1.0 INTRODUCTION

Calhoun County Navigation District (CCND) is proposing to improve the Matagorda Ship Channel (MSC) from its facilities in upper Lavaca Bay to the terminus in the Gulf of Mexico. In addition, a new turning basin is proposed to accommodate the larger vessels that would use the improved channel. The Project extends approximately 27 miles from the Port of Port Lavaca – Point Comfort turning basin in Lavaca Bay (Channel Station 118+502) through the southwest section of Matagorda Bay and offshore into the Gulf of Mexico (Channel Station -23+000), in Matagorda and Calhoun Counties, Texas (**Figure 1**). The project can be located on the U.S.G.S. quadrangle maps entitled Point Comfort, Port Lavaca East, Keller Bay, Port O'Connor, and Decros Point, Tex. Approximate UTM Coordinates at the north end of the existing turning basin in NAD 27 (meters): Zone 14; Easting 739500; Northing 3170500.

The purpose of this document is to summarize the mitigation procedures for unavoidable impacts to habitats from the proposed Project. This document provides a summary of the Project's impacts and a description of the relevant mitigation options.

2.0 PROJECT IMPACTS SUMMARY

Dredging operations required for the proposed Matagorda Ship Channel Improvement Project (MSCIP) would result in the conversion of existing open bay bottom and offshore bottom to ship channel bottom, and impact oysters present on the side slope of the existing channel. Placement of materials dredged from the channel, from both initial construction and in subsequent maintenance dredging, would impact additional bay bottom, as well as existing intertidal marsh and oyster reef (**Figure 2**). There are two types of intertidal marsh that would be impacted by the Project, low and high, defined as:

- Low intertidal marsh communities are located in areas regularly inundated by daily tides, supporting nearly monotypic stands of smooth cordgrass (*Spartina alterniflora*). Low marshes transition to high marsh as elevation increases and tidal inundation decreases.
- High marsh communities are found at higher elevations than low marsh. High marshes are subject to infrequent tidal flooding and/or receive runoff and groundwater flow from site levees and riprap areas. The density of vegetation in the high marshes that would be impacted ranges from moderate to sparse. These communities are typically dominated by: saltgrass (*Distichlis spicata*), sea-ox-eye daisy (*Borrichia frutescens*), sea purslane (*Sesuvium maritimum*), annual glasswort (*Iva frutescens*), and saltmeadow cordgrass (*Spartina patens*).

There are no anticipated negative impacts to seagrass habitats from the MSCIP.

2.1 Low Marsh Impacts

For the proposed MSCIP, 8.4 acres of low marsh would be impacted as follows: placement area D would cover 3.4 acres of low marsh, placement area ER2 would cover 3.4 acres, and placement area ER3 would cover 1.6 acres (**Figures 3-5**), for descriptions of placement areas see URS 2006a). Low marsh in areas D and ER3 was delineated in the field (BESI 2006a). Low marsh in area ER2 was estimated using on-screen aerial photo analysis of a 2004 digital orthophoto quarter quadrangle with 1 m resolution. Area A1 might contain marsh on active placement areas PA18 and PA19; however, any marsh existing on active placement areas would not require mitigation for the placement of materials, as the areas are currently designated for that use.

2.2 High Marsh Impacts

A total of 28 acres of high marsh would be impacted by the proposed MSCIP as follows: area D would cover 18.6 acres of high marsh, and area ER3 would cover 9.4 acres. These high marsh

habitats have become established on Dredge Island in Lavaca Bay (**Figures 3-5**). High marsh in areas D and ER3 were delineated in the field (BESI 2006a).

2.3 Impacts to Other Wetlands

Proposed onshore placement area P1 is located on agricultural land. The site contains prior converted cropland, artificial wetlands, and farmed wetlands that would be impacted by construction of the placement area (**Figure 7 and Figure 8**). After a jurisdictional determination is made, any necessary wetland delineations will be done in order to determine the acreages of wetlands that would be impacted by the placement of materials.

2.4 Oyster Reef Impacts

A total of 148.2 acres of oyster reef would be directly impacted by the proposed MSCIP, and an additional 105.7 acres would be indirectly impacted by project-induced increases in salinity (URS 2006b). The majority of the direct impacts of the project are from widening the existing ship channel. There are 129.2 acres of oyster reef on the side slope and on the bay bottom near the existing channel that would be impacted by channel widening. It is likely that the oysters on the side slope of the channel would naturally colonize the new side slope after channel widening; however, these impacts will be mitigated for at the same rate as for other oyster reef losses. Area ER3 contains 17 acres of oyster reef; and areas A2, D, and ER2 each contain less than one acre (0.75, 0.66, and 0.6 acres, respectively; **Figures 3-6**). Oyster reef in areas ER3, A2, and D were delineated in the field (BESI 2006b). Oyster reef in area ER2 was estimated using on-screen aerial photo analysis of a 2004 digital orthophoto quarter quadrangle with 1 m resolution.

There is an estimated 105.7 acres of loss of oyster production from indirect impacts caused by predicted increases in salinity from the MSCIP (URS 2006b). This loss of production is a result of an increased level of infection of oysters by the parasite Dermo (*Perkinsus marinus*).

2.5 Bay and Offshore Bottom Impacts

The conversion of bay bottom habitat as a result of the MSCIP is expected to have both positive and negative effects on the overall habitat functional value of the bay system; with an expected net increase in functional value. Some of the dredged material from the proposed MSCIP would be used to enhance bay bottom and mercury-impacted bay bottom areas by: creating more

productive habitats (marsh, oyster reef, or sand platform conducive to seagrass colonization), placing submerged caps on mercury impacted sediments, or nourishing beaches. Created marshes would be low marshes dominated by *Spartina alterniflora*. A total of 1398.6 acres of bay bottom and mercury-impacted bottom would be enhanced by habitat creation (**Table 1**). Unconfined placement areas would also receive dredged material. A total of 3403 acres would be impacted by unconfined placement. Areas impacted by open bay placement are allowed to recover between dredging cycles with productivity restored within one year. In the proposed MSCIP 1350 acres of Matagorda Bay bottom would receive unconfined placement at approximately a two-year dredging interval (there would be no unconfined placement in Lavaca Bay). Of the 2053 acres of Offshore Bottom impacted, 1600 acres would only receive a single placement of new work material, then be allowed to recover; the remaining 453 acres would receive material at the two-year dredging interval. In-bay upland areas covering 974.6 acres of bay bottom and 368.8 acres of mercury impacted bay bottom would be created in Lavaca and Matagorda Bays to hold dredged material. In-bay uplands covering mercury-impacted sediments are considered an impact to aquatic habitat, but they also provide a benefit by burying mercury. In addition, 704 acres of bay bottom and 213 acres of offshore bottom would be converted to ship channel.

Table 1. Summary of conversions of bay and offshore bottom from the Project.

	Habitat Creation (acres)	Unconfined Placement (acres)	In-bay uplands (acres)	Convert to channel (acres)	Total (acres)
Bay Bottom	1232.1	1350.0	974.6	704.0	4260.7
Offshore Bottom	0.0	2053.0	0.0	213.0	2266.0
Mercury-impacted Bay Bottom	166.5	0.0	368.8	0.0	535.3
Total	1398.6	3403.0	1343.4	917.0	7062.0

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3.0 MITIGATION MEASURES

Mitigation ratios of 1:1 for direct impacts to oyster reefs and 3:1 for low marsh (in-kind) will be used (**Table 2**). Mitigation will also be done for salinity impacts to oysters as explained in the Oyster Reef Impact Assessment (URS 2006b). In addition to the 253.9 acres required for all oyster impacts from the Project, material is available for an additional 44.1 acres of oyster reef to be created. Since low marsh is a more productive habitat than high marsh, mitigation would include a mix of low marsh and high marsh to mitigate for habitat losses and provide a greater habitat functional value. To mitigate for impacts to 28 acres of high marsh, 23.2 acres of high marsh and 22.2 acres of low marsh will be created. The resulting mitigation ratio for a mix of low marsh and high marsh to mitigate for impacts to high marsh is approximately 1.5:1.

