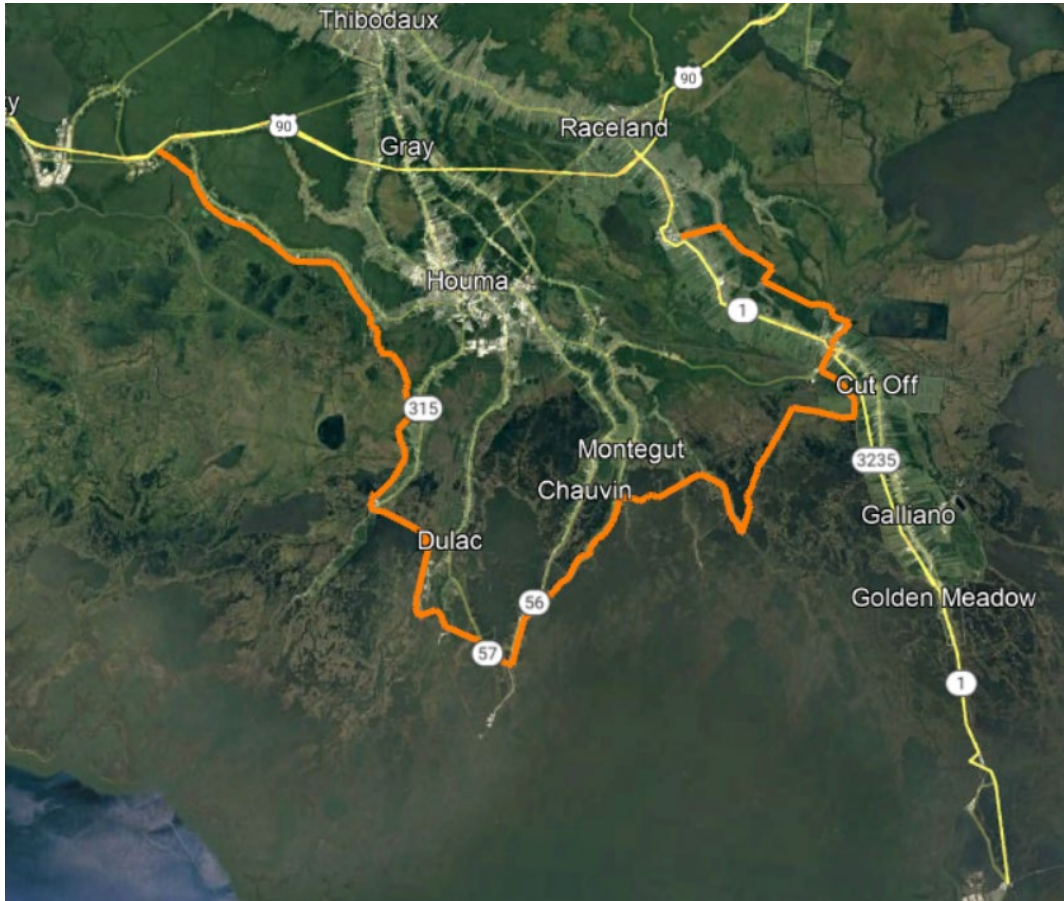


**MORGANZA TO THE GULF
SURVEYS AND BORINGS ANALYSIS
TERREBONNE AND LAFOURCHE PARISHES, LOUISIANA**



APPENDIX G: 404 (B)(1)

CEMVN-ED

MEMORANDUM FOR Chief, Environmental Planning Section (CEMVN-PDS-C/David Day)

SUBJECT: Request for Water Quality, Hydraulics, and Hydrology Sections for the 404(b)(1) Evaluation for the Morganza to the Gulf, Mitigation Project, Hurricane and Storm Damage Reduction System, Surveys and Borings, located in Terrebonne Parish, Louisiana.

1. As requested, enclosed are the completed sections of the 404(b)(1) evaluation relating to impacts to water quality from the proposed surveys and borings for the subject project (Encl 1). A memorandum of explanation for these completed sections is in (Encl 2).
2. An electronic copy is available in Microsoft Word and PDF.
3. Point of contact is Julio I. Vidal Salcedo, Hydrology, Hydraulics and Coastal Branch, Ext. 2267.

2 Encls

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CHRISTOPHER L. DUNN, Ph.D., P.E.
Chief, Engineering Division

404(b) Evaluation (Short Form) for the Morganza to the Gulf, LA (MTG) Project, Hurricane and Storm Damage Reduction System, Surveys and Borings

The following short form 404(b) (1) evaluation follows the format designed by the U.S. Army Corps of Engineers, New Orleans District, Office of the Chief of Engineers (CEMVN-ED). As a measure to avoid unnecessary paperwork, and to streamline regulation procedures, while fulfilling the spirit and intent of environmental statutes, CEMVN is using this format for all proposed project elements requiring a 404(b)(1) evaluation but involving no adverse significant impacts.

PROJECT DESCRIPTION. Surveys and Borings are needed to inform design of project features for the proposed Morganza to the Gulf of Mexico, LA (MTG) Project, Hurricane and Storm Damage Risk Reduction System. Total project consists of the construction of approximately 98 miles of levee embankment, several drainage structures, and the addition of floodgates. The proposed surveys and activities under this data collection effort aim to, among other things, identify the centerline of the levees and/structures to be used by the contractors to design and build the flood risk reduction structures and features. Figure 1 depicts total footprint of the project.



Figure 1. Overview of the proposed 98-mile alignment footprint for the Morganza to the Gulf of Mexico, LA, Hurricane and Storm Damage Risk Reduction System.

Surveys and Survey Methods. Topographic and hydrographic surveys will be performed, and data will be collected from pre-determined transects within the identified work areas that will be accessed primarily by foot or airboat.

Borings and Cone Penetration Tests (CPTs). Borings and CPTs are needed to collect soil information to be used for the levees design and accompanying structural features. The CPTs would be performed to an approximate depth of 80 feet and 125 feet, below the ground surface, using an electronic piezocone penetrometer with a 10-cm² cross-sectional area. The holes created by pushing the cone tipped rod into the ground would be approximately 1.5-inch diameter with no material removal and would close on their own with no adverse effect on the existing soil.

