PROPOSED COMPENSATORY MITIGATION PLAN
Proposed Shoreline Stabilization, Bulkhead Construction – 1 Finisterre Street
Rockport, Aransas County, Texas
USACE Permit No. SWG-2011-00880
March 04, 2016
September 21, 2016

I. Proposed Project

The applicant, Mr. John Nau proposes to place fill and construct a bulkhead with riprap for purposes of stabilizing his shoreline at the property address 1 Finisterre Street, Rockport, Aransas County, Texas. The project site is located at the eastern tip of the Key Allegro Subdivision in Aransas Bay. The applicant proposes to construct a new bulkhead approximately 24 feet bayward of the existing concrete-sack bulkhead. The proposed project will impact a total of 0.22-acres of sandy, unvegetated bay bottom. The proposed fill area has water depths ranging from -0.4 to -0.9 feet below mean high water. The fill material will consist of approximately 0.12-acres of clean fill soil between the existing and proposed bulkhead, approximately 0.02-acre of concrete bulkhead, and approximately 0.08-acres of riprap.

II. Objective of the Compensatory Mitigation Plan

A. *Method of Compensation.* The applicant proposes permittee responsible mitigation. No mitigation banks are available in the area. The 2008 Mitigation Rule states that, if no mitigation bank is available, "[c]ompensatory mitigation may be performed using the methods of restoration, enhancement, establishment, and in certain circumstances preservation. Restoration should generally be the first option considered because the likelihood of success is greater and the impacts to potentially ecologically important uplands are reduced compared to establishment, and the potential gains in terms of aquatic resource functions are greater, compared to enhancement and preservation." The objective of the compensatory mitigation plan is to provide assistance with the erosion of the shoreline at the Big Tree Unit of Goose Island State Park, Lamar, Aransas County, Texas to assure there is no net loss in the function and values of aquatic resources. As compensatory mitigation for the proposed impacts to unvegetated shallow water bay bottom, the applicant proposes to construct a 0.22-acre portion of a larger living shoreline project currently planned by the Harte Research Institute (HRI) for Gulf of Mexico Studies at Texas A&M University – Corpus Christi (TAMU-CC). TAMU-CC's HRI's mission is to advance the long-term sustainable use and conservation of the Gulf of Mexico through scientific research, public policy, and spreading knowledge about its ecosystem [http://www.harteresearchinstitute.org/the-institute].

TAMU-CC's HRI program, in coordination with Texas Parks and Wildlife Department (TPWD), is currently proposing an approximately 2,000 foot section of living shoreline at the Big Tree Unit of Goose Island State Park in Aransas County, Texas (Figure 1). The applicant and TAMU-CC will oversee all construction of the living shoreline, 0.22-acre restoration activities. TAMU-CC is beginning the necessary permitting for the larger living shoreline project and anticipates USACE permit issuance on or about April 2017. The applicant will work with the U.S. Army

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Corps of Engineers (USACE) and TAMU-CC to ensure that his shoreline stabilization project results in no net loss of aquatic resources.

Historically, the USACE has not required compensatory mitigation for impacts to this type of aquatic resource. Section 2.2.1 of the Final Environmental Assessment, Finding of No Significant Impact and Regulatory Analysis of the 2008 Mitigation Rule states that "[a]ctivities in open waters and certain other types of waters typically do not require compensatory mitigation." However, it is understood that estuarine shallow water habitat and submerged estuarine sand substrate in the project area have been identified as essential fish habitat (EFH) by the Gulf of Mexico Fishery Management Council (GMFMC) and the National Marine Fisheries Service (NMFS). Therefore, a permittee responsible mitigation project that contains all the elements of a complete mitigation plan as described in 33 CFR 332.4(c)(2) through (c)(13) of the Final Compensatory Mitigation Rule issued on April 10, 2008 will be provided and detailed herein.

B. *Manner in Which the Resource Functions of the Mitigation will address the Needs of the Watershed or Region.*

The shoreline along the Big Tree Unit has been eroding for the past 20 years and has lost over a 2.0-acre section of shoreline. It is the mission statement of Texas Parks and Wildlife "To manage and conserve the natural and cultural resources of Texas and provide hunting, fishing, and outdoor recreation opportunities for the use and enjoyment of present and future generations."

