



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SAVANNAH DISTRICT, CORPS OF ENGINEERS  
100 W. OGLETHORPE AVENUE  
SAVANNAH, GEORGIA 31401-3640

OCTOBER 22 2013

Regulatory Division  
SAS-2006-00650

**JOINT PUBLIC NOTICE**  
**Savannah District/State of Georgia**

The Savannah District has received an application for Modification to a Department of the Army Permit SAS-2006-00650, pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344), as follows:

Application Number: SAS-2006-00650

Applicant: Mr. Jeffrey Green  
Southern LNG Company  
Post Office Box 1367  
Savannah, Georgia 31402

Agent: Mr. David Vance  
Geosyntec Consultants  
1255 Roberts Boulevard  
Suite 200  
Kennesaw, Georgia 30144

Location of Proposed Work: The project site is located on Elba Island, in wetlands adjacent to the Savannah River, near the City of Savannah, Chatham County, Georgia (Latitude 32.0896, Longitude -81.0091).

Site History and Current Proposal: On November 15, 2012, the Savannah District, U.S. Army Corps of Engineers issued a permit to impact 2.23 acres of non-tidal freshwater wetland and 5.67 acres of salt marsh (ditches) for the expansion of an existing dike around Dredge Material Containment Area #2 (DMCA). The original compensatory mitigation plan included the purchase of 10.71 credits for the freshwater wetland impacts and permittee-responsible on-site mitigation for the restoration of 1.79 acres of salt marsh for the ditch impacts. In addition, the 50-foot upland buffer surrounding the mitigation site (approximately 2.43 acres) was to be put under a Declaration of Conservation Covenants and Restrictions. To date, the wetland mitigation credits have been purchased and the salt marsh restoration was constructed and planted.

The applicant is proposing to impact the remaining 0.44 acre of Ditch 2 (salt marsh) and to install a tide gate to replace a corroded metal culvert. To compensate for the additional impacts, the applicant is proposing to add 0.14 acre of salt marsh mitigation to their permittee-responsible mitigation site to offset impacts. The applicant states that in the Fall of 2012, another analysis was done on the permitted design of the DMCA dike expansion. The foundation soils were weaker than expected along a section of the DMCA dike dropping the factor of safety below minimum requirements. In order to meet the minimum factor of safety, the counterweights needed to be completely over Ditch 2 and onto the gas pipeline.

Additional information regarding this proposal including project background, proposed impacts and mitigation, and site plans are attached as references.

## **STATE OF GEORGIA**

Water Quality Certification: By letter dated February 22, 2008, the Georgia Department of Natural Resources, Environmental Protection Division (Georgia EPD) issued Water Quality Certification (WQC) pursuant to Section 401 of the Clean Water Act for the original permit for the expansion of the DMCA. The Georgia EPD will review the proposed modification and verify whether or not the previously issued WQC remains valid. Should Georgia EPD determine that the original WQC issued for the proposed expansion is still valid, no further review or action would be necessary.

Should Georgia EPD determine that the original WQC is not valid, then they intend to certify the modified proposal at the end of 30 days in accordance with the provisions of Section 401 of the Clean Water Act, which is required by an applicant for a Federal Permit to conduct an activity in, on, or adjacent to the waters of the State of Georgia. Copies of the permit modification request and supporting documents relative to a specific application will be available for review and copying at the office of the Georgia Department of Natural Resources, Environmental Protection Division, Water Protection Branch, 4220 International Parkway, Suite 101, Atlanta, Georgia 30354, during regular office hours. A copier machine is available for public use at a charge of 25 cents per page. Any person who desires to comment, object, or request a public hearing relative to State Water Quality Certification must do so within 15 days of the State's receipt of application in writing and state the reasons or basis of objections or request for a hearing. The permit modification request can be reviewed in the Regulatory Division Savannah District, U.S. Army Corps of Engineers, 100 West Oglethorpe Avenue, Savannah, Georgia 31401-3640.

State-owned Property and Resources: The applicant may also require assent from the State of Georgia, which may be in the form of a license, easement, lease, permit or other appropriate instrument.

Marshland Protection: This notice also serves as notification of a request to alter coastal marshlands (under the provision of the Coastal Marshlands Protection Act,

Georgia Laws, 1970, p. 939 and as amended), if required. Comments concerning this action should be submitted to the Ecological Services Section, Coastal Resources Division, Georgia Department of Natural Resources, 1 Conservation Way, Brunswick, Georgia 31523-8600 (Telephone 912-264-7218).

Georgia Coastal Management Program: By letter dated April 20, 2011, Georgia Department of Natural Resources, Coastal Resources Division (Georgia CRD) issued a Coastal Marshland Protection Act Permit (CMPA) #643 to fill the tidally influenced ditches and create tidal ditches. The Georgia CRD will review the proposed modification and verify whether or not the previously issued CMPA permit remains valid. Should Georgia CRD determine that the original CMPA issued for the proposed expansion is still valid, no further review or action would be necessary.

Should Georgia CRD determine that the original CMPA is not valid, then they would intend to certify the modified proposal at the end of 30 days in accordance with the applicable provisions of the State of Georgia Coastal Management Program (15 CFR 930). Anyone wishing to comment on Coastal Management Program certification of this project should submit comments in writing within 15 days of the date of this notice to the Federal Consistency Coordinator, Ecological Services Section, Coastal Resources Division, Georgia Department of Natural Resources, One Conservation Way, Brunswick, Georgia 31523-8600 (Telephone 912-264-7218).

### **U.S. ARMY CORPS OF ENGINEERS**

The Savannah District must consider the purpose and the impacts of the applicant's proposed work, prior to a decision on issuance of a Department of the Army Permit.

Cultural Resources Assessment: On July 9, 2012, the State Historic Preservation Office (SHPO) issued a concurrence e-mail indicating a finding of "No Historic Properties Affected" by the proposed project. This project area has also been previously studied and no archeological resources were discovered. Current operations at Elba Island have had no effect on historical, archeological and/or architectural concerns, nor is it expected to. Therefore, the Corps has determined that the proposed project would have no effect on historical, archaeological, and architectural factors.

Essential Fish Habitat (EFH): This notice initiates the EFH consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. The applicant's proposal would result in the destruction or alteration of an additional 0.44 acre of EFH utilized by various life stages of species comprising the red drum, shrimp, bluefish or snapper grouper management complexes. In an email dated July 2, 2012, the National Marine Fisheries (NMFS) found the Hydrogeomorphic Method calculations regarding the salt marsh ditch impacts and proposed mitigation to be sufficient for the original scope of the project. Since the applicant is proposing to utilize this same method for the same aquatic resource within the same footprint as the original proposal to compensate for the additional 0.44 acre of impact, our initial determination is that the proposed

action would not have an individual or cumulatively substantial adverse impact on EFH or federally managed fisheries in the Atlantic Ocean. Our final determination relative to project impacts to EFH and the need for mitigation measures are subject to review by and coordination with the NMFS and the South Atlantic Fisheries Management Council.

Endangered Species: The applicant and the Corps reviewed the following information to determine the proposed project's potential impact to protected species in Chatham County, Georgia: the USFWS County Listing of Threatened and Endangered Species; the Georgia Department of Natural Resources County Listing of Locations of Special Concern Animals, Plants, and Natural Communities; and the Georgia Department of Natural Resources Listing of Locations of Special Concern Animals, Plants and Natural Communities by Quarter Quad. A pedestrian survey was conducted by Geosyntec to identify protected individuals and/or potential habitat for protected individuals within the project area. None of the listed species were observed during the pedestrian survey of the area, and no suitable habitat was identified for any of the species.

The original project included a determination by the Corps of "no effect on Federally listed threatened or endangered species with the exception of the wood stork," pursuant to Section 7 of the Endangered Species Act. There are no known wood stork rookeries within the project boundaries, but wood stork foraging may occur within the project area. Based on the proximity of available habitat for wood stork foraging, the Corps made a determination of "may effect, not likely to adversely affect". In a letter dated October 31, 2012, the USFWS concurred with this determination. We believe this modification does not change the original determination. Pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), we request concurrence from the U.S. Department of the Interior, Fish and Wildlife Service.

Public Interest Review: The decision whether to issue a permit modification will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and in general, the needs and welfare of the people.

Consideration of Public Comments: The U.S. Army Corps of Engineers is soliciting comments from the public; federal, state, and local agencies and officials; Native American Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the

U.S. Army Corps of Engineers to determine whether to issue, modify, condition or deny the permit modification. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Application of Section 404(b)(1) Guidelines: The proposed activity involves the discharge of dredged or fill material into the waters of the United States. The Savannah District's evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency, under the authority of Section 404(b) of the Clean Water Act.

Public Hearing: Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application for a Department of the Army Permit modification. Requests for public hearings shall state, with particularity, the reasons for requesting a public hearing. The decision whether to hold a public hearing is at the discretion of the District Engineer, or his designated appointee, based on the need for additional substantial information necessary in evaluating the proposed project.

Comment Period: Anyone wishing to comment on this application for a Department of the Army Permit should submit comments in writing to the Commander, U.S. Army Corps of Engineers, Savannah District, Attention: Ms. Sherelle Reinhardt, 100 West Oglethorpe Avenue, Savannah, Georgia 31401-3640, no later than 15 days from the date of this notice. Please refer to the applicant's name and the application number in your comments.

Enclosures:

1. Permit Modification Request (5 pages)
2. Overall Concept ("Existing Site Conditions", Page 2 of 10, 1 page)
2. Project Drawings (Figures 8A-8C, 9A-9B, 20A-20B, 7 pages)
4. Permittee-Responsible Compensatory Mitigation Plan, revised September 2013 (22 pages)

20 September 2013

Ms. Sherelle Reinhardt  
Regulatory Specialist  
Coastal Branch, Permits Section  
U.S. Army Corps of Engineers (USACE) – Savannah District  
100 West Oglethorpe Avenue  
Savannah, Georgia 31401

**Subject: Permit Modification Request  
DMCA #2 Expansion Project  
Southern LNG Company, L.L.C.  
Elba Island, Georgia  
USACE Regulatory Nos. SAS-2006-00650**

Dear Ms. Reinhardt:

On behalf of Southern LNG Company, L.L.C. (SLNG), a Kinder Morgan company, Geosyntec Consultants, Inc. (Geosyntec) is submitting the below proposed minor permit modifications to the Department of Army permit (SAS-2006-00650) issued on November 15, 2012 for the horizontal expansion and raising of SLNG's Dredge Material Containment Area (DMCA) 2's perimeter dikes and counterweights. The permit authorized the fill of 5.67 acres of salt marsh CRD/USACE Ditch 2 (0.44 acre not impacted) and 2.23 acres of freshwater non-tidal wetland. Mitigation for the freshwater wetland impacts included the purchase of 10.71 freshwater non-tidal wetland mitigation credits from Black Creek Mitigation Bank (purchase completed) and permittee-responsible on-site mitigation (restoration of 1.79 acre of salt marsh) for the salt marsh Ditch 2 impacts. The salt marsh restoration was recently constructed and planted and will be monitored per the approved mitigation plan.

The permit states that any deviations (i.e., modifications) from the permitted plan must be submitted to and approved by USACE – Savannah District prior to implementing. In total, **two minor modifications** are being requested that are consistent with the project purpose and need and do not invalidate or materially alter the conclusions of the Environmental Assessment (EA), the 404(b)(1) guidelines evaluation, Public Interest Review, and Statement of Findings previously completed for the project. The minor modifications are as follows:

**A. Proposed DMCA 2 Additional Counterweight Extension Impacts to 0.44 Acre of Ditch 2 and Proposed Tide Gate Installation**

## **B. Adding 0.14 Acre of Additional Salt Marsh Mitigation Area for Proposed Additional Impacts to Ditch 2**

To assist in review of this application for a permit modification for the items requested above, revised figures and detailed drawings have been provided with revised text preceded by “**Modification A**” or “**Modification B**” in **bold** to illustrate items modified from the original submittal.

In addition, SLNG is providing documentation of capping DMCA underdrains to address U.S. Fish and Wildlife Service (USFWS) concerns (letter dated October 31, 2012) regarding release of potential contaminants of concern in underdrain water.

### **PERMIT MODIFICATION REQUEST DETAILS**

#### **Modification A - Proposed DMCA 2 Additional Counterweight Extension Impacts to 0.44 Acre of Ditch 2 and Proposed Tide Gate Installation**

*Summary: SLNG is hereby notifying the USACE that due to the analysis of new (recent) geotechnical data (evaluation of strength gain of underlying soils), the original counterweight design along the southwest face of the DMCA 2 dike adjacent to Ditch 2 (e.g., Section C) will require further expansion and would permanently fill an additional 0.44 acres of CRD/USACE Ditch 2, thus increasing the total of filled salt marsh ditch to 6.11 acres (e.g., filling Ditch 2 completely) and would require an additional 0.14 acre of salt marsh mitigation per use of the previously established compensation ratio for the existing permit. In addition to the counterweight extension, SLNG is proposing to replace a corroded 24-inch diameter metal culvert (discharge point from existing Ditch 2 to a tidal creek to the South Channel) with a new 48-inch diameter HDPE pipe affixed with a tide gate. The tide gate will be installed within the same footprint of the existing culvert and inlet and outlet scour protection will be added per standard engineering and regulatory requirements.*

In the Fall of 2012, analysis and interpretation of additional cone penetration test (CPT) soundings taken in 2011 and earlier in 2012 were performed to assess whether the factor of safety (FOS) for the permitted (SAS-2006-00650) design DMCA 2 dike expansion design (e.g., On-site Alternative 1C, Applicant’s Preferred Alternative) remained at or above the minimum slope stability FOS of 1.2. For background, the permitted design was the product of earlier data (2000, 2005, 2008, and 2009) and assumptions (e.g., based on interpretation of data). Interpretation of the results from the additional 2011 and 2012 CPT shear strength profiles

suggested that the strength gains previously anticipated for the underlying foundation soils were weaker than expected along Section C of the DMCA dike (southwest face of dike adjacent to Ditch 2) resulting in a drop in the FOS below 1.0 (**Figures 8A and 8B**). A FOS below 1.0 indicates probable failure of the dike unless counterweights are extended to increase the FOS to a minimum FOS of 1.2.