Soil borings are normally 3-5 inches in diameter and are acquired with a Thin Wall Shelby Tube attached to a rotating shaft with a hollow center. It functions like a drill and the tube is rotated into the ground at 3 feet intervals and then retrieved for collection of what is considered an undisturbed soil sample. Borings to be collected will vary in diameter depending on the identified area. All 5-inch borings would be drilled to an approximate depth of 80-180 feet below the existing ground surface. 3-inches borings may be collected instead in some areas where shallow borings are sufficient or where an access road will be required. The holes created by the borings will be backfilled with a bentonite clay slurry to return the soil to its pre-drilled volume.

Work Areas. Surveys and borings would be performed for the following identified areas:

1. **GIWW East Floodgate.** Located along the navigable Gulf Intercoastal Waterway (GIWW) mile 33.6, approximately 1.5 miles north of the intersection of the GIWW and Bayou Lafourche. The nearest town of Larose is approximately 0.1 miles southeast of the project area. Figure 2 depicts an overview of the survey work zone with survey transects shown in red color. Figure 3 depicts and overview of the boring's locations.

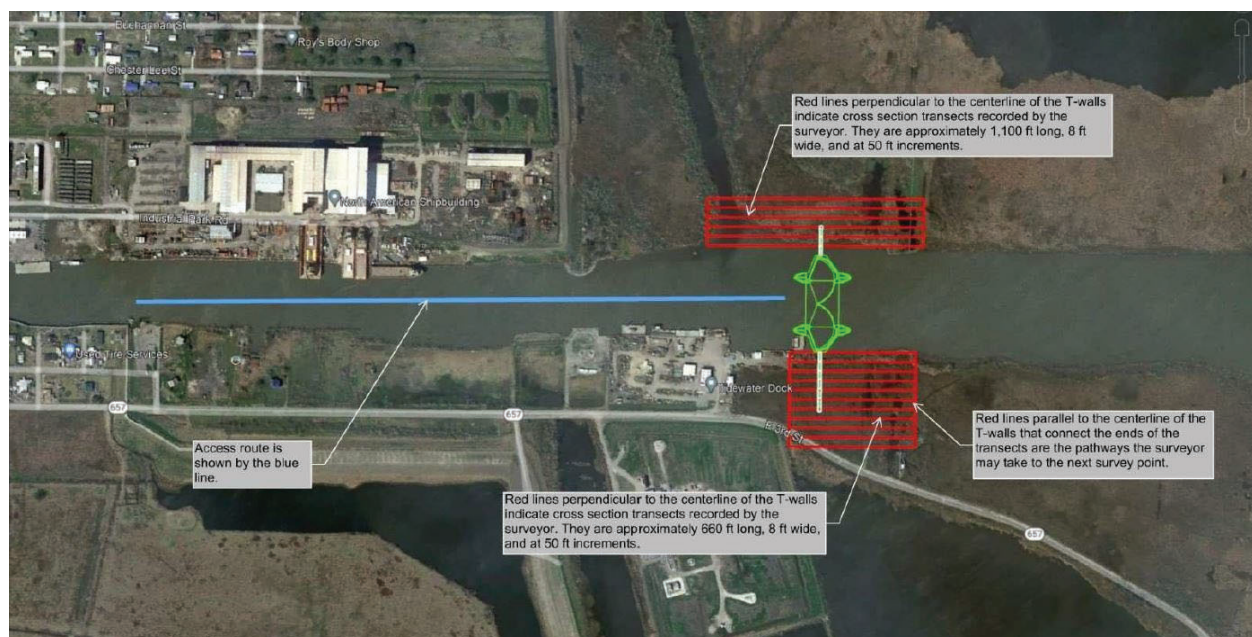


Figure 2. Overview of GIWW East Floodgate survey work zone.

Three 5-inches soil borings and three CPTs would be taken at a depth of 200 feet and at the approximate locations shown on Figure 3.

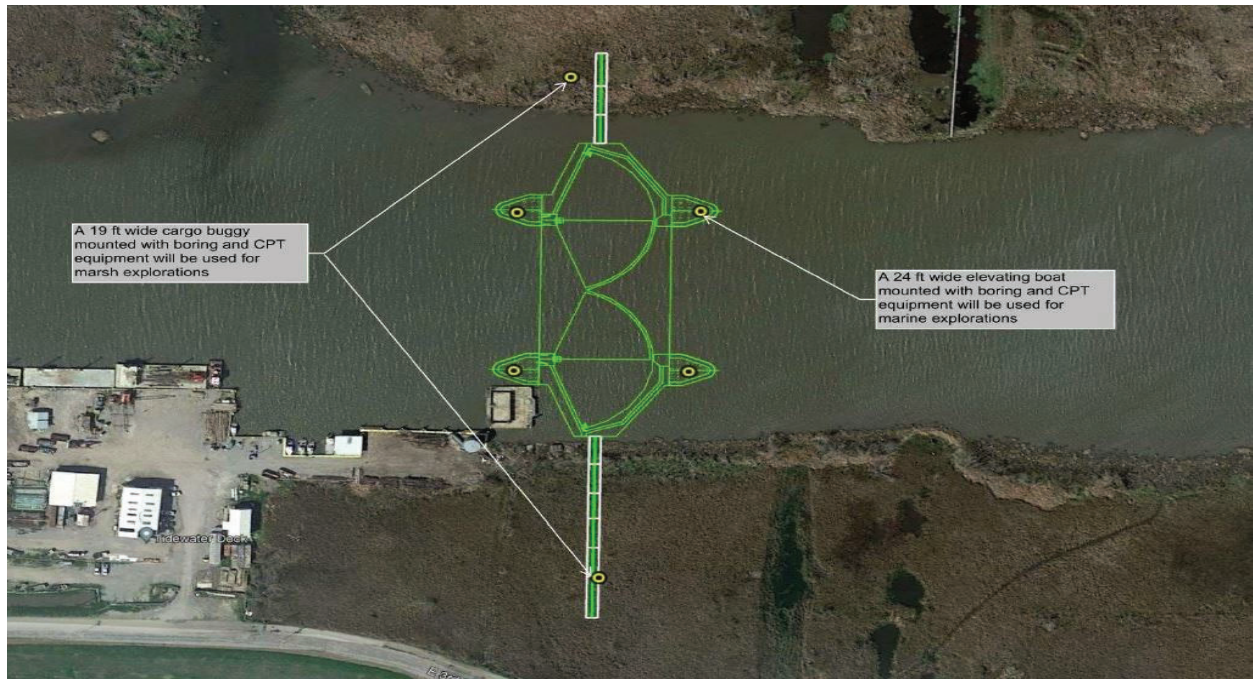


Figure 3. Overview of GIWW East Floodgate borings work zone.