The proposed mitigation site construction will result in the restoration and re-establishment of a 0.22-acre living shoreline near the Big Tree Unit at Goose Island State Park. The construction of the living shoreline will offer high function and value for all species which utilize the shoreline ecosystem within the general project area. The functions to be provided are an increase in essential fish and bird habitat, erosion protection, a reduction of wave energy, shelter areas for fishery nurseries, stabilization of the shoreline, foraging, promotion of biodiversity, habitat and protection to infaunal organisms, improvement of water clarity, reduction of suspended sediment, erosion protection, and improvement of water quality. The applicant will be insuring the construction of 0.22-acre of living shoreline restoration and significantly contributing to a successful habitat restoration program within the local region.

III. Site Selection

The marshes, seagrass beds, tidal flats, oyster reefs, and open water habitats associated with Goose Island State Park are highly productive for the living marine resources in the St. Charles Bay and larger Aransas Bay system, including important commercial and recreational fisheries species. These habitats and the upland habitats on Goose Island State Park also provide feeding, roosting, and nesting habitat for other wildlife in the area, including several federal and state listed threatened and endangered species.

In an effort to identify suitable mitigation for the applicant's proposed project, the applicant was informed by TAMU-CC of their plans to construct a living shoreline along a significantly eroded

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shoreline of Goose Island State Park. The goal of the applicant's partnership with TAMU-CC HRI scientists is to determine and develop a mitigation site with a history of success. TAMU-CC HRI's oyster restoration program includes two sites within the Mission-Aransas Estuary: restoration of oyster reef near Lap Reef in Copano Bay and oyster reef restoration/shoreline protection near Goose Island State Park.

The applicant performed site reconnaissance in the general vicinity of the proposed living shoreline project on March 16, 2016. During the site reconnaissance survey, a detailed mapping of site elevations, boundaries of sensitive resources, as well as mean high water and annual high tide elevations were delineated.

In addition to the site reconnaissance survey, the applicant also evaluated current and historical aerial imagery to estimate the rate of erosion. The findings are provided in Figure 2. Since 1951 approximately 107.3-feet of shoreline erosion has occurred. This equates to an approximately 1.67-foot loss per year. TPWD staff and contractors compared aerial photography of Goose Island from 1969 and 2002 and determined that more than 2-acres has eroded from the southern shoreline during the 33 year time period. Further, the proposed mitigation also supports the goals and objectives of the Texas Wetlands Conservation Plan, the Seagrass Conservation Plan for Texas, and the Coastal Bend Bays Plan by conserving valuable fish and wildlife habitats and addressing shoreline erosion.

As proposed, the compensatory mitigation site is ecologically suitable for providing the desired habitat resource functions. As stated above, the mitigation area will provide valuable function and value to the Goose Island State Park shoreline via increase in essential fish and bird habitat, erosion protection, a reduction of wave energy, shelter areas for fishery nurseries, stabilization of the shoreline, foraging, promotion of biodiversity, habitat and protection to infaunal organisms, improvement of water clarity, reduction of suspended sediment, erosion protection, and improvement of water quality.

IV. Site Protection Instrument

The applicant intends to work with Goose Island State Park and TAMU-CC to ensure the 0.22-acre mitigation site is protected in perpetuity. The applicant proposes either a lease agreement with a state agency of a conservation easement will hold the 0.22-acre mitigation site in order to ensure the long-term protection of the mitigation site. This site protection instrument will be executed within 60-days of the start of mitigation site construction. The USACE shall have the right to enter and go upon the mitigation properties for purposes of inspection, and to take actions including but not limited to scientific or educational observations and studies, and collection of samples.

If acceptable to the USACE, landowner and TAMU-CC, the applicant will post signs near the 0.22-acre living shoreline upon construction completion to restrict recreational use. For example, the signs will read: "Restricted Area – Environmental Protection Zone."

V. Baseline Information (Impact and Mitigation Sites)

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A. *Ecological Characteristics of the Proposed Project Site.* The proposed bulkhead and associated riprap construction would permanently impact a 0.22-acre section of bay bottom which is composed of shell hash and completely devoid of vegetation. The location of this project is at the tip of Key Allegro Subdivision which receives very little protection from the predominant wind driven current from the south-southeast. This 0.22-acre unvegetated tidal area could possibly provide habitat for various marine fishery species though it is considered degraded and eroding.