The amount of mitigation required for unavoidable impacts to wetlands in onshore placement area P1 will be determined following a wetland delineation. Appropriate mitigation for these potential wetland impacts will be provided that is acceptable to the United States Army Corps of Engineers (USACE) and applicable resource agencies.

Table 2. Mitigation for low marsh, high marsh, and oyster reef.

	Impacts (acres)							Mitigation ratio	Mitigation Required (acres)
	A2	**D**	**ER2**	**ER3**	**Ship Channel**	**Indirect Impacts**	**Total**		
Low Marsh [1]		3.4	3.4	1.6			8.4	3:1	**25.2**
High Marsh [2]		18.6		9.4			28.0	**Not Applicable**	
Oyster Reef	0.8	0.7	0.6	17.0	129.2	105.7	253.9	1:1	**253.9**

	Mitigation (acres)						Material used Beneficially (acres)
	D	**ER1**	**ER2**	**ER3**	**OR1 and OR2**	**Total**	**OR1 and OR2**
Low Marsh [1]	7.1		10.2	7.9		**25.2**	
High Marsh [2]	7.1			16.1 High Marsh, 22.2 Low Marsh		**23.2 High Marsh, 22.2 Low Marsh**	
Oyster Reef		63.0			190.9	**253.9**	44.1

[1] Low Marsh is *Spartina alterniflora*-dominated vegetation at an elevation between MLLW and MHHW water level

[2] Existing High Marsh has various species at low density at a higher elevation than Low Marsh. High Marsh habitat is found near the upper end of the tidal range at or below MHHW. Mitigation High Marsh will be planted with *Spartina patens.*

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A Habitat Equivalency Analysis (HEA) was used to quantify the loss of functional value of unvegetated bay and offshore bottom habitats impacted by the proposed MSCIP (URS 2006c). The HEA addresses losses due to channel enlargement, and placement of new work and maintenance material over a 50-year planning period. The analysis is also used to ensure that proposed mitigation would restore all lost functional value over the 50-year period. A HEA is used to assess mitigation for bay and offshore bottom impacts rather than a mitigation ratio based on acreage because it is necessary to compare habitat functional values across habitat types. In-kind mitigation would not be a reasonable practice for the impacted habitats. The creation of open bay bottom or offshore bottom would require a loss of either terrestrial habitat, or more productive aquatic habitat such as marsh, oyster reef, or seagrass bed. Drawing on agency comments and experience from other recent permit efforts, several mitigation sites are proposed for open bay and offshore bottom impacts. Creation of more productive habitats such as marsh and areas designed to be colonized by seagrass are proposed. Protection of marsh and seagrass habitat in and around Keller Bay from loss to erosion is also proposed as mitigation for project impacts and as would provide additional benefits to habitat functional value beyond what is required for mitigation. The values of bay and offshore bottom areas impacted by the proposed project, as well as the value of mitigation sites from the HEA are provided in **Table 3**.

Table 3. Mitigation for bay bottom and offshore bottom.

	Impacts		Mitigation		Additional Functional Value
	Habitat Type	**HEA Value[1]**	**Habitat Type**	**HEA Value[1]**	**HEA Value[1]**
Proposed Ship Channel	Bay Bottom and Offshore Bottom	-4546.9			
A1	Bay Bottom	-2627.9			
A2	Bay Bottom	-694.2	Marsh	1230.3	
D	Bay Bottom	-1289.2			
ER2	Bay Bottom	-416.0			
ER3	Bay Bottom	-399.2			
G	Bay Bottom	-59.5	Marsh	3280.9	
Keller Bay protection[2]	Bay Bottom	-62.5	Marsh and seagrass protection	5298.8	2460.4
H4 Habitat Area	Bay Bottom	-223.2	Marsh and sand platform	2962.3	
O5 and PA1	Bay Bottom	-844.4			
PA5-12	Bay Bottom	-1609.3			
Total		**-12,772.3**		**12,772.3**	**2460.4**

[1] Value calculated from a Habitat Equivalency Analysis. Units are relative acre-years of function, see Habitat Equivalency Analysis for Bay Bottom Impacts, URS 2006c

[2] The value of marsh and seagrass protection beyond the amount required for mitigation is an additional benefit to habitat functional value. The value of 2460.4 is equivalent to the value of creating approximately 240 acres of marsh or oyster reef, see Habitat Equivalency Analysis for Bay Bottom Impacts, URS 2006c

3.1 Marsh Mitigation

Approximately 587.6 acres of low marsh and 23.2 acres of high marsh will be created as part of the mitigation for project impacts. The low marsh will consist of smooth cordgrass (*Spartina alterniflora*) which will be planted on clay fill. Approximately 47.4 acres of low marsh and 23.2 acres of high marsh will be created for mitigating low marsh and high marsh impacts in Lavaca Bay. The remaining 540 acres of low marsh will be used to offset impacts to open bay bottom.

Prior to planting, a survey will be performed at the site to determine the topography and elevation. The target elevation for intertidal marsh (*Spartina alterniflora*) vegetation ranges from MLLW to MHHW, which is approximated at the 1.0-foot range in this area. High marsh will consist of *Spartina patens*, and the target elevation for high marsh is in the upper tidal range near MHHW. If the topographic survey is determined to be outside of the target range for the low marsh and high marsh, then remedial actions will be taken after coordination with the USACE and appropriate resource agencies. Recommendations may include allowing for additional site conditioning prior to conducting a full-scale planting of the site, grading the area, or conducting a pilot planting effort. Planting and monitoring will be done as described in the following sections. Prior to planting, the results of the survey(s) will be coordinated with the USACE.

3.1.1 Transplant Source

The intertidal marsh vegetation will be transplanted in the proposed marsh mitigation areas. *Spartina alterniflora* and *S. patens* will be harvested from the following potential sources:

a. Nursery that Alcoa utilizes for mitigating the Alcoa/Lavaca Bay Superfund site;

b. Adjacent existing shoreline that is not impacted by mercury-contaminated sediments; or

c. Commercial sources.

The transplant source areas will be identified and applicable permits obtained from the resource agencies. Staking of the approved transplant harvest areas will be in accordance with applicable permits. To avoid incidental damage to source areas, *Spartina alterniflora* and *S. patens* harvest techniques will be coordinated with the resource agencies.

3.1.2 Transplanting

Spartina alterniflora and *S. patens* should be planted between mid-October and mid-June. If planting is required outside of these times, planting will be coordinated with the resource

agencies at least two weeks prior to commencement of those plantings. The transplanting technique would be coordinated with the resource agencies during final engineering and design of the mitigation site, but it is anticipated that *Spartina alterniflora* and *S. patens* planting units would consist of multiculm sod or multiculm sprigs. The initial planting would be completed within 18 months of the beginning of construction.

3.1.3 Performance Criteria

Marsh mitigation would be considered successful if, within three years, *Spartina alterniflora* and *S. patens* cover 70 percent of the planted area (excluding areas designed to be open water). If mitigation is unsuccessful at the end of the monitoring period, the resource agencies will be consulted to determine if corrective measures are warranted. If, at any time during the monitoring period, it becomes apparent that the selected location is unlikely to support target vegetation, a determination may be made to re-locate the *Spartina alterniflora* and *S. patens* planting or modify the mitigation project.

