- **Size Threshold**: For marsh creation project concepts, a minimum size threshold of 500 acres (i.e., the expected area of project effect on the coastal landscape) was required for a project to be considered for inclusion in the 2017 Coastal Master Plan analysis. Like the 2012 Coastal Master Plan, the 2017 Coastal Master Plan will involve a large-scale, regional approach to coastal risk reduction and restoration. The core of the master plan's analysis is an interconnected suite of predictive models that estimate restoration and risk reduction effects of candidate projects on various aspects of the coastal system. These models were developed for a system-wide, planning-scale analysis and, consequently, in some cases, are unable to capture the effects of small-scale, localized projects in the coastal system.
- **Geographic Area**: The 2012 Coastal Master Plan screened out certain types of project concepts in some locations (e.g., marsh creation in the lower Atchafalaya or Wax Lake Deltas) because natural processes in those locations could be expected to produce similar results and investment in restoration projects in these areas would be unnecessary. Based on the current state of the Louisiana coast, the 2017 Coastal Master Plan will likewise screen out projects where natural processes are already producing the desired effects.
- **Adequate Information**: Project concepts need to be described in sufficient detail so they can be evaluated using the master plan models. Adequate information typically includes specific geospatial location data (for all project concepts), elevations (for risk reduction projects), and, where applicable, information on proposed operational regimes (for restoration projects).
- **Consistency with Master Plan Objectives and Principles**: Project concepts need to clearly contribute to and be consistent with the objectives and principles of the master plan (http://coastal.la.gov/a-common-vision/2012-coastal-master-plan/) to be considered for inclusion. Projects that did not meet these criteria were eliminated from consideration. Furthermore, as stated in the master plan principles, the state will strive to use sediment from renewable sources, such as the Mississippi River, or from outside the coastal system, such as the Gulf of Mexico, for marsh creation and barrier headland/island projects.
- **Duplicative Effects**: Many project concepts have overlapping scopes, goals, and physical locations. New projects must be significantly different than any project analyzed through the 2012 Coastal Master Plan process, including those that were not selected for inclusion in the final plan.

Overall, CPRA received 155 project ideas from 42 project sponsors. Using the screening criteria above, 52 submissions were considered for inclusion in the 2017 Coastal Master Plan. From these

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52 submissions, projects were accepted in full, combined with other submittals, or modified to better reflect CPRA project types (Table 4).

Table 4: 2017 Coastal Master Plan New Project Development Program Submissions.

Project Title	Project Type	Decision[4]	Screening Criteria[5]
Adams Bay Headland Restoration	RC; MC	Partial	
AGMAC Marsh Creation Project from Beneficial Use of Dredged Material	MC	Partial	
Armoring of the Tidal Levee in Delacroix Island, St. Bernard Parish	HP	No	4
Avoca Island Diversion	HR	N/A	
Barataria/Terrebonne Basin Marsh Terracing Program	OT	No	4
Bay Denesse Outfall Management	OT	No	4
Bayou Aux Chenes Ridge Restoration	RC; MC	Partial	
Bayou Cane Marsh Creation	MC	Yes	
Bayou Decade Marsh Creation	MC	No	5
Bayou Dularge Marsh Creation	MC; SP	No	5

[4] **Decision**: For each submittal, a decision was made on whether the project would be evaluated as part of the 2017 Coastal Master Plan. The decision options are described below.

N/A: Refers to Hydrologic Restoration or Oyster Reef projects that meet master plan goals and objectives and fall under the new programmatic measure program to be outlined in the 2017 Coastal Master Plan or nonstructural projects which are being developed separately.

No: Submittal will not be modeled. The reason for the decision is provided in the Screening Criteria column.

Partial: Refers to submittals that were partially accepted (i.e., multiple project types were submitted but only one project type was accepted), or projects that were modified to better correspond with master plan principles and objectives.

Subsumed: Refers to projects that overlapped another 2017 submittal. Projects (or parts of projects) listed as subsumed were ultimately approved for consideration.

Yes: Project will be evaluated.

[5] **Screening Criteria**: Criteria for which projects were screened out of consideration:

1. Size threshold
2. Geographic area
3. Adequate information
4. Consistency with master plan objectives and principles
5. Duplicative effects

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
Bayou Eau Noir Ridge Restoration	RC; MC	Partial	
Bayou La Loutre Ridge Restoration Project	RC	No	5
Bayou Lacombe Marsh Creation	MC	Yes	
Bayou Lafourche East Bank	MC	No	5
Bayou L'Ours Restoration	HR; MC	No	4
Bayou Penchant Marsh Creation	MC	No	5
Bayou Sauveur Marsh Creation Land Bridge	MC	Subsumed	
Bayou Terre aux Boeufs Ridge Restoration Project	RC	Yes	
Bayou Terrebonne Freshwater Diversion into Grand Montegut and PAC/DU Wetlands	HR	N/A	
Bayou Terrebonne to Isle St. Jean Charles Land Bridge	MC	No	5
Bell Island Marsh Creation	MC	No	4
Belle Pass to Golden Meadow Marsh Creation	MC	Subsumed	
Big Branch Marsh Restoration	MC	Subsumed	
Biloxi Marsh Creation	MC	No	5
Biloxi Marsh Subtidal and Fringe Oyster Reefs	OR	Partial	
Bully Camp Marsh Creation	MC	No	5
Caernarvon Freshwater Distribution – East	HR	No	4
Caillou Lake – Lake Mechant Marsh Creation	MC	No	5
Calcasieu Lake East and West Fringe Oyster Reefs	OR	N/A	
Calcasieu Lake West Bank	MC	Yes	

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
Cameron Meadows Marsh Creation, Phase II	MC	Subsumed	
Cameron Parish Comprehensive Plan	HR; MC; RC; SP	Partial	
Carlisle Ridge Restoration	RC; MC	Partial	
Channel Restrictions at Bayou Dupont, Harvey Cut, Bayou Perot, and Barataria Waterway	HR	N/A	
Controllable Coastline Creation via Positive Displacement Sediment Pumping	MC	No	4
Cote Blanche Freshwater & Sediment Introduction & Shoreline Protection Project	HR; SP	N/A	
Design and Construction of Braithwaite to White Ditch back levee	HP	No	5
Design and Construction of Fort Jackson to Venice back levee (HSDRRS NOV-08)	HP	Yes	
Design and Construction of Oakville to La Reussite back levee (HSDRRS NOV-NFL-04a) and MRL Oakville to La Reussite (MRL-WB-179)	HP	Yes	
Design and Construction of Phoenix to Bohemia back levee (HSDRRS NOV - 01)	HP	No	5
Design and Construction of St. Jude to City Price back levee (NOV-05a) and MRL St. Jude to City Price (NOV 09)	HP	Yes	
Drum Island Marsh Creation	MC	No	4
Dulac - Cocodrie Marsh Creation	MC	No	5
East Bank Land Bridge (Alternative A) Marsh Creation	MC	Subsumed	
East Bank Land Bridge (Alternative B) Marsh Creation	MC	Yes	
East Bank Land Bridge (Alternative C) Marsh Creation	MC	Subsumed	

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
East Bank Land Bridge (Alternative D) Marsh Creation	MC	Subsumed	
East Bank Oyster Barrier Reef	OR	N/A	
East Golden Meadow Marsh Creation	MC	No	5
East Maurepas Swamp Diversion Project	DI	Yes	
East St. Tammany Storm Surge Structural Protection Project	OT	No	4
Eastern Lake Borgne Shoreline Protection	SP	No	5
Eloi Bay Subtidal and Fringe Oyster Reefs	OR	N/A	
Expansion of Large-Scale Barataria Marsh Creation Component E (002.MC.05e)	MC	Yes	
Faciane Canal Marsh Creation	MC	Yes	
Falgout Canal Marsh Creation	MC	Subsumed	
Fifi Island Restoration Project	MC; SP	Partial	
Freshwater Diversion from GIWW down Grand Bayou in Lafourche Parish	HR	Subsumed	
Fritchie North Marsh Creation	MC	Yes	
Geologic Framework Preservation Through Innovative Reef Building	OR	N/A	
Golden Meadow - Montegut Marsh Creation	MC	No	5
Grand Bayou Freshwater Enhancement	HR; MC	Subsumed	
Grand Bayou Freshwater Reintroduction	HR; MC	Partial	
Grand Bayou Ridge Restoration	RC; MC	Partial	
Grand Chenier Subtidal Oyster Reefs	OR	N/A	
Grand Lake Shoreline Marsh Creation	MC	Subsumed	
Gulf future coalition non-structural adaptation and community resiliency	OT	N/A	
Guste Island Marsh Creation	MC	Yes	

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
HNC - Lake Mechant Marsh Creation	MC	No	5
Iron Banks Marsh Creation	MC	No	4
Jesuit Bend Marsh Creation Site	MC	No	4
LaBranche Wetlands Freshwater & Sediment Diversion Project	HR	Yes	
LaBranche Wetlands Shoreline Protection	SP	Partial	
Lake Hermitage Shoreline Protection	SP	Yes	
Lake Hermitage South Marsh Creation	MC	No	5
Lake Salvador Shoreline Protection	SP	Yes	
Large Scale Barataria – Barataria Bay Rim Marsh Creation	MC	Partial	
Leeville Area Bank Stabilization along the Southeast and Southwest Canals	BS	Yes	
Leeville Ridge Restoration and Marsh Creation	RC	No	3
Marsh Creation Through Beneficial Use of Dredged Material from Baptiste Collette Bayou Navigation Channel Deepening	MC	No	2
Marsh Creation via Atchafalaya Long Distance Sediment Pipeline	DI; MC	Partial	
Mermentau Marsh Restoration	SP; OT	No	5
Mid Breton Marsh Creation Land Bridge	MC	No	5
Mid-Barataria Oyster Breakwater & Brood Stock Sanctuary - Pilot Project	OR	N/A	
Mississippi River Long Distance Sediment Pipeline - West of Barataria Waterway	MC; RC	No	4
MRGO Shoreline Protection	SP	No	5
MSR East Bank	MC	No	5
MSR West Bank South	MC	No	5

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
New Orleans East Land Bridge Marsh Creation	MC	Subsumed	
North East Tangipahoa Shoreline Protection	SP	Yes	
North Goose Point Marsh Restoration	MC	Subsumed	
North Lake Boudreaux Marsh Creation and Shoreline Protection Project	MC; SP	Partial	
North Lost Lake Marsh Creation and Hydrologic Restoration Project	MC; HR	No	5
North Terrebonne Bay Marsh Creation	MC	No	5
Overbank Spillway(s) into Upper Barataria Coastal Forests	OT	No	5
Overbank Spillway(s) into Upper Pontchartrain Coastal Forest	OT	No	5
Oysterville Project	OR	N/A	
Pass-A-Loutre Hydrologic Restoration and Marsh Creation Project	HR; MC	No	2
Pelto Bay to Point Au Fer Subtidal and Fringe Oyster Reefs	OR	N/A	
Point a la Hache Marsh Creation (Central)	MC	Yes	
Point a la Hache Marsh Creation (North)	MC	Yes	
Point a la Hache Marsh Creation (South)	MC	Yes	
Pointe a la Hache Ridge Restoration	RC; MC	No	5
Proposal for the Use of Harvested Water Hyacinth in Burlap "Geomembranes" for Creation of Silt Barriers in Louisiana Wetlands	OT	No	4
Protecting our marsh restoration projects and natural marshes through feral hog removal	OT	No	4
Protecting our marsh restoration projects and natural marshes through invasive plant species control	OT	No	4

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
Red Pass Ridge Restoration	RC; MC	Partial	
Restoration of Chandeleur Barrier Island Complex	BI	No	5
Ridge Restoration Modification Project	RC	No	4
Sabine Marsh Creation Browns Lake Area	MC	No	1;5
SCA Gulf Restoration Corps Marsh Creation Project	MC	No	2
Sediment and Freshwater Diversions Using Very Large Spillways and Above Ground Reservoirs	DI	No	4
Sediment Diversion Efficiency Along the Atchafalaya and Mississippi Rivers	HR	N/A	
Sediment Enhancement and Management of the Caernarvon Diversion	DI; MC; HR	No	4
Shoreline Protection along Lake Salvador (south side of Couba Island)	SP	Yes	
Shoreline Protection along the Gulf and Bay Shoreline from Oyster Bayou to Grand Pass des Illettes	SP	No	5
Shoreline Protection at Lost Lake – Southern Rim	SP	Yes	
Shoreline Protection East Marsh Island	SP	Yes	
Shoreline Protection in East Cote Blanche Bay, West Cote Blanche, and Vermilion Bay	SP	No	5
Small Bayou LaPointe Marsh Creation	MC	Subsumed	
South Avoca Island Freshwater Diversion (5,000 cfs)	DI	No	5
South East Tangipahoa Shoreline Protection	SP	No	5
South Lake Salvador Landbridge Restoration	MC; SP	Partial	

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
South Sabine Refuge Pool 3 Marsh Restoration	MC	Subsumed	
Southeast LaBranche Wetland Creation and Nourishment Project	MC	No	5
Southeast Marsh Island Restoration Project	MC	Yes	
Southwest Barataria Subtidal and Fringe Oyster Reefs	OR	N/A	
Southwest Pecan Island Marsh Restoration	MC	No	5
Spanish Lake Shoreline Marsh Creation	MC	Yes	
St. Bernard Bioengineered Reef Zones	OR	N/A	
St. Tammany Parish Elevation	OT	N/A	
Strategic Stabilization Barrier	SP	Partial	
Sulphur Mine Land Bridge Restoration Project	MC	No	5
Sunrise Point Marsh Creation	MC	Yes	
Telegraph Point/Pelican Island Marsh Creation	MC	No	4
Terrebonne Bay Rim Subtidal and Fringe Oyster Reef Restoration	OR	N/A	
Third Delta Conveyance Channel	DI	No	5
Tiger Ridge/Maple Knoll Area Marsh Creation	MC	Yes	
Triple Pass Island Marsh Creation	MC	No	4
Twin Pipeline Canal Marsh Creation and Ridge Restoration	RC; MC	No	4;5
Twin Pipelines Land Bridge	MC	No	5
Uhlan Bay Marsh Creation	MC	Yes	
Vermilion Bay Marsh Creation	MC; SP	Partial	
Wax Lake Outlet Enrichment Project	DI; MC	No	2

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Project Title	Project Type	Decision[4]	Screening Criteria[5]
West Bank Barrier Island Expansion	BI	No	5
West Bank Oyster Barrier Reef	OR	N/A	
West Belle Pass Marsh Creation	MC	No	1;5
West Brown Lake Marsh Restoration	MC	Yes	
West Cameron Restoration Proposal	HR; MC	Subsumed	
West Lac Des Allemands Shoreline Protection Project Phase II	SP	Yes	
West Point a la Hache and Naomi Siphon Enhancement	HR	No	4
West St. Tammany Shoreline Protection	SP	Yes	
Western Sabine Refuge Marsh Restoration	MC	Yes	
White Lake Marsh Creation	MC; SP	Yes	
Wild Horse Ridge Protection Project	BS; MC	No	5

Legend:
BS – Bank Stabilization
DI – Freshwater/Sediment Diversion
HR – Hydrologic Restoration
OR – Oyster Barrier Reef
RC – Ridge Restoration
BH – Barrier Island/Headland Restoration
HP – Structural Protection
MC – Marsh Creation
OT – Other
SP – Shoreline Protection

In addition to the New Project Development Program, CPRA considered CWPPRA project nominees from PPL 19-24 (117 projects) and projects submitted under the Natural Resource Damage Assessment (NRDA) process in response to the Deepwater Horizon and other oil spills (501 projects). CWPPRA and NRDA projects were screened using the same criteria described above. From this screening, seven projects were identified for consideration in the 2017 Coastal Master Plan.

As a result of new information from ongoing Mississippi River studies, Union Freshwater Diversion (001.DI.102), Ama Sediment Diversion (001.DI.101), Mid Barataria Diversion (002.DI.100, 002.DI.101), and Upper Breton Diversion (001.DI.103) have been proposed and added to the list of candidate projects, totaling 61 new projects being considered in 2017 (Figure 2; Table 5).

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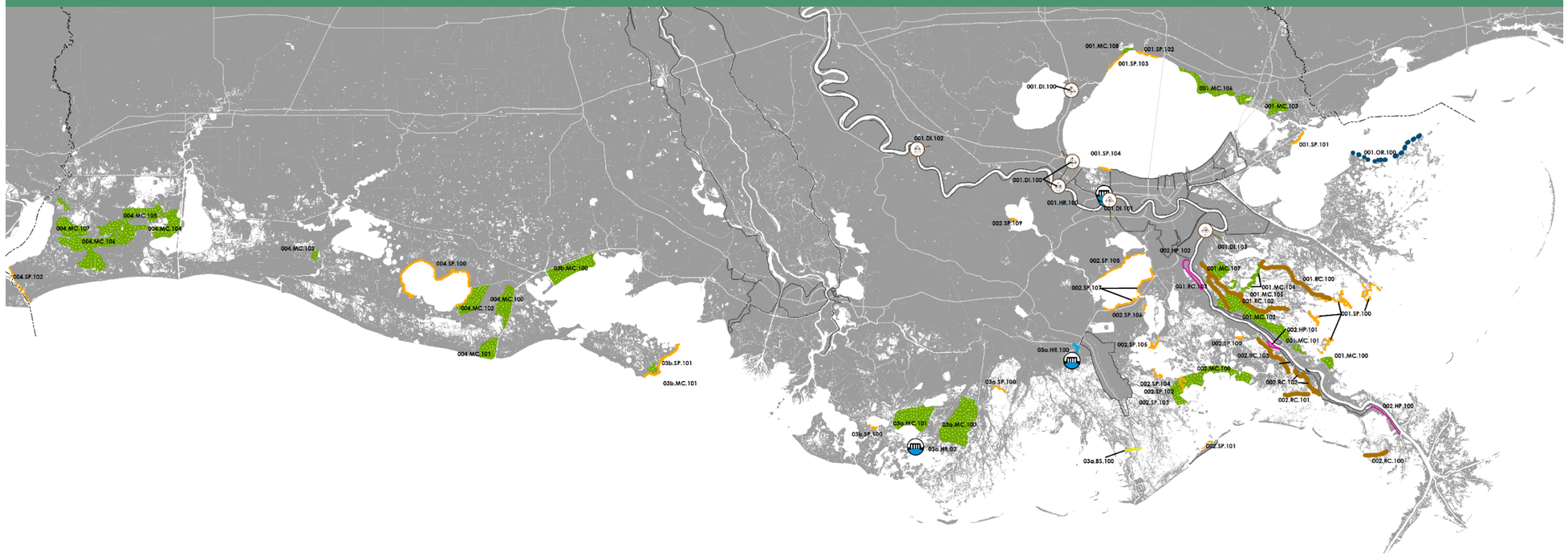
2017 Coastal Master Plan Candidate Projects

Projects Being Considered Through the New Project Development Program



Legend

- Bank Stabilization
- Barrier Island\Headland
- Hydrologic Restoration
- Hydrologic Restoration
- Marsh Creation
- Oyster Barrier Reef
- Ridge Restoration
- Sediment Diversion
- Sediment Diversion
- Shoreline Protection
- Structural Protection

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Figure 2: Projects Being Considered through the New Project Development Program (includes CWPPRA, NRDA, and CPRA projects).

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Table 5: New Projects Being Considered Based on New Project Development Program (includes CWPPRA, NRDA, and CPRA projects).

Project ID	Project Name	Parish
001.DI.100	Manchac Landbridge Diversion	St. Charles; St. John
001.DI.101	Ama Sediment Diversion	St. Charles
001.DI.102	Union Freshwater Diversion	Ascension
001.DI.103	Upper Breton Diversion (75,000 cfs)	Plaquemines
001.HR.100	LaBranche Hydrologic Restoration	St. Charles
001.MC.100	Sunrise Point Marsh Creation	Plaquemines
001.MC.101	Uhlan Bay Marsh Creation	Plaquemines
001.MC.102	Pointe a la Hache Marsh Creation	Plaquemines
001.MC.103	Fritchie North Marsh Creation	St. Tammany
001.MC.104	East Bank Land Bridge Marsh Creation	Plaquemines
001.MC.105	Spanish Lake Marsh Creation	Plaquemines
001.MC.106	St. Tammany Marsh Creation	St. Tammany
001.MC.107	Tiger Ridge/Maple Knoll Marsh Creation	Plaquemines
001.MC.108	Guste Island Marsh Creation	St. Tammany
001.OR.100	North Biloxi Marsh Oyster Reef	St. Bernard
001.RC.100	Bayou Terre aux Boeufs Ridge Restoration	St. Bernard
001.RC.102	Bayou Aux Chenes Ridge Restoration	Plaquemines
001.RC.103	Carlisle Ridge Restoration	Plaquemines
001.SP.100	Breton Sound Shoreline Protection	St. Bernard; Plaquemines
001.SP.101	Unknown Pass to Rigolets Shoreline Protection	Orleans
001.SP.102	North Lake Pontchartrain Shoreline Protection	St. Tammany
001.SP.103	Northeast Lake Pontchartrain Shoreline Protection	St. Tammany; Tangipahoa

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Project ID	Project Name	Parish
001.SP.104	LaBranche Wetlands Shoreline Protection	St. Charles
002.DI.100	Mid Barataria Diversion (35,000-75,000 cfs)	Plaquemines
002.HP.100	Fort Jackson to Venice	Plaquemines
002.HP.101	St. Jude to City Price	Plaquemines
002.HP.102	Oakville to La Reussite	Plaquemines
002.MC.100	North Barataria Bay Marsh Creation	Plaquemines; Jefferson; Lafourche
002.RC.100	Red Pass Ridge Restoration	Plaquemines
002.RC.101	Adams Bay Ridge Restoration	Plaquemines
002.RC.102	Bayou Eau Noire Ridge Restoration	Plaquemines
002.RC.103	Grand Bayou Ridge Restoration	Plaquemines
002.SP.100	Lake Hermitage Shoreline Protection	Plaquemines
002.SP.101	Fifi Island Shoreline Protection	Jefferson
002.SP.102	East Snail Bay Shoreline Protection	Lafourche
002.SP.103	West Snail Bay Shoreline Protection	Lafourche
002.SP.104	South Little Lake Shoreline Protection	Lafourche
002.SP.105	North Little Lake Shoreline Protection	Lafourche
002.SP.106	Bayou Perot Shoreline Protection	Lafourche
002.SP.107	South Lake Salvador Shoreline Protection	Jefferson; Lafourche
002.SP.108	Lake Salvador Shoreline Protection	St. Charles
002.SP.109	Lac Des Allemands Shoreline Protection	St. John
03a.BS.100	Leeville Bank Stabilization	Lafourche
03a.HR.100	Grand Bayou Hydrologic Restoration	Lafourche
03a.MC.100	South Terrebonne Marsh Creation	Terrebonne

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Project ID	Project Name	Parish
03a.MC.101	North Lake Mechant Marsh Creation	Terrebonne
03a.SP.100	North Lake Boudreaux Shoreline Protection	Terrebonne
03b.MC.100	Vermilion Bay Marsh Creation	Vermilion
03b.MC.101	Southeast Marsh Island Marsh Creation	Iberia
03b.SP.100	Lost Lake Shoreline Protection	Terrebonne
03b.SP.101	Southeast Marsh Island Shoreline Protection	Iberia
004.MC.100	Freshwater Bayou North Marsh Creation	Vermilion
004.MC.101	Freshwater Bayou South Marsh Creation	Vermilion
004.MC.102	White Lake Marsh Creation	Vermilion
004.MC.103	Little Chenier Marsh Creation	Cameron
004.MC.104	Calcasieu Lake West Bank Marsh Creation	Cameron
004.MC.105	West Brown Lake Marsh Creation	Cameron
004.MC.106	Cameron Meadows and Vicinity Marsh Creation	Cameron
004.MC.107	West Sabine Refuge Marsh Creation	Cameron
004.SP.100	White Lake Shoreline Protection	Cameron, Vermilion
004.SP.102	Sabine Pass Shoreline Protection	Cameron

1.1.3 Programmatic Measures for Oyster Reef and Hydrologic Restoration

Artificial or bioengineered oyster reef projects, in which reefs are created using shell or engineered products to provide substrate for oyster recruitment, have become an increasingly popular restoration technique over the last decade. Rather than management or enhancement of the oyster fishery, the primary goal of these projects is coastal restoration. They can provide a number of benefits including protecting shorelines, creating habitat for other fauna, reducing saltwater exchange, and reducing fetch in open water. In areas suitable for oyster recruitment and growth, these reefs could serve as an alternative to traditional methods for shoreline

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protection. So far, in limited applications, promising results have been seen, although their overall effectiveness is still being evaluated through several projects in Louisiana.[6]

The 2012 Coastal Master Plan evaluated several large artificial Oyster Barrier Reef projects, with the primary goal being shoreline protection. Given the scope of the master plan, smaller-scale oyster reef projects, the types of projects that are currently being proposed and constructed across the state, were unable to be modeled. The majority of our resources were focused on the large-scale restoration projects specifically identified in the master plan. However, CPRA will continue to partner on oyster reef projects through programs such as the Restoration Partnership Fund and CWPPRA where projects can be evaluated on a case by case basis.

The biggest drivers of marsh health in coastal Louisiana are salinity and water level. Hydrologic restoration, as a technique for improving marsh health, seeks to restore natural hydrologic patterns by conveying fresh water to areas that have been isolated by man-made features, relieving unnatural impoundments, or preventing the intrusion of salt water.

Hydrologic restoration can range in scale from large-scale freshwater diversions and locks to spoil bank gapping and culverts for drainage. Given the scope and scale of the modeling used to inform the master plan, many of the smaller-scale hydrologic restoration projects were unable to be fully evaluated.

While the state will focus most of its resources on projects specifically identified in the 2017 Coastal Master Plan, it is recognized that there are many small-scale hydrologic improvements that could benefit existing wetlands and work synergistically with existing and planned restoration projects. Small-scale hydrologic restoration projects designed to relieve impoundments, convey fresh water, and limit saltwater intrusion will be considered consistent with the master plan.

1.1.4 Identify Candidate Projects from 2012 for Reconsideration

Based on feedback from the 2017 Coastal Master Plan's Framework Development Team as well as other stakeholders, CPRA was asked to reconsider a select number of projects that were evaluated for the 2012 Coastal Master Plan but not included in the final plan. CPRA developed a set of criteria to determine which projects could justifiably be reconsidered.

Because the 2012 Coastal Master Plan was based on an unprecedented technical analysis, including the reliance on predictive models and the Planning Tool, CPRA proposed that projects not in the 2012 Coastal Master Plan but selected by the Planning Tool based on modeled benefits under the $50 billion, Max Land, 50/50 Restoration/Protection Funding Split be reconsidered for analysis. This category of projects was proposed because these projects were the next highest performers based on the two primary 2012 Coastal Master Plan decision drivers, risk reduction, and/or land building.

In addition, CPRA further proposed reconsidering projects not in the 2012 Coastal Master Plan but selected by the Planning Tool using model output under the $50 billion, Max Land, 60/40 Restoration/ Protection Funding Split. This category of projects was proposed because these

[6] Living Shoreline Protection Demonstration Project (PO-148); Terrebonne Bay Shore Protection Demonstration (TE-45); Bio-Engineered Oyster Reef Demonstration (LA-08).

projects were the next highest performers if an extra $5 billion was allocated toward restoration projects.

The list of projects in these two categories was then reviewed on a project-by-project basis to determine if there were any projects that overlapped or were duplicative with projects already being considered for 2017, if any projects were no longer feasible from an implementation perspective, or if there were any projects removed from the 2012 Coastal Master Plan based on project-specific feedback. This resulted in five additional projects that will be reconsidered.

In addition to reconsidering high-performing projects, CPRA proposed reconsidering projects evaluated as part of the 2012 Coastal Master Plan that were either on critical landscape areas identified in the 2009 Louisiana Coastal Protection and Restoration Report (USACE, 2009) or on the critical landforms included in the decision criteria used as part of the decision-making process for the 2012 Coastal Master Plan but not included in the final plan. Based on this step, one 2012 project increment, Lower Barataria Marsh Creation – Component A (002.MC.04a), will be reconsidered.

Lastly, CPRA established the Project Development and Implementation Program to work with local entities to develop new project alternatives for consideration. As such, CPRA has worked with the North Lafourche Levee District to develop alternate alignments to 002.HP.06 (Upper Barataria Risk Reduction) since that project was modeled and not selected as part of the 2012 Coastal Master Plan. The project alignment has been developed and is included in the list of 2017 candidate projects. In total, CPRA will reconsider 8 candidate projects from the 2012 Coastal Master Plan (Table 6) along with all projects selected in the 2012 Coastal Master Plan (Table 7).

Table 6: Candidate Projects from 2012 for Reconsideration.

Project ID	Project Name	Reason for Reconsideration
001.MC.06a	Breton Marsh Creation – Component A	Max Land 50/50 next highest performer
001.MC.17	Eastern Lake Borgne Marsh Creation	Max Land 50/50 next highest performer
001.DI.21	East Maurepas Diversion	See Notes Below[7]
002.HP.06	Upper Barataria Risk Reduction	Alternate alignment identified through the Project Development and Implementation Program
002.MC.04a	Lower Barataria Marsh Creation – Component A	Located on critical landform

[7] Due to the ongoing work with the River Reintroduction into Maurepas Swamp (PO-0029) project and the existing LCA Small Diversion at Convent/Blind River (PO-0068) project, the 2012 Coastal Master Plan West Maurepas Diversion (5,000 cfs; 001.DI.29) project has been separated into East Maurepas Diversion (2,000 cfs; 001.DI.21) and West Maurepas Diversion (2,000 cfs; 001.DI.29).

Project ID	Project Name	Reason for Reconsideration
002.MC.08	North Caminada Marsh Creation	Max Land 50/50 next highest performer
03b.MC.03	Marsh Island Marsh Creation	Max Land 60/40 next highest performer
03b.MC.09	Point Au Fer Island Marsh Creation	Max Land 50/50 next highest performer

Table 7: 2012 Coastal Master Plan Projects Being Considered.[8]

Project ID	Project Name	Parish
001.DI.02	Lower Breton Diversion (50,000 cfs)	Plaquemines
001.DI.17	Upper Breton Diversion (250,000 cfs)	Plaquemines
001.DI.18	Central Wetlands Diversion (5,000 cfs)	St. Bernard
001.DI.23	Mid-Breton Sound Diversion (35,000 cfs)	Plaquemines
001.DI.29	West Maurepas Diversion (3,000 cfs)	St. James
001.HP.04	Greater New Orleans High Level	Orleans; St. Bernard; Jefferson; St. Charles; Plaquemines
001.HP.05	West Shore Lake Pontchartrain	St. Charles; St. John; St. James
001.HP.08	Lake Pontchartrain Barrier	Orleans; St. Tammany
001.HP.13	Slidell Ring Levees	St. Tammany
001.MC.02	Hopedale Marsh Creation	St. Bernard
001.MC.05	New Orleans East Landbridge Restoration	Orleans; St. Tammany
001.MC.07a	Lake Borgne Marsh Creation - Component A	St. Bernard
001.MC.08a	Central Wetlands Marsh Creation - Component A	Orleans; St. Bernard

[8] Lake Charles Protection (004.HP.06p) is being considered programmatically. CPRA will continue to coordinate with this community to identify the flood risk reduction measures that best address current and future flooding risks. Terrebonne Bay Rim Marsh Creation Study (03a.MC.09p) is being considered programmatically. CPRA will continue to explore options to provide sustainable, constructible restoration of Terrebonne Bay rim.