B. *Ecological Characteristics of the Proposed Mitigation.*

NOAA is working to implement a more natural bank stabilization technique called "living shorelines." Living shoreline is a broad term that encompasses a range of shoreline stabilization techniques along estuarine coasts, bays, sheltered coastlines, and tributaries. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural "soft" elements alone or in combination with some type of harder shoreline structure (e.g. oyster reefs or rock sills) for added stability. Living shorelines maintain continuity of the natural land–water interface and reduce erosion while providing habitat value and enhancing coastal resilience. (NOAA website, accessed September 9, 2016.)

As discussed above, the proposed mitigation site is currently experiencing significant erosion. The installation of a living shoreline will prevent further erosion; thus protecting valuable adjacent habitat. The area where the 0.22-acre living shoreline will be constructed is unvegetated sandy bay bottom. The average existing elevation of the proposed living shoreline mitigation site is approximately -0.173 feet NAVD88. Currently, bayward of the proposed living shoreline mitigation a large, healthy, shoalgrass (*Halodule wrightii*) bed is present. Shoalgrass was observed from +0.036 feet NAVD88 to -2.874 feet NAVD88. The dominant bay bottom substrate was sand. Along the eroding shoreline, the mean high water elevation (+0.99 feet NAVD88) and annual high tide elevation (+2.65 feet NAVD88) were delineated. Landward of the proposed living shoreline mitigation site and above the mean high water elevation, an estuarine wetland is present.

Expected outcomes of living shorelines are shoreline protection, estuarine habitat creation in the intertidal, beach and subaqueous zones, and enhanced habitat services for fauna and flora communities. To date, there has been limited research on the ecosystem functioning of living shorelines, particularly for living shoreline projects in higher energy systems that include rock structure, such as marsh-sills (low "free standing" stone structures placed near the marsh shoreline). (Galveston Bay Foundation website, accessed September 9, 2016) The average erosion rate for the 367 miles of Texas coast is 4.1 feet per year. This high rate is attributed to increased human activity impact and natural processes. Coastal wetlands, especially estuarine and marine wetlands, are naturally altered by high energy events such as erosion and inundation from sea level rise and storms. The impacts of these processes may be magnified by climate change and shoreline armoring. (Texas General Land Office website, accessed September 9, 2016)

VI. Determination of Credits

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As recommended by the USACE's Interagency Construction Guidelines for Breakwaters and Shoreline Stabilization Structures, the applicant proposes to place clean riprap, free of toxic substances, at a 3:1 slope bay-ward of the proposed bulkhead. This will protect the integrity of the bulkhead, reduce reflective wave energy, and provide hard substrate for aquatic organisms to attach to. The Guidance also cites that the riprap provides shoreline protection and good quality fish and wildlife habitat. Examination of riprap material along neighboring bulkheads indicates that it is a preferred substrate for algae, sessile organisms, invertebrates and other species.

Regarding the compensatory mitigation component, it was brought to the applicant's attention by the USACE that perhaps partnering with Texas A&M-Corpus Christi's Harte Research Institute on one of their restoration projects would be considered for compensatory mitigation.

As mentioned above, the compensatory mitigation proposed by the applicant will occur in conjunction with a much larger living shoreline project conducted by TAMU-CC HRI. Construction of the 0.22-acre section of living shoreline will assure compensation at a 1:1 ratio of function and value for the shallow, unvegetated tidal waters that will be impacted.

VI. Mitigation Work Plan

The proposed living shoreline mitigation site is designed to provide sufficient aquatic habitat establishment compared to the impacted area, so that no long-term net loss of aquatic resources will occur. The mitigation will improve upon the existing eroding shoreline, which will stabilize the adjacent estuarine wetlands. The mitigation effort will result in a net gain in wetland function and value.

The mitigation site construction will be managed by TAMU-CC and will occur in conjunction with a larger living shoreline restoration effort. Currently, TAMU-CC is tentatively planning to start the living shoreline construction during the month of April 2017. Therefore, it is anticipated that the construction of the applicant's 0.22-acre mitigation will begin no later than one year of permit issuance.

The construction of the 0.22-acre mitigation site will be conducted by an accredited and licensed contractor with demonstrated, successful experience with similar projects. If the timing is appropriate, the applicant will likely coordinate the construction effort with TAMU-CC and utilize TAMUCC's selected contractor so that it is one simultaneous effort. The entire construction process will be closely monitored by a qualified representative of the permittee to ensure the contractor constructs the 0.22-acre living shoreline to permitted specifications. This representative will also assist with site access and tide planning to assure prop-washing damage does not occur, and to ensure any required best management practices (BMPs) are implemented and maintained.