3.1.4 Performance Monitoring

An initial transplant survival survey would be conducted approximately 90 days after completion of the initial planting effort and, if necessary, each subsequent re-planting. Using acceptable survey methods, a minimum of 15 percent of all transplant units will be randomly selected and surveyed for the initial transplant survival survey. A written report detailing the survival results will be submitted to the resource agencies. If at least 50 percent survival is not achieved, the resource agencies would be consulted to determine if/how the site should be modified or other appropriate corrective actions that should be taken prior to initiating a replanting effort.

Post-planting monitoring would consist of site surveys to determine transplant survival and colonization. At least four (4) transects would be established for the purpose of post-planting monitoring surveys. All transects located within the mitigation site would be surveyed at intervals of 6 months, 1 year, 2 years and 3 years post-planting to estimate percent coverage within the planted areas. Representative photographs of the site(s) would be taken during each survey to document *Spartina alterniflora* and *S. patens* success. A written report detailing the results of the quarterly surveys would be submitted to the USACE.

3.2 Oyster Mitigation Plan

Approximately 253.9 acres of oyster reef will be created to compensate for the loss of oyster production resulting from direct and indirect project-related impacts to natural oyster reef habitats. An additional 44.1 acres of oyster reef will be created as a means of using dredged

materials beneficially, for a total of 298 acres of reef created. It is anticipated that the ecological services provided by the constructed reef will benefit a wide range of estuarine species, including finfish, shrimp, crabs, mussels, oysters and many species of reef dwelling invertebrates.

Lavaca Bay has been selected for reef construction because much of the oyster impacts from the MSCIP are found within this bay, and it provides an environment suitable for oyster reef growth, as indicated by the numerous reefs in the area.

3.2.1 Construction Criteria

Prior to construction of the oyster reefs, a detailed bathymetric survey will be conducted. Constructed reefs will consist of parallel segments that will be constructed perpendicular or diagonal to the tidal currents. The base of the reef will be constructed using stiff clay. The upper part of the reefs will be constructed using materials that will provide appropriate attachment surfaces for oysters and other sessile mollusks, i.e. limestone, whole oyster shell, clean processed and graded crushed concrete, or any other material approved by the USACE in coordination with the resource agencies. After settling, the top of the reef base shall be on average one (1) foot higher than the surrounding bay bottom, with no area less than six (6) inches above the surrounding sediment, in order to prevent burial by natural sedimentation. After construction has been completed, a permanent elevation marker will be placed on the reef to mark +6 feet MLT for monitoring the reef elevation.

The target will be to deposit surface reef material between mid-April and early June. This would establish reef as soon as possible before spat set (colonization by young oysters) to prevent excessive siltation on the reef, but before anticipated spat set in June. If the reefs cannot be placed until later in the year, then spat set will be lower, resulting in a less productive oyster reef the first year.

3.2.2 Construction Certification

The oyster reef will be constructed in accordance with the criteria identified in Section 3.2.1 above. Within 21 days of construction completion, a notice will be provided to the USACE that construction has been completed in accordance with the criteria above.

The first post-construction survey will be conducted at any time during the first October-December time period after the oyster reef has settled by 70% ("70% Settling Date"). A detailed geotechnical assessment will be conducted based on the best professional geotechnical testing

and engineering practices to determine the 70% Settling Date. The 70% Settling Date will be provided to the USACE.

During the first post-construction monitoring event, a baseline survey will be conducted by a Registered Professional Land Surveyor. The survey will be conducted to determine if aerial size and surface elevations specified have been achieved. When the baseline survey and monitoring event are complete, a Post-Construction Report will be prepared, which will include the following elements:

- Summary of construction activities
- Baseline survey showing reef area, configuration, and elevation
- Estimated depths of overlying water
- Information to establish that the construction criteria have been met

Within 60 days after the completion of the first post-construction monitoring event, the post-construction report will be submitted to the USACE for review. Within 30 days after receiving the report, the USACE may establish a date for a construction inspection.

The USACE will evaluate the report and the results of any inspection they may undertake, and if it is agreed that the construction criteria have been met, shall issue a written notice certifying completion of construction of the oyster reef mitigation plan within 60 days after receipt of the Post-Construction Report. If the construction criteria have not been met, a discussion will be held to decide whether any additional steps are needed to meet the construction criteria.

3.2.3 Performance Criteria

Performance criteria define short-term milestones that, if met, will provide reasonable assurance of project success in the long term. The performance criteria for the oyster mitigation plan are:

a. Design-Based Criteria

   i. The presence of a suitable solid reef base that has a surface elevation that is on average 1 foot higher than the surrounding bay bottom. Due to the slight unevenness of the bay bottom, and the shape of the reef construction material, reef surface elevation will be an arithmetic average of 1 foot above the surrounding bay bottom, but no individual area will be less than 6 inches above bay bottom.

   ii. The reefs may consist of multiple reef segments constructed at the same site, but the combined aerial size of the segments, not counting open

water between segments, will be measured as the area of reef created. The area of reef in ER1 will be no less than 63 acres, and the total area of OR1 and OR2 will be no less than 235 acres.

b. Ecological Criteria

   i. Evidence of oyster colonization on the constructed reef within 30 months post-construction.

Compliance with the design-based performance criteria shall be documented during each monitoring event that will occur during the October-December time period approximately 18 and 30 months after construction has been completed. Compliance with the ecological performance criteria may be determined during any of the scheduled monitoring events or other inspections approved by the USACE.

3.2.4 Contingencies

Successful establishment of a productive oyster reef depends on a number of environmental factors that can not be controlled. Severe flooding, drought, or tropical storms can kill oysters on a reef, or prevent them from colonizing. If conditions exist that prevent the establishment of reefs when they are built, then the timeline for the performance criteria for reef establishment will begin when conditions become favorable for oysters.

3.2.5 Performance Monitoring

Reef monitoring will be conducted at scheduled intervals following reef construction. The schedule and objectives of post-construction monitoring events are shown in **Table 4** below:

Table 4. Post-Construction Monitoring Events

Monitoring Schedule	Characteristics to Evaluate	Methods
October-December after 70% Settling Date	Evidence of oyster colonization	Photo documentation
	Average reef surface elevation and aerial extent	Baseline survey by a Registered Professional Land Surveyor
October-December approximately 18 months following certification of completion of construction	Evidence of oyster colonization (if not documented during prior monitoring event)	Photo documentation
	Average reef surface elevation	Confirmation survey by a Registered Professional Land Surveyor
October-December approximately 30 months following certification of completion of construction	Evidence of oyster colonization (if not documented during prior monitoring event)	Photo documentation

A written report following each monitoring event will be submitted to the USACE for review.

3.2.6 Corrective Actions

Approval will be obtained from the USACE prior to performing any corrective actions. These may include the following:

a. Mobilization of heavy equipment for reworking existing base material to provide gaps, passes, or deflectors designed to improve circulation and/or reduce sedimentation.

b. Reconstruction or augmentation of reef base to address excessive subsidence or settlement.

c. Mechanical manipulation of the upper reef surface to increase surface attachment area if the spat set is not successful and is negatively colonized by algae.

Corrective actions will not include construction of a new reef at a different location, and are limited to corrections, amendments, or modifications of the existing reef. Corrective actions may be triggered by the following:

a. Excessive subsidence or settling of the reef base (from baseline or confirmation surveys).

b. No evidence of colonization of sessile mollusks is detected in any scheduled post-construction monitoring event.

The USACE has the option of requiring one additional monitoring event if the ecological performance criterion has not been met by the time of the 30-Month Post-Construction Monitoring Event.

