



**State of Louisiana
Coastal Protection and Restoration Authority**

2024 Annual Inspection Report

For The

**Lake Borgne Shoreline Protection
Project**

State Project Number PO-30
Priority Project List 10

April 2024
St. Bernard Parish

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Lake Borgne Shoreline Protection Project
(PO-30)**

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I. Introduction

The Lake Borgne Shoreline Protection Project (State Project No. PO-30) was approved on the 10th Priority Project List. A second Lake Borgne Project (PO-31) was approved on the 11th Priority Project List and was subsequently combined with the previously approved Lake Borgne Shoreline Protection Project. The project includes two segments along the southwestern coast of Lake Borgne, in the locations where Lake Borgne is closest to the Mississippi River Gulf Outlet (MRGO). The project features are located entirely in St. Bernard Parish, consisting of 5.7 miles of shoreline protection.

A site map showing the project boundaries is shown in Appendix A.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the Lake Borgne Shoreline Protection Project (PO-30) is to evaluate the constructed project features to identify any deficiencies and to prepare a report detailing the condition of project features and recommending corrective actions needed. Should it be determined that corrective actions are needed, CPRA shall provide a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan). The annual inspection report also contains a summary of maintenance projects (See Section IV) and an estimated projected budget (See Appendix C) for the upcoming three (3) years for operation, maintenance and rehabilitation.

This annual inspection of the Lake Borgne Shoreline Protection Project (PO-30) was performed on March 20, 2024. Based on discussions between CPRA and EPA, the 2023 Annual Inspection was deferred and combined into the 2024 Annual Inspection due to the navigational aid maintenance that was ongoing during 2023. On March 20, 2024, weather consisted of partly cloudy skies and a temperature of approximately 60°F. Taking part in the inspection were Patty Taylor of EPA, the federal sponsor, and Steven Gunter and Taylor Chassaignac of CPRA, the non-federal sponsor. All project features were visited. During the inspection, the nearby Shell Beach gage showed a water level of approximately -1.0 feet NAVD 88.

III. Project Description and History

The project's objectives include preventing and/or reducing the Lake Borgne shoreline retreat in the areas adjacent to Old Shell Beach and Bayou Dupre to mitigate further joining of the lake and MRGO, reestablishing a sustainable lake rim, and preventing and/or reducing conversion of emergent marsh to open water.

The principal project features include a rock breakwater, composite sheet pile wall, and steel double sheet pile structures located in the alignment shown in Appendix A. The Lake Borgne Shoreline Protection Project is divided into two segments: Shell Beach and Bayou Dupre. The Project is further divided into reaches. The Bayou Dupre segment includes Reach 1 (north of Bayou Dupre) and Reach 2 (south of Bayou Dupre). The Shell Beach



segment includes Reach 3 Strong (between Fort Bayou and the Tennessee Gas Pipeline), Reach 3 Weak (between the Tennessee Gas Pipeline and Bayou Yscloskey), and Reach 4 (between Bayou Yscloskey and Doulluts Canal). Reach 3 Weak and Reach 3 Strong refer to classifications determined during the original project design according to soil shear strength profiles.

The segment at Shell Beach extends approximately 3.4 miles between Fort Bayou and Doulluts Canal. The PO-30 rock breakwater ties into the existing rock breakwater, which surrounds the perimeter of Fort Beauregard. The only openings in the breakwater occurred along the mouth of Bayou Yscloskey and across the Tennessee Gas Pipeline right-of-way.

The segment at Bayou Dupre extends approximately 1.5 miles to the north and 0.8 miles to the southeast of Bayou Dupre. At the mouth of Bayou Dupre, where maintenance dredging within the MRGO has created an unnatural water depth, steel double sheet pile structures filled with rock were built on each side of the bayou opening to tie the rock shoreline breakwater into the existing offshore USACE rock breakwater along the MRGO to the east and west of the bayou opening.

Reach 1 and Reach 3 Weak were identified during design as having relatively weak soil foundation conditions compared to the rest of the project. These “weak” areas were designed to have rock be placed in two (2) lifts during the initial construction contract followed by a maintenance lift approximately one (1) year later.