The 0.22-acre living shoreline construction will occur near the intersection of Lamar Beach Rd. and 12th St. in Lamar, TX. The applicant's 0.22-acre mitigation will be constructed in conjunction with a larger shoreline restoration effort. The design consists of placing bagged oyster shell slightly forward of the shoreline to reduce wave energies and stabilize sediments for salt marsh plants. The total area will be 385-feet long by 25-feet wide, oyster bed to shoreline

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(Figure 3 & 4). This effort will be coordinated with a larger restoration effort involving oyster reef mounds of dimensions 30 yard x 1 yard created along the 1 meter depth contour parallel the shoreline to further provide shoreline protection functions.

VII. Monitoring Requirements

The 2008 Mitigation Rule and the USACE's October 10, 2008 Regulatory Guidance Letter "Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment, and/or Enhancement of Aquatic Resources" (RGL No. 08-03) govern compensatory mitigation for activities authorized by permits issued by the Department of the Army (33 CFR, Parts 325 & 332), including monitoring for success criteria.

The RGL states that "the monitoring period must be sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years [see 33 CFR, 332.6(b)]. If a compensatory mitigation project has met its performance standards in less than five years, the monitoring period length can be reduced, if there are at least two consecutive monitoring reports that demonstrate that success. Monitoring requirements may be waived upon a determination that the compensatory mitigation project has achieved its performance standards."

The applicant will monitor the 0.22-acre portion of the living shoreline in accordance with the monitoring requirements outlined in TAMU-CC's permit authorizing the 2,000 linear feet of living shoreline. Though this project is still in development, TAMU-CC has confirmed the project will occur and will result in 0.22-acre of compensatory mitigation as proposed here in. As such, the applicant expects monitoring requirements to be similar to the following:

The mitigation site will be monitored for function and value 60-days after the completion of construction and at 6 months, one, two, three, four, and five years from the date of construction completion. Monitoring efforts will include:

a. Photo documentation and narrative observations of pre-project conditions, installation activities, and post-project conditions immediately after installation.

b. Monitoring of the as-built breakwater conditions and crest elevations to document settlement.

c. Documentation of any oyster colonization of the breakwaters over time.

d. Monitoring of the percent coverage of shoreline marsh vegetation, marsh fringe width, and any resultant shoreline accretion behind the breakwaters.

e. Documentation of any unanticipated impacts or challenges (i.e. erosion or scour areas along the shoreline or breakwaters).

f. Documentation of any corrective actions that were taken to ensure long term project success.

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Monitoring reports will be submitted in writing to the USACE, Corpus Christi Regulatory Field Office within 45-days of completion of each monitoring event. These reports will list the monitoring requirements, performance standards, and evaluate whether the compensatory mitigation site has achieved these goals. A general statement will be included describing the condition of the sites.

VIII. Maintenance Plan

The proposed 0.22-acre living shoreline is not expected to require maintenance and is expected to sustain the typical dynamics of the St. Charles Bay System. However, if a storm event or other natural forces, within the monitoring timeframe (5 years) damage the 0.22-acre living shoreline, the permittee will make any necessary repairs as directed by the USACE.

IX. Performance Standards

a. The USACE shall be notified in writing upon the start and completion of the 0.22-acre mitigation construction effort. A monitoring effort will be conducted within 60-days following construction completion. A written report detailing the results of this effort shall be submitted within 45 days following the survey.

b. Each monitoring event: 60-days, six-months, one, two, three, four, and five-years will require documentation related to the function and value established by the construction of the 0.22-acre living shoreline. Photos of each monitoring effort will also be provided.

c. If the 0.22-acre mitigation site is void of function and value within two years following construction, the permittee will consult the USACE regarding remedial action. A written report detailing the results of this effort shall be submitted within 45-days following the survey.

d. If performance standards are not being met, an explanation of the difficulties and potential remedial actions proposed by the permittee, including a timetable will be provided to the USACE.

X. Long-Term Management Plan

Once the mitigation site has reached permitted success criteria and the USACE has signed-off on the completion of the monitoring effort, it is expected that the living shoreline will be self-sustaining. Because of the sites' location along the Goose Island State Park shoreline, which is owned and maintained by the State, it is expected to be preserved in perpetuity and not subject to damage from recreational or other activities.