4.0 MAINTENANCE

The Calhoun County Navigation District is committed to maintaining the mitigation sites, and will work to establish a reasonable maintenance program that is acceptable to the USACE, in coordination with appropriate resource agencies. An inspection will be performed at least every five years or after hurricane/tropical storm/or public notice of degradation of the site to determine if particular element(s) need maintenance to preserve the function of the mitigation site. These inspections and maintenance work activities would be coordinated with the USACE and appropriate resource agencies.

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5.0 REFERENCES

Benchmark Ecological Services, Inc. (BESI). 2006a. Dredge Island Wetland Delineation Report. April 7, 2006.

Benchmark Ecological Services, Inc. (BESI). 2006b. Oyster Reef Delineation Study Lavaca Bay System. January 2006.

URS. 2006a. Dredged Material Management Plan for Matagorda Ship Channel Improvement Project.

URS. 2006b. Oyster Impact Assessment for Matagorda Ship Channel Improvement Project.

URS. 2006c. HEA for Bay Bottom Impacts for the Matagorda Ship Channel Improvement Project,

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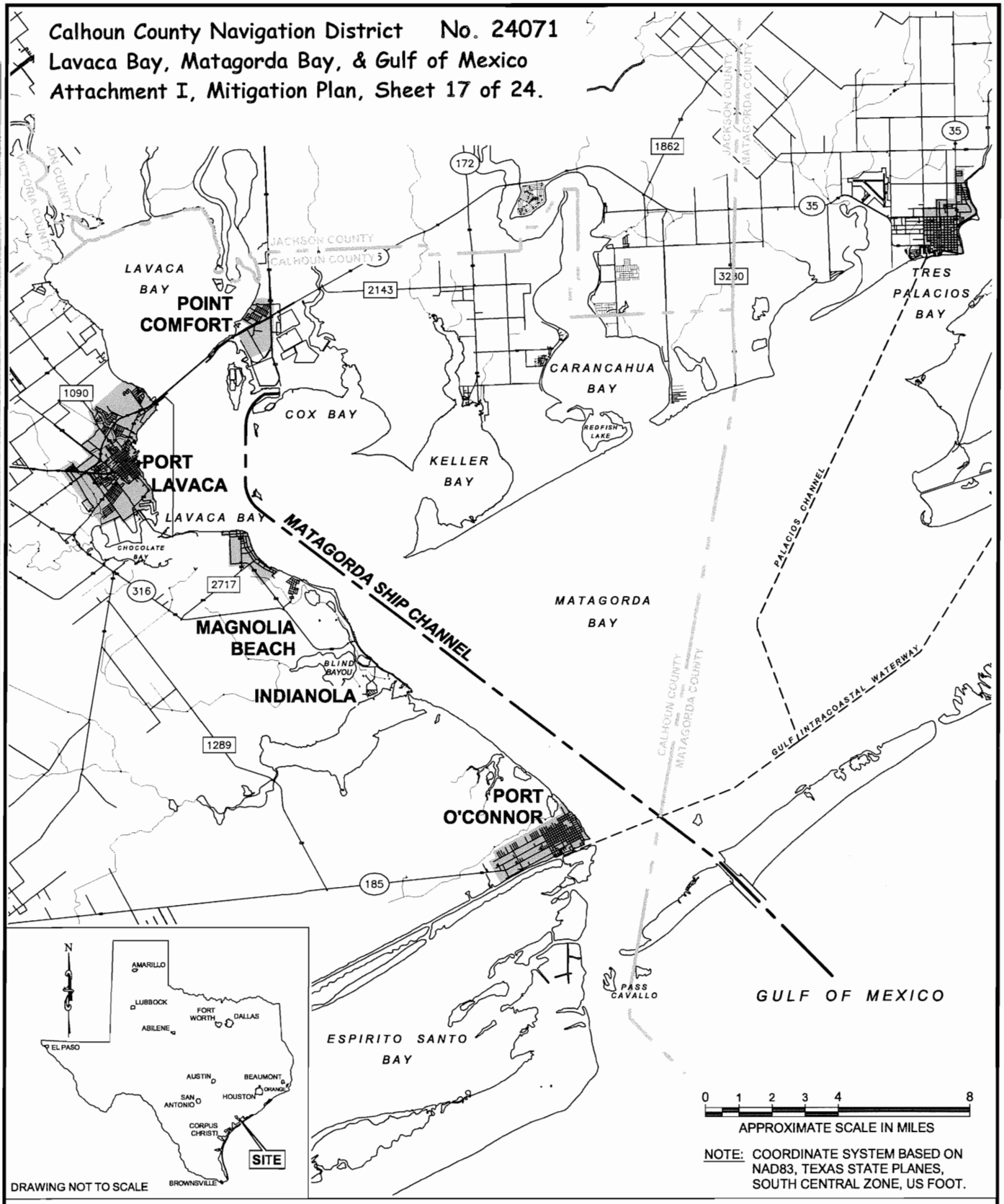
Attachment I, Mitigation Plan, Sheet 17 of 24.



SITE VICINITY MAP

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

MATAGORDA AND CALHOUN COUNTIES, TEXAS

CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 1 OF 8

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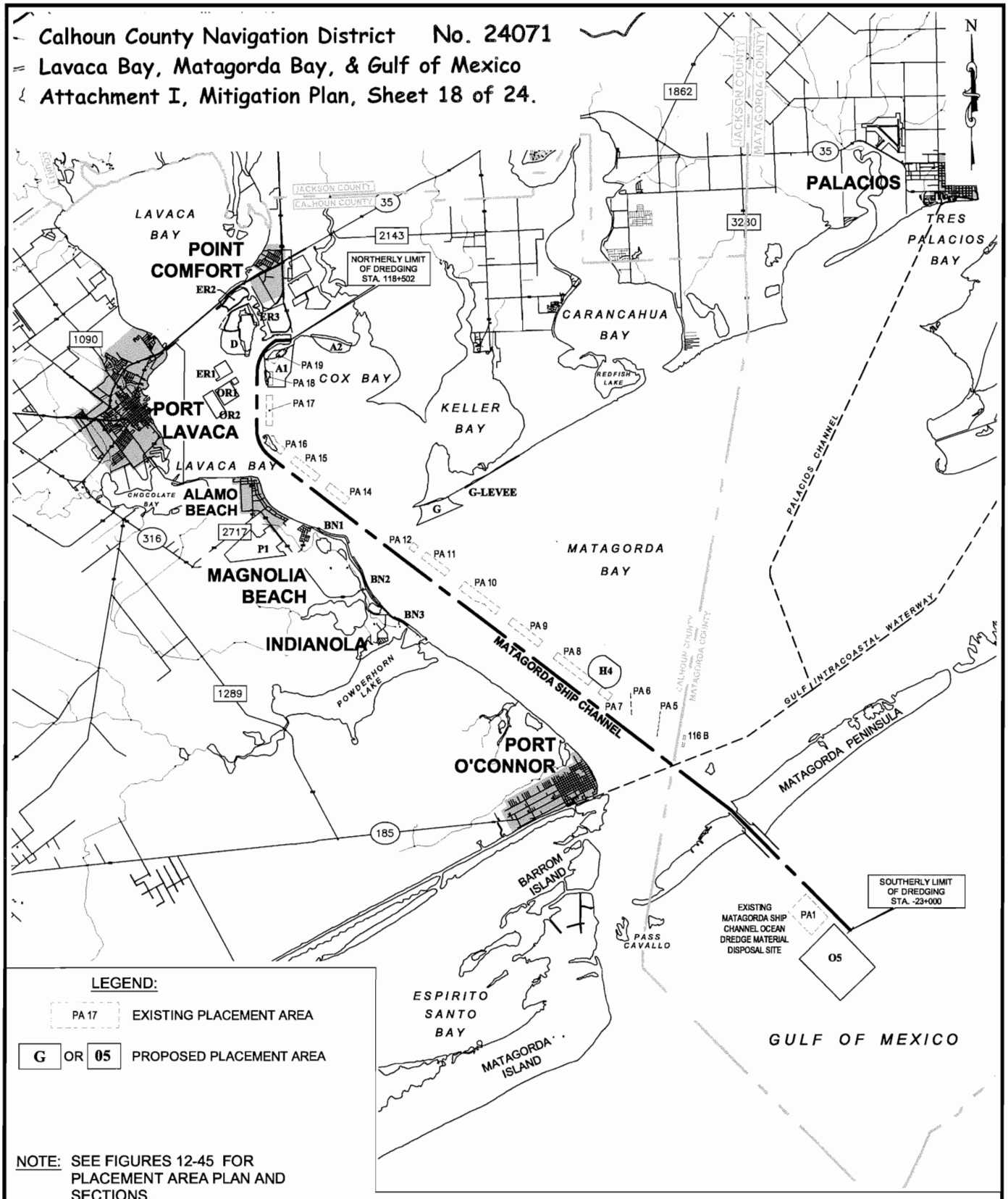