Therefore, the implications of this data means the permitted DMCA 2 dike design (Alternative 1C) failed to meet the required FOS of 1.2 for raising the dikes to the next height. In order to meet the minimum FOS of 1.2 for the dike design, the counterweights at Section C needed to be extended completely over Ditch 2 and onto the gas pipeline, as illustrated in **Sheets 3 and 4** of the Revised "**Salt Marsh Restoration Project**" drawings following this letter.

The proposed expansion of the dike counterweights across the remainder of Ditch 2 and the gas pipeline will subsequently cause an additional 0.44 acre of salt marsh ditch to be filled (**Figures 8A and 8B; Drawing Sheets 3 and 4**). The additional acreage increase equivocates to the filling and loss of the entire CRD/USACE Ditch 2 (6.11 acres total) and the need for compensatory mitigation for 0.14 acre of salt marsh. The Final Permittee-Responsible Compensatory Mitigation Plan (approved by SAS-2006-00650) approved the creation of a 1.79 acre salt marsh mitigation area contiguous with a reference marsh on Elba Island (**Figures 9A and 9B**) for fill impacts to 5.67 acres of salt marsh ditch.

Therefore, to meet the required FOS for the DMCA 2 Expansion, Geosyntec is proposing that 0.44 acre of additional impacts to CRD/USACE Ditch 2 (salt marsh ditch) be compensated using the same credit calculation methodology approved under SAS-2006-00650 since the resource type is identical to the 5.67 acres permitted for filling. To mitigate for the additional impacts, 0.14 acre of additional mitigation area would be added to the existing 1.79 acre salt marsh mitigation area thus increasing the size from 1.79 acres to 1.93 acres.

**Modification B - Adding Additional Acreage to Salt Marsh Mitigation Area for Proposed Additional Impacts to 0.44 Acre of Ditch 2 and a Proposed Minor Adjustment in the 50-foot Upland Buffer**

*Summary: SLNG is hereby requesting the USACE allow for compensation of 0.44 acres of additional impacts to the salt marsh section of Ditch 2 be mitigated through increasing the size of the approved 1.79-acre salt marsh mitigation area that is contiguous with a reference marsh*

*on Elba Island. The acreage would be increased from 1.79-acre to 1.93 acres, a difference of 0.14 acre (determined based on approved credit calculation methodology).*

The National Marine Fisheries Service (NMFS) considers the salt marsh portion of Ditch 2 (6.11 acre) essential fish habitat (EFH). Compensatory mitigation for the prior 5.67 acres of approved impacts to anthropogenic Ditch 2 was assessed based on application of the Hydrogeomorphic Method (HGM) developed for the Tidal Fringe Wetlands along the Mississippi and Alabama Gulf Coast (See **Appendix A**) modified for use in an estuarine diurnal tidal system. The HGM assessed the biological, chemical and physical functions of the anthropogenic ditch in comparison to an abutting reference tidal salt marsh. SLNG proposes the use of the same methodology to calculate the appropriate mitigation since the salt marsh mitigation area was recently completed and no other sources of salt marsh mitigation are available.

Therefore, the variance in function (demonstrated by the HGM model) between 6.11 acres (5.67 acres of original impacts and 0.44 acre of additional impacts) of Ditch 2 and the Reference Marsh illustrated that 1.93 acres (1.79 acres plus 0.14 acre) of reference marsh was equivalent in function to 6.11 acres of low quality anthropogenic tidally influenced Ditch 2 (See **Appendix A**, Section 2.5 for detailed discussion of HGM model and compensatory mitigation calculations). Therefore, using the results of the HGM model compensatory mitigation replacement of lost biological, chemical and physical functions could be adequately replaced by restoring 1.93 acres of salt marsh contiguous with the reference marsh (i.e., the primary requirement by NMFS for their acceptance of the mitigation) (**Figures 9A and 9B; Drawing Sheets 5, 6, and 8**).

**Appendix A** contains the *revised* “Final Permittee-Responsible Compensatory Mitigation Plan” which incorporates the above modifications with the exception of Modification A which is separate from the mitigation. All changes to the mitigation plan are highlighted in yellow and bolded.

## **DMCA UNDERSDRAIN CAPPING DOCUMENTATION**

*Summary: SLNG is hereby notifying the USACE that it has permanently capped and sealed both DMCA underdrain pipes. After capping and sealing these pipes they were subsequently buried by the permitted counterweight extension.*

Originally, the DMCA 2 expansion had planned to continue utilizing the existing underdrains (one for DMCA 1 and one for DMCA 2) which discharge side by side into Ditch 1 (**Figure 8A**), approximately 700 feet east of the Savannah River. These underdrains were designed within the

perimeter dikes and interior counterweights of the DMCA's and their purpose is to promote consolidation and release of excess pore pressure (drainage of water) from the dikes and counterweights. However, over time, due to natural geochemical processes in the underdrain field (e.g., precipitation of mineral deposits in the pipe network), the effectiveness of both underdrains degraded. Additionally, active settlement management techniques (i.e., surface ditching and draining activities) of the DMCA's is achieving the desired settlement needed between dredge events to buy time for DMCA 2's dikes to be raised.

Also, as mentioned above, the USFWS expressed concerns (letter dated October 31, 2012) regarding release of potential contaminants of concern in underdrain water. Therefore, SLNG in consultation with Geosyntec has decided to permanently cap and seal the two underdrain pipes due to their decreased performance and to alleviate USFWS concerns. Please see **Appendix B** for documentation and a photograph of the completed action.

## CONCLUSION

We believe the two minor modifications continue to support the purpose and need originally submitted and do not invalidate or materially alter the conclusions of the Environmental Assessment (EA), the 404(b)(1) guidelines evaluation, Public Interest Review, and Statement of Findings previously completed for the project. Additionally, we believe Modifications A and B should be considered minor in nature given the respectively small changes in acreage and similarity of resources being impacted and proposed mitigation.

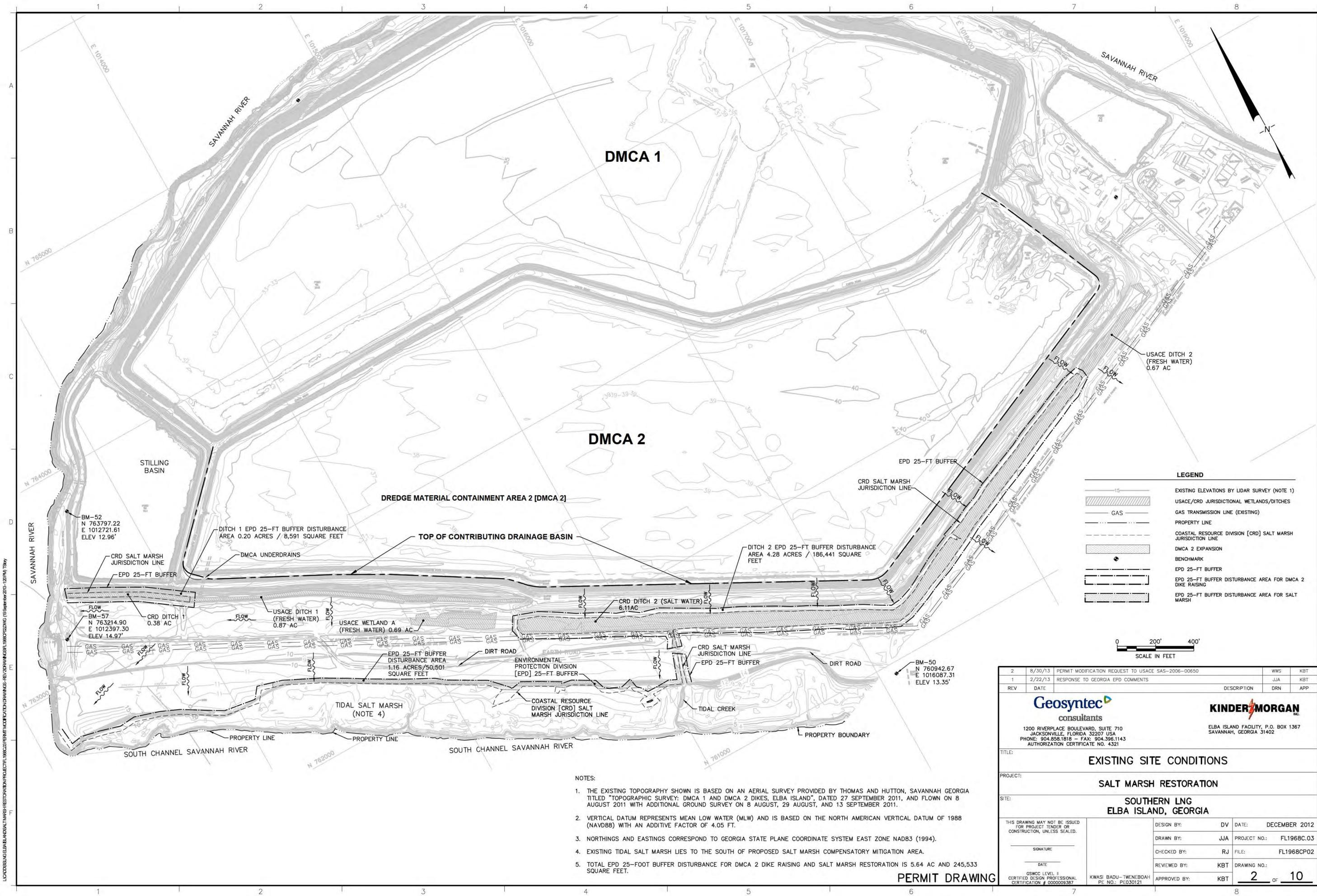
Please do not hesitate to contact either of us if you have any questions or concerns regarding this project at (678) 202-9612 or [dvance@geosyntec.com](mailto:dvance@geosyntec.com). Thank you for your assistance with this important project.

Sincerely,  
Geosyntec Consultants, Inc.

David J. Vance  
Project Scientist

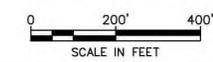


Kwasi Badu-Tweneboah, Ph.D., P.E.  
Associate



**LEGEND**

|  |  |
|--|--|
|  | EXISTING ELEVATIONS BY LIDAR SURVEY (NOTE 1)                 |
|  | USACE/CRD JURISDICTIONAL WETLANDS/DITCHES                    |
|  | GAS TRANSMISSION LINE (EXISTING)                             |
|  | PROPERTY LINE  |
|  | COASTAL RESOURCE DIVISION [CRD] SALT MARSH JURISDICTION LINE |
|  | DMCA 2 EXPANSION   |
|  | BENCHMARK  |
|  | EPD 25-FT BUFFER   |
|  | EPD 25-FT BUFFER DISTURBANCE AREA FOR DMCA 2 DIKE RAISING    |
|  | EPD 25-FT BUFFER DISTURBANCE AREA FOR SALT MARSH             |



|     |         |   |     |     |
|-----|---------|---|-----|-----|
| 2   | 8/30/13 | PERMIT MODIFICATION REQUEST TO USACE SAS-2006-00650 | WWS | KBT |
| 1   | 2/22/13 | RESPONSE TO GEORGIA EPD COMMENTS                    | JJA | KBT |
| REV | DATE    | DESCRIPTION   | DRN | APP |

**Geosyntec**  
consultants  
1200 RIVERPLACE BOULEVARD, SUITE 710  
JACKSONVILLE, FLORIDA 32207 USA  
PHONE: 904.858.1818 - FAX: 904.396.1143  
AUTHORIZATION CERTIFICATE NO. 4321