2. **GIWW East Proposed Floodwall and Levee Alignment.** located near the GIWW at around mile 33.6, and south of the Proposed GIWW East Floodgate. Figures 4 and 5 depict an overview of the survey work zone (red transects) and boring's locations.

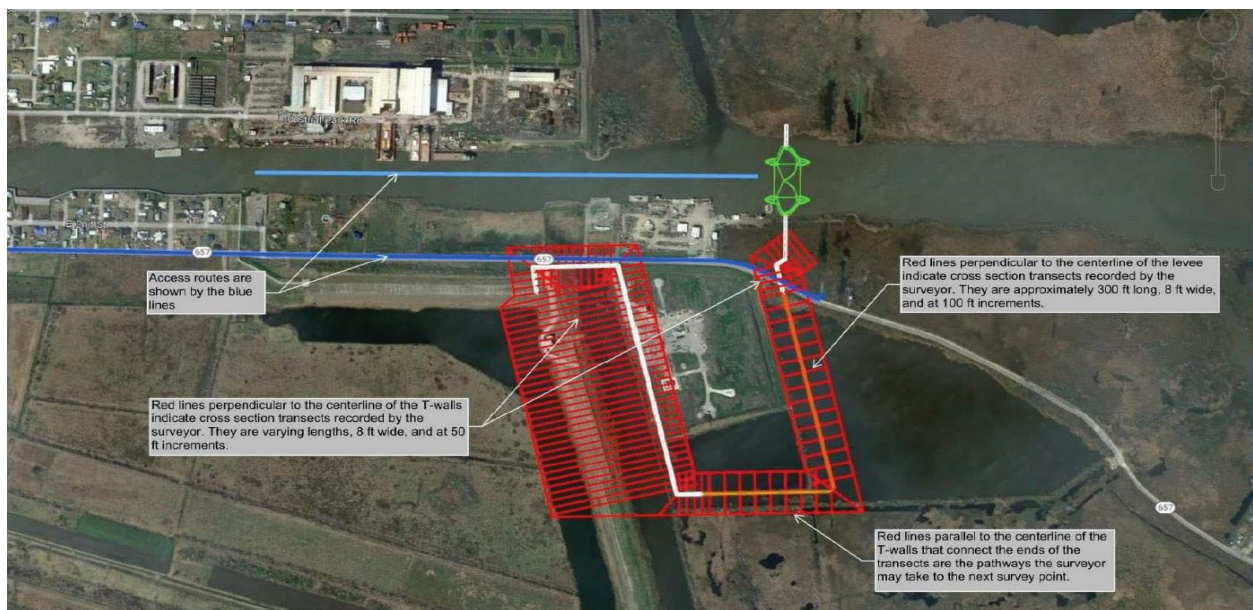


Figure 4. Overview of the survey work zone including the proposed Floodwall and Levee.

As shown in Figure 5, this area includes a segment of the proposed levee alignment (orange line) and Floodwall (white line). A total of seven 5-inches soil borings and six CPTs will be taken at the approximate locations shown. Three of the borings and CPTs will be drilled at a depth of 80 feet and four at a depth of 200 feet.



Figure 5. Overview of GIWW East Floodwall and Levee Alignment boring's locations.

3. **GIWW West Floodgate.** Located within Terrebonne Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins along the GIWW near mile 66.0 and is approximately 5.0 miles southwest of the city of Houma. The proposed work consists of a 225-ft sector gate and levee tie-ins on the north and south sides of the GIWW. The survey work zone will encompass approximately 1.33 miles of the GIWW and transects extend 2000 feet, both north and south, perpendicular to the waterway. One 5-inch soil boring will be drilled at a depth of 200 feet on the GIWW at the location shown in Figure 6.



Figure 6. Overview of the survey work zone and boring location for GIWW West Floodgate.

4. **Reach A Levee – South of GIWW.** Located within Terrebonne Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins and is positioned on a North-South path between the GIWW and Theriot, LA. Survey points would be recorded every 200 ft along the levee centerline (green line) and up to 300 ft in each direction perpendicular to the levee centerline. Thirty-four (34) soil borings and twenty-eight (28) CPTs would be taken at the approximate locations shown in Figure 7. All soil boring sites are located along the proposed levee centerline. All borings and CPTs will be taken at a depth of 80 feet.

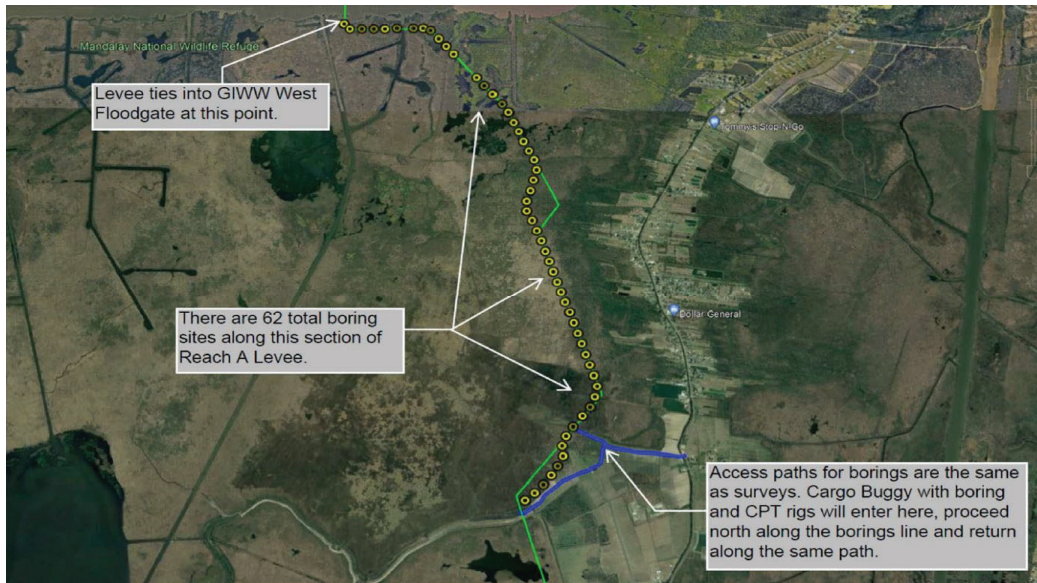


Figure 7. Overview of the borings work zone for Reach A – South of GIWW.