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Project ID	Project Name	Parish
001.MC.09	Biloxi Marsh Creation	St. Bernard
001.MC.13	Golden Triangle Marsh Creation	Orleans; St. Bernard
001.OR.01a	Biloxi Marsh Oyster Reef	St. Bernard
001.RC.01	Bayou LaLoutre Ridge Restoration	St. Bernard
001.SP.01	Manchac Landbridge Shoreline Protection	Tangipahoa
001.SP.03	Eastern Lake Borgne Shoreline Protection	St. Bernard
001.SP.04	MRGO Shoreline Protection	Orleans; St. Bernard
001.SP.05	East New Orleans Landbridge Shoreline Protection (previously 001.CO.03 in 2012 Coastal Master Plan)	Orleans
002.BH.04	Barataria Pass to Sandy Point Barrier Island Restoration	Plaquemines; Jefferson
002.BH.05	Belle Pass to Caminada Pass Barrier Island Restoration	Lafourche; Jefferson
002.DI.03	Mid-Barataria Diversion (75,000 cfs)	Plaquemines
002.DI.03a	Mid-Barataria Diversion (250,000 cfs)	Plaquemines
002.DI.15	Lower Barataria Diversion (50,000 cfs)	Plaquemines
002.HP.07	Lafitte Ring Levee	Jefferson
002.MC.05e	Large-Scale Barataria Marsh Creation – Component E	Plaquemines; Jefferson
002.MC.07	Barataria Bay Rim Marsh Creation	Plaquemines; Jefferson; Lafourche
002.RC.01	Bayou Long Ridge Restoration	Plaquemines
002.RC.02	Spanish Pass Ridge Restoration	Plaquemines
03a.BH.03	Isles Dernieres Barrier Island Restoration	Terrebonne
03a.BH.04	Timbalier Islands Barrier Island Restoration	Lafourche; Terrebonne
03a.DI.01	Bayou Lafourche Diversion (1,000 cfs)	Ascension, Assumption, Lafourche
03a.DI.05	Atchafalaya River Diversion (30,000 cfs)	Terrebonne

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Project ID	Project Name	Parish
03a.HP.02b	Morganza to the Gulf	Lafourche; Terrebonne
03a.HP.20	Larose to Golden Meadow	Lafourche
03a.HR.02	Central Terrebonne Hydrologic Restoration	Terrebonne
03a.MC.07	Belle Pass-Golden Meadow Marsh Creation	Lafourche
03a.MC.09b	North Terrebonne Bay Marsh Creation – Component B	Terrebonne
03a.RC.01	Bayou DeCade Ridge Restoration	Terrebonne
03a.RC.02	Bayou DuLarge Ridge Restoration	Terrebonne
03a.RC.03	Small Bayou LaPointe Ridge Restoration	Terrebonne
03a.RC.04	Mauvais Bois Ridge Restoration	Terrebonne
03a.RC.05	Bayou Terrebonne Ridge Restoration	Terrebonne
03a.RC.06	Bayou Pointe au Chene Ridge Restoration	Terrebonne
03b.DI.04	Increase Atchafalaya Flow to Terrebonne (18,000 cfs)	Assumption, St. Mary; Terrebonne
03b.HP.08	Amelia Levee Improvements (3E)	Assumption; St. Mary
03b.HP.10	Morgan City Back Levee	St. Mary
03b.HP.12	Franklin and Vicinity	St. Mary
03b.HP.13	Bayou Chene Floodgate	St. Mary; Terrebonne
03b.HP.14	St. Mary/Iberia Upland Levee	St. Mary; Iberia
03b.MC.07	East Rainey Marsh Creation	Vermilion
03b.SP.01	Freshwater Bayou Shoreline Protection (Belle Isle Canal to Lock)	Vermilion
03b.SP.05	Gulf Shoreline Protection (Freshwater Bayou to Southwest Pass)	Vermilion
03b.SP.06a	Vermilion Bay and West Cote Blanche Bay Shoreline Protection	Vermilion; Iberia

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Project ID	Project Name	Parish
03b.SP.08	Southwest Pass Shoreline Protection (West Side)	Vermilion
004.BS.01	Grand Lake Bank Stabilization	Cameron
004.BS.02	West Cove Bank Stabilization	Cameron
004.BS.05	Sabine Lake Bank Stabilization	Cameron
004.HP.15	Abbeville and Vicinity (previously 004.HP.04 in 2012 Coastal Master Plan)	Iberia; Vermilion
004.HR.06	Calcasieu Ship Channel Salinity Control Measures	Calcasieu; Cameron
004.MC.01	South Grand Chenier Marsh Creation	Cameron
004.MC.04	Mud Lake Marsh Creation	Cameron
004.MC.07	West Rainey Marsh Creation	Vermilion
004.MC.10	Southeast Calcasieu Lake Marsh Creation	Cameron
004.MC.13	Cameron Meadows Marsh Creation	Cameron
004.MC.16	East Pecan Island Marsh Creation	Vermilion
004.MC.19	East Calcasieu Lake Marsh Creation	Cameron
004.MC.23	Calcasieu Ship Channel Marsh Creation	Cameron
004.MC.25	Kelso Bayou Marsh Creation	Cameron
004.RC.01	Grand Chenier Ridge Restoration	Cameron
004.RC.02	Cheniere au Tigre Ridge Restoration	Vermilion
004.RC.03	Pecan Island Ridge Restoration	Vermilion
004.RC.05	Front Ridge Restoration	Cameron
004.SP.02	Schooner Bayou Canal Shoreline Protection	Vermilion
004.SP.03	Freshwater Bayou Canal Shoreline Protection	Vermilion

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Project ID	Project Name	Parish
004.SP.05a	Gulf Shoreline Protection (Calcasieu River to Rockefeller)	Cameron; Vermilion
004.SP.07	Northeast White Lake Shoreline Protection	Vermilion

1.1.5 Project Variations Examined

As a result of local stakeholder feedback and interim reconnaissance and feasibility studies completed since the 2012 Coastal Master Plan, three variants of previously examined 2012 Coastal Master Plan structural protection projects were analyzed, as described in the following bullets.

- **Larose to Golden Meadow-enhanced (03a.HP.101):** based on preliminary data from the Larose to Golden Meadow Federal Feasibility study currently being undertaken by the USACE, CPRA elected to analyze versions of levee improvements for the Larose to Golden Meadow (LGM) system that incorporated basic improvements to the existing levee cross section (03a.HP.20) and enhanced improvements (03a.HP.101), which incorporate wave and stability berms into the alignment.
- **Morganza to the Gulf-basic inducements study (03a.HP.103):** based on preliminary data from the Larose to Golden Meadow Federal Feasibility study currently being undertaken by the USACE, CPRA elected to analyze versions of levee improvements for the LGM and Morganza to the Gulf (MtoG) systems which account for known surge inducement seen by the western reaches of LGM the system if the federal MtoG system is implemented. This alternative sums the implementation cost of the federal Morganza system with the cost of improving the basic LGM alignment (reaches A-West, B-North, B-South, and C-South) to withstand any surge inducements caused by the Morganza system's implementation.
- **Morganza to the Gulf-enhanced inducements study (03a.HP.102):** based on preliminary data from the Larose to Golden Meadow Federal Feasibility study currently being undertaken by the USACE, CPRA elected to analyze versions of levee improvements for the LGM and MtoG systems which account for known surge inducement seen by the western reaches of the LGM system if the federal MtoG system is implemented. This alternative sums the implementation cost of the federal Morganza system with the cost of improving the enhanced cross-section version of the LGM alignment (reaches A-West, B-North, B-South, and C-South) to withstand any surge inducements caused by the Morganza system's implementation.
- **Mid-Breton Sound Diversion (001.DI.104):** is a variation of 001.DI.23 with a difference in operating regime in that 001.DI.104 has a minimum flow of 5,000 cfs when the Mississippi River flow are less than 200,000 cfs while 001.DI.23 does not operate when Mississippi River flows are less than 200,000 cfs. This project was examined to test the sensitivity of modeling runs to basin salinity variations driven by the Mississippi River's hydrograph and different rates of sea level rise in the various environmental scenarios analyzed.

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- **Mid-Barataria Diversion (002.DI.100)**: is a variation of 002.DI.03 with a difference in operating regime in that 002.DI.100 increases maximum flowrate over time from 35,000 cfs to 75,000 cfs. This project allows flow beyond the 75,000 cfs capacity to pass through the diversion based on available head in the Mississippi River. This project was examined to determine how land building and other project outcomes may vary in response to changes in diversion operations.
- **Mid-Barataria Diversion (002.DI.101)**: is a variation of 002.DI.100 with a difference in operating regime in that 002.DI.101has an initial maximum flowrate of 75,000 cfs when the Mississippi River is flowing at 1.2 Million cfs. This flowrate is capped regardless of the behavior of the river. This project was examined to determine how land building and other project outcomes may vary in response to changes in diversion operations.
- **Mid-Barataria Diversion (002.DI.102):** is a variation of 002.DI.101 with a difference in operating regime in that 002.DI.102 has a minimum flow of 5,000 cfs when Mississippi River flows are less than 200,000 cfs while 002.DI.101 does not operate when Mississippi River flows are less than 200,000 cfs. This project was examined to test the sensitivity of modeling runs to basin salinity variations driven by the Mississippi River's hydrograph and different rates of sea level rise in the various environmental scenarios analyzed.

1.2 The Project List

Through the processes described above and variants developed during 2017, 157 candidate projects have been identified for consideration in the 2017 Coastal Master Plan: 80 from the 2012 Coastal Master Plan, 60 through the New Project Development Program, eight being reconsidered from 2012, and seven project variants discussed in Section 1.1.5. Figure 3 represents all projects being considered in the 2017 Coastal Master Plan. The 54 Nonstructural Protection projects are discussed in Section 1.2.3.

1.2.1 Restoration Projects

Restoration projects are those projects whose features restore degraded components of Louisiana's coastal ecosystem by re-establishing natural processes or through mechanical means such as the placement of dredged material. Restoration projects are grouped into the following eight general categories:

- Bank Stabilization (four projects)
- Barrier Island/Headland Restoration (four projects)
- Diversions (20 projects):
- Hydrologic Restoration (four projects)
- Marsh Creation (48 projects)
- Oyster Barrier Reefs (two projects)
- Ridge Restoration (20 projects)
- Shoreline Protection (33 projects)

Additional information about the restoration projects evaluated in the 2017 Coastal Master Plan is presented in Sections 3.1 through 3.8. Table 8 provides a list of the 135 restoration projects evaluated for the 2017 Coastal Master Plan.

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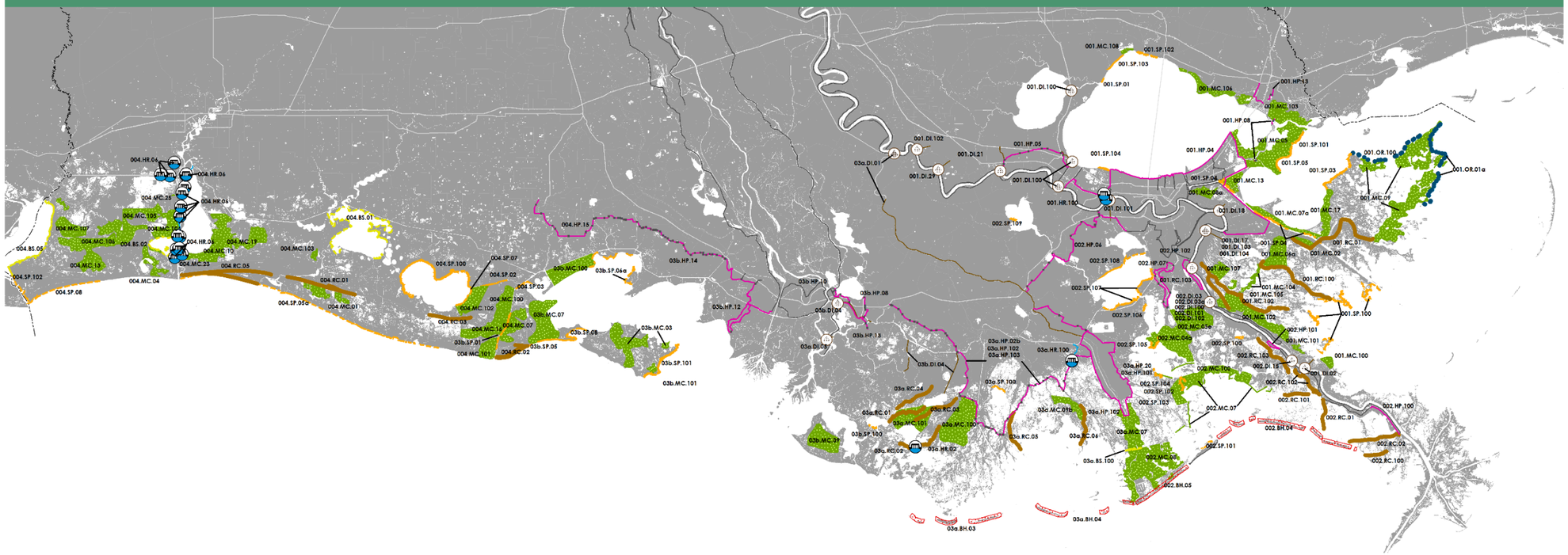
2017 Coastal Master Plan Candidate Projects

All Projects Being Considered



Legend

- Bank Stabilization
- Barrier Island\Headland
- Hydrologic Restoration
- Hydrologic Restoration
- Marsh Creation
- Oyster Barrier Reef
- Ridge Restoration
- Sediment Diversion
- Sediment Diversion
- Shoreline Protection
- Structural Protection
- Nonstructural Project Areas

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Figure 3: All Projects Being Considered.

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Table 8: Restoration Projects Being Considered in the 2017 Coastal Master Plan.

Project ID	Project Type	Name	Description	Parish
001.DI.02	Diversion	Lower Breton Diversion (50,000 cfs)	Diversion to lower Breton Sound in the vicinity of Black Bay, 50,000 cfs capacity	Plaquemines
001.DI.100	Diversion	Manchac Landbridge Diversion	Diversion from Bonnet Carre Spillway to the I-55 Borrow Canal, 2,000 cfs	St. Charles; St. John
001.DI.101	Diversion	Ama Sediment Diversion	Diversion into Upper Barataria in the vicinity of Ama, 50,000 cfs	St. Charles
001.DI.102	Diversion	Union Freshwater Diversion	Diversion into West Maurepas Swamp in the vicinity of Burnside, 25,000 cfs	Ascension
001.DI.103	Diversion	Upper Breton Diversion	Diversion into upper Breton Sound in the vicinity of Braithwaite, 75,000 cfs	Plaquemines
001.DI.104	Diversion	Mid-Breton Sound Diversion (35,000 cfs)	Diversion to Mid-Breton Sound in the vicinity of Woodlawn, 35,000 cfs capacity (5,000 cfs minimum flow)	Plaquemines
001.DI.17	Diversion	Upper Breton Diversion (250,000 cfs)	Diversion to Upper Breton Sound in the vicinity of Braithwaite, 250,000 cfs capacity	Plaquemines
001.DI.18	Diversion	Central Wetlands Diversion (5,000 cfs)	Diversion to Central Wetlands in the vicinity of Violet, 5,000 cfs capacity[1]	St. Bernard
001.DI.21	Diversion	East Maurepas Diversion (2,000 cfs)	Diversion to Maurepas Swamp in the vicinity of Hope Canal, 2,000 cfs capacity[1]	St. John
001.DI.23	Diversion	Mid-Breton Sound Diversion (35,000 cfs)	Diversion to Mid-Breton Sound in the vicinity of Woodlawn, 35,000 cfs capacity (no operation below 200,000 cfs).	Plaquemines

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Project ID	Project Type	Name	Description	Parish
001.DI.29	Diversion	West Maurepas Diversion (3,000 cfs)	Diversion(s) to Maurepas Swamp in the vicinity of Romeville, maximum capacity 3,000 cfs	St. James
001.HR.100	Hydrologic Restoration	LaBranche Hydrologic Restoration	A structure that would divert water into the LaBranche wetlands via the Mississippi River	St. Charles
001.MC.02	Marsh Creation	Hopedale Marsh Creation	Creation of 1,700 acres of marsh in the vicinity of Hopedale	St. Bernard
001.MC.05	Marsh Creation	New Orleans East Landbridge Restoration	Creation of 34,800 acres of marsh in the New Orleans East Landbridge	Orleans; St. Tammany
001.MC.06a	Marsh Creation	Breton Marsh Creation-Component A	Creation of 11,000 acres of marsh in the Breton Marsh	St. Bernard
001.MC.07a	Marsh Creation	Lake Borgne Marsh Creation-Component A	Creation of 5,600 acres of marsh along the shoreline of Lake Borgne	St. Bernard
001.MC.08a	Marsh Creation	Central Wetlands Marsh Creation-Component A	Creation of 2,400 acres of marsh in the northern Central Wetlands area	Orleans; St. Bernard
001.MC.09	Marsh Creation	Biloxi Marsh Creation	Creation of 30,500 acres of marsh in Biloxi Marsh from Oyster Bay to Drum Bay	St. Bernard
001.MC.100	Marsh Creation	Sunrise Point Marsh Creation	Creation of 1,100 acres of marsh on east bank around Auguste Bay	Plaquemines
001.MC.101	Marsh Creation	Uhlan Bay Marsh Creation	Creation of 900 acres of marsh on east bank around Uhlan Bay	Plaquemines
001.MC.102	Marsh Creation	Pointe a la Hache Marsh Creation	Creation of approximately 19,100 acres of marsh on east bank near Pointe a la Hache	Plaquemines

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Project ID	Project Type	Name	Description	Parish
001.MC.103	Marsh Creation	Fritchie North Marsh Creation	Creation of 4,300 acres of marsh in along the eastern Lake Pontchartrain shoreline	St. Tammany
001.MC.104	Marsh Creation	East Bank Land Bridge Marsh Creation	Creation of 2,300 acres of marsh in between Grand Lake and Lake Lery	Plaquemines
001.MC.105	Marsh Creation	Spanish Lake Marsh Creation	Creation of 800 acres of marsh along eastern shore of Spanish Lake	Plaquemines
001.MC.106	Marsh Creation	St. Tammany Marsh Creation	Creation of 6,300 acres of marsh along northern shore of Lake Pontchartrain	St. Tammany
001.MC.107	Marsh Creation	Tiger Ridge/Maple Knoll Marsh Creation	Creation of 4,700 acres of marsh near Tiger Ridge	Plaquemines
001.MC.108	Marsh Creation	Guste Island Marsh Creation	Creation of 700 acres of marsh along the northwest Lake Pontchartrain shoreline	St. Tammany
001.MC.13	Marsh Creation	Golden Triangle Marsh Creation	Creation of 4,100 acres of marsh in the Golden Triangle area	Orleans; St. Bernard
001.MC.17	Marsh Creation	Eastern Lake Borgne Marsh Creation	Creation of 7,600 acres along the eastern shore of Lake Borgne	St. Bernard
001.OR.01a	Oyster Barrier Reef	Biloxi Marsh Oyster Barrier Reef-Component A	Creation of 112,300 feet of oyster barrier reef in the northern portion of Biloxi Marsh	St. Bernard
001.OR.100	Oyster Barrier Reef	North Biloxi Marsh Oyster Reef	Creation of 72,000 feet of oyster barrier reef along the northern shore of Biloxi Marsh	St. Bernard
001.RC.01	Ridge Restoration	Bayou LaLoutre Ridge Restoration	Restoration of 108,900 feet of historical ridge along Bayou LaLoutre	St. Bernard

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Project ID	Project Type	Name	Description	Parish
001.RC.100	Ridge Restoration	Bayou Terre aux Ridge Restoration	Restoration of 91,200 feet of historical ridge along Bayou Terre aux Boeufs	St. Bernard
001.RC.102	Ridge Restoration	Bayou Aux Chenes Ridge Restoration	Restoration of 113,200 feet of historical ridge along Bayou Aux Chenes	Plaquemines
001.RC.103	Ridge Restoration	Carlisle Ridge Restoration	Restoration of 38,200 feet of a natural land bridge near Carlisle	Plaquemines
001.SP.01	Shoreline Protection	Manchac Landbridge Shoreline Protection	Shoreline protection of 5,800 feet of Lake Pontchartrain shoreline north of Pass Manchac	Tangipahoa
001.SP.03	Shoreline Protection	Eastern Lake Borgne Shoreline Protection	Shoreline protection of 57,100 feet of the eastern shore of Lake Borgne	St. Bernard
001.SP.04	Shoreline Protection	MRGO Shoreline Protection	Shoreline protection of 75,000 feet of the north bank of the Mississippi River Gulf Outlet (MRGO)	Orleans; St. Bernard
001.SP.05	Shoreline Protection	East New Orleans Landbridge Shoreline Protection	Shoreline protection of 37,800 feet on the east side of the New Orleans Landbridge	Orleans
001.SP.100	Shoreline Protection	Breton Sound Shoreline Protection	Shoreline protection of 229,100 feet on the west side of Breton Sound from MRGO to California Bay	St. Bernard; Plaquemines
001.SP.101	Shoreline Protection	Unknown Pass to Rigolets Shoreline Protection	Shoreline protection of 3,000 feet on the east side of the New Orleans Landbridge from Unknown Pass to The Rigolets	Orleans
001.SP.102	Shoreline Protection	North Lake Pontchartrain Shoreline Protection	Shoreline protection of 25,300 feet along the north side of Lake Pontchartrain	St. Tammany

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Project ID	Project Type	Name	Description	Parish
001.SP.103	Shoreline Protection	Northeast Lake Pontchartrain Shoreline Protection	Shoreline protection of 20,000 feet on the western shore of Lake Pontchartrain east of the Tangipahoa River	St. Tammany; Tangipahoa
001.SP.104	Shoreline Protection	LaBranche Wetlands Shoreline Protection	Shoreline protection of 12,600 feet on the southern shore of Lake Pontchartrain near the LaBranche wetlands	St. Charles
002.BH.04	Barrier Island/Headland Restoration	Barataria Pass to Sandy Point Barrier Island Restoration	Restoration of dune, beach and back barrier marsh in barrier islands between Barataria Pass and Sandy Point	Plaquemines; Jefferson
002.BH.05	Barrier Island/ Headland Restoration	Belle Pass to Caminada Pass Barrier Island Restoration	Restoration of dune, beach, and back barrier marsh in barrier islands between Belle Pass and Caminada Pass	Lafourche; Jefferson
002.DI.03	Diversion	Mid-Barataria Diversion (75,000 cfs)	Diversion into mid-Barataria in the vicinity of Myrtle Grove, 75,000 cfs capacity.	Plaquemines
002.DI.03a	Diversion	Mid-Barataria Diversion (250,000 cfs)	Diversion to mid-Barataria in the vicinity of Myrtle Grove, 250,000 cfs capacity	Plaquemines
002.DI.100	Diversion	Mid-Barataria Diversion (35,000-75,000 cfs)	Diversion to mid-Barataria in the vicinity of Myrtle Grove, 35,000 cfs increasing over time to 75,000 cfs capacity.	Plaquemines
002.DI.101	Diversion	Mid-Barataria Diversion (75,000 cfs)	Diversion to mid-Barataria in the vicinity of Myrtle Grove, 75,000 cfs capacity capped, 5,000 cfs minimum.	Plaquemines

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Project ID	Project Type	Name	Description	Parish
002.DI.102	Diversion	Mid-Barataria Diversion (75,000 cfs)	Diversion to mid-Barataria in the vicinity of Myrtle Grove, 75,000 cfs capacity capped, no flow under 200,000 cfs.	Plaquemines
002.DI.15	Diversion	Lower Barataria Diversion (50,000 cfs)	Diversion to lower Barataria in the vicinity of Empire, 50,000 cfs capacity[11]	Plaquemines
002.MC.04a	Marsh Creation	Lower Barataria Marsh Creation-Component A	Creation of 20,300 acres of marsh in Lower Barataria Basin from Barataria Waterway to Little Lake	Jefferson
002.MC.05e	Marsh Creation	Large-Scale Barataria Marsh Creation-Component E	Creation of 11,600 acres of marsh in Barataria Basin to address the Barataria Landbridge	Plaquemines; Jefferson
002.MC.07	Marsh Creation	Barataria Bay Rim Marsh Creation	Creation of 1,200 acres of marsh along northern rim of Barataria Bay	Plaquemines; Jefferson; Lafourche
002.MC.08	Marsh Creation	North Caminada Marsh Creation	Creation of 18,600 acres of marsh north of Caminada headland to Leeville	Lafourche
002.MC.100	Marsh Creation	North Barataria Bay Marsh Creation	Creation of 11,800 acres of marsh surrounding Barataria Bay shoreline	Plaquemines; Jefferson; Lafourche
002.RC.01	Ridge Restoration	Bayou Long Ridge Restoration	Restoration of 49,000 feet of historical ridge along Bayou Long/ Bayou Fontanelle	Plaquemines
002.RC.02	Ridge Restoration	Spanish Pass Ridge Restoration	Restoration of 46,300 feet of historical ridge along banks of Spanish Pass near Venice	Plaquemines
002.RC.100	Ridge Restoration	Red Pass Ridge Restoration	Restoration of 23,000 feet of historical ridge along banks of Red Pass	Plaquemines

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Project ID	Project Type	Name	Description	Parish
002.RC.101	Ridge Restoration	Adams Bay Ridge Restoration	Restoration of 31,600 feet of historical ridge along Adams Bay	Plaquemines
002.RC.102	Ridge Restoration	Bayou Eau Noire Ridge Restoration	Restoration of 34,800 feet of historical ridge along Bayou Eau Noire	Plaquemines
002.RC.103	Ridge Restoration	Grand Bayou Ridge Restoration	Restoration of 48,100 feet of historical ridge along Grand Bayou	Plaquemines
002.SP.100	Shoreline Protection	Lake Hermitage Shoreline Protection	Shoreline protection of 7,700 feet around the southern shore of Lake Hermitage	Plaquemines
002.SP.101	Shoreline Protection	Fifi Island Shoreline Protection	Shoreline protection of 11,900 feet on the northeastern shore and southwestern shore of Fifi Island	Jefferson
002.SP.102	Shoreline Protection	East Snail Bay Shoreline Protection	Shoreline protection of 8,600 feet on the northeastern shore of Snail Bay south of Little Lake	Lafourche
002.SP.103	Shoreline Protection	West Snail Bay Shoreline Protection	Shoreline protection of 18,300 feet along the western shoreline of Snail Bay south of Little Lake	Lafourche
002.SP.104	Shoreline Protection	South Little Lake Shoreline Protection	Shoreline protection of 18,900 feet along the southern shore of Little Lake west of Coffee Bay	Lafourche
002.SP.105	Shoreline Protection	North Little Lake Shoreline Protection	Shoreline protection of 27,900 feet along the eastern shore of Little Lake and the west shore of Turtle Bay into the Harvey Cutoff	Lafourche
002.SP.106	Shoreline Protection	Bayou Perot Shoreline Protection	Shoreline protection of 7,000 feet on the western shore of Bayou Perot	Lafourche

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Project ID	Project Type	Name	Description	Parish
002.SP.107	Shoreline Protection	South Lake Salvador Shoreline Protection	Shoreline protection of 87,300 feet along the southern shore of Lake Salvador from Catahoula Bay to the northeast of Bayou Villars	Jefferson; Lafourche
002.SP.108	Shoreline Protection	Lake Salvador Shoreline Protection	Shoreline protection of 53,600 feet along the northern shore of Lake Salvador from Baie du Cabanage to Bayou Bardeaux	St. Charles
002.SP.109	Shoreline Protection	Lac Des Allemands Shoreline Protection	Shoreline protection of 7,000 feet on the west shore of Lac Des Allemands from Fausse Pointe to Pointe aux Herbes	St. John
004.BS.01	Bank Stabilization	Grand Lake Bank Stabilization	Bank stabilization of 298,000 feet of the Grand Lake shoreline	Cameron
004.BS.02	Bank Stabilization	West Cove Bank Stabilization	Bank stabilization of 98,000 feet of shoreline in the West Cove area of Calcasieu Lake	Cameron
004.BS.05	Bank Stabilization	Sabine Lake Bank Stabilization	Bank stabilization of 128,000 feet of Sabine Lake shoreline	Cameron
004.HR.06	Hydrologic Restoration	Calcasieu Ship Channel Salinity Control Measures	Construction of measures designed to prevent salt water from entering Calcasieu Lake through the Calcasieu Ship Channel	Calcasieu; Cameron
004.MC.01	Marsh Creation	South Grand Chenier Marsh Creation	Creation of 6,600 acres of marsh at South Grand Chenier	Cameron
004.MC.04	Marsh Creation	Mud Lake Marsh Creation	Creation of 5,400 acres of marsh at Mud Lake	Cameron

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Project ID	Project Type	Name	Description	Parish
004.MC.07	Marsh Creation	West Rainey Marsh Creation	Creation of 7,200 acres of marsh in the western portion of Rainey Marsh	Vermilion
004.MC.10	Marsh Creation	Southeast Calcasieu Lake Marsh Creation	Creation of 8,600 acres of marsh southeast of Calcasieu Lake	Cameron
004.MC.100	Marsh Creation	Freshwater Bayou North Marsh Creation	Creation of 4,700 acres of marsh west of Freshwater Bayou	Vermilion
004.MC.101	Marsh Creation	Freshwater Bayou South Marsh Creation	Creation of 5,800 acres of marsh west of Freshwater Bayou	Vermilion
004.MC.102	Marsh Creation	White Lake Marsh Creation	Creation of 9,700 acres of marsh east of White Lake	Vermilion
004.MC.103	Marsh Creation	Little Chenier Marsh Creation	Creation of 1,000 acres of marsh south of Grand Lake	Cameron
004.MC.104	Marsh Creation	Calcasieu Lake West Bank Marsh Creation	Creation of 9,000 acres of marsh west of Calcasieu Lake	Cameron
004.MC.105	Marsh Creation	West Brown Lake Marsh Creation	Creation of 11,700 acres of marsh south of Black Lake	Cameron
004.MC.106	Marsh Creation	Cameron Meadows and Vicinity Marsh Creation	Creation of 27,000 acres of marsh in the vicinity of Cameron Meadows and Sabine National Wildlife Refuge	Cameron
004.MC.107	Marsh Creation	West Sabine Refuge Marsh Creation	Creation of 9,800 acres of marsh east of Sabine Lake	Cameron
004.MC.13	Marsh Creation	Cameron Meadows Marsh Creation	Creation of 3,600 acres of marsh at Cameron Meadows	Cameron
004.MC.16	Marsh Creation	East Pecan Island Marsh Creation	Creation of 9,800 acres of marsh at East Pecan Island	Vermilion

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Project ID	Project Type	Name	Description	Parish
004.MC.19	Marsh Creation	East Calcasieu Lake Marsh Creation	Creation of 16,700 acres of marsh east of Calcasieu Lake	Cameron
004.MC.23	Marsh Creation	Calcasieu Ship Channel Marsh Creation	Creation of 2,900 acres of marsh near Calcasieu Ship Channel	Cameron
004.MC.25	Marsh Creation	Kelso Bayou Marsh Creation	Creation of 300 acres of marsh near Kelso Bayou	Cameron
004.RC.01	Ridge Restoration	Grand Chenier Ridge Restoration	Restoration of 86,300 feet of historical ridge along Grand Chenier Ridge	Cameron
004.RC.02	Ridge Restoration	Cheniere au Tigre Ridge Restoration	Restoration of 77,800 feet of historical ridge along Bill Ridge and Cheniere au Tigre	Vermilion
004.RC.03	Ridge Restoration	Pecan Island Ridge Restoration	Restoration of 43,800 feet of historical ridge along Pecan Island Ridge	Vermilion
004.RC.05	Ridge Restoration	Front Ridge Restoration	Restoration of 147,000 feet of historical ridge along Front Ridge at Hackberry	Cameron
004.SP.02	Shoreline Protection	Schooner Bayou Canal Shoreline Protection	Shoreline protection of 18,200 feet of Schooner Bayou Canal bank line from Highway 82 to North Prong	Vermilion
004.SP.03	Shoreline Protection	Freshwater Bayou Canal Shoreline Protection	Shoreline protection of 7,900 feet of Freshwater Bayou Canal Bankline at Vermilion Bay	Vermilion
004.SP.05a	Shoreline Protection	Gulf Shoreline Protection (Calcasieu River to Rockefeller)	Shoreline protection of 281,000 feet along the Gulf shoreline between the Calcasieu River and Freshwater Bayou	Cameron; Vermilion
004.SP.07	Shoreline Protection	Northeast White Lake Shoreline Protection	Shoreline protection of 3,400 feet of critical areas along Northeast White Lake	Vermilion

