FRANKLIN COUNTY

REPLY TO:
BOARD OF COUNTY COMMISSIONERS
33 MARKET STREET, SUITE 203
APALACHICOLA, FL 32320
(850) 653-8861, EXT. 100
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REPLY TO:
PLANNING & BUILDING DEPARTMENT
34 FORBES STREET, SUITE 1
APALACHICOLA, FL 32320
(850) 653-9783
(850) 653-9799 FAX

February 17, 2023

Maureen Klovers, Program Director, RESTORE Act
Office of Grants and Asset Management
U.S. Department of Treasury

Dear Maureen Klovers:

Please accept this letter as approval for the submission of Amendment #01 to the Franklin County Multi-Year Implementation Plan to the U.S. Department of Treasury, Office of Gulf Coast Restoration. The Franklin County Board of County Commissioners voted to approve the Amendment on February 7, 2023, after the completion of the 45-day public comment period.

Please contact Erin Griffith, Fiscal Manager/Grants Coordinator via e-mail at erin@franklincountyflorida.com or telephone at (850) 653-9783 Ext. 158 with any questions or concerns regarding Amendment #01 to the Multi-Year Implementation Plan.

Sincerely,

Ricky D. Jones

Ricky Jones
Chairman
Franklin County Board of County Commissioners

RESTORE ACT Direct Component Multiyear Plan Matrix — Department of the Treasury									OMB Approval No. 1505-0250
Applicant Name:	Franklin County Florida, Board of County Commissioners								
1. MULTIYEAR PLAN VERSION (INITIAL OR AMENDMENT NUMBER):	Amendment #01		**2a. DATE OF INITIAL MULTIYEAR PLAN ACCEPTANCE (mm/dd/yyyy):**			1/22/2020	**2b. DATE OF LAST MULTIYEAR PLAN ACCEPTANCE:**		1/22/2020
3. CUMULATIVE DIRECT COMPONENT ALLOCATION AVAILABLE FOR DISTRIBUTION TO APPLICANT:			$11,105,942.38	**4. TOTAL ALLOCATIONS PLUS KNOWN FUNDS NOT YET DEPOSITED IN TRUST FUND FOR DIRECT COMPONENT:**					$23,598,703.30
5. Primary Direct Component Eligible Activity Further Described in Application (Static Field)	**6. Activity Title (Static Field)**	**7. Location (Static Field)**	**8. Estimated Total Funding Contributions For Proposed Activity(ies)(refer to Instructions)**				**9. Proposed Start Date mm/dd/yyyy**	**10. Proposed End Date mm/dd/yyyy**	**11. Status (refer to Instructions)**
			8a. Direct Component Contribution	**8b. Other RESTORE Act Contribution**	**8c. Other Third Party Contribution**	**8d. Total Contribution**			
Restoration and protection of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast Region	County-wide Dune Restoration	Approximately 11 miles of Franklin County coastline. St. George Island (4.0 miles), Alligator Point (5.0 miles), Bald Point (1.2 miles) and Carrabelle Beach (0.8	$1,500,000.00			$1,500,000.00	09-2023	09-2025	Planning and design completed, move to construction phase
Coastal flood protection and related infrastructure	St. George Island Storm Water Drainage Improvements	The commercial district on St. George Island, which runs from 3rd St. East to 3rd St. West, from Gorrie Drive to Bayshore Drive, and covers approximately 70	$4,500,000.00			$4,500,000.00	11-2023	11-2025	Planning and design nearing completion, moving towards construction phase
Infrastructure projects benefitting the economy or ecological resources, including port infrastructure	Franklin County Municipal Solid Waste Transfer Station	255 FL-65, Eastpoint, FL 32328 (County-wide)	$2,500,000.00			$2,500,000.00	11-2023	11-2025	New project, not included in initial approved MYP
						$0.00			
						$0.00			
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						$0.00			
						$0.00			
						$0.00			
	12. ESTIMATED TOTAL FUNDING CONTRIBUTIONS FOR ACTIVITY(IES) (refer to Instructions)		$8,500,000.00	$0.00	$0.00	$8,500,000.00	**Please note: Grant awards may reflect non-material changes in proposed dates and estimated funding.**		

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 1505-0250. Comments concerning the time required to complete this information collection, including the time to review instructions, search existing data resources, gathering and maintaining the data needed, and completing and reviewing the collection of information, should be directed to the Department of the Treasury, Office of Gulf Coast Restoration, 1500 Pennsylvania Ave., NW, Washington, DC 20220.

RESTORE ACT Direct Component Multiyear Plan Narrative

Department of the Treasury

OMB Approval No. 1505-0250

Directions: Use this form for the Initial Multiyear Plan and any subsequent amendments to an accepted Multiyear Plan. For amendments, include only new and/or materially modified activities.

Multiyear Plan Version (Initial or Amendment Number):	Amendment #01
Date of Initial Multiyear Plan Acceptance:	1/22/2020
Date of Last Multiyear Plan Acceptance:	1/22/2020

Eligible Applicant Name:	Franklin County Florida, Board of County Commissioners
Name and Contact Information of the Person to be contacted (POC) on matters concerning this Multiyear Implementation Plan:	
POC Name:	Erin Griffith
POC Title:	Fiscal Manager/Grants Coordinator (Authorizing Official)
POC Email:	erin@franklincountyflorida.com
POC Phone:	(850) 653-9783 Ext. 158

NARRATIVE DESCRIPTION:

1. A description of each activity, including the need, purpose, objective(s), milestones and location. Include map showing the location of each activity.

Project #1: County-wide Dune Restoration

Need: In Franklin County's coastal communities including, St. George Island, Alligator Point, Bald Point, and Carrabelle Beach, the beach and dune system are the first line of defense from storms and in many places need re-building. This area, approximately 16 miles in length, has been damaged by several recent hurricanes in which most of the dune system was leveled in certain areas. The beach dune community on Alligator Point is generally in poor condition and/or completely absent in certain areas of dune stabilizing sea oats. The typical shoreline habitat on Alligator Point has been completely compromised to a relatively low elevation primary dune and narrow berm.

Purpose: In April 2022, MRD Associates, Inc. completed a County-wide Dune Restoration Study funded with Planning Assistance dollars provided by the RESTORE Act Direct Component Program. This study identified four (4) shoreline segments along approximately 11 miles of coastline in need of restoration and provided cost-effective solutions to rebuild and increase the stability of the dunes. Based upon the findings and recommendations of this study, the County intends to pursue the construction template dune and coastal hammock restoration at the two county beach park locations: St. George Island's Lighthouse Park (Current Cost Estimate: $215,782) and Carrabelle Beach Park (Current Cost Estimate: $228,944) and implement a county-wide dune vegetation project (Current Cost Estimate: $257,250). A varied vegetation footprint of between 6 and 7.5 feet could be installed along the toe of the dune areas along 11 miles of public beaches (the four project segments shown in figure 27, page 34, of the attached report consisting of four miles of St. George Island, .8 miles of Carrabelle Beach, 5 miles of Alligator Point and 1.2 miles of Bald Point). Native coastal vegetation would be placed on 18" centers in staggered rows for a natural look. Approximately 171,500 plants would be needed for the county-wide effort at an estimated installed cost per plant of $1.25. Franklin County would obtain written consent from interested private property owners for the plants to be installed along the dune line. As cited in the study 'Native dune vegetation provides significant benefits to beaches, dunes, uplands and wildlife (FDEP, 2022). Salt tolerant dune plants: build protective dunes by trapping and stabilizing wind-blown beach sand, reduce erosion losses by wind and storms, provide a buffer against storm surges and salt spray, provide shelter for wildlife, and block light pollution for nesting and hatchling sea turtles.'

Objectives: 1) Improve existing dune structures at public park facilities by increasing crest elevations, crest widths, and side slopes utilizing template dune restoration methods; 2) Improve existing dune structures by assisting beach-front property owners by planting vegetation to assist in the development and growth of the dunes on private property.

Milestones: 1) Prepare a final Scope of Work and Budget for Construction activities; 2) Prepare bid package meeting U.S. Treasury specifications and solicit bids for Construction Contractor; 3) Obtain permits for Construction from FDEP; 4) Select Construction Contractor and award Contract Agreement; 5) Notice to Proceed and Mobilization; 6) Complete Construction Scope of Work; 7) De-Mobilization; 8) Periodic Reports to Grantor; and 9) File Final Reports and complete Closeout of Grant Award Agreement

Location: Approximately 11 miles of shoreline in Franklin County, including the municipalities and shoreline segments of St. George Island (R-73 to R-94), Alligator Point (R-195 to R-222), Bald Point (R-229 to R-235), and 4) Carrabelle Beach.

Project #2: St. George Island Storm Water Improvements

Need: The commercial district on St. George Island, which runs from 3rd Street East to 3rd Street West, from Gorrie Drive to Bayshore Drive, has an existing storm water pond that provides treatment to approximately 25% of the commercial area. The appeal of the quaint coastal community has led to the increased desirability of the commercial area of St. George Island and there are several proposed developments underway that will increase the population, increase demand for commercial development, and therefore potentially increase storm water runoff as spaces that had previously been undeveloped become developed. Expanding storm water drainage capacity is necessary as the current storm water drainage facility is near capacity. Similarly, the commercial area is near sea-level which adds additional layers of difficulty with construction of storm water infrastructure. The County anticipates further development in the commercial district of St. George in the near future thus necessitating additional storm water drainage capacity and improvements.

Purpose: Franklin County contracted with Dewberry Engineers for the planning and design phase of the St. George Island Storm Water Improvements project. This phase is nearly complete and was funded with Planning Assistance dollars provided by the RESTORE Act Direct Component Program which determined the need for the installation of approximately 1,489 linear feet of 18" piping and 3,186 linear feet of 24" piping, and 3,270 square yards of asphalt patching and resurfacing, sod improvements, other required piping and restoration activities to complete the overall objectives of the St. George Island Stormwater Improvements project. The purpose of this project is to fund the construction phase of the St. George Island Stormwater Improvements project, which includes mentioned above to extend, enhance and construct storm water drainage facilities in order to increase the capacity for the commercial district of St. George Island.

Objective(s): 1) Increase storm water drainage capacity

Milestones: 1) Prepare a final Scope of Work and Budget for Construction activities; 2) Prepare bid package meeting U.S. Treasury specifications and solicit bids for Construction Contractor; 3) Obtain permits for Construction from FDEP; 4) Select Construction Contractor and award Contract Agreement; 5) Notice to Proceed and Mobilization; 6) Complete Construction Scope of Work; 7) De-Mobilization; 8) Periodic Reports to Grantor; and 9) File Final Reports and complete Closeout of Grant Award Agreement

Location: Zone 1: W Gorrie Drive, 1st Street W, W Gulf Beach Drive; Zone 2: W Pine Street to Franklin Blvd; Zone 3: W Bay Shore Drive to Franklin Blvd; Zone 4: 1st Street E; Zone 5: 2nd Street E to E Pine Street; Zone 6: E Pine Street to 3rd Street E [See attached map]

Project #3: Franklin County Municipal Solid Waste Transfer Station

Need: The existing 16.98 acre Franklin County Municipal Solid Waste Facility, permitted in 1995, serves all Franklin County municipalities and unincorporated areas, and approximately 8,452 housing units. On October 10, 2018, Hurricane Michael made landfall approximately 45 miles NW of Franklin County resulting in unprecedented damage to the Florida Panhandle, including Franklin County cities Apalachicola and Carrabelle, and coastal unincorporated areas of the County including Eastpoint, St. George Island, Lanark Village and Alligator Point. Debris left behind in the wake of Hurricane Michael took years of capacity off of the estimated useful life of the landfill. Franklin County estimates that within the next 7-9 years, the landfill will reach its full capacity which elevates this project to a community urgent need. Furthermore, due to Franklin County's proximity to the Gulf of Mexico, additional storms will further reduce capacity and lead to the closure of the landfill and eliminate the County's ability to process solid waste locally.

Purpose: Franklin County is coming to a crossroads whereas there are only two options to extend the capacity of the landfill: 1) the County will have to acquire or purchase a large tract of suitable land, permit and build a new landfill at an estimated construction cost of $10 to $15 million; OR 2) the County will construct a 'County Transfer Station' operation in lieu of a new landfill to dispose of waste at a private facility inland at an estimated cost of $2.5 million. A possible alternative site for a new landfill has not been identified and coastal property is expensive and in short supply. Franklin County proposes pursuing option #2 to construct a transfer station operation with RESTORE Act Direct Component Program dollars. In July 2022, Franklin County contracted with Dewberry

Engineers to conduct a Franklin County Municipal Solid Waste Transfer Station Feasibility Study in order to produce pre-construction design services. The Feasibility Study will estimate costs to permit and construct a Municipal Solid Waste transfer station and administrative building utilizing capacity, intended size and level of service of the proposed facility based on current and future tonnages; estimate the manpower and equipment operations costs to properly operate and maintain the proposed transfer station; and determine the estimated cost to transfer municipal solid waste to a selected disposal facility. Franklin County will use the results of the Feasibility Study to formulate a scope of work and budget for construction costs.

Objective: 1) Construct Municipal Solid Waste Transfer Station operation and administrative building; and 2) Extend current capacity (remaining useful life) of existing landfill

Milestones: 1) Prepare a final Scope of Work and Budget for Construction activities; 2) Prepare bid package meeting U.S. Treasury specifications and solicit bids for Construction Contractor; 3) Obtain permits for Construction; 4) Select Construction Contractor and award Contract Agreement; 5) Notice to Proceed and Mobilization; 6) Complete Construction Scope of Work; 7) De-Mobilization; 8) Periodic Reports to Grantor; and 9) File Final Reports and complete Closeout of Grant Award Agreement

Location: All construction activities will take place at the existing Central Landfill location at 255 Fl-65, Eastpoint, FL 32328. Please see attached the draft Site Plan included in the draft Feasibility Study conducted by Dewberry Engineers. Should the location change after the approval of this MYP Amendment, the final location maps and approved Site Plan will be included in the construction grant application for RESTORE Act Direct Component funding.

2. How the applicant made the multiyear plan available for 45 days for public review and comment, in a manner calculated to obtain broad-based participation from individuals, businesses, Indian tribes, and non-profit organizations, such as through public meetings, presentations in languages other than English, and postings on the Internet. The applicant will need to submit documentation (e.g., a copy of public notices) to demonstrate that it made its multiyear plan available to the public for at least 45 days. In addition, describe how each activity in the multiyear plan was approved after consideration of all meaningful input from the public and submit documentation (e.g., a letter from the applicant's leadership approving submission of the multiyear plan to Treasury or a resolution approving the applicant's multiyear plan).

The Franklin County Multi-Year Implementation Plan, Amendment #01 was posted to the County's website on November 10, 2022 and remained available until December 29, 2022. It was also available in hard copy format at the Franklin County Courthouse and Courthouse Annex buildings during the public comment period. In addition, the Multi-Year Implementation Plan, Amendment #01 was advertised in the Apalachicola The Times newspaper on November 10, 2023 and November 17, 2023 and the Panama City News Herald newspaper on November 10, 2023 and November 17, 2023.

One comment on the proposed Dune Restoration construction project was received from a member of the public and involved some suggested alternatives for consideration. County reviewed the comment and responded to the commenter directly with appreciation for the meaningful input. After consultation with the County's Engineer for the County Dune Restoration Study, it was decided that no changes to the proposed Scope of Work would be necessary. .

3. How each activity included in the applicant's multiyear plan narrative meets all the requirements under the RESTORE Act, including a description of how each activity is eligible for funding based on the geographic location of each activity and how each activity qualifies for at least one of the eligible activities under the RESTORE Act.

Project #1: County-Wide Dune Restoration

Geographic Requirement: This proposed project location includes approximately 11 miles of Franklin County coastline along the Gulf of Mexico, including St. George Island, Alligator Point, Bald Point and Carrabelle Beach.

Primary Eligible Activity: This proposed project was previously approved in the initial Multi-Year Implementation Plan as planning assistance for the RESTORE eligible activity of coastal flood protection and related infrastructure. However, after the completion of the County-Wide Dune Restoration Study, and the proposed construction elements and perceived benefits to the wildlife habitats within the proposed project area, we are re-classifying this project under the Restoration and protection of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast Region eligible activity. Please see figure 27, page 34 of the completed County-Wide Dune Restoration study, provided by MRD Associates, attached as 'Exhibit 1' for more detail on the proposed project scope and location.

