

**ESTERO ISLAND SHORE PROTECTION PROJECT**  
**PROJECT DESCRIPTION**  
**CEC FILE NO. 21.504**  
**DECEMBER 7, 2021**

**I. PROJECT DEFINITION**

The Project provides erosion control and includes beach nourishment for approximately 6.5 miles of critically eroding gulf shoreline along Estero Island, Lee County. The Project boundary extends from the terminal groin to Florida Department of Environmental Protection (FDEP) Reference Monument R-207. The total length of shoreline within the Project boundary is 33,923 feet. The length of shoreline within the Project boundary that is designated critically eroding by FDEP is approximately 30,905 feet (terminal groin to R-200, R-203 to R-207). The length of shoreline that has an established Erosion Control Line (ECL) is approximately 24,177 feet (terminal groin to R-198). The length of shoreline within the Little Estero Island Critical Wildlife Area (CWA) is approximately 5,662 feet (R-202 to R-207). Measurements and lengths presented herein are based on Mean High Water (MHW) measurements conducted by Coastal Engineering Consultants, Inc. (CEC) in May 2021 as part of the design survey.

The Project is consistent with the State's Strategic Beach Management Plan (FDEP, 2021) including these components:

- Restore critically eroding beaches;
- Maximize the infusion of beach-quality sand into the coastal system;
- Implement projects that contribute most significantly to addressing the state's beach erosion problems;

The request is for a 15-year permit for the renourishment of the north and central beach segments and initial restoration and subsequent renourishment of the south beach segment utilizing offshore sand sources, use of approved upland quarries for hot-spot maintenance and post-storm recovery, and maintenance grading of historic ponding areas.

The activity is located on Estero Island, Lee County, along the Gulf of Mexico shoreline. Directions to the Project area include the following. Travel south on U.S. 41. Turn right onto Boy Scout Drive (2.0 mi) and head west. Turn left on Summerlin Road and head south- southwest (6.2 mi). Turn left onto Pine Ridge Road and head south then west (0.9 mi). Turn left onto FL-865/San Carlos Blvd and head south onto Estero Island (2.6 mi.).

**II. PROJECT JUSTIFICATION**

The proposed Project includes restoration of designated critically eroding beaches and their long-term maintenance and nourishment. Per Section 161.088 of Florida Statutes, "Because beach

erosion is a serious menace to the economy and general welfare of the people of this state and has advanced to emergency proportions... The Legislature declares that ... beach restoration and beach nourishment projects, as approved pursuant to s. 161.161, are in the public interest”.

### **III. HISTORY**

In December 2011, Lee County completed construction of the Estero Island Beach Restoration Project including sand placement along the north segment of the island and the addition of a terminal groin on the northern end of the beach fill.

The 2011 initial beach restoration project was constructed between April 2011 and December 2011. Approximately 403,000 cubic yards (CY) of sand were excavated and placed in the beach fill area between the terminal groin and R-182. The beach was constructed to a berm height of 2.9 feet NAVD88 over a shoreline distance of approximately 6,700 feet (1.3 miles). The design berm extended seaward at the 2.9 feet NAVD88 elevation an average of 236 feet and then sloped to the -1.2 feet NAVD88 elevation at a 15H:1V slope. The design then adjusted to a 20H:1V slope seaward until it connected with existing grade. All dredging was conducted in the Borrow Area located in the Gulf of Mexico approximately 1.4 miles southwest of the Project area. The terminal groin was constructed with approximately 3,630 tons of limestone rock for a length of 240 feet with a maximum crest width of approximately 12.7 feet. A single vinyl sheetpile row was installed along the centerline of the structure to make it sand tight (Lee County, 2003).

In 2016, the U.S. Army Corps of Engineers (USACE) dredged Matanzas Pass and placed dredged material (estimated quantity was 130,000 CY based on USACE Project Plans) in the nearshore area between R-182 and R-187.

In 2017, the West Coast Inland Navigation District and Lee County completed the initial dredging of the Big Carlos Pass Navigation Channel. Over 55,000 CY were excavated and placed between R-203 and R-206 (Humiston and Moore, 2018).

In 2017, Lee County imported over 2,000 CY via truck haul to address erosion due to Hurricane Irma along the Crescent Beach shoreline in the vicinity of R-181.