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Project ID	Project Type	Name	Description	Parish
004.SP.08	Shoreline Protection	Calcasieu-Sabine Shoreline Protection-Component A	Shoreline protection of 79,300 feet on the Gulf shoreline east of Sabine River	Cameron
004.SP.100	Shoreline Protection	White Lake Shoreline Protection	Shoreline protection of 187,100 feet along the White Lake shoreline	Cameron, Vermilion
004.SP.102	Shoreline Protection	Sabine Pass Shoreline Protection	Shoreline protection of 44,000 feet on the east bank of Sabine Pass from the Gulf to Sabine Lake	Cameron
03a.BH.03	Barrier Island/ Headland Restoration	Isles Dernieres Barrier Island Restoration	Restoration of dune, beach, and back barrier marsh in Isles Dernieres barrier islands	Terrebonne
03a.BH.04	Barrier Island/ Headland Restoration	Timbalier Islands Barrier Island Restoration	Restoration of dune, beach, and back barrier marsh in Timbalier barrier islands	Lafourche; Terrebonne
03a.BS.100	Bank Stabilization	Leeville Bank Stabilization	Bank stabilization of 28,000 feet of shoreline on the Southeast and Southwest Canals	Lafourche
03a.DI.01	Diversion	Bayou Lafourche Diversion (1,000 cfs)	Diversion at Bayou Lafourche, 1,000 cfs capacity (continuous operation at capacity)	Ascension, Assumption, Lafourche
03a.DI.05	Diversion	Atchafalaya River Diversion (30,000 cfs)	Diversion off the Atchafalaya River into or to benefit Penchant and southwest Terrebonne marshes, 30,000 cfs capacity	Terrebonne
03a.HR.02	Hydrologic Restoration	Central Terrebonne Hydrologic Restoration	Installation of a structure in Grand Pass to restrict the opening to Lake Mechant.	Terrebonne
03a.HR.100	Hydrologic Restoration	Grand Bayou Hydrologic Restoration	A water control structure that will divert fresh water to wetlands west of Grand Bayou Canal.	Lafourche

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Project ID	Project Type	Name	Description	Parish
03a.MC.07	Marsh Creation	Belle Pass-Golden Meadow Marsh Creation	Creation of 26,500 acres of marsh from Belle Pass to Golden Meadow	Lafourche
03a.MC.09b	Marsh Creation	North Terrebonne Bay Marsh Creation-Component B	Creation of 5,700 acres of marsh between Bayou St. Jean Charles and Bayou Pointe au Chien	Terrebonne
03a.MC.100	Marsh Creation	South Terrebonne Marsh Creation	Creation of 23,000 acres of marsh between Bayou du Large and Houma Navigation Canal	Terrebonne
03a.MC.101	Marsh Creation	North Lake Menchant Marsh Creation	Creation of 13,700 acres of marsh between Lake de Cade and Lake Mechant	Terrebonne
03a.RC.01	Ridge Restoration	Bayou DeCade Ridge Restoration	Restoration of 42,600 feet of historical ridge along Bayou DeCade from Lake Decade to Raccourci Bay	Terrebonne
03a.RC.02	Ridge Restoration	Bayou DuLarge Ridge Restoration	Restoration of 53,200 feet of historical ridge along Bayou DuLarge	Terrebonne
03a.RC.03	Ridge Restoration	Small Bayou LaPointe Ridge Restoration	Restoration of 49,000 feet of historical ridge along Small Bayou LaPointe	Terrebonne
03a.RC.04	Ridge Restoration	Mauvais Bois Ridge Restoration	Restoration of 43,400 feet of historical ridge at Mauvais Bois	Terrebonne
03a.RC.05	Ridge Restoration	Bayou Terrebonne Ridge Restoration	Restoration of 40,700 feet of historical ridge along Bayou Terrebonne	Terrebonne
03a.RC.06	Ridge Restoration	Bayou Pointe au Chien Ridge Restoration	Restoration of 43,600 feet of historical ridge along Bayou Pointe au Chien	Terrebonne
03a.SP.100	Shoreline Protection	North Lake Boudreaux Shoreline Protection	Shoreline protection of 16,200 feet along the northern shore of Lake Boudreaux east of Hog Point	Terrebonne

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Project ID	Project Type	Name	Description	Parish
03b.DI.04	Diversion	Increase Atchafalaya Flow to Eastern Terrebonne	Increase freshwater flows from Atchafalaya River to Terrebonne marshes (18,000 cfs east along the GIWW toward the Houma Navigation Canal)	Assumption, St. Mary; Terrebonne
03b.MC.03	Marsh Creation	Marsh Island Marsh Creation	Creation of 10,700 acres of marsh at Marsh Island	Iberia
03b.MC.07	Marsh Creation	East Rainey Marsh Creation	Creation of 20,800 acres of marsh in the eastern portion of Rainey Marsh	Vermilion
03b.MC.09	Marsh Creation	Point Au Fer Island Marsh Creation	Creation of 13,200 acres of marsh on Point au Fer Island	Terrebonne
03b.MC.100	Marsh Creation	Vermilion Bay Marsh Creation	Creation of 14,700 acres of marsh along Vermilion Bay	Vermilion
03b.MC.101	Marsh Creation	Southeast Marsh Island Marsh Creation	Creation of 1,100 acres of marsh on eastern tip of Marsh Island	Iberia
03b.SP.01	Shoreline Protection	Freshwater Bayou Shoreline Protection (Belle Isle Canal to Lock)	Shoreline protection of 38,700 feet of Freshwater Bayou shoreline from Belle Isle Canal to Lock	Vermilion
03b.SP.05	Shoreline Protection	Gulf Shoreline Protection (Freshwater Bayou to Southwest Pass)	Shoreline protection of 84,300 feet of Gulf shoreline from Freshwater Bayou to Southwest Pass	Vermilion
03b.SP.06a	Shoreline Protection	Vermilion Bay and West Cote Blanche Bay Shoreline Protection (Critical Areas)	Shoreline protection in critical areas of Vermilion Bay and West Cote Blanche Bay (82,300 feet)	Vermilion; Iberia
03b.SP.08	Shoreline Protection	Southwest Pass Shoreline Protection (West Side)	Shoreline protection of 36,200 feet of shoreline along Southwest Pass immediately west of Marsh Island	Vermilion

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Project ID	Project Type	Name	Description	Parish
03b.SP.100	Shoreline Protection	Lost Lake Shoreline Protection	Shoreline protection of 11,200 feet along the southern shore of Lost Lake from Rice Bayou to Lost Lake Pass	Terrebonne
03b.SP.101	Shoreline Protection	Southeast Marsh Island Shoreline Protection	Shoreline protection of 70,100 feet along the eastern shoreline of Marsh Island	Iberia

1.2.2 Structural Protection Projects

Structural Protection projects reduce hurricane flood risk in coastal communities by acting as a physical barrier against storm surge. The 20 Structural Protection projects evaluated in the 2017 Coastal Master Plan include one or more of the following basic components:

- **Earthen Levee:** The principal component of each Structural Protection project is the earthen levee. These structures consist of pyramidal banks of compacted earth that provide a barrier against storm surge for coastal communities or assets. Levees can either be linear or ring levees. Ring levees form a closed risk reduction system that encircles a protected area (referred to as a polder). Linear levees create a closed system by tying into other linear levees or by extending inland to high ground. Based on local geotechnical and hydraulic conditions, some levee templates include stability berms on the protected side and wave berms on the flood side of levees. CPRA's Louisiana Flood Protection Design Guidelines (July 2015b) were used when applicable to inform levee geometry selections when not made explicit in a source report or document.
- **Concrete T-wall:** T-walls are typically located at points along an earthen levee that have a high potential for erosion or insufficient space for the wide slopes of an earthen levee.
- **Floodgate:** Floodgates are needed where levees or T-walls cross a road or railroad or where they intersect waterways.
- **Ring Pumps (Internal to Levees):** Pumps are needed in enclosed risk reduction systems to allow water that enters a polder to be pumped out.

Additional information about the Structural Protection projects evaluated in the master plan is presented in Section 3.9. Table 9 presents the 20 Structural Protection projects evaluated in the 2017 Coastal Master Plan.

Table 9: Structural Protection Projects Evaluated in the 2017 Coastal Master Plan.

Project ID	Project Name	Description	Parish
001.HP.04	Greater New Orleans High Level	Hurricane protection levee around the Greater New Orleans area from Verret to the Bonnet Carre Spillway (elevation 15 to 35 feet)	Orleans; St. Bernard; Jefferson; St. Charles; Plaquemines

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Project ID	Project Name	Description	Parish
001.HP.05	Greater New Orleans LaPlace Extension	Hurricane protection levee in the LaPlace area (elevation 13.5 feet)	St. Charles; St. John; St. James
001.HP.08	Lake Pontchartrain Barrier	Planning and design of hurricane protection barriers across the passes at Chef Menteur and The Rigolets (elevation 2.0 feet)	Orleans; St. Tammany
001.HP.13	Slidell Ring Levee	Hurricane protection levee around Slidell (elevation 16.0 feet)	St. Tammany
002.HP.06	Upper Barataria Risk Reduction-Hwy 90 Alignment	Hurricane protection levee along Highway 90 between the West Bank and Larose (elevation 15.5 feet)	St. Charles; Lafourche; Jefferson
002.HP.07	Lafitte Ring Levee	Hurricane protection levee around Lafitte (elevation 16.0 feet)	Jefferson
002.HP.100	Fort Jackson to Venice	Hurricane protection levee between Fort Jackson and Venice (elevation 18.0 feet)	Plaquemines
002.HP.101	St. Jude to City Price	Hurricane protection levee between St. Jude and City Price (elevation 17.0 to 22.0 feet)	Plaquemines
002.HP.102	Oakville to La Reussite	Hurricane protection levee between Oakville and La Reussite (elevation 10.5 feet)	Plaquemines
03a.HP.02b	Morganza to the Gulf	Hurricane protection levee around Houma and Terrebonne ridge communities from Larose to Humphreys Canal (elevation 19.5 to 36.5 feet)	Lafourche; Terrebonne
03a.HP.20	Maintain Larose to Golden Meadow-basic	Maintenance of existing Larose to Golden Meadow hurricane protection levees to design elevation for 50-year period of analysis	Lafourche
03a.HP.101	Maintain Larose to Golden Meadow-enhanced	Maintenance of existing Larose to Golden Meadow hurricane protection levees to design elevation for 50-year period of analysis	Lafourche

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Project ID	Project Name	Description	Parish
03a.HP.102	Morganza to the Gulf- enhanced inducements investigation	Hurricane protection levee around Houma and Terrebonne ridge communities from Larose to Humphreys Canal	Lafourche; Terrebonne
03a.HP.103	Morganza to the Gulf- basic inducements investigation	Hurricane protection levee around Houma and Terrebonne ridge communities from Larose to Humphreys Canal	Lafourche; Terrebonne
03b.HP.08	Amelia Levee Improvements (3E)	Hurricane protection levee along the GIWW between Lake Palourde and the Bayou Boeuf Lock (elevation 18.0 feet)	Assumption; St. Mary
03b.HP.10	Morgan City Back Levee	Hurricane protection levee along Lake Palourde in the vicinity of Morgan City (elevation 13.5 feet)	St. Mary
03b.HP.12	Franklin and Vicinity	Hurricane protection levee along the GIWW between the Wax Lake Outlet and Charenton Drainage and Navigation Canal and along Bayou Sale (elevation 16.5 feet)	St. Mary
03b.HP.13	Bayou Chene Floodgate	Floodgate across Bayou Chene near Amelia (elevation 10.0 feet)	St. Mary; Terrebonne
03b.HP.14	St. Mary/Iberia Upland Levee	Hurricane Protection levee in Iberia and St. Mary Parishes between the Delcambre Canal and the Charenton Canal (elevation 15.5 to 20.0 feet)	St. Mary; Iberia
004.HP.15	Abbeville and Vicinity	Construction of a levee south of Delcambre, Erath, and Abbeville roughly following Highway 330 from the Delcambre Canal to the western extents of Abbeville (elevation 23.0 to 27.0 feet)	Iberia; Vermilion

Note: All elevations are referenced to the North American Vertical Datum of 1988 (NAVD88 Geoid 12a).

1.2.3 Nonstructural Protection Projects

Nonstructural Protection projects include commercial floodproofing, residential elevation, and residential voluntary acquisition. Table 10 presents the 54 Nonstructural Protection project areas evaluated in the 2017 Coastal Master Plan. These projects include floodproofing commercial properties where 100-year flood depths are 0-3 feet, elevating residential properties where 100-year flood depths are 3-14 feet, and acquiring residential properties where 100-year flood

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depths are greater than 14 feet based on Coastal Louisiana Risk Assessment (CLARA) Base Flood Elevation +2.0 feet.

Table 10: Nonstructural Protection Project Areas Evaluated in the 2017 Coastal Master Plan.

Project ID	Name	Parish
ACA.01N	Acadia	Acadia
ASC.01N	Ascension – Donaldsonville	Ascension
ASC.02N	Ascension – Prairieville/Sorrento	Ascension
ASU.01N	Assumption	Assumption
ASU.02N	Assumption – Amelia	Assumption
CAL.01N	Calcasieu	Calcasieu
CAM.01N	Cameron	Cameron
IBE.03N	Iberia	Iberia
IBE.01N	Iberia – Lower	Iberia
IBV.01N	Iberville	Iberville
JEF.01N	Jefferson – Grand Isle	Jefferson
JEF.03N	Jefferson – Kenner/Metairie	Jefferson
JER.02N	Jefferson – Lafitte/Barataria	Jefferson
JEF.04N	Jefferson – Marrero/Gretna	Jefferson
JFD.01N	Jefferson Davis	Jefferson Davis
LFT.01N	Lafayette	Lafayette
LAF.02N	Lafourche – Larose/Golden Meadow	Lafourche
LAF.01N	Lafourche – Lower	Lafourche
LAF.03N	Lafourche – Raceland	Lafourche
LIV.01N	Livingston	Livingston
ORL.04N	Orleans – Algiers	Orleans
ORL.02N	Orleans – Lake Catherine	Orleans
ORL.03N	Orleans – New Orleans	Orleans

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Project ID	Name	Parish
ORL.01N	Orleans – Rigolet	Orleans
PLA.04N	Plaquemine – Belle Chasse	Plaquemines
PLA.02N	Plaquemines – Braithwaite	Plaquemines
PLA.03N	Plaquemines – Grand Bayou	Plaquemines
PLA.05N	Plaquemines – Phoenix/Pointe A La Hache	Plaquemines
PLA.01N	Plaquemines – West Bank	Plaquemines
STB.02N	St. Bernard	St. Bernard
STB.01N	St. Bernard – Yscloskey/Delacroix	St. Bernard
STC.04N	St. Charles – Ama	St. Charles
STC.03N	St. Charles – Destrehan	St. Charles
STC.01N	St. Charles – Hahnville/Luling	St. Charles
STC.02N	St. Charles – Montz	St. Charles
STC.05N	St. Charles – Salvador	St. Charles
STJ.01N	St. James – Convent	St. James
STJ.02N	St. James – Vacherie	St. James
SJB.03N	St. John the Baptist – Edgard	St. John the Baptist
SJB.02N	St. John the Baptist – Garyville	St. John the Baptist
SJB.01N	St. John the Baptist – Laplace/Reserve	St. John the Baptist
SMT.01N	St. Martin	St. Martin
STM.04N	St. Mary – Franklin/Charenton	St. Mary
STM.02N	St. Mary – Glencoe	St. Mary
STM.05N	St. Mary – Lower	St. Mary
STM.01N	St. Mary – Morgan City	St. Mary
STM.03N	St. Mary – Patterson	St. Mary

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Project ID	Name	Parish
STT.01N	St. Tammany	St. Tammany
STT.02N	St. Tammany – Slidell	St. Tammany
TAN.01N	Tangipahoa	Tangipahoa
TER.02N	Terrebonne – Houma	Terrebonne
TER.01N	Terrebonne – Lower	Terrebonne
VER.01N	Vermilion	Vermilion
VER.02N	Vermilion – Abbeville/Delcambre	Vermilion

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2.0 Project Attributes Assumptions

2.1 Task Attribute Descriptions and Background

Following development of the candidate projects list, specific project details were required to define project features affecting the landscape and hydrology in the coastal system. This was accomplished by the development of specific attributes for each type of candidate project to provide parameters needed for both the predictive models and the Planning Tool. Due to the variety of candidate restoration and risk reduction projects, attribute descriptions were developed for each project evaluated. Attributes for all projects evaluated are presented in the 2017 Coastal Master Plan Project Attributes Table (Attachment A-2, A-3, A-4, and A-5). The implementation of 2017 Coastal Master Plan projects should adhere to the most current version of the Louisiana Flood Protection Design Guidelines (2015b) and the Louisiana Restoration Design Guidelines (2015c).

2.2 General Attributes Common for all Project Types

The following list of attributes is common for each candidate restoration project and risk reduction project:

1. **Project Number:** A unique project identification number, arranged by "Component Planning Unit. Project Type. Sequential Number" (e.g., 001.MC.09) for restoration and structural risk reduction projects and "Community. Sequential Number" (e.g., VER.02N) for Nonstructural Protection projects.
2. **Project Name:** A unique name for each project.
3. **Project Type:** BS=Bank Stabilization, MC=Marsh Creation, DI= Diversion, SP=Shoreline Protection, BH=Barrier Island/Headland Restoration, RC=Ridge Restoration, HR=Hydrologic Restoration, OR=Oyster Barrier Reef, HP=Hurricane Protection, and NS=Nonstructural.
4. **Description:** Brief description of project features and intent.

2.3 Planning Tool Attributes Common for all Project Types

The following list of attributes is common for each candidate restoration project and risk reduction project:

- **P/E&D Duration:** Expected length of time to complete all planning, engineering, and design (P/E&D) activities. Based on average historical data or previous study data of similar project planning and design durations. Durations inform the Planning Tool of the lag time required between project selection and realization of a project and its impacts on the landscape.
- **Estimated P/E&D Cost:** Total estimated cost associated with all aspects of P/E&D phase including engineering, surveying, hydraulic modeling, geotechnical work, wetland delineations, land rights, and cultural resources investigation. Calculated as 10% of Estimated Construction Cost (before contingency) for all project types except for diversions greater than 75,000 cfs and Hurricane Protection Projects. P/E&D was calculated as 6% of the Estimated Construction Cost for diversions greater than

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75,000 cfs. P/E&D was calculated as 15-20% of the Estimated Construction Cost for Hurricane Protection Projects.

- **Construction Duration:** Expected length of time to complete all construction activities. Based on average historical data or previous study data of similar project construction durations. Durations inform the Planning Tool of the lag time required between project selection and realization of a project and its impacts on the landscape.
- **Estimated Construction Cost:** Total estimated cost associated with all aspects of construction phase including a 20% contingency. Details of Estimated Construction Cost by project type are outlined in Section 3.0.
- **Estimated O&M Cost:** Total estimated cost associated with all aspects of operations and maintenance (O&M) phase. Details of O&M cost by project type are outlined in Section 3.0.
- **Estimated Construction Management Cost:** Total estimated cost associated with the oversight of construction. This cost is 5% of the Estimated Construction Cost and is included with the Estimated Construction Cost when reported to the Planning Tool.
- **Cost Uncertainty Factor:** Represents the uncertainty associated with the estimated construction cost and is outlined in Section 2.5.3.
- **Prerequisites:** List of other projects that would need to be implemented before the candidate project would be implemented.
- **Mutually Exclusive Projects:** List of other projects that would not be included in an alternative should the current project be selected.
- **Latitude/Longitude:** Centroid of project used for tracking purposes within the Planning Tool expressed in the NAVD88, Universal Transverse Mercator (UTM) spatial reference.

Note: Project-specific details about P/E&D, Construction, and O&M costs are presented by project type in the following sections. All costs are calculated for 2015. P/E&D Duration, Estimated P/E&D Cost, and Cost Uncertainty Factor are not attributes for Nonstructural Protection projects.

2.4 General/Planning Tool Attributes Specific to Project Types

Table 11 presents a list of general and Planning Tool attributes that are specific to project types. Additional information about these attributes is presented by project type in the following sections.

Table 11: Project Attributes Specific to Project Types.

Attribute	Description	Applicable Project Types
Operational Regime	Explanation of the operational strategies and triggers for each structure.	DI
Created Acres	Total acres of land created or nourished by project.	BS, BH, MC, OR, RC, SP
Length	Total length of project centerline.	BS, BH, DI, OR, RC, SP, HP

Attribute	Description	Applicable Project Types
Volume	Total estimated volume of fill material required to construct the project feature using one initial lift based on the target elevation at the time of construction.	BS, BH, MC, RC, SP
Borrow Source	Borrow area(s) required to construct project feature(s).	BS, BH, MC, RC
Fill Source	Numerical code corresponding to an identified borrow source/region from which fill material will be obtained (used by Planning Tool for sediment constraint application).	BH, MC
Dune Elevation	Dune crest elevation at the time of construction.	BH
Beach Elevation	Beach crest elevation.	BH
Dune Volume	Design volume based on the barrier island design template and an initial advanced volume equal to 100% of the design volume.	BH
Beach Volume	Design volume based on the barrier island design template and an initial advanced volume equal to 100% of the design volume.	BH
Marsh Volume	Total estimated volume of marsh fill material required to construct the back barrier marsh component of a Barrier Island/Headland project.	BH
Crest Elevation	Top of crown elevation.	OR, RC, SP
Marsh Elevation	Marsh elevation of consolidated fill material after one year of settlement.	BH, MC
Invert Elevation	Invert elevation of control structure (taken from previous report if available; assumed if unknown).	DI, HR
Opening Geometry Area	Total area of control structure opening (taken from previous report if available; assumed if unknown).	DI, HR
Opening Geometry	Description of the dimensions and geometric shape of control structure opening.	DI, HR
Discharge	Peak design flow through the structure and channel.	DI
River	Numerical code corresponding to river that is the source of fresh water for a diversion project.	DI

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Attribute	Description	Applicable Project Types
Footprint	Levee footprint based on the length and width of each levee.	HP
Existing Average Elevation	Average surface elevation within project footprint.	HP
Design Elevation	Target height of proposed protection features.	HP

Legend:
BS – Bank Stabilization
DI – Diversion
HR – Hydrologic Restoration
OR – Oyster Barrier Reef
SP – Shoreline Protection
BH – Barrier Island/Headland Restoration
HP – Structural Protection
MC – Marsh Creation
RC – Ridge Restoration

2.5 Detailed Project Attribute Assumptions and Rationale (Excluding Nonstructural)

2.5.1 Project Feature Development

In an effort to delineate project features for the candidate projects, conceptual restoration feature design templates were developed for each type of restoration project. These templates are based on current design methodologies and lessons learned from recently constructed restoration projects. The templates were used to populate the project attributes for each project. The conceptual restoration design templates are shown on Figures 4 through 7 in Section 4.0.

2.5.2 Project Total Cost Development and Rationale

Project cost-estimates were developed for each project type and are typically based on the conceptual design of known project features. The conceptual restoration and protection feature design templates, historical bid and cost data, and cost methodology were researched and developed by the CPRA Engineering Division to estimate cost. When applicable, unit prices from recently bid projects or completed study values from other coastal programs were also used to develop unit cost parameters. All cost-estimates and unit costs are in 2015 dollars.

2.5.3 Project Total Cost Breakdown

The following criteria were assumed for the development of the Project Total Cost. Project total cost-estimates are presented in the Project Fact Sheets in Attachment A7.

- The estimated construction cost was developed according to the unit cost method of estimation using both a detailed and systems approach. The unit cost method is the sum of costs for various project components based on estimated unit costs times the estimated quantities of material. Estimated construction bid items, unit costs, and quantities were developed for each candidate project type.

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- A 20% contingency was used to develop the final estimated construction cost for restoration projects. A 15-30% contingency was applied to Structural Protection projects (see Section 3.9 for additional detail) based on CPRA Engineering Division guidance. Contingency is a dollar amount intended to provide an allowance for costs expected to be part of a project total, but that have not been specifically identified or for which no quantities have been estimated.
- The P/E&D cost is a percentage of the estimated construction cost. A P/E&D cost was estimated at 10% of the estimated construction cost (before contingency in the case of restoration projects) with the exception of diversions and hurricane protection projects. For diversions, P/E&D cost was estimated at 10% of estimated construction cost for those with a capacity less than 75,000 cfs and 6% for diversions greater than 75,000 cfs. For hurricane protection projects, P/E&D cost ranged between 15-20% based on historical data from previously constructed projects.
- Construction management cost is a cost for professional services during construction to monitor contractor compliance with contract requirements and to monitor schedules and costs. It was estimated as 5% of the construction cost (before contingency in the case of restoration projects). Construction management costs are reported separately for clarity, but are included in construction cost for Planning Tool analysis.
- The O&M cost is specific for each project type as described in the subsections below.
- The total cost is the sum of the estimated construction cost (including contingency), the P/E&D cost, the construction management cost, and the O&M cost.

Tables 12 and 13 were developed to provide guidelines for estimating uncertainty in project costs. The uncertainty factor acknowledges that project components are not fully developed and defined at the planning level, that projects may be more complex and costly than proposed, or that selected costs are higher than anticipated. The range of uncertainty defines an anticipated window within which costs are expected to fall based on the project complexity and outside influences.

Cost uncertainty methodology was assigned based on two main factors: how much information exists about the proposed project and its location and the scale of the proposed project. Table 12 tracks the uncertainty factors used to consider the uncertainty assignment for each project type. Table 13 lists the bounding ranges of uncertainty for each project type and the actual uncertainty ranges calculated for all projects within each project type. Bounding allowable ranges were assigned by the CPRA Engineering Division based on prior project experience. A scoring system gave each distinct project credit for the amount of existing information available and the scale of the project. The ranges within each project type of all individual project uncertainty factor scores are listed in Table 13 as the Calculated Variation. All project-specific Cost Uncertainty Factors can be found in Attachment A-6.

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Table 12: Cost Uncertainty Factors by Project Type.

	BS	BH	DI	HP	HR	MC	OR	RC	SP
Existing Survey Information • No Information • Regional Maps/Charts • Remotely Sensed (Light Detection and Ranging [LiDAR]) • Local Survey • Design Level Survey Report	X	X	X	X		X	X	X	X
Existing Geotechnical Information • No Information • Regional Information/Borings • Sporadic Local Information/Borings • Project-Specific Borings/Testing • Design Level Geotechnical Report	X	X	X	X		X	X	X	X
Existing Design Reports • No Prior Study • Basic Feasibility Report • Detailed Feasibility or Basic 30% Design Report • Detailed 30% Design or Basic 65% Design Report • 95-100% Design Report	X		X	X			X	X	X
Existing Borrow Source Investigation • No Prior Study • Sparse Sampling • Detailed Sampling & Testing • Detailed Information Exists and Location has been Permitted for Excavation • Site has Previously been Mined for Borrow		X				X			

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	BS	BH	DI	HP	HR	MC	OR	RC	SP
Existing Pipeline Corridor Investigation • No Prior Study • Basic Information and Survey from Public Datasets • Sparse Survey, Magnetometer, Pipeline Location Data • Local Survey, Magnetometer, Pipeline Location Data • Design Level Study or Previously Permitted Pipeline Corridor		X				X			
Scale-Project Length (miles) • Shorter Lengths Yield Lower Uncertainty	X			X			X	X	X
Scale-Number of Structures. • Fewer Structures Yield Lower Uncertainty				X	X				
Scale-Magnitude of Hydrologic Exchange/Flow Exchange (cfs) • Smaller Flow/Exchange Yields Smaller Structures and Lower Uncertainty			X		X				
Scale-Local Water Depth (feet) • Shallower Water Depths Yield Lower Uncertainty in Fill Quantity and Cost								X	

Legend:
BS – Bank Stabilization
BH – Barrier Island/Headland Restoration
DI – Diversion
HP – Structural Protection
HR – Hydrologic Restoration
MC – Marsh Creation
OR – Oyster Barrier Reef
RC – Ridge Restoration
SP – Shoreline Protection

Note: Length, Structure, and Hydrologic Exchange/Flow and uncertainty cutoffs vary between project types.

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Table 13: Cost Uncertainty Factor Bounding and Calculated Ranges.

	Bounding Allowable Uncertainty Range	Calculated Variation
Bank Stabilization	10-80%	54-65%
Barrier Island/Headland	5-50%	8-16%
Diversions	10-80%	13-68%
Hurricane Protection	10-70%	30-57%
Hydrologic Restoration	10-80%	48-58%
Marsh Creation	5-30%	5-27%
Oyster Reef	10-80%	47-54%
Ridge Creation/Restoration	10-80%	37-72%
Shoreline Protection	5-50%	21-42%

2.5.4 Planning/Engineering and Design Duration Rationale

The estimated P/E&D project durations were developed based on a review of past projects and current design and construction practices. Durations are the expected length of time to complete either all P/E&D or construction activities and were estimated based on CPRA Engineering Division's prior project experience. P/E&D duration includes the time and efforts associated with obtaining landowner agreements, servitudes, environmental regulatory compliance permits, and contracting agreements. Durations were estimated based on the project size and complexity, and specific duration assumptions are discussed by project type in Section 3.0. Table 14 was developed to provide guidelines for estimating project durations by project type. Table 15 was developed for estimating Nonstructural project durations based on the number of structures to be mitigated within a given project.

Table 14: Duration Ranges.

	P/E&D Duration Range (Years)	Construction Duration Range (Years)
Bank Stabilization	2-3	1-4
Barrier Island/Headland	3	3
Diversions	4-6	2-7
Hurricane Protection	3-4	1-10
Hydrologic Restoration	2-3	1-4
Marsh Creation	2-3	1-20

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	P/E&D Duration Range (Years)	Construction Duration Range (Years)
Oyster Reef	3	3
Ridge Creation/Restoration	2	2
Shoreline Protection	2-3	2-4

Table 15: Duration Ranges for Nonstructural Projects.

	P/E&D Duration Range (Years)	Construction Duration Range (Years)
Nonstructural Protection	N/A	0-30 Structures: 1 31-200 Structures: 2 201-500 Structures: 3 501-1000 Structures: 4 1001-2000 Structures: 5 2001+ Structures: 7

2.5.5 Cost and Feasibility of Marsh Creation and Barrier Island/Headland Projects

The master plan is considering the implementation of a multitude of Marsh Creation and Barrier Island/Headland project increments. The cost and feasibility of constructing these projects will likely vary depending on when the projects are implemented. This section describes an approach to reflect this in the cost-estimates and a new feasibility constraint for the 2017 Coastal Master Plan.

2.5.5.1 Approach for 2012 Coastal Master Plan

For the 2012 Coastal Master Plan, the effects of each project and cost of construction were based on implementation in Year 1 of the 50-year planning period. When constructing alternatives, the Planning Tool would simply shift the effects of the project in time to account for engineering, design, and construction phases and delay due to implementing in later periods. It would assume the costs and sediment would remain the same in current dollars, despite the possible greater requirements in the future.

2.5.5.2 Approach for 2017 Coastal Master Plan

The 2017 Coastal Master Plan reflects higher potential costs and sediment requirements accounting for the time for engineering and design and when a project is implemented in the second or third implementation periods. The 2017 Coastal Master Plan also introduces a feasibility screen when formulating a project so that resources are not allocated in the Planning Tool to an infeasible project (e.g., when the water is too deep). This approach treats project increments separately. To do this, construction cost and sediment requirements for implementation in Periods 1, 2, and 3, for each environmental scenario were developed. The

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approach applies to project types where cost is dependent on conditions at the time of implementation, i.e., Barrier Island and Marsh Creation projects.

2.5.5.3 Developing the Needed Data

As part of the "project evaluation" phase, the Water Institute of the Gulf worked with the modeling team to generate a sediment requirement and wetland/barrier area for each environmental scenario and implementation period. The attributes team then used these sediment requirements to develop associated cost-estimates for each project/scenario/ implementation case.