Project #2: St. George Island Storm Water Drainage Improvements

Geographic Requirement: This proposed project location is St. George Island, which is an island and Census-designated place in Franklin County, FL. It is within walking distance to the coastline of the Gulf of Mexico.

Primary Eligible Activity: This proposed project was previously approved in the initial Multi-Year Implementation Plan as planning assistance for the RESTORE eligible activity of infrastructure projects benefitting the economy or ecological resources, including port infrastructure. However, as the planning and design work nears completion on the St. George Island Storm Water Drainage Improvements we are re-classifying this project under the coastal flood protection and related infrastructure eligible activity. Please see the St. George Island Storm Water Drainage Improvements planning and design documents, provide by Dewberry Engineers, attached as 'Exhibit 2' for more detail on the proposed project scope and location.

Project #3: Franklin County Municipal Solid Waste Transfer Station

Geographic Requirement: This proposed project location is Eastpoint, FL, located in Franklin County, and services households located along or near the coastline of the Gulf of Mexico.

Primary Eligible Activity: This proposed project is new, and has not been previously approved in prior Multi-Year Implementation Plans, but a description of the proposed project was provided to Franklin County's Treasury Program Analyst for eligibility review and classification with RESTORE Act requirements. It was determined by Franklin County, and confirmed by U.S. Department of Treasury, that this proposed project should be classified under the infrastructure projects benefitting the economy or ecological resources, including port infrastructure eligible activity.

4. Criteria the applicant will use to evaluate the success of the activities included in the multiyear plan narrative in helping to restore and protect the Gulf Coast Region impacted by the Deepwater Horizon oil spill.

Project #1 County-Wide Dune Restoration:

Project success will be measured by:

1. The template dune restoration project construction at the county-owned beach parks will help protect the coastline from erosion and added flood protection of critical public tourism infrastructure in areas prone to Gulf Coast storms; and
2. The sand fencing and planting of new vegetation's ability to create new wildlife habitats and protect existing habitats along the coastline.

Project #2: St. George Storm Water Drainage Improvements

Project success will be measured by:

1. The ability to re-route storm water to existing storm water facilities; and
2. The ability to extend the capacity of the existing storm water facilities.

Project #3: Franklin County Municipal Solid Waste Transfer Station

Project success will be measured by:

1. The transfer station operation's ability to extend the capacity and estimated useful life of the existing landfill site.

5. How the activities included in the multiyear plan narrative were prioritized and list the criteria used to establish the priorities.

Project #1: County-Wide Dune Restoration and Project #2: St. George Storm Water Drainage Improvements were prioritized based on their readiness to proceed forward to construction. The planning and design phases for the County-Wide Dune Restoration project is complete and planning and design of the St. George Island Storm Water Drainage Improvements is nearing completion. Final engineering plans are almost ready to be reviewed and set for approval by both the County and State regulatory agencies, such as Florida Department of Transportation (FDOT) and Florida Department of Environmental Protection (FDEP).

Criteria used: 1) Readiness to proceed to construction; and 2) Prevention of further damage or capacity reduction from Gulf Coast storm events.

Project #3: Franklin County Municipal Solid Waste Transfer Station is currently undergoing the planning and design phase under a task authorization outside of the RESTORE Program with Dewberry Engineers to determine a proposed Scope of Work and estimated construction costs to achieve the project objectives. This project was prioritized because of its community urgent need status.

Criteria used: 1) Engineering and design is underway; and 2) Prevention of further capacity reduction from Gulf Coast storm events.

6. If applicable, describe the amount and current status of funding from other sources (e.g., other RESTORE Act contribution, other third party contribution) and provide a description of the specific portion of the project to be funded by the RESTORE Act Direct Component.

Project #1 County-Wide Dune Restoration – The construction of this project is estimated to cost $1,500,000.00 and will be funded 100% with RESTORE Act Direct Component funding.

Project #2 St. George Storm Water Drainage Improvements – The construction of this project is estimated to cost $4,500,000.00 and will be funded 100% with RESTORE Act Direct Component funding.

Project #3: Franklin County Municipal Solid Waste Transfer Station and Administrative Building– The construction of this project is estimated to cost $2,500,000.00 and will be funded 100% with RESTORE Act Direct Component funding.

EXHIBIT 1

County-wide Dune Restoration Study

Franklin County, Florida
County-Wide Dune Restoration Study

Source: MRD Associates

PREPARED FOR:

Franklin County Board of County Commissioners
33 Market Street, Suite 203
Apalachicola, Florida 32320

PREPARED BY:

mrd associates, inc.
Coastal, Marina & Water Resources Engineering
543 Harbor Boulevard, Suite 204
Destin, Florida USA 32541
850.654.1555 • (fax) 850.654.0550
www.mrd-associates.com

April 28, 2022
MRD Project No. 21-495.001

Executive Summary

The purpose of this investigation was to identify cost-effective solutions to rebuild and increase the stability of the dunes throughout the Franklin County study shoreline. There are four (4) shoreline segments included in this study 1) St. George Island shoreline between R-73 to R-94, 2) Alligator Point between R-195 to R-222, 3) Bald Point between R-229 to R-235, and 4) Carrabelle Beach.

The primary constraints that determine the types of dune enhancement or restoration possible for a particular stretch of shoreline were: 1) the height of the existing dune system, 2) the width of the existing dry beach berm, 3) the location of upland structures and infrastructure relative to the shoreline, and 4) the level of storm protection provided by the existing beach and dune system. The greatest benefit of constructing a continuous, contiguous dune feature is to provide a barrier to storm events, reduce overtopping and flooding to the back dune areas, mitigating for historic dune erosion and creating wildlife habitat.

Three conceptual dune types (A, B and C) were developed through an iterative process by revising the crest height and width to optimize the level of storm protection while maintaining a minimum berm width. A fourth option consists of vegetation and sand fence where there is not an adequate amount of room to construct a dune feature. The conceptual dune designs included location, crest elevations, crest widths, and side slopes.

There are some shoreline segments where there is not adequate room between the existing structures and the shoreline to construct a dune feature. In these locations vegetation and sand fencing can be placed to assist in the development and growth of dunes. It should be noted that the sand fence requires periodic maintenance to ensure the optimal long-term performance to capture wind-blown sediments. The fencing must be pulled up before it is buried by 2 feet of sand. Otherwise, it will be difficult to impossible to remove the fence and be completely covered making the fence ineffective at trapping sand. Post and rope fencing is used to direct pedestrian traffic away from the dune and to dune walkovers, beach and vehicular accesses and paths. “Keep Off the Dunes” signs should also be installed at the toe of the dune to inform and educate beach goes on the ecological importance of dunes systems.

The conceptual construction templates may need to be refined to fit along a particular beach segment depending on the specific conditions existing at the time of final design. Updated surveys will document the existing grades that will be used to develop the construction templates and update construction volumes. The preliminary opinion of probable construction costs in 2022 dollars were $7,546,557 for St. George Island, $5,032,130 for Alligator Point, $1,199,884 for Bald Point, and $228,944 for Carrabelle Beach. A price escalation was applied to these unit costs to account for the increased fuel costs since these projects were bid. The preparation of a budget for grant applications or construction should include an adjustment in the unit costs based on the anticipated design, permitting and construction schedule.

The proposed activities seaward of the CCCL will require a CCCL permit from FDEP. FDEP encourages the placement of beach quality sand and native dune vegetation to restore and enhance dune systems, therefore permitting is relatively straight forward. A USACE permit should not be required provided the proposed activity will occur upland of the High Tide line. Construction may be limited to outside of sea turtle nesting season which extends from May 1 to October 30. Permits and authorization from FDEP can be obtained in approximately 6-months or less from submitting a complete permit application that will also identify the borrow area(s) and sand quality.

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Figure 28. Sea oats (*Uniola paniculata*) (top left), Bitter panicum (*Panicum amarum*) (top right), Beach Morning Glory (*Ipomoea imperati*) (bottom left) and Silver Sea Oxeye Daisy (*Borrichia frutescens*) (bottom right). 35

1.0 Introduction

In June 2021, the Franklin County Board of County Commissioners retained the services of MRD Associates, Inc. (MRD) to prepare a County-Wide Dune Restoration Study along the Franklin County shoreline. This work has been performed under Agreement for Professional Services, executed on June 6, 2021, and commenced on August 2, 2021, upon receipt of the Notice to Proceed.

Sand dunes are naturally occurring dynamic coastal features which are formed by the accumulation of wind-blown sand and beach over wash. Damaged sand dunes resulting from severe storms or human activity can be repaired or rebuilt to restore ecological habitat, increase storm protection and provide a source of sand to replenish the beach. A dune restoration project should be designed to mimic the existing or historic natural dune patterns along the shoreline. Sand fences and dune plants can be used to stabilize the dune and trap sand more rapidly.

Franklin County, Florida is located in the eastern portion of the Florida Panhandle along the Gulf of Mexico *(Figure 1)*. There are four (4) shoreline segments included in this study 1) St. George Island shoreline between the Florida Department of Environmental Protection (FDEP) Reference Monument R-73.5 to R-93.8 (4.0 miles, 21,100 feet), 2) Alligator Point between R-195 to R-222 (5.0 miles, 25,950 feet), 3) Bald Point between R-229 to R-235 (1.1 miles, 5,950 feet), and 4) Carrabelle Beach (0.15 miles, 800 feet). The purpose of this investigation is to identify cost-effective options rebuilding and increasing the stability of the dunes throughout the identified 10.25-miles of Franklin County shoreline.

One valuable set of information that is mentioned frequently throughout this document are the FDEP "R-Monuments" which are reference points spaced approximately 1,000 feet apart along the gulf shoreline. They are used to correlate survey data over time to monitor and are also used to reference the location of coastal features and projects.

2.0 Oceanographic Data

Beach and dune changes are dependent on tides, storm surge and storm events, and are described in the following sections.

2.1 Tidal Datums

The tides along the Gulf of Mexico are primarily diurnal, becoming mixed during the 1/4 and 3/4 moon phases. Tidal datums in Franklin County were obtained from the NOAA Tides and Current Station 8728669 located at Sikes Cut near R-52 on the south-western edge of St. George Island, Station 8728488 located at South Carrabelle Beach, and Station 8728261 located on Alligator Point near R-207 which provides the tidal datums for both Alligator and Bald Point. This data is summarized in ***Table 1***.

2.2 Storm Surge

Predicted storm surge elevations along the Gulf of Mexico were obtained from the reports entitled, "*Design Storm Surge Hydrographs for the Florida Coast*" (FDOT, 2003) and "*SBEACH High-Frequency Storm Erosion Model Study for Franklin County*" (FDEP, 2016). The range of Storm surge elevations for various return periods in Franklin Count are listed in ***Table 2***. The combined total storm tide includes the effects of wave and wind set-up, astronomical tides and pressure.

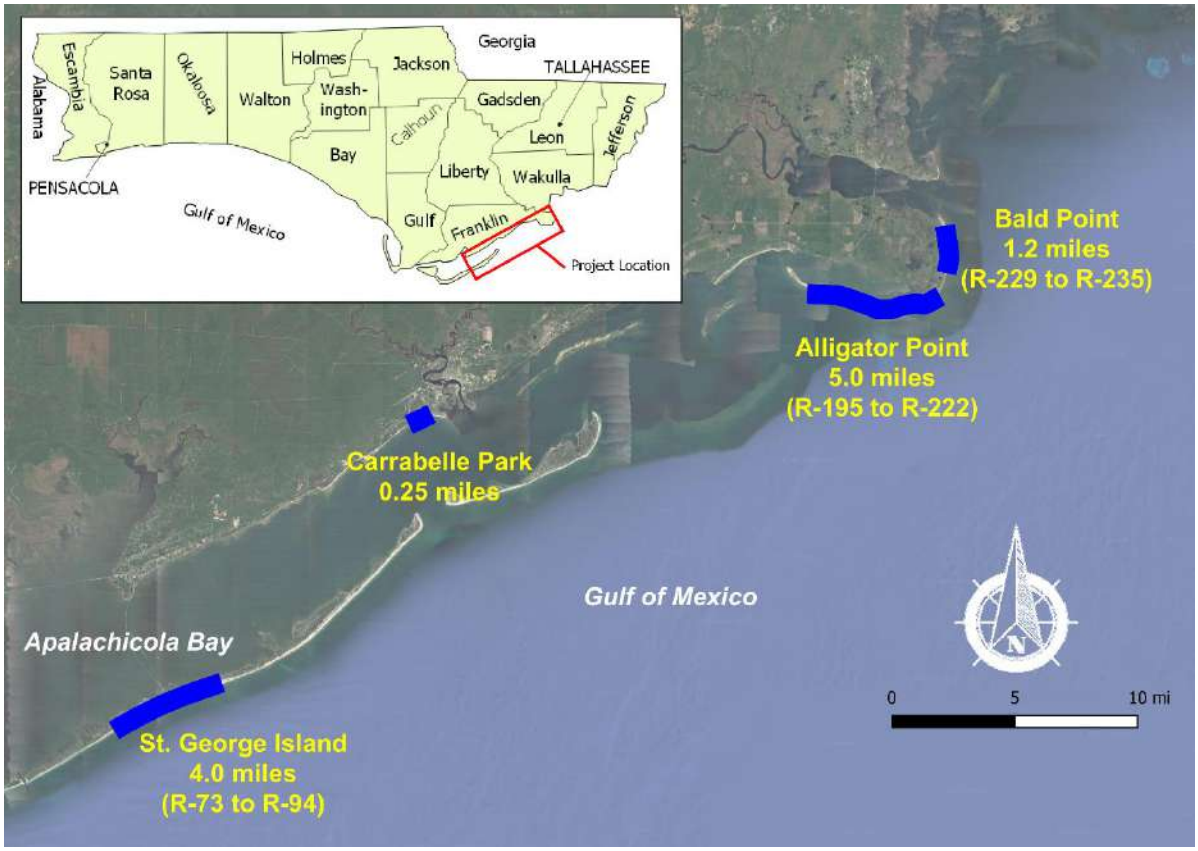

Figure 1. *Location map and project limits.*

Table 1. *Tidal datums along Franklin County, Florida . (feet, NAVD88).*

Datum	Sike's Cut	Carrabelle Beach	Alligator & Bald Point
Mean Higher High Water (MHHW)	+0.62	+0.99	+1.27
Mean High Water (MHW)	+0.39	+0.80	+1.05
Mean Tide Level (MTL)	-0.22	-0.03	0.07
Mean Low Water (MLW)	-0.83	-0.86	-0.92
Mean Lower Low Water (MLLW)	-1.35	-1.47	-1.50
Mean Tide Range	**1.22**	**1.66**	**1.97**

It should also be noted that there is an undefined correlation between return periods and hurricane categories. Return periods for a defined storm event is given as the probability of being equaled or exceeded in any one year (i.e., exceedance = 1/return period = 1/50 year = 0.02 or 2% chance per year) compared to a hurricane category which are based on the measured "Sustained Winds" in accordance with the Saffir-Simpson Hurricane Wind Scale.

Table 2. *Combined total storm tide level (feet, NAVD88) for various Return Periods.*

Return Period (years)	**R-90 (St. George Island)** (feet, NAVD88)	**R-210 (Alligator Point, Bald Point)**
50	+9.7	+10.6
30	+8.6	+8.8
25	+8.1	+8.4
20	+7.6	+7.7
15	+6.9	+6.9
10	+5.9	+5.8

2.3 Storm Events

Historical storm events (Tropical Storms to Category 5 Hurricanes) that passed within 150 nautical miles (NM) of Franklin County since 1996 were assessed for the two distinct time frames (1996 to 2008, 2008 to 2018), which also correspond to available survey dates. The purpose is to correlate the effects of storm events on the beach and dune system and trends in shoreline position and volume changes in Section 4.0. The following sections describe those storm events.

2.3.1 July 1996 to October 2008

Over this 12-year period, 20 named storms and one tropical depression passed within 150NM of Franklin County (NOS, 2021). Of the 20 named storms, four reached hurricane strengths: Danny in 1997 (Category 1), Earl in 1998 (Category 1-2), Gordon in 2000 (Category 1), and Dennis in 2005 (Category 2-3) (***Figure 2***). This was one of the most active storm periods over the last 40-years. This period also included Hurricane's Ivan (2004), Katrina (2005), Gustav (2008), and Ike (2008), while their tracks where not within 150NM's of the studies shoreline, their effects were still felt along the beaches of the Gulf of Mexico.