LEGEND:

PA 17 EXISTING PLACEMENT AREA

G OR 05 PROPOSED PLACEMENT AREA

NOTE: SEE FIGURES 12-45 FOR PLACEMENT AREA PLAN AND SECTIONS.

0 1 2 3 6

APPROXIMATE SCALE IN MILES

COORDINATE SYSTEM BASED ON NAD83, TEXAS STATE PLANES, SOUTH CENTRAL ZONE, US FOOT.

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CHANNEL LAYOUT WITH EXISTING AND PROPOSED PLACEMENT AREAS

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

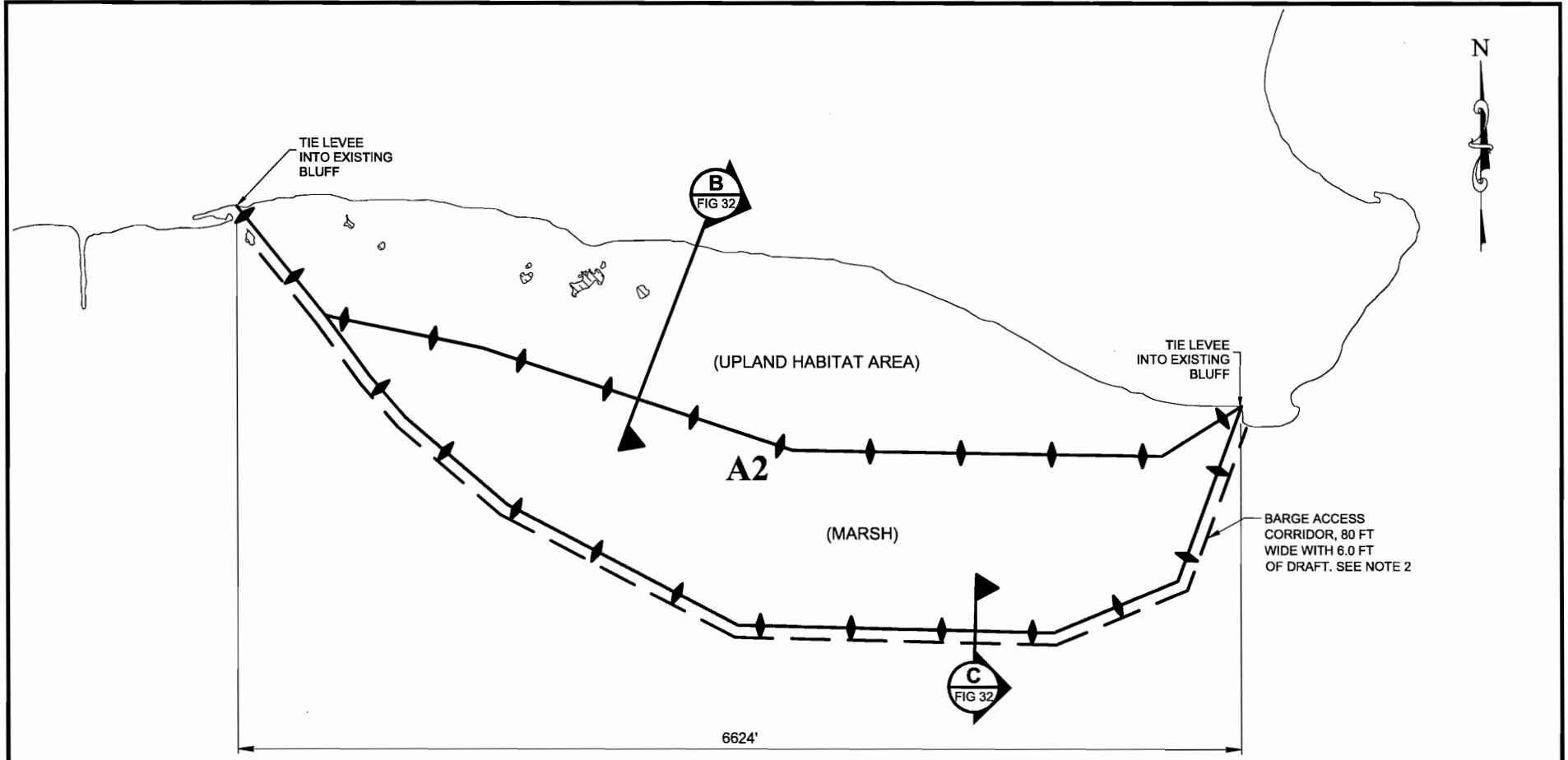
MATAGORDA AND CALHOUN COUNTIES, TEXAS

CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 2 OF 8



COX BAY

Calhoun County Navigation District No. 24071
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NOTES:

1. COORDINATE SYSTEM BASED ON NAD83, TEXAS STATE PLANES, SOUTH CENTRAL ZONE, US FOOT.
2. MATERIAL DREDGED FROM ACCESS CORRIDOR WILL BE PLACED ALONG THE CHANNEL ALIGNMENT AND PULLED BACK INTO THE CHANNEL UPON COMPLETION. IF MATERIAL IS IMPACTED BY MERCURY ABOVE THE LAVACA BAY SUPERFUND REMEDIAL ACTION OBJECTIVE FOR OPEN WATER THEN IT WILL BE MANAGED IN A MANNER CONSISTENT WITH THE LAVACA BAY SUPERFUND SITE REQUIREMENTS
3. THIS DOCUMENT IS RELEASED FOR PERMITTING ON MARCH 15, 2007 UNDER AUTHORITY OF MARK E. MAZOCH, P.E., #81099. IT IS NOT TO BE USED FOR CONSTRUCTION, OR BIDDING PURPOSES.