In 2020, the Town of Fort Myers Beach took over the local sponsorship from the County. The Town contracted with CEC to conduct a project performance assessment (CEC, 2020). Based on the assessment, the Town and CEC applied to the Lee County Tourist Development Council for funding and received a grant in the amount of \$300,000 to initiate the Project’s design and permitting specific to renourishment of the original fill limits along the north segment. The Town

and CEC successfully applied for funding assistance through the State of Florida's Beach Management Funding Assistance Program and the Town is set to receive \$150,000 for the design and permitting phase.

In 2020, Lee County imported over 4,000 CY via truck haul to address erosion due to Tropical Storm Eta along the Lynn Hall Beach Park shoreline in the vicinity of R-180.

In 2020, the USACE dredged Matanzas Pass and placed dredge material (estimated quantity was 124,000 CY based on USACE Project Plans) in the nearshore area between R-182 and R-187.

In 2020 and 2021, the Island was impacted by multiple tropical storms and hurricanes, most notably Tropical Storm Eta (2020) and Hurricane Elsa (2021). Multiple beachfront property owners located primarily in the south segment, which has never been restored, requested the Town include them in their beach management program. The Town engaged CEC as their consultant to design and permit the next renourishment project as well as expand the beach management program to include all of the designated critically eroding beach segments on Estero Island.

#### **IV. PROPOSED ACTIVITY**

##### **A. North Segment (Terminal Groin to R-182)**

Based on eight years of monitoring results and CEC's project performance assessment, the 2011 project has performed well. The background erosion rate was measured equal to approximately 20,000 CY/YR. The updrift and downdrift beach segments adjacent to the beach fill limits were generally accretional due to the spreading of the beach fill alongshore as well as the beneficial use of the maintenance dredging of Matanzas Pass. There were no documented adverse impacts from the terminal groin or from dredging the Borrow Area (CEC, 2020).

CEC performed cross-shore sediment transport modeling utilizing SBEACH to analyze the existing conditions along Estero Island and determine the optimal beach width to provide storm damage reduction benefits for the 25-year design storm. Based on the modeling CEC selected 75 feet as the design beach fill width noting the majority of the existing shoreline is on the order of 75 feet as measured during the May 2021 design survey. Utilizing the pre- and post-construction surveys and monitoring results, CEC computed the average initial profile equilibrium adjustment equaled 60 feet, and the 9-year background erosion averaged approximately 10 feet per year. The Town desires a 10-year renourishment interval. Combining the design width (75 feet), advanced nourishment (100 feet), and equilibrium profile adjustment (60 feet) totals 235 feet.

The berm crest elevation of 3.2 feet NAVD88 was established by conducting a sea level change analysis which resulted in raising the 2011 crest elevation of 2.9 feet NAVD88 by 0.3 feet. The design template slopes include a 200H:1V beach berm slope, a 15H:1V seaward slope from the crest to approximate mean low water (MLW), and a 20H:1V slope below MLW. Based on the 2021 design survey, the volume for the north segment was computed equal to 276,000 CY.

#### **B. Central Segment (R-182 to R-200)**

CEC applied the results of their analysis for the north segment to the central segment. The model results for the central beach profiles indicate the majority of the beach currently provides the storm damage reduction benefits for the design storm thus the 75-foot wide design template was adopted for the central segment. During the original shore protection project design and permitting, the ECL was established along the Island extending to approximately R-198. While the original fill limits ended at R-181.5, the routine maintenance dredging and beneficial use of dredge spoil has benefited this shoreline segment. The average shoreline change rate has been net accretional, averaging 7 to 8 feet per year. CEC recommends using 1 foot per year of erosion for the advanced nourishment and adopting 60 feet from the north segment analysis to account for equilibrium profile adjustment. Combining the design width (75 feet), advanced nourishment (10 feet), and equilibrium profile adjustment (60 feet) totals 145 feet. The template berm and slopes are the same as the north segment. Based on the 2021 design survey, the volume for the central segment was computed equal to 338,000 CY extending to the southern end of the ECL.