Hurricane Earl made landfall as a Category 1 hurricane near Panama City on September 5, 1998, located approximately 60-miles to the northwest of Franklin County. There was no storm tide data, but it was estimated that Hurricane Earl's conditions were typical of that of a 15- to 20-year storm tide (FDEP, 2006a). Hurricane Dennis was a Category 3 hurricane that made landfall over Santa Rosa Island (Navarre Beach) on July 10, 2005. Even though Franklin County was over 150 miles east of the center of the eye of Hurricane Dennis, gulf storm tides were around 8 to 10 feet (FDEP, 2006a) and 7 feet in Apalachicola, Florida (Beven, J., 2005). A storm tide line of +11.7 feet, NAVD88 was found on St. George Island. The storm had a major effect on the shoreline, with FDEP categorizing the erosion as Category IV, meaning major dune erosion with dunes receding greater than 10 feet or the dunes being completely removed (FDEP, 2006b).

In addition, five of the 16 Tropical Storms passed within 65 miles of Franklin County resulting in minor beach and dune erosion. These included Josephine (1996), Alberto (2002), Bonnie (2004), and Fay (2008). Frances (2004) crossed the Florida peninsula,

emerging in the Gulf of Mexico as a tropical storm, where it made a second landfall near St. Marks on September 6, 2004. FDEP classified the effects of the storm as Erosion Condition I (minor beach erosion), resulting in a small scarp on the beach (FDEP, 2004).

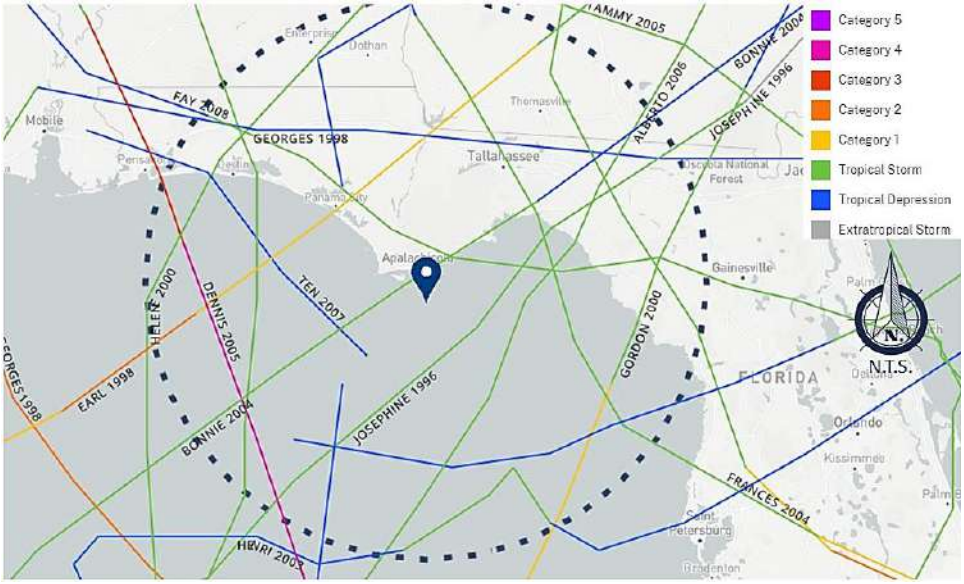

Figure 2. *Major storms within 150NM of Franklin County, Florida – 1996 to 2008.*

2.3.2 October 2008 to October 2018

Over this ten-year period, 12 named storms and two tropical storms passed within 150NM of St. George Island (NOS, 2021). Of the 12 storms, 2 reached hurricane strength: Hermine in 2016 (Category 1), and Michael (Category 5+) in 2018 (***Figure 4***).

Hurricane Hermine made landfall on September 2, 2016, near St. Marks as a Category 1 hurricane. The estimated storm surge was +5 feet, NAVD88. The coastal damage in Franklin County was most pronounced between Southwest Cape and Bald Point with road, rock revetment, and armoring damage (FDEP, 2017). Minor beach and dune erosion occurred as well along Alligator Point and St. George Island. Hurricane Michael made landfall 45-miles to the northwest of St. George Island near Tyndall Air Force Base on October 10, 2018, as a Category 5+ hurricane. FDEP categorized the erosion along St. George Island as Erosion Condition IV (major beach and dune erosion), along Alligator Point as Erosion Conditions II (minor beach and dune erosion) and III (moderate beach and dune erosion), and along Bald Point as Erosion Condition II (minor beach and dune erosion) (***Figure 3***). The storm tides from Hurricane Michael ranged from +8 ft to +10.6 feet, NAVD88 along St. George Island and from +8.8 ft to +10.7 feet along Alligator and Bald Points (FDEP, 2019). FDEP did not classify the erosion condition at Carrabelle Park but storm tides of 9 to 10 feet above sea level were measured which would have over washed the park. Extensive storm surge flooding and substantial over wash deposit occurred over the length of St. George Island. In addition, one (Colin in 2016) of the eight Tropical Storms passed within 65 miles of Franklin County resulting in only minor beach erosion.

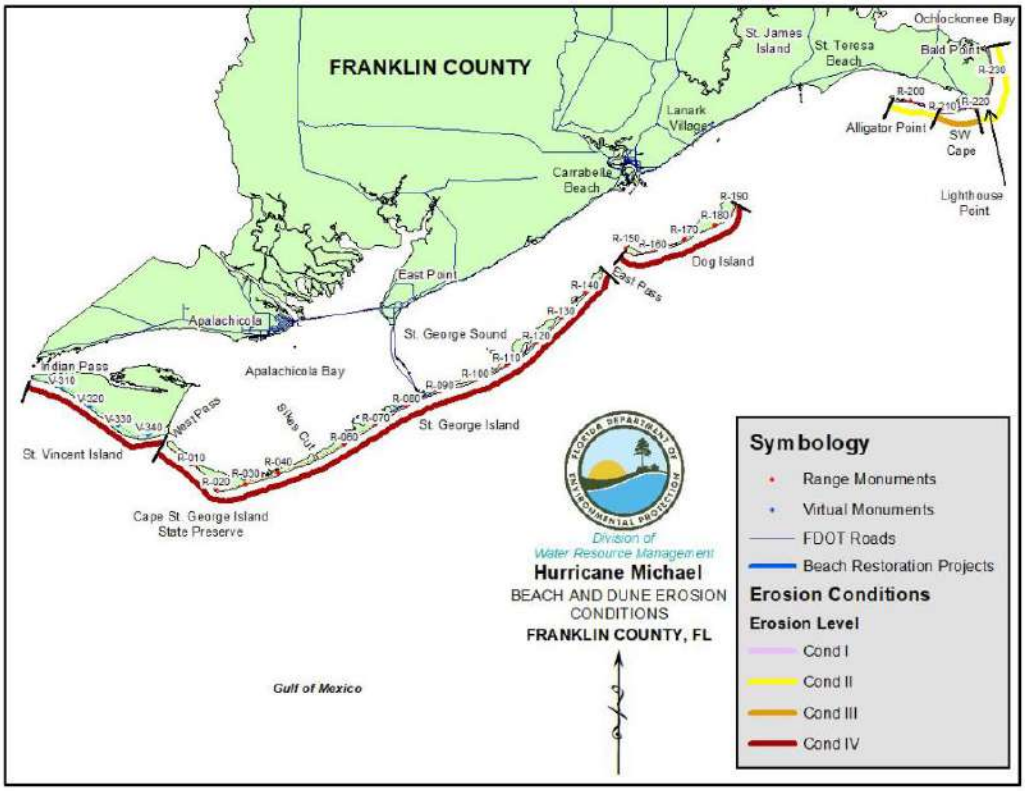

Figure 3. *Franklin County beach and dune erosion conditions from Hurricane Michael.*

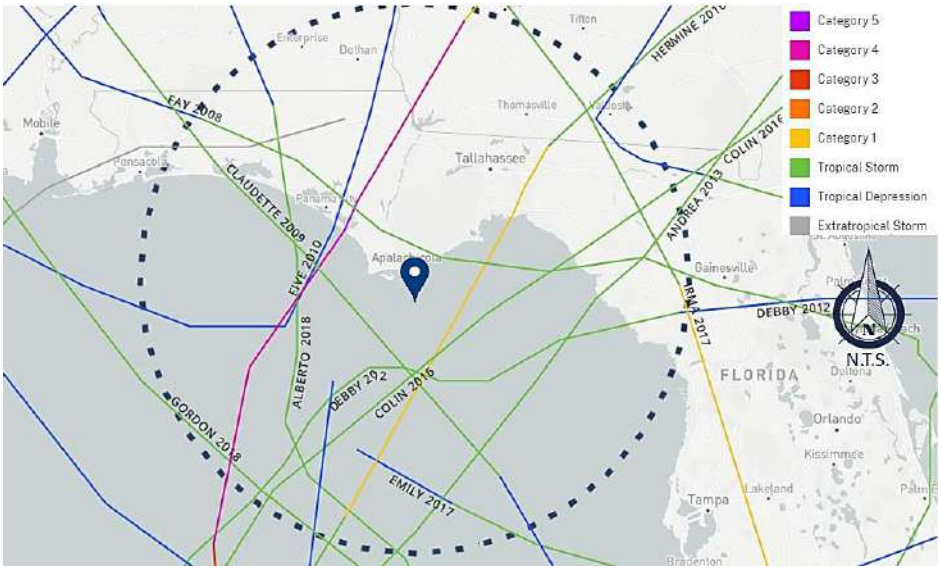

Figure 4. *Major storms within 150NM of Franklin County, Florida – 2008 to 2018.*

3.0 FDEP Shoreline and Profile Data

Historical and recent beach survey data at FDEP R-Monuments are used in this study to document and analyze shoreline position changes along three of the four separate study areas: 1) the St. George Island residential area (R-73 to R-94), 2) Alligator Point (R-195 to R-222) and 3) Bald Point (R-229 to R-235). These data sets are based on the FDEP R-Monuments which are reference points spaced approximately 1,000 feet apart along the gulf shoreline. These FDEP maintained monuments which are either physical monuments set into the ground or virtual locations are referenced to vertical and horizontal datums. They are used to correlate survey data over time to monitor various shoreline changes within the littoral zone and upland topography and are also used to reference the location of coastal features. This data is available from DEP's website: https://floridadep.gov/rcp/beaches-inlets-ports/content/historic-shoreline-database. The shoreline changes along the 1,500-foot Carrabelle Beach Park maintained by the County were based on historic aerials and LIDAR. The topography obtained in September 2021 by a drone did not delineate the MHW contour and was not used in this analysis.

3.1 Shoreline (MHW Line) Position Data

A historic shoreline position documents the horizontal location of the MHW elevation at one point in time. A comparison of such shoreline positions can suggest erosional (landward movement) or accretional (seaward movement) trends. For this investigation, the shoreline position was taken where the plane of the MHW elevation intersects the beach. FDEP provides a MHW line database which tabulates shoreline position based on historic beach profile surveys performed at DEP R-Monuments and covers the years selected in this study. These historic surveys have an accuracy in shoreline position within one (1) foot. Shoreline positions were analyzed for July 1996, Winter of 2008/2009, and May 2019. DEP does not have reference monuments nor shoreline position data for Carrabelle Beach. An analysis was done using LIDAR data from USGS and FDEM from the NOAA data access viewer over a 10-year period from July 2007 to May 2018 to achieve an understanding of the shoreline changes along the Park.

3.2 Historic Beach and Offshore Profiles

Historic beach and offshore survey data used in this analysis are used to document the dune volume changes above the MHW line to provide a reasonable estimate of episodic and long-term changes along the study limits. These vertical slices through the beach perpendicular to the shoreline are plotted in profile form at FDEP R-Monuments for shoreline and volume change analysis. Historic beach profiles include surveys from July 1996, Winter 2008/2009, October/November 2018, and May 2019. This study relied on existing survey data and no additional beach and offshore surveys were performed.

4.0 Shoreline Position and Volume Changes

This section presents the changes to the shoreline (MHW) position over the 22+ year period between 1996 and 2019, and dune volume changes between 2008 and 2019.

4.1 Shoreline Position Changes

The shoreline changes presented reflect the actual measured positions and rates based on the location of the MHW line at the time of the survey. The shoreline change at each R-Monument

was measured as the difference between the distance from the R-Monument to the MHW for the July 1996, Winter of 2008/2009, and May 2019 surveys. The survey over the winter of 2008/2009 completed St. George Island in October 2008, Bald Point in December 2008 and Alligator Point in January of 2009. ***Table 3*** through ***6*** list the total shoreline change, and yearly shoreline change rate during the three time periods (July 1996 to Winter of 2008/09, Winter of 2008/09 to May 2019, and July 1996 to May 2019) and ***Figure 5*** through ***7*** plot the shoreline changes rates in feet per year for 2008/09 to May 2019 (left axis).

The two LIDAR data sets (July 2007, May 2018) for Carrabelle Beach were used to calculate the shoreline changes at three shore perpendicular profiles: The Eastern and Western edge of the park and a central profile going through the existing restroom. This data is presented in ***Table 6***.

4.2 Dune Volume Changes

The dune volume changes are based on the measured loss or gain of sand measured from the estimated toe of the dune to the landward limits of observed change. The volume changes at each R-Monument were measured by comparing the Winter 2008/2009, and May 2019 surveys. ***Table 3*** through ***6*** lists the dune volume change rate (in cubic yards/linear foot/year) and ***Figure 5*** through 7 plot the volume change rates in cubic yards per linear foot per year over the 2008/2009 to 2019 time period (right axis). The LIDAR data was used to determine the volume change rate above the MHW line in Carrabelle Beach shown in ***Table 6***.

4.1 Critically Eroded Shoreline

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection (aka Beaches) has long recognized the erosive condition of the shoreline and as a result has designated certain beach segments of the Franklin County shoreline as "Critically Eroded" and "Non-Critically Eroded" (FDEP, 2021a). A "Critically Eroded" shoreline is "*where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost.*" A "Non-Critically Eroded" shoreline is where "*many areas have significant historic or contemporary erosion conditions, yet the erosion processes do not currently threaten public or private interests. These areas are therefore designated as non-critically eroded beaches and require close monitoring in case the conditions become critical*". The R-Monument ranges of critical erosion within the study area are listed in ***Table 7***.

The State of Florida may participate in erosion control projects as prescribed by Chapter 161 of the Florida Statutes and 62B-36 of the Florida Administrative Codes. According to Section 161.101(8), DEP *is authorized to pay from legislative appropriations specifically provided for these purposes an amount up to 50% of the actual costs of the approved project …*State funding is limited to projects located within Critically Eroded shoreline and the cost-share percentage is dependent on the spacing of beach accesses and number of parking spaces open to the general public.