5. **Reach A Levee – North of GIWW.** Also located within Terrebonne Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins and is positioned on a North-South path between the GIWW and Bayou Black, LA. Survey points would be recorded every 200 ft along the levee centerline (green line) and up to 300 ft in each direction perpendicular to the levee centerline. Twelve (12) 5-inches soil borings and eleven (11) CPTs would be taken at a depth of 80 feet and at the locations shown in Figure 8.
6. **Minors Canals Floodgate.** Located within Terrebonne Parish in southeastern Louisiana between the Mississippi and the Atchafalaya River basins and is positioned along the Minors Canal approximately 1.0 mile north of the intersection with the navigable GIWW near mile marker 66.0 and just north of the Mandale National Wildlife Refuge. The town of Houma, LA is approximately 4 miles northeast of the area. Survey transects would extend 180 ft from the alignment and recorded at 50 ft increments. Six 5-in soil borings would be taken at a depth of 150 ft, five 3-in soil borings would be taken at a depth of 6ft,

and two CPTs would be taken at a depth of 150 ft. All borings and CPTs would be taken at the locations shown in Figure 9.

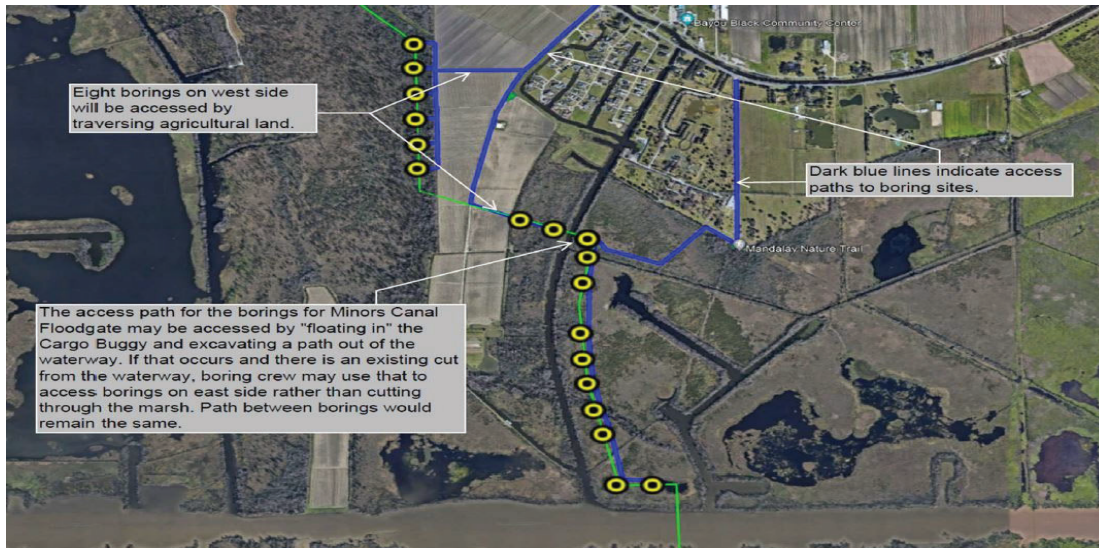
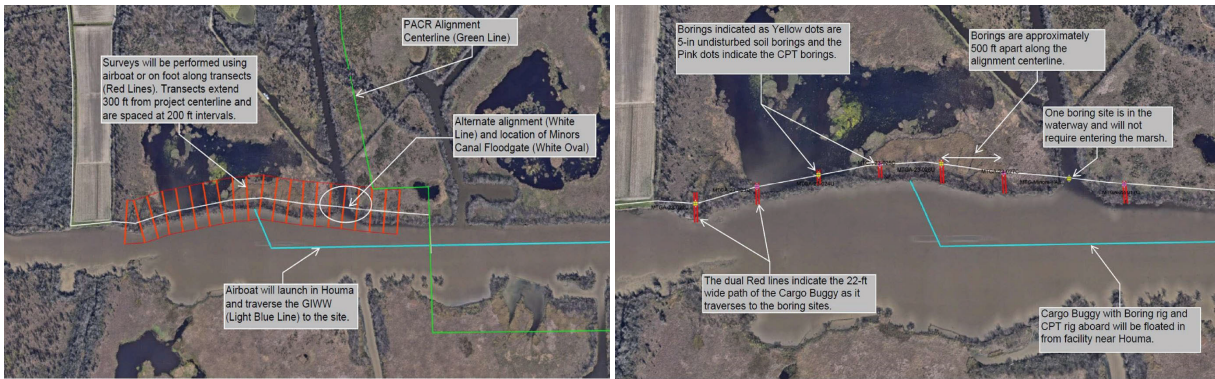


Figure 8. Overview of the borings work zone for Reach A – North of GIWW.