All project features were constructed to an initial height of +4.0 feet NAVD88. Based on the initial design, a minimum feature height of +2.0 feet NAVD88 was determined to best meet project objectives.

The following describes the construction sequence and completion:

- Construction began on August 1, 2007.
- The breakwater alignment was realigned in the field to conform more closely to the new shoreline location that resulted from the land losses that were accelerated by Hurricane Katrina (which occurred between the design investigations and the start of construction).
- The second lifts were placed on the weak sections in August 2008.
- Before the access and flotation channels could be backfilled, storm surges from Hurricanes Ike and Gustav (September 2008) inundated the area and resulted in the sinking of a large portion of the Reach 1 rock breakwater. Two (2) short sections of Reach 3 “weak soils” were also affected. It was decided to address this issue during the planned maintenance lift to allow time for the team to select an effective solution (described below in Section IV).
- The project was accepted on March 11, 2009.

Annual project inspections are included in the O&M Plan. The Project has a 20 year economic life, which began when the project completion report was submitted to CWPPRA in April 2010.



IV. Summary of Past Operations and Maintenance Projects

There are no operable structures in the project. There have been three maintenance events over the life of the project, as described below.

Hurricanes Ike and Gustav in 2008 resulted in the sinking of large portions of the rock breakwater along Reach 1 and Reach 3 Weak. The design of the previously planned maintenance project performed in 2014 included a rock lift along 5 stretches of Reach 1 and 3 stretches of Reach 3 as well as the installation of a composite sheet pile breakwater behind portions of the rock breakwater that experienced excessive settlement: 4 stretches of Reach 1 and 2 stretches of Reach 3. The contractor placed 13,568 tons of rock as a part of this 2014 maintenance lift and additionally placed 4,563 linear feet of composite sheet pile wall using 902 timber piles, 9,027 linear feet of pressure treated walers, and 67,650 square feet of composite sheet pile. A scour protection feature at the wall toe was added to the sheet pile wall during construction utilizing 4,000 additional tons of rock. The maintenance project was accepted on September 11, 2014.

The composite sheet pile wall that was installed during the 2014 maintenance event was first noted to have damage during the 2016 annual inspection. Over the next five years, the composite sheet pile wall continued to deteriorate, creating the need for a maintenance event. Due to budget limitations that prevented the project team from replacing the damaged wall, the scope of the maintenance event included the removal of the damaged wall (all components except for the timber piles which may be used to reinstall shoreline protection if funding becomes available), replacing the splice hardware on the intact wall, replacing two tie rods on the double steel sheet pile structure, and replacing one steel tube waler splice on the double steel sheet pile structure. The as-built drawing for Reach 1 is included in Figure 1. The maintenance project was accepted on October 12, 2021.

During the 2022 annual inspection, damage to two of the project's three navigational aids was noted. One navigational aid was missing completely (sign and pile), and one additional pile was missing its sign. This was addressed in a maintenance event completed in early 2024. The contractor replaced the missing pile and installed three new signs (replacing the one that was still remaining as a preventative maintenance measure). The maintenance project was accepted on February 23, 2024.