2.5.5.4 Dredge Mobilization Estimator

A detailed cost-estimating sheet was developed to estimate hydraulic dredging costs for the Barrier Island/Headland and Marsh Creation project types. This effort was necessary to capture the myriad of factors that affect the cost of hydraulically dredging and placing material over sometimes great distances on a per-project basis.

Because many of the Barrier Island/Headland and Marsh Creation projects are composed of up to tens of thousands of acres of proposed restoration, the analysis team employed a system to subdivide each project into multi-part polygons with a maximum area of 2,000 acres per cell per polygon. The 2,000-acre cutoff point was arrived upon via analysis through the Draft Feasibility Report, Innovative Dredging Initiative (Arcadis, 2011). This allowed the analysis team to approach vast projects on a scale that is relatable to the scale found in previously constructed CPRA hydraulic fill projects.

For each 2,000-acre cell, aerial photography and Geographic Information System (GIS) software were used to determine the areas of dredge material placement and potential borrow sources. The dredge pipeline corridor was spilt into segments of pipeline to include subline, shoreline (land-based line or shallow water with firm bottom), and pontoon (floating line required behind the dredge). The pipeline was then further divided into segments that had to be in placed before dredging could begin and those sections that would require pickup when dredging is complete. Unit costs were estimated using values from recent dredging projects conducted by CPRA based on pumping distance, sediment type, dredge plant, and number of dredges assumed for each project. CPRA created unit cost relationships based on project bid data which capture the effects that distance and sediment type have on unit cost. Results of this analysis are shown on Figure 4. Mobilization and demobilization costs, boosters, containment, bucket dredges, jack and bore, earth-moving equipment, and other necessary costs were estimated and included as well on a per-project basis. The sum of all 2,000 acre cells within a given project was then used to calculate the overall Project Construction Cost.

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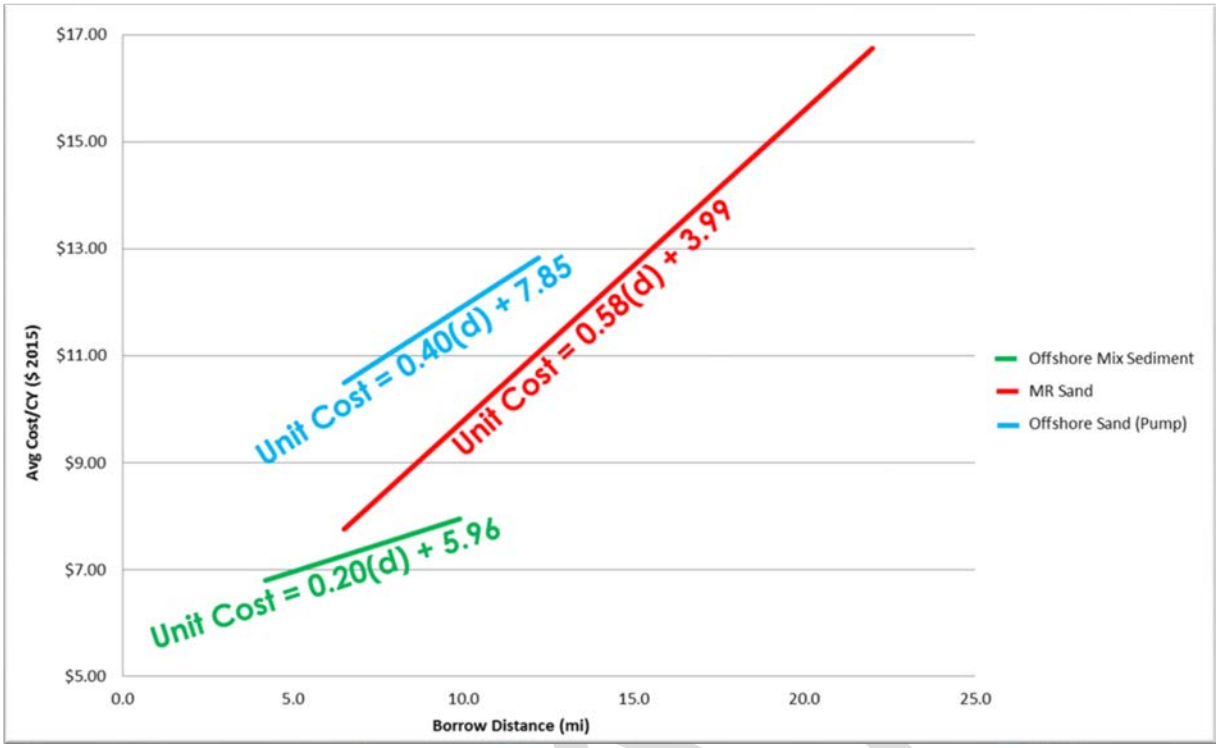

Figure 4: Pumping Cost versus Distance Pumped by Sediment Type.

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3.0 Project Attribute Assumptions for Each Project Type

The following sections present information about the principal project attribute assumptions for each project type. Tables of all project attributes can be found in Attachments A-2, A-3, A-4, and A-5.

3.1 Bank Stabilization (BS)

Bank stabilization projects are defined as the onshore placement of earthen fill and vegetative plantings and are primarily used to reduce wave energies and maintain shorelines in open bays, lakes, and natural and artificial channels. Conceptual design templates and costs were developed for bank stabilization projects using recently designed projects. Large-scale project features and costs that significantly exceed the size of recently designed projects are based on scaling of these features.

The cost of a bank stabilization project is primarily influenced by the in-situ material properties, wave conditions, and geographic location. Vegetative plantings will be required during O&M cycles. The uncertainty in design, costs, and duration increases with project size.

3.1.1 Bank Stabilization Project Assumptions and Attributes

1. **Length:** Total length of the Bank Stabilization project.
2. **Crest Elevation:** Top of crown elevation of the Bank Stabilization project**.**
3. **Top Width:** Total width at top of Bank Stabilization project perpendicular to the project centerline.
4. **Base Width:** Total width at base of project perpendicular to the project centerline.
5. **Side Slope Water:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.
6. **Side Slope Marsh:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.
7. **Wave Attenuation:** Percent of wave energy deflected away/prevented from contact with the shoreline by the project. This value was calculated on a per-project basis using methodology found in the USACE Coastal Engineering Manual (2002).
8. **Armoring Type:** The type of armoring used to construct the bank stabilization and protect against erosion (articulated concrete block mat, riprap, or high performance turf reinforcement mat).
9. **Borrow Source:** The borrow area(s) required to construct the feature(s). Note: Bank stabilization projects assumed an in-situ source (i.e., material immediately adjacent to project site).
10. **Volume:** Total dredge volume required for project. Note: Bank stabilization projects assumed sediment constraints do not apply to in-situ material sources. Fill volume was calculated by multiplying the average cross sectional area by the length. The cross-sectional area was calculated using the template and the existing average elevation. Source volume was calculated by multiplying the fill volume by a loss factor based on historical data from similar projects constructed by CPRA.
11. **Existing Average Elevation:** Elevation of the existing ground calculated as an average for length of project based on the 2017 Coastal Master Plan Initial Conditions Digital Elevation Model (DEM).
12. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction

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management costs as well as the following bid items: mobilization and demobilization, earthen fill, vegetative plantings, and surveys.

13. **Estimated Operation and Maintenance Cost:** Includes O&M costs for annual activities as well as the following bid items: one ridge lift, vegetative planting, and profile survey (TY5). This project type calculated specific O&M event quantities based on a 50-year project life. Those summed 50-year costs were annualized for the Planning Tool so that O&M costs could be calculated to represent actual project lifespan, should it be less than 50 years if the project is selected for a later Implementation Period.

Bank Stabilization Project Landscape Feature Assumptions (See Figure 4 in Section 4.0):

- Geometry:
    - A crown elevation of +4.0 feet NAVD88 (geoid 12a) to be maintained for the duration of the project.
    - A 20-foot crown width; 20:1 – water-side slopes /10:1 – marsh-side slopes.
    - Placement of material on shoreline edge.

Bank Stabilization Project Cost Assumptions:

- Access and flotation channels included.
- Using in-situ material placed by mechanical dredge.
- Vegetative plantings included in O&M cost to ensure that 30% of the area has vegetative coverage.

Bank Stabilization Project Duration Assumptions:

- Bank stabilization duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, borrow area, preconstruction, magnetometer surveying, production rate of typical equipment such as mechanical bucket dredge/barges, earth-shaping equipment such as dozers, installation rate of armor type specific to each project, and project acceptance. See Table 14 for project duration ranges for Bank Stabilization projects.

3.2 Barrier Island/Headland Restoration (BH)

Barrier Island/Headland Restoration projects create and restore dune, beach, and back barrier marsh to restore or augment Louisiana's barrier islands and headlands and to provide additional storm surge attenuation. Barrier Island/Headland Restoration projects primarily rely on near-shore and/or offshore sediment sources to obtain the required borrow volume to construct the project features. The marsh fill unit cost is typically influenced by the type of material to be dredged, the dredging distance, payment method, and dredging experience. Mobilization and demobilization of construction equipment cost is influenced by the project size, borrow source, dredging distance, pipeline corridor, dredging equipment, dredging volume, manpower, and contractor risk. Projects along the Gulf of Mexico are typically at greater risk from storm effects and may require several demobilizations due to storm impacts. Larger dredging volumes may require several dredges, pipeline corridors, and borrow sources.

Due to the use of large offshore sediment sources, permitting of these borrow sources would require a longer period for permit review and approval and could lengthen the time to finalize the design and implement construction. Consequently, the uncertainty in design, costs, and duration increases with project size.

3.2.1 Barrier Island/Headland Project Assumptions and Attributes

1. **Length:** Total length of project.
2. **Base Width:** Total width at base of project perpendicular to the project centerline.
3. **Side Slope Water:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the water side of project.
4. **Side Slope Marsh:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the marsh side of project.
5. **Side Slope Beach:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the water side of project.
6. **Borrow Source:** The borrow area(s) required to construct the feature(s). For further project development, the source of material should be optimized using material from shoals, relic channels, the Mississippi River, or other. A 500-foot buffer should be used near existing inland pipelines and a 1,500-foot buffer for offshore pipelines. Borrow sources were selected from those identified in the Report on Louisiana Surficial Sediment Distribution Maps Compilation and Sand/Sediment Volume Estimates (Larenas et al., 2015).
7. **Volume:** Total dredge volume required for project, including assumed loss factor.
8. **Beach Area:** Total area of beach created or nourished by project.
9. **Beach Elevation:** The beach crest elevation post construction.
10. **Beach Volume:** Design volume based on the 50-year barrier island design template (see geometry assumptions below).
11. **Dune Area:** Total area of dune created or nourished by project.
12. **Dune Elevation:** The dune crest elevation post-construction.
13. **Dune Volume:** Design volume based on the 50-year barrier island design template (see geometry assumptions below).
14. **Marsh Area:** Total area of marsh created or nourished on the bay side of the barrier island by project.
15. **Marsh Elevation:** Marsh elevation on seaward side of Barrier Island/Headland typical template after one year of settlement.
16. **Marsh Volume:** Total estimated volume of marsh fill material required to construct the project feature using one initial lift based on the target marsh fill elevation at +3.0 feet NAVD88 (geoid 12a). Regional settlement curves were used to determine target marsh elevation.
17. **D_{50}:** The 50th percentile diameter of the sediment to be used.
18. **Percent Sand In Eroding Profile:** Percentage of sand within the eroding profile.
19. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management costs as well as the following bid items: mobilization and demobilization, settlement plates, beach fill, dune fill, marsh fill, earthen containment dikes, navigation aids, sand fencing, surveys, sea turtle relocation, and vegetative plantings.
20. **Estimated Operation and Maintenance Cost:** Includes O&M costs for annual activities and assumed to be 5% of the estimated construction cost (before contingency). O&M costs were assumed to include the following bid items: sand fencing replacement (TY5, TY15, TY25, TY35, and TY50), vegetative plantings (TY5, TY15, and TY25), containment dike gapping (TY1, TY3, and TY5), and profile surveys (TY5, TY15, TY25, TY35, and TY50). This project type calculated specific O&M event quantities based on a 50-year project life. Those summed 50-year costs were annualized for the Planning Tool so that O&M costs could be calculated to represent actual project lifespan, should it be less than 50 years if selected for a later Implementation Period.

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Barrier Island/Headland Project Landscape Feature Assumptions (See Figures 5 and 6 in Section 4.0):

- **Geometry:** All geometric aspects of Barrier Island/Headland design were taken from the Barrier Island/Barrier Headland Restoration Design Template Development Technical Memorandum (CPRA, 2015d) created by Coastal Engineering Consultants on behalf of the CPRA Planning and Research Division.
    - **Barrier Island:** A beach and dune feature with sand fencing; a dune crest elevation of +6.0 feet NAVD88 (geoid 12a), a width of 300 feet, and a 45H:1V slope; 1,500-foot marsh platform; target marsh fill elevation of +3.0 feet NAVD88 (geoid 12a) at TY0 for back barrier marsh platform.
    - **Headland:** A beach and dune feature with sand fencing; a dune crest elevation of +7.0 feet NAVD88 (geoid 12a), a width of 300 feet, and a 45H:1V slope; beach dune at +5.0 feet NAVD88 (geoid 12a); 1,000-foot marsh platform; target marsh fill elevation of +3.0 feet NAVD88 (geoid 12a) at TY0 for back barrier marsh platform.

Barrier Island/Headland Project Cost Assumptions:

- Borrow Source and Pipeline Corridor:
    - **Borrow Source Quantity:** Sufficient borrow source volume to build each conceptual candidate project was assumed through assignment of up to two borrow sources for each island within a project to draw from.
    - **Borrow Source Material Type:** Unit costs for marsh fill and beach/dune fill adjusted accordingly based on source location and material type.
    - **Geographic Location:** Use of sediment sources outside the system (such as the Gulf of Mexico beyond the depth of closure) was maximized. The borrow source location could significantly impact the cost of the project. Therefore, a dredging implementation plan will be required to optimize preliminary project development features by further evaluation of the borrow source location(s), available sediment, dredging logistics, implementation, and environmental criteria.
    - **Dredge Types:** Depending on project location and scale, a number of 20-inch to 30-inch hydraulic cutter suction dredges were identified on a per-project basis.
    - **Pumping Distance:** The maximum distance from the proposed beach/dune fill area(s) to the borrow source(s) identified for each project. Pumping distance was calculated on a per-project basis as discussed in Section 2.5.5 and a requisite number of boosters were then identified, if needed.
    - **Pipeline Corridor:** The hydraulic dredging pipeline route required to deliver the sediment slurry from the borrow source to the beach/dune fill area(s). The pipeline corridor is required to be maintained throughout construction.
        - The amount of land-based pipe and marine-based pipe was calculated on a per-project basis as discussed in Section 2.5.5.
        - Marsh buggies will be utilized for pipeline outfall work in fill area(s).
- Beach/Dune/Marsh Fill Area(s):

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- Fill volumes for beach, dune, and marsh were determined via superimposing the 50-year design template over the 2017 Coastal Master Plan Initial Conditions DEM and evaluating the volume difference required using ArcGIS software. Fill volumes account for loss factors based on previously constructed projects by CPRA.

- Earthen Containment Dike:
  - Containment dikes placed along the perimeter of the proposed marsh fill cells and in the interior to create cells.
  - Constructed using marsh buggy backhoe and in-situ material.

Barrier Island/Headland Project Duration Assumptions:

- Barrier Island/Headland duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, borrow area, preconstruction, magnetometer surveying, production rate of typical equipment such as hydraulic dredges, earthen containment dike construction, pipeline maintenance and construction, earth-shaping equipment such as dozers, installation rate of vegetative plantings, and project acceptance. See Table 14 for project duration ranges for Barrier Island/Headland projects.

3.3 Diversions (DI)

Diversion projects create new conveyance channels to divert fresh water and/or sediment from coastal Louisiana's rivers into adjacent basins to stabilize or restore salinity gradients, nourish existing wetlands, and support land building. Diversion projects are primarily located near the Mississippi River and rely on the nutrients and sediments present in freshwater flows to deliver benefits to the outfall area. Conceptual design templates were developed for candidate diversion projects with flows between 1,000 and 250,000 cfs. Costs are based on current studies such as those shown below. For candidate projects which do not have direct design reports or studies, unit costs derived and scaled from existing design reports were used. The cost of a diversion is affected by river stage, outfall stage, sediment data, dredging requirements, inflow and outfall channel geometry and lengths, infrastructure crossings, control structure type, and operational plan. The uncertainty in design, costs, and duration increases with diversion capacity.

1. **Mid-Barataria Sediment Diversion:** Value Engineering Report. 30% Basis of Design (HDR, 2014).
2. **Lower Breton Sound Sediment Diversion:** Final Site Selection Conceptual Design Engineering Report (URS, 2013).
3. **Design Analysis report:** Lower Barataria Sediment Diversion (Arcadis, 2014).
4. **Louisiana Coastal Area (LCA) Medium Diversion at White Ditch:** preconstruction Engineering and Design Location Analysis (USACE, 2013b).
5. **Mississippi River Diversion into Maurepas Swamp.** (URS, 2014).
6. **Convey Atchafalaya Flow to Terrebonne: Opinion of Probably Cost and Planning Report.** (Moffat & Nichol, 2015).

3.3.1 Diversion Project Assumptions and Attributes

1. **Invert Elevation:** Invert elevation of diversion intake control structure.

2. **Length:** Total length of project conveyance channel.
3. **Opening Geometry Area:** Horizontal distance of the inflow and outflow conveyance channels (if known). Description of the opening type of the intake structure using information from existing planning or feasibility-level studies. For those projects where existing information was not available, the dimensions and geometric shape of the control structure opening were calculated based on peak design flow and a scaling of similar projects in the area which have undergone some level of feasibility and/or design.
4. **Opening Geometry:** Description of the dimensions and geometric shape of control structure opening.
5. **Operational Regime:** Explanation of the operational strategies and triggers for each structure.
6. **Bulk Density:** Bulk density assumption of sediment transported.
7. **Discharge:** Peak design flow through the structure and channel (e.g., 2,000 cfs, 50,000 cfs, 250,000 cfs, or other).
8. **Diversion Channel Depth:** Average depth of diversion conveyance channel.
9. **Diversion Channel Length:** Length of diversion channel from the beginning of the diversion, including the diversion structure, to the outfall area.
10. **Diversion Channel Width:** Bottom width of the conveyance channel from the diversion structure to the outfall area.
11. **Sand, Silt, and Clay Concentration:** Sand, silt, and clay concentration of water during peak diversion flow.
12. **Sediment to Water Ratio:** Sediment capture efficiency.
13. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management costs. It includes all costs pertaining to facilitation of the construction of the inflow/outflow channels, control structure, road and railroad bridges, pipeline relocations, and guide levees.
14. **Estimated Operation and Maintenance Cost:** Includes O&M costs for annual activities. The O&M costs are calculated as 25% of construction cost (before contingency).

Diversion Project Landscape Feature Assumptions:

- Geometry:
    - Inflow channel extending 500 to 1,000 feet from the Mississippi River bank; control structure located 1,000 feet from the Mississippi River bank.
    - A gated control structure appropriate for proposed flows. Gated box culverts were proposed for flows less than 15,000 cfs and tainter gates for flows greater than 15,000 cfs.
    - Extended outfall channel 500 to 1,000 feet into existing basin and/or beyond the existing basin side hurricane protection system.
    - Maximum invert range assumed to be -7.0 feet for diversions less than 15,000 cfs and -40 feet for diversions greater than 15,000 cfs. All elevations given in NAVD88 (geoid 12a).
    - Earthen guide levees on both sides of the channel; earthen levee tie-ins assumed for existing Mississippi River Levee; a 12-foot crown width; 4H:1V side slopes; Mississippi River levee crown elevation adjusted due to location and known data.

- Conveyance channels sized for maximum proposed flows and high velocities for potential sediment capture and delivery to outfall area.

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- A 24 inch riprap scour protection layer for inflow and outflow channel underlain with non-woven geotextile.
- Articulated concrete block mats or riprap were used for channel armoring of the conveyance channel.
- A woven geotextile assumed for guide levee stability support due to soft soils.

Diversion Project Cost Assumptions:

- Mississippi River hydraulic dredging volumes assumed during construction.
- Excavation volumes based on required channel geometry.
- Earthen levee volumes based on guide levee geometry using hauled-in material.
- Riprap tonnage based on a 24 inch rock layer for 100% with 20% spillage.
- Diversions less than 15,000 cfs flow capacity assumed maximum velocity of roughly 3 feet per second for conveyance channel. Riprap channel armoring was only assumed for conveyance channel portions falling within leveed areas. Diversions less than 15,000 cfs flow capacity assume maximum invert of -7 feet for conveyance channel and riprap channel armoring only for conveyance channel portions falling within leveed areas.
- Diversions greater than 15,000 cfs flow assume maximum velocity of roughly 8 feet per second for conveyance channel and Articulated Concrete Block channel armoring for entire conveyance channel. Diversions greater than 15,000 cfs flow assume maximum invert of -40 feet for conveyance channel and riprap channel armoring only for conveyance channel portions falling within leveed areas.
- Highway and railroad bridge costs based on existing design reports referenced in Section 3.3.
- Pipeline and infrastructure crossings were determined from Strategic Online Resource Information System (http://www.sonris.com/). Costs were based on existing design reports referenced in Section 3.3.

Diversion Project Duration Assumptions:

- Derived from recent completed design reports referenced in Section 3.3. See Table 14 for project duration ranges for Diversion projects.

3.4 Hydrologic Restoration (HR)

Hydrologic Restoration projects are primarily used to convey fresh water to proposed outfall areas or to improve water circulation and reduce saltwater intrusion within a hydrologic system. Conceptual design templates were developed for candidate Hydrologic Restoration projects using past projects and proposals. Hydrologic Restoration features and cost are based on current design studies.

The cost of a Hydrologic Restoration project is influenced by the water stage, inflow and outfall channel dimensions and lengths, project scale, control structure type, and operational plan. Uncertainty in design, costs, and duration increases with project size.

3.4.1 Hydrologic Restoration Project Assumptions and Attributes

1. **Invert Elevation:** Invert elevation of the control structure.

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2. **Opening Geometry Area:** Total area of the control structure opening.
3. **Opening Area:** Area of control structure opening.
4. **Operational Regime:** Explanation of the operational strategies and triggers for each structure.
5. **Crest Elevation:** Top of crown elevation.
6. **Top Width:** Total width at top of project perpendicular to the project centerline.
7. **Base Width:** Total width at base of project perpendicular to the project centerline.
8. **Side Slope Water:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the water side of project.
9. **Side Slope Marsh:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the marsh side of project.
10. **Wave Attenuation:** Percent of wave energy deflected away/prevented from contact with the shoreline by the project. This value was calculated on a per-project basis using methodology found in the USACE Coastal Engineering Manual (2002).
11. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management costs. It includes all costs pertaining to construction of the hydrologic restoration feature.
12. **Estimated Operation and Maintenance Costs:** Includes O&M costs for annual activities. The O&M costs were calculated as 5% of construction cost (before contingency).

Hydrologic Restoration Project Landscape Feature Assumptions:

- Excavated channels assumed for restoring hydraulic circulation.
- Hydrologic and salinity control structures assumed to consist of a rock dike, sluice gate, barge gate, or other structure. Project descriptions indicate which type of structure was assumed.

Hydrologic Restoration Project Cost Assumptions:

- Excavation volumes based on required channel geometry.
- Structure costs such as sluice gates were based on similar projects constructed by CPRA.
- Major element costs based on similar projects such as those described in the Calcasieu Ship Channel Salinity Control Measures Project (004.HR.06) Planning and Feasibility Decision Document (CPRA, 2015a).

Hydrologic Restoration Project Duration Assumptions:

- Hydrologic Restoration duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, preconstruction, magnetometer surveying, production rate of typical equipment such as mechanical bucket dredge/barges, earth shaping equipment such as dozers, and project acceptance. See Table 14 for project duration ranges for Hydrologic Restoration projects.

3.5 Marsh Creation (MC)

Marsh Creation projects create wetlands in open water areas through placement of dredged material and vegetative plantings to restore ecosystem services and provide additional storm surge attenuation. Marsh Creation projects have historically relied on near-shore or Mississippi River sediment sources to obtain the required borrow volume to construct the project features. The marsh fill unit cost is typically influenced by the type of material to be dredged, the dredging

distance, payment method, fuel costs, and dredging experience. The mobilization and demobilization cost is influenced by the project size, borrow source, dredging distance, pipeline corridor, dredging equipment, dredging volume, manpower, and contractor risk. Projects near the Gulf of Mexico are typically more at risk from storm effects. Larger dredging volumes may require several dredges, pipeline corridors, and borrow sources.

Marsh Creation projects are constructed primarily in open water areas or areas with deteriorated marsh. Conceptual design templates were developed for candidate Marsh Creation projects using data from recently designed and constructed projects (see Figure 7 in Section 4.0). Uncertainty in design, costs, and duration increases with project size. Costs pertaining to oyster lease acquisition are not included.

3.5.1 Marsh Creation Project Assumptions and Attributes

1. **Borrow Source:** The borrow area(s) required to construct the feature(s). The borrow source is typically the nearest available and suitable borrow source by distance to the marsh area boundary. For further project development, the source of material was optimized using material from shoals, relic channels, the Mississippi River, or other. A 500-foot buffer should be used near existing inland pipelines and a 1,500-foot buffer for offshore pipelines. Borrow sources were selected from those identified in the Report on Louisiana Surficial Sediment Distribution Maps Compilation (CB&I, 2013) (Larenas et al., 2015).
2. **Marsh Area:** Total acres of marsh created or nourished by project.
3. **Volume:** The total estimated volume of marsh fill material required to construct the project feature using one initial lift based on the construction grade elevation, including assumed loss factor.
4. **Marsh Elevation:** Marsh elevation of consolidated fill material after one year of settlement.
5. **Bulk Density:** Bulk density of fill material to be placed.
6. **Sediment Size Distribution:** Particle size distribution of fill material.
7. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management costs as well as the following bid items: mobilization and demobilization, marsh fill, earthen containment dikes, surveys, settlement plates, and vegetative plantings as discussed in Section 2.5.3.
8. **Estimated O&M Cost:** Includes O&M costs for annual activities. The O&M costs were calculated as 5% of construction cost (before contingency). It includes the following bid items: vegetative plantings (TY5, TY15, and TY25), containment dike gapping (TY1, TY3, and TY5), and profile surveys (TY5, TY15, TY25, TY35, and TY50). Those summed 50-year costs were annualized for the Planning Tool so that O&M costs could be calculated to represent actual project lifespan, should it be less than 50 years if selected for a later Implementation Period.

Marsh Creation Project Landscape Feature Assumptions (See Figure 7 in Section 4.0):

- Geometry:
    - **Marsh Creation Fill Area:** One initial marsh fill lift placed to the target marsh fill elevation at TY0 as derived from the regional settlement curves; maximum target marsh fill elevation of +3.2 feet NAVD88 (geoid 12a).
    - **Earthen Containment Dikes:** A crest width of 5 feet, side slopes of 4H: 1V; crown elevation of +4.5 feet NAVD88 (geoid 12a) assumed to be maintained during construction; constructed using in-situ material.

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Marsh Creation Project Cost Assumptions:

- Borrow Source and Pipeline Corridor:
    - **Borrow Source Quantity:** Sufficient borrow source volume to build each conceptual candidate project was assumed through assignment of up to two borrow sources for each project increment within a project to draw from.
    - **Borrow Source Quantity:** Sufficient borrow source volume to build each conceptual candidate project was assumed through assignment of up to two borrow sources for each project increment within a project to draw from.
    - **Geographic Location:** Use of sediment sources outside the system (including in-situ, inland borrow sources, the Mississippi River, Atchafalaya River, and the Gulf of Mexico beyond the depth of closure) was maximized. The borrow source location could significantly impact the cost of the project. Therefore, a dredging implementation plan will be required to optimize preliminary project development features by further evaluation of the borrow source location(s), available sediment, dredging logistics, implementation, and environmental criteria.
    - **Dredge Types:** Depending on project location and scale, a number of 20-inch to 30-inch hydraulic cutter suction dredges were identified on a per-project basis.
    - **Pumping Distance:** The maximum distance from the proposed marsh fill area(s) to the borrow source(s) identified for each project. Pumping distance was calculated on a per-project basis as discussed in Section 2.5.5 and a requisite number of boosters were then identified, if needed.
    - **Pipeline Corridor:** The hydraulic dredging pipeline route required to deliver the sediment slurry from the borrow source to the beach/dune fill area(s). The pipeline corridor is required to be maintained throughout construction.
        - The amount of land-based pipe and marine-based pipe was calculated on a per-project basis as discussed in Section 2.5.5.
        - Marsh buggies will be utilized for pipeline outfall work in fill area(s).
- Marsh Creation Fill Area(s):
    - Fill volumes for marsh were determined via superimposing the design template over the 2017 Coastal Master Plan Initial Conditions DEM and evaluating the volume difference required using ArcGIS software.
        - All areas within the project polygon less than -2.5 feet NAVD88 (geoid 12a) were filled to 100% land; this new land was then built to a project-specific target elevation. Open water areas greater than -2.5 feet deep were not filled. Areas with elevations greater than the design elevation had no material placed on top.
    - Marsh acreages provided by the Integrated Compartment Model based on surface footprint of filled areas.
- Earthen Containment Dike:

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- Containment dikes placed along the perimeter of the proposed marsh fill cells and in the interior to create cells.
- Constructed using marsh buggy backhoe and in-situ material.

Marsh Creation Project Duration Assumptions:

- Marsh Creation duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, borrow area, preconstruction, magnetometer surveying, production rate of typical equipment such as hydraulic dredges, earthen containment dike construction, pipeline maintenance and construction, earth-shaping equipment such as dozers, installation rate of vegetative plantings, and project acceptance. See Table 14 for project duration ranges for Marsh Creation projects.

3.6 Oyster Barrier Reef (OR)

Oyster Barrier Reef projects are defined as bioengineered oyster reefs to improve oyster cultivation and to reduce wave energies on shorelines in open bays and lakes. Conceptual design templates were developed for Oyster Barrier Reef projects using demonstration projects (see Figure 8 in Section 4.0). Smaller features and costs are based on recently designed and constructed projects. Larger features and costs are based on scaling of these features.

The cost of an Oyster Barrier Reef project is primarily influenced by the underlying soil conditions, construction access, local wave conditions, and geographic location. Additional material may be required during construction and for O&M as a result of weak soil conditions. Uncertainty in design, costs, and duration increases with project size.

3.6.1 Oyster Barrier Reef Project Assumptions and Attributes

1. **Length:** Length along the centerline of the project.
2. **Crest Elevation:** Top of reef crown elevation.
3. **Top Width:** Total width at top of project perpendicular to the project centerline.
4. **Base Width:** Total width at base of project perpendicular to the project centerline.
5. **Side Slope Water:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the water side of project.
6. **Side Slope Marsh:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the marsh side of project.
7. **Wave Attenuation:** Percent of wave energy deflected away/prevented from contact with the shoreline by the project. This value was calculated on a per-project basis using methodology found in the USACE Coastal Engineering Manual (2002).
8. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management costs as well as the following bid items: mobilization and demobilization, access and flotation channels, woven geotextile fabric, oyster reef structure, surveys, and navigation aids.
9. **Estimated Operation and Maintenance Cost:** Includes annual O&M costs and is calculated at 25% of construction cost. It includes repair and profile surveys (TY5, TY15, TY25, TY35, and TY50).

Oyster Barrier Reef Project Landscape Feature Assumptions (See Figure 8 in Section 4.0):

- Oyster Barrier Reef Geometry:

  - Base width of approximately 60 feet; units to be placed up to +2 feet above mean high water elevation and assumed to be maintained for the duration of the project.

- Reef Material:
  - Concrete armor unit capable of resisting wave forces and supporting oysters. Armor units to be placed over non-woven geotextile and rock base.

Oyster Barrier Reef Project Cost Assumptions:

- For open water area, an average water bottom elevation of -2 to -5 feet NAVD88 (geoid 12a) was assumed for volume calculations. Additional volume was included to account for initial and long-term consolidation settlement.
- Flotation channels placed along barrier with a 40-foot bottom width; draft of at least -7.0 feet below mean low water.
- A geotextile/rock marine mattress placed under rock.
- A 50-foot fish access placed every 1,000 feet.
- Navigational aids placed every 1,000 feet.