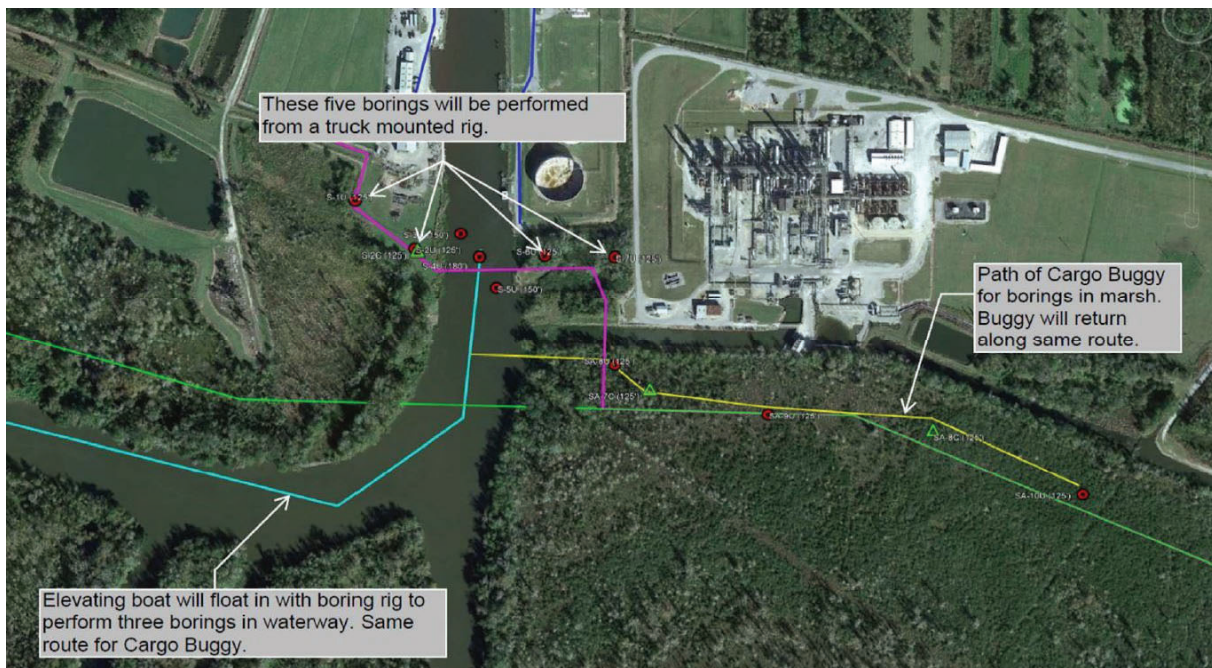


Figure 9. Overview of the borings work zone for Minors Canal Floodgate.

7. **Minors Canal Floodgate (Alternate Alignment).** This alternate alignment is located within the vicinities of proposed Minors Canal Floodgate. Survey transects would extend 300 ft from the alternate alignment and taken at 200 ft increments. Four (4) 5-in diameter soil borings and four (4) Cone Penetration Tests (CPTs) will be taken at a depth of 150 ft and at the location shown in Figure 10.



8. **Shell Canal East Floodgate.** The project area is located within Terrebonne Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins and the structure will be positioned in the canal between Shell Oil Pipeline Company and Empire Midstream approximately five miles southeast of Gibson, LA. Survey transects would extend 300 ft from the levee alignment and taken at 50 ft increments. Six 5-inches borings would be taken at a depth of 125 ft, two 5-inches borings at a depth of 150ft, One 5-inches boring at a depth of 80 ft. Two CPTs would be taken at a depth of 125 ft and one CPT at a depth of 80ft. All borings and CPTs would be taken at the locations shown in Figure 11.



9. **Reach F Levee.** Located within Terrebonne Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins. The project levee is approximately four miles long and is situated on a north-south track along the Houma Navigation Channel beginning at Falgout Canal Road on the north end. The city of Houma, LA is approximately 12 miles

to the north. Thirty 5-inches soil borings and thirty-one CPTs would be taken at a depth of 80 ft and within the identified boring work zone (red polygon shown in Figure 12).



Figure 12. Overview of the Surveys and borings work zone for Reach F Levee.

10. **Reach J2 Levee.** Located within Terrebonne Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins and approximately 2.0 miles south of the city of Montegut, Louisiana. Survey transects would extend 300 ft from the levee alignment and at 200 ft increments. Sixty-five soil borings and sixty-three (63) CPTs would be taken. Two of those would be 5-inches borings taken at a depth of 125 ft, the rest would all be taken at a depth of 80ft and within the identified levee footprint shown in Figure 13. All soil boring work zones are located within the current NFS constructed levee footprint and would not extend outside the toe of the existing levee.



Figure 13. Overview of the Surveys and borings work zone for Reach J2 Levee.

11. **L2L Reach 1 Levee.** Located within Lafourche Parish in southeastern Louisiana between the Mississippi and Atchafalaya River basins and is positioned just North of Louisiana Highway 1 between the cities of Lockport and Larose. Surveys transects would extend from the alignment and would be taken every 100 ft. Soil borings would be taken every 500 ft for a total of Twelve 5-inches soil borings, taken at a depth of 150 ft, and twelve CPTs, taken at a depth of 125 ft. All soil boring work zones are located along the levee footprint. An overview of this work is shown in Figure 14.

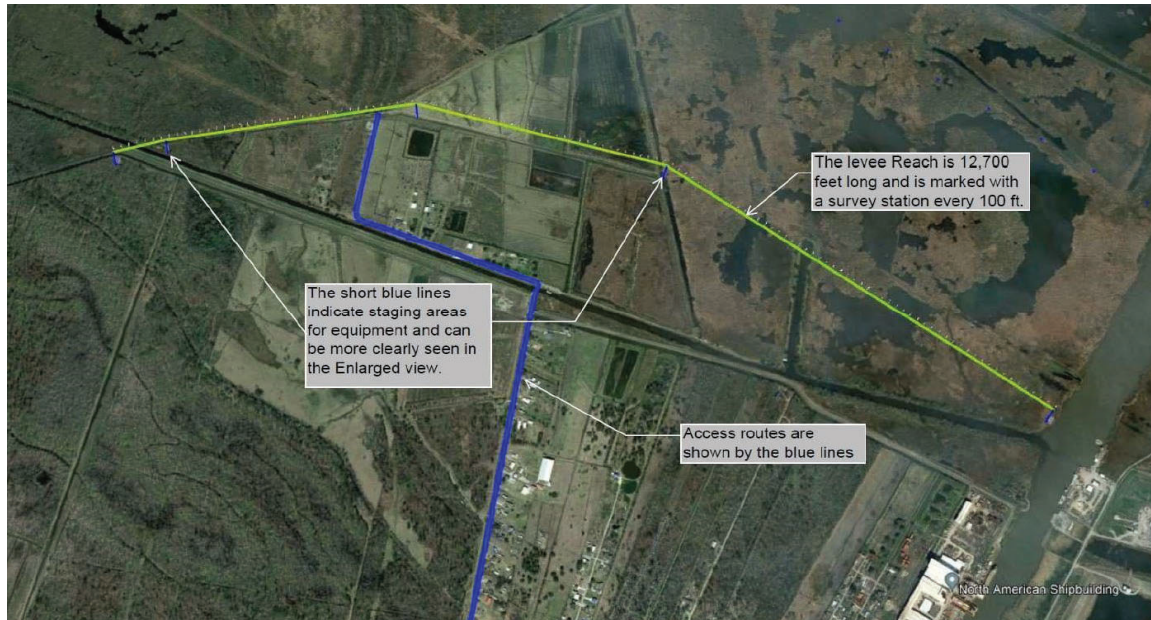


Figure 14. Overview of the Surveys and borings work zone for L2L Reach 1 Levee.