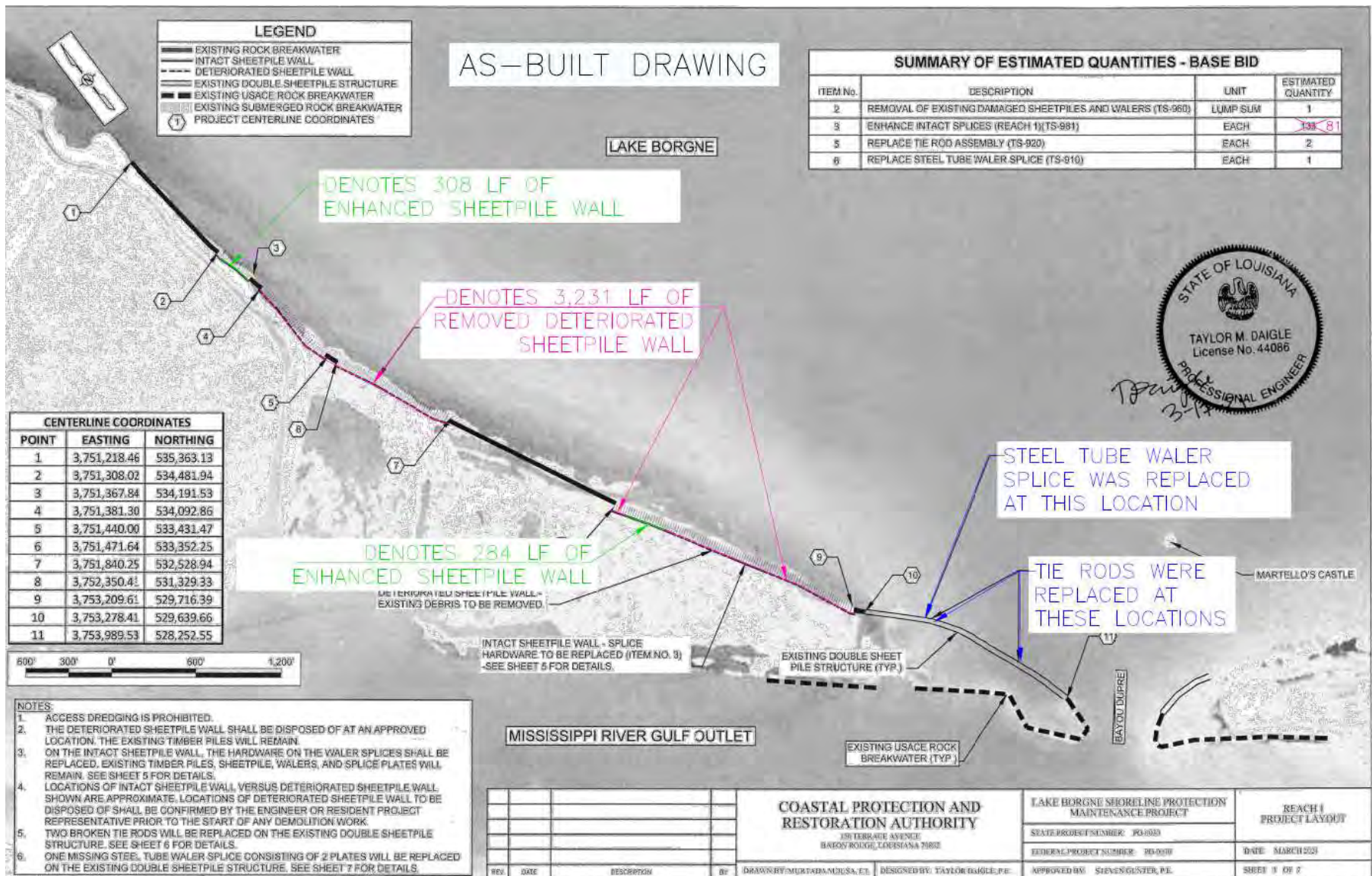


Figure 1: 2021 Maintenance Event As Built for Reach 1



V. Inspection Results

- A. **Breakwater Reach 1 (North of Bayou Dupre)** – Along the composite sheetpile alignment, the majority of the sheetpile that was upgraded with new hardware in 2021 is now damaged, with only a few short segments still intact. The areas where the composite sheetpile were removed during the maintenance event are also no longer functioning as a breakwater (only the timber piles remain). The rock breakwater has experienced some settlement but is in generally good condition.
- B. **Breakwater Reach 2 (South of Bayou Dupre)** – The rock breakwater has experienced some settlement but is in generally good condition.
- C. **Breakwater Reach 3 Strong (West of Tennessee Gas Pipeline)** – The rock breakwater has numerous low spots with marsh retreat observed behind those locations. Other areas are performing well.
- D. **Breakwater Reach 3 Weak (Between Tennessee Gas Pipeline and Bayou Yscloskey)** – The rock breakwater has experienced some settlement but is in generally good condition. The recently enhanced composite sheet pile wall appears to be in good condition.
- E. **Breakwater Reach 4 (East of Bayou Yscloskey)** – The rock breakwater has experienced some settlement but is in generally good condition.
- F. **Double Sheet pile Wall Breakwater at the mouth of Bayou Dupre** – The double sheet pile wall breakwater appears to be performing well, although significant corrosion of all features of the steel sheet pile structure is noted. The interior rock has experienced settlement, but this does not appear to be impacting project performance. Most tie rods are still functioning; however, most ties are showing significant areas of reduced cross section due to corrosion.
- G. **Warning Signs** – The recently-replaced warning signs at the double sheet-pile wall breakwater are all present and appear to be in good condition.