XI. Adaptive Management Plan

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The mitigation success criteria, as outlined above, must be achieved for the mitigation requirements to be considered completed and successful. Should mitigation be determined to be unsuccessful by USACE personnel at the end of the monitoring period, the permittee will be required to take necessary corrective measures, as approved by the USACE. Once corrective measures are completed, the permittee's environmental consultant will notify the USACE and a determination will be made regarding success of the mitigation plan. In the event of a discreet storm event or other "Act of God", the permittee will not be required to bring the site up to performance standards.

XII. Financial Assurances

Financial Assurances for the mitigation site will be provided via either an escrow account or bond and will be financially based off the costs associated with the 0.22-acre mitigation plan as outlined above. The permittee will work with the USACE, and their environmental consultant to determine an appropriate escrow account amount or bond amount to ensure the completion of the mitigation plan, and the monitoring requirements.

It is anticipated that the third party holding the lease or conservation easement will provide any required maintenance after permit conditions have been met. The applicant will obtain from the third party the likely cost for future maintenance and the applicant will provide reasonable funds in the form of a letter of credit, or other financial instrument.

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LITERATURE CITED

Code of Federal Regulations, Processing of the Department of the Army Permits, Title 33, Chapter II, Part 325. 1999.

Code of Federal Regulations, Compensatory Mitigation for Losses of Aquatic Resources, Title 33, Chapter II, Part 332. 2008.

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Guidance for Considering the Use of Living Shorelines, 2015. NOAA. http://www.habitat.noaa.gov/pdf/noaa_guidance_for_considering_the_use_of_living_shorelines_2015.pdf

Living shoreline. 2016. Galveston Bay Foundation. http://www.galvbay.org/how-we-protect-the-bay/on-the-ground/living-shorelines/

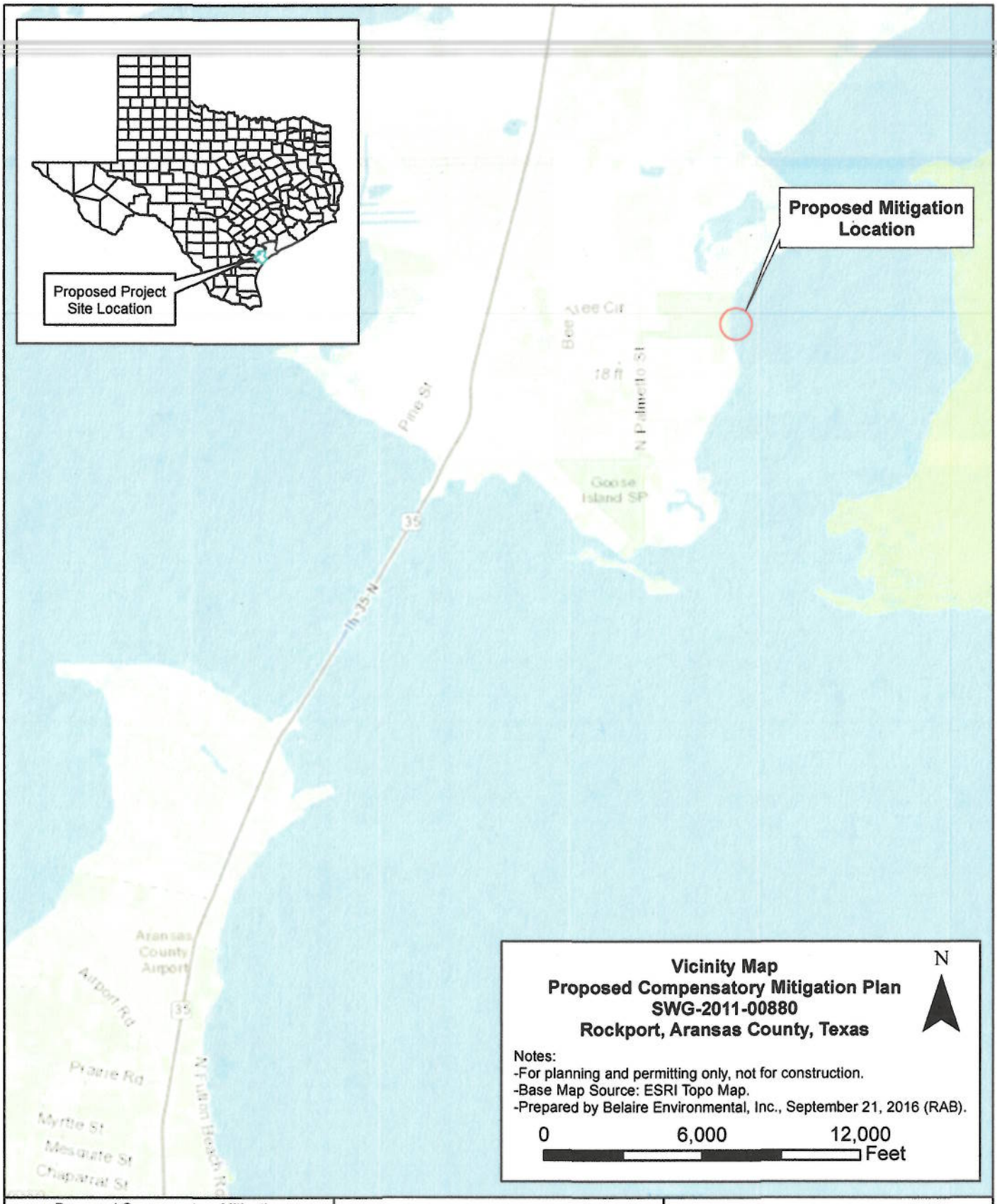
Stockton, S.L. Oct. 10, 2008. "Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment, and/or Enhancement of Aquatic Resources" U.S. Army Corps of Engineers, Regulatory Guidance Letter No. 08-03.