Table 3. *St. George Island - Annualized shoreline (MHW line) position change (ft) and rates (ft/yr) and dune volume change rate (yds^3/lf yr).*

DEP Monument	1996 to 2008		1996 to 2019		2008 to 2019		
	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Dune Volume Change Rate (yds^3/yr)
R-73	-36.50	-2.98	-36.50	-1.60	0.00	0.00	-7.68
R-74	-31.67	-2.59	-30.33	-1.33	1.33	0.13	-11.39
R-75	-25.33	-2.07	-32.00	-1.40	-6.67	-0.63	-13.47
R-76	-11.33	-0.93	-9.00	-0.39	2.33	0.22	-12.74
R-77	-1.67	-0.14	-7.67	-0.34	-6.00	-0.57	-7.98
R-78	8.67	0.71	8.00	0.35	-0.67	-0.06	-4.88
R-79	18.67	1.52	10.33	0.45	-8.33	-0.79	-1.98
R-80	7.00	0.57	4.67	0.20	-2.33	-0.22	-0.92
R-81	-3.67	-0.30	1.67	0.07	5.33	0.50	-0.75
R-82	-10.00	-0.82	5.00	0.22	15.00	1.42	-4.75
R-83	6.33	0.52	18.67	0.82	12.33	1.17	-2.10
R-84	8.00	0.65	12.67	0.55	4.67	0.44	0.01
R-85	-4.67	-0.38	-10.67	-0.47	-6.00	-0.57	0.65
R-86	6.67	0.54	0.67	0.03	-6.00	-0.57	-0.54
R-87	36.33	2.97	15.67	0.69	-20.67	-1.95	-0.97
R-88	44.33	3.62	18.00	0.79	-26.33	-2.49	-0.02
R-89	35.33	2.88	8.33	0.36	-27.00	-2.55	-2.15
R-90	29.67	2.42	8.67	0.38	-21.00	-1.98	-4.57
R-91	31.33	2.56	22.67	0.99	-8.67	-0.82	-3.41
R-92	21.33	1.74	15.00	0.66	-6.33	-0.60	-3.08
R-93	17.67	1.44	21.67	0.95	4.00	0.38	-1.02
R-94	12.50	1.02	18.50	0.81	6.00	0.57	-0.28
Average	7.23	0.59	2.91	0.13	-4.32	-0.41	-3.82

Table 4 *Alligator Point - Annualized shoreline (MHW line) position change (ft) and rates (ft/yr) and dune volume change rate (yds^3/lf/yr).*

DEP Monument	1996 to 2008		1996 to 2019		2008 to 2019		
	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Dune Volume Change Rate (yds3/lf/yr)
R-195	126.00	10.08	111.00	4.86	-15.00	-1.45	(1)
R-196	66.67	5.33	58.00	2.54	-8.67	-0.84	-1.34
R-197	-21.33	-1.71	-10.67	-0.47	10.67	1.03	-0.22
R-198	-15.00	-1.20	2.67	0.12	17.67	1.71	1.18
R-199	7.00	0.56	20.67	0.91	13.67	1.32	2.41
R-200	22.00	1.76	25.33	1.11	3.33	0.32	3.95
R-201	21.33	1.71	21.33	0.93	0.00	0.00	2.17
R-202	11.67	0.93	17.33	0.76	5.67	0.55	-2.51
R-203	3.33	0.27	-2.00	-0.09	-5.33	-0.52	-7.36
R-204	6.67	0.53	-6.00	-0.26	-12.67	-1.23	-7.59
R-205	5.33	0.43	-6.67	-0.29	-12.00	-1.16	-2.14
R-206	11.33	0.91	18.33	0.80	7.00	0.68	2.47
R-207	11.00	0.88	29.67	1.30	18.67	1.81	4.99
R-208	38.00	3.04	56.33	2.47	18.33	1.77	5.07
R-209	-12.00	-0.96	-5.00	-0.22	7.00	0.68	-5.98
R-210	-29.00	-2.32	-32.00	-1.40	-3.00	-0.29	-11.68
R-211	-50.33	-4.03	-57.67	-2.53	-7.33	-0.71	(2)
R-212	-12.00	-0.96	-12.33	-0.54	-0.33	-0.03	(2)
R-213	-20.33	-1.63	-18.67	-0.82	1.67	0.16	(2)
R-214	-23.33	-1.87	-26.67	-1.17	-3.33	-0.32	(2)
R-215	-28.00	-2.24	-44.00	-1.93	-16.00	-1.55	(2)
R-216	-18.33	-1.47	-37.67	-1.65	-19.33	-1.87	-7.66
R-217	-21.67	-1.73	-26.00	-1.14	-4.33	-0.42	-1.96
R-218	-41.33	-3.31	-29.00	-1.27	12.33	1.19	4.30
R-219	-19.00	-1.52	-0.67	-0.03	18.33	1.77	5.15
R-220	-38.00	-3.04	-66.67	-2.92	-28.67	-2.77	3.00
R-221	-26.33	-2.11	-82.33	-3.61	-56.00	-5.42	(3)
R-222	-65.00	-5.20	-155.00	-6.79	-90.00	-8.71	(3)
Average	-3.95	-0.32	-9.23	-0.40	-5.27	-0.51	-0.69

(1) End of Alligator Drive, insufficient data

(2) Alligator Drive Revetment, insufficient data

(3) End of Gulfshore Boulevard, insufficient data

Table 5. *Bald Point - Annualized shoreline (MHW line) position change (ft) and rates (ft/yr)and dune volume change rate (yds^3/lf/yr).*

DEP Monument	1996 to 2008		1996 to 2019		2008 to 2019		
	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Dune Volume Change Rate (yds^3/lf/yr)
R-229	-11.00	-0.89	-43.50	-3.12	-32.50	-3.12	-10.41
R-230	-17.67	-1.42	-39.67	-2.11	-22.00	-2.11	-2.04
R-231	-21.00	-1.69	-39.00	-1.73	-18.00	-1.73	1.06
R-232	-48.00	-3.87	-53.33	-0.51	-5.33	-0.51	2.21
R-233	-39.00	-3.14	-55.00	-1.54	-16.00	-1.54	-0.12
R-234	-11.33	-0.91	-12.33	-0.10	-1.00	-0.10	2.14
R-235	22.50	1.81	15.00	-0.72	-7.50	-0.72	2.60
Average	-17.93	-1.44	-32.55	-1.43	-14.62	-1.40	-0.65

Table 6. *Carrabelle - Annualized shoreline (MHW line) position change (ft) and rates (ft/yr)and dune volume change rate (yd^3/lf/yr).*

Profile	2007 to 2018		
	Total Shoreline Change (ft)	Shoreline Change Rate (ft/yr)	Dune Volume Change Rate (yds^3/lf/yr)
West	-23.43	-2.16	0.15
Central	-15.18	-1.40	0.13
East	-11.72	-1.08	0.21
Average	-16.78	-1.55	0.17

Table 7. *"Critically Eroded" shoreline within study area.*

R-Monument Range	Type of Erosion
R-194 to R-196	Non-Critically Eroded Beach
R-210 to R-216	Critically Eroded Beach
R-220 to R-222	Critically Eroded Beach
R-222 to R-232	Non-Critically Eroded Beach

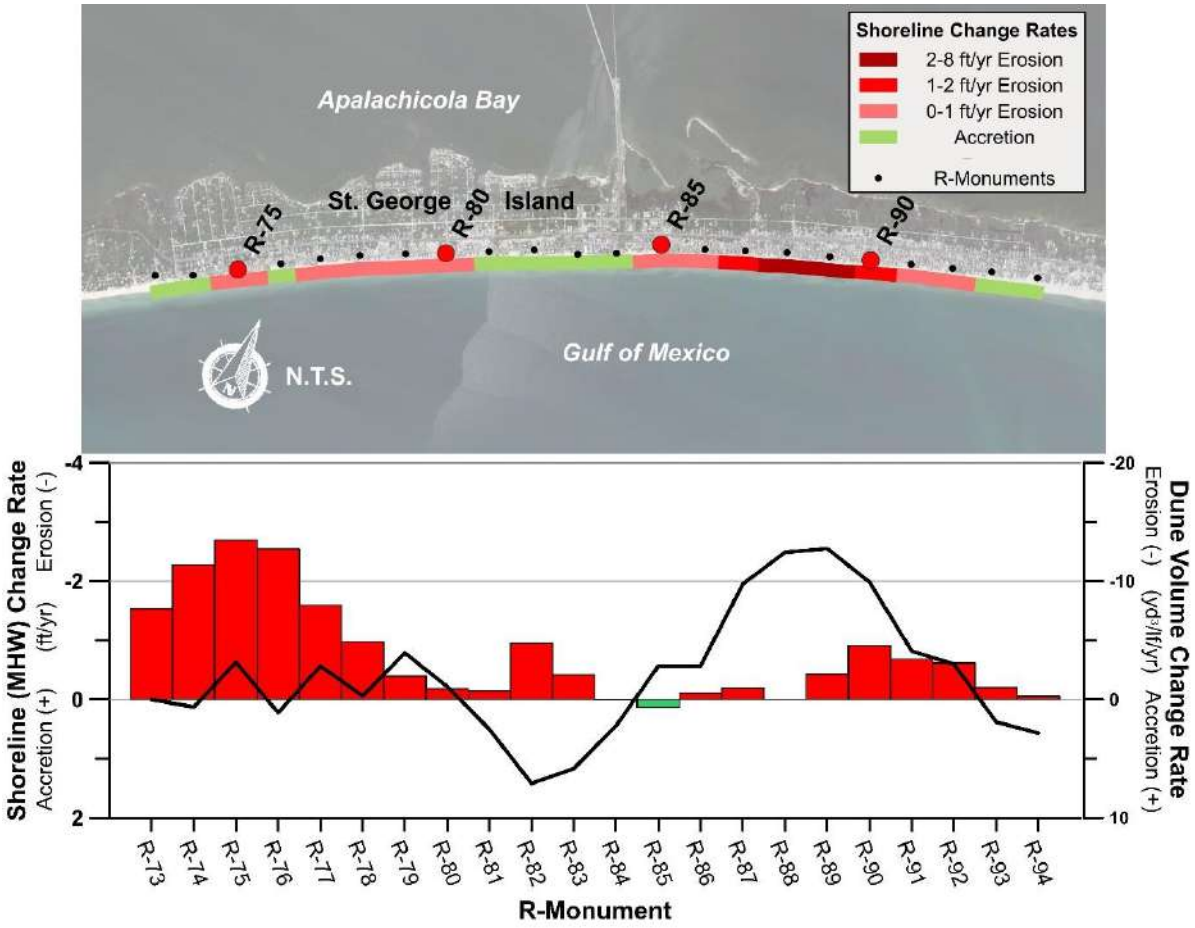

Figure 5. *St. George Island - Annualized shoreline (left axis, line) and dune volume (right axis, bar) change rate 2008 to 2019 in ft/yr.*

5.0 Sea Level Rise

Sea Level Rise (SLR) plays an important role in long-term shoreline position and volumetric change trends. This also has a potential impact on the design and longevity of the beach and dune system. A general "Rule of Thumb" is for every-one (1) foot in sea level rise for a beach with an average slope of 1 vertical to 100 horizontal (1V:100H) would equate to 100 feet of shoreline erosion.

5.1 Local Trends

The National Oceanic and Atmospheric Administration (NOAA) Center for Operational Oceanographic Products and Services (NOAA 2017) has been measuring the sea level for over 150 years, with tide stations of the National Water Level Observation Network (NWLON) operating on all U.S. coasts. Changes in Mean Sea Level (MSL), either a sea level rise or sea level fall, have been computed at 142 long-term water level stations using a minimum span of 30 years of observations at each location. NOAA provides estimates based upon monthly averages and a linear trend analysis for Apalachicola, Florida (NOAA Station 8728690). The measured mean sea level trend is currently +2.7 millimeters/year (mm/yr) or 0.1063 inch/year with a 95% confidence interval of +/-

0.61 mm/yr based on monthly mean sea level data from 1967 to 2020 which is equivalent to a change of 0.89 feet in 100 years (***Figure 8***).

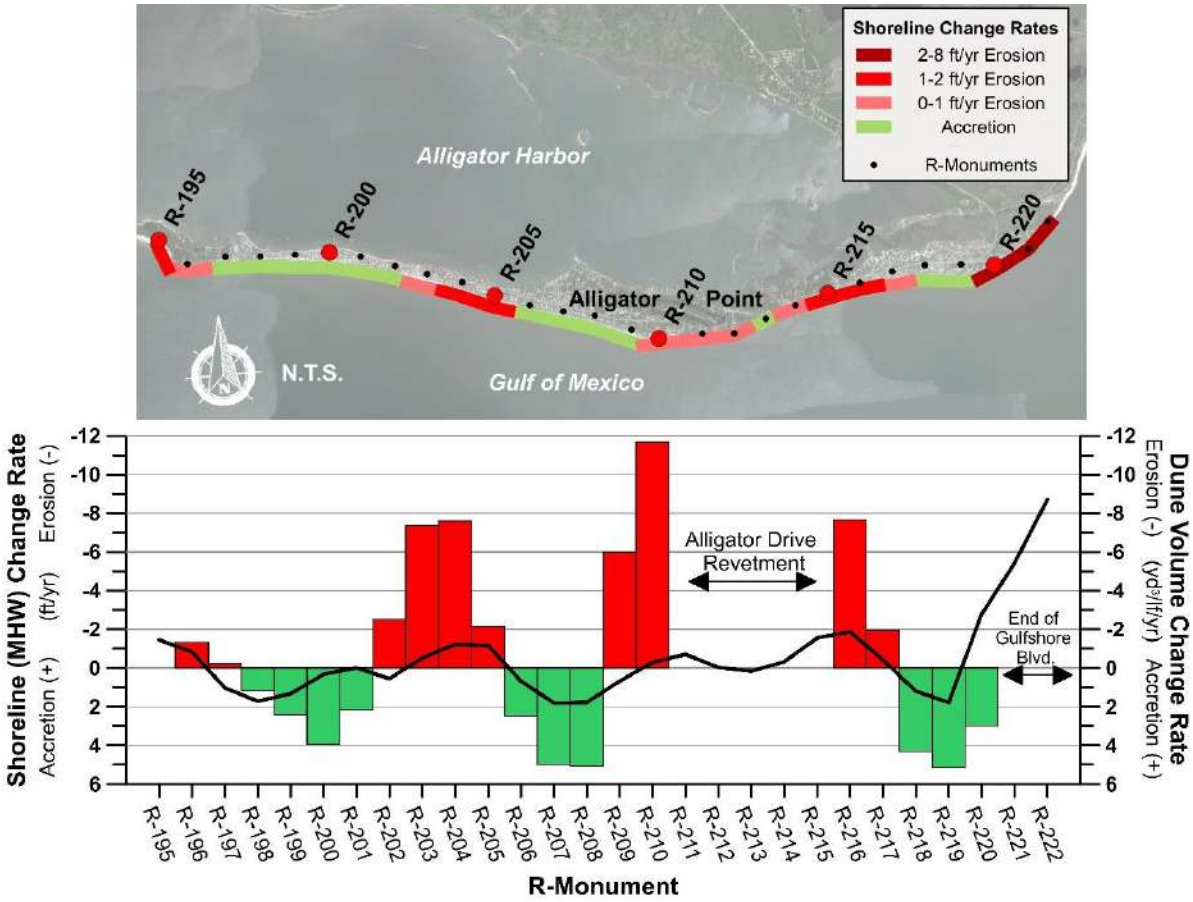

Figure 6. *Alligator Point - Annualized shoreline (left axis, line) and dune volume (right axis, bar) change rate 2008 to 2019 in ft/yr.*

NOAA (2017) assessed global, regional, and local sea level rise estimates under various future climate scenarios ultimately producing a gridded model for localized sea level estimates for the coastal shorelines of the United States. They determined that along almost all U.S. coasts outside Alaska, relative sea level (RSL) is projected to be higher than the global average under the Intermediate-High, High and Extreme scenarios (i.e., 0.3 to 1 meter or more RSL rise by the year 2100 than global mean sea level (GMSL) rise under the High scenario).