VI. Conclusions and Recommendations

Project Condition

CPRA concludes that the Lake Borgne Shoreline Protection Project (PO-30) is achieving project objectives along the majority of the project length. Approximately 11% of the project length consisting of the composite sheet pile wall has been removed, as described in Section IV.

Portions of the rock breakwater visually appear to have experienced settlement below the design elevation (+2.0 feet NAVD 88), and portions of the composite sheetpile wall are



damaged, despite recent maintenance. The double sheet pile wall breakwater has experienced significant corrosion of all features.

Immediate Repairs

CPRA recommends an end-of-life maintenance event to include the removal of all remaining components of the composite sheetpile wall including the timber piling, the removal of the steel features at the mouth of Bayou Dupre, mechanically lowering the elevation of the remaining rock and sand at the mouth of Bayou Dupre, and a possible rock lift in selected low areas. Immediate actions include a spot elevation survey along the rock alignment to inform the scope of the end-of-life maintenance event.

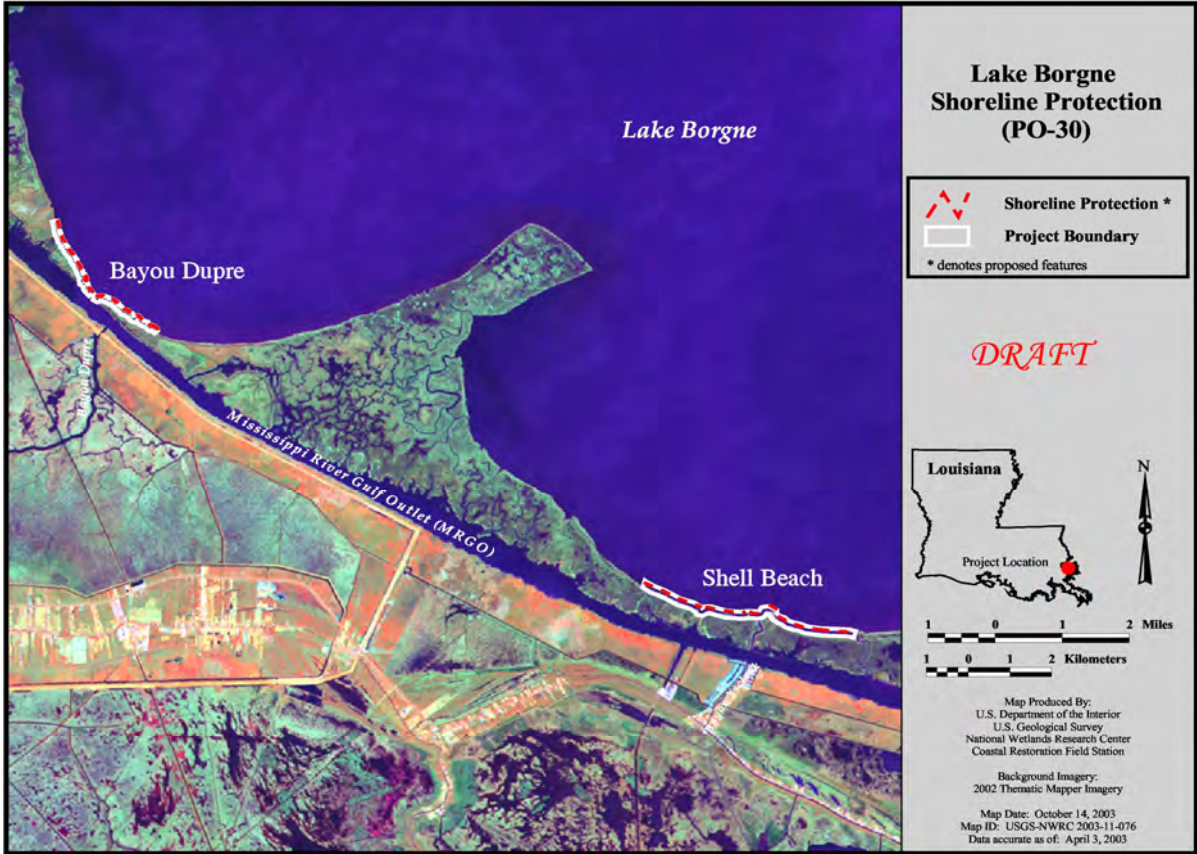
A budget increase will be required for this final maintenance event.