Oyster Barrier Reef Project Duration Assumptions:

- Oyster Barrier Reef project duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, preconstruction, magnetometer surveying, production rate of typical equipment such as installation barges, bed construction, and project acceptance. See Table 14 for project duration ranges for Oyster Barrier Reef projects.

3.7 Ridge Restoration (RC)

Ridge Restoration projects, including ridge creation, are intended to reestablish historical ridges through sediment placement and vegetative plantings to provide additional storm surge attenuation and restore forested maritime habitat. Conceptual design templates were developed for candidate Ridge Restoration projects using existing projects (see Figure 7 in Section 4.0).

The cost of a Ridge Restoration project is influenced by the project length, local water depth, in-situ soil conditions, and geographic location. The uncertainty in design, costs, and duration therefore increases with project size.

3.7.1 Ridge Restoration Project Assumptions and Attributes

1. **Length:** Length along the centerline of the feature.
2. **Crest Elevation:** Top of the ridge crown elevation.
3. **Top Width:** Total width at top of project perpendicular to the project centerline.
4. **Base Width:** Total width at base of project perpendicular to the project centerline.
5. **Side Slope Water:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the water side of project.
6. **Side Slope Marsh:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the marsh side of project.
7. **Ridge Area:** Total area of ridge created or nourished by project.

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8. **Volume:** Total estimated volume of fill material required to construct the project feature using one initial lift to target elevation at TY0 including loss factor. Note: Ridge Restoration projects assumed an in-situ source (i.e., material immediately adjacent to project site).
9. **Existing Average Elevation:** Elevation of the existing ground calculated as an average for the length of project based on the 2017 Coastal Master Plan Initial Conditions DEM.
10. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management cost. An average water bottom elevation of -1.5 feet NAVD88 (geoid 12a) for open water areas and marsh elevation measured at each location. It includes the following bid items: mobilization and demobilization, earthen fill, surveys, vegetative plantings. Reforestation and filling of low areas assumed for Chenier restoration projects.
11. **Estimated Operation and Maintenance Cost:** This cost includes O&M costs for a 50-year project lifespan and was calculated at 25% of the construction cost. It includes the following bid items: vegetative plantings (TY5, TY15, and TY25), earthen fill (TY5, TY15, and TY25), and profile surveys (TY5, TY15, TY25, TY35, and TY50) for Ridge Restoration projects as well as events assumed for invasive species eradication.

Ridge Restoration Project Landscape Feature Assumptions (See Figure 7 in Section 4.0):

- Geometry:
    - A crest width of 50 feet, side slopes of 5H: 1V; crown elevation of +5.0 feet NAVD88 (geoid 12a) assumed to be maintained for the duration of the project; constructed using in-situ material.
- Plantings to ensure that 60% of the area has vegetative coverage.
- Chenier restoration projects include reforestation and filling of low areas.

Ridge Restoration Project Cost Assumptions:

- Costs are based on use of in-situ borrow material for the earthen ridge fill material using several lifts.
- O&M costs were estimated as 35% of the construction cost. They are assumed to include vegetative plantings to ensure that 20% of the area has vegetative coverage and invasive species are removed.

Ridge Restoration Project Duration Assumptions:

- Ridge Restoration project duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, borrow area, preconstruction, magnetometer surveying, production rate of typical equipment such as bucket dredges, earthen containment dike construction, earth-shaping equipment such as dozers, installation rate of vegetative plantings, and project acceptance. See Table 14 for project duration ranges for Ridge Restoration projects.

3.8 Shoreline Protection (SP)

Shoreline Protection projects are defined as near-shore segmented rock breakwaters and are primarily used to reduce wave energies on shorelines in open bays, lakes, sounds, and natural and manmade channels. Conceptual design templates were developed for Shoreline

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Protection projects using recent design methodology (see Figures 9 and 10 in Section 4.0). Shoreline Protection features and costs are based on recently constructed projects.

The cost of a Shoreline Protection project is primarily influenced by underlying soil conditions, construction access, local wave conditions, and geographic location. Additional material is usually required during the construction phase and during the O&M phase due to weak soil conditions. The uncertainty in design, costs, and duration increases with project size.

3.8.1 Shoreline Protection Project Assumptions and Attributes

1. **Length:** Length along the centerline of the rock breakwater feature.
2. **Crest Elevation:** Top of breakwater crown elevation.
3. **Top Width:** Total width at top of project perpendicular to the project centerline.
4. **Base Width:** Total width at base of project perpendicular to the project centerline.
5. **Side Slope Water:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the water side of project.
6. **Side Slope Marsh:** The slope of the fill expressed as the ratio of horizontal distance to vertical distance on the marsh side of project.
7. **Wave Attenuation:** Percent of wave energy deflected away/prevented from contact with the shoreline by the project. This value was calculated on a per-project basis using methodology found in the USACE Coastal Engineering Manual (2002).
8. **Volume:** The total estimated volume of rock required to construct the project feature. An open water contour elevation of -1.0 feet NAVD88 (geoid 12a) was assumed for volume calculations. Additional volume was included to account for the initial and long-term consolidation settlement as well as for losses during construction. A 250-pound class rock was assumed for the breakwater.
9. **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction and construction management costs as well as the following bid items: mobilization and demobilization, access and flotation channels, woven geotextile fabric, 250-pound class rock, navigational aids, surveys, and settlement plates.
10. **Estimated Operation and Maintenance Cost:** Includes O&M costs computed for a 50-year project lifespan and then annualized. Rock fill maintenance events assumed at Years TY5, TY15, and TY25. It includes the following bid items: access and flotation channels (TY5, TY15, and TY 25), rock (TY5, TY15, and TY25 for projects in southeast Louisiana; TY15 and TY25 for projects in southwest Louisiana), and profile surveys (TY5, TY15, TY25, TY35, and TY50).

Shoreline Protection Project Landscape Feature Assumptions (See Figures 9 and 10 in Section 4.0):

- Breakwater Geometry:
    - **Inland Breakwater:** crest width of 4 feet, side slopes of 3H: 1V; crown elevation of +3.5 feet NAVD88 (geoid 12a) assumed to be maintained for the duration of the project.
    - **Gulf Breakwater:** crest width of 16 feet, side slopes of 3H: 1V; crown elevation of +3.5 feet NAVD88 (geoid 12a) assumed to be maintained for the duration of the project.
- Breakwater Contour:

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  - **Inland Breakwater:** constructed at the -1.0-foot NAVD88 (geoid 12a) contour based on calculated wave breaking depth.
  - **Gulf Breakwater:** constructed at the -1.2-foot NAVD88 (geoid 12a) contour to account for the formation of salients and tombolos. See Louisiana Shoreline Erosion Reduction Evaluation for Segmented Rock Breakwaters Technical Memorandum (Technical Memorandum; CPRA, 2014).

- A stone class of 250 pounds was utilized due to the mean stone diameters and the stone mass required to resist wave forces.

Shoreline Protection Project Cost Assumptions:

- Access channels placed every 15,000 feet with a 60-foot bottom width.
- Flotation channels placed along rock breakwater with an 80-foot bottom width; draft at -8 feet below mean low water.
- A woven geotextile placed under rock; 15% overage to account for overlapping.
- A 50-foot fish access placed every 1,050 feet.
- A rock-to-cubic yard ratio of 1.55 and a 10% rock spillage value (i.e., 10% of rock volume assumed to spill into adjacent areas) were used to determine the rock volume.
- Regional settlement percentages were developed for volume calculations and included in the O&M costs: volumes were determined for Years TY5 (50% of volume), TY15 (25% of volume in southeast Louisiana; 15% of volume in southwest Louisiana), and TY25 (10% of volume) and were based on constructed projects.
- Navigation aids placed every 1,000 feet.

Shoreline Protection Project Duration Assumptions:

- Shoreline Protection project duration estimation accounted for the durations of activities typically associated with similar project types such as mobilization/demobilization of equipment, preconstruction, magnetometer surveying, production rate of typical equipment such as installation barges, bed construction, and project acceptance. See Table 14 for project duration ranges for Shoreline Protection projects.

3.9 Structural Protection (HP)

Structural hurricane protection/risk reduction projects evaluated in the 2017 Coastal Master Plan include one or more of the following basic components: earthen levee, concrete T-wall, and floodgates. Floodgates are typically constructed at road, railroad, and water body crossings. Additionally, pump stations are included in the interior of ring levees. Structural Protection projects are designed to reduce risk from storm surge damage associated with tropical cyclone events.

3.9.1 Structural Protection Project Assumptions and Attributes

Project attributes were developed for candidate Structural Protection projects using data from recently studied, designed, or constructed projects. Examples include the Morganza to the Gulf Post Authorization Change Report (2013a), the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study Final Integrated Feasibility Report and Environmental Impact Statement (2014) and the Southwest Coastal Louisiana Revised Integrated Draft Feasibility Report and Environmental Impact Statement (2015). The cost of a Structural Protection

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project is primarily influenced by structure type, underlying soil conditions, construction access and available right of way, local surge and wave conditions, and geographic location. The uncertainty in design, costs, and duration increases with project size.

1. **Length:** Length along the centerline of the project. Locations of future levees were obtained using locations identified from previous reports and studies and identifying reasonable tie-in points to other existing Structural Protection projects and natural features. The length of the GIS centerline for each levee was used as the project length. The portion of the length which is earthen or wall is also reported.
2. **Predominant Structure Type:** The predominant structure type for all projects is earthen levee, but each project could be composed of one or more of the following structure types:
    a. *Earthen Levee:* The principal component of each Structural Protection project is the earthen levee. The following attributes describe earthen levees:
        i. Location: Levees are designated as linear or ring levees. Ring levees typically do not cross water bodies, but will have associated internal drainage pumping unless the levee or drainage pumping is pre-existing. All levee alignments and locations are depicted in a GIS shapefile and were generally taken from the conceptual design report or modification plans for existing levees.
        ii. Levee length: The length of gates and T-walls was deducted from the overall project length to obtain the earthen levee portion.
        iii. Top height: Top elevations for earthen levees were obtained from the appropriate conceptual design report.
        iv. Side slopes: Typical side slopes used by USACE for levee design were assumed for all Structural Protection projects. These slopes varied by project. Front slopes ranged between 3H: 1V and 6H: 1V while back slopes ranged between 3H: 1V and 4H: 1V.
        v. Top width: A top width of 10 feet was used for all levees as is typical of USACE earthen levee projects to provide reasonable access after levee construction.
    b. *Concrete T-wall:* T-walls are typically located at points along the levee where there is a high potential for erosion or insufficient space for an earthen levees. Although T-walls may be constructed at various locations along a levee, for the purposes of this analysis, it is assumed that T-walls would primarily be constructed at locations with limited right of way, locations of high erosion potential, junctions with water crossings, railroads, and major roadways (i.e., interstates and state highways). The following attributes were determined to describe T-walls:
        i. Location: T-walls are located on either side of every river, railroad, interstate, and state highway crossings.
        ii. Wall height: T-wall height was set to equal one to two feet higher than the adjoining earthen levee height due to structural superiority considerations.
        iii. Wall thickness: Wall thickness varies by wall height and ranged between 1.5 and 4.5 feet.
        iv. Wall length: It was assumed that T-walls would be constructed on each side of a crossing. T-walls are assumed to extend 200 feet on either side of a floodgate and 120 feet on each side of a railroad or major road crossing.

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v. Base width and thickness: Base width and thickness varied by location and wall height. Base width ranged from 6 to 22.5 feet and base thickness ranged from 2 to 4.25 feet.

c. *Floodgate-Land (Road, Railroad):* Floodgates are needed where levees cross a road or railroad. Crossings have been determined for each levee and gate attributes determined for each of these crossings. The following attributes were determined to describe floodgates:
   i. Gate type: Swing or roller gates were assumed at all railroad, interstate, and state highway crossings.
   ii. Location: Only major roads were assumed to have gates. Minor crossings would have earthen embankment crossings because of the large number of secondary road crossings (gates were not assigned to these other minor crossings because they typically have earthen embankment crossings).
   iii. Width: The width of each gate is based on GIS data and set to an opening size of either 30 or 40 feet to accommodate road/railroad traffic.
   iv. Gate height: All gate heights are assumed to be 1 to 2 feet higher than the adjoining levee height.

d. *Floodgate-Water (Canal Surge Gate):* Floodgates are needed where levees intersect water bodies. Crossings have been determined for each levee and gate attributes determined for each of these crossings. The following attributes were determined to describe floodgates.
   i. Gate type: Either a sector gate, stop log gate, swing gate, barge gate, or lock was assumed. Gate type was dictated by the source study or report for the alignment when available.
   ii. Width: Gate width varied by gate type. Sector gate lengths ranged from 30 to 250 feet, barge gates ranged from 30 to 220 feet, stop log gates ranged from 20 to 30 feet, and swing gates ranged from 25 to 40 feet. The width of gates is determined by the anticipated traffic loads in the waterway and authorized dimensions of the channel.
   iii. Gate height: All gate heights were set to be 1 to 2 feet higher than the adjoining T-wall height.

e. *Pumps (Internal to Ring Levees):*
   i. Pump type: Low-head, high-capacity, axial flow.
   ii. Number of pumps: Based on an estimate of pumping rate required for a 10-year, 12-hour storm.
   iii. Pump capacity: Pump capacity of the proposed pump station. Capacity varied by project and location based on the previous design or feasibility reports.

3. **Footprint:** Levee footprints reflect the right of way required for the levee and inspection/maintenance corridors flanking the levee multiplied by the overall length of the alignment.
4. **Existing Average Elevation:** Average surface elevation within project footprint (either ground surface in unprotected areas or existing crown height when project footprint overlays an existing project system as measured from the 2017 Coastal Master Plan Initial Conditions DEM.

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5. **Design Elevation:** Target height of proposed protection features. The design elevation is a vertical reference used over time for the material placed in the hurricane risk reduction areas. Design elevations for earthen levees, T-walls, and gates were obtained from the appropriate conceptual design report.

Structural Protection Project Cost Assumptions:

- **Estimated Construction Cost:** Total estimated cost associated with all aspects of the construction phase including a 20% contingency. Includes construction costs for the levee plus any pump stations, T-walls, and/or floodgates as well as the following bid items: mobilization and demobilization, soil stabilization, hauling costs, fill and compaction, vegetative plantings and other restoration, construction access roads, armoring, T-wall and foundation construction, gate and tie-in feature costs, and other typical components.
    - Cost data for recent Louisiana projects were gathered from a variety of public agencies including local parishes and USACE. These data sets were then reviewed and evaluated and typical costs for the major components of the levee system were determined.
    - Calculations were based on a unit cost method of estimating or gross project costs based on the quantity of the major project component (e.g., 56-foot sector gate and tie-in features). The costs are estimated in 2015 dollars.
    - Fill volume was calculated using the length, height, and side slopes of each levee. In order to account for compaction of material, the calculated fill volume includes 25% overbuild to account for initial subsidence. This allowance is to account for the initial compaction of earth beneath the levee, not long-term subsidence. Note: A regional borrow approach was assumed for this effort. Levee fill unit costs vary on a per-project basis based on analysis of recently constructed projects and planning study estimates. Variation accounts for proximity to suitable borrow material. Specific locations for fill material were not identified as part of this effort.
- **Estimated Operation and Maintenance Cost:** Includes annual O&M costs to maintain the intended level of risk reduction and computed per project. It includes items such as routine inspections and reporting, vegetative plantings, gravel access road maintenance, mowing, varmint control, surveys, floodwall maintenance, pump repair, floodgate and dry dock maintenance, and other typical maintenance items.
- There is no assumption of maintenance lifts for any levee system other than the HSDRRS surrounding New Orleans and the Mississippi River and Tributaries (MR&T) levees along the Mississippi and Atchafalaya Rivers. This assumption was made because there is no guarantee of dedicated maintenance or improvement funds for lifts of systems (other than HSDRRS and MR&T) to account for combating relative sea level rise and maintain a consistent or improved level of risk reduction. Maintenance lifts to maintain present levels of risk reduction are considered local responsibility and therefore are not considered projects with dedicated costs in the master plan as are the ones discussed in Table 9.
- Scheduled HSDRRS and MR&T maintenance lifts were reflected over the 50-year modeling timeframe so that the present level of risk reduction was maintained over the entire 50 years in the face of increasing relative sea level rise rates. Maintenance was

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based on available USACE New Orleans District survey data. For model years 0 to 25, HSDRRS and MR&T levees were subsided and raised at model years 10 and 25 back to present day design elevations if they had subsided below the present design elevations. For model years 26 to 50, levees were subsided and re-raised to new design elevations from 2057 and 2063 based on provisional outlook study data compiled by USACE. MR&T levee elevations were taken as the higher value of the survey data or the USACE flowline design elevation because MR&T flowline design elevations will be maintained by USACE.

Structural Protection Project Duration Assumptions:

- Duration of Project Phases:
    - **P/E&D**: In addition to the planning and design of the Structural Protection project, this phase includes required tasks such as permitting and land and/or right-of-way acquisition. The estimated duration is a function of the total length of the project. Estimates of project duration were based on recently constructed projects and recently completed feasibility studies.
    - Construction: Construction duration was estimated to be a function of the length of the levee, complexity of design of gates, and number of gates. For very long levee projects, it is assumed that the size of the project will require multiple contractors working as a team to complete the project.

3.10 Nonstructural Protection (NS)

Given the array of candidate restoration and risk reduction projects under consideration, project attributes were developed for each project type, including Nonstructural Protection projects, to provide a basis for evaluation in comparing individual projects and alternatives. Nonstructural Protection project costs are categorized by mitigation measures (i.e., floodproofing, elevation, and voluntary acquisition). The following narrative presents the primary components, assumptions (on size and cost development), unit cost ranges, and comparisons to unit costs developed for previous planning efforts for each Nonstructural Protection mitigation measure. These estimated costs will be used in the CLARA model to provide a comparison of candidate Nonstructural Protection projects and to assemble groups of mitigation measures based on cost-effectiveness (as well as other criteria as described in Section 4.2.2 of Appendix E - Flood Risk and Resilience Program Framework document). These cost-estimates will also be beneficial in the Phase II Initial Assessment application.

Nonstructural Protection project attributes for the 2017 Coastal Master Plan are as follows:

1. **Location:** Location is provided as latitude/longitude coordinates.
2. **Structure Classifications:** Structure classifications include residential (single family, small multi-family, large multi-family, and manufactured homes) and non-residential (commercial buildings).
3. **Project Types:** Nonstructural Protection project types applied include non-residential floodproofing, residential elevation, and residential acquisition.
4. **Level of Protection:** Project elevation data for structures are important in addressing both current and future risk. The level of protection for structures, and resulting Nonstructural Protection project selection, are based on results from CLARA modeling, as described in Section 3.0 of Appendix E - Flood Risk and Resilience Program Framework

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3.10.1 Nonstructural (Floodproofing, Elevation, Acquisition) Project Assumptions and Attributes

The 2017 Coastal Master Plan refines the Nonstructural Protection project attributes used in project modeling and analysis to provide additional details that will aid parishes and residents in evaluating and moving forward with potential flood mitigation projects.

Nonstructural measures are traditionally voluntary in nature. The anticipated participation rates are a critical component of the evaluation process. While CPRA will make every effort to include as many property owners as possible, past experience with Nonstructural Protection projects indicates that the participation rate will be less than 100%. For the 2017 Coastal Master Plan, participation rates of 80% will be used.

3.10.1.1 Elevation Projects:

Elevation project cost estimating involves several components:

- Design, engineering, structural feasibility analysis, and cost-estimate preparation (10% of construction costs).
- Surveying and soil sampling.
- Permitting and title search.
- Inspections, elevation certificate, and other legal fees.
- Physical lifting and lowering of the structure onto new foundation (shoring and excavation).
- Demolition and disposal of old foundation.
- Construction of a new elevated foundation that complies with CPRA elevation requirements and/or local flood ordinance(s), whichever is higher.
- Construction of typical builder's grade new stairs, landings, and railings.
- Disconnection, elevation of, and reconnection of utilities.
- Basic landscape restoration.
- Debris disposal, site cleanup, and erosion control.
- Reasonable living expenses while temporarily relocated in general area during elevation construction.

The following subsection presents notes and assumptions associated with elevation cost estimating.

Notes and Assumptions for Elevation Costs

1. Unit cost-estimates are developed using data and approaches provided in RSMeans® Building Construction Cost Data 2014, 72nd Annual Edition. A Geographic Adjustment Factor is applied to adjust cost based on variable economic conditions in different types of areas (e.g., generally higher labor rates in/near urban areas associated with higher costs of living). A Geographic Adjustment Factor (relevant to a mix of development types) is applied to coastal Louisiana localities within one hour of urban areas. The Geographic Adjustment Factor applies a multiplier of 0.88 to the overall projected construction cost to account for slightly more expensive labor/materials typical of the economies in more urbanized areas.

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2. The estimates are also based on information in Federal Emergency Management Agency (FEMA) documents P-499 (2010) and P-550 (2009). The estimates assume that elevated structures fit within two rectangular modules, each of which is a minimum size of 28 feet wide by 24 feet long. Unusual structure floor plans will require more engineering and thus will have additional costs.
3. Structures are assumed to be in the 500- to 3,000-square-foot range with an average size of 2,000 square feet.
4. It is assumed that existing structures are single family, ranch style, timber-framed homes built on shallow concrete foundations. The first floor is a concrete slab-on-grade that will be included in the lift. Notes: 1) Elevated structures over a crawl space are less expensive to lift, 2) the cost of raising a two-story structure is based on the first floor square footage, and 3) the estimates are not applicable for homes more than two stories in height.
5. It is assumed that elevated framing is built on new timber piles. The required depth of the piles is assumed to be 40 feet. For structures elevated more than 10 feet (per FEMA P-550), concrete grade beams and columns are required in combination with the timber piles to resist anticipated loads. For timber pile installation, the existing home will need to be lifted and temporarily moved. It is assumed that adequate space is available for moving the existing structure.
6. Two means of egress are provided, each with a 4-foot by 6-foot deck at the home entryway.
7. The new space under the elevated foundation must be open, consisting of piles, piers, and columns with knee or x-bracing.
8. Materials used solely for the elevation process are assumed to have a 75% salvage value.
9. These cost-estimates are valid for elevations up to 14 feet above the existing grade elevation.
10. The estimates include basic landscape restoration, debris removal, and site cleanup, as well as removal and restoration of 300 square feet of concrete driveway ($1,250). This assumption pertains to the part of the driveway near the house where construction activity would take place. The cost for removing and restoring a driveway was derived from RSMeans® 2014 using a cost of $4.18 per square foot.
11. The structure is not located in a V Zone.
12. Several elements are not included in this cost-estimate because they are contingency items allowable only where specific conditions exist. These include:
    a. Ramps/elevators for Americans with Disabilities Act access when an occupant of the structure has a permanent physical handicap and a physician's written certification.
    b. Historical/architectural considerations if required by the State Historic Preservation Office.
    c. Code upgrades other than elevation costs are subject to a case-by-case determination and approval, in writing, by CPRA if they are determined to be allowable.

Elevation Project Cost-Estimates

Table 16 shows the residential elevation costs for an average-size structure (2,000 square feet) for different elevation height ranges.

Table 16: Elevation Cost-Estimates.

Component Description	Estimated Unit Cost (for a 2,000-square-foot structure)
Cost to elevate over 3 feet up to 7 feet	$82.50/square foot

Component Description	Estimated Unit Cost (for a 2,000-square-foot structure)
Cost to elevate over 7 feet up to 10 feet	$86.25/square foot
Cost to elevate over 10 feet up to 14 feet*	$103.75/square foot
Temporary occupant relocation costs during construction, reimbursable by CPRA	$3,500/structure
Estimated permitting cost	$2,175/structure
Inspection cost	$4,300/structure
Survey	$470
Title search	$300
Project administration and construction management	$10,000 flat fee (based on an estimated 200 hours of work)

*10- to 14-foot elevation above grade will require concrete columns; more than 14-foot elevation above grade will require voluntary acquisition.

Comparison to Other Elevation Cost-Estimating Efforts

- USACE methodology results in costs that ranged from $59 per square foot to $80 per square foot (USACE, 2010).
- The 2012 Coastal Master Plan provides the following cost-estimates for different elevation height ranges: a) over 3 feet up to 7 feet – $85 per square foot; b) over 7 feet up to 14 feet – $95 per square foot; and c) over 4 feet up to 18 feet – $100 per square foot (CPRA, 2012).
- Actual project results from Terrebonne Parish show costs that range from $55 per square foot to $106 per square foot.

3.10.1.2 Acquisition Projects

Acquisition project cost estimating involves three components: 1) an engineering estimate for the demolition; 2) an estimate of typical real estate transaction costs in Louisiana; and 3) a Fair Market Value (FMV) purchase price for the structure and land. The FMV is calculated using structure value data with no depreciation from the FEMA Hazus Structure Database. The Hazus data include a multiplier to bring it closer to FMV.

Notes and Assumptions for Demolition Costs

1. Estimates are based on unit cost data developed using data and approaches provided in RSMeans® Building Construction Cost Data 2014, 72nd Annual Edition.
2. Most residential acquisition projects will likely occur in rural areas of Louisiana. These areas have a Geographic Adjustment Factor that uses a 0.81 multiplier to the projected

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demolition cost to account for less expensive labor/materials typical of the economies in such areas.
3. Given that the project areas are assumed to be rural, there will not be an additional cost for confined space (e.g., dense urban area) for demolition.
4. Demolition estimates include basic site restoration such as grading.
5. Demolition estimates do not include removal of hazardous materials.
6. Demolition estimates do not include removal of driveways, separate structures, or underground storage tanks/wells on the property.
7. The formulas provided are effective for 1,500- to 3,000-square-foot homes.

To account for variations in housing types and degree of foundation removal, six options are presented below:

Option A:

- Ranch home built on concrete slab-on-grade with shallow concrete footings; includes complete removal of the foundation.
- The cost of demolition = $13.75 x floor area in square feet.

Option B:

- Ranch home built on concrete slab-on-grade, with shallow concrete footings. The cost-estimate is applicable for demolition of either a partial concrete foundation or foundation walls consisting of masonry block.
- The ranch home is built over a crawl space without concrete slab. The cost-estimate includes complete shallow concrete foundation removal.
- The cost of demolition = $12.00 x floor area in square feet.

Option C:

- Two-story home built on concrete slab-on-grade with shallow concrete footings; includes complete removal of the foundation. (The first floor and second floor areas are assumed to be equal.)
- The cost of demolition = $10.75 x floor area in square feet.

Option D:

- Multi-family, three-story home (small multi-family) constructed on concrete slab-on-grade with shallow concrete footings; includes complete foundation removal. (All floor areas are assumed to be equal.)
- The cost of demolition = $11.25 x floor area in square feet.

Option E:

- Multi-family, three-story apartment building (large multi-family) assumed to have a 4,000-square-foot footprint and 12 units (1,000 square feet each). It is constructed on concrete slab-on-grade with shallow concrete footings; includes complete foundation removal. (All floor areas are assumed to be equal.)
- The cost of demolition = $6.67 x floor area in square feet.

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Option F:

- Manufactured home constructed on concrete slab-on-grade.
- The cost of demolition = $8.83 x floor area in square feet.

Estimated Typical Real Estate Transaction Costs in Louisiana and Other Project Costs for Acquisition Projects

The following costs (Table 17) are typically required of real estate transactions (minus the underwriting and lending fee because the community is the buyer with grant funds), as well as other project costs (e.g., environmental assessment, project management).

Table 17: Acquisition Project Cost-Estimate Components and Estimated Costs.

Component Description	Estimated Unit Cost
Appraisal	$425
Survey	$470
Title search (Note: Title insurance is optional unless required by a lending institution to provide protection against title claims post-purchase. A general estimate of the cost (not included in this estimate) is 0.05%.)	$300
Real estate transaction fees including attorney closing fee or settlement	$490 (Note: This is generally calculated at $2 per $1,000 of purchase price, plus $250)
Deed recordation/deed restriction costs	$90
Demolition – see Options A through F earlier in this section	-
Site restoration costs	Part of demolition costs
Environmental site assessment/asbestos inspection	$500
Abatement of asbestos/asbestos disposal (if necessary)	Add $3 to $5 per square foot to demolition costs
Lead-based paint removal/disposal (if necessary)	No additional cost beyond demolition
Project management fee for property owner coordination and management of the various acquisition components (e.g., appraisals, surveys, title searches, offers, contracts, closings). This is typically a flat fee per structure instead of percentage based.	$5,000 per structure (based on an estimated 100 hours of work)

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The estimated FMV employs a multiplier on the non-depreciated values (NDV) for each structure classification from the FEMA Hazus Database. These values are based on RSMeans® replacement values and are periodically updated.

Based on the costs detailed above, the overall cost-estimation for acquisition projects includes FMV (NDV times multiplier) plus demolition costs (using square footage costs earlier in this section) plus $7,275 in fixed costs (totaled from above), which does not include title insurance or asbestos abatement. Multi-family buildings are assumed to have one owner and therefore only one transaction cost for purchase.

Itemized costs vary greatly for real estate transactions and structure demolition. Typical real estate transactions (e.g., appraisals, surveys, title work) will differ from one region to another, and even by county within a given state, depending on available resources. Additional factors impacting these costs include structure size (square footage), age, location (rural vs. urban), price range, value, and lot size. As a result, it is difficult to assign a single value that will accurately portray the standard costs for an entire region. Best available estimates or averages for southern Louisiana are based on an analysis of multiple reliable resources, as noted below:

- Real Estate Fees – Louisiana closing costs for approximate costs for appraisals, title search, closing fees, surveys, and deed recordation (Bankrate, 2015). Additional references include Properties Closing Cost Explained (for appraisal and title search) (Bonano ND) and Charting your Course to Home Ownership (for closings costs such as survey and attorney fees) (LSU AgCenter, 2008).
- Asbestos Abatement and Disposal – the following sources were reviewed:
    - Houston Chronicle How to Determine Building Demolition Costs
    - Ohio Environmental Protection Agency (2015) Fee Schedule (p. 7)
    - Asbestos Inspection and Testing Cost (Fixr, No Date)
- Lead-Based Paint Removal/Disposal – During demolition of an entire building, debris is considered a nonhazardous waste, even with lead-based paint, given the large ratio of the total amount of debris to the relatively small amount of lead-based paint:
    - Nevada Department of Conservation and Natural Resources, Division of Environmental Protection (2007) Lead-Based Paint Fact Sheet.
    - USEPA Landfill Lead-Based Paint Ruling.

Acquisition Project Cost-Estimates by Structure Type

Table 18 shows the acquisition costs for different types of residential structures and a cost for vacant lots.

Table 18: Acquisition Project Cost-Estimate Components.

Structure Type	Acquisition Multiplier	Total Cost* (NDV = Non-Depreciated Value)
Single Family	1.6	NDV x 1.6 + Demolition by square foot (Options A, B, or C) + $7,275

Structure Type	Acquisition Multiplier	Total Cost* (NDV = Non-Depreciated Value)
Small Multi-Family	1.7	NDV x 1.7 + Demolition by square foot (Option D) + $7,275
Large Multi-Family	1.8	NDV x 1.8 + Demolition by square foot (Option E) + $7,275
Vacant Lots	N/A	$72,500

*Assumes no asbestos removal needed.

Comparison to Other Acquisition Cost-Estimating Efforts

USACE Estimates (USACE, 2010)

- FMV Multiplier for Residential is 1.18

(Note: It is assumed that the USACE multiplier accounts for fixed costs. This is subject to verification.)

3.10.1.3 Floodproofing Projects

Floodproofing encompasses two broad categories: dry and wet floodproofing. Due to its greater range of applicability, only dry floodproofing techniques will be employed for the purposes of cost estimating.