**KINDER MORGAN**  
ELBA ISLAND FACILITY, P.O. BOX 1367  
SAVANNAH, GEORGIA 31402

TITLE: **EXISTING SITE CONDITIONS**  
PROJECT: **SALT MARSH RESTORATION**  
SITE: **SOUTHERN LNG ELBA ISLAND, GEORGIA**

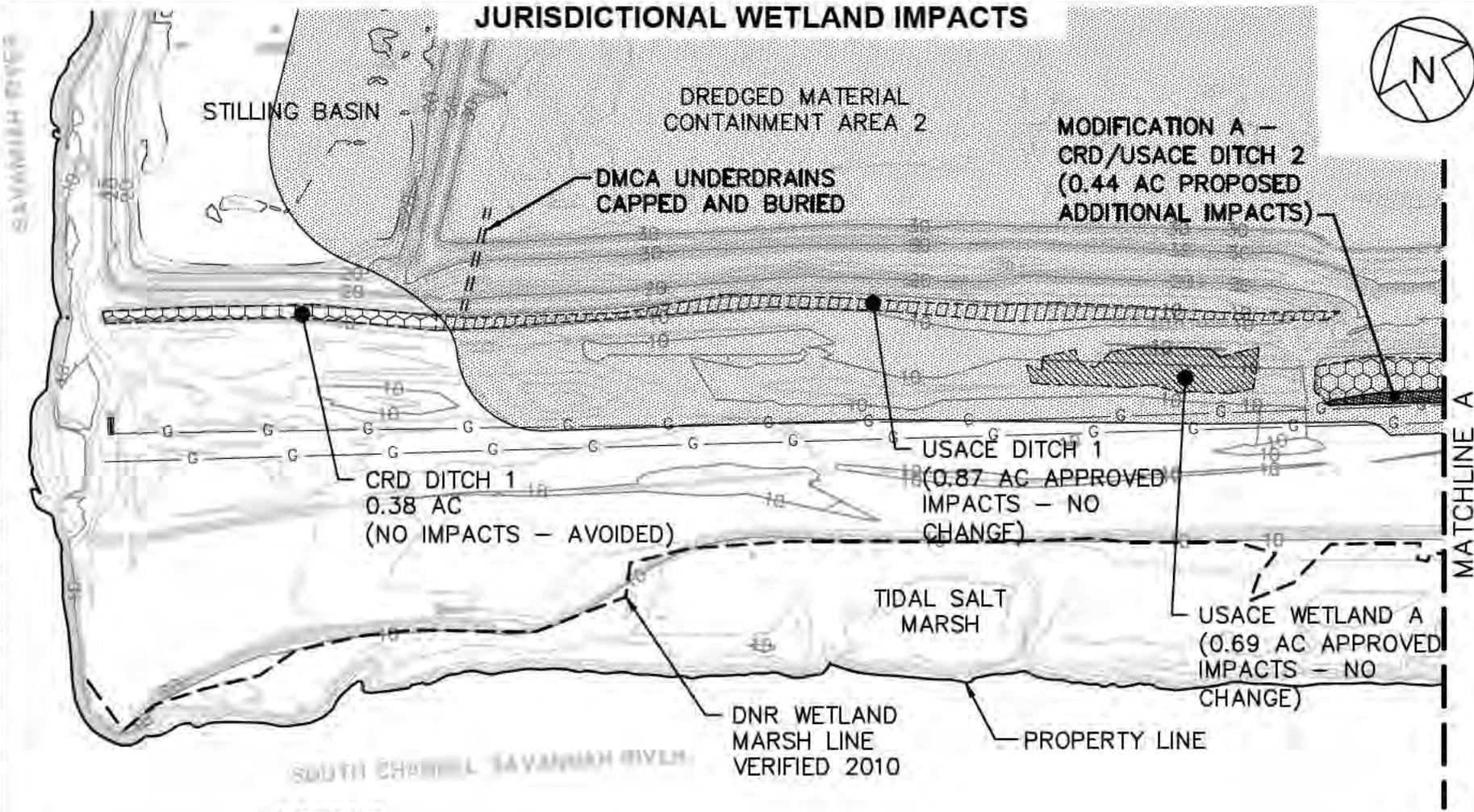
|   |                  |                         |
|---|------------------|-------------------------|
| THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED. | DESIGN BY: DV    | DATE: DECEMBER 2012     |
| SIGNATURE   | DRAWN BY: JJA    | PROJECT NO.: FL1968C.03 |
| DATE  | CHECKED BY: RJ   | FILE: FL1968CP02        |
| CSWCC LEVEL II<br>CERTIFIED DESIGN PROFESSIONAL<br>CERTIFICATION # 000009387      | REVIEWED BY: KBT | DRAWING NO.:            |
| KWASI BADU-TWENEBOAH<br>PE. NO.: PEG30121   | APPROVED BY: KBT | <b>2</b> OF <b>10</b>   |

- NOTES:
1. THE EXISTING TOPOGRAPHY SHOWN IS BASED ON AN AERIAL SURVEY PROVIDED BY THOMAS AND HUTTON, SAVANNAH GEORGIA TITLED "TOPOGRAPHIC SURVEY: DMCA 1 AND DMCA 2 DIKES, ELBA ISLAND", DATED 27 SEPTEMBER 2011, AND FLOWN ON 8 AUGUST 2011 WITH ADDITIONAL GROUND SURVEY ON 8 AUGUST, 29 AUGUST, AND 13 SEPTEMBER 2011.
  2. VERTICAL DATUM REPRESENTS MEAN LOW WATER (MLW) AND IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) WITH AN ADDITIVE FACTOR OF 4.05 FT.
  3. NORTHINGS AND EASTINGS CORRESPOND TO GEORGIA STATE PLANE COORDINATE SYSTEM EAST ZONE NAD83 (1994).
  4. EXISTING TIDAL SALT MARSH LIES TO THE SOUTH OF PROPOSED SALT MARSH COMPENSATORY MITIGATION AREA.
  5. TOTAL EPD 25-FOOT BUFFER DISTURBANCE FOR DMCA 2 DIKE RAISING AND SALT MARSH RESTORATION IS 5.64 AC AND 245,533 SQUARE FEET.

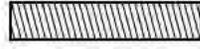
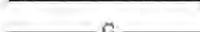
PERMIT DRAWING

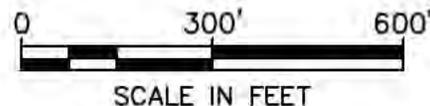
LOADING ELBA ISLAND SALT MARSH RESTORATION PROJECT: 1968C PERMIT MODIFICATION DRAWING REV: 02/22/13 10:58 AM 13/13

# JURISDICTIONAL WETLAND IMPACTS



## LEGEND

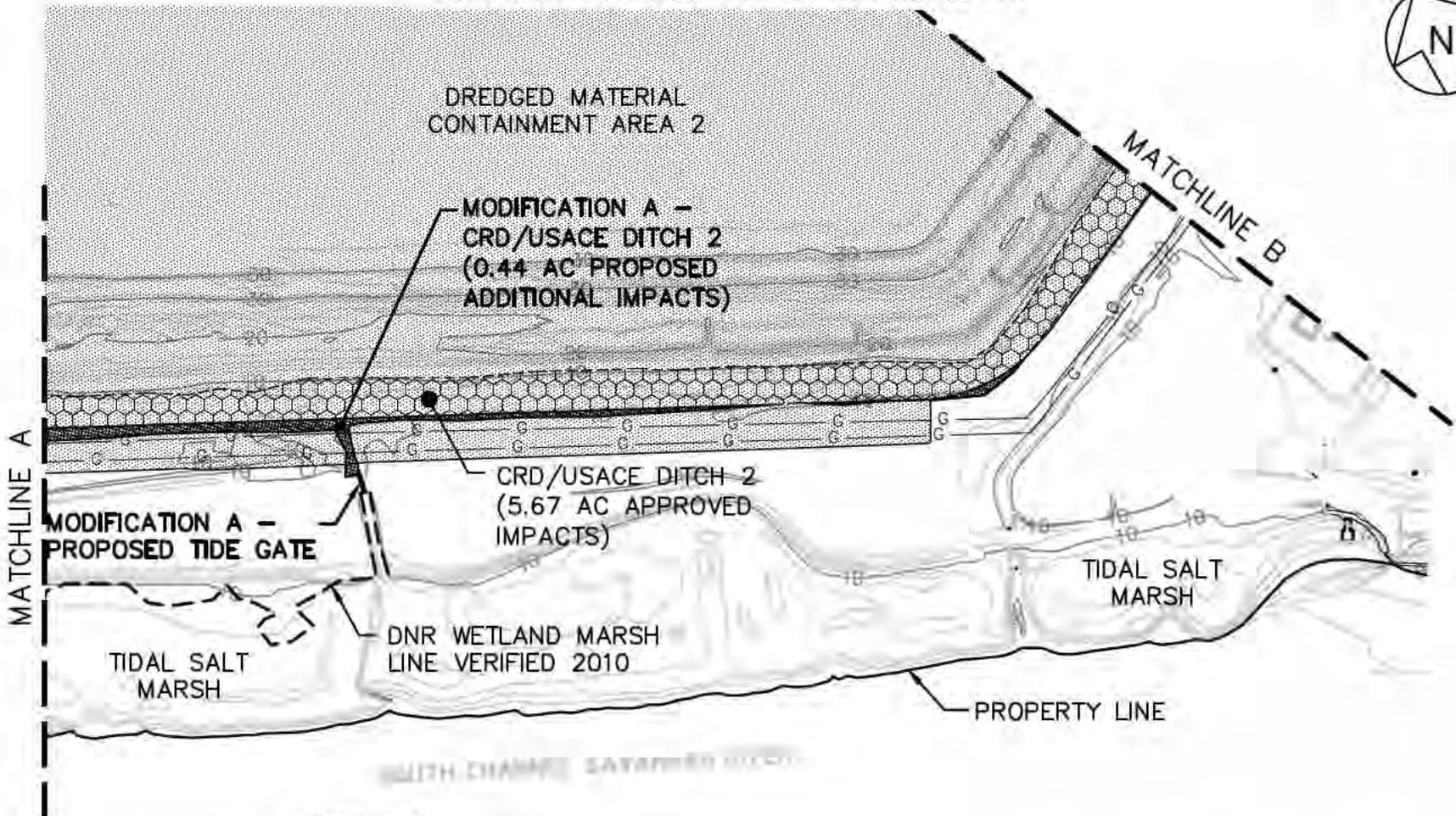
-  EXISTING ELEVATION  
9 APRIL 2008 (2-FT CONTOURS)
-  USACE DITCH
-  USACE WETLAND
-  CRD/USACE DITCH
-  CRD/USACE DITCH 2 (PROPOSED  
ADDITIONAL IMPACTS)
-  PROPOSED DMCA 2 FOOTPRINT
-  GAS TRANSMISSION LINE



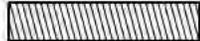
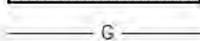
|                                 |           |                                   |
|---------------------------------|-----------|-----------------------------------|
| <b>Geosyntec</b><br>consultants |           | KENNESAW, GA                      |
| DATE:                           | Aug-13    | SCALE: 1" = 300'                  |
| PROJECT NO.                     | FL1968.03 | FILE NO. FL1968B.03.04.FIG08_REV1 |
| DOCUMENT NO.                    |           | FIGURE NO. 8A                     |

L:\CADD\SLING ELBA ISLAND\SALT MARSH RESTORATION PROJECT\FL1968C.03 PERMIT MODIFICATION DRAWINGS - REV  
 2\FIGURES\FL1968E.03.04\FIG08\_REV1

# JURISDICTIONAL WETLAND IMPACTS



## LEGEND

-  EXISTING ELEVATION  
9 APRIL 2008 (2-FT CONTOURS)
-  USACE DITCH
-  USACE WETLAND
-  CRD/USACE DITCH
-  CRD/USACE DITCH 2 (PROPOSED  
ADDITIONAL IMPACTS)
-  PROPOSED DMCA 2 FOOTPRINT
-  GAS TRANSMISSION LINE