1. Review of Compliance (§230.10 (a)-(d))

A review of this project indicates that:

	Preliminary ¹		Final ²	
	Yes	No	Yes	No
a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and information gathered for environmental assessment alternative)				
b. The activity does not appear to: i. violate applicable state water quality standards or effluent standards prohibited under Section 307 of the Clean Water Act; ii. jeopardize the existence of Federally listed endangered or threatened species or their habitat; and iii. violate requirements of any Federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies)	x ⁴			
c. The activity will not cause or contribute to significant degradation of waters of the United States including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, esthetic, and economic values (if no, see section 2)				
d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5)				

2. Technical Evaluation Factors (Subparts C-F)

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

- i. Substrate impacts
- ii. Suspended particulates/turbidity impacts.
- iii. Water column impacts
- iv. Alteration of current patterns and water circulation
- v. Alteration of normal water fluctuations/hydroperiod
- vi. Alteration of salinity gradients

N/A	Not Significant	Significant ^{3,5}
	x	
	x	
	x	
	x	
	x	
x		

b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)

- i. Effect on threatened/endangered species and their habitat
- ii. Effect on the aquatic food web
- iii. Effect on other wildlife (mammals, birds, reptiles, and amphibians)

c. Special Aquatic Sites (Subpart E)

- i. Sanctuaries and refuges
- ii. Wetlands
- iii. Mud flats
- iv. Vegetated shallows
- v. Coral reefs
- vi. Riffle and pool complexes

d. Human Use Characteristics (Subpart F)

- i. Effects on municipal and private water supplies
- ii. Recreational and commercial fisheries impacts
- iii. Effects on water-related recreation.
- iv. Esthetic impacts
- v. Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves

	x	
	x	
	x	

3. Evaluation of Dredged or Fill Material (Subpart G)

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material.

- | | |
|---|---------------|
| i. Physical characteristics | <u>x</u> |
| ii. Hydrography in relation to known or anticipated sources of contaminants | <u>x</u> |
| iii. Known, significant sources of persistent pesticides from land runoff or percolation | <u>x</u> |
| iv. Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances | <u>x</u> |
| v. Other public records of significant introduction of contaminants from industries, municipalities, or other sources | <u> </u> |
| vi. Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities | <u> </u> |
| vii. Other sources (specify) | <u> </u> |

Appropriate references: See Encl 2

b. An evaluation of the appropriate information in 3.a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or the material meets the testing exclusion criteria.⁶

Yes	No ³
x	

4. Disposal Site Delineation (§230.11(f))

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

i. Depth of water at disposal site	<u>x</u>
ii. Current velocity, direction, and variability at disposal site	<u>x</u>
iii. Degree of turbulence	<u>x</u>
iv. Water column stratification	<u>x</u>
v. Discharge vessel speed and direction	<u>x</u>
vi. Rate of discharge	<u>x</u>
vii. Dredged or fill material characteristics (constituents, amount, and type of material, settling velocities)	<u>x</u>
viii. Number of discharges per unit of time	<u> </u>
ix. Other factors affecting rates and patterns of mixing (specify)	<u> </u>

Appropriate references: See Encl 2

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable

Yes	No ³
x	

5. Actions to Minimize Adverse Effects (Subpart H)

All appropriate and practicable steps have been taken, through application of the recommendations of §230.70-230.77, to ensure minimal adverse effects of the proposed discharge

Yes	No ³

Actions taken:

6. Factual Determination (§230.11)

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:

- a. Physical substrate at the disposal site (review sections 2a, 3, 4, and 5 above)
- b. Water circulation, fluctuation and salinity (review sections 2a, 3, 4, and 5)
- c. Suspended particulates/turbidity (review sections 2a, 3, 4, and 5)
- d. Contaminant availability (review sections 2a, 3, and 4)
- e. Aquatic ecosystem structure and function (review sections 2b and c, 3, and 5)
- f. Disposal site (review sections 2, 4, and 5)
- g. Cumulative impact on the aquatic ecosystem
- h. Secondary impacts on the aquatic ecosystem

Yes	No ³
x	
x	
x	
x	

¹ Negative responses to three or more of the compliance criteria at this stage indicates that the proposed projects may not be evaluated using this "short form procedure". Care should be used in assessing pertinent portions of the technical information of items 2a-d, before completing the final review of compliance.

² Negative responses to one of the compliance criteria at this stage indicates that the proposed project does not comply with the guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form" evaluation process is inappropriate.

³ A negative, significant, or unknown response indicates that the project may not be in compliance with the Section 404(b)(1) Guidelines.

⁴ For 1.b., review is for i. only (i.e., The activity does not appear to violate applicable state water quality standards or effluent standards prohibited under Section 307 of the Clean Water Act)

⁵ Where a check is placed under the significant category, the preparer has attached explanation.

⁶ If the dredged or fill material cannot be excluded from individual testing, the "short form" evaluation process is inappropriate.

7. Evaluation Responsibility

a. Prepared by:

Julio I. Vidal Salcedo
Civil Engineer
U.S. Army Corps of Engineers, New Orleans District
December 22, 2023

b. Reviewed by:

Whitney Hickerson
Hydraulic Engineer
U.S. Army Corps of Engineers, New Orleans District
January 05, 2024

8. Findings

- a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines _____
- b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions _____
- c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reason(s):
 - i. There is a less damaging practicable alternative _____
 - ii. The proposed discharge will result in significant degradation of the aquatic ecosystem _____
 - iii. The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem _____

Date: _____

Chief, Environmental Planning and
Compliance Branch



**US Army Corps of
Engineers, New Orleans
District**

To: File

From: Julio I. Vidal Salcedo, CEMVN

EDH CC:

Date: 22 December 2023

Re: Morganza to the Gulf, LA (MTG) Project, Hurricane and Storm Damage Reduction System, Surveys and Borings