From the southern limit of the ECL (~R-198) to R-200, the Town desires to permit placement of sand (ebb shoal sand source or FDEP approved upland sources) to fill in low-lying “ponding” areas above MHW only. That is, there is no proposed placement of sand seaward of existing MHW. Subsequent work may include maintenance grading to restore a smooth profile of uniform grade from the existing vegetation line / armoring line to MHW. As an optional alternative to address the “ponding” issue, the Town desires to permit regrading of the existing beach landward of MHW.

#### **C. Non-Designated Segment (R-200 to R-203)**

Currently, the shoreline segment between R-200 and R-203 is not designated by FDEP as critically eroded or non-critically eroded beach (FDEP, 2020). The Town respectfully requests the FDEP review the MHW data from the 2010 pre-construction survey to the May 2021 design survey tabulated below (Table 1) and designate the reach from R-200 to R-203 as critically eroding. Bridging this short gap along Estero Island will benefit the overall performance of the renourishment, and provide additional storm damage reduction benefits. Lastly, it will enhance the north end of the CWA.

Sand placement from R-200 to the northern boundary of the CWA (~R-202) is also proposed to fill in low-lying “ponding” areas above MHW only with subsequent maintenance grading. There is no proposed placement of sand / grading seaward of MHW. As an optional alternative to address the “ponding” issue, the Town desires to permit regrading of the existing beach landward of MHW.

Table 1. MHW Positions from R-200 to R-203 for 2010 to 2021

<b>Monument</b>	<b>MHW (FT) March 2010</b>	<b>MHW (FT) May 2021</b>	<b>Average Change (FT/YR)</b>
R-200	812.0	836.6	+2.2
R-201	1315.0	1303.0	-1.1
R-202	947.0	876.0	-6.4
R-203	490.0	398.7	-8.2
<b>Average</b>			<b>-3.3</b>

**D. South Segment (R-203 to R-207)**

CEC also applied the results of their analysis for the north segment to the south segment. While some portion of the south segment beach is in good condition, the reach from R-203.5 to R-204.5 has been extremely erosional and little to no dry beach remains along multiple properties. The model results indicated the 75-foot design width would provide the desired benefit except in this reach, where an additional 40 feet of width was added to achieve the design goal. Utilizing the monitoring data, CEC computed the background erosion averaged approximately 11 feet per year. Combining the design width (75 feet), advanced nourishment (110 feet), and equilibrium profile adjustment (60 feet) totals 245 feet plus an additional 40 feet at R-204. The template berm and slopes are the same as the north and central segments. Based on the 2021 design survey, the volume for the south segment was computed equal to 316,000 CY.

**E. Non-Designated Segment (R-207 to R-210)**

Currently, the shoreline segment between R-207 and R-210 is not designated by FDEP as critically eroded or non-critically eroded beach (FDEP, 2020). The Town respectfully requests the FDEP review the MHW data from the 2010 pre-construction survey to the May 2021 design survey tabulated below (Table 2) and designate the reach from R-207 to R-208.5 (end of CWA) as critically eroding. Extending this designation will provide the opportunity to address restoration of the CWA in the future if warranted.

Table 2. MHW Positions from R-207 to R-210 for 2010 to 2021

<b>Monument</b>	<b>MHW (FT) March 2010</b>	<b>MHW (FT) May 2021</b>	<b>Average Change (FT/YR)</b>
R-207	509.0	320.2	-16.9
R-208	694.0	616.0	-7.0
R-209	693.0	910.4	19.5
R-210	409.0	1101.7	62.0

**F. Borrow Area**

Based on the 2021 survey, the originally permitted Borrow Area located within the Matanzas Pass ebb shoal complex has over 1 MCY of available volume. It is anticipated that with shoaling between the monitoring survey and time of construction, there will be sufficient volume for the initial event. Subsequent renourishment events will require identification of additional offshore borrow areas. The Town contracted with the CEC team to conduct a detailed level geophysical and cultural resource investigation of the Borrow Area concurrent with the sediment pipeline corridor investigations. No areas of potential hardbottom exposure were resolved within the borrow area or its buffer by the side scan sonar or subbottom profiler. These data are currently being reviewed by the Team’s marine archaeologist. At this time the buffers that were instituted for the original project have been retained. If upon review of these data changes are recommended by the Team’s marine archaeologist, a revised Borrow Area plan will be provided.