Programmed Maintenance

Continue to monitor the condition of the breakwaters, especially Reach 1 and Reach 3 Weak. Plan for an end-of-life maintenance event as described above in, “Immediate Repairs.”



Appendix A
Project Features Map



Appendix B

Photographs



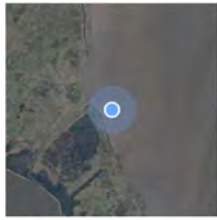
Photo 1: Reach 1

Rock breakwater appears to be in good condition. Note that the tide was low (EL -1.0-ft) at the time of the inspection.



Photo 2: Reach 1

This damage demonstrates the typical condition of the remaining composite sheet pile wall and walers in Reach



3/20/24, 9:56 AM
N 29° 57' 28", W 89° 50' 47"
LA
United States
Lake Borgne



Photo 3: Reach 1

This particular segment of composite sheet pile is in better condition than the rest of the composite sheet pile in Reach 1, with only a few sheets missing on the northern (right) side.

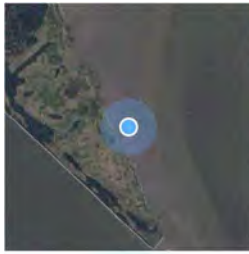


3/20/24, 9:58 AM
N 29° 57' 19", W 89° 50' 43"
LA
United States
Lake Borgne



Photo 4: Reach 1

This area of the rock breakwater has experienced significant settlement. At a normal tide, the rocks near the middle of this photo would be overtopped.



3/20/24, 10:01 AM
N 29° 57' 5", W 89° 50' 36"
LA
United States
Lake Borgne



Photo 5: Reach 1

Composite sheetpile segment showing a portion (left side) intact and a portion (middle) damaged – with almost all components missing. The sheetpiling on the right side of the photo had been previously removed in 2021.



3/20/24, 10:06 AM
N 29° 56' 51", W 89° 50' 28"
LA
United States
Lake Borgne



Photo 6: Reach 1

Typical condition of double sheetpile structure at the mouth of Bayou Dupre



Photo 7: Reach 1

Closer view of corrosion on double sheetpile wall and reduced cross section of the tie rods at the mouth of Bayou Dupre



3/20/24, 10:16 AM
N 29° 56' 46", W 89° 50' 22"
LA
United States
Lake Borgne



Photo 8: Reach 1

WS 11 – Pile and new sign appear to be in good condition.