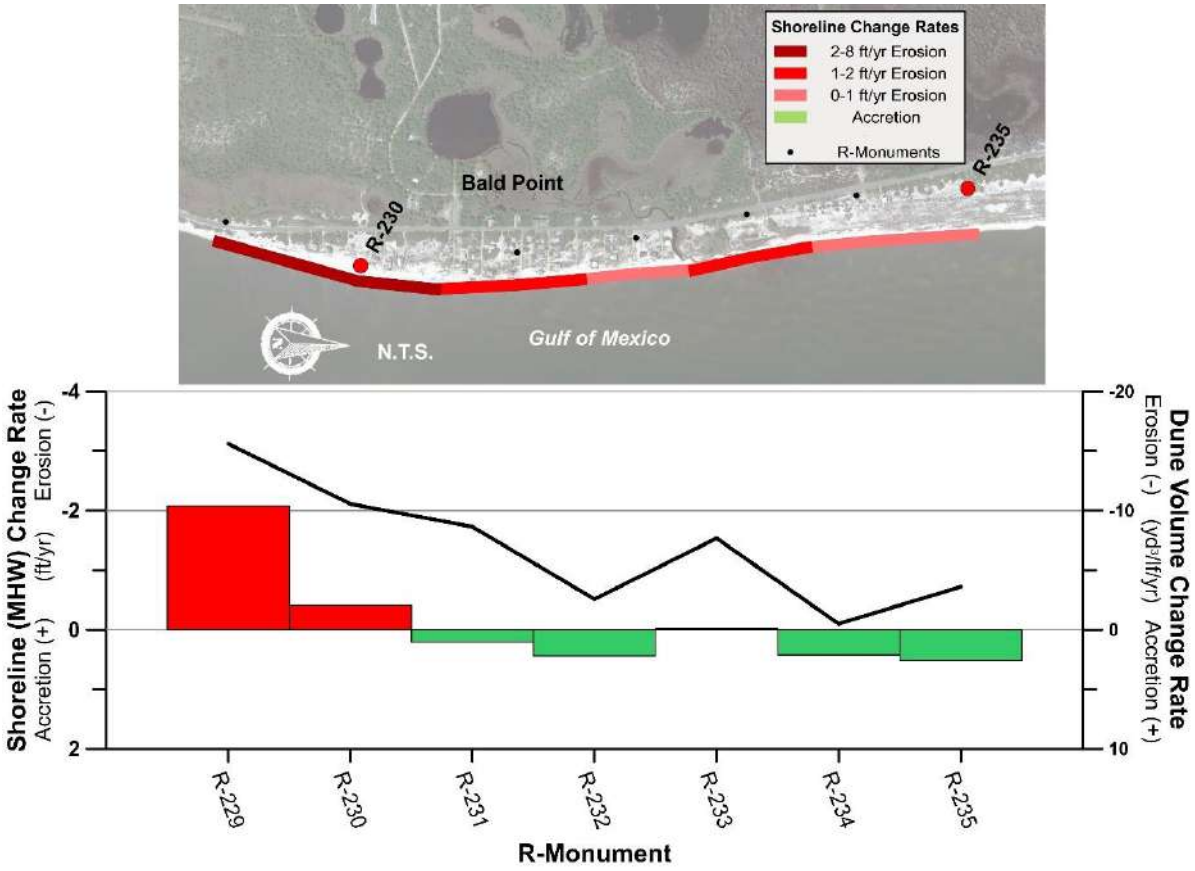

Figure 7. *Bald Point – Annualized shoreline (left axis, line) and dune volume (right axis, bar) change rate 2008 to 2019 in ft/yr.*

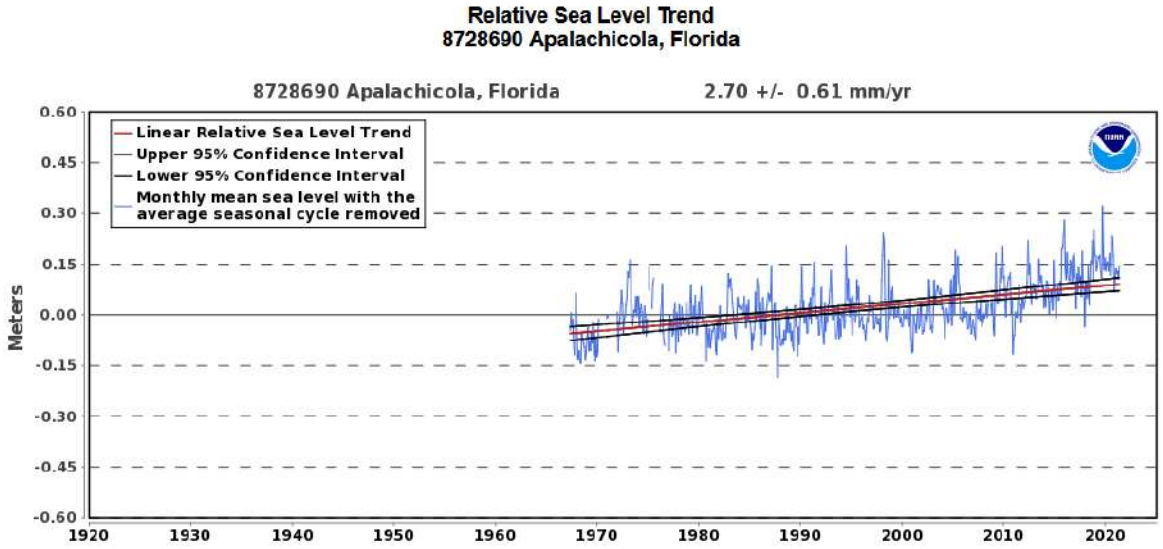

Figure 8. *Measured sea level trends from 1967 to 2020 at Apalachicola, Florida.*

5.2 Regional Trends

Analyzing relative sea level rise for the Gulf of Mexico region, Boon (2018) provides a summary of measured trends and a quadratic statistical model of future trends. All measured regional trends in the northern Gulf of Mexico show an increase in sea level rise. The quadratic statistical model analyzed sea level change rate or acceleration, as well as sea level change for various stations across the United States. ***Figure 9*** shows the estimated sea level trends for an analysis area centered on Pensacola, which includes Apalachicola and St. George Island. The analysis shows that within the next 30 years sea level rise could increase between 0.4 and 0.5 meters (1.3 and 1.6 feet) above the existing mean sea level elevation as of 2020. NOAA (2017) determined factors influencing regional sea level rise in the Gulf of Mexico included shifts in oceanographic factors such as circulation patterns, changes in Earth's gravitational field, and vertical land movement such as subsidence or uplift, sediment compaction, groundwater, and fossil fuel withdrawals and other non-climatic factors.

The potential impacts of sea level rise include the loss of recreational beaches and dunes due to accelerated erosion, loss of waterfront property through erosion and inundation of low-lying areas, and the loss of and changes to natural habitats, and other low-lying natural areas. This may result in the loss or required relocation of gulf front structures. A general rule of thumb is for every 1-foot of sea level rise equals 100 feet of additional coastal erosion.

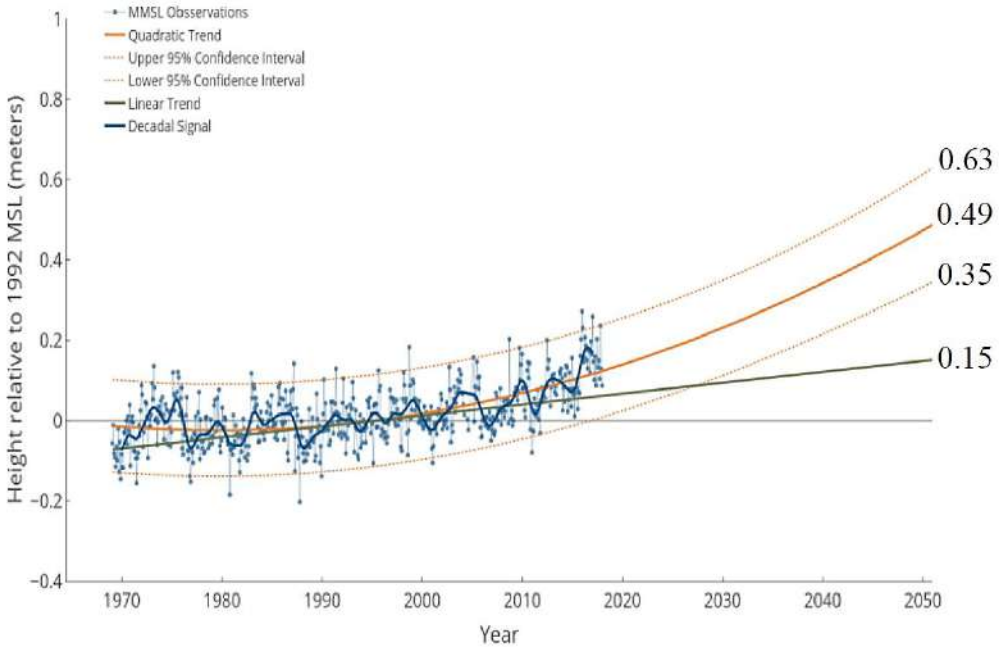

Figure 9. *Measured and predicted sea level change for Pensacola, Florida (Boon, 2018).*

6.0. Existing Storm Capacity

Existing dune performance was evaluated by applying the cross-shore model SBEACH (Storm-induced BEAch CHange). The 2018 upland FDEP beach profile data was combined with 2008 offshore FDEP profile data to develop a complete profile as the initial conditions, and subjected to 20-, 30-, and 50-year return period storms. The storm tide levels used to calibrate the model are displayed in ***Table 2***. It should also be noted that there is an undefined correlation between return periods and hurricane categories. Return periods for a defined storm event is given as the probability of being equaled or exceeded in any one year (I.e., exceedance = 1/return period = 1/50 year = 0.02 or 2% chance per year) compared to a hurricane category which are based on the measured "Sustained Winds" in accordance with the Saffir-Simpson Hurricane Wind Scale.

Representative profiles were used for the four segments: 1) St. George Island at R-76, R-84, and R-91; 2) Alligator Point at R-201, R-209, R-217; 3) Bald Point at R-232; and 4) Carrabelle Beach. The Carrabelle beach profile was compiled by combining a transect of the photogrammetry taken in September 2021 with an equilibrium beach profile concluding at a depth of -11.5 feet. The qualitative risk to upland structures is divided into three levels: High, Medium, and Low. High is when a hypothetical storm event captures a majority the structure along a continuous beach section, Medium when the landward limit of the storm captures the seaward limit of the structures, and, Low when the storm limits are seaward of the structures. ***Table 8*** summarizes the risk along Franklin County.

Table 8. *Structures at risk for 20-year, 30-year, and 50-year storm events.*

Beach Segment	R-Monument	20-year Level of Risk	30-year Level of Risk	50-year Level of Risk
St. George Island	R-76	Low	Medium	High
	R-84	Low	Medium	High
	R-91	Low	Medium	High
Alligator Point	R-201	Low	High	High
	R-209	Low	Medium	High
	R-217	High	High	High
Bald Point	R-232	High	High	High
Carrabelle Beach		High	High	High

7.0. Native Beach Sand

Native beach sand data for St. George Island, Alligator Point, and Bald Point was found from the report "A Sedimentological and Granulometric Atlas of the Beach Sediments of Florida's Northwest Coast and Big Bend", dated July 2011 and prepared by the Florida Geological Survey (FGS). Samples FK-27 to FK-30 were collected within the study limits of St. George Island, with FK-27 at the western end of the study area and FK-30 at the eastern end. FK-57 to FK-60 were collected within the limits of Alligator Point, and FK-63 and FK-64 were collected on Bald Point. The sediment characteristics are presented in ***Table 9*** and ***Figure 10***, ***Figure 11***, and ***Figure 12*** show the sample collection sites with the R-Monuments. Additionally, sand

samples were gathered by MRD Associates on March 8, 2022 at the County Park on St. George Island (near R-84) and Carrabelle Beach.

Table 9. *Franklin County sand characteristics.*

Sample ID	Description	Mean Grain Size, d_{50} (mm)	Sorting (phi)	Percent Silt (%)	Munsell Color Value	Percent Carbonate (%)
St. George Island						
Native FK-27-BB	Mid-berm R-77	0.37	0.421	0.03	10YR 8/3	1.75
Native FK-28-BB	Mid-berm R-82	0.37	0.466	0.01	10YR 8/3	2.55
Native FK-29-BB	Mid-berm R-87	0.37	0.965	0.06	10YR 8/3	8.62
Native FK-30-BB	Mid-berm R-92	0.32	0.533	0.08	10YR 8/2	1.35
County Park - 1	Mid-berm	0.32	0.49	0.32	10YR 8/3	1.80
County Park - 2	Seaward dune Toe	0.35	0.5	0.87	10YR 8/3	-
Alligator Point						
Native FK-57-BB	Mid-berm R-199	0.21	0.435	0.26	2.5Y 8.5/2	0.11
Native FK-58-BB	Mid-berm R-204	0.20	0.429	0.11	2.5Y 8.5/2	2.18
Native FK-59-BB	Mid-berm R-209	0.30	0.466	0.10	2.5Y 8.5/2	0.38
Native FK-60	Near R-215	0.28	0.667	0.48	2.5Y 8/2	0.51
Bald Point						
Native FK-63	Near R-229	0.51	0.726	0.38	10YR 7/2	0.52
Native FK-64	Near R-234	0.60	0.484	0.41	10YR 8/2	0.27
Carrabelle Beach						
Carrabelle - 1	Mid-berm	0.29	0.52	0.63	10YR 8/2	0.04
Carrabelle - 2	Seaward dune Toe	0.24	0.37	0.39	10YR 8/1	-

Figure 10. *St. George Island - Sediment sampling sites.*

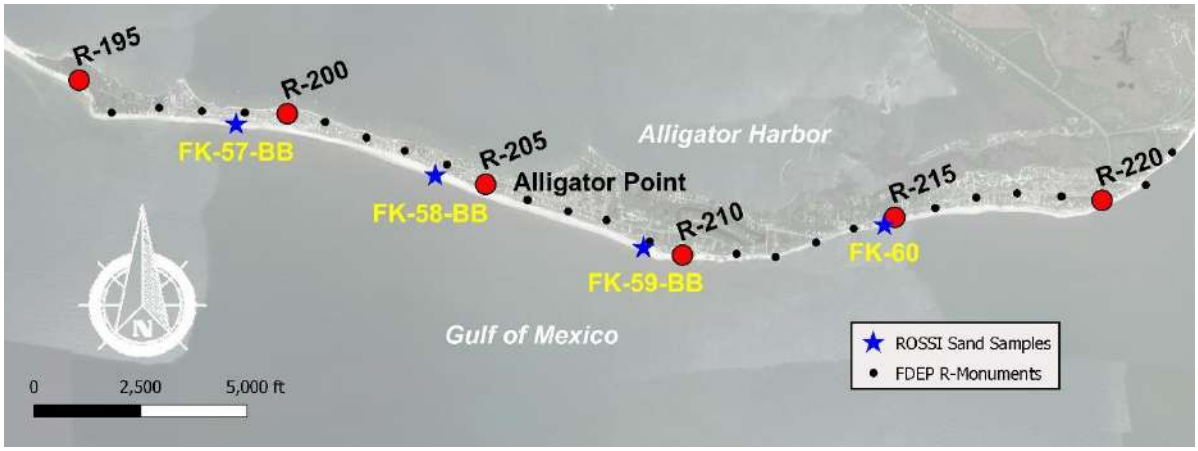

Figure 11. *Alligator Point - Sediment sampling sites.*

Figure 12. *Bald Point - Sediment sampling sites.*

8.0. Potential Sand Sources

Sand pits in Gulf, Franklin, and Wakulla counties were identified as potential sources of sand for dune projects in Franklin County. The sand mine locations were found from the "Mandatory Non-Phosphate (mannon) Mine Boundaries" database provided by DEP on Map Direct (FDEP, 2021b). There are 6 mines in Gulf, Franklin, and Wakulla counties that contain sand, shown in ***Figure 13***. Google maps was used to estimate the driving distance and drive time to the four project sites (***Table 10***).

Table 10. *Driving distances and times (one-way) from sand pits to the project sites.*

Sand Mine	St. George Island		Alligator Point		Bald Point		Carrabelle Park	
	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes
Honeyville	53.7	63	92.3	113	90.1	107	62.1	73
Taunton	53.9	63	92.5	114	90.3	107	62.2	73
110-Acre pit	13.0	17	36.3	46	34.1	41	6.0	8
Rouse-Pigot	54.6	65	24.2	34	21.8	29	35.4	42

The distance from the sand mines to the project site will influence the cost of the project. Whenever an individual dune project is started, it is in the interest of the stakeholders to find a mine with the required sand that provides the lowest cost. This may not be the same sand mine for projects on St. George Island versus Alligator or Bald Point.

MRD have previously used the Honeyville Sand Mine and had completed a geotechnical analysis. Four (4) samples were collected from the upland borrow pit at the Honeyville Sand Mine in 2017 and 2018 and were analyzed (***Table 11***). Sediment characteristics for the Taunton Sand Mine were also provided by the operator.

Fill material should be placed in accordance with the guidelines provided under the Florida Department of Environmental Protection pursuant to the following conditions:

8.1. All fill material shall be sand that is similar to the native beach sand in both coloration and grain size and be free of debris, rocks, clay, organic matter or other foreign matter. In general, beach-compatible fill material will be predominantly quartz sand of a mean grain size diameter between 0.20mm and 0.45mm and a moist Munsell color-value/chroma of 7/1 or lighter with similar quantity of shell as the existing beach. No sand may be obtained from the beach, near shore, or below MHW seaward of the Coastal Construction Control Line (CCCL) without specific written authorization from FDEP.

8.2. During visual inspection of sand material upon arrival to the beach access site, physical samples will be taken for later quantitative analysis (sieving, color, etc) if the suitability of the material is uncertain at delivery time.

8.3. Any single or cumulative placement of greater than 15 cubic yards of material determined not to meet the benchmark beach sand sample quality shall be remediated. Upon discovery of such an occurrence, all sand placements shall cease, and the incompatible material removed and disposed of in an upland site. Sand that does not meet the beach compatibility requirements must be removed immediately.