A short form 404 (b)(1) evaluation of the Federal actions for the subject project was completed by CEMVN-EDH for water quality impacts. Existing data was used to make factual determinations for the subject actions. The proposed data collection activities include topographic and hydrographic surveys along pre-determined transects within the identified work areas, Cone penetration tests (CPTs), and soil borings. It is noted that not all the proposed activities needed to be included in this review per Section 404(b) Guidelines. This mostly applies to surveys to be performed along the various work zones. Nonetheless these surveys work zones have been reviewed to properly document that those efforts do not include disposition of dredged or fill material within these areas. Most of the review process focuses on the CPTs and soil borings. The soils borings include a backfill component that will be used to return the soil to its pre-drilled volume. The following summarizes the review process and comments noted:

I. Subpart B – Review of Compliance

- a. 230.10 (a): The proposed survey work zones for GIWW East Floodgate, GIWW East Proposed Floodwall and Levee Alignment, GIWW West Floodgate, Reach A Levee – South of GIWW, Reach A Levee – North of GIWW, Minor Canals Floodgate, Minors Canal Floodgate (Alternate Alignment), Shell Canal East Floodgate, Reach F Levee, Reach J2 Levee, and L2L Reach 1 Levee do not involve a discharge of dredged or fill materials into any of the identified areas. Therefore, no restrictions on discharge would apply.

The proposed soil boring's locations, identified under these work zones, consider optimal practicable position that could reasonably be obtained to fulfill basic design requirements of the proposed construction features for each area. This include minimizing the number of borings required to collect sufficient data.

- b. 230.10 (b) (1): After consideration of disposal site dilution and dispersion, there are no expected violations of State water quality standards from the proposed Federal actions.

The proposed survey and boring work zones for GIWW East Floodgate and GIWW East Propose Floodwall and Levee Alignment are located within the Barataria Basin. The segment of the GIWW concerning these areas is mile 33.6, which is the portion in the basin that extends from Larose to Bayou Villars and Bayou Barataria. This segment of the GIWW has designation number LA020801. During the 2023 reporting period, subsegment LA020801 has fully supported designated uses for Primary Contact Recreation (PCR, swimming), Secondary Contact Recreation (SCR, boating) and Fish and Wildlife Propagation.

The proposed survey and boring work zones for GIWW West Floodgate is located within the Terrebonne basin. The segment of the GIWW concerning this area is mile 66.0, which is the portion in the basin that extends from Bayou Boeuf Lock to Bayou Black in Houma; includes segments of Bayous Boeuf, Black, and Chene. During the 2023 reporting period, subsegment LA120403 has fully supported designated uses for Primary Contact Recreation (PCR, swimming), Secondary Contact Recreation (SCR, boating), Fish and Wildlife Propagation, Drinking Water Supply, and Agriculture.

The proposed survey and boring work zones for Reach A Levee (North and South of the GIWW) are located within the Terrebonne Basin. The basin is bordered by Bayou Lafourche on the east, the Atchafalaya Basin floodway on the west, and the Gulf of Mexico on the south. The Terrebonne Basin is divided into four subbasins: Timbalier, Penchant, Verret, and Fields. The basin includes Terrebonne Parish and parts of Lafourche, Assumption, St. Martin, St. Mary, Iberville, and Ascension parishes. The Verret and Penchant Subbasins receive fresh water from the Atchafalaya River and Bay, while the Fields Subbasin gets fresh water primarily from rainfall. The Timbalier Subbasin gets fresh water from rainfall and from Atchafalaya River inflow to the GIWW via the Houma Navigation Canal (HNC) and Grand Bayou Canal. The segment of the GIWW concerning this area extends from Bayou Black to Houma with designation number LA120202. During the 2023 reporting period, subsegment LA120202 has fully supported designated uses for Primary Contact Recreation (PCR, swimming), Secondary Contact Recreation (SCR, boating), Fish and Wildlife Propagation, and Drinking Water Supply.

The proposed survey and boring work zones for Minors Canal Floodgate, Minors Canal Floodgate (alternate alignment), Shell Canal East floodgate, Reach J2 Levee, and L2L Reach 1 Levee are also located within the Terrebonne Basin. No official designated use for any of these areas during the 2023 reporting period.

The proposed survey and boring work zones for Reach F levee are located within the Terrebonne basin. The areas are located along the Houma

Navigation Channel and the segments of concern begin at Falgout Canal Road on the north end with designation number LA120508. During the 2023 reporting period, subsegment LA120508 has fully supported designated uses for Primary Contact Recreation (PCR, swimming), Secondary Contact Recreation (SCR, boating), Fish and Wildlife Propagation, and Oyster Propagation.

At the time of this review the only potential causes of water quality impairment in these subsegment include mercury (no fish consumption advisory active) and organic chemical contamination (no swimming advisory active). The suspected sources of water quality impairment in these subsegment include atmospheric deposition (toxics), on-site treatment systems (septic systems and similar decentralized systems), sanitary sewer overflows, and unknown sources. Placement of small amounts of bentonite clay slurry at borings locations would not result in the release of contaminants that would violate water quality standards or criteria or exacerbate existing water quality impairments in the identified areas, which are the result of local- and regional-scale nonpoint sources of pollution.

- c. 230.10 (c): The proposed Soil Borings, CPTs and Bentonite backfill do not represent (individually or collectively) a potential degradation of waters of the USA.
- d. 230.10 (d): The proposed Soil Borings, CPTs and Bentonite backfill are not expected to have adverse impacts on aquatic ecosystems.

(See references a, b, d, and e.)

II. Subpart C – Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem

- a. *230.20 - Substrate*: The proposed survey work zones do not involve a direct discharge of dredged or fill materials into the identified segments of the GIWW, Minors Canal, Shell Canal, and other identified areas. The proposed soil borings, CPTs, and placement of bentonite clay (backfill) are not expected to alter the physical, chemical, and biological characteristics of water bottoms in the identified reaches/areas nor affect the permeability of water bottom sediments. The proposed activities are not anticipated to alter channel bottoms in a way that would appreciably adversely alter the chemical, physical, or biological characteristics of water bottoms.
- b. *230.21 – Suspended Particulates/Turbidity*: The proposed survey work zones do not involve a direct discharge of dredged or fill materials into the identified segments of the GIWW, Minors Canal, Shell Canal, and other identified areas. The proposed soil borings, CPTs, and placement of bentonite clay (backfill) are not expected to impact channel and/or wetlands suspended particulate and turbidity levels.
- c. *230.22 – Water Column*: The proposed survey work zones do not involve a direct

discharge of dredged or fill materials into the identified segments of the GIWW, Minors Canal, Shell Canal, and other identified areas. The proposed soil borings, CPTs, and placement of bentonite clay (backfill) are not expected to impact water column, which includes potential changes in chemistry, physical characteristics, changes in clarity, color, odor, or taste of water.