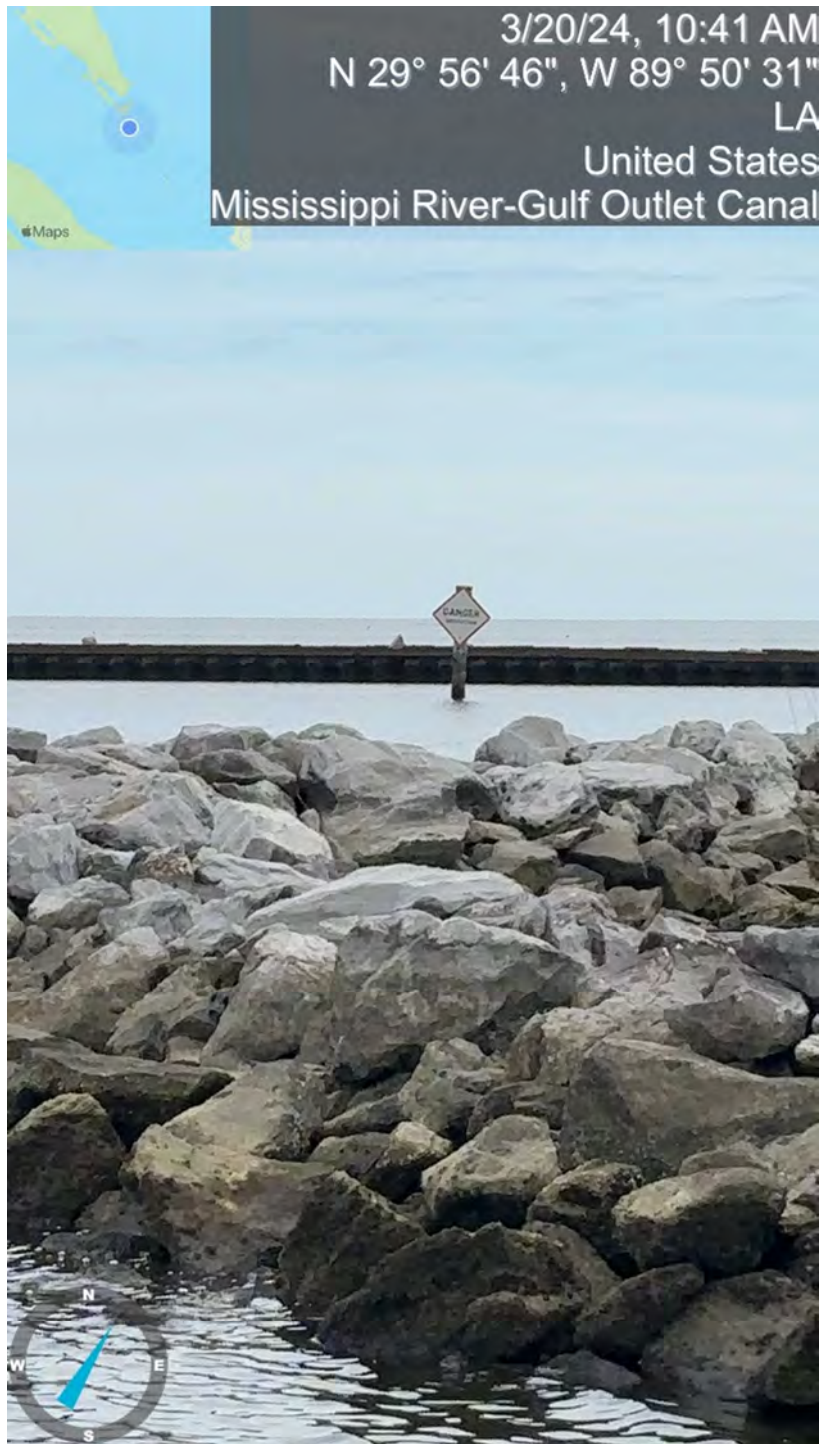


Photo 9: Reach 1

WS 10 – Pile and new sign appear to be in good condition.



Photo 10: Reach 2

WS 12 – New pile and new sign appear to be in good condition.



Photo 11: Reach 2

Typical condition of double sheetpile structure at the mouth of Bayou Dupre



Photo 12: Reach 2

Damaged tie rod on the double sheetpile structure at the mouth of Bayou Dupre, near the tie in to the USACE rocks.