0 1000 2000
APPROXIMATE SCALE IN FEET

LEGEND:

- PROPOSED LEVEE
- OYSTER REEF (BENCHMARK)
- BARGE ACCESS CORRIDOR

PLACEMENT AREA PLAN AREA A2

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

MATAGORDA AND CALHOUN COUNTIES, TEXAS

CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 3 OF 8

Calhoun County Navigation District No. 24071
Lavaca Bay, Matagorda Bay, & Gulf of Mexico
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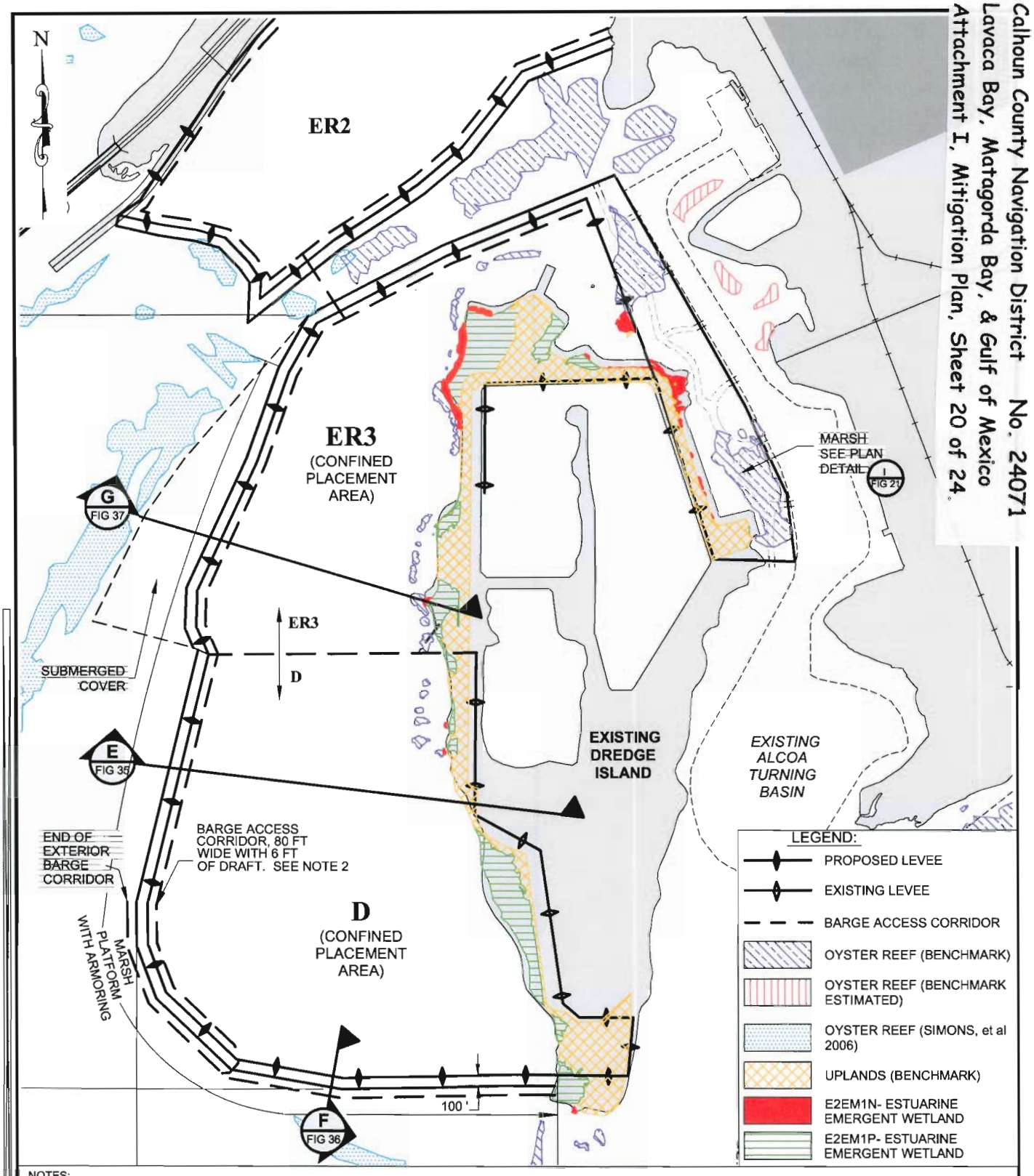

NOTES:

1. COORDINATE SYSTEM BASED ON NAD83, TEXAS STATE PLANES, SOUTH CENTRAL ZONE, US FOOT.
2. MATERIAL DREDGED FROM ACCESS CORRIDOR WILL BE PLACED ALONG THE CHANNEL ALIGNMENT AND PULLED BACK INTO THE CHANNEL UPON COMPLETION. IF MATERIAL IS IMPACTED BY MERCURY ABOVE THE LAVACA BAY SUPERFUND REMEDIAL ACTION OBJECTIVE FOR OPEN WATER THEN IT WILL BE MANAGED IN A MANNER WITH THE LAVACA BAY SUPERFUND SITE REQUIREMENTS
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0 1200 2400
APPROXIMATE SCALE IN FEET

PLACEMENT AREA PLAN AREAS D and ER3

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

MATAGORDA AND CALHOUN COUNTIES, TEXAS

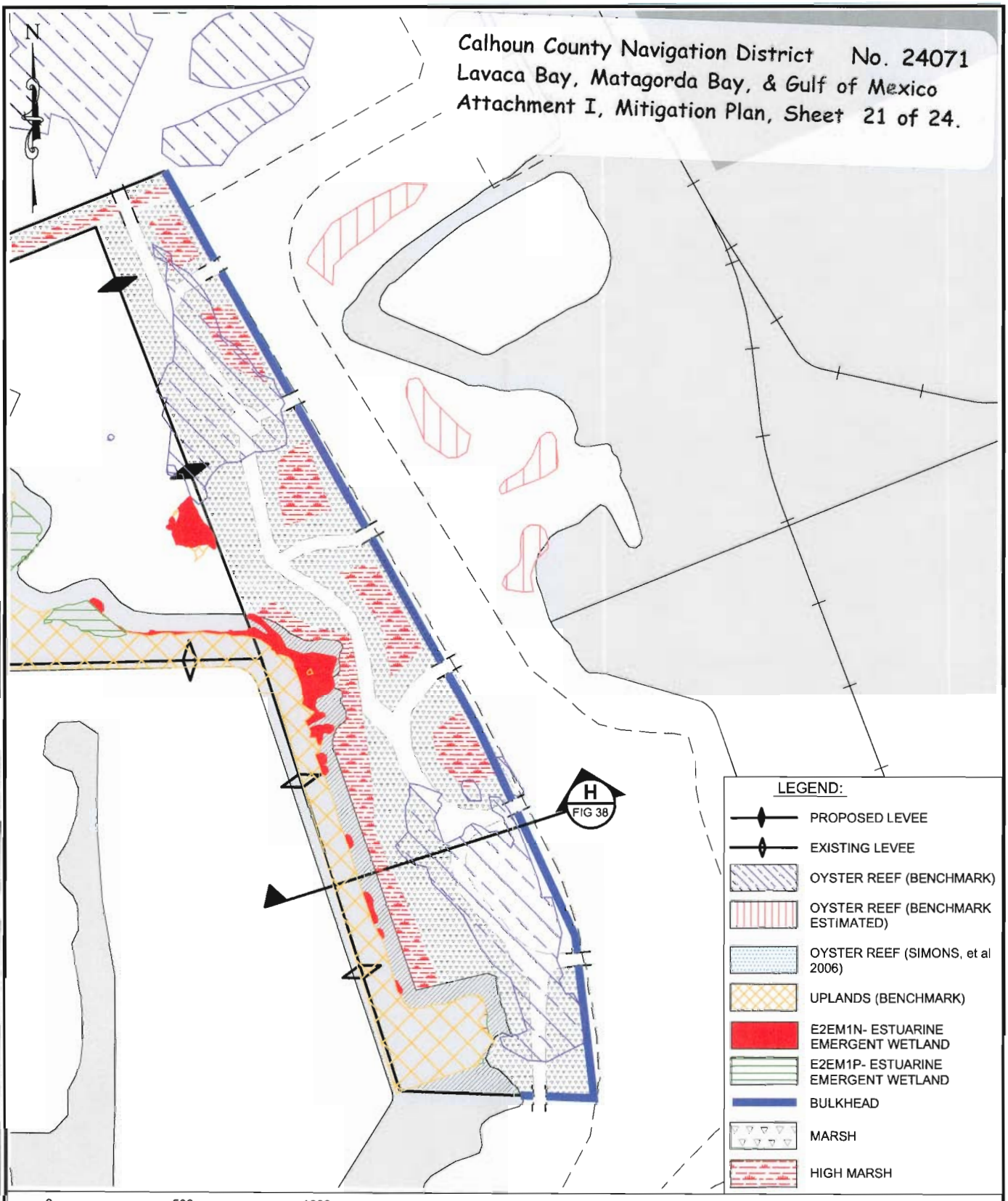
CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 4 OF 8

Calhoun County Navigation District No. 24071
Lavaca Bay, Matagorda Bay, & Gulf of Mexico
Attachment I, Mitigation Plan, Sheet 21 of 24.