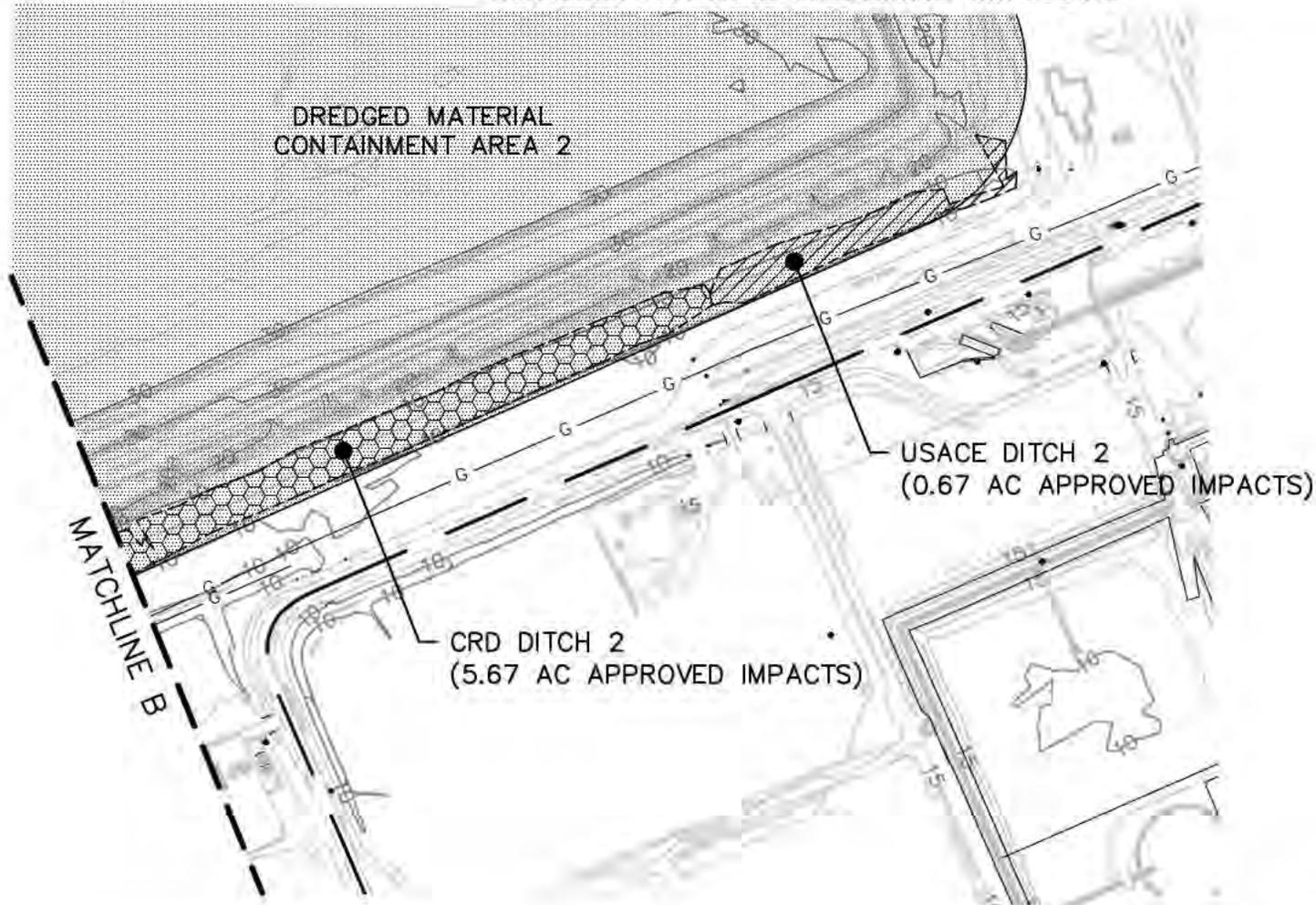
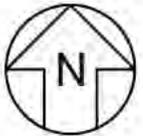


**Geosyntec**  
consultants

KENNESAW, GA

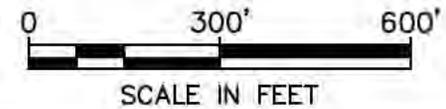
|              |            |            |                          |
|--------------|------------|------------|--------------------------|
| DATE:        | Aug-13     | SCALE:     | 1" = 300'                |
| PROJECT NO.  | FL1968B.03 | FILE NO.   | FL1968B.03.04.FIG08_REV1 |
| DOCUMENT NO. |            | FIGURE NO. | 8B                       |

# JURISDICTIONAL WETLAND IMPACTS



## LEGEND

|  |  |
|--|--|
|  | EXISTING ELEVATION<br>9 APRIL 2008 (2-FT CONTOURS) |
|  | USACE DITCH  |
|  | USACE WETLAND                                      |
|  | CRD/USACE DITCH                                    |
|  | PROPOSED DMCA 2 FOOTPRINT                          |
|  | GAS TRANSMISSION LINE                              |

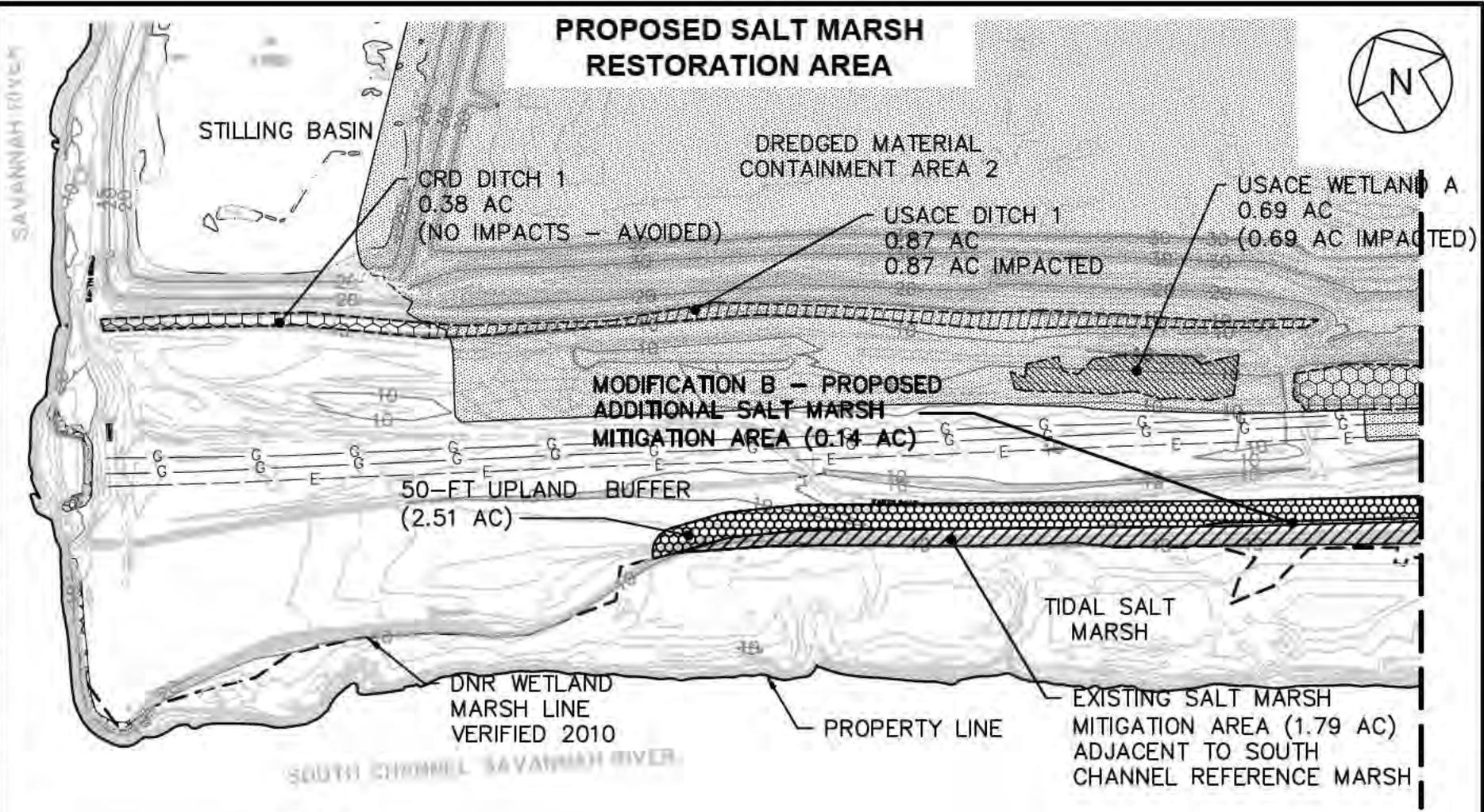


**Geosyntec**  
consultants

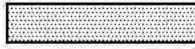
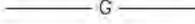
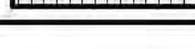
KENNESAW, GA

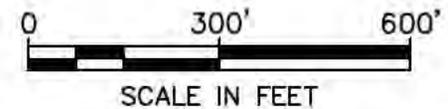
|              |            |            |                          |
|--------------|------------|------------|--------------------------|
| DATE:        | Aug-13     | SCALE:     | 1" = 300'                |
| PROJECT NO.  | FL1968B.03 | FILE NO.   | FL1968B.03.04.FIG08_REV1 |
| DOCUMENT NO. |            | FIGURE NO. | 8C                       |

# PROPOSED SALT MARSH RESTORATION AREA



## LEGEND

-  EXISTING ELEVATION 9 APRIL 2008
-  PROPOSED FUTURE DMCA FOOTPRINT
-  GAS TRANSMISSION LINE
-  EASEMENT (GAS LINE)
-  EXISTING SALT MARSH MITIGATION AREA
-  UPLAND 50-FT MITIGATION AREA BUFFER
-  PROPOSED ADDITIONAL SALT MARSH MITIGATION AREA



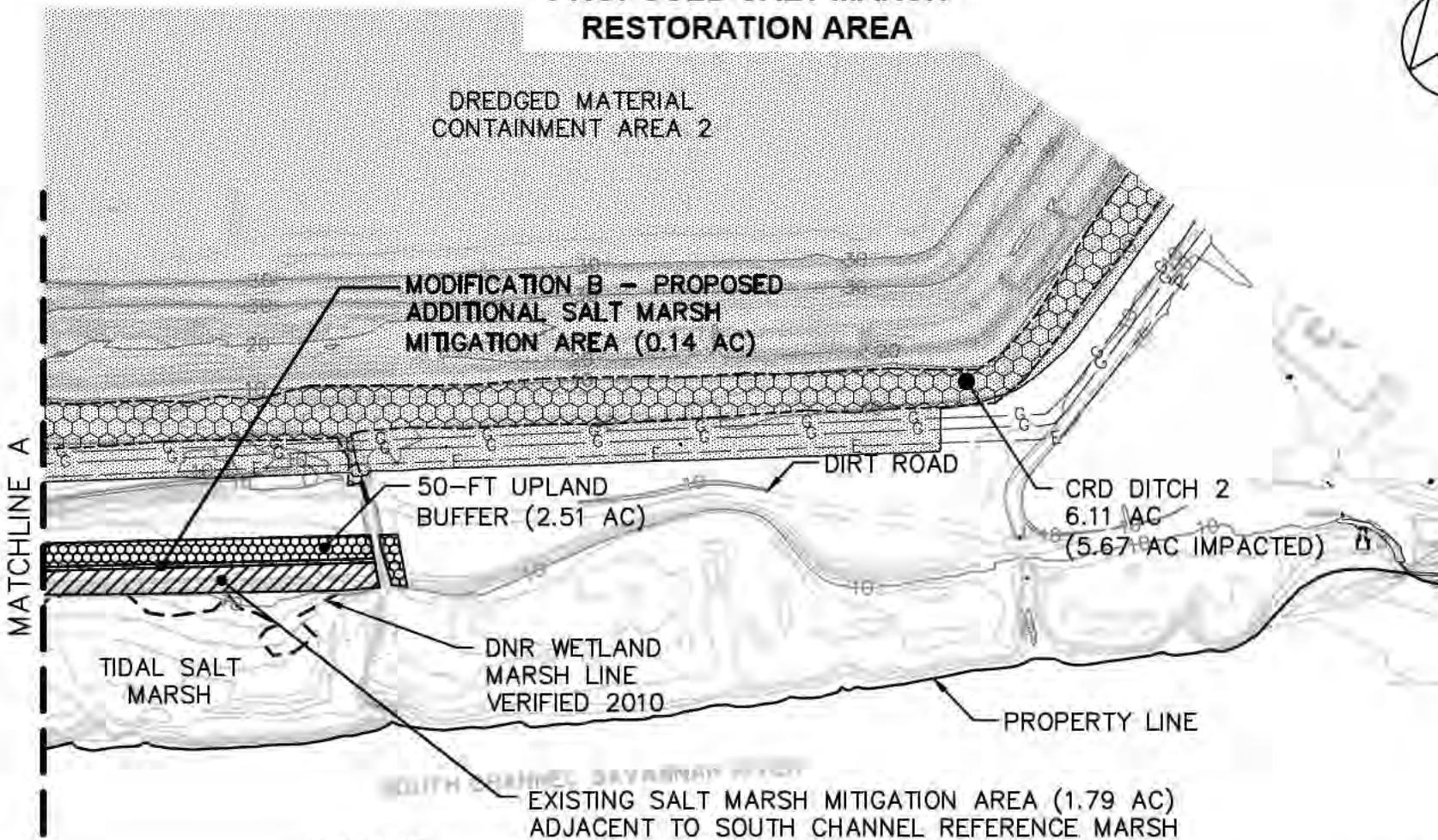
**Geosyntec**  
consultants

KENNESAW, GA

|              |            |            |                     |
|--------------|------------|------------|---------------------|
| DATE:        | AUG -13    | SCALE:     | 1" = 300'           |
| PROJECT NO.  | FL1968B.03 | FILE NO.   | FL1968B.03.04.FIG09 |
| DOCUMENT NO. | -          | FIGURE NO. | 9A                  |

L:\CADD\SLING ELBA ISLAND\SALT MARSH RESTORATION PROJECT\FL1968B.03 PERMIT MODIFICATION DRAWINGS - REV 2\FIGURES\FL1968B.03.04.FIG09

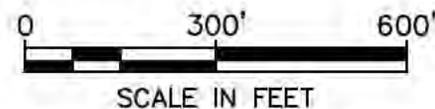
# PROPOSED SALT MARSH RESTORATION AREA



MATCHLINE A

## LEGEND

- EXISTING ELEVATION 9 APRIL 2008
- PROPOSED FUTURE DMCA FOOTPRINT
- GAS TRANSMISSION LINE
- EASEMENT (GAS LINE)
- EXISTING SALT MARSH MITIGATION AREA
- UPLAND 50-FT MITIGATION AREA BUFFER
- PROPOSED ADDITIONAL SALT MARSH MITIGATION AREA