Dry floodproofing project cost estimating involves multiple components, as follows:

- Flood shields for all doors and windows at or below the flood protection level on exterior walls.
- Use of flood-resistant materials on interior of building up to the level where water is expected to accumulate due to seepage (spray-on cement for waterproofing in this estimate).
- Labor and materials to install floodproofing (excavation, mobilization, and asphalt).
- Code-required egress above flood elevation.
- Sewage backflow preventer.
- Internal drainage system for seepage.
- Survey and title search.
- Permitting and final inspection.
- Project administration and construction management.
- Engineering design costs (10% of construction costs).

The following subsection presents notes and assumptions associated with floodproofing cost estimating.

Notes and Assumptions

1. Estimating methods include USACE-provided costs and unit cost data developed using data and approaches provided in RSMeans® Building Construction Cost Data 2014,

72nd Annual Edition. Based on a coastal Louisiana locality within one hour of an urban area, floodproofing projects use a coast-wide Geographic Adjustment Factor to apply a 0.88 multiplier to the projected construction costs to account for slightly more expensive labor/materials typical of the economies in more urbanized areas.

2. Estimates are for dry floodproofing non-residential structures and limited to floodproofing of three feet or less above-ground.
3. Cost-estimates are developed using the perimeter footprint (not straight square footage).
4. Design requirements are based on FEMA P-259, part 5D (FEMA, 2012) and state building requirements presented in the American Society of Civil Engineers (ASCE) 24 (ASCE, 2014).
5. Dry floodproofing methods assume that the existing structure (wall, foundation, and slab) and sanitary system are capable of resisting the hydraulic forces imposed by the flood.
6. The existing structure's wall material should be conducive to receiving floodproofing material. Acceptable examples include concrete masonry units, masonry, and brick.
7. The concrete slab-on-grade is water-tight.
8. The existing sanitary pipe system must add a backflow preventer. It is assumed that the existing plumbing will be capable of resisting the hydraulic flood forces.
9. The flood shields at the doorways (and windows less than three feet above-ground) will require manual activation and, once in place, will prohibit egress from the facility.
10. A means of egress above the design flood-protection elevation is required in case local code requires freeboard. For example, if a building is floodproofed to three feet, then egress is needed (e.g., window, door) above three feet, given that floodproofed doors will be blocked.
11. This floodproofing methodology is subject to impacts due to flood depth and duration and may only be effective for a few hours.
12. The floodproofing requirements are based on FEMA P-259 Part 5D (FEMA, 2012).
13. The building code requirements prescribed in ASCE 24-05 (requirement of the International Building Code 2012, adopted in Louisiana 1/1/2014) further limit dry floodproofing methods in Coastal A Zone and V Zone high-wave velocity areas (ASCE, 2006). Also, a method for egress is required above the flood elevation (ASCE, 2010). The required egress is previously mentioned in Item 10 in this list.
14. Estimates are based on actual quantities in lieu of a facility location to more closely represent the actual conditions of the facility.
15. Estimates do not include the following elements which may be required (case by case):
    - Landscaping restoration.
    - Walkway or driveway demolition and restoration.
    - Shoring for structure during installation.

Floodproofing Project Cost-Estimates

Table 19 shows the dry floodproofing costs for a representative non-residential structure (6,000 square feet) and a summary cost per square foot in the last row. Table 19 provides a comparison of key costs with USACE estimated costs.

Table 19: Dry Floodproofing Cost-Estimate Components and Cost per Square Foot.

Component Description	Estimated Unit Cost (for representative non-residential 6,000-square-foot structure)
Code-required egress above the design flood protection elevation	$6,800/each

Component Description	Estimated Unit Cost (for representative non-residential 6,000-square-foot structure)
Backflow preventer (required to be regularly maintained, assumes plumbing can withstand the hydraulic forces)	$6,200/each
Flood shields (metal), maximum three feet wide (assumed), require adequate structure for fastening shield. Cost does not include bracket installation. (Note: any windows below the design flood protection elevation will also require a flood shield.)	$135/square foot of doors/windows below flood elevation
Spray-on cement (1/8 inch thick); existing structure must be of cementitious material (i.e., not applicable for timber/metal siding)	$5.50/square foot
Asphalt (two coats below grade); see periphery drainage below for excavation requirements	$3/square foot
Periphery drainage, includes excavation (see notes below)	$30/linear foot
Sump pump and back-up power required for addressing seepage	Sump pump – $360; Back-up power (from gas-powered generator delivering 277/480 volts) – $8,260
Survey and title search	$770 (same as acquisition survey and title search cost)
Permitting and inspection	$6,475 (same as elevation permitting and inspection cost)
Project administration and construction management	$7,500 flat fee (based on an estimated 150 hours of work)
Engineering design costs	10% of construction costs
Floodproofing costs per square foot	$19.40/square foot

*Assumes structure requires no shoring, that excavated soils can be used for backfill, and that landscaping restoration and concrete walkway demolition/restoration is not needed.

Comparison to Other Floodproofing Cost-Estimating Efforts

Table 20 provides key floodproofings costs compared to USACE-estimated costs.

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Table 20: Key Floodproofing Costs versus USACE-Estimated Costs.

Required Components	USACE Cost (National Costs - USACE, 2010)	CPRA 2017 Coastal Master Plan Costs
Required egress	N/A	$6,800 each
Backflow valve	N/A	$6,200 each
Flood shield	$110 each	$135/square foot of door or window openings below flood elevation
Spray-on cement	$5/square foot	$5.50/square foot
Asphalt	$2/square foot	$3/square foot
Periphery drainage	$35/square foot	$30/linear foot
Sump pump/back-up power	N/A	Sump pump – $360; Back-up power generator – $8,260

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4.0 Typical Design Templates

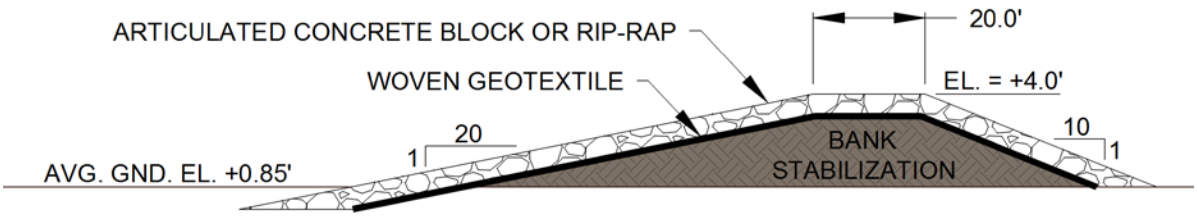

Figure 5: Bank Stabilization Design Template.

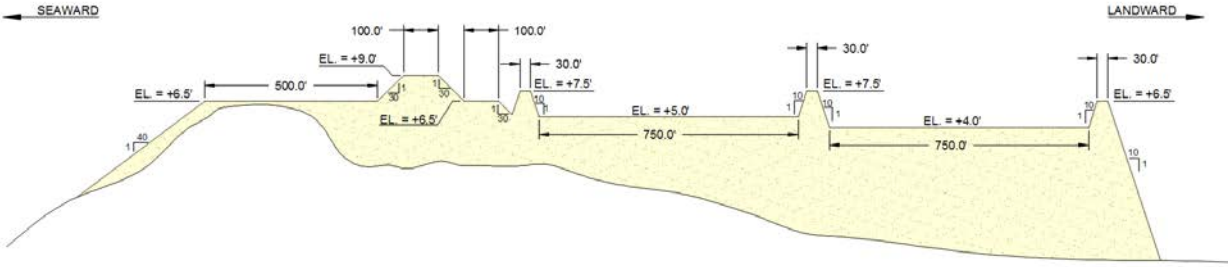

Figure 6: Barrier Island Conceptual Design Template.

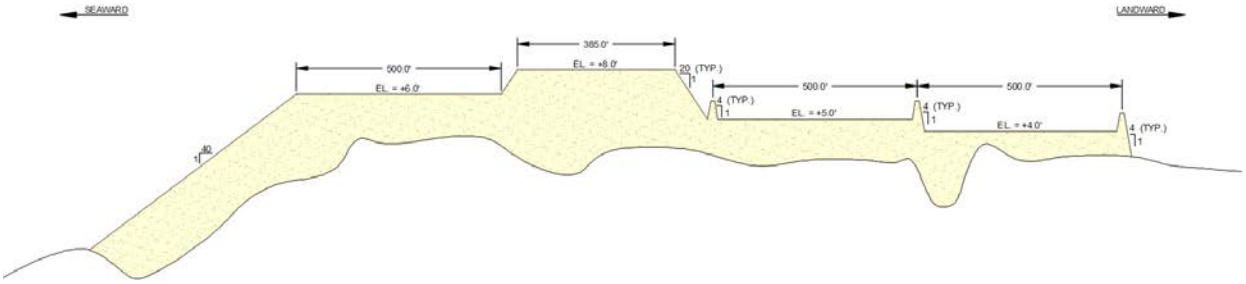

Figure 7: Barrier Headland Conceptual Design Template.

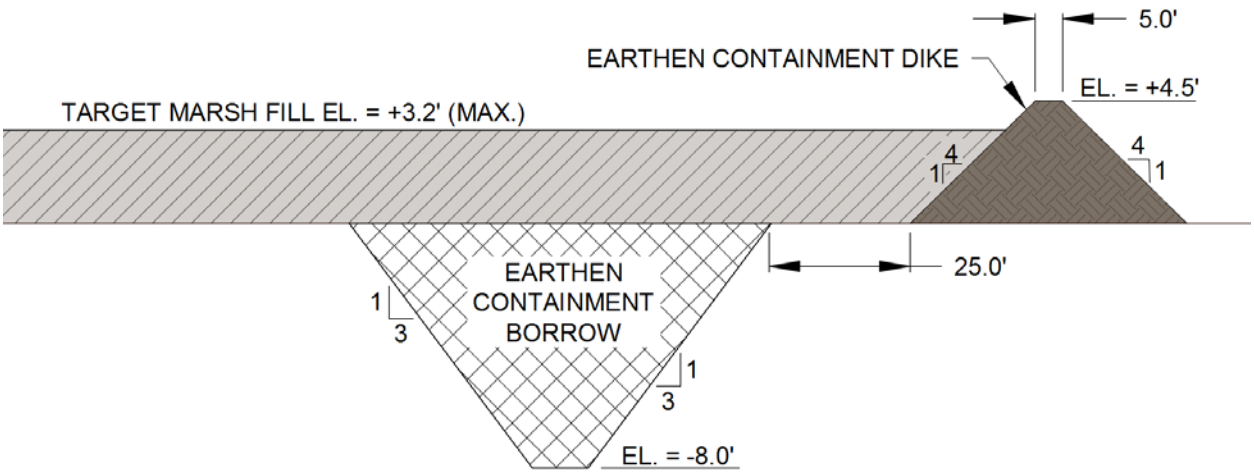

Figure 8: Marsh Creation Conceptual Design Template.

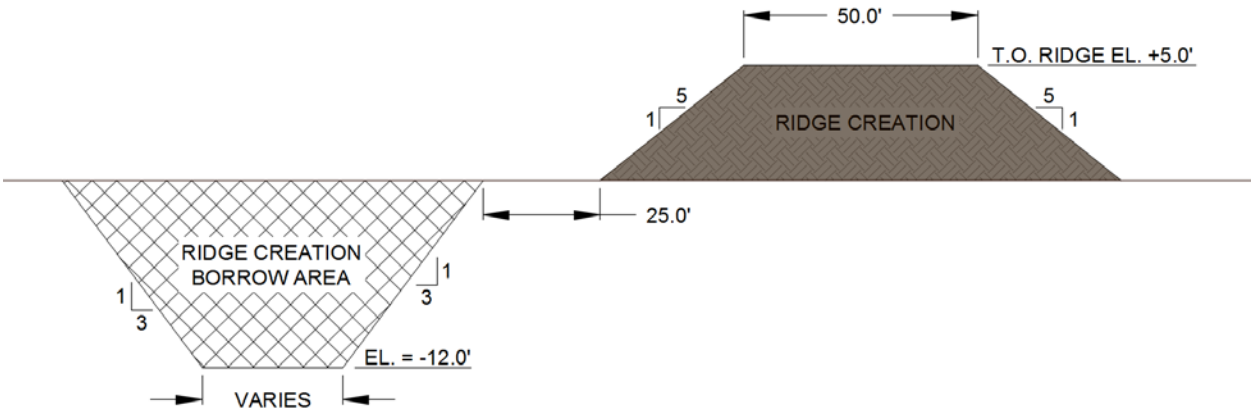

Figure 9: Ridge Creation Conceptual Design Template.

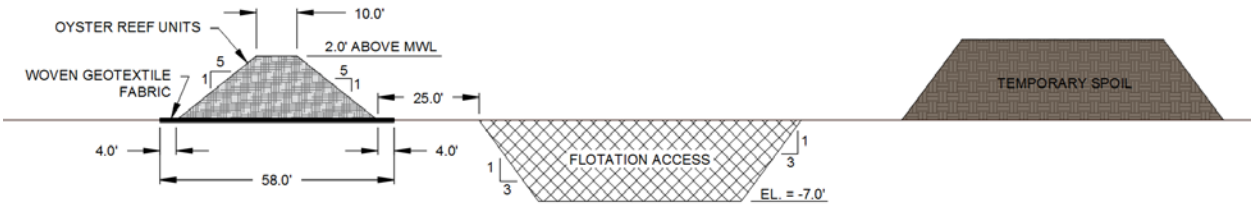

Figure 10: Oyster Reef Conceptual Design Template.

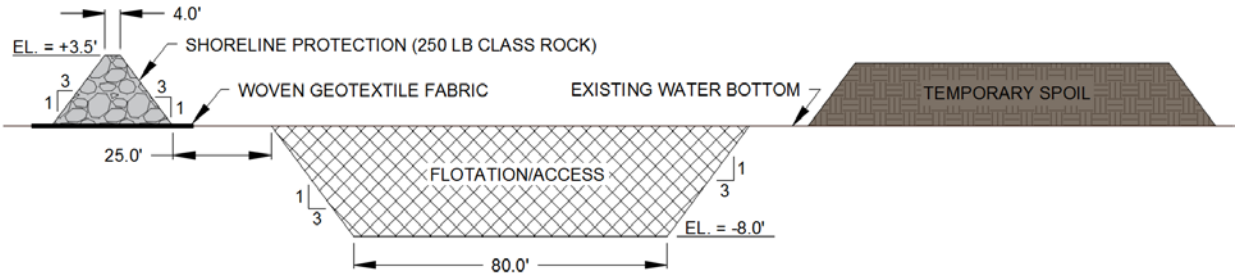

Figure 11: Shoreline Protection Conceptual Design Template (Inshore).

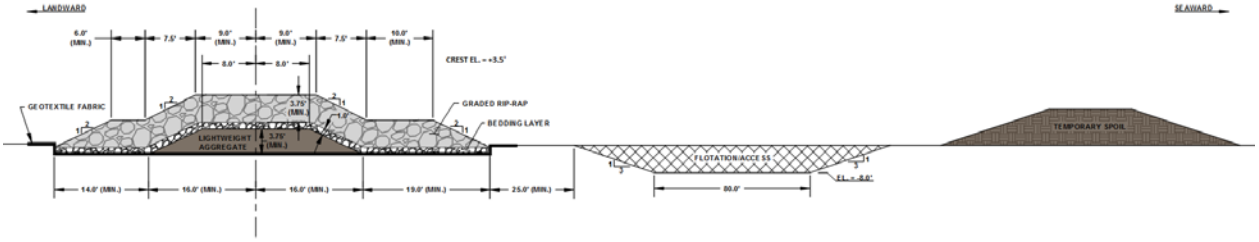

Figure 12: Shoreline Protection Conceptual Design Template (Gulf Shoreline).

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Attachment A-1: Projects to be in 2017 FWOA

Project ID	Project Name	Program	Project Type	Last Year of Construction
AT-0002	Atchafalaya Sediment Delivery	CWPPRA	SD	1998
AT-0003	Big Island Mining	CWPPRA	DM	1998
AT-0005	Morgan City Industrial Road	CIAP (Par.)	IN	2015
AT-0006	Point Chevreuil Shoreline Protection	CIAP (Par.)	MC/SP	Pending
AT-0007	Deer Island Pass Realignment	CIAP (Par.)	DM/HR/MC	Pending
AT-0009	Stephensville Wastewater Assimilation	CIAP (Par.)	MM	Pending
AT-0010	Beau Bayou Swamp Hydrologic Restoration	CIAP (Par.)	HR/TE	Pending
BA-0001	Davis Pond Freshwater Diversion	WRDA	FD	2002
BA-0002	GIWW (Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration	CWPPRA	HR	2000
BA-0003	Naomi Siphon Diversion	CWPPRA	FD	2002
BA-0003-C	Naomi Outfall Management	CWPPRA	OM	2002
BA-0004	West Point a la Hache Siphon	State	FD	1992
BA-0005-B	Queen Bess	State	SP/DM	1993
BA-0005-C	Baie de Chactas	State	SP	1990
BA-0015	Lake Salvador Shore Protection Demonstration	CWPPRA	SP	1998
BA-0015-X1	Lake Salvador Shoreline Protection Extension	State	SP	2005
BA-0015-X2	Lake Salvador Shoreline Protection (Phase III)	CIAP (St.)	SP	2009
BA-0016	Bayou Segnette	State	SP	1998
BA-0019	Barataria Bay Waterway Wetland Restoration	CWPPRA	MC	1996
BA-0020	Jonathan Davis Wetland Protection	CWPPRA	HR	2012
BA-0023	Barataria Bay Waterway West Side Shoreline Protection	CWPPRA	SP	2000
BA-0025*	Bayou Lafourche Freshwater Introduction	Surplus 08	FD	2011
BA-0026	Barataria Bay Waterway East Side Shoreline Protection	CWPPRA	SP	2001
BA-0027	Barataria Landbridge Shoreline Protection (Phases 1 and 2)	CWPPRA	SP	2009
BA-0027-C	Barataria Basin Landbridge Shoreline Protection, Phase 3 - CU7 and CU8	CWPPRA	SP	Pending
BA-0027-D	Barataria Basin Landbridge Shoreline Protection Phase 4	CWPPRA	SP	2008
BA-0030-EB	East Grand Terre	CIAP (St.)	BH	2011

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Project ID	Project Name	Program	Project Type	Last Year of Construction
BA-0035	Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration	CWPPRA	BH	2009
BA-0036	Dedicated Dredging on the Barataria Basin Landbridge	CWPPRA	MC	2010
BA-0036-EB	Barataria Landbridge Dedicated Dredging (CIAP)	CIAP (St.)	NC	2010
BA-0037	Little Lake Shoreline Protection/ Dedicated Dredging Near Round Lake	CWPPRA	SP/MC	2007
BA-0038	Pelican Island and Pass La Mer to Chaland Pass Restoration	CWPPRA	BH	2013
BA-0039	Mississippi River Sediment Delivery System	CWPPRA	MC	2010
BA-0040	Riverine Sand Mining/Scofield Island Restoration	BB	BH	2014
BA-0041	South Shore of the Pen Shoreline Protection and Marsh Creation	CWPPRA	SP	2012
BA-0042	Lake Hermitage Marsh Creation	CWPPRA	MC	Pending
BA-0043-EB	Long Distance Mississippi River Sediment Pipeline	CIAP (St.)	MC	Pending
BA-0045	Caminada Headlands	CIAP (St.)	BH	2015
BA-0048	Bayou Dupont Marsh and Ridge Creation Project	CWPPRA	MC	Pending
BA-0050	Bayside Segmented Breakwaters at Grand Isle	CIAP (Par.)	SP	2012
BA-0051	Goose Bayou Ridge Creation and Shoreline Protection	CIAP (Par.)	SP	2011
BA-0052	Lower Lafitte Shoreline Stabilization at Bayou Rigolettes	CIAP (Par.)	SP	Pending
BA-0053	Maritime Forest Ridge Restoration	CIAP (Par.)	VP	Pending
BA-0054	Northwest Little Lake Marsh Creation and Enhancement	CIAP (Par.)	DM/MC/VP	2010
BA-0055	LA-1 Improvements- Fourchon to Leeville Bridge	CIAP (St.)	OT	2009
BA-0057	Tidewater Road Flood Protection	CIAP (Par.)	IN	2010
BA-0058	Fringe Marsh Repair	CIAP (St.)	MC	2013
BA-0059	Waterline Booster Pump Station, West Bank	CIAP (Par.)	IN	2010
BA-0061	West Bank Wetland Conservation and Protection	CIAP (Par.)	LA	2010
BA-0062	West Bank Wastewater Assimilation Plant	CIAP (Par.)	MM	Pending
BA-0063	Small Dredge Program	CIAP (Par.)	DM/MC	2010
BA-0064	Jump Basin Dredging and Marsh Creation	CIAP (Par.)	MC	2013

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Project ID	Project Name	Program	Project Type	Last Year of Construction
BA-0065	Fifi Island Restoration Extension	CIAP (Par.)	BH	2013
BA-0066	West Bank and Vicinity (HSDRRS)	GNO-HSDRRS	HP	Pending
BA-0067	New Orleans to Venice	Federal	HP	Pending
BA-0068*	Grand Liard Marsh and Ridge Restoration	CWPRRA	MC	Pending
BA-0074	Storm-Proofing of Interior Pumping Stations	GNO-HSDRRS	HP	2015
BA-0075-1	Jean Lafitte Tidal Protection	Surplus 07	HP	Pending
BA-0075-2*	Rosethorne Tidal Protection	Surplus 07	HP	Pending
BA-0076*	Cheniere Ronquille Barrier Island Restoration	NRDA	BI	Pending
BA-0082	Lafitte Levee Repair	CDBG	HP	Pending
BA-0084	Bayou Lafourche FWD - Walter S Lemann Memorial Pump Station	CDBG	OT	2015
BA-0085	St. Charles West Bank Hurricane Protection Levee	State	HP	Pending
BA-0110	Shell Island East - BERM	Berm to Barrier	BH	2014
BA-0111*	Shell Island West - NRDA	NRDA	BI	Pending
BA-0141	NRDA Lake Hermitage Marsh Creation Increment 2	NRDA	MC	2015
BA-0143*	Caminada Headland Beach and Dune Restoration INCR2	NFWF	BH	Pending
BA-0152	East Harvey Canal Interim Hurricane Protection - Phase I	State	HP	2010
BA-0155	Fifi Island Restoration	Other	SP	2003
BA-0161*	Mississippi River Water Reintroduction into Bayou Lafourche - BLFWD	CIAP (St.)	DI	Pending
BA-0162-CAT	Shoreline Protection Cat Island	CIAP	SP	Pending
BA-0162-SPER	Shoreline Protection Emergency Restoration	CIAP (St.)	SP	2014
BA-0168	Grand Isle - Fifi Island Breakwaters	State	SP	Pending
BA-0169	Kraemer Bayou Boeuf Levee Lift	State	HP	Pending
BA-0186	Fort Livingston Fisheries Habitat Restoration	Other	SP	2003
BA-0187	Grand Isle Bay Side Breakwaters	State	SP	1995
BA-0191	North Grand Isle Breakwaters	State	SP	1995
BA-165	Culverts Through Existing Berms & Board Roads	CIAP (Par.)	OT	2013
BS-0003-A	Caernarvon Diversion Outfall Management	CWPPRA	OM	2002
BS-0006	Lake Lery Hydrologic Restoration	State	FD	1997

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Project ID	Project Name	Program	Project Type	Last Year of Construction
BS-0008	Caernarvon Freshwater Diversion	State	FD	1991
BS-0011	Delta Management at Fort St. Philip	CWPPRA	SD	2006
BS-0016*	South Lake Lery Shoreline and Marsh Restoration	CWPRRA	MC	Pending
BS-0017	Lake Lery Rim Re-Establishment and Marsh Creation	CIAP (Par.)	MC	Pending
BS-0029	North Breton Island	NFWF	BH	Pending
CS-0001	Holly Beach	State	SP	1994
CS-0002	Rycade Canal Marsh Management	State	MM	1994
CS-0004-A	Cameron-Creole Maintenance	CWPPRA	HR	2011
CS-0011-B	Sweet Lake/Willow Lake Hydrologic Restoration	CWPPRA	SP	2001
CS-0017	Cameron Creole Plugs	CWPPRA	HR	1997
CS-0018	Sabine National Wildlife Refuge Erosion Protection	CWPPRA	SP	1995
CS-0020	East Mud Lake Marsh Management	CWPPRA	MM	1996
CS-0021	Highway 384 Hydrologic Restoration	CWPPRA	MM	2000
CS-0022	Clear Marais Bank Protection	CWPPRA	SP	1997
CS-0023	Replace Sabine Refuge Water Control Structures at Headquarters Canal, West Cove Canal, and Hog Island	CWPPRA	MM	2001
CS-0024	Perry Ridge Shore Protection	CWPPRA	SP	1999
CS-0025	Plowed Terraces Demonstration	CWPPRA	TE	2000
CS-0027	Black Bayou Hydrologic Restoration	CWPPRA	HR	2001
CS-0028-1	Sabine Refuge Marsh Creation, Increment 1	CWPPRA	MC	2002
CS-0028-2	Sabine Refuge Marsh Creation, Cycle 2	CWPRRA	MC	2010
CS-0028-3	Sabine Refuge Marsh Creation, Cycle 3		MC	2007
CS-0028-4-5	Sabine Refuge Marsh Creation Cycles 4&5	CWPPRA	MC	Pending
CS-0029	Black Bayou Culverts Hydrologic Restoration	CWPPRA	HR	2007
CS-0030	GIWW - Perry Ridge West Bank Stabilization	CWPPRA	SP	2001
CS-0031	Holly Beach Sand Management	CWPPRA	SP	2003
CS-0032	East Sabine Lake Hydrologic Restoration	CWPRRA	HR, TE	2010
CS-0033*	Cameron Parish Shoreline	Surplus 07	BH	2015

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Project ID	Project Name	Program	Project Type	Last Year of Construction
CS-0034	Beneficial Use Calcasieu Ship Channel	Surplus 07	DM	2011
CS-0035-EB	Marsh Creation via Beneficial Use (Phase 1) (CIAP)	CIAP (St.)	DM	2010
CS-0036	Shoreline Protection at Intracoastal Park	CIAP (Par.)	SP	2012
CS-0037	South GIWW Restoration	CIAP (Par.)	HR/SP	Pending
CS-0041	Horseshoe Lake Marsh Restoration	CIAP (Par.)	HR/SP	2014
CS-0044	Rabbit Island	CIAP (Par.)	DM/MC/SP	Pending
CS-0047	Trosclair Road Repairs	CIAP	OT	2009
CS-0048	Bank Stabilization from Dugas Cut to Kelso Bayou	CIAP (Par.)	PL	2010
CS-0049	Cameron-Creole Freshwater Introduction - Vegetative Plantings	CWPPRA	FD	Pending
CS-0051	Little Chenier Rd.	CIAP (Par.)	HR/IN	2010
CS-0052	CIAP - Clear Marais Bank Protection	CIAP (Par.)	SP	2013
CS-0054	Cameron Creole Watershed Grand Bayou Marsh Creation	CWPPRA	MC	Pending
CS-0059*	Oyster Bayou Marsh Creation and Terracing	CWPPRA	MC	Pending
CS-0061	Brannon Ditch	State	SP	1991
CS-0063	Sabine Shellbank Stabilization	State	SP	1990
CS-0074	Blind Lake	State	SP	1989
CS-0075	Sabine Terraces	State	TE	1990
CS-42	South Johnson Bayou	CIAP (Par.)	HR/MM	Pending
CS-43	Dreary Island	CIAP (Par.)	HR/MM	2012
LA-0001-A	Dedicated Dredging Program - Lake Salvador	State	DM	1999
LA-0001-B	Dedicated Dredging Program - Bayou Dupont	State	DM	2000
LA-0001-D	Dedicated Dredging Program - Terrebonne Parish School Board	State	DM	2006
LA-0001-E	Dedicated Dredging - Grand Bayou Blue	LA Dedicated Dredging	MC	2008
LA-0001-F	Dedicated Dredging - Point au Fer	LA Dedicated Dredging	MC	2008
LA-0006	Shoreline Protection Foundation Improvements Demonstration	CWPPRA	SP	2006
LA-0008	Bioengineered Oyster Reef	CWPRRA	OR	2012
LA-0009	Sediment Containment System for Marsh Creation Demonstration	CWPRRA	MC	2014

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Project ID	Project Name	Program	Project Type	Last Year of Construction
LA-0013	Coastal Forest Conservation Initiative	CIAP (St.)	OT	Pending
LA-0016	Non-rock Alternatives to Shoreline Protection Demo	CWPRRA	SP	Pending
LA-0021-1	Beneficial Use- Sabine Cycle	Surplus 08	DM	2010
LA-0225	Raising of LA 23 at Lareussite	Surplus 07	HP	2012
LA-21.2	Beneficial Use- Calcasieu Ship Channel	Surplus 08	DM	2010
ME-0001	Pecan Island Freshwater Introduction	State	FD	1992
ME-0004	Freshwater Bayou Wetland (Phases 1 &2)	CWPPRA	HR/SP	1998
ME-0009	Cameron Prairie National Wildlife Refuge Shoreline Protection	CWPPRA	SP	1994
ME-0011	Humble Canal Hydrologic Restoration	CWPPRA	HR	2003
ME-0013	Freshwater Bayou Bank Stabilization	CWPPRA	SP	1998
ME-0014	Pecan Island Terracing	CWPPRA	TE	2003
ME-0016	Freshwater Introduction South of Highway 82	CWPPRA	HR	2006
ME-0018-EB	Rockefeller Shoreline Protection Demonstration	CIAP (St.)	SP	2009
ME-0019	Grand-White Lakes Landbridge Protection	CWPPRA	SP	2004
ME-0020*	South Grand Chenier Marsh Creation Project	CWPPRA	MC	Pending
ME-0021	Grand Lake Shoreline Protection	CWPPRA	SP	Pending
ME-0021-EB	Grand Lake Shoreline Protection (CIAP)	CIAP (St.)	SP	2010
ME-0022	South White Lake Shoreline Protection	CWPPRA	SP	2006
ME-0025-SF	Marsh Creation Near Freshwater Bayou	Surplus 07	MC	Pending
ME-0026	West Big Burn Bridge Restoration	CIAP (Par.)	HR/MM	2010
ME-0027	South Little Pecan Bayou Restoration	CIAP (Par.)	HR	Pending
ME-0030	North Mermentau Restoration	CIAP (Par.)	HR/MM	2011
MR-0001-B	Small Sediment Diversions	State	SD	1993
MR-0003	West Bay Sediment Diversion	CWPPRA	SD	2003
MR-0006	Channel Armor Gap Crevasse	CWPPRA	SD	1997
MR-0009	Delta Wide Crevasses	CWPPRA	SD	1999
MR-0010	Dustpan Maintenance Dredging Operation for Marsh Creation in the Mississippi River Delta Demonstration	CWPPRA	DM	2002

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Project ID	Project Name	Program	Project Type	Last Year of Construction
N/A	MRGO Shoreline Protection - USACE	Federal	SP	Unknown
N/A	Slidell Levees	Local	HP	Unknown
N/A	Slidell Levees Eastern	Local	HP	Unknown
N/A	Slidell Levees Western	Local	HP	Unknown
PO-0001	Violet Siphon	State	FD	1992
PO-0002-C	Bayou Chevee	State	SP	1994
PO-0003	LaBranche Shoreline Stabilization and Canal Closure	State	SP	1987
PO-0003-B	LaBranche Shoreline Protection	State	SP	1996
PO-0006	Fritchie Marsh Restoration	CWPPRA	HR	2001
PO-0008	Central Wetlands Pump Outfall	State	FD	1992
PO-0010	Turtle Cove Shore Protection	State	SP	1994
PO-0016	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 1	CWPPRA	HR	1996
PO-0017	Bayou LaBranche Wetland Creation	CWPPRA	MC	1994
PO-0018	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 2	CWPPRA	HR	1997
PO-0019	Mississippi River Gulf Outlet (MRGO) Disposal Area Marsh Protection	CWPPRA	HR	1999
PO-0022	Bayou Chevee Shoreline Protection	CWPPRA	SP	2001
PO-0024	Hopedale Hydrologic Restoration	CWPPRA	HR	2004
PO-0030	Lake Borgne Shoreline Protection	CWPPRA	SP	2008
PO-0033	Goose Point/Point Platte Marsh Creation	CWPPRA	MC	2008
PO-0036-EB	Orleans Landbridge Shoreline Protection	CIAP (St.)	SP	2013
PO-0038-SF	MRGO Closure Structure	State	HR	2010
PO-0039	Bald Cypress/Tupelo Coastal Forest Protection	CIAP (Par.)	LA	2011
PO-0040	Hydrologic Restoration in West Lake Maurepas	CIAP (Par.)	HR	Pending
PO-0042	West LaBranche Shoreline Protection	CIAP (Par.)	SP	2013
PO-0043	East LaBranche Shoreline Protection	CIAP (Par.)	SP	Pending
PO-0045	East Bank Wastewater Assimilation Project	CIAP (Par.)	OT	Pending
PO-0046	Reserve Relief Canal Shoreline Protection Project	CIAP (Par.)	SP	2014
PO-0048	Green Property Preservation Project	CIAP (Par.)	LA	2011