Table 11. *Available sand mine characteristics.*

Sample ID	Description	Mean Grain Size, d_{50} (mm)	Sorting (phi)	Percent Silt (%)	Munsell Color Value	Percent Carbonate (%)
Honeyville Sand Mine						
Sample 1	Berm near weir	0.34	1.10	4.78	10YR 8/1	0.3
Sample 2	Berm near discharge	0.26	0.96	2.08	10YR 8/1	0.3
Sample 3	At discharge	0.29	0.95	1.68	10YR 8/1	0.2
Sample 5	North Stockpile	0.44	0.73	2.47	10YR 8/1	0.1
Taunton Sand Mine						
GS-1	Composite	0.67	0.96	-	2.5Y 8/1	0

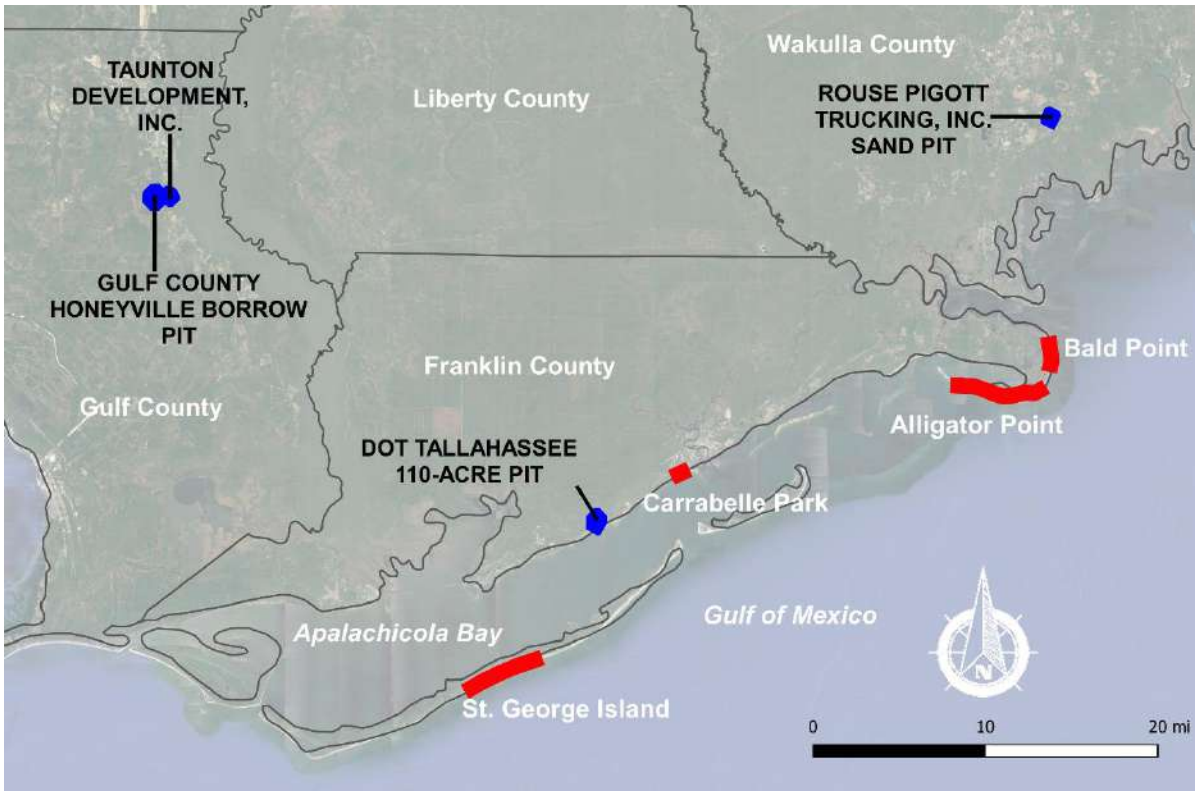

Figure 13. *Sand pit locations in vicinity of Franklin County.*

9.0. Alternative Designs Assessment

The primary objective of the alternative design assessment is to develop feasible dune alternatives that meet the design goals of the study. Additionally, this section provides an assessment of the existing beach conditions along the four project sites (St. George Island, Alligator Point, Bald Point, and Carrabelle Beach Park) The topography and geo-refenced aerial obtained in 2021 by a drone documented the seaward limits of vegetation and structures, dune topography, and beach berm width. The primary constraints that determine the types of dunes possible for a particular stretch of shoreline are: 1) the height (or lack) of the existing dune system, 2) the width of the existing dry beach berm, 3) the location of upland structures and infrastructure relative to the shoreline, and 4) the level of storm protection (level of risk) provided by the existing beach and dune system. The greatest benefits of constructing a continuous and contiguous dune feature along the Franklin County beaches are to provide a barrier to storm events, reduce overtopping and flooding to the back dune area, mitigate for historic dune erosion and create wildlife habitat.

These conceptual dunes were developed through an iterative process by revising the crest height and width to optimize the level of storm protection through SBEACH modeling while maintaining a minimum berm width of 80-feet, where possible. The typical sections provided within may need to be refined to fit along a particular beach segment depending on the specific conditions existing at the time of final design. In addition, planting native dune vegetation is recommended after placement of the sand to increase the stability of the dune, capture wind-blown sediments to further grow the dune feature and mitigate for any vegetation covered by the dune construction.

9.1. Type A Dune

Portions of Alligator Point and Bald Point are typically characterized by wide berms greater than 100 ft, low flat dune features with elevations typically less than +8 feet, NAVD88 and significant structural setbacks of approximately 175 feet from the Gulf of Mexico (***Figure 14*** left). ***Figure 15*** plots the historic profiles at R-198 on Alligator Point used to compare the profiles between 1996 and 2019 to a conceptual dune. Type A Dune will have a crest elevation of +10-foot, NAVD88 so not to impede views, crest width from 20 to 30-feet and side slopes from 1V:4H to 1V:3H. The footprint for this style dune can range from approximately 55 to 65 feet depending on the existing dune topography. This dune type is suitable for an existing berm width of 100-feet or greater. ***Figure 14*** shows an example beach on Alligator Point at R-198 that would be suitable for the Type A Dune. The wider dune crest and more gradual slope of this dune type (1V:4H) allows for greater storm protection and a more natural transition from dune to the beach berm (***Figure 16***).

Figure 14. *Typical beach condition to support a Type A Dune at Alligator Point near R-198 (left, view to the East, taken August 23, 2021) and a Type B Dune on St. George Island near R-90 (right, view to the southwest, taken August 24, 2021).*

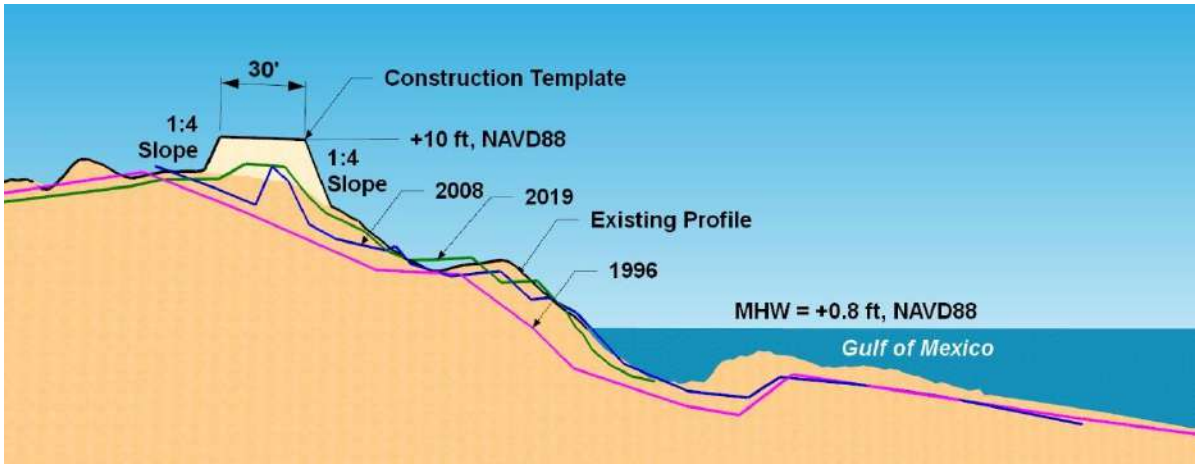

Figure 15. *Conceptual Type A Dune comparison to historical profiles on Alligator Point (R-198).*

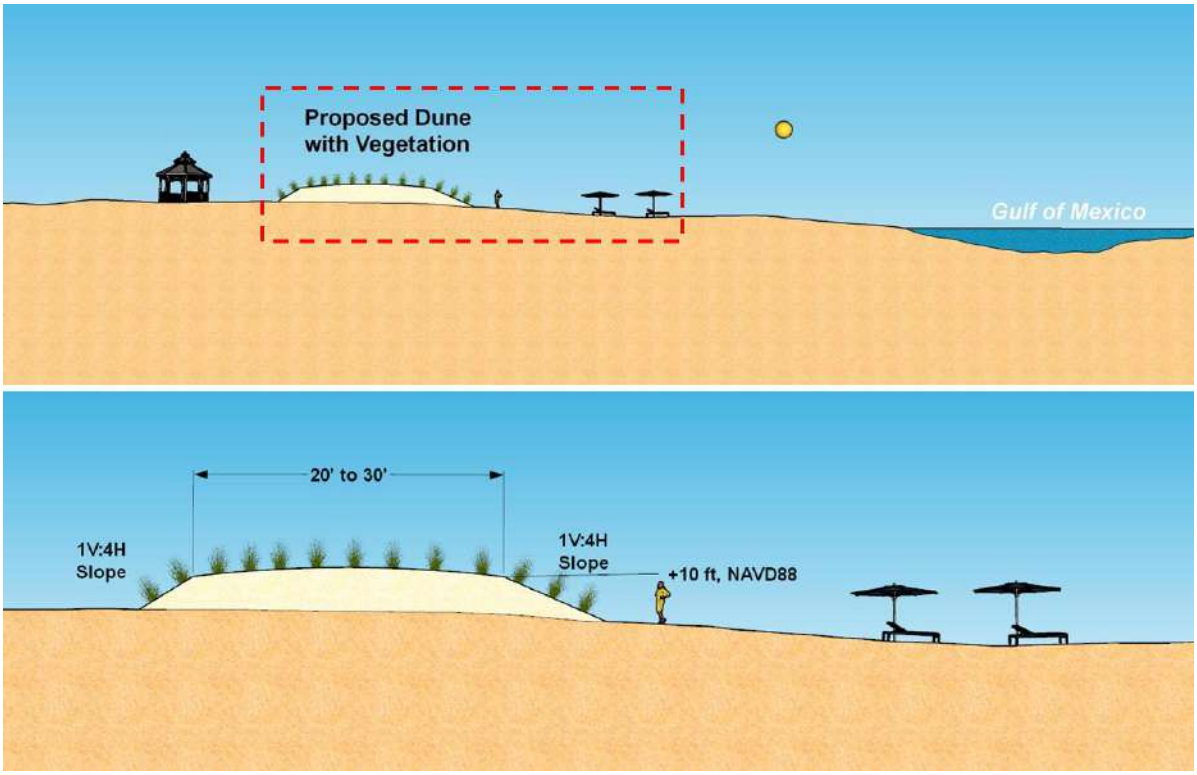

Figure 16. *Typical Type A Dune overview (top) and detailed view (bottom).*

9.2. Type B Dune

The entire St. George Island beach segment between R-73.5 and R-93.8 along with portions of Alligator Point and Bald Point are typically characterized by wide beach berms, eroded dune faces with peaks from +10 to +13 feet, NAVD88 and fairly significant structural setbacks of approximately 200 feet from the Gulf of Mexico (***Figure 14,*** right). ***Figure 17*** plots the historic dune profiles between 1996 and 2019 at R-90 on St. George Island compared to a conceptual Type B dune. The Type B Dune alternative extends from the existing dune crest elevation of +10 ft, NAVD88 so not to impede views to the Gulf of Mexico from the upland structures and can be placed in locations with narrow or wide existing beach berm widths by varying the crest width from 20 to 30 feet and side slopes from 1V:3H to 1V:4H. It has a dune footprint ranging from 40 to 65 feet, depending on the crest and slope (***Figure 18***). ***Figure 14*** shows an example of a typical beach condition for a Type B Dune placement on St. George Island.

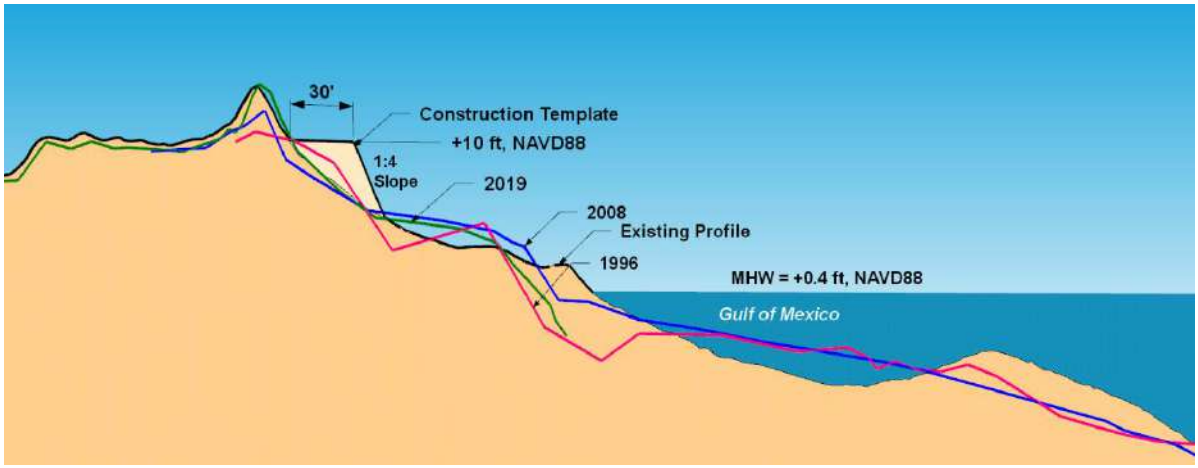

Figure 17. *Conceptual Type B Dune on St. George Island compared to historical profiles (R-90).*

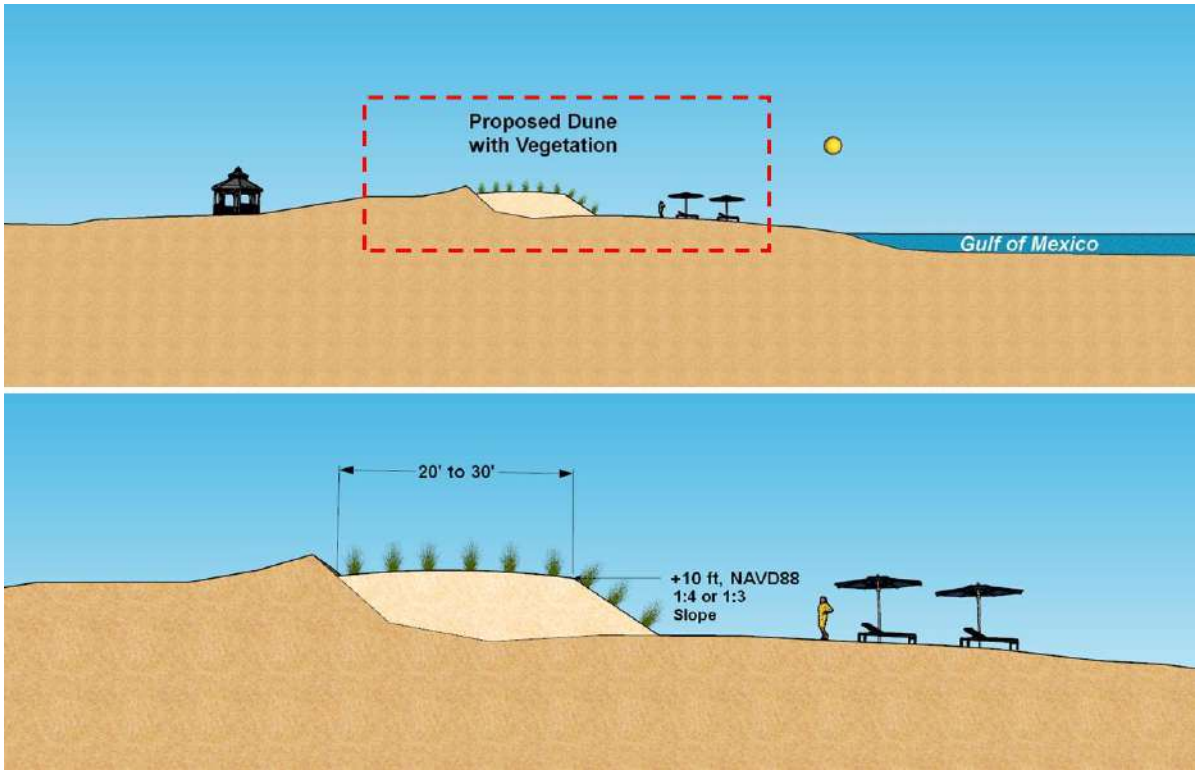

Figure 18. *Typical Type B Dune overview (above) and detail view (below).*

9.3. Type C Dune

Portions of Alligator Point are typically characterized by narrow berm widths less than 80 feet with eroded dune peaks to +7 to +8 feet, NAVD88 and constrained structural setbacks of less than 125 feet from the Gulf of Mexico (***Figure 19***, left). ***Figure 20*** plots the historic dune profiles between 1996 and 2019 at R-221 on Alligator Point compared to a conceptual dune. The Type C Dune is similar to the Type A Dune in that it extends further landward along the existing profile. Also, the Type C Dune is for locations with narrower and lower beach berms than the beaches a Type A Dune is suitable for. The Type C Dune would have a crest elevation of +10 feet NAVD 1988

so not to impede views, narrow crest width of 10 to 20 feet (depending on the available beach width), and front and back slopes of 1V:3H. This dune style has a footprint of approximately 20 to 30 feet depending on the existing topography and is suitable for sections of Franklin County beaches where the existing dune elevations are less than +8 feet, NAVD88 and the berm is less than 100-feet wide. ***Figure 19*** shows a shoreline on Alligator Point where the Type C Dune would be appropriate.