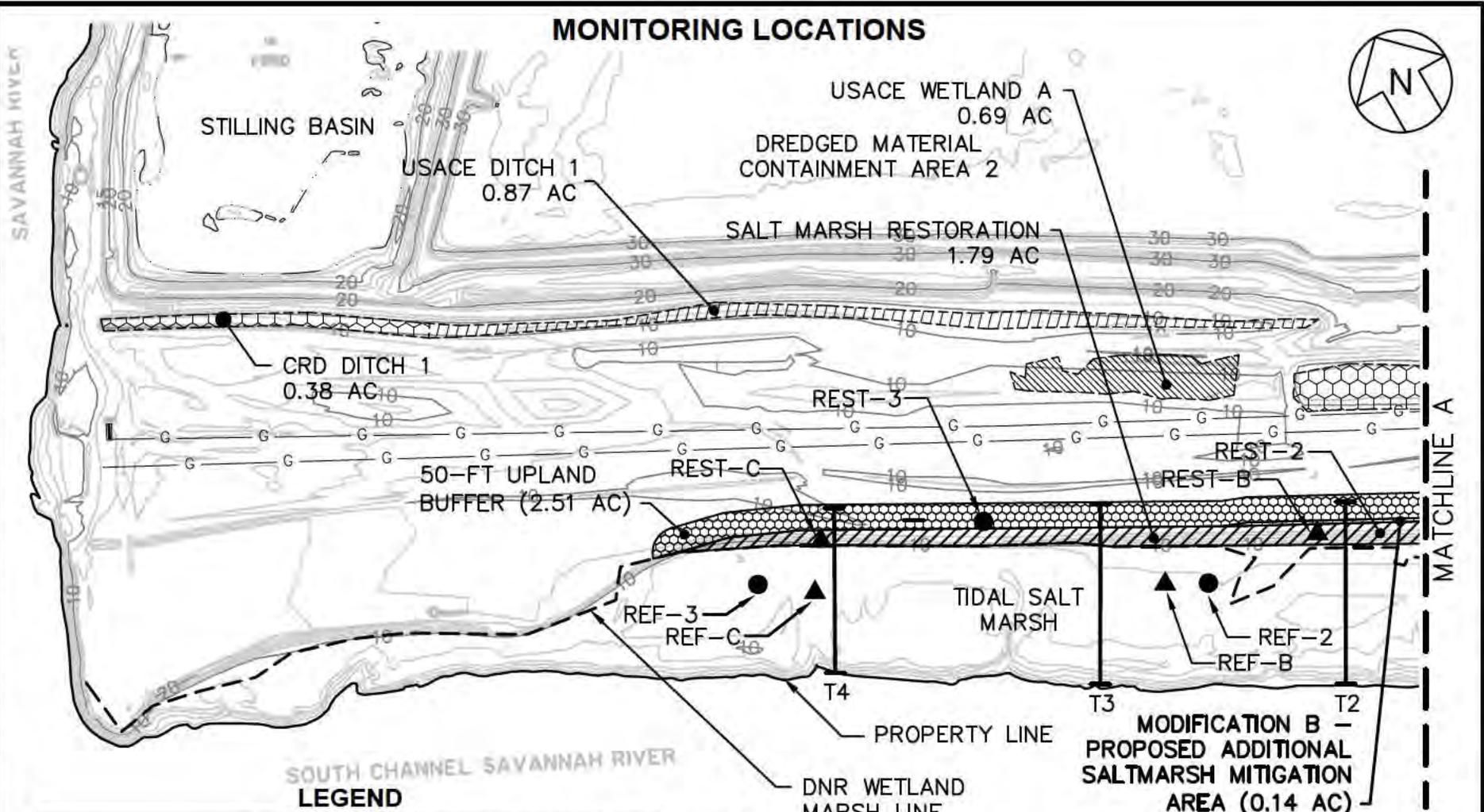


|                                 |            |                              |
|---------------------------------|------------|------------------------------|
| <b>Geosyntec</b><br>consultants |            | KENNESAW, GA                 |
| DATE:                           | AUG-13     | SCALE: 1" = 300'             |
| PROJECT NO.                     | FL1968B.03 | FILE NO. FL1968B.03.04.FIG09 |
| DOCUMENT NO.                    | -          | FIGURE NO. 9B                |

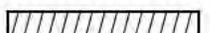
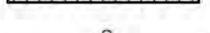
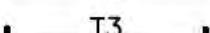
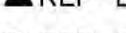
L:\CADD\SYSLING ELBA ISLAND\SALT MARSH RESTORATION PROJECT\FL1968B.03 PERMIT MODIFICATION DRAWINGS - REV 2\FIGURES\FL1968B.03.04.FIG09

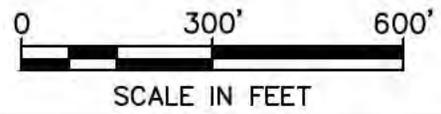
L:\CADD\SLING ELBA ISLAND\SALT MARSH RESTORATION PROJECT\FL1968B.03 PERMIT MODIFICATION DRAWINGS - REV 2\FIGURES\FL1968B.03.04.FIG20\_REV1

# MONITORING LOCATIONS



SOUTH CHANNEL SAVANNAH RIVER

- LEGEND**
-  EXISTING ELEVATION 9 APRIL 2008 (2-FT CONTOURS)
  -  USACE DITCH
  -  USACE WETLAND
  -  CRD DITCH
  -  PROPOSED ADDITIONAL SALTMARSH MITIGATION AREA
  -  GAS TRANSMISSION LINE
  -  VEG MONITORING TRANSECTS
  -  REF-B WATER CHEMISTRY AND BIOTIC MONITORING LOCATIONS
  -  REF-1 MONITORING WELL LOCATIONS

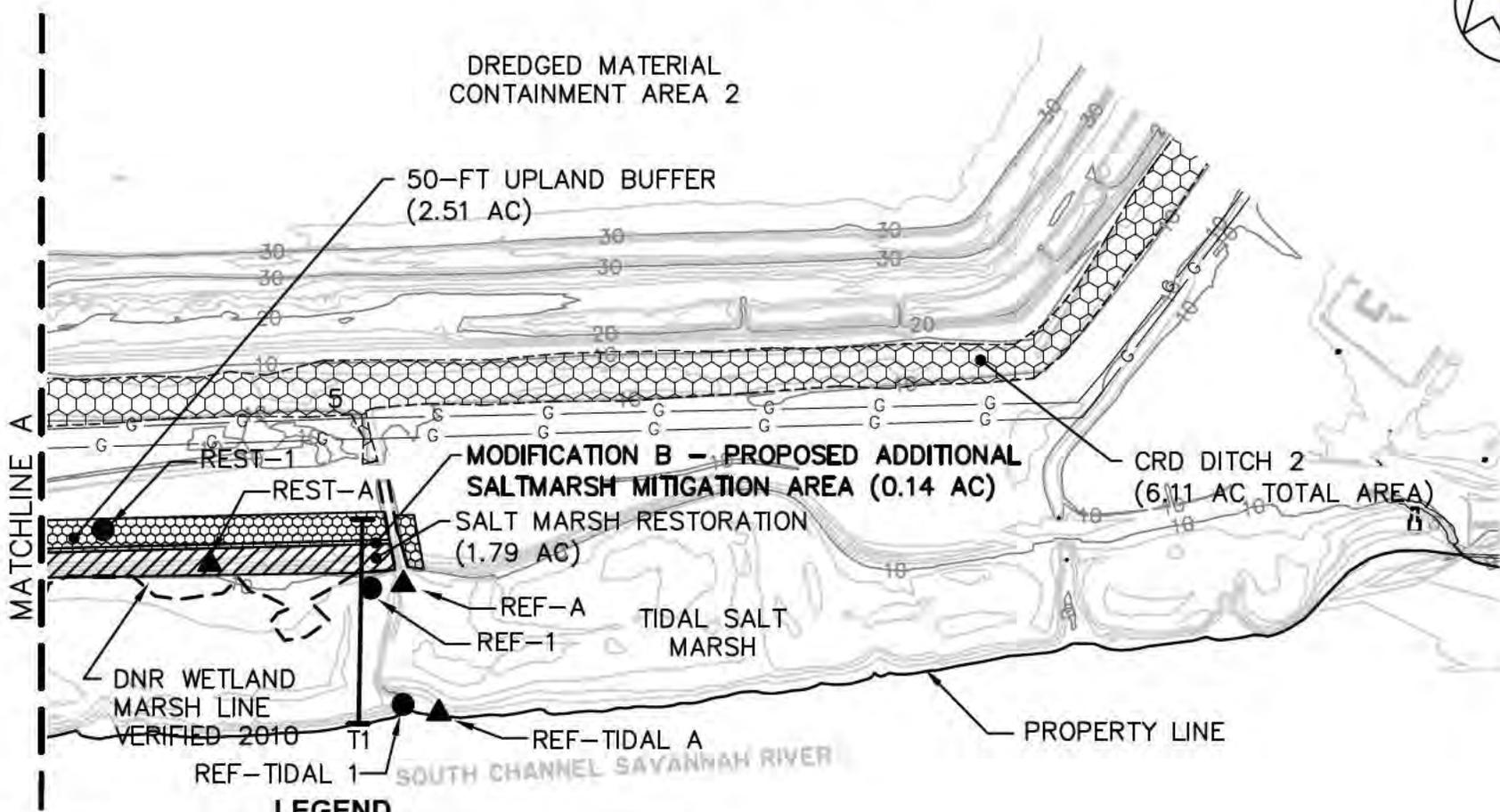


**Geosyntec**  
consultants

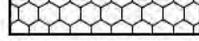
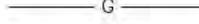
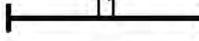
KENNESAW, GA

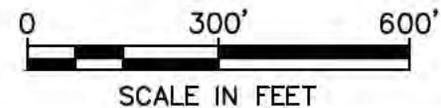
|              |            |            |                          |
|--------------|------------|------------|--------------------------|
| DATE:        | Aug-13     | SCALE:     | 1" = 300'                |
| PROJECT NO.  | FL1968B.03 | FILE NO.   | FL1968B.03.04.FIG20_REV1 |
| DOCUMENT NO. |            | FIGURE NO. | 20A                      |

# MONITORING LOCATIONS



## LEGEND

-  EXISTING ELEVATION 9 APRIL 2008 (2-FT CONTOURS)
-  USACE DITCH
-  USACE WETLAND
-  CRD DITCH
-  PROPOSED ADDITIONAL SALT MARSH MITIGATION AREA
-  GAS TRANSMISSION LINE
-  VEG MONITORING TRANSECTS
-  REF-B WATER CHEMISTRY AND BIOTIC MONITORING LOCATIONS
-  REF-1 MONITORING WELL/TIDAL GAUGE LOCATIONS



**Geosyntec**  
consultants

KENNESAW, GA

|              |            |            |                          |
|--------------|------------|------------|--------------------------|
| DATE:        | Aug-13     | SCALE:     | 1" = 300'                |
| PROJECT NO.  | FL1968B.03 | FILE NO.   | FL1968B.03.04.FIG20_REV1 |
| DOCUMENT NO. |            | FIGURE NO. | 20B                      |

L:\CADD\SLING ELBA ISLAND\SALT MARSH RESTORATION PROJECT\FL1968B.03 PERMIT MODIFICATION DRAWINGS - REV 2\FIGURES\FL1968B.03.04.FIG20\_REV1



*Prepared for*

**Southern LNG**  
P.O. Box 1367  
Savannah, Georgia 31402

**FINAL PERMITTEE-RESPONSIBLE  
COMPENSATORY MITIGATION PLAN:  
ELBA ISLAND TIDAL SALT MARSH  
MITIGATION AREA  
DREDGED MATERIAL CONTAINMENT AREA #2  
EXPANSION PROJECT  
ELBA ISLAND, GEORGIA  
USACE # 2006-00650**

*Prepared by*

**Geosyntec**   
consultants

engineers | scientists | innovators

1255 Roberts Boulevard, Suite 200  
Kennesaw, Georgia 30144

Project Number FL1968C-03

July 2012/ September 2013 (Revision 1)

## TABLE OF CONTENTS

|      |   |    |
|------|---|----|
| 1.   | GENERAL INFORMATION.....                              | 1  |
| 1.1  | Permittee-Responsible Mitigation Sponsor .....        | 1  |
| 1.2  | Agent, Consultant, and/or Representative .....        | 1  |
| 2.   | 12 COMPONENTS OF A COMPENSATORY MITIGATION PLAN ..... | 2  |
| 2.1  | Objectives .....                                      | 2  |
| 2.2  | Site Selection .....                                  | 5  |
| 2.3  | Site Protection Instrument .....                      | 6  |
| 2.4  | Baseline Information .....                            | 6  |
| 2.5  | Determination of Credits .....                        | 9  |
| 2.6  | Mitigation Work Plan .....                            | 12 |
| 2.7  | Maintenance Plan .....                                | 14 |
| 2.8  | Performance Standards .....                           | 14 |
| 2.9  | Monitoring Requirements.....                          | 16 |
| 2.10 | Long-Term Management Plan.....                        | 17 |
| 2.11 | Adaptive Management Plan.....                         | 17 |
| 2.12 | Financial Assurances .....                            | 18 |
| 3.   | References.....                                       | 18 |