- d. *230.23 –Current Patterns and Water Circulation:* The proposed survey work zones do not involve a direct discharge of dredged or fill materials into the identified segments of the GIWW, Minors Canal, Shell Canal, and other identified areas. The proposed soil borings, CPTs, and placement of bentonite clay (backfill) are not expected to alter current patterns and water circulation.
- e. *230.24 –Normal Water Fluctuations/Hydroperiod:* The proposed soil borings, CPTs, and placement of bentonite clay (backfill) are not expected to have a direct effect on normal water fluctuations and hydroperiod.
- f. *230.25 –Salinity Gradients:* N/A

III. Subpart F – Potential Effects on Human Use Characteristics

- a. *230.50 –Municipal and Private Water Supplies:* The impairments reported in the Louisiana Department of Environmental Quality (LDEQ) 2022 Louisiana Water Quality Integrated Report outline potential risks of adverse effects to humans due to substances in the water. Several of the proposed areas are located within segments with a Drinking Water Supply designated use, however no water intake for drinking water is located near the proposed areas, therefore the proposed actions evaluated herein are not expected to negatively impact water supplies.
- b. *230.51 –Recreational and commercial fisheries:* Several of the proposed areas are located within segments with a Fish and Wildlife Propagation designated use, however, the proposed construction activities are not expected to interfere with reproductive success of aquatic species, nor introduce pollutants that may directly reduce population of important aquatic organisms.
- c. *230.52 –Water-related recreation:* Several of the proposed areas are located within segments with a PCR and SCR designated use. The proposed activities are not expected to permanently change turbidity, suspended particulates, temperature, dissolved oxygen, dissolved materials, pathogenic organisms, aesthetics qualities of sight, taste, odor, or color, of water used for recreation.

(See references d and e)

IV. Subpart G – Evaluation of Dredged or Fill Material

- a. *230.60 (a) – General evaluation of dredged or fill material:* Bentonite clay is formed by the alteration of minute glass particles derived from volcanic ash. The formation of bentonite involves the alteration of volcanic glass to clay minerals; this requires

hydration and a loss of alkalis, bases, and possibly silica, with the preservation of the textures of the original volcanic glass. Bentonite Clay is expected to largely be comprised of crystalline clay minerals belonging to the smectite group, which are hydrous aluminum silicates containing iron and magnesium as well as either sodium or calcium. Two types of bentonites are recognized, and the uses of each depend on specific physical properties. Sodium bentonites absorb large quantities of water, swelling to many times their original volume, and give rise to permanent suspensions of gel like masses. These are commonly used in construction (seal dams; as drilling muds; in Portland cements and concrete, ceramics, emulsions; for clarifying water; and as a water softener to remove calcium from hard water. Calcium bentonites are non-swelling and break down to a finely granular aggregate that is widely used as an absorbent clay sometimes called fuller's earth. Bentonite Clay is also used, in some cases, as a barrier to percolation to prevent or reduce loss of water in wetland areas where such a loss could impact breeding of certain species. In addition, due to its chemical composition bentonite clay can absorb water up to 13 times its original size. The use of this material as fill will create a natural mud-like seal that effectively prevents underground filtrations. Proposed volumes of bentonite fill are not significant; however, literary review suggests there are advantages to the use of bentonite clay as fill when compared to other options. No potential impacts to pH levels are expected for south Louisiana waters. Bentonite clay is expected to be comprised of elements that commonly occur in the earth's crust and are not expected to be carriers of contaminants or negatively affect water quality.

- b. 230.61 (a) – Considerations in Evaluating the Biological Availability of Possible Contaminants in Dredged or Fill Material: See II.a. Additionally, the U.S. Coast Guard National Response Center website containing spill reports (USCG 2023) has been reviewed for the different segments of the GIWW, Minors Canal, Shell Canal, and other identified areas. Several spill incidents have been identified in the vicinities in 2023, however the proposed work is not expected to exacerbate previously reported incidents.

(See references a, c, g, and h)

- c. An evaluation of the appropriate information in IV(a) above indicates that there is reason to believe the proposed fill material is not a carrier of contaminants, or the material meets the testing exclusion criteria: Yes

V. Disposal Site Delineation

- a. 230.11 (f) – *Considerations in Evaluating the Disposal Site:* The proposed features (Levee and scour protection) are adjacent to the GIWW and Minors Canals in Terrebonne Parish, Louisiana. The materials being placed for scour protection and fill are not expected to include contaminants that would adversely affect aquatic life.

- b. An evaluation of the appropriate factors in V(a) above indicates that the disposal site and/or size of mixing zone are acceptable: Yes

VI. Subpart H - Actions to Minimize Adverse Effects

All appropriate and practicable steps have been taken, through application of the recommendations of 230.70 – 230.77 to ensure minimal adverse effects of the proposed discharge: N/A

VII. Factual Determinations

A review of appropriate information as identified in items I - VI above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge:

- a. Physical substrate at the disposal site (review sections II, IV, V, and VI above): Yes
- b. Water circulation, fluctuation and salinity (review sections II, IV, V, and VI): Yes
- c. Suspended particulates (review sections II, IV, V, and VI): Yes
- d. Contaminant availability (review sections II, IV, and V): Yes

VIII. References

- a. Britannica, T. Editors of Encyclopedia (2023, November 22). bentonite. Encyclopedia Britannica. <https://www.britannica.com/science/bentonite>
- b. Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA). 2023. Coastal Louisiana Basins. https://lacoast.gov/new/about/Basin_data/te/Default.aspx
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- d. Louisiana Department of Environmental Quality (LDEQ). 2023. Fishing Consumption and Swimming Advisories. <https://deq.louisiana.gov/page/fishing-consumption-and-swimming-advisories>
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- f. Louisiana Watershed Initiative (LWI). 2023. Watershed Regions.
<https://watershed.la.gov/watershed-regions>
- g. United States Coast Guard (USCG). 2023. National Response Center.
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- h. Weems, J.B. 1903. Chemistry of Clays. Iowa Geological Survey Annual Report No. 14. Pp. 319-346.
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