**G. Pipeline Corridors**

The CEC team conducted a detailed level geophysical and cultural resource investigation within two sediment pipeline corridor alignments, the first extending from the borrow area directly to the beach fill in the vicinity of R-178, the second extending from the borrow area to the south beach fill in the vicinity of R-204. The results of this investigation indicate that numerous side scan sonar targets and magnetic anomalies exist within and proposed corridors. The vast majority of the targets and anomalies detected during this investigation are fairly small and not associated with any recognizable manmade features. Several alignments of magnetic anomalies were detected crossing the corridors. There are no NOAA charted utilities crossing the areas investigated. Preliminary background research suggests that the alignments crossing the corridors may be associated with abandon telegraph cables in the area. No areas of possible hardbottom exposure were mapped within the R-204 corridor by the side scan sonar or subbottom profiler. (OSI, 2021).

## **H. Benthic Surveys and Hardbottom Investigations**

### **Borrow Area and Pipeline Corridors**

A diver verification survey of benthic habitats adjacent to the Borrow Area and proposed sediment pipeline corridors was conducted. Patchy seagrass (*H. wrightii*) had been identified on adjacent shoals during the original borrow area development. The purpose of the current field survey was to verify seagrass presence/absence adjacent to the borrow area and if present, to map the extent of adjacent seagrass bed/patch edges. Seagrass was not observed at any of the cross-shore transects along the historic seagrass bed edge within 1,000 ft (305 m) of the Borrow Area limits or two transects which extended into the interior of the Borrow Area. The only seagrass observed was a solitary 32 sq. ft (3 sq. m) patch of *H. wrightii* more than 1,700 ft (518 m) from the proposed borrow area (CEG, 2021).

Anomaly alignments from the magnetometer survey and an unknown signature from the side scan survey at the landward end of the corridor were recommended for diver verification. The magnetic anomalies had no correlating sidescan or subbottom signatures. The nearshore signature in the sidescan survey was presumed to be “noise” but needed diver verification to verify the absence of exposed hardbottom. The bottom along the three transects within the submerged sediment pipeline corridor was unconsolidated sediment with occasional bivalve shell deposits. The two anomaly alignments showed no evidence of the source of the magnetic signature on the sediment surface. No emergent sessile fauna or exposed hardbottom were observed. No objects with magnetic signatures were observed, and seafloor anomalies in the side scan sonar data likely resulted from transitions between sandy bottom and bivalve shell deposits (CEG, 2021).

### **Estero Island Nearshore Zone**

The nearshore mapping extended along the Estero Island shoreline south of the historic beneficial use placement site for the Matanzas Pass maintenance dredging, extending for approximately 22,400 feet, within a swath extending approximately 400 to 1,100 feet offshore of the Island. Soundings, side scan sonar imagery and subbottom profiling data acquired in the Project area were reviewed with the focus to identify and map areas of potential hardbottom exposures on the seafloor. Analysis of the data along with the results of limited push probing performed during the survey found no apparent signatures of hardbottom exposure on the seafloor (OSI, 2021).

## **I. Upland Sand Sources**

FDEP approved upland sand sources are proposed to address hot-spot maintenance or assist with post-storm recovery efforts and filling in ponded areas. Large scale mining operations within the vicinity of the Project area include but are not limited to Stewart Mining Industries’ Immokalee Mine, Vulcan Materials Company’s Witherspoon Mine, E.R. Jahna Industries’ Ortona Mine, and

CEMEX Lake Wales Mine. The proposed source will be chosen per competitive bidding and will be required to meet the specifications contained in the approved Sediment QA-QC plan.

#### **J. Dune Management Plan**

The Town proposes to incorporate at grade dune plantings upon completion of construction consistent with the Fort Myers Beach Dune Management Plan for beach segments to be restored / renourished without existing dune vegetation subject to receipt of construction easements by the private property owners.

#### **K. Beach Regrading**

The Town requests the authorization to regrade the entire beach fill limits, outside of shorebird and sea turtle nesting seasons, to address “ponding” areas in the future as a maintenance activity.