## LIST OF TABLES

|                 |   |
|-----------------|---|
| Table 1.        | Elba Island existing conditions, impairments, and proposed impacts.                             |
| Table 2.        | Plant species observed in the existing salt marsh adjacent to the proposed EITSMMA.             |
| Table 3.        | Plant species observed in uplands within the proposed EITSMMA.                                  |
| <b>Table 4.</b> | <b>REVISED Hydrogeomorphic model summary of results and functional mitigation requirements.</b> |
| Table 5.        | Native shrub and tree species proposed for enhancement of the upland buffer of EITSMMA.         |

**TABLE OF CONTENTS (Continued)**

**LIST OF FIGURES**

|                       |   |
|-----------------------|---|
| Figure 1              | Vicinity Map, Elba Island   |
| Figure 2a             | Road Map, Elba Island   |
| Figure 2b             | Location Map, Elba Island   |
| Figure 3              | Property Plat, Elba Island  |
| Figure 4              | 8-Digit Hydrologic Unit Codes (HUC) Map, Elba Island                |
| Figure 5              | U.S. Geologic Survey Quadrangle Map, Elba Island                    |
| Figures 6a-6d         | Aerial Photograph, Elba Island                                      |
| Figures 7a-7c         | Jurisdictional Wetlands   |
| <b>Figures 8a-8c</b>  | <b>REVISED Jurisdictional Wetland Impacts</b>                       |
| <b>Figures 9a-9b</b>  | <b>REVISED Proposed Salt Marsh Restoration Area</b>                 |
| Figure 10             | Proposed Salt Marsh Restoration, Typical Cross-Section              |
| Figure 11             | Natural Resources Conservation Service (NRCS) Soil Map, Elba Island |
| Figure 12             | National Wetland Inventory, Elba Island                             |
| Figure 13             | SWAP Map, Elba Island   |
| Figure 14             | Federal Aviation Administration Regulated Airports, Elba Island     |
| Figure 15             | Endangered, Threatened, or Rare Species, Elba Island                |
| Figure 16             | Cultural Resource Site, Elba Island                                 |
| Figure 17             | Land Use Areas  |
| Figure 18             | 1952 Aerial Photograph  |
| Figure 19             | 1855 Historical Survey  |
| <b>Figure 20a-20b</b> | <b>REVISED Monitoring Locations</b>                                 |

**TABLE OF CONTENTS (Continued)**

**LIST OF APPENDICES**

|            |   |
|------------|---|
| Appendix A | SOP Calculation Sheets for Freshwater Impacts   |
| Appendix B | Photographic Record   |
| Appendix C | Federally Listed Species Known to Occur in Chatham County, Georgia, and Jasper County, South Carolina |
| Appendix D | Jurisdictional Waters Determination   |

## **1. GENERAL INFORMATION**

### **1.1 Permittee-Responsible Mitigation Sponsor**

The sponsor for the Elba Island Tidal Salt Marsh Mitigation Area (EITSMMA), being the fee-simple owner of the tract of land proposed for this permittee-responsible on-site tidal salt marsh mitigation, is Southern LNG (SLNG), a Kinder Morgan Company.

Contacts for the sponsor are:

Mr. Steve Heard  
Title: Terminal Manager  
Southern LNG  
P.O. Box 1367  
Savannah, Georgia 31402  
Phone: (912) 944-3806  
Fax: (912) 944-3860  
E-mail:  
Steve\_Heard@KinderMorgan.com

Mr. Jeffrey Green, P.E.  
Title: Principal Engineer  
Southern LNG  
P.O. Box 1367  
Savannah, Georgia 31402  
Phone: (912) 944-3838  
Fax: (912) 944-3860  
E-mail:  
Jeffrey\_Green@KinderMorgan.com

### **1.2 Agent, Consultant, and/or Representative**

Geosyntec Consultants, Inc. (Geosyntec) is under contract with SLNG as the environmental consultant and authorized agent for this project. Geosyntec will provide all the necessary regulatory and administrative coordination with the U.S. Army Corps of Engineers (USACE), members of the Interagency Review Team (IRT), and other federal, state, or county governmental entities that may be involved with review and approval of this mitigation plan and the activities proposed herein. Geosyntec's additional role for this project will be providing the technical/environmental tasks necessary for site assessment and baseline monitoring, developing mitigation concept(s) and detailing salt marsh restoration design, coordinating and overseeing the mitigation site construction, monitoring of mitigation site as-built conditions and performance criteria, and preparing appropriate technical documentation and reports, and final project closeout. The Geosyntec contact information is as follows:

Mr. David J. Vance  
Geosyntec Consultants, Inc.  
1255 Roberts Boulevard, Suite 200  
Kennesaw, Georgia 30144  
Phone: (678) 202-9612  
Fax: (678) 202-9501  
Mobile: (678) 361-4801  
E-mail: [dvance@geosyntec.com](mailto:dvance@geosyntec.com)

## 2. 12 COMPONENTS OF A COMPENSATORY MITIGATION PLAN

### 2.1 Objectives

The EITSMMA is a permittee-responsible on-site mitigation area for the purpose of providing compensatory mitigation for the Dredge Material Containment Area (DMCA) #2 expansion's impacts. In total, two anthropogenic ditches (Ditch 1 and 2) and one wetland (Wetland A) are affected by the proposed expansion of the DMCA #2 dikes and counterweights (**Table 1**). Both Ditch 1 and Ditch 2 have saltwater and freshwater components and Wetland A is a forested (non-native light-seeded tree species) freshwater wetland. In total 6.49 acres of tidally influenced anthropogenic salt marsh ditch (0.38 acre and 6.11 acres, respectively) are present and 2.23 acres of freshwater ditches (0.87 acre and 0.67 acre, respectively) and Wetland A (0.69 acre) are present. All ditches, including Wetland A, were initially excavated for borrow material for the original DMCA dikes and then for mosquito control.

Proposed impacts will fill **6.11 acres (5.67 acres permitted impacts + 0.44 acres for proposed permit modification impacts)** of low quality tidally influenced Ditch 2 and 2.23 acres of freshwater non-tidal wetland. Out of the **6.11 acres** proposed for impacts within Ditch 2 a total of approximately **2.67 acres** have open water tidal ditch with unconsolidated mud bottom and approximately **3.44 acres** have unconsolidated mud bottom and tidal salt marsh vegetation. Following the rationale that was presented by Geosyntec in the February 8, 2012 meeting with the Interagency Review Team (IRT), the compensatory mitigation breakdown presented below is supported by Savannah District policy:

- **2.48 acres** out of **6.11 acres** of Ditch 2 to be filled which is constructed in uplands with tidally influenced open-water and unconsolidated mud bottom does not require mitigation by the Savannah District, however National Marine Fisheries Service (NMFS) is requiring mitigation for this portion of Ditch 2 based on determining it to be essential fish habitat (EFH);
- **3.44 acres** out of **6.11 acres** of Ditch 2 to be filled, which is constructed in uplands with tidal salt marsh vegetation community and unconsolidated mud bottom, does require mitigation by Savannah District and is also considered EFH by NMFS thus requiring mitigation; and
- 2.23 acres of freshwater non-tidal ditch will be compensated through the purchase of wetland mitigation credits from a USACE approved mitigation bank which is supported by USACE and the Environmental Protection Agency's (EPA) mitigation hierarchy.

**Table 1. Elba Island existing conditions, impairments, and proposed impacts.**

| <b>Wetlands</b>            | <b>Existing Acreage</b> | <b>Existing Impairment <sup>2</sup></b> | <b>Permitted Impact Acreage</b> | <b>Proposed Permit Modification Impact Acreage</b> | <b>Total Revised Impacts</b> |
|----------------------------|-------------------------|---|---------------------------------|--|------------------------------|
| Ditch 1 Tidal <sup>1</sup> | 0.38                    | 1, 2, 3, 4, 5, 6                        | None                            | -  | None                         |
| Ditch 1 Freshwater         | 0.87                    | 1, 2, 3, 4, 5, 6                        | 0.87                            | -  | 0.87                         |
| Ditch 2 Tidal <sup>1</sup> | 6.11                    | 1, 2, 3, 4, 5, 6                        | 5.67                            | <b>0.44</b>  | <b>6.11</b>                  |
| Ditch 2 Freshwater         | 0.67                    | 1, 2, 3, 4, 5, 6                        | 0.67                            | -  | 0.67                         |
| Wetland A Freshwater       | 0.69                    | 2, 6                                    | 0.69                            | -  | 0.69                         |
| Reference Salt Marsh       | 72.1                    | None                                    | None                            | -  | None                         |

<sup>1</sup> GADNR Coastal Resource Division delineated tidal ditch.

<sup>2</sup> 1 – Hydrology; 2 – Exotic Species; 3 – Shading; 4 – Sediment Transport; 5 – Salinity; 6 – Borrow area of dike construction and ditch maintenance for mosquito control.

Therefore, to satisfy NMFS's EFH designation for the entire **6.11 acres** of Ditch 2, compensatory mitigation for the **6.11 acres** of anthropogenic ditch was assessed based on application of the Hydrogeomorphic Method (HGM) developed for the Tidal Fringe Wetlands along the Mississippi and Alabama Gulf Coast (Shafer et al., 2007) modified for use in an estuarine diurnal tidal system. The HGM assessed the biological, chemical and physical functions of the anthropogenic ditch in comparison to an abutting reference tidal salt marsh. The variance in function (demonstrated by the HGM model) of the two systems illustrated that **1.93 acres** of reference marsh was equivalent in function to **6.11 acres** of low quality anthropogenic tidally influenced ditch (See Section 2.5 for detailed discussion of HGM model and compensatory mitigation calculations). Therefore, using the results of the HGM model compensatory mitigation replacement of lost biological, chemical and physical functions could be adequately replaced by restoring **1.93 acres** of salt marsh contiguous with the reference marsh (i.e., the primary requirement by NMFS for their acceptance of the mitigation). In addition, a 50-foot upland buffer (**2.51 acres**) will be established to further protect and enhance the salt marsh restoration area.

The 2004 Standard Operating Procedures (SOP) for Compensatory Mitigation: Wetlands, Open water and Streams (USACE, 2004) was utilized for calculation of compensatory mitigation credit values for the freshwater non-tidal wetland impacts. Therefore, the impacts to 2.23 acres of freshwater non-tidal sections of Ditch 1 (0.87 acre), Ditch 2 (0.67 acre), and the entirety of Wetland A (0.69 acre) will be compensated for via the purchase of 10.71 mitigation credits from Black Creek Mitigation Bank. Please see **Appendix A** for SOP calculation sheets for freshwater impacts.

The above mitigation objectives will address the following watershed needs:

- Adequate replacement (minimum 1:1 functional replacement) of lost biological, chemical and physical functions for both saltwater and freshwater systems;
- Tidal salt marsh in-kind resource type to be restored will be an on-site tidal salt marsh that is contiguous with an existing fully functional tidal salt marsh on the South Channel of Elba Island;
- Increased high-quality habitat acreage for estuarine dependent aquatic invertebrates and vertebrates (e.g., fish and crustaceans);

- Compensatory mitigation of freshwater impacts through purchase of 10.71 credits from Black Creek Mitigation Bank to satisfy in-kind replacement of functions lost; and
- Replacement at a minimum of equal water quality functions for both resource types (e.g., freshwater and salt marsh) within the watershed.

## 2.2 Site Selection

The EITSMMA is located on Elba Island (**Figures 1, 2a and 2b**) and owned by SLNG (**Figure 3**). Elba Island is located in the Savannah River approximately 5.3 miles east of Savannah, Georgia and 8.3 miles west-northwest of Fort Pulaski National Monument at the mouth of the Savannah River and the Atlantic Ocean. The site is located in the Lower Savannah River Hydrologic Unit Code (HUC) 03060109 (**Figure 4**). **Figures 5, 6a-d, and 7a-c** illustrate the existing conditions of the site. **Figures 8a-c** illustrates the proposed area of impacts.

The mitigation site (**Figures 9**) was selected due to several important factors: 1) site is adjacent to an existing and historically stable marsh; 2) the mitigation site was historically a salt marsh prior to being buried by creation of a dredge spoil site in the 1940s; 3) site is located away from present day industrial activities on Elba Island and their operations; and 4) the surrounding upland buffer for the mitigation site can be preserved in perpetuity. Other watershed factor benefits include but are not limited to: restoring historical salt marsh acreage and function; improved water quality and essential fish habitat (EFH) produced through increased acreage of high-quality, tidally connected, salt marsh; improved floodplain morphology with expanded acreage for passage of flood flows and enhanced floodwater storage characteristics for the South Channel; and enhancement and preservation of a forested riparian corridor, providing protected natural habitat for wildlife and wildlife corridors benefiting from advantageous connectivity to coastal salt marsh habitat and in other nearby protected natural areas and wildlife refuges.

The practicability of restoring the historical tidal salt marsh at the EITSMMA is high since the project's main goal is to restore full tidal exchange to the restored marsh which drives a number of biological, chemical, and physical processes important to marsh development and sustainability. By excavating the historical dredge material

(**Figure 10**) and exposing the historical tidal marsh surface, this will expose organic rich soils which are a necessity for successful salt marsh restorations.

### **2.3 Site Protection Instrument**

Upon approval of the mitigation plan, SLNG's attorney will prepare a Declaration of Conservation Covenants and Restrictions (DCCR) using model language provided by the USACE and will submit to the USACE Office of Counsel for their review and approval prior to recording. The DCCR will be recorded in the local record deeds office in Chatham County showing the book and page numbers of its recorded location.