Figure 19. *Typical beach condition to support a Type C Dune at end of Gulf Shore Boulevard near R-221 (left, view to the southwest, taken August 23, 2021) and vegetation only at Bald Point near R-231 (right, view to the southwest, taken August 24, 2021).*

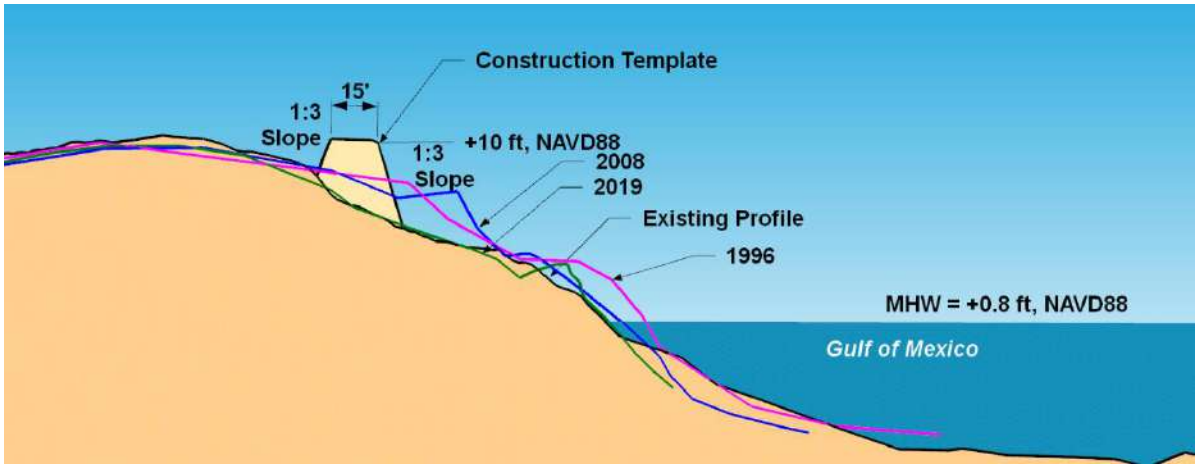

Figure 20. *Conceptual Type C Dune comparison to historical profiles on Alligator Point (R-221).*

9.4. Vegetation Only

There are some areas on Alligator Point and Bald Point where there is not adequate room between the existing structures and the shoreline to construct a dune feature. In these locations vegetation and sand fence can be placed to assist in the development and growth of dunes naturally. Initially this option would not provide any storm protection but over time the storm protection offered by the dune may increase as the dune grows naturally. ***Figure 19*** shows a shoreline on Bald Point where the vegetation only option would be recommended to be placed

seaward of the existing structures. It should be noted that sand fencing requires periodic maintenance to ensure the optimal long-term performance is achieved with respect to capturing wind-blown sediments. It is recommended that the fencing be pulled up and reinstalled before it is buried by 2 feet of sand. Otherwise, it will be difficult or impossible to remove the fence and may eventually be completely covered becoming ineffective at trapping sand.

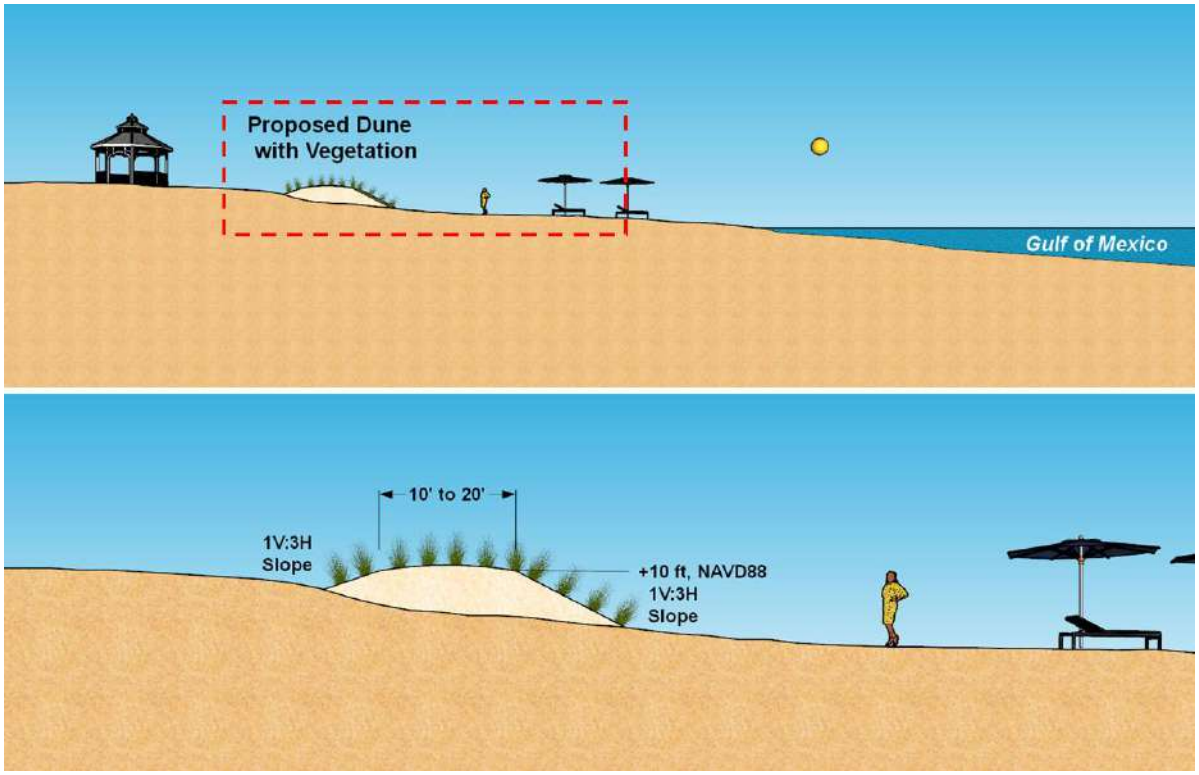

Figure 21. *Typical Type C Dune overview (above) and detail view (below).*

10.0. Conceptual Design

The typical dune types discussed in Section 9.0 are summarized in ***Table 12*** below. The following section presents the four project sites (St. George Island, Alligator Point, Bald Point, and Carrabelle Beach Park) and the dune type for each beach segment. The preliminary opinion of probable construction costs associated with each beach segment are also presented which include sand placement, vegetation, sand fences, post and rope fence and Engineering, Design, and Permitting (2022 dollars). Sand placement costs will vary due to transport distances from the mine to the project site. The 10-foot-long sand fencing shall be spaced at the DEP recommended 10-feet centers in the alongshore direction and at an angle to the shoreline will be placed at select beach sites where construction of a dune is not feasible. This generally includes areas that need assistance in starting a dune or dune enhancement of an existing dune. Sand fencing could also be utilized to reduce wind-blown sediment in problem areas. Vegetating the dune typically will have a greater effect on growing and stabilizing the sand than installing fencing. Post and rope fencing is used to direct pedestrian traffic away from the dune around dune walkovers, beach and vehicular accesses and paths. This investigation does not include the costs for dune walkovers.

Table 12. *Typical Dune types per shoreline segment summary.*

Dune Type	R-Monument Range	Length (feet)
St. George Island		
Type B	R-73.5 to R-93.8	21,100
Alligator Point		
Type C	R-195.8 to R-197.5	1,500
Type A	R-197.5 to R-203.5	6,000
Type B	R-203.5 to R-210	6,500
Alligator Point Revetment	R-210 to R-216	6,050
Type C	R-216 to R-217.2	1,100
Type B	R-217.2 to R-219.9	2,700
Vegetation and Sand Fence	R-219.9 to R-220.7	800
Type C	R-220.7 to R-221.5	800
Vegetation and Sand Fence	R-221.5 to R-222	500
Bald Point		
Type B	R-229.5 to R-230.5	1,200
Vegetation and Sand Fence	R-230.5 to R-232.5	2,150
Type A	R-232.5 to R-235	2,600
Carrabelle Beach Park		
Specific to Carrabelle		800

10.1. St. George Island

The Type B Dune concept is suitable for the entirety of St. George Island (R-73.5 to R-93.8 shown in ***Figure 22***) as the existing dunes have varying elevations up to and great than +10 feet, NAVD88. The proposed dune would extend seaward from the existing dune (shown in ***Figure 16***). Comparing FDEP historical profiles, the Type B Dune would extend the +10-foot contour seaward of where it was located in 1996 (***Figure 17***). Performance of the Type B Dune along St. George Island was modeled in SBEACH with the same storm parameters used in Section 6.0. The SBEACH analysis showed a slight increase in the level of storm protection for a 20+ year storm event to a 30-year storm event. The Type B Dune would not protect the upland structures from a 50-year storm and would be completely eroded during this level of storm.

The average construction volume rate of the proposed dune construction template for St. George Island is 4.91 cubic yards per linear foot (yd^3/lf). Over the 21,100 feet of the shoreline on St. George Island from R-73.5 to R-93.7 the total in-place volume is estimated at 103,545 cubic yards (yd^3) (***Table 13***). The estimated cost to construct the dune is $52 per cubic yard ($yd^3$) in place (2022 dollars). Approximately 558,750 dune plants spaced at 12-inch to 18-inch on-center will be installed on the constructed dune. Ten-foot-long sections of sand fencing would be installed at 10-foot spacing along 20% of the project length (21,100 x 0.20 = 4,220 feet) and post and rope

will be installed along 10% of the project length (21,250 x 0.1 = 2,110 feet). ***Table 13*** summarizes the probable costs of construction for a dune restoration project on St. George Island.

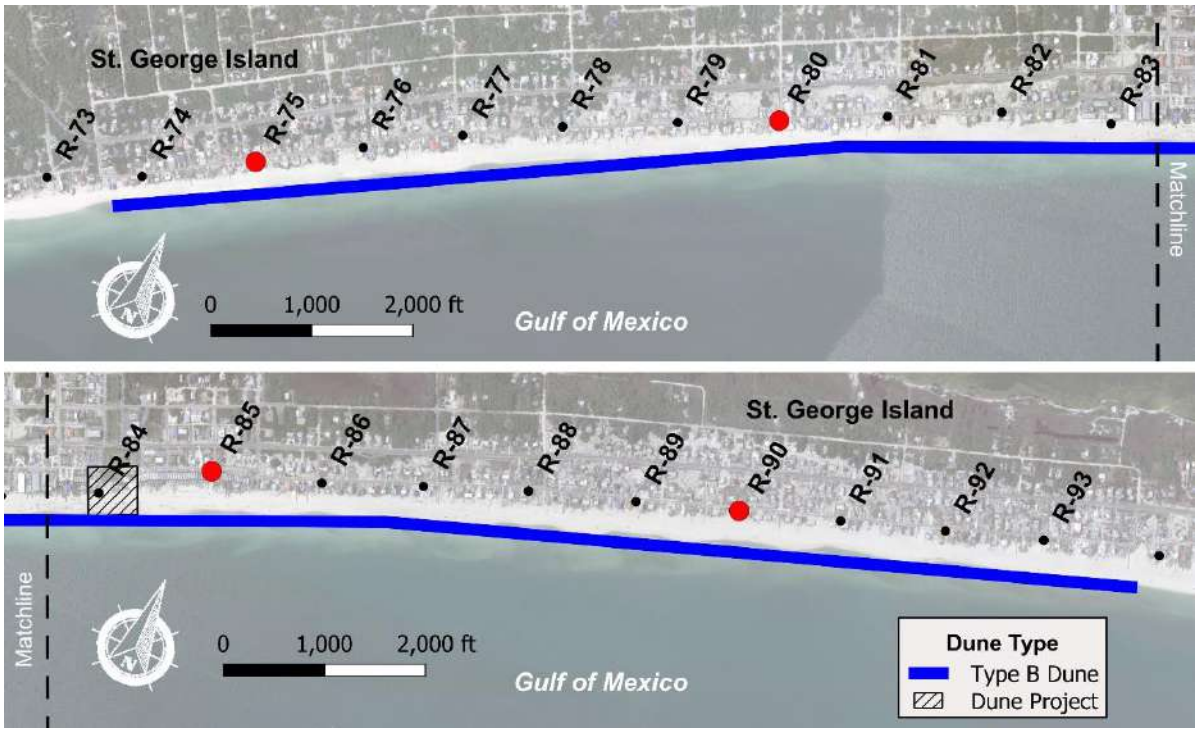

Figure 22. *Locations of the Conceptual St. George Island dune project and the St. George Island Park dune project.*

Table 13. *St. George Island Conceptual Dune Project - Preliminary Opinion of Probable Construction Costs.*

Description	Quantities	Unit Cost	Costs in 2021 Dollars
Type B Dune			
Sand Placement	103,545 yd^3	$52/$yd^3$	$5,384,326
Native Dune Vegetation	554,777	$1.25/plant	$693,471
Sand Fence	422	$250/fence	$105,500
Post and Rope Fence	2,110 feet	$50/lf	$105,500
Engineering, Design, Permitting		20% of total	$1,257,760
Totals:			**$7,546,557**

10.2. St. George Island County Park

The existing beach at the St. George Island County Park near R-84 is relatively wide (less than 200 feet) and is comprised of a dune system with elevations greater than +10 ft, NAVD88. A dune with a +10 ft, NAVD 88 crest height and a crest width ranging from 15 to 30 feet was determined to be the optimum design for the park. The proposed dune would leave an 80-to-100 foot berm width seaward of the proposed dune. The dune would be vegetated with native coastal vegetation to help stabilize the dune. Native vegetation will also be placed landward of the dune to fill in areas of the county park currently lacking vegetation. Coastal hammock plant species consisting of Scrub Oak, Saw Palmetto, Cabbage Palms, Slash Pine, Sand Live Oak, and Florida Rosemary will be placed between the existing gazebos and the CCCL line along the existing dune walkover. The project would also include 1,727 feet of post and rope fencing around the dune and throughout the county park to protect the native coastal vegetation. The dune would have a fill rate of 2.99 yd^3/lf over 452 feet of shoreline for a total volume of 1,353 yd^3 (***Table 17***). MRD Associates, Inc has submitted a CCCL permit application to FDEP for this dune project.