U.S. Army Corps of Engineers. 2008. "Final Environmental Assessment, Finding of No Significant Impact, and Regulatory Analysis for the Compensatory Mitigation Regulation". Director of Civil Works. Operations and Regulatory Community of Practice. Washington, DC 20314-1000.

List of Figures:

Figure 1:
Vicinity Map

SEP 2 1 2016



Vicinity Map
Proposed Compensatory Mitigation Plan
SWG-2011-00880
Rockport, Aransas County, Texas

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Notes:
-For planning and permitting only, not for construction.
-Base Map Source: ESRI Topo Map.
-Prepared by Belaire Environmental, Inc., September 21, 2016 (RAB).

0 6,000 12,000 Feet

Proposed Compensatory Mitigation
Proposed Bulkhead
Rockport, Aransas County, Texas

Applicant:
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1 Finisterre St.
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September 21, 2016 Page __ of __

Figure 2:
Shoreline Erosion Evaluation, Big Tree Unit, Goose Island State Park

SEP 2 1 2016

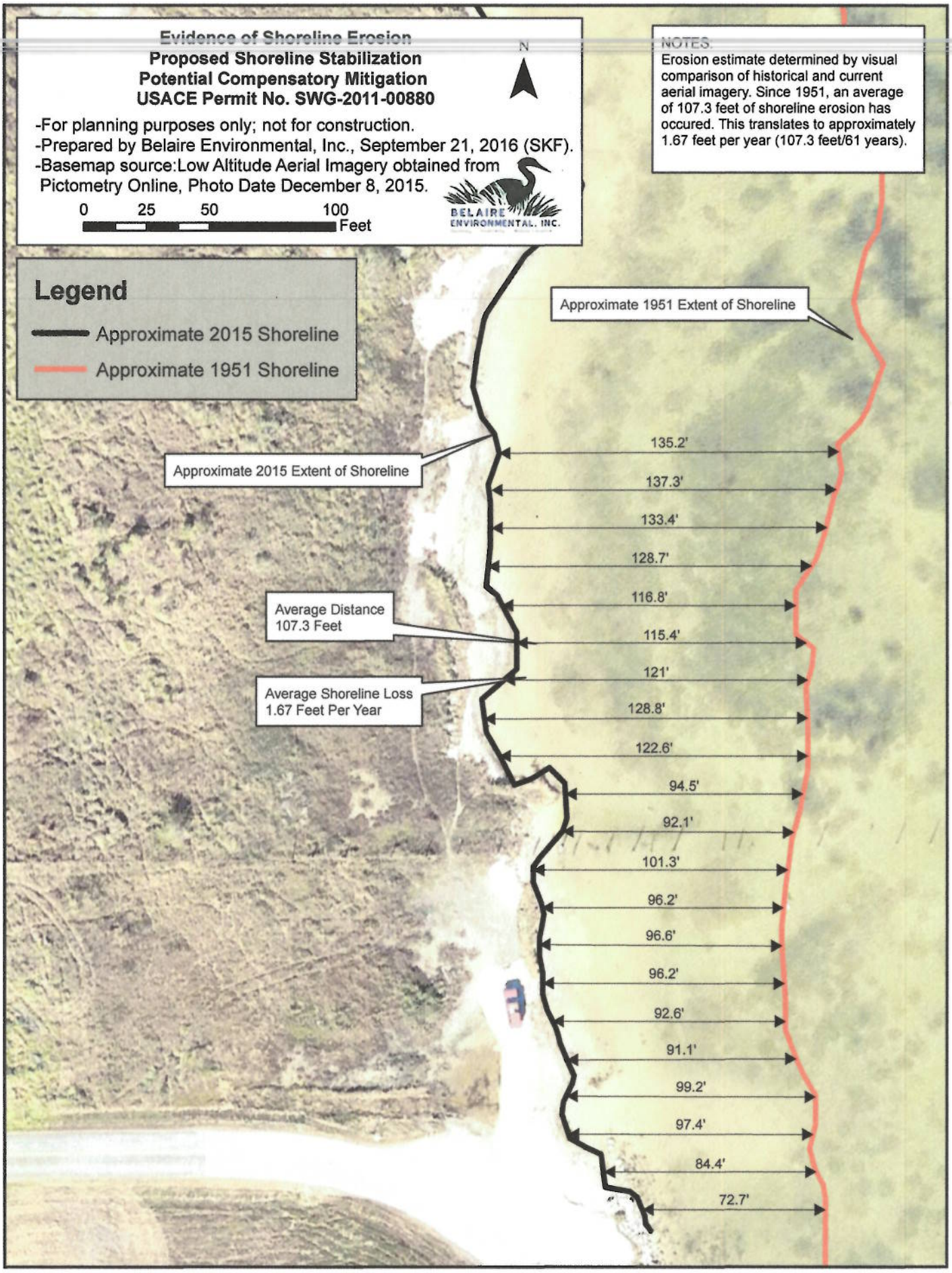
Evidence of Shoreline Erosion
Proposed Shoreline Stabilization
Potential Compensatory Mitigation
USACE Permit No. SWG-2011-00880
-For planning purposes only; not for construction.
-Prepared by Belaire Environmental, Inc., September 21, 2016 (SKF).
-Basemap source:Low Altitude Aerial Imagery obtained from Pictometry Online, Photo Date December 8, 2015.
0 25 50 100 Feet
N
BELAIRE ENVIRONMENTAL, INC.
NOTES:
Erosion estimate determined by visual comparison of historical and current aerial imagery. Since 1951, an average of 107.3 feet of shoreline erosion has occured. This translates to approximately 1.67 feet per year (107.3 feet/61 years).