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Project ID	Project Name	Program	Project Type	Last Year of Construction
PO-0049	French Property Preservation Project	CIAP (Par.)	LA	2009
PO-0051	Mandeville Aquatic Ecosystem Restoration	CIAP (Par.)	MM	2010
PO-0052	Lake Pontchartrain Shoreline Protection	CIAP (Par.)	SP	2013
PO-0055	Lake Pontchartrain and Vicinity-Lake Borgne Surge Barrier (HSDRRS)	HSDRRS	HP	2014
PO-0057	SELA	GNO-HSDRRS	HP	Pending
PO-0060	Permanent Canal Closures and Pump Stations	GNO-HSDRRS	HP	Pending
PO-0061	St. Bernard Parish 40 Arpent Levee Repairs	Surplus 07	HP	2011
PO-0063	Lake Pontchartrain and Vicinity (PRO) (HSDRRS)	HSDRRS	HP	Pending
PO-0064	Lake Pontchartrain and Vicinity, Seabrook Structure (HSDRRS)	HSDRRS	HP	2013
PO-0070	Northshore Beach Marsh Creation/Restoration	CIAP (Par.)	MC	Pending
PO-0072	Biloxi Marsh	Surplus 07	SP	2015
PO-0073	Central Wetlands Demonstration	CIAP (St.)	HR	Pending
PO-0073-1	Central Wetlands - Riverbend	CIAP (St.)	HR	Pending
PO-0073-2	Central Wetlands - EBSTP to A2	CIAP (St.)	HR	Pending
PO-0073-3	Central Wetlands Demonstration Expansion	CIAP (St.)	HR	Pending
PO-0087	Madisonville Bulkhead Project	CDBG	HP	2015
PO-0104	Bayou Bonfouca Marsh Creation	CWPPRA	MC	Pending
PO-0142*	Hydrologic Restoration of the Amite River Diversion Canal	State	HR	Pending
PO-0148	Living Shoreline	CIAP (St.)	OR	Pending
PO-0161	Lake Pontchartrain Mitigation Project	Other	SP	1996
PO-71	Waterline Booster Pump Station, East Bank	CIAP (Par.)	IN	2011
PO-90	West Lac Des Allemands Shoreline Protection	CIAP (Par.)	SP	Pending
TE-0001	Montegut Wetland	State	MM	1993
TE-0002	Falgout Canal Wetland	State	MM	1995
TE-0003	Bayou LaCache Wetland	State	MM	1996
TE-0006	Point au Chien Hydrologic Restoration	State	HR	2006
TE-0007-B	Lower Petit Caillou	State	HR	2007
TE-0017	Falgout Canal Planting Demonstration	CWPPRA	VP	1996

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Project ID	Project Name	Program	Project Type	Last Year of Construction
TE-0020	Isles Dernieres Restoration East Island	CWPPRA	BH	1999
TE-0022	Point au Fer Canal Plugs	CWPPRA	SP/HR	2000
TE-0023	West Belle Pass Headland Restoration	CWPPRA	DM/SP	1998
TE-0024	Isles Dernieres Restoration Trinity Island	CWPPRA	BH	1999
TE-0025	East Timbalier Island Sediment Restoration, Phase 1	CWPPRA	BH	2000
TE-0026	Lake Chapeau Sediment Input and Hydrologic Restoration, Point Au Fer Island	CWPPRA	HR/MC	1999
TE-0027	Whiskey Island Restoration	CWPPRA	BH	1999
TE-0028	Brady Canal Hydrologic Restoration	CWPPRA	HR	2000
TE-0029	Raccoon Island Breakwaters Demonstration	CWPPRA	BH	1997
TE-0030	East Timbalier Island Sediment Restoration, Phase 2	CWPPRA	BH	2000
TE-0032-A	North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management	CWPPRA	HR	Pending
TE-0034	Penchant Basin Natural Resources Plan, Increment 1	CWPPRA	HR	2012
TE-0037	New Cut Dune and Marsh Restoration	CWPPRA	BH	2007
TE-0039	South Lake Decade Freshwater Introduction	CWPRRA	SP	2012
TE-0040	Timbalier Island Dune and Marsh Creation	CWPPRA	BH	2004
TE-0041	Mandalay Bank Protection Demonstration	CWPPRA	SP	2003
TE-0043	GIWW Bank Restoration of Critical Areas in Terrebonne	CWPPRA	SP	2014
TE-0043-EB	GIWW Bank Restoration of Critical Areas of Terrebonne (CIAP)	CIAP (St.)	SP	2010
TE-0044	North Lake Mechant Landbridge Restoration	CWPPRA	SP/MC	2009
TE-0045	Terrebonne Bay Shore Protection Demonstration	CWPPRA	SP	2008
TE-0046	West Lake Boudreaux Shoreline Protection and Marsh Creation	CWPPRA	SP/MC	2008
TE-0048	Raccoon Island Shoreline Protection/Marsh Creation	CWPPRA	SP/MC	2013
TE-0050	Whiskey Island Back Barrier Marsh Creation	CWPPRA	BH	2010

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Project ID	Project Name	Program	Project Type	Last Year of Construction
TE-0052	West Belle Pass Barrier Headland Restoration	CWPPRA	BH/MC	2013
TE-0053	Enhancement of Barrier Island Vegetation Demonstration	CWPRRA	OT	2012
TE-0059	Attakapas Canal Hydrologic Restoration	CIAP (Par.)	DM/HR	Pending
TE-0060	Lake Verret Swamp and Lake Rim Restoration	CIAP (Par.)	DM/MC	Pending
TE-0063	Falgout Canal Freshwater Enhancement	CIAP (St.)	HR	Pending
TE-0064*	Morganza to the Gulf (locally constructed segments)	Surplus 07	HP	Pending
TE-0065*	Larose to Golden Meadow (locally constructed segments)	Surplus 08	HP	2015
TE-0065-SP	Larose to Golden Meadow - Larose Sheetpile	State	HP	Pending
TE-0072*	Lost Lake Marsh Creation and Hydrologic Restoration	CWPPRA	MC	Pending
TE-0078	Cutoff-Pointe Aux Chene Levee	CDBG	HP	Pending
TE-0082	Lost Lake Vegetation Project	State	VP	2011
TE-0100*	NRDA Caillou Lake Headlands	NRDA	BH	Pending
TE-0106	Raccoon Island Repair	State	DM	1994
TE-0107	Spoilbank along the GIWW	State	VP	1993
TE-0111	Valentine to Larose	State	HP	2014
TE-0113*	Houma Navigation Canal Lock Complex	Oil Spill	HR	Pending
TE-0116*	St. Mary Backwater Flooding	State	HP	Pending
TE-0125	Bush Canal and Bayou Terrebonne Bank Stabilization	Other	SP	2007
TE-0135	Raising of LA 1 Floodgate and Lock Structure	Surplus 07	HP	2010
TV-0003	Vermilion River Cutoff Bank Protection	CWPPRA	SP	1996
TV-0004	Cote Blanche Hydrologic Restoration	CWPPRA	HR	1999
TV-0006	Marsh Island Control Structures	State	MM	1993
TV-0009	Boston Canal/Vermilion Bay Bank Protection	CWPPRA	SP	1995
TV-0011	Freshwater Bayou Bank Protection	State	SP	1994
TV-0011-B-EB	Freshwater Bayou Bank Stabilization (CIAP)	CIAP (St.)	SP	2015
TV-0012	Little Vermilion Bay Sediment Trapping	CWPPRA	TE	1999
TV-0013-A	Oaks/Avery Canal Hydrologic Restoration, Increment 1	CWPPRA	HR	1999
TV-0013-B	Oaks/Avery Structures	State	SP	2000

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Project ID	Project Name	Program	Project Type	Last Year of Construction
TV-0014	Marsh Island Hydrologic Restoration	CWPPRA	HR	2001
TV-0015	Sediment Trapping at "The Jaws"	CWPPRA	TE	2004
TV-0016	Chenier Au Tigre Sediment Trapping Demonstration	CWPPRA	TE/SP	2001
TV-0017	Lake Portage Landbridge	CWPPRA	SP	2004
TV-0018	Four Mile Canal Terracing and Sediment Trapping	CWPPRA	TE	2004
TV-0021	East Marsh Island Marsh Creation	CWPPRA	MC	2011
TV-0028	Port of Iberia Bridge Replacement - Port Road over Commercial Canal	CIAP (Par.)	IN	2013
TV-0030	Port of Iberia Bridge Replacement - David Dubois Road over Commercial Canal	CIAP (Par.)	IN	2013
TV-0031	Acadiana Regional Airport Street Improvements - Admiral Doyle Drive	CIAP (Par.)	IN	Pending
TV-0032	Lake Sand Terracing	CIAP (Par.)	MC/SP	2013
TV-0033	Lake Tom/Lake Michael Terracing	CIAP (Par.)	MC/SP	2013
TV-0035	Vermilion Bay Shoreline Restoration	CIAP (Par.)	TE/SP	2012
TV-0037	Burns Point Recreation Park Improvements	CIAP (Par.)	SP	2011
TV-0038	Thorguson Road Improvements	CIAP (Par.)	IN	2012
TV-0044	Henry Hub Access Improvements LA 331	CIAP (Par.)	IN	Pending
TV-0045	Shoreline Protection and Marsh Creation at Tiger Point	CIAP (Par.)	SP	Pending
TV-0046	Henry Hub Access - Charlie Field Rd. Bridge	CIAP (Par.)	IN	2011
TV-0049	Intracoastal City Street Improvements	CIAP (Par.)	IN	2011
TV-0051	Oyster Reef Parallel to Cheniere au Tigre	CIAP (Par.)	SP	2013
TV-0052-1	Franklin Floodgate Sinkable Barge and Pump Station (Phase 1)	CDBG	HP	2014
TV-0052-2	Franklin Floodgate Sinkable Barge and Pump Station (Phase 2)	CDBG	HP	Pending
TV-0053	North Prong Schooner Bayou	CIAP (Par.)	FD/SP	2010
TV-0055	Morgan City/ St Mary Flood Protection	Surplus 09	HP	Pending
TV-0060	Front Ridge Cheniere Terracing Project	CDBG	OT	Pending
TV-0064	Cheniere Au Tigre	State	SP	2005
TV-0065	Rainey Audubon Wildlife Sanctuary Earthen Terraces	CIAP (St.)	MC	2005

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Project ID	Project Name	Program	Project Type	Last Year of Construction
TV-0067	Bayou Tigre Flood Control Project	CDBG	HP	Pending
TV-0072	Quintana Canal/ Cypremort Point	State	SP	1998
TV-0075	Bayou Tigre Flood Control Complex	State	OT	Pending
TV-25	Port of Iberia Bridge - Port Rd. Over Rodere	CIAP (Par.)	IN	2012
TV-50	Henry Hub Access - Charlie Field Road	CIAP (Par.)	IN	2012

* Denotes project part of 2012 Master Plan Project

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Attachment A-2: Common Attributes

Common Attributes - Definition			
Attribute	**Attribute Reporting Name**	**Reporting Unit**	**Definition**
Tier	Tier	Numerical Code	Tier system used to prioritize the order in which groups of projects were run through the suite of models.
Model Group	Model_Grp	Textual Code	Each project and alternative was assigned a unique model group identifier to efficiently track and name model outputs.
Eco-Hydro Group	EcoHydGrp	Textual Code	Denotes which of the three eco-hydrology regions the project was located within: ATT refers to the Atchafalaya/Terrebonne region; PBB refers to the Pontchartrain/ Barataria/Breton region; and ChP refers to the Chenier Plain region.
Project Number	Prj_No	Textual Code	A unique project identification number, arranged by "Planning Unit.Project Type.Sequential Number" (e.g., 001.MC.09).
Project Name	Prj_Name	Textual Code	A unique name for each project (may utilize part of the Name Source).
Project Type	Prj_Type	Textual Code	The type of restoration or protection provided by the project.
Description	Descript	Textual Code	Brief description of project features and purpose.
Name Source	Name_Src	Textual Code	The project name as specified in the source document.
Source	Src	Textual Code	The source plan or document from which the project was taken.
Planning Unit	PU	Alphanumeric Code	Planning unit(s) in which the project footprint is located.
Latitude	Lat_m	Numerical Code	Denotes the latitude of the point or a centroid (for line and polygon features) in NAVD88 UTM.
Longitude	Long_m	Numerical Code	Denotes the longitude of the point or a centroid (for line and polygon features) in NAVD88 UTM.
Latitude_DD	Lat_DD	Numerical Code	Denotes the latitude of the point or a centroid (for line and polygon features) in decimal degree.
Longitude_DD	Long_DD	Numerical Code	Denotes the longitude of the point or a centroid (for line and polygon features) in decimal degree.

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Common Attributes - Definition			
Attribute	**Attribute Reporting Name**	**Reporting Unit**	**Definition**
Model Number	Model_No	Textual Code	A unique identification number provided for Hydrologic Restoration, Barrier Island/Headland Restoration, Marsh Creation and Hurricane Protection projects, where individual components are separated out for modeling, costing, or project-selection purposes. The model number is needed to track individual sub-components of a project.
Planning Tool Number	PT_No	Textual Code	A unique identification number provided for Barrier Island/Headland Restoration and Marsh Creation projects with sub-components that may be tracked separately (from the complete project) in the Planning Tool.
Cost Number	Cost_No	Textual Code	A unique identification number provided for Barrier Island/Headland Restoration and Marsh Creation projects with sub-components for which both complete project and sub-component costs will be tracked in the Planning Tool.
Parish	Parish	Textual Code	Parish(es) in which the project footprint is located.
Prerequisites	Prereq	Textual Code	List of other projects that would need to be implemented before the candidate project would be implemented.
Mutually Exclusive	Mut_Excl	Textual Code	List of other projects that would not be included in an alternative should the current project be selected.
Planning Unit 1	PU1	Percentage	Percent of project footprint within Planning Unit 1.
Planning Unit 2	PU2	Percentage	Percent of project footprint within Planning Unit 2.
Planning Unit 3a	PU3a	Percentage	Percent of project footprint within Planning Unit 3a.
Planning Unit 3b	PU3b	Percentage	Percent of project footprint within Planning Unit 3b.
Planning Unit 4	PU4	Percentage	Percent of project footprint within Planning Unit 4.

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Attachment A-3: Project-Specific Attributes by Project Type: Restoration

Restoration Projects – Definition by Project Type

Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Shoreline Protection				
Crest Elevation	Crest_El	m (NAVD88)	Top of crown elevation.	Crest elevation was taken from typical shoreline protection project template (3.5 ft/1.0668 m NAVD88).
Length	Lngth	m	Total length of the project centerline.	Length was provided through a GIS query to determine each projects length.
Top Width	Top_Wdth	m	Total width at top of project perpendicular to the project centerline.	Top width of 4 ft/1.2192 m taken from typical shoreline protection project template.
Base Width	Bse_Wdth	m	Total width at base of project perpendicular to the project centerline.	Base width was calculated from typical shoreline protection project template crown elevation, side slopes, and local water depth.
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope water of 3H:1V was taken from typical shoreline protection project template.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.	Side slope marsh of 3H:1V was taken from typical shoreline protection project template.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Wave Attenuation	Wave_Attn	Percentage	Percent of wave energy deflected away/prevented from contact with the shoreline by the project.	Nomographs from the USACE Coastal Engineering Manual were utilized. Fetch was determined based on an estimate of water depth at project location, to help determine if the wave was depth limited, and the 90 percentile wind, at 40-45 mph, was used to determine if the wave was time limited or fetch limited. The developed wave was then compared to the size and height of the shoreline protection and given a ratio for overtopping plus a factor for run up. Each project was calculated separately.
Volume	Volume	m^3	Total estimated volume of fill material required to construct the project feature using one initial lift based on the template.	Fill volume was calculated in the cost worksheets with a formula utilizing length, side slope, width, and elevations taken from the template.
Bank Stabilization				
Crest Elevation	Crest_El	m (NAVD88)	Top of crown elevation.	Crest elevation was taken from typical bank stabilization project template (4.0 ft NAVD88).
Length	Lngth	m	Total length of the project centerline.	Length was provided through a GIS query to determine each projects length.
Top Width	Top_Wdth	m	Total width at top of project perpendicular to the project centerline.	Top width of 20 ft/6.0960 m was taken from typical bank stabilization project template.
Base Width	Bse_Wdth	m	Total width at base of project perpendicular to the project centerline.	Base width was calculated using the existing average elevation, side slopes, and crown elevation from the typical bank stabilization project template.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope water of 20H:1V was taken from typical bank stabilization project template.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.	Side slope marsh of 10H:1V was taken from typical bank stabilization project template.
Wave Attenuation	Wave_Attn	Percentage	Percent of wave energy deflected away/prevented from contact with the shoreline by the project.	Nomographs from the USACE Coastal Engineering Manual were utilized. Fetch was determined based on an estimate of water depth at project location, to help determine if the wave was depth limited, and the 90 percentile wind, at 40-45 mph, was used to determine if the wave was time limited or fetch limited. The developed wave was then compared to the size and height of the shoreline protection and given a ratio for overtopping plus a factor for run up. Each project was calculated separately.
Armoring Type	Armr_Type	Textual Code	Type of armoring such as turf, concrete, riprap, revetment mats, etc.	Determined by project location and typical bank stabilization template design. Armor types include planted vegetation, riprap, and articulated concrete block mattresses.
Borrow Source	Bor_Src1	Numerical Code	Borrow area required to construct project feature(s).	Due to the typical project locations and access/construction method, in-situ material will be used to construct the Bank Stabilization projects.
Date of Planting	DatePlnt	Date	The implementation date of the planting program.	The date of planting was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Fraction Vegetation Species	FracSpec	Ratio	The fraction of each 500 m^2 cell within the project footprint covered by each vegetation species identified for planting.	Based on vegetative planting schemes for coastal projects, it was determined that 60% of the project would be planted; therefore, the fraction of vegetation species is calculated by taking 60% divided by the number of species to be planted.
Vegetation Type	VegType	Species Code	Vegetation type(s) to be planted following project construction.	The species to be utilized in the planting scheme was based on project location and salinity levels as well as associated habitat composition to achieve the highest survival rates and species composition typical of the habitat type.
Volume	Volume	m^3	Total estimated volume of fill material required to construct the project feature using one initial lift based on the template.	Fill volume was calculated in the cost worksheets with a formula utilizing the average cross sectional area times the length. The cross sectional area was calculated using the template and the existing average elevation. Source cut volume was calculated in the cost worksheets with a formula that utilized the fill volume times a 1.5 loss factor.
Existing Average Elevation	ExstAvgEl	m (NAVD88)	Elevation of the existing ground calculated as an average for length of project.	The existing average elevation was calculated in GIS and is based on the 2017 Coastal Master Plan DEM.
Oyster Barrier Reef				
Crest Elevation	Crest_El	m (NAVD88)	Top of crown elevation.	Crest elevation of 2 ft/0.6096 m NAVD88 was taken from typical oyster reef project template.
Length	Lngth	m	Total length of the project centerline.	Length was provided through a GIS query to determine each projects length.
Top Width	Top_Wdth	m	Total width at top of project perpendicular to the project centerline.	Top width of 10 ft/3.048 m was taken from typical oyster reef project template.
Base Width	Bse_Wdth	m	Total width at base of project perpendicular to the project centerline.	Base width was calculated from side slopes, local water depth, and crown elevation of typical oyster reef project template.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope water of 5H:1V was taken from typical oyster reef project template.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.	Side slope marsh of 5H:1V was taken from typical oyster reef project template.
Wave Attenuation	Wave_Attn	Percentage	Percent of wave energy deflected away/prevented from contact with the shoreline by the project.	Nomographs from the USACE Coastal Engineering Manual were utilized. Fetch was determined based on an estimate of water depth at project location, to help determine if the wave was depth limited, and the 90 percentile wind, at 40-45 mph, was used to determine if the wave was time limited or fetch limited. The developed wave was then compared to the size and height of the shoreline protection and given a ratio for overtopping plus a factor for run up. Each project was calculated separately.
Barrier Island / Headland Restoration				
Length	Lngth	m	Total length of the project centerline.	Length was provided through a GIS query to determine each projects length.
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope for the dune of 30H:1V on the water side was taken from Barrier Island/Headland project template.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.	Side slope for the dune on the marsh of 30H:1V side was taken from Barrier Island/Headland project template.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Side Slope beach	Bch_Slp	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope for the beach of 40H:1V on the water side was taken from Barrier Island/Headland project template.
Borrow Source	Bor_Src1	Numerical Code	Borrow area(s) required to construct project feature(s).	Borrow source was provided through a GIS query of the surficial sand source layer that measured the distance from the project to the nearest borrow source (i.e., Borrow Source 1), and then calculated the second closest (i.e., Borrow Source 2). These were then adjusted based on current scientific understanding and design practice.
Second Borrow Source	Bor_Src2	Numerical Code	Borrow area(s) required to construct project feature(s). Used only once Borrow_Src1 has been depleted.	Borrow source was provided through a GIS query of the surficial sand source layer that measured the distance from the project to the nearest borrow source (i.e., Borrow Source 1), and then calculated the second closest (i.e., Borrow Source 2), and finally the third closest (i.e., Borrow Source 3). These were then adjusted based on current scientific understanding and design practice.
Date of Planting (Dune)	DatePlntDn	Date	The implementation date of the planting program for dune.	The date of planting for dune was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.
Date of Planting (Swale)	DatePlntSw	Date	The implementation date of the planting program for swale.	The date of planting for swale was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.
Date of Planting (Marsh)	DatePlntMh	Date	The implementation date of the planting program for marsh.	The date of planting for marsh was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Fraction Vegetation Species (Dune)	FracSpecDn	Ratio	The fraction of each 500 m^2 cell within the project footprint covered by each vegetation species identified for planting dune habitat.	Based on vegetative planting schemes for coastal projects, it was determined that 60% of the project would be planted; therefore, the fraction of vegetation species is calculated by taking 60% divided by the number of species to be planted.
Fraction Vegetation Species (Swale)	FracSpecSw	Ratio	The fraction of each 500 m^2 cell within the project footprint covered by each vegetation species identified for planting swale habitat.	Based on vegetative planting schemes for coastal projects, it was determined that 60% of the project would be planted; therefore, the fraction of vegetation species is calculated by taking 60% divided by the number of species to be planted.
Fraction Vegetation Species (Marsh)	FracSpecMh	Ratio	The fraction of each 500 m^2 cell within the project footprint covered by each vegetation species identified for planting marsh habitat.	Based on vegetative planting schemes for coastal projects, it was determined that 60% of the project would be planted; therefore, the fraction of vegetation species is calculated by taking 60% divided by the number of species to be planted.
Vegetation Type (Dune)	VegTypeDn	Species Code	Vegetation type(s) specific to dune habitat to be planted following project construction.	The species to be utilized in the planting scheme was based on project location and salinity levels as well as associated habitat composition to achieve the highest survival rates and species composition typical of the habitat type.
Vegetation Type (Swale)	VegTypeSw	Species Code	Vegetation type(s) specific to swale habitat to be planted following project construction.	The species to be utilized in the planting scheme was based on project location and salinity levels as well as associated habitat composition to achieve the highest survival rates and species composition typical of the habitat type.
Vegetation Type (Marsh)	VegTypeMh	Species Code	Vegetation type(s) specific to marsh habitat to be planted following project construction.	The species to be utilized in the planting scheme was based on project location and salinity levels as well as associated habitat composition to achieve the highest survival rates and species composition typical of the habitat type.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Beach Area	Bch_Area	km^2	Total area of beach created or nourished by project.	Beach area was calculated by multiplying the width of the beach section and length of project. The beach section is defined as the beach slope plus the berm width.
Beach Width	Bch_Wdth	m	Width of the beach portion created or nourished by the project.	Beach width of 500 ft/152.4 m was taken from typical barrier island/headland project template.
Beach Elevation	Bch_El	m (NAVD88)	Beach crest elevation.	Beach crest elevation of 6.5 ft/1.9812 m NAVD88 was taken from the typical barrier island/headland project template.
Beach Volume	Bch_Vol	m^3	Total estimated volume of fill material required to construct the beach component of the project.	Beach volume was provided by the modeling team.
Dune Area	Dn_Area	km^2	Total area of dune created or nourished by project.	Dune area was calculated by multiplying the width of the dune section and length of project based on the barrier island or headland template. The dune segment of the project is width of dune portions, which is shown on the template as 100 ft.
Dune Elevation	Dn_El	m (NAVD88)	Dune crest elevation after one year of settlement.	Dune crest elevation was taken from typical barrier island/headland project template assuming 0.5 ft/ 0.1524 m of settlement after one year. 8.5 ft/ 2.4384 m NAVD88 for barrier island dune feature and 7.5 ft/2.2860 m NAVD88 for headland dune feature after Year 1.
Dune Volume	Dn_Vol	m^3	Total estimated volume of fill material required to construct the dune component of the project.	Dune volume was provided by the modeling team.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Marsh Area	Mh_Area	km^2	Total area of marsh created or nourished on the seaward side of the barrier island by project.	Marsh area was calculated by multiplying the width of the marsh section and length of project based on the barrier island or headland template. The marsh section is defined as the width of the marsh portions which is shown on the template as 750 ft.
Marsh Elevation	Mh_El	m (NAVD88)	Marsh elevation on seaward side of Barrier Island/ Headland typical template after one year of settlement.	Marsh elevation after Year 1 from typical Barrier Island/Headland project template assumes 1 ft/ 0.3044 m of settlement to elevation 4 ft/1.2192 m NAVD88.
Marsh Volume	Mh_Vol	m^3	Total estimated volume of marsh fill material required to construct the seaward side back barrier marsh component of a Barrier Island/ Headland project.	Marsh volume was provided by the modeling team.
Volume	Volume	m^4	Total estimated volume of marsh, beach, dune fill material required to construct the Barrier Island/ Headland project.	Volume was provided by the modeling team.
D_{50}	D50	mm	50th Percentile Diameter of Sediment.	D_{50} is the diameter of the sediment particles of which 50% is of a greater size and 50% is a lesser size; i.e., the median sediment particle diameter of the sediment source. Based on boring logs from the surficial sand borrow locations.
Percent Sand in Eroding Profile	PerSndErd	Percentage	Percentage of sand within the eroding profile (d>0.063mm).	Percent sand in eroding profile is the ratio of the sand in the fill material to the total volume of fill material and was developed using the soil characteristics of the surficial sand source data provided from representative soil borings. Sand is defined as particles greater than 0.063 mm.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Percent Silt in Eroding Profile	PerSltErd	Percentage	Percentage of silt within the eroding profile (d<0.063mm).	Percent silt in eroding profile is the ratio of the silt in the fill material to the total volume of fill material and was developed using the soil characteristics of the surficial sand source data provided from representative soil borings. Silt is defined as particles less than 0.063 mm.
Marsh Creation				
Borrow Source	Bor_Src1	Numerical Code	Borrow area(s) required to construct project feature(s).	Typically identified from the Surficial Sediment Deposits Database, first borrow source, by distance to marsh area boundary, with known sediment characteristics (i.e., nearest borrow source). Borrow Area D is unknown and was not recommended. These were then adjusted based on current scientific understanding and design practice.
Second Borrow Source	Bor_Src2	Numerical Code	Borrow area(s) required to construct project feature(s). Used only once Borrow_Src1 has been depleted.	Typically identified from the Surficial Sediment Deposits Database, second borrow source, by distance to marsh area boundary, with known sediment characteristics (i.e., second closest borrow source). Borrow Area D is unknown and was not recommended. These were then adjusted based on current scientific understanding and design practice.
Date of Planting (Marsh)	DatePlntMh	Date	The implementation date of the planting program.	The date of planting for marsh was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.
Fraction Vegetation Species (Marsh)	FracSpecMh	Ratio	The fraction of each 500 m^2 cell within the project footprint covered by each vegetation species identified for planting.	Based on vegetative planting schemes for coastal projects, it was determined that 60% of the project would be planted; therefore, the fraction of vegetation species is calculated by taking 60% divided by the number of species to be planted.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Vegetation Type (Marsh)	VegTypeMh	Species Code	Vegetation type(s) specific to marsh habitat to be planted following project construction.	The species to be utilized in the planting scheme was based on project location and salinity levels as well as associated habitat composition to achieve the highest survival rates and species composition typical of the habitat type.
Volume	Volume	m^3	Total estimated volume of fill material required to construct the project feature using one initial lift based on the construction grade elevation.	The fill volume was provided by the modeling team.
Marsh Area	Mh_Area	km^2	Total area of marsh created or nourished by project.	The value for marsh area was provided by the modeling team.
Marsh Elevation	Mh_El	m (NAVD88)	Marsh elevation of consolidated fill material after one year of settlement.	Year 1 marsh elevation is based on historical sub-region consolidation settlement curves.
Bulk Density	Blk_Densty	g/cm^3	Bulk Density of fill material.	Bulk density is based on existing geotechnical information as well as borrow sediment location and type. The three bulk densities (with sources) include: 1. 2.1 g/cm^3 (Grand Liard - Inshore) - Assumed to apply to Surficial Mixed and Surficial Fines outside the Mississippi River. 2. 2.2 g/cm^3 (Lake Hermitage - Mississippi River) - Assumed to apply to both Surficial Mixed and Surficial Sand from the Mississippi River. 3. 2.02 g/cm^3 (Ship Shoal) - Assumed to apply to all Surficial Sands outside the Mississippi River.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Sediment Size Distribution	Sed_Size	mm	Particle size distribution of fill material.	Sediment size distribution is based on existing geotechnical information as well as borrow sediment location and type. The three bulk densities (with sources) include: 1. 0.06 mm (Grand Liard - Inshore) - Assumed to apply to Surficial Mixed and Surficial Fines outside the Mississippi River. 2. 0.3 mm (Lake Hermitage - Mississippi River) - Assumed to apply to both Surficial Mixed and Surficial Sand from the Mississippi River. 3. 0.19 mm (Ship Shoal) - Assumed to apply to all Surficial Sands outside the Mississippi River.
Ridge Restoration				
Crest Elevation	Crest_El	m (NAVD88)	Top of crown elevation.	Crest elevation was taken from ridge restoration project template (5.0 ft/1.5240 m NAVD88).
Length	Lngth	m	Total length of the project centerline.	Length was provided through a GIS query to determine each projects length.
Top Width	Top_Wdth	m	Total width at top of project perpendicular to the project centerline.	Top width of 50 ft/15.24 m was based on recently constructed ridge restoration project template.
Base Width	Bse_Wdth	m	Total width at base of project perpendicular to the project centerline.	Base width was calculated using the existing average elevation, side slopes, and crown elevation from the typical ridge restoration design template.
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope water of 5H:1V was taken from ridge restoration project template.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.	Side slope marsh of 5H:1V was taken from ridge restoration project template.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Ridge Area	Ridge_Area	km^2	Total area of ridge created or nourished by project.	Ridge area was calculated by multiplying the perpendicular width of the base of the ridge by the length of the ridge, that value was then converted to square kilometers.
Borrow Source	Bor_Src1	Numerical Code	Borrow area required to construct project feature(s).	Borrow source was assumed to be in-situ for Ridge Restoration projects.
Date of Planting	DatePlnt	Date	The implementation date of the planting program.	The date of planting was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.
Fraction Vegetation Species	FracSpec	Ratio	The fraction of each 500 m^2 cell within the project footprint covered by each vegetation species identified for planting.	Based on vegetative planting schemes for coastal projects, it was determined that 60% of the project would be planted; therefore, the fraction of vegetation species is calculated by taking 60% divided by the number of species to be planted.
Vegetation Type	VegType	Species Code	Vegetation type(s) to be planted following project construction.	The species to be utilized in the planting scheme was based on project location and salinity levels as well as associated habitat composition to achieve the highest survival rates and species composition typical of the habitat type.
Volume	Volume	m^3	Total estimated volume of fill material required to construct the project feature using one initial lift based on the template.	Fill volume was calculated in the cost worksheets with a formula utilizing the average cross sectional area times the length. The cross sectional area was calculated using the typical ridge restoration template and the existing average elevation. Source cut volume was calculated based on the typical ridge restoration project template access channel dredge volumes.
Existing Average Elevation	ExstAvgEl	m (NAVD88)	Elevation of the existing ground calculated as an average for length of project.	The existing average elevation was calculated in GIS and is based on the 2017 Coastal Master Plan DEM.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Hydrologic Restoration				
Crest Elevation	Crest_El	m (NAVD88)	Top of crown elevation.	Crest elevation upon constructed project templates for a rock barrier (5.0 feet NAVD88).
Length	Lngth	m	Total length of the project centerline.	Length was provided through a GIS query to determine each projects length.
Top Width	Top_Wdth	m	Total width at top of project perpendicular to the project centerline.	Top width was taken from a project template from the Shoreline Protection typical project template (4 ft/1.2192 m).
Base Width	Bse_Wdth	m	Total width at base of project perpendicular to the project centerline.	Base width was calculated using the side slope, design crown elevation, and local water depth based on the Shoreline Protection typical project template.
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on water side of project.	Side slope water of 3H:1V was taken from the Shoreline Protection typical project template for a rock barrier.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance on marsh side of project.	Side slope marsh of 3H:1V was taken from the Shoreline Protection typical project template for a rock barrier.
Invert Elevation	Invert_El	m (NAVD88)	Estimated invert elevation of control structure.	Invert of control structure. Based on information from existing planning or feasibility level studies. For those projects where existing information was not available, the invert elevation was calculated based on similar projects which have undergone some level of feasibility and/or design.
Opening Geometry Area	OpnGeoArea	m^2	Total area of the control structure opening.	Opening geometry was taken from existing reports where possible. Where no reports existed, it was calculated using the structure's net opening size (Length x width x number of openings) in square feet then converting the area to square meters.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Opening Geometry	OpenGeo	Textual Description	Description of the dimensions and geometric shape of control structure opening.	The dimensions and geometric shape of the control structure opening are described and based on peak design flow, and similar projects in the area in feasibility and or design.
Operational Regime	Op_Regime	Textual Description	Explanation of the operational strategies and triggers for each structure.	For fixed structures this attribute is not applicable. For projects in which operational regime is applicable, operation at capacity was assumed and informed by the hydrodynamic modeling teams.
Wave Attenuation	Wave_Attn	Percentage	Percent of wave energy deflected away/prevented from contact with the shoreline by the project.	Nomographs from the USACE Coastal Engineering Manual were utilized. Fetch was determined based on an estimate of water depth at project location, to help determine if the wave was depth limited, and the 90 percentile wind, at 40-45 mph, was used to determine if the wave was time limited or fetch limited. The developed wave was then compared to the size and height of the shoreline protection and given a ratio for overtopping plus a factor for run up. Each project was calculated separately.
Diversion				
Invert Elevation	Invert_El	m (NAVD88)	Invert elevation of diversion intake control structure.	Invert of intake structure of diversion. Based on information from existing planning or feasibility level studies. For those projects where existing information was not available, the invert elevation was calculated based on similar projects which have undergone some level of feasibility and/or design.
Opening Geometry Area	OpnGeoArea	m^2	Total area of the control structure opening.	Opening geometry area was taken from existing reports where possible. Where no reports existed, it was calculated using the intake structure's net opening size of all bays or culverts (Length x width x number of openings) in square feet then converting the area to square meters.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Opening Geometry	OpenGeo	Textual Description	Description of the dimensions and geometric shape of control structure opening.	Description of the opening type of the intake structure using information from existing planning or feasibility level studies. For those projects where existing information was not available, the dimensions and geometric shape of the control structure opening was calculated based on peak design flow and similar projects in the area which have undergone some level of feasibility and/or design.
Operational Regime	Op_Regime	Textual Description	Explanation of the operational strategies and triggers for each structure.	Description of the operational rules of the diversion implemented in the ICM model. Information from existing planning or feasibility level studies was used where possible. Where information was unavailable, hydrodynamic modeling teams informed the assignment of an operational regime.
Bulk Density	Blk_Densty	g/cm^3	Bulk density of fill material.	Information from existing geotechnical reports from known source material.
Discharge	Discharge	m^3/s	Peak design flow through the structure and channel.	Maximum conveyance capacity of diversion based on information from existing planning or feasibility level studies. Where information was unavailable, hydrodynamic modeling teams informed the assignment of maximum discharge based on available flow, hydrodynamic head, receiving basin characteristics, source river historical data, and project intent.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Diversion Channel Depth	Chnl_Dpth	m	Average depth of diversion conveyance channel.	Depth of conveyance channel in NAVD88 based on information from existing planning or feasibility level studies. For those projects where existing information was not available, depth was calculated based on required channel geometry to balance flow conveyance and sediment transport versus scour considerations. Similar projects in the area which have undergone some level of feasibility and/or design also informed the calculation.
Diversion Channel Length	Chnl_Lngth	m	Length of diversion channel from the beginning of the diversion, including the diversion structure, to the outfall area.	Information from existing planning or feasibility level studies was used where possible. For those projects where existing information was not available, the diversion length was based on GIS measurement of the diversion and outfall locations corresponding to the ICM model discharge boxes.
Diversion Channel Width	Chnl_Wdth	m	Bottom width of conveyance channel from diversion structure to outfall area.	Bottom width of conveyance channel based on information from existing planning or feasibility level studies. For those projects where existing information was not available, the width was calculated based on peak design flow, sediment or freshwater transport considerations, and scour considerations. Similar projects in the area which have undergone some level of feasibility and/or design also informed the calculation.
River	River	Numeric Code	Numerical code corresponding to river that is the source of fresh water for a diversion project.	River was provided through a GIS query to determine each projects location and river source.
Sand, Silt, and Clay Concentration	SndSltClay	Percentage	Sand, silt, and clay concentration of water during peak diversion flow.	Information from existing planning or feasibility level studies.
Sediment to Water Ratio	STW	Ratio	Sediment Capture Efficiency	Information from existing planning or feasibility level studies.