0 500 1000
APPROXIMATE SCALE IN FEET

NOTES:

1. COORDINATE SYSTEM BASED ON NAD83, TEXAS STATE PLANES, SOUTH CENTRAL ZONE, US FOOT.
2. THIS DOCUMENT IS RELEASED FOR PERMITTING ON MARCH 15, 2007 UNDER AUTHORITY OF MARK E. MAZOCH, P.E., #81099. IT IS NOT TO BE USED FOR CONSTRUCTION, OR BIDDING PURPOSES.

PLACEMENT AREA PLAN
AREA ER3 MARSH

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

MATAGORDA AND CALHOUN COUNTIES, TEXAS

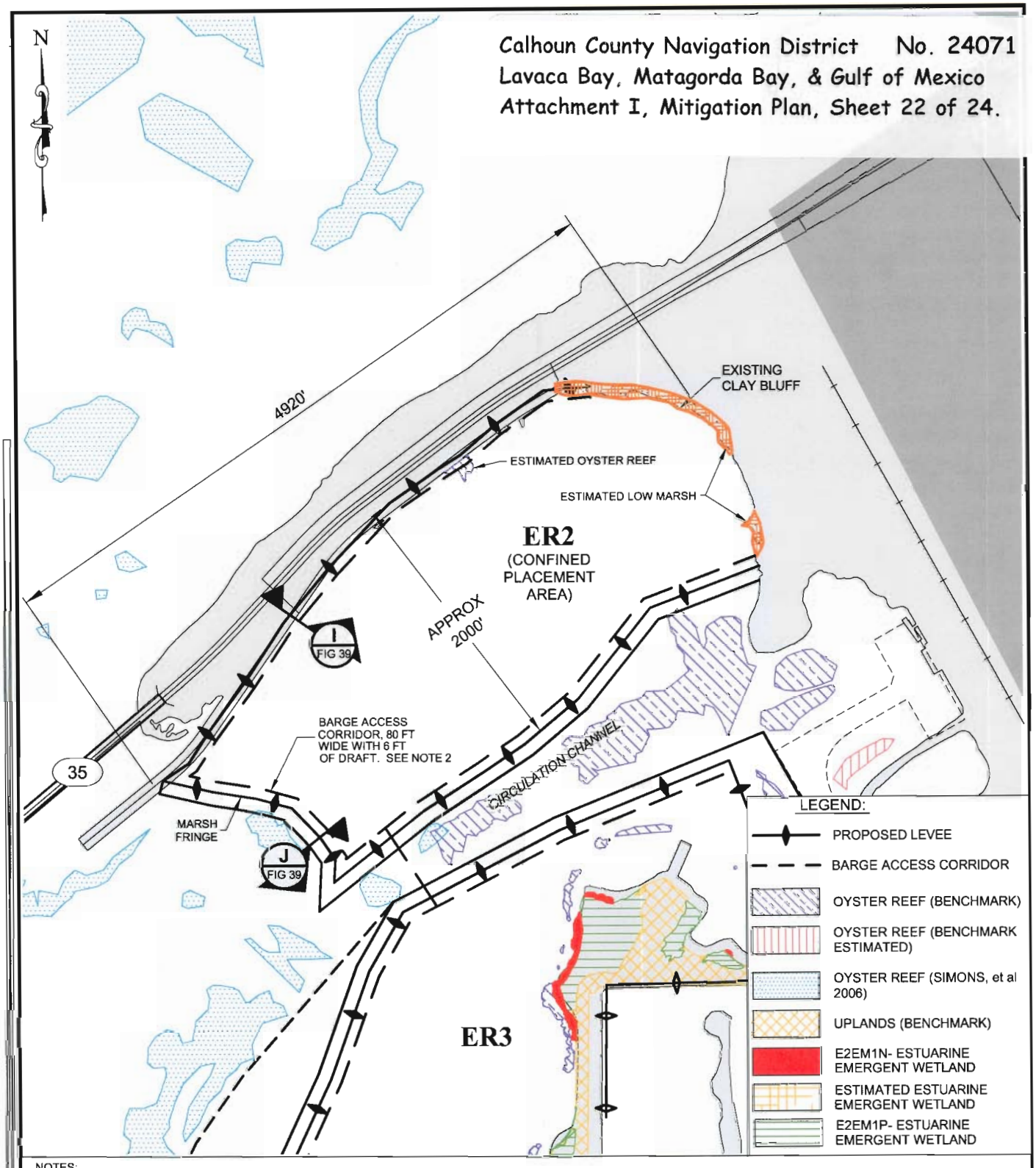
CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 5 OF 8

Calhoun County Navigation District No. 24071
Lavaca Bay, Matagorda Bay, & Gulf of Mexico
Attachment I, Mitigation Plan, Sheet 22 of 24.



NOTES:

1. COORDINATE SYSTEM BASED ON NAD83, TEXAS STATE PLANES, SOUTH CENTRAL ZONE, US FOOT.
2. MATERIAL DREDGED FROM ACCESS CORRIDOR WILL BE PLACED ALONG THE CHANNEL ALIGNMENT AND PULLED BACK INTO THE CHANNEL UPON COMPLETION. IF MATERIAL IS IMPACTED BY MERCURY ABOVE THE LAVACA BAY SUPERFUND REMEDIAL ACTION OBJECTIVE FOR OPEN WATER THEN IT WILL BE MANAGED IN A MANNER CONSISTENT WITH THE LAVACA BAY SUPERFUND SITE REQUIREMENTS
3. THIS DOCUMENT IS RELEASED FOR PERMITTING ON MARCH 15, 2007 UNDER AUTHORITY OF MARK E. MAZOCH, P.E., #81099. IT IS NOT TO BE USED FOR CONSTRUCTION, OR BIDDING PURPOSES.