Legend
Approximate 2015 Shoreline
Approximate 1951 Shoreline
Approximate 1951 Extent of Shoreline
Approximate 2015 Extent of Shoreline
Average Distance 107.3 Feet
Average Shoreline Loss 1.67 Feet Per Year
135.2'
137.3'
133.4'
128.7'
116.8'
115.4'
121'
128.8'
122.6'
94.5'
92.1'
101.3'
96.2'
96.6'
96.2'
92.6'
91.1'
99.2'
97.4'
84.4'
72.7'

Figure 3:
Mitigation Site Plan View

SEP 2 1 2016

Proposed Compensatory Mitigation
Proposed Bulkhead
Rockport, Aransas County, Texas

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September 21, 2016 page __ of __

Figure 4:
Mitigation Site Cross-Section

SEP 2 1 2016

Typical Cross Section
Proposed Compensatory Mitigation Plan: 0.18 Acre of Living Shoreline
USACE Permit No. SWG-2011-00880

Notes:
-For planning and permitting purposes only.
-Prepared by Belaire Environmental, Inc., September 21, 2016 (RAB).
-All elevations shown in feet, NAVD88.
-All dimensions and configurations are preliminary and subject to agency review.
-A pre-construction survey will be performed prior to beginning construction. The applicant will modify the site design, if necessary based on elevations.
-Depending on site conditions, the applicant may use netting, fencing, or similar means to stabilize the reef.
-Oyster shell placed above the mean high water elevation (+0.99 ft NAVD88) will likely not colonize with live oysters. However, they are expected to dissipate wind and wave energy for shoreline stabilization.

Proposed Bulkhead
Rockport, Aransas County, Texas

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September 21, 2016 page __ of __