The restored salt marsh within the mitigation site will be perpetually protected under the Coastal Marshlands Protection Act (CMPA) [O.C.G.A. 12-5-280] since the former uplands will become "lands subject to the ebb and flow of the tide". These lands are thereby regulated and protected by the CMPA under the jurisdiction of Georgia's Coastal Resources Division (CRD). Further protection of the mitigation site is afforded by the Coastal Management Act (CMA) [O.C.G.A. 12-5-320] which ensures that federal activities that have a reasonable likelihood to affect any coastal use or resource must be conducted consistent with Georgia's Coastal Management Program and reviewed to be consistent with State laws.

The DCCR will protect the upland buffer of the mitigation site, while the CMPA and CMA will protect the newly restored salt marsh restoration area in perpetuity. The mitigation site will be continued to be owned and operated by SLNG once performance criteria have been met and the mitigation deemed complete and satisfactory by the USACE.

### **2.4 Baseline Information**

The impact area for the DMCA #2 expansion will cover portions of Ditches 1 and 2 as well as all of Wetland A (**Table 1, Figure 7a-c**). **Figures 11-19** cover typical required maps for mitigation areas and document existing conditions at the site. Representative photos of the site are provided in **Appendix B**. Protected Species and Jurisdictional Determination data are provided in **Appendices C and D**, respectively.

Ditches 1 and 2 are comprised of a patch mosaic of smooth cordgrass, common reed (*Phragmites australis*) and open water areas in the saltwater tidal portions fringed by common reed in the upland transition. Ditch 2 is largely ringed by a canopy of

Chinaberry, Chinese tallow, Chinese privet and cabbage palm, while Ditch 1 is surrounded largely by herbaceous emergent vegetation (e.g., common reed, blackberry, Bermuda grass and other common weeds). In freshwater areas of the ditches common reed is the predominant vegetation in the ditch with open water areas present. Wetland A occupies an adjacent borrow area to the western extent of Ditch 2 and is primarily composed of hackberry, Chinese tallow, Chinaberry, and Chinese privet.

The aquatic functions of the saltwater tidal ditch systems are significantly impacted by limited tidal exchange via one 24-inch diameter culvert on each ditch, encroachment by non-native exotic herbaceous species, presence of only light seeded non-native trees which shade out portions of the ditches, and low dissolved oxygen values that average 3.1 mg/L for the saltwater sections unlike the average reference dissolved oxygen values of 7.4 mg/L.

The freshwater components of the ditches and Wetland A can be broken out into forested (Ditch 2 – 0.67 acre and Wetland A – 0.69 acre) and emergent wetlands (Ditch 1 - 0.89 acre). The aquatic functions of the freshwater systems are significantly impacted by poor water quality (dissolved oxygen values in ditches average 1.1 mg/L), encroachment by non-native exotic herbaceous species, and presence of only light seeded non-native trees, which provided canopy for the forested systems. No water quality data is available for Wetland A because hydrology is groundwater (no surface water present).

Current vegetation of the bordering reference marsh at the mitigation site consists of a broad low marsh border on the western half of the reference wetland site. Vegetation in the low marsh consists predominantly of smooth cordgrass and big cordgrass, groundsel-tree, marsh elder, and sea oxeye in the high marsh. Upland forest located on top of the historical dredge spoils is dominated by vegetation such as hackberry, Chinese tallow, Chinaberry, Chinese privet, cabbage palm, and greenbrier. A complete list of species observed within the adjacent reference salt marsh (**Table 2**) and in uplands comprising and surrounding the EITSMMA (**Table 3**) is provided below.

Proposed vegetation at the mitigation site will be restored to a tidal salt marsh contiguous with an existing fully functional tidal salt marsh. Native salt marsh species will be planted as well as natural regeneration of viable seeds and rhizomes will be allowed to occur. The proposed vegetation is to consist of smooth cordgrass in the low marsh and saltmeadow cordgrass, big cordgrass and sea myrtle in the high marsh.

Elba Island lies within the Savannah River between River Mile 6 and 9, as measured from the mouth at Tybee Island. It sits within the mesotidal Savannah estuary with a tidal range of approximately 8.2 feet. Current velocities range from 3.28 feet per second (ft/sec; peak flood) to 4.26 ft/sec (peak ebb). Salinity varies from 15 to 30 parts per thousand (ppt).

The NRCS Soils Survey for Chatham County (Wilkes et al., 1974) identifies Elba Island soils as either salty tidal marsh or “Made land”. Salty tidal marsh soil is predominately located on the northeast and southeast end of the island. “Made land” dominates the island and is former marshland that is now covered by dredged material. Four sediment types have been documented in Elba Island core samples (i.e., dredge material, salt marsh, estuarine, fluvial).

**Table 2. Plant species observed in the existing salt marsh adjacent to the proposed EITSMMA.**

| Scientific Name              | Common Name         | Indicator Status |
|------------------------------|---------------------|------------------|
| <i>Baccharis halimifolia</i> | Sea myrtle          | FAC              |
| <i>Borrichia frutescens</i>  | Sea oxeye           | OBL              |
| <i>Distichlis spicata</i>    | Saltgrass           | FACW+            |
| <i>Iva frutescens</i>        | Marsh elder         | FACW+            |
| <i>Morella cerifera</i>      | Wax myrtle          | FAC+             |
| <i>Sabal minor</i>           | Blue palm           | FACW             |
| <i>Sabal palmetto</i>        | Cabbage palm        | FAC              |
| <i>Salicornia perennis</i>   | Perennial glasswort | OBL              |
| <i>Spartina alterniflora</i> | Smooth cordgrass    | OBL              |
| <i>Spartina cynosuroides</i> | Big cordgrass       | OBL              |
| <i>Spartina patens</i>       | Saltmarsh cordgrass | FACW             |

Approximate center of the EITSMMA site is located at coordinates 32° 05' 34.72" North latitude and 81° 00' 41.19" West longitude. Its 8-digit HUC designation is HUC 03060109, representing the Lower Savannah River watershed. The EITSMMA site is located 8.3 miles from the discharge point of the Savannah River drainage basin, which is approximately 9,850 square miles in size. The EITSMMA's close proximity to the Atlantic Ocean provides for mixing of the oceanic flood-tide waters with fresh water discharge from the Savannah River creating salinity ranges of 15 to 30 ppt.

The existing salt marsh delineation was conducted by Georgia EPD, Coastal Resources Division on 28 July 2010 (**Appendix E**).

**Table 3. Plant species observed in uplands within the proposed EITSMMA.**

| Scientific Name                    | Common Name            | Indicator Status |
|------------------------------------|------------------------|------------------|
| <i>Ampelopsis arborea</i>          | Peppervine             | FAC+             |
| <i>Asplenium platyneuron</i>       | Ebony spleenwort       | FACU             |
| <i>Celtis laevigata</i>            | Hackberry              | FACW             |
| <i>Ilex vomitoria</i>              | Yaupon                 | FAC              |
| <i>Juniperus virginiana</i>        | Eastern red cedar      | FACU-            |
| <i>Ligustrum japonicum</i>         | Japanese privet        | NL               |
| <i>Ligustrum sinense</i>           | Chinese privet         | FAC              |
| <i>Lonicera japonica</i>           | Japanese honeysuckle   | FAC-             |
| <i>Lygodium japonicum</i>          | Japanese climbing fern | FAC              |
| <i>Melia azedarach</i>             | Chinaberry tree        | NL               |
| <i>Morella cerifera</i>            | Wax myrtle             | FAC+             |
| <i>Parthenocissus quinquefolia</i> | Virginia creeper       | FAC              |
| <i>Prunus serotina</i>             | Black cherry           | FACU             |
| <i>Rubus</i> sp.                   | Blackberry/dewberry    | FAC              |
| <i>Sabal minor</i>                 | Bluestem palm          | FACW             |
| <i>Sabal palmetto</i>              | Cabbage palm           | FAC              |
| <i>Sapium sebiferum</i>            | Chinese tallow         | FAC              |
| <i>Smilax bona-nox</i>             | Greenbrier             | FAC              |
| <i>Smilax glauca</i>               | Cat greenbrier         | FACU             |
| <i>Smilax laurifolia</i>           | Laurel greenbrier      | FACW+            |
| <i>Smilax rotundifolia</i>         | Roundleaf greenbrier   | FAC              |
| <i>Toxicodendron radicans</i>      | Poison ivy             | FAC              |
| <i>Triadica sebifera</i>           | Chinese tallow         | FAC              |

## 2.5 Determination of Credits

The 2004 SOP for Compensatory Mitigation: Wetlands, Open water and Streams (USACE, 2004) was utilized for calculation of compensatory mitigation credit values for the freshwater wetland impacts resulting in 10.71 credits required. Please see SOP calculation sheets for freshwater impacts (**Appendix A**) for explanation of factors chosen.

However, the SOP was not designed to calculate functional loss of salt marsh wetlands and based on a regulatory impetus to quantify and mitigate functions based on the 2008 New Mitigation Rule, Geosyntec has selected to use the HGM model developed for the Mississippi and Alabama Gulf Coast (Shafer et al., 2007) to quantify functional value of the existing tidal ditches and the existing reference fringe salt marsh on the South Channel.

The HGM model was modified for diurnal tidal processes and the remaining components of the model were applied which include five main functional variables:

**Wave Energy** – This function is designed to measure the wetlands ability to attenuate wind- and vessel-generated wave energy utilizing landscape position, marsh width, and vegetative cover.

**Biogeochemical Cycling** – This function is designed to measure the ability of the tidal wetland to receive, transform, and export various elements and compounds through natural biogeochemical processes.

**Nekton Utilization Potential** – This function is designed to measure the marsh's potential utilization by resident and seasonally non-resident adult or juvenile fish and macrocrustacean species. This function would be measured by abundance of resident nekton per square meter.

**Provide Habitat for Tidal Marsh-Dependent Wildlife** – This function is designed to measure the capacity of a coastal fringe marsh to provide critical life requisites to selected components of the vertebrate wildlife community to quantify quality of habitat.

**Maintain Characteristic Plant Community, Structure and Composition** – This function is designed to measure the ability of a wetland to support a native plant community with desired species compositions.

The HGM was applied to each wetland system based on the Chapter 5 Assessment Protocol (Shafer et al., 2007). This protocol establishes the assessment area size utilized to produce a functional score value for the entire wetland system (e.g., tidally influenced Ditch 2 or Reference Wetland). The calculated index values for each variable and wetland are presented in **Table 4**.

The reference salt marsh's functional value (FV) of 1.918 was normalized to 1.000 (e.g., 1.918 divided by 1.918 = 1.000) to create a normalized functional value (NFV) since it is considered fully functioning and the highest potential the proposed restoration is likely to

**Table 4. Hydrogeomorphic model summary of results and functional mitigation requirement.**

| HGM Functional Capacity Index (FCI)   | Reference Salt Marsh | Ditch 2 (Tidal)  |
|---|----------------------|--|
| FCI Wave Energy Attenuation   | 0.225                | 0.000  |
| FCI Biogeochemical Cycling  | 0.160                | 0.020  |
| FCI Nekton Utilization  | 0.833                | 0.383  |
| FCI Tidal-Marsh Dependent Wildlife  | 0.200                | 0.004  |
| FCI Plant Community Structure   | 0.500                | 0.200  |
| Functional Value (FV)   | 1.918                | 0.607  |
| Normalized Functional Values (NFV)  | 1.000                | 0.316  |
| Functional Acreage Equivalent (FAE) of Reference Salt Marsh acres to Existing Ditch 2 acres |                      | 1.00 ac to 3.16 acre   |
| Proposed Impacts (acres)  |                      | 5.67 acres (Permitted)<br><b>+ 0.44 acre (Proposed)</b><br><b>= 6.11 acres (Total)</b>       |
| <b>Total Compensatory Functional Mitigation Acreage (CFMA)</b>                              |                      | <b>1.79 acres (Permitted)</b><br><b>+ 0.14 acre (Proposed)</b><br><b>= 1.93 acre (Total)</b> |

achieve. The FV of Ditch 2 will be normalized in reference to the reference salt marsh to provide a NFV for Ditch 2. Ditch 2's FV of 0.607 is divided by the reference salt marsh's FV of 1.918; therefore, 0.607 is divided by 1.918 and equals an NFV of 0.316 for Ditch 2.

The NFV ratio is thus 1.000 to 0.316. Therefore, Ditch 2 has a NFV of less than one-third the functional potential of the reference salt marsh. The NFV ratio is then transformed into a functional acreage equivalent (FAE) by dividing the NFV of the reference salt marsh (1.000) and Ditch 2 (0.316) into 1.000. This produces a FAE ratio

for the reference marsh and Ditch 2 of 1.00 acre to 3.16 acres, which says that 3.16 acres of Ditch 2 is equivalent in function to 1.00 acre of the reference marsh.