0 1000 2000
APPROXIMATE SCALE IN FEET

PLACEMENT AREA PLAN AREA ER2

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

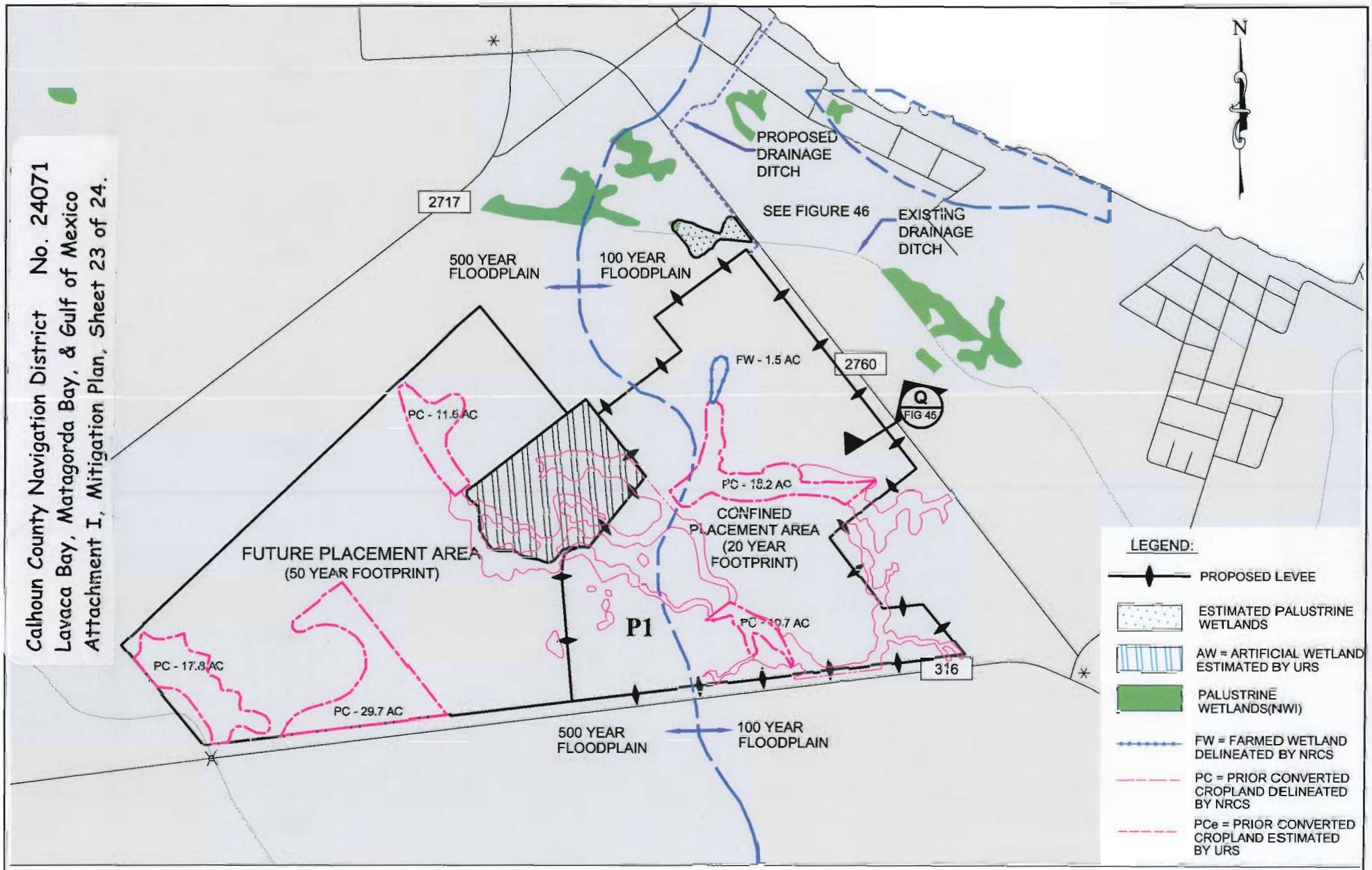
MATAGORDA AND CALHOUN COUNTIES, TEXAS

CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 6 OF 8



NOTES:

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2. THIS DOCUMENT IS RELEASED FOR PERMITTING ON MARCH 15, 2007 UNDER AUTHORITY OF MARK E. MAZOCH, P.E., #81099. IT IS NOT TO BE USED FOR CONSTRUCTION, OR BIDDING PURPOSES.

0 1500 3000

APPROXIMATE SCALE IN FEET

PLACEMENT AREA PLAN AREA P1

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

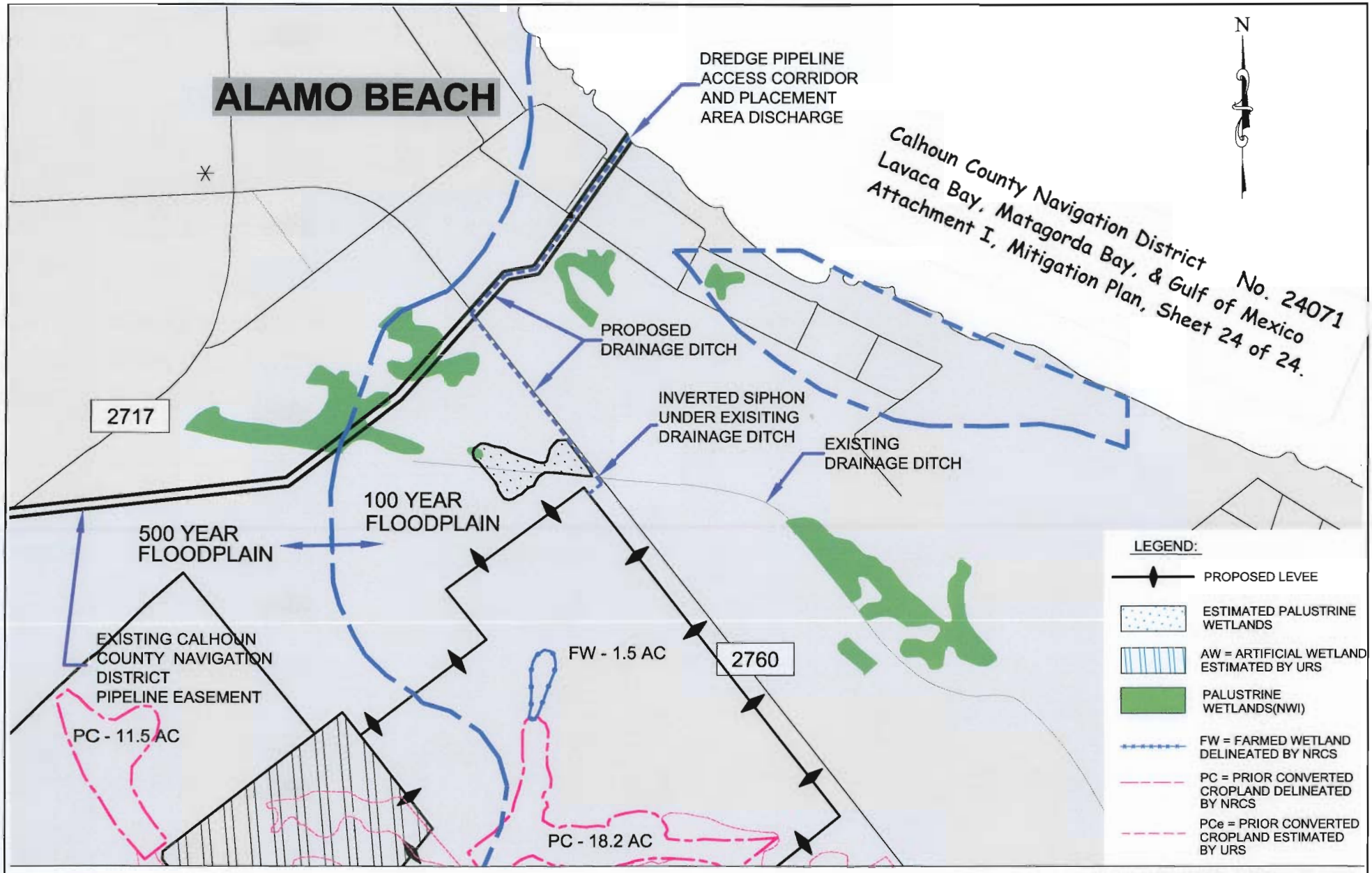
MATAGORDA AND CALHOUN COUNTIES, TEXAS

CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 7 OF 8



NOTES:

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0 1000 2000

APPROXIMATE SCALE IN FEET

PLACEMENT AREA PLAN AREA P1

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

Revised 3-15-07

MATAGORDA AND CALHOUN COUNTIES, TEXAS

CALHOUN COUNTY NAVIGATION DISTRICT

URS

PERMIT NO. 24071

FIGURE 8 OF 8