### **V. CONSTRUCTION DETAILS**

#### **A. Construction Methods**

The Town proposes to permit the use of a hydraulic cutterhead dredge for excavation of the Borrow Area. Cutterhead dredges utilize a rotary excavating bit to loosen the sediment. The bit or cutter is located on the end of an arm (the ladder) that is hinged off the forward end of the dredge. The ladder can be maneuvered vertically to control its depth and the dredge and ladder maneuvered laterally and fore/aft using anchors deployed off the forward quarters in combination with vertical spuds. The loosened slurry is pumped up the ladder to a large suction pump in the dredge hull, which also pumps it ashore through a submerged pipeline, often aided by a booster pump, through the sediment pipeline corridors. The dredged sediment will be discharged into the fill templates, where it will be graded using conventional earth moving equipment.

Two sediment delivery pipeline conveyance corridors have been delineated to connect the Borrow Area to the fill templates. They will be thoroughly surveyed for depth, sonar targets, and magnetic anomalies, and sited to avoid as many potential cultural resource targets as possible. The corridors do not require any excavation for pipeline installation, as the weighted sediment discharge pipelines will be placed directly on the sea floor.

The in-water work will be conducted using barge/vessel-based heavy equipment (vessel draft: 4’ to 8’ offshore, 3’ to 4’ inshore) with no blasting. The land-based work for beach fill construction, hot-spot maintenance, upland sand truck hauls, and maintenance grading would be conducted by bulldozers, excavators, front-end loaders, dump trucks, and off-road vehicles.

## **B. Environmental Protection**

The Town proposes to conduct natural resource protection programs during construction for sea turtles, shorebirds, water quality, manatees, and smalltooth sawfish. These programs will be conducted consistent with the most current and applicable State and Federal Reasonable and Prudent Measures for protection of the pertinent threatened and endangered species including the 2015 Statewide Programmatic Biological Opinion for Sea Turtles, and the 2013 Programmatic Piping Plover Biological Opinion which shall also apply to Red Knots. The proposed sea turtle protection plan consists of daily monitoring of turtle nesting, marking and avoidance, nest relocations, escarpment removal, lighting, and beach tilling corresponding to the state and federal requirements. The proposed shorebird protection plan includes monitoring of bird activity and nesting, passive abatement measures, and marking/maintaining/enforcing appropriate construction buffers during construction events. The proposed water quality protection plan contains standard water quality monitoring provisions for turbidity monitoring. The proposed manatee, swimming sea turtle, and smalltooth sawfish protection plans contain the standard construction conditions corresponding to the state and federal requirements.

## **C. Construction Schedule**

Dates are taken from Date of Notice to Proceed to be issued by the FDEP. Goal is to initiate construction of the Project spring of 2023.

- Mobilization: 45 days
- Dredge and Fill: 165 days
- Demobilization: 45 days

## **VI. EXISTING AND PROPOSED UPLAND USES**

Estero Island is developed and includes single family, multi-family, condominium residences, commercial uses, and beach parks (County and Town). The beaches within the Project Area are publicly accessible. No changes are proposed for the existing upland uses.

Primary structures along the Project area include the Terminal Groin constructed in 2011 (~C-174.2), Ft. Myers Beach Pier (~R-180.7), Crescent Beach Park seawall and walkovers (~R-181.2), and Newton Beach Park seawall and walkovers/ADA ramps (~R-192.3). Secondary structures include seawalls and dune walkovers for the residential and commercial properties.

## **VII. SUMMARY**

The Town and CEC are developing the Joint Coastal Permit Application for the Project based on CEC's preliminary design. If successful with designating the segment from R-200 to R-203 as

critically eroding, CEC will redesign the south end to extend the fill design to the northern boundary of the CWA (~R-202) while conserving volume.

The beach fill design template volume equates to 252,000 CY, the advanced nourishment volume to account for background erosion equates to 295,000 CY, and the volume to account for equilibrium profile adjustment equates to 383,000 CY. In total, up to 930,000 CY are proposed for Project construction. The previously utilized Borrow Area has over 1 MCY remaining and is proposed for the initial event. The Preliminary Opinion of Probable Project Cost including design and permitting, construction, construction phase services, and first year monitoring is approximately \$23,068,000.

Hot-spot maintenance and post-storm recovery will be implemented based on monitoring surveys utilizing FDEP approved upland sand sources, as will maintenance grading, through the life of the Permits.

## **VIII. REFERENCES**

Coastal Eco-Group. (2021). Estero Island Shore Protection Project: Diver Reconnaissance Surveys-Proposed Borrow Area and Submerged Pipeline Corridor.

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