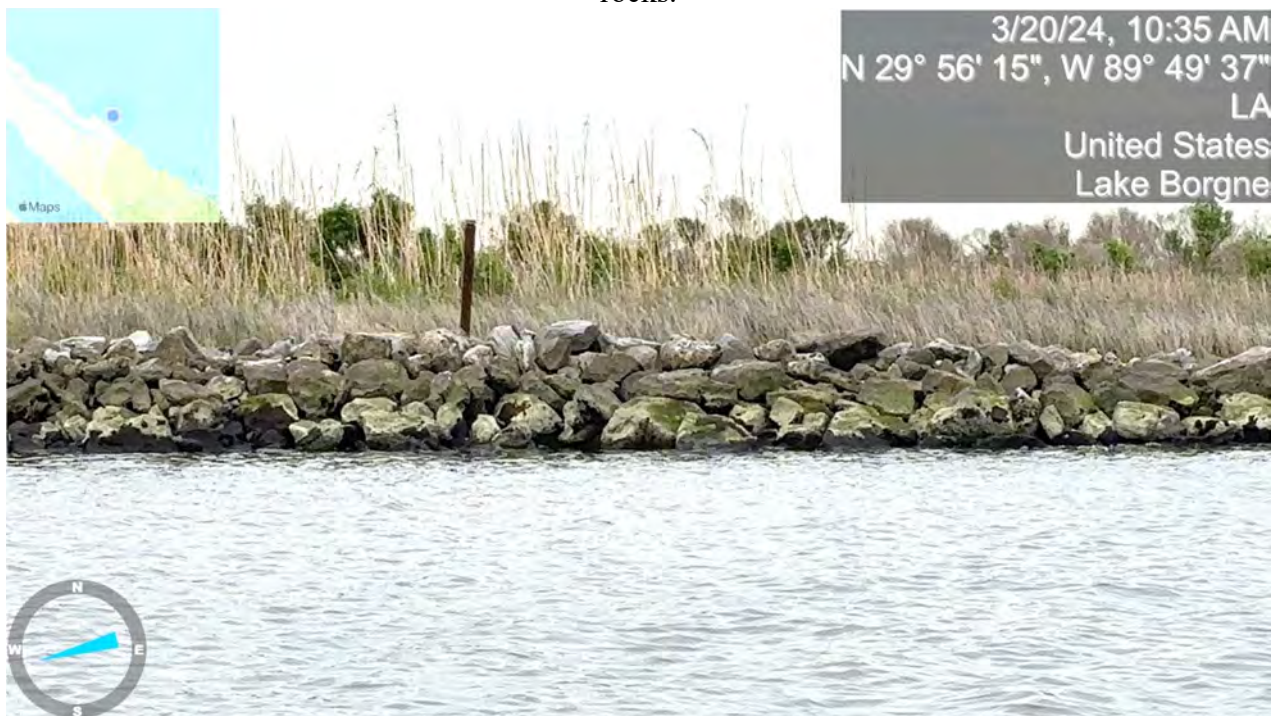


Photo 13: Reach 2

Rock breakwater in generally good condition



Photo 14: Reach 2

This short segment of the rock breakwater has experienced visible differential settlement.



Photo 15: Reach 3

This area of the rock breakwater has experienced significant settlement with associated shoreline retreat visible.



Photo 16: Reach 3
Rock breakwater in generally good condition



Photo 17: Reach 3

This area of the rock breakwater has experienced significant settlement with associated shoreline retreat visible. At a normal tide, these rocks would be overtopped.



3/20/24, 11:27 AM
N 29° 52' 0", W 89° 40' 57"
LA
United States
Lake Borgne



Photo 18: Reach 3

Composite sheet pile wall appears to be in generally good condition, although two missing panels are noted.



3/20/24, 11:37 AM
N 29° 51' 41", W 89° 39' 16"
LA
United States
Lake Borgne



Photo 19: Reach 4

Rocks appear to be in generally good condition.