In order to determine the compensatory functional mitigation acreage (CFMA), the FAE of Ditch 2 (3.16 acres) is divided into the impacted acreage of Ditch 2 (**6.11 acres total** = *5.67 acres permitted impacts + 0.44 acres for proposed permit modification impacts*). This calculation produces a CFMA of **1.93 acres** (*1.79 acres permitted mitigation + 0.14 acre proposed permit modification mitigation* = **1.93 acres total**) of required salt marsh restoration for the DMCA #2 expansion impacts to **6.11 acres of Ditch 2**. The CFMA is defined as the number of acres of restored salt marsh contiguous with the reference wetland that is functionally equivalent to the impacted area. Therefore, Ditch 2's CFMA value of **1.93 acres** of required salt marsh restoration will functionally replace/compensate for impacts to a total of **6.11 acres** of anthropogenic tidally influenced Ditch 2.

## 2.6 Mitigation Work Plan

SLNG proposes to excavate **1.93 acres** of existing uplands (to expose a historical marsh) abutting an existing fully functioning tidal salt marsh that parallels the South Channel. The methods proposed for the restoration are derived from the principles established by the *Handbook for Restoring Tidal Wetlands* (Zedler et al., 2001) and success measured via applying the HGM developed for the Tidal Fringe Wetlands along the Mississippi and Alabama Gulf Coast (Shafer et al., 2007) modified for use in an estuarine diurnal tidal system. Salt marsh establishment is contingent on excavating the dredge spoils down to the buried marsh peat surface for the length of the proposed mitigation site. The new marsh surface (predominantly low marsh) will be planted with smooth cordgrass with higher areas planted with saltmeadow cordgrass and sea myrtle. The upland transition between the salt marsh and upland buffer will be sloped at a 2:1 (horizontal to vertical) and planted with native shrubs and trees (**Table 5**).

The proposed salt marsh restoration would consist of excavating the dredge material (**Figures 9 and 10**) to expose the historic marsh surface and plant it with native species and allow for natural regeneration of viable seeds and rhizomes. The excavated material would be disposed of within DMCA #2. Sediment and erosion control measures would be installed to prevent migration of excavated material or sediment laden run-off into the adjacent reference marsh. The surface of the marsh would be surveyed checked to determine its elevation relative to existing marsh habitats to

confirm planting zonations and habitat distribution. Once the surface elevations are checked and soils stabilized post-excavation and allowed to acclimate to exposure to air and surface water exchange, the restored marsh surface will be planted. While parent soil materials will provide a native seed and rhizome source, native, tidal flora species will be obtained commercially and planted within the restoration area.

**Table 5. Native shrub and tree species proposed for enhancement of the upland buffer of EITSMMA.**

| Scientific Name             | Common Name       | Indicator Status |
|-----------------------------|-------------------|------------------|
| <i>Ilex vomitoria</i>       | Yaupon holly      | FAC              |
| <i>Morella cerifera</i>     | Wax myrtle        | FAC+             |
| <i>Sabal palmetto</i>       | Cabbage palm      | FAC              |
| <i>Juniperus silicicola</i> | Southern redcedar | FAC              |
| <i>Juniperus virginiana</i> | Eastern redcedar  | FACU-            |
| <i>Quercus nigra</i>        | Water oak         | FAC              |
| <i>Quercus phellos</i>      | Willow oak        | FACW-            |
| <i>Quercus virginiana</i>   | Live oak          | FACU+            |

The combination of a mud substrate, native tidal vegetation, and the potential for new organic detritus to deposit over time, is expected to provide suitable habitat for the white shrimp (*Litopenaeus setiferus*), other penaeids, and fish species that utilize marsh habitat during their life cycle. The proposed restoration area is expected to contain a clay, silty clay, and silty clay loam substrate (e.g., pre-existing marsh peat), which is generally preferred by white shrimp larvae, and suitable for the proposed plant species. To minimize stress and encourage rapid establishment, Geosyntec proposes to plant vegetation during spring or fall. Planting will occur during low tide of a neap tide period. Plant material will be selected and installed by a company/organization having specialized experience in tidal vegetation.

Plant material will consist of species representative of the adjacent reference tidal marsh. The reference marsh is dominated by smooth cordgrass in the low marsh and big cordgrass and sea myrtle in the high marsh. Selected plant material will consist of smooth cordgrass and big cordgrass (sea myrtle is expected to recruit naturally over time). All three rhizomatous species are known to provide cover, forage, and substrate for a variety of intertidal fauna. Therefore, the installation of these species combined with substantially improved tidal interconnection, suspended sediment transport and

deposition, lack of shading, lack of invasive species, and salinities that are not diluted by freshwater inputs should promote EFH that is substantially more functional than that found within the impacted tidal ditches.

Plant material will consist of plugs, which will be hand-planted at a density of 1-m centers. Approximately 75 percent of the plant material will consist of smooth cordgrass and will be planted throughout the restoration area. The remaining 25 percent of plant material will be divided evenly between saltmeadow and big cordgrass, and will be planted on the higher elevations of the restoration bottom and along the base of the excavation slopes. A Geosyntec wetland ecologist will be present on-site to provide plant installation oversight.

In order to buffer the restored salt marsh from surrounding land uses, SLNG proposes to establish a 50-foot perpetually protected vegetated buffer (**2.51 acres total**) to further protect the salt marsh restoration area and preserve the riparian habitat functions for wildlife. By enhancing the upland buffer with the selected shrub and tree species presented in **Table 5** SLNG will be enhancing upland habitat structure and wildlife forage surrounding the EITSMMA.

## **2.7 Maintenance Plan**

The mitigation area will be protected against unwarranted encroachments during and following construction activities by the posting of signs. Signs will be placed at an appropriate height and spaced close enough together to provide an uninterrupted visual boundary. Signs will be a minimum of 8-inch width x 11-inch length, constructed of durable weather resistant material, properly maintained, and will remain posted for perpetuity. The signs shall state: "Salt Marsh Mitigation Area, No Trespassing", or other appropriate phrase, which must be approved by the sponsor prior to posting. No fencing off of the mitigation area is proposed. Annual monitoring will identify the need for control of exotic vegetation and/or nuisance animals. Existing roads will be maintained during the monitoring period in order to allow access for site work and inspections.

## **2.8 Performance Standards**

The sponsor will utilize the applicable performance standards and success criteria, as outlined in the Mitigation Metrics and Performance Standards (Appendix 10 of the new

banking guidance), for the mitigation site and thoroughly discuss how these criteria will be used to document annual and final success.

The restoration and enhancement efforts will be considered successful and complete if, at the end of the 5-year monitoring program, the vegetation present within each plot is dominated by saltwater species including smooth cordgrass and/or big cordgrass or other native tidal marsh vegetative community. Demonstration of success and milestones are as follows:

- Year 1: Demonstrated Improvement in Vegetation (10% Coverage in 70% of Plots);
- Year 2: Demonstrated Improvement in Vegetation (20% Coverage in 70% of Plots);
- Year 3: Demonstrated Improvement in Vegetation (40% Coverage in 70% of Plots);
- Year 4: Demonstrated Improvement in Vegetation (50% Coverage in 70% of Plots); and
- Year 5: Demonstrated Improvement in Vegetation (58% Coverage in 70% of Plots). This metric is based on reference salt marsh average relative cover.

Annual performance criteria for hydrology, water chemistry and aquatic biology will be measured by the following metrics:

- Hydrology will be deemed successful if the hydrology function matches the reference site for parameters including degree, duration and periodicity of inundation annually. Note that with any tidally influenced system, the time and elevation of surface water will be different for each plot.
- The water chemistry parameters, principally dissolved oxygen, temperature and salinity will be with the natural variation of the reference marsh condition.
- Aquatic biology will be deemed successful annually based on utilization of the restored marsh by the same species as the reference marsh.

The success of the mitigation efforts will be easily determined by both the daily tide exchange recorded by monitoring wells, the vegetation establishment performance, water chemistry and documented utilization by aquatic vertebrates and invertebrates compared to the reference. The contiguous nature of the proposed EITSMMA will provide the highest success by maximizing the surface area of the restoration with the reference marsh.

Should all performance criteria for Year 5 be met before Year 5 (i.e., Year 3), the sponsor will discontinue monitoring and will request to have the USACE close the mitigation project, and transition the mitigation area to long-term management. In the case that only one or several parameters meet the performance criteria for Year 5 ahead of schedule (e.g., Year 3), the sponsor will continue monitoring all the parameters for one additional year (e.g., Year 4) or until the final year of monitoring until all the performance criteria are met. Once all Year 5 performance criteria are met, the sponsor will discontinue monitoring and will request to have the USACE close the mitigation project, and transition the mitigation area to long-term management. Documentation will be provided to the USACE in each annual report and should all parameters be documented to have met performance criteria prior to Year 5, the sponsor will request to conclude monitoring, have the USACE close the mitigation project, and transition the mitigation area to long-term management.

## **2.9 Monitoring Requirements**

The monitoring criteria will be based on five components of the mitigation site: restoration of tidal hydrology through excavation and exposure of the historical marsh surface, restoration of salt marsh vegetation (e.g., predominantly smooth cordgrass) with high marsh fringes, restoration of water quality, restoration of aquatic biology utilization, and vegetation enhancement of upland buffer with heavy seeded canopy species (e.g., oaks) and other native tree and shrub species (**Table 5**). Three monitoring wells will be installed in the new salt marsh to record inundation frequency and groundwater levels and will be compared to the reference salt marsh to illustrate that the hydrologic regime has been restored. Monitoring groundwater level will address hydrologic regime criteria for Appendix 10 (USACE, 2011). Hydric soils conditions if not already present are expected to develop rapidly once the historic salt marsh is re-exposed. Salt marsh vegetation survival and growth will be monitored using approximately 1-m<sup>2</sup> plots spaced on 5 meter centers on four established transects (**Figure 20a-b**). Relative abundance of vegetation using the point intercept method and

mean vegetation height within the plot will be collected. The upland buffer of the new salt marsh will be monitored per Appendix 10 of the new mitigation guidance (USACE, 2011). Elements to be monitored will be buffer vegetation and survival growth, buffer vegetation structure, percent cover of herbaceous layer, and litter.

Annual reports will be prepared in accordance with Regulatory Guidance Letter No. 08-03 dated 10 October 2008 and will be submitted after each year of monitoring, by the end of June and within 30 days of field data collection. Each report will document in detail the restored and enhanced vegetative and hydrologic conditions and will generally include executive summary, introduction, monitoring methods, plot data, photographs, etc. A copy of the annual reports will be provided to each member of the IRT.

#### **2.10 Long-Term Management Plan**

Compensatory mitigation projects must be designed, to the maximum extent practicable, to be self-sustaining once performance standards have been achieved. The project intends to be in compliance with the policy of the USACE that all mitigation sites be self-sustaining. This project has been designed to be self-sustaining by its reliance on natural biological, chemical and physical processes that are currently sustaining the existing and contiguous reference salt marsh. SLNG will be the long-term manager of the mitigation site, including upland buffer.

#### **2.11 Adaptive Management Plan**

SLNG has considered potential problems and the need for flexibility and responsiveness to address and correct such potential problems. Since the mitigation site will require grading to expose the historical marsh surface and replant it, along with enhancing the native composition of the upland buffer, the sponsor acknowledges the potential for future minor modifications. Changes that maybe required are replanting the salt marsh and/or upland buffer and addressing nuisance animal issues. Beyond these measures no additional modifications are anticipated. In addition, the sponsor fully acknowledges their responsibility for proposing and implementing adaptive management measures necessary to correct adverse impacts to the mitigation site that may occur from a catastrophic event (e.g., wildfire, drought, flood, tornado, acts of vandalism, or encroachment) throughout the monitoring period.

## **2.12 Financial Assurances**

SLNG has sufficient funds to implement, monitor and maintain as necessary the mitigation site at Elba Island. The proposed restoration efforts do not have a high degree of difficulty and have a high likelihood of succeeding due to the dependence on natural processes (e.g., having full tidal and ecological exchange due to being contiguous to a highly functioning existing salt marsh) to govern the restoration of the historical salt marsh. Due to the low degree of difficulty, the small size of the mitigation site and upland buffer no financial assurances are warranted for this compensatory mitigation project.

## **3. REFERENCES**

Shafer, D., Roberts, T., Peterson, M., and Schmid, K. 2007. A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing the Functions of Tidal Fringe Wetlands along the Mississippi and Alabama Gulf Coast. U.S. Army Corps of Engineers, Environmental Laboratory. Ecosystem Management and Restoration Research Program. ERDC/EL TR-07-2. 76 p.

U.S. Army Corps of Engineers (USACE). 2004. Standard Operating Procedures for Compensatory Mitigation: Wetlands, Open water and Streams. Savannah District, Regulatory Division.

USACE, 2011. Draft Guidelines to Establish and Operate Mitigation Banks in Georgia. Savannah District, U.S. Army Corps of Engineers.

Wilkes, R.L., Johnson, J.H., Stoner, H.T., and D.D. Bacon. 1974. Soil survey of Bryan and Chatham Counties, Georgia. U.S. Dept. of Agriculture-Natural Resources Conservation Service.

Zedler, J., Vivian-Smith, G., Callaway, J., Sullivan, G., Williams, G., and Desmond, J. 2001. Handbook for Restoring Tidal Wetlands. CRC Press, Boca Raton, FL. 439 p.

END OF EITSMMA FINAL PERMITTEE-RESPONSIBLE COMPENSATORY  
MITIGATION PLAN