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Attachment A-4: Project-Specific Attributes by Project Type: Structural Protection

Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Structural Protection				
Length	Lngth	m	Overall length of the structural protection project.	The overall length of levees was measured along the centerline using GIS from endpoint to endpoint including all levee feature types (i.e., earthen levee, T-wall, gates).
Earthen Levee				
Top Width	Top_Wdth	m	The width of the levee crown.	A crown width of 10 ft/3.048 m was used unless specified otherwise.
Side Slope Water	Sd_Slp_Wtr	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance.	Typical side slopes used by the USACE for levee design were assumed to be 4H:1V front slopes of the levee itself (not wave berm) unless otherwise specified in reports or other published documents. The side slope water refers to the "Flood Side" or front side of the levee.
Side Slope Marsh	Sd_Slp_Mh	Ratio	The slope of the fill expressed as the ratio of horizontal distance to vertical distance.	Typical side slopes assumed are those used by the USACE for HSDRRS levee design were assumed to be 3H:1V back slopes for the levee itself (not stability berm)unless otherwise specified in reports or other published documents. The side slope marsh refers to the "Protected Side" or back side of the levee.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Armoring Type	Armr_Type	Textual Code	Type of armoring used to protect earthen levees.	Full earthen levee section - turf on flood side and protected side is universal assumption. Levee turf is included in the cost of fertilizing and seeding. Riprap is used on flood side wave berms when exposed to open fetch. Levee to floodwall tie-ins and slope pavement transitions are typically constructed at hardened structures and are armored with 6" concrete slope pavement. The transition slope pavement, riprap, and tie-ins are considered minor cost to the overall project and is not included as a line item for a high level study.
Design Elevation	Lev_Elev	m (NAVD88)	Crown elevation of levee feature.	All required design elevations are provided from previous studies and reports, where existing. Where previous information was not available, project profiles and submittal information was used.
Existing Average Elevation	ExstAvgEl	m (NAVD88)	Average surface elevation within project footprint.	The following three steps were be performed for calculated the existing average elevation: 1) Existing non-federal levee - the existing average elevation of the crown will be taken from the HNTB/CPRA database, 2) New-start levee project concepts - the existing average elevation of the ground will be taken from the 2017 Master Plan DEM, 3) Existing federal levees - the existing average elevation of the crown will be taken from the design elevation.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Earthen Levee Length	Leve_Lngth	m	Total length of the earthen levee section.	The length of levees was measured along the centerline using GIS from endpoint to endpoint. The length of gates and T-walls were deducted from the overall length to obtain the earthen levee portion of the project. Because the design elevation can change within a single project, most levees are broken into "Reaches". These reaches are typically where there is a change in design elevation or change in cross section. Varying elevations within a reach were averaged where necessary.
Footprint	Footprint	km^2	Levee footprint based on the length and width of each levee section.	The levee width includes crown width, slope width, and any flood side wave berm and/or protected side stability berm widths.
Construction Grade	Con_Grade	m (NAVD88)	The crown elevation of the levee including the design elevation plus construction overbuild that compensates for settlement.	Additional fill added to design elevation to achieve construction elevation to account for settlement.
Concrete T-Wall				
Base Width	Bse_Wdth	m	The base width of the concrete T-wall which was developed as a function of the wall height.	Base width will vary depending on the forces and height of the wall. Base width will be refined in final design. Wall cross-sections were taken from existing projects with similar heights and soil conditions, such as those constructed using HSDRRS guidelines. All Floodwalls are assumed protected from vessel impact; only a debris loading was considered.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Design Elevation	Wall_Elev	m (NAVD88)	Elevation to protect against a specified storm event (Example: 50-year, 100-year) including acceptable overtopping at Year 50. Unless stated otherwise the acceptable overtopping rate is 0.1 cfs/LF (.002832 cms/ 0.3048 m)	All required design elevations are provided from project profiles. The provided design grades were assumed to include sufficient height for future conditions (subsidence and sea level rise).
Existing Average Elevation	ExstAvgEl	m (NAVD88)	Average surface elevation within project footprint.	Taken from existing reports when available. When reports were unavailable, the following steps were used to for existing average elevation: 1) For existing non-federal levees and walls - the existing average elevation of the ground or structure was taken from the HNTB/CPRA database using survey elevations, 2) For existing federal levees and walls - the existing ground or structure elevation was taken from the design elevation, 3) For new levees and walls - the existing average elevation of the ground was taken from the 2017 DEM model.
Base Thickness	BseThckns	m	The base thickness of the concrete T-wall which was developed as a function of the wall height.	Base thickness will vary depending on the forces and height of the wall. Base thickness will be refined at final design. Wall cross-sections were taken from existing projects with similar heights and soil conditions such as projects constructed according to HSDRRS guidelines. All floodwalls are assumed protected from vessel impact; only a debris loading was considered.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Wall Height	Wall_Ht	m (NAVD88)	Distance from the top of the base foundation to top of wall.	T-wall height is based on project profile elevations. The wall heights are assumed to include sufficient height to account for future sea level rise and ground subsidence, structural superiority has not been added to the wall heights.
Wall Length	Wall_Lngth	m	The total length of the T-wall section.	Actual length of wall was used where reports available. Where reports were unavailable, GIS measurement was used to assign wall length. Assumed tie-in lengths were used at isolated structures such as floodgates and pump stations. Assumed transition lengths: @ vehicular and railroad gates - 120 ft/35.576 m each side, @ floodgates 200 ft/60.96 m each side, @ pump stations 200 ft/60.96 m each side.
Wall Thickness	Wall_Thck	m	Thickness of T-wall as proportioned to the wall height.	All walls are assumed protected from vessel impact, the wall thickness considers the hydrostatic forces and a debris loading.
Floodgate - Land				
Length	Lngth	m	Total length of the project centerline.	The gate monolith assumed to be 10 ft/3.048 m longer than the gate opening on each side. Base widths are based on the wall height.
Design Elevation	Design_El	m (NAVD88)	Elevation to protect against a specified storm event (Example: 50-year, 100-year) including acceptable overtopping rate for target Year 50. Unless stated otherwise the acceptable overtopping rate is 0.1 cfs/LF.	All required design elevations were provided from project profiles. The wall heights are assumed to include sufficient height to account for future sea level rise and ground subsidence.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Gate Height	Gate_Ht	m	Distance from sill to the top of gate.	The top of gate is set at the required design elevation plus 1 ft/0.3048 m of structural superiority, unless specified otherwise. Sill elevation is set by the road or RR track grade.
Gate Type	Gate_Type	Textual Code	Type of floodgate utilized.	Unless noted otherwise, swing gates shall be used for openings less than 40 ft/12.192 m in width; roller gates shall be used at gate openings greater than 40 ft/12.192 m. Vehicular gate widths shall exceed the existing road width plus 6 ft/1.8288 m clearance on each side to gate columns. The minimum opening width is 30 ft/ 9.144 m. Railroad gates shall include the centerline to centerline distance of the outer rails plus 9 ft/2.7432 m from the centerline of the outer rails to the gate columns. The minimum railroad gate opening is 18 ft/5.4864 m. Small pedestrian gate crossings are an insignificant increase in cost over T-wall sections and are not considered in this estimate.
Floodgate - Water				
Length	Lngth	m	Total length of the project centerline.	The length of the gate depends on the requirement of the navigational channel. Barge gates typically range from 30 ft/9.144 m long to 220 ft/67.056 m long. Sector gates typically range from 56 ft/17.0688 m long to 250 ft/76.2 m long. The 56 ft/17.0688 m wide sector gate shall be used in cost estimating unless noted otherwise.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Design Elevation	Design_El	m (NAVD88)	Elevation to protect against a specified storm event (Example: 50-year, 100-year) including acceptable overtopping rate for target Year 50. Unless stated otherwise the acceptable overtopping rate is 0.1 cfs/LF (0.002832 cms/ 0.3048 m).	All required design elevations are provided from project profiles. Structural superiority was NOT added.
Gate Height	Gate_Ht	m	Total height of the gate structure.	Unless stated otherwise, the sill was assumed to be set at El -14 ft/-4.2672 m. Top of floodgate shall match the adjacent walls. The sill is set at the authorized channel depth plus 2 ft/0.6096 m of clearance.
Gate Type	Gate_Type	Textual Code	Type of floodgate utilized.	Unless stated otherwise, the gate shall be a 56 ft/ 17.0688 m sector gate supported on a pile founded concrete gate bay monolith. The more durable and operable sector gate was used in all navigation channel floodgates.
Pumps				
Operational Regime	Op_Regime	Textual Description	Explanation of the operational strategies and triggers for each structure.	Strategies and triggers are provided from project profiles.
Impeller Elevation	Implr_El	m (NAVD88)	Elevation of the impeller.	Provided from reports or assumed bottom elevation of the canal.
Capacity	Capacity	m^3/s	Discharge of the pumps at the design head.	Capacities are provided from project profiles. The pumping was assumed to work against the design storm grade and the intake stage at El 0.0 ft/0 m NAVD88.

Note: Soil stabilization for earthen levees was not considered for the master plan. It is assumed the levees will be constructed in lifts to achieve final design elevation.

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Attachment A-5: Cost and Duration Attributes

Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Implementation Year	Implem_Yr	Years	The project implementation date.	The date of implementation was calculated by adding the Engineering Duration and the Construction Duration and then the addition of one year.
Planning/Engineering and Design Duration	PED_Dur	Years	The expected length of time to complete all planning, engineering, and design activities.	Based on historical data of similar project planning durations.
Estimated Planning/Engineering and Design Cost	EstPEDCst	Dollars	Total estimated cost associated with all aspects of the planning, engineering, and design phase.	See actual cost worksheets for assumptions. Typically 10% of construction cost. 6% of construction cost for diversions greater than 50,000 cfs capacity.
Rounded Planning/Engineering and Design Cost	RndPEDCost	Dollars	Rounded cost to complete planning, engineering, and design based on the estimated P/E&D cost.	Rounded to the nearest 100,000.
Construction Duration	Con_Dur	Years	Expected length of time to complete all construction activities.	Based on average historical data of similar project construction durations.
Estimated Construction Cost	EstConCst	Dollars	Total estimated cost associated with all aspects of the construction phase including a 20% contingency.	See actual cost worksheets for assumptions.
Rounded Construction Cost	RndConCst	Dollars	Rounded cost to construct a project based on the estimated construction cost.	Rounded to the nearest 100,000.

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Attribute	Attribute Reporting Name	Reporting Unit	Definition	Assumptions
Estimated Construction Management Cost	EstCMCst	Dollars	Cost for all managerial costs associated with construction of a project based on the estimated construction cost.	5% of construction cost for all projects.
Rounded Construction Management Cost	RndCMCst	Dollars	Rounded cost for all managerial costs associated with construction of a project based on the estimated construction cost.	Rounded to the nearest 100,000.
Estimated Operation and Maintenance Cost	EstOMCst	Dollars	Total estimated cost associated with all aspects of the operation and maintenance phase.	See actual cost worksheets for assumptions. Costs vary by project type.
Rounded Operation and Maintenance Cost	RndOMCst	Dollars	Rounded cost to operate and maintain a project based on the estimated operation and maintenance cost.	Rounded to the nearest 100,000.
Cost Uncertainty Factor	CstUF	Percent	Represents the uncertainty associated with the estimated construction cost.	Uncertainty of overall cost based on scale of the project, presently available info, level of prior study, and constructability.

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Attachment A-6: Project Uncertainty Factors

Project ID	Project Type	Project Name	Uncertainty Factor
004.BS.01	Bank Stabilization	Grand Lake Bank Stabilization	65%
004.BS.02	Bank Stabilization	West Cove Bank Stabilization	54%
004.BS.05	Bank Stabilization	Sabine Lake Bank Stabilization	65%
03a.BS.100	Bank Stabilization	Leeville Bank Stabilization	58%
002.BH.04	Barrier Island	Barataria Pass to Sandy Point Barrier Island Restoration	14%
002.BH.05	Barrier Island	Belle Pass to Caminada Pass Barrier Island Restoration	8%
03a.BH.03	Barrier Island	Isles Dernieres Barrier Island Restoration	16%
03a.BH.04	Barrier Island	Timbalier Islands Barrier Island Restoration	18%
001.DI.02	Diversion	Lower Breton Diversion (50,000 cfs)	48%
001.DI.17	Diversion	Upper Breton Diversion (250,000 cfs)	68%
001.DI.18	Diversion	Central Wetlands Diversion (5,000 cfs)	51%
001.DI.21	Diversion	East Maurepas Diversion (2,000 cfs)	13%
001.DI.23	Diversion	Mid-Breton Sound Diversion (35,000 cfs)	51%
001.DI.29	Diversion	West Maurepas Diversion (2,000 cfs)	48%
001.DI.100	Diversion	Manchac Landbridge Diversion (2,000 cfs)	48%
001.DI.101	Diversion	Ama Diversion (50,000 cfs)	51%
001.DI.102	Diversion	Union Diversion (25,000 cfs)	54%
001.DI.103	Diversion	Upper Breton Diversion (75,000 cfs)	60%
001.DI.104	Diversion	Mid-Breton Sound Diversion (35,000 cfs)	51%
002.DI.03	Diversion	Mid-Barataria Diversion (75,000 cfs)	36%
002.DI.03a	Diversion	Mid-Barataria Diversion (250,000 cfs- Incremental)	68%
002.DI.15	Diversion	Lower Barataria Diversion (50,000 cfs)	39%
002.DI.100	Diversion	Mid-Barataria Diversion (35,000-75,000 cfs)	36%
002.DI.101	Diversion	Mid-Barataria Diversion (75,000 cfs, 5,000 cfs minimum)	36%
002.DI.102	Diversion	Mid-Barataria Diversion (75,000 cfs, no flow under 200,000 cfs)	36%
03a.DI.01	Diversion	Bayou Lafourche Diversion (1,000 cfs)	45%
03a.DI.05	Diversion	Atchafalaya Diversion (30,000 cfs)	54%
03b.DI.04	Diversion	Increase Atchafalaya Flow to Terrebonne (20,000 cfs)	42%
001.HR.100	Hydrologic Restoration	Labranche Hydrologic Restoration	51%
004.HR.06	Hydrologic Restoration	Calcasieu Ship Channel-Gulf Salinity Control Structure	58%

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Project ID	Project Type	Project Name	Uncertainty Factor
03a.HR.02	Hydrologic Restoration	Central Terrebonne Hydrologic Restoration	48%
03a.HR.100	Hydrologic Restoration	Grand Bayou Hydrologic Restoration	51%
001.MC.02	Marsh Creation	Hopedale Marsh Creation	20%
001.MC.05	Marsh Creation	New Orleans East Landbridge Restoration	18%
001.MC.06a	Marsh Creation	Breton Marsh Creation Component A	21%
001.MC.07a	Marsh Creation	Lake Borgne Marsh Creation Component A	20%
001.MC.08a	Marsh Creation	Central Wetlands Marsh Creation Component A	20%
001.MC.09	Marsh Creation	Biloxi Marsh Creation	23%
001.MC.13	Marsh Creation	Golden Triangle Marsh Creation	20%
001.MC.17	Marsh Creation	Eastern Lake Borgne Marsh Creation	23%
001.MC.100	Marsh Creation	Sunrise Point Marsh Creation	19%
001.MC.101	Marsh Creation	Uhlan bay Marsh Creation	19%
001.MC.102	Marsh Creation	Pt. a la Hache Marsh Creation	23%
001.MC.103	Marsh Creation	Fritchie North Marsh Creation	20%
001.MC.104	Marsh Creation	East Bank Land Bridge Marsh Creation	22%
001.MC.105	Marsh Creation	Spanish Lake Marsh Creation	24%
001.MC.106	Marsh Creation	St. Tammany Marsh Creation	18%
001.MC.107	Marsh Creation	Tiger Ridge/Maple Knoll Marsh Creation	24%
001.MC.108	Marsh Creation	Guste Island Marsh Creation	28%
002.MC.04a	Marsh Creation	Lower-Barataria Marsh Creation Component A	14%
002.MC.05e	Marsh Creation	Large-Scale Barataria Marsh Creation Component E	9%
002.MC.07	Marsh Creation	Barataria Bay Rim Marsh Creation	29%
002.MC.08	Marsh Creation	North Caminada Marsh Creation	19%
002.MC.100	Marsh Creation	North Barataria Bay Marsh Creation	18%
004.MC.01	Marsh Creation	South Grand Chenier Marsh Creation	12%
004.MC.04	Marsh Creation	Mud Lake Marsh Creation	22%
004.MC.07	Marsh Creation	West Rainey Marsh Creation	20%
004.MC.10	Marsh Creation	Southeast Calcasieu Lake Marsh Creation	13%
004.MC.13	Marsh Creation	Cameron Meadows Marsh Creation	7%
004.MC.16	Marsh Creation	East Pecan Island Marsh Creation	20%
004.MC.19	Marsh Creation	East Calcasieu Lake Marsh Creation	13%
004.MC.23	Marsh Creation	Calcasieu Ship Channel Marsh Creation	12%

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Project ID	Project Type	Project Name	Uncertainty Factor
004.MC.25	Marsh Creation	Kelso Bayou Marsh Creation	16%
004.MC.100	Marsh Creation	Freshwater Bayou North Marsh Creation	13%
004.MC.101	Marsh Creation	Freshwater Bayou South Marsh Creation	13%
004.MC.102	Marsh Creation	White Lake Marsh Creation	23%
004.MC.103	Marsh Creation	Little Cheniere Marsh Creation	23%
004.MC.104	Marsh Creation	Calcasieu Lake West Bank Marsh Creation	16%
004.MC.105	Marsh Creation	West Brown Lake Marsh Creation	23%
004.MC.106	Marsh Creation	Cameron Meadows Marsh Creation	13%
004.MC.107	Marsh Creation	West Sabine Refuge Marsh Creation	22%
03a.MC.07	Marsh Creation	Belle Pass-Golden Meadow Marsh Creation	16%
03a.MC.09b	Marsh Creation	North Terrebonne Bay Marsh Creation Component B	26%
03a.MC.100	Marsh Creation	South Terrebonne Marsh Creation	19%
03a.MC.101	Marsh Creation	North Lake Mechant Marsh Creation	13%
03b.MC.03	Marsh Creation	Marsh Island Marsh Creation	19%
03b.MC.07	Marsh Creation	East Rainey Marsh Creation	18%
03b.MC.09	Marsh Creation	Point Au Fer Island Marsh Creation	16%
03b.MC.100	Marsh Creation	Vermillion Bay Marsh Creation	22%
03b.MC.101	Marsh Creation	Southeast Marsh Island Marsh Creation	14%
001.OR.01a	Oyster Barrier Reef	Biloxi Marsh Oyster Barrier Reef Component A	54%
001.OR.100	Oyster Barrier Reef	North Biloxi Marsh Oyster Barrier Reef Restoration	47%
001.RC.01	Ridge Restoration	Bayou LaLoutre Ridge Restoration	53%
001.RC.100	Ridge Restoration	Bayou Terre aux Boeufs Ridge Restoration	61%
001.RC.102	Ridge Restoration	Bayou aux Chene Ridge Restoration	68%
001.RC.103	Ridge Restoration	Carlisle Ridge Restoration	64%
002.RC.01	Ridge Restoration	Bayou Long Ridge Restoration	64%
002.RC.02	Ridge Restoration	Spanish Pass Ridge Restoration	64%
002.RC.100	Ridge Restoration	Red Pass Ridge Restoration	53%
002.RC.101	Ridge Restoration	Adams Bay Ridge Restoration	57%
002.RC.102	Ridge Restoration	Bayou Eau Noir Ridge Restoration	53%
002.RC.103	Ridge Restoration	Grand Bayou Ridge Restoration	53%
004.RC.01	Ridge Restoration	Grand Chenier Ridge Restoration	49%
004.RC.02	Ridge Restoration	Cheniere au Tigre Ridge Restoration	61%

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Project ID	Project Type	Project Name	Uncertainty Factor
004.RC.03	Ridge Restoration	Pecan Island Ridge Restoration	49%
004.RC.05	Ridge Restoration	Front Ridge Restoration	57%
03a.RC.01	Ridge Restoration	Bayou DeCade Ridge Restoration	37%
03a.RC.02	Ridge Restoration	Bayou DuLarge Ridge Restoration	72%
03a.RC.03	Ridge Restoration	Small Bayou LaPointe Ridge Restoration	49%
03a.RC.04	Ridge Restoration	Mauvais Bois Ridge Restoration	57%
03a.RC.05	Ridge Restoration	Bayou Terrebonne Ridge Restoration	49%
03a.RC.06	Ridge Restoration	Bayou Pointe au Chene Ridge Restoration	61%
001.SP.01	Shoreline Protection	Manchac Shoreline Protection	21%
001.SP.03	Shoreline Protection	Eastern Lake Borgne Shoreline Protection	28%
001.SP.04	Shoreline Protection	MRGO Shoreline Protection	30%
001.SP.05	Shoreline Protection	East New Orleans Land Bridge Shoreline Protection	32%
001.SP.100	Shoreline Protection	Breton Sound Shoreline Protection	42%
001.SP.101	Shoreline Protection	Unknown Pass to Rigolets Shoreline Protection	27%
001.SP.102	Shoreline Protection	North Lake Pontchartrain Shoreline Protection	32%
001.SP.103	Shoreline Protection	Northeast Lake Pontchartrain Shoreline Protection	23%
001.SP.104	Shoreline Protection	LaBranche Wetlands Shoreline Protection	21%
002.SP.100	Shoreline Protection	Lake Hermitage Shoreline Protection	21%
002.SP.101	Shoreline Protection	Fifi Island Shoreline Protection	21%
002.SP.102	Shoreline Protection	East Snail Bay Shoreline Protection	32%
002.SP.103	Shoreline Protection	West Snail Bay Shoreline Protection	32%
002.SP.104	Shoreline Protection	South Little Lake Shoreline Protection	32%
002.SP.105	Shoreline Protection	North Little Lake Shoreline Protection	28%
002.SP.106	Shoreline Protection	Bayou Perot Shoreline Protection	27%
002.SP.107	Shoreline Protection	South Lake Salvador Shoreline Protection	32%
002.SP.108	Shoreline Protection	Lake Salvador Shoreline Protection	28%
002.SP.109	Shoreline Protection	Lac Des Allemands Shoreline Protection	21%
004.SP.02	Shoreline Protection	Schooner Bayou Canal Shoreline Protection	28%
004.SP.03	Shoreline Protection	Freshwater Bayou Canal Shoreline Protection	21%
004.SP.05a	Shoreline Protection	Gulf Shoreline Protection (Calcasieu River to Rockefeller)	32%
004.SP.07	Shoreline Protection	Northeast White Lake Shoreline Protection	30%
004.SP.08	Shoreline Protection	Calcasieu-Sabine Shoreline Protection Component A	34%

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Project ID	Project Type	Project Name	Uncertainty Factor
004.SP.100	Shoreline Protection	White Lake Shoreline Protection	36%
004.SP.102	Shoreline Protection	Sabine Pass Shoreline Protection	34%
03a.SP.100	Shoreline Protection	North Lake Boudreaux Shoreline Protection	30%
03b.SP.01	Shoreline Protection	Freshwater Bayou Bank Stabilization (Belle Isle Canal to Lock)	21%
03b.SP.05	Shoreline Protection	Gulf Shoreline Protection (Freshwater Bayou to Southwest Pass)	36%
03b.SP.06a	Shoreline Protection	Vermilion-West Cote Blanche Bay Shoreline Protection (Critical Areas)	42%
03b.SP.08	Shoreline Protection	Southwest Pass Shoreline Protection (West Side)	32%
03b.SP.100	Shoreline Protection	Lost Lake Shoreline Protection	25%
03b.SP.101	Shoreline Protection	Southeast Marsh Island Shoreline Protection	30%
001.HP.04	Structural Protection	Greater New Orleans High Level	41%
001.HP.05	Structural Protection	West Shore Lake Pontchartrain	50%
001.HP.08	Structural Protection	Lake Pontchartrain Barrier	46%
001.HP.13	Structural Protection	Slidell Ring Levees	41%
002.HP.06	Structural Protection	Upper Barataria Risk Reduction	50%
002.HP.07	Structural Protection	Lafitte Ring Levee	50%
002.HP.100	Structural Protection	Fort Jackson to Venice	34%
002.HP.101	Structural Protection	St. Jude to City Price	32%
002.HP.102	Structural Protection	Oakville to LaReussite	30%
004.HP.15	Structural Protection	Abbeville and Vicinity	57%
03a.HP.02b	Structural Protection	Morganza to the Gulf (high)	52%
03a.HP.20	Structural Protection	Larose to Golden Meadow-basic improvement	48%
03a.HP.101	Structural Protection	Larose to Golden Meadow-enhanced improvement	48%
03a.HP.102	Structural Protection	MtoG with LGM enhanced inducements	52%
03a.HP.103	Structural Protection	MtoG with LGM basic inducements	52%
03b.HP.08	Structural Protection	Amelia Levee Improvements 3E	41%
03b.HP.10	Structural Protection	Morgan City Levee Improvements	32%
03b.HP.12	Structural Protection	Franklin and Vicinity	54%
03b.HP.13	Structural Protection	Bayou Chene Floodgate	46%
03b.HP.14	Structural Protection	Iberia/St Mary Upland Levee	54%

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Attachment A-7: Project Fact Sheets

Project Fact Sheets are Forthcoming

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