Appendix C

Three-Year Operations & Maintenance Budget

Lake Borgne Shoreline Protection - PO-30																								
Federal Sponsor: EPA																								
Construction Completed : April 12, 2010																								
PPL 10																								
Current Approved O&M Budget	Year 0	Year - 1	Year -2	Year -3	Year -4	Year -5	Year -6	Year -7	Year -8	Year -9	Year -10	Year -11	Year -12	Year -13	Year -14	Year -15	Year -16	Year - 17	Year -18	Year -19	Year-20	Project Life	Currently	
	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	Budget	Funded	
State O&M	\$0	\$6,646,735	\$5,565	\$5,741	\$4,790	\$4,951	\$88,400	\$5,282	\$5,453	\$5,628	\$5,806	\$5,988	\$6,174	\$6,363	\$88,400	\$6,755	\$6,957	\$7,163	\$7,373	\$7,588		\$6,921,112		
Corps Admin	\$729	\$744	\$760	\$776	\$792	\$809	\$826	\$843	\$861	\$879	\$897	\$916	\$935	\$955	\$975	\$996	\$1,017	\$1,038	\$1,060	\$1,082		\$17,890		
Federal S&A	\$1,041	\$132,935	\$1,086	\$1,108	\$1,132	\$1,155	\$1,180	\$1,204	\$1,230	\$1,256	\$1,282	\$1,309	\$1,336	\$1,364	\$1,393	\$1,422	\$1,452	\$1,483	\$1,514	\$1,547		\$157,429		
Total	\$1,770	\$6,780,414	\$7,411	\$7,625	\$6,714	\$6,915	\$90,406	\$7,329	\$7,544	\$7,763	\$7,985	\$8,213	\$8,445	\$8,682	\$90,768	\$9,173	\$9,426	\$9,684	\$9,947	\$10,217		\$7,096,431	\$6,895,932	
Projected O&M Expenditures																						Remaining	Current 3 year	
Maintenance Inspection															\$16,829	\$17,274	\$17,730	\$18,198	\$18,678	\$19,170	\$21,256	\$129,135	\$51,833	
General Admin																						\$0	\$0	
Surveys															\$9,856							\$9,856	\$9,856	
Sign Replacement															\$21,500							\$21,500	\$21,500	
Federal S&A															\$1,393	\$1,422	\$1,452	\$1,483	\$1,514	\$1,547		\$8,811	\$4,267	
Supervision and Inspection																	\$600,000					\$600,000	\$600,000	
Construction (Removal of steel sheetpile structure, composite sheetpile, timber piles)																	\$2,600,000					\$2,600,000	\$2,600,000	
Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$49,578	\$18,696	\$3,219,182	\$19,681	\$20,192	\$20,717	\$21,256	\$3,369,302	\$3,287,456	
O&M Expenditures from Nov 2020 LANA Report					\$5,734,320																		\$7,078,541	
State O&M Expenditures not submitted for in-kind credit					\$584,015																			\$760,206
Federal Sponsor MIPRs (if applicable)					\$0																			\$2,527,250
																								\$7,078,541
																								\$9,687,637
																								\$2,609,096

Note: The November 2020 LANA report is the most recent LANA report that CPRA has received.

Note: The Maintenance Event Cost for FY26 is a very rough estimate. The project is currently in the scoping phase, and a more accurate estimate will not be available until closer to construction.

Appendix D

Field Inspection Form

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: **PO-30 Lake Borgne Shoreline Protection Project**

Date of Inspection: 3/20/2024

Start Time: 9:00 am

Structure No. N/A

Inspector(s): Steven Gunter (CPRA), Taylor Chassaignac (CPRA), Patty Taylor (EPA)

Structure Description: Shoreline Protection Breakwater

Water Level: -1.0 feet NAVD 88

Type of Inspection: Annual

Weather Conditions: partly cloudy

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Reach 1 Rock Breakwater	Good	Some settlement	N/A	1, 4	Most rock appears to be in good condition. Some settlement observed.
Reach 1 Composite Sheetpile Const. 2013 Maintained 2021	Poor	Deteriorating sheetpile wall	N/A	2-3, 5	The majority of the sheetpile that was enhanced in 2021 is now damaged, with only a few segments still intact. Many sheets are out of alignment or missing.
Reach 2 Rock Breakwater	Good	Some settlement	N/A	13-14	Most rock appears to be in good condition. Some settlement observed.
Reach 3 Rock Breakwater	Good	Some settlement	N/A	15-17	The rock breakwater has numerous low spots with marsh retreat observed behind those locations. Other areas are performing well.
Reach 3 Composite Sheetpile Const. 2013 Maintained 2021	Good	Minimal (2 missing sheets)	N/A	18	Recently maintained wall is in good condition. Two missing sheets were noted.
Reach 4 Rock Breakwater	Good	Some settlement	N/A	19	Most rock appears to be in good condition. Some settlement observed.
Reaches 1 & 2 Double Sheet-pile	Fair	Significant corrosion, some damaged tie rods	Yes	6-7, 11-12	Corrosion observed throughout steel sheetpile and steel tube walers. Rock has experienced settlement. Most tie rods are still functioning, but some are damaged.
Reaches 1 & 2 Warning Signs Maintained 2024	Good	None	N/A	8-10	The recently-replaced warning signs at the double sheet-pile wall breakwater are all present and appear to be in good condition.