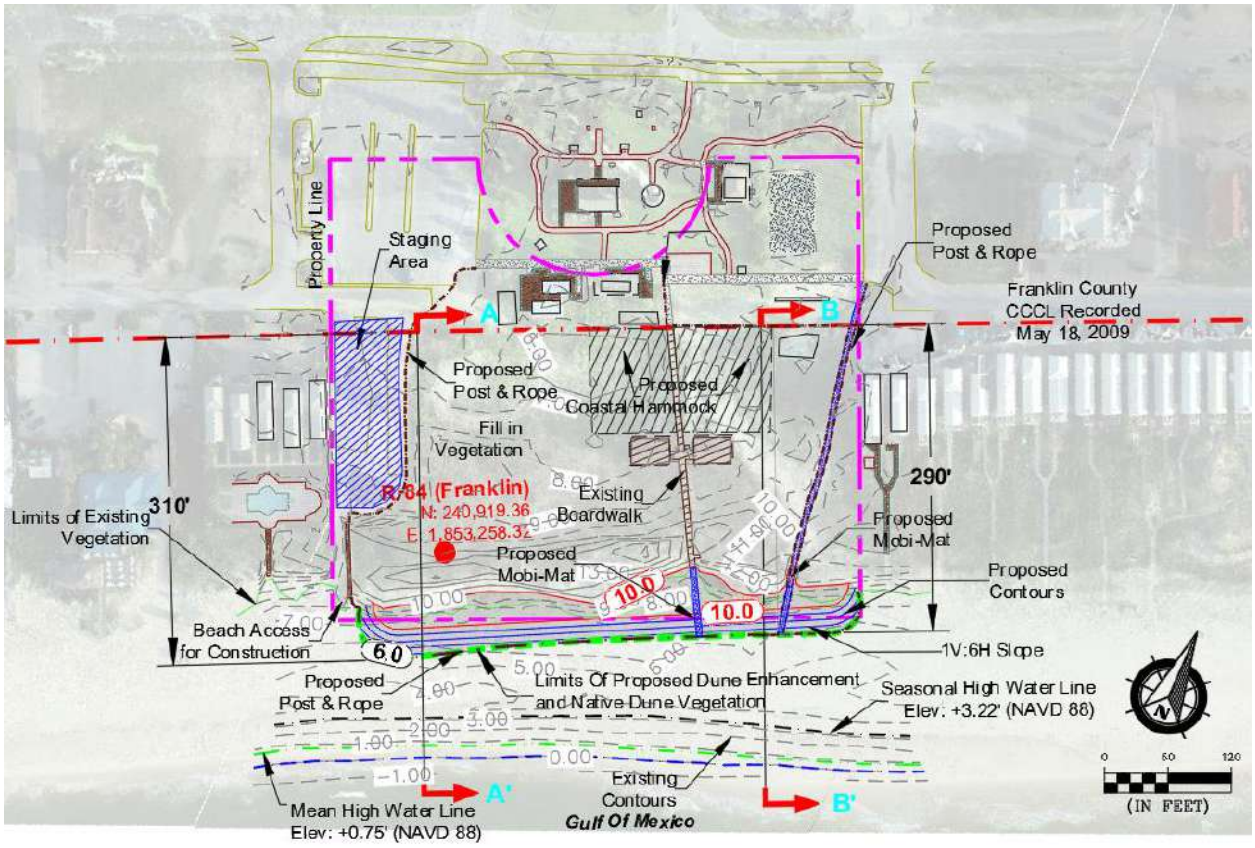

Figure 23. *Proposed Dune Dimensions excerpted from FDEP CCCL permit application.*

Table 14. *St. George Island County Park - Preliminary Opinion of Probable Construction Costs.*

Description	Quantities	Unit Cost	Costs in 2021 Dollars
Sand Placement	1,353 yd^3	\$52/yd^3	\$70,376
Native Dune Vegetation	13,958	\$1.25/plant	\$17,448
Hammock Vegetation	82	\$40-90/plant	\$5,595
Post and Rope Fence	1,728	\$50/ft	\$86,400
Engineering, Design, Permitting		20% of Total	\$35,964
Totals:			**\$215,782**

10.3. Alligator Point

The shoreline between R-197.5 and R-203.5 (***Figure 24***) has a large beach width of greater than 120 feet and low elevations suitable for a Type A Dune which will generally provide an 80-foot beach berm if constructed. A SBEACH model run was conducted at R-198 and simulated 30- and 50-year storm events with the conceptual Type A dune constructed. The results found that the 30-year storm would likely not capture the upland structures along this beach segment. A 50-year storm event is predicted to cause significant beach and dune erosion, potentially capture all the structures within the erosion profile and over wash Alligator Drive. The conceptual Type A Dune would have 1V:4H slopes and a fill rate of 3.77 yd^3/lf for a total volume of 22,614 yd^3. The revetment shoreline (R-210 and R-216) is not suitable for construction of a dune. However, a beach and dune restoration project are in the planning stages for construction in 2025-2026.

The conceptual Type B Dune is the optimal alternative for R-203.5 to R-210 and R-217.2 to R-219.9. These beach sections have a significant distance between the seaward structures and shoreline, and existing dune elevations of +10 feet, NAVD88 or greater providing storm protection greater than a 20-year storm event. Similar to the Type B Dunes on St. George Island, the proposed dune would mitigate for dune erosion, enhance the existing dune system, and increase the level of storm protection up to a 30-year storm event. The construction template has an estimated average construction volume rate of 3.25 yd^3/lf for a total volume of 29,734 yd^3. The preliminary opinion of probable construction costs for Alligator Point is found in ***Table 15***.

There are three shoreline sections on Alligator Point where a Type C Dune is most-appropriate due to the narrow beach and low existing dune elevations: R-195.8 to R-197.5, R-216.5 to R-217.2 and R-220.7 to R-221.5. Type C Dune would provide minimal storm protection for up to a 20-year storm event. This is an increase over the existing conditions of no storm protection for a 20-year storm. An analysis of the historical profiles provided by DEP shows the dune extending above the historic 1996 profile (***Figure 20***). The average construction volume rate of this type of dune on Alligator Point would be 3.19 yd^3/lf for a total volume of 10,856 yd^3.

A proposed project along the shoreline segment of Alligator Point from R-220 to 220.7 and R-221.5 to R-222 would be Vegetation and Sand Fence Only due to the narrow beach widths of 40 to 60 feet and proximity of the shoreline to the structures. Approximately 13,000 square feet of

beach would be vegetated with 17,333 native dune plants using various species with 26 sections of 10-foot-long sand fence.

Table 15 summarizes the construction volumes for each of the dune types and estimated costs associated with the design, permitting, and construction of a project on Alligator Point. Due to Alligator Point being further from the sand mines, we estimated the construction cost for the dune to be \$55/yd^3 in place (2022 dollars).

10.4. Bald Point

At the northern shoreline of Bald Point just north of the outfall from R-232.5 to R-235 (***Figure 25***), the Type A Dune along this section is suitable due to the structural setbacks of over 200 ft. The maximum dune elevations seaward of the structures range between +7 to +9 feet, NAVD88 and a proposed +10-foot dune would extend seaward of the existing dunes and provide protection up to a 30-year storm. The construction volume rate for a proposed construction template is estimated to be 3.77 yd^3/lf over the 2,600 feet of shoreline or 9,799 yd^3.

The landward end of the Type B Dune between R-229.5 and R-230.5 would taper into the existing dune system and would provide storm protection up to a 30-year event along the southern end of Bald Point (***Figure 25***). The historical profiles on Bald Point indicate that implementing a conceptual Type B dune would restore the dune system to the 1996 profile. The average construction volume rate of sand for this dune is 3.19 yd^3/lf over the 1,200-foot shoreline or a total volume of 3,829 yd^3 (***Table 16***).

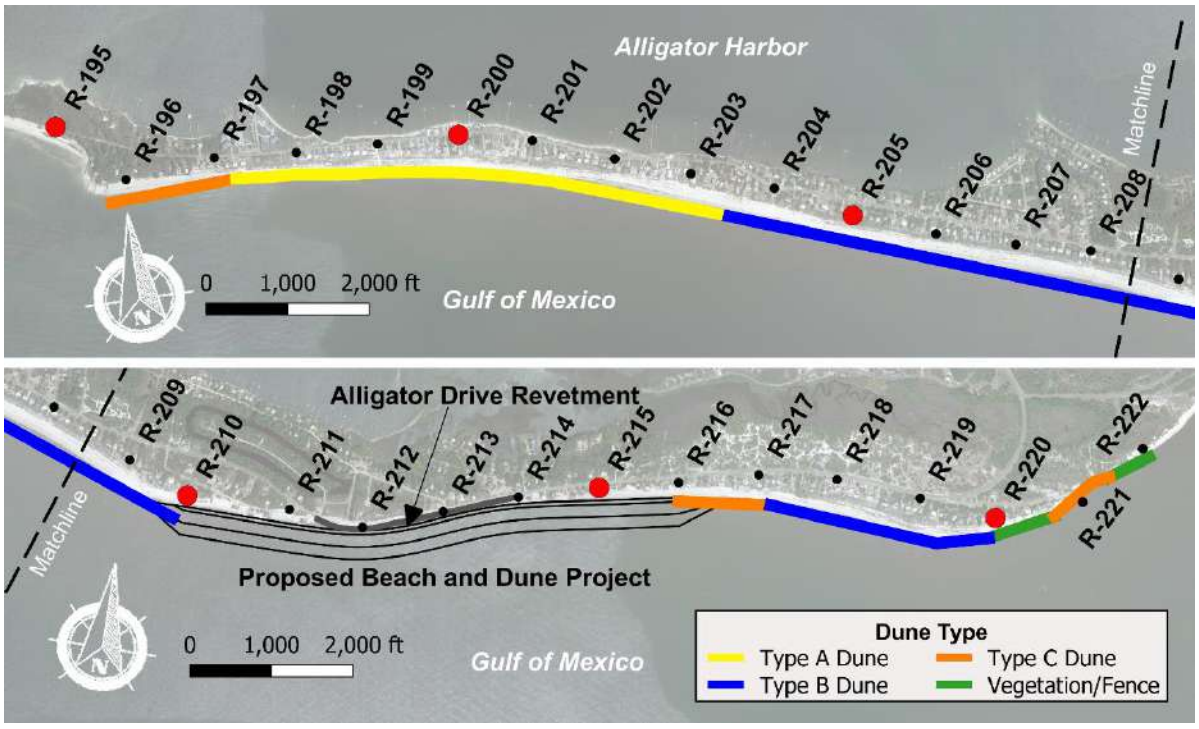

Figure 24. *Alligator Point dune type and the proposed Beach and Dune Restoration Project.*

Multiple structures in the middle of Bald Point (R-230.5 to R-232.5) are directly on the water or within 100 feet of the shoreline. It is unlikely that any dune or vegetation can be placed in front of these structures and not encroach the existing dry beach. Further inland are areas where an estimated 64,500 plants can be placed to help enhance and build dunes from captured wind-blown sand, as well as sand fences every 10 feet and post and rope where necessary. Vegetation planting can be completed within existing bare spots.

Table 16 summarizes the volumes for each of the dune types and the preliminary opinion of probable construction costs associated with the design, permitting, and construction of a project on Bald Point. Due to the greater distance between the sand mines and fill area, the cost of sand will be approximately $55/yd^3 (2022 dollars).

10.5. Carrabelle Beach

The existing beach at the Carrabelle Beach Park is both relatively wide (less than 200 feet) and is comprised of a low-profile dune system. ***Figure 26*** shows the existing beach conditions at Carrabelle Park. A small dune with an +8 ft, NAVD 88 crest height and a 10-foot crest width was determined to be the optimum design for the park based on SBEACH modeling. For reference, the elevation of the parking lot is approximately +8 feet, NAVD 88. The proposed dune would leave a 75-to-100-foot berm width seaward of the proposed dune. This design would also provide storm protection between a 20- and 30-year storm event. The dune would have a fill rate of 2.45 yd^3/lf, for a total volume of 1,954 yd^3 (***Table 17***).

Table 15. *Alligator Point - Preliminary Opinion of Probable Construction Costs.*

Description	Quantities	Unit Cost	Costs in 2021 Dollars
Type A Dune			
Sand Placement	22,614 yd^3	\$55/yd^3	\$1,243,770
Native Dune Vegetation	149,408	\$1.25/plant	\$186,759
Sand Fence	120	\$250/fence	\$30,000
Post and Rope Fence	600 feet	\$50/ft	\$30,000
Type B Dune			
Sand Placement	29,734 yd^3	\$55/yd^3	\$1,635,381
Native Dune Vegetation	177,817	\$1.25/plant	\$222,271
Sand Fence	184	\$250/fence	\$46,000
Post and Rope Fence	920	\$50/ft	\$46,000
Type C Dune			
Sand Placement	10,856 yd^3	\$55/yd^3	\$597,091
Native Dune Vegetation	70,002	\$1.25/plant	\$87,501
Sand Fence	68	\$250/fence	\$17,000
Post and Rope Fence	340	\$50/ft	\$17,000
Vegetation and Sand Fence Only			
Native Dune Vegetation	17,333	\$1.25/plant	\$21,667
Sand Fence	26	\$250/fence	\$6,500
Post and Rope Fence	130	\$50/ft	\$6,500
Engineering, Design, Permitting		20% of Total	\$838,688
Totals:			**\$5,032,130**

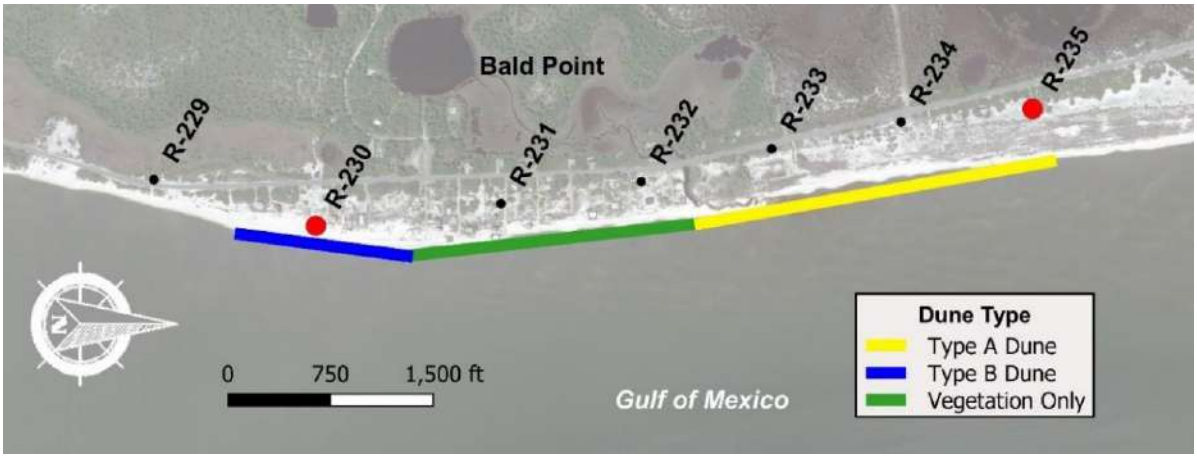

Figure 25. *Bald Point dune type locations.*

Table 16. *Bald Point - Preliminary Opinion of Probable Construction Costs.*

Description	Quantities	Unit Cost	Costs in 2021 Dollars
Type A Dune			
Sand Placement	9,799 yd^3	$55/$yd^3$	$538,5967
Native Dune Vegetation	64,743	$1.25/plant	$80,929
Sand Fence	52	$250/fence	$13,000
Post and Rope Fence	260 feet	$50/ft	$13,000
Type B Dune			
Sand Placement	3,829 yd^3	$55/$yd^3$	$210,606
Native Dune Vegetation	23,421	$1.25/plant	$29,276
Sand Fence	24	$250/fence	$6,000
Post and Rope Fence	120 feet	$50/ft	$6,000
Vegetation Only			
Native Dune Vegetation	64,500	$1.25/plant	$80,625
Sand Fence	43	$250/fence	$10,750
Post and Rope Fence	215 feet	$50/ft	$10,750
Engineering, Design, Permitting		20% of Total	$199,981
Totals:			**$1,199,884**

Table 17. *Carrabelle Park - Preliminary Opinion of Probable Construction Costs.*

Description	Quantities	Unit Cost	Costs in 2021 Dollars
Sand Placement	1,954 yd^3	$52/$yd^3$	$101,632
Native Dune Vegetation	18,396	$1.25/plant	$22,995
Sand Fence	16	$250/fence	$4,000
Post and Rope Fence	1,240	$50/ft	$62,160
Engineering, Design, Permitting		20% of Total	$38,157
Totals:			**$228,944**

Figure 26. *Existing conditions of Carrabelle Beach*

10.6. County Wide Dune Vegetation

Coastal vegetation can be planted at the toe of the dune along the county's shoreline as an alternative to provide some dune stabilization and enhancement to the existing dune system. A varied vegetation footprint of between 6 and 7.5 feet wide could be installed along the toe of the dune. The vegetation would be placed along the approximately 11 miles of the 4 project segments shown in ***Figure 27***. The native coastal vegetation would be placed on 18" centers in staggered rows to help achieve a natural look. The cost is estimated at $1.25 per plant, including the installation. The total number of plants to be installed is estimated at 171,500 with the final number to be determined during a design phase (***Table 18***).

Table 18. *County wide dune vegetation project - Preliminary Opinion of Probable Construction Costs.*

Description	Quantities	Unit Cost	Costs in 2021 Dollars
Native Dune Vegetation	171,500	$1.25/plant	$214,375
Engineering, Design, Permitting		20% of Total	$42,875
Totals:			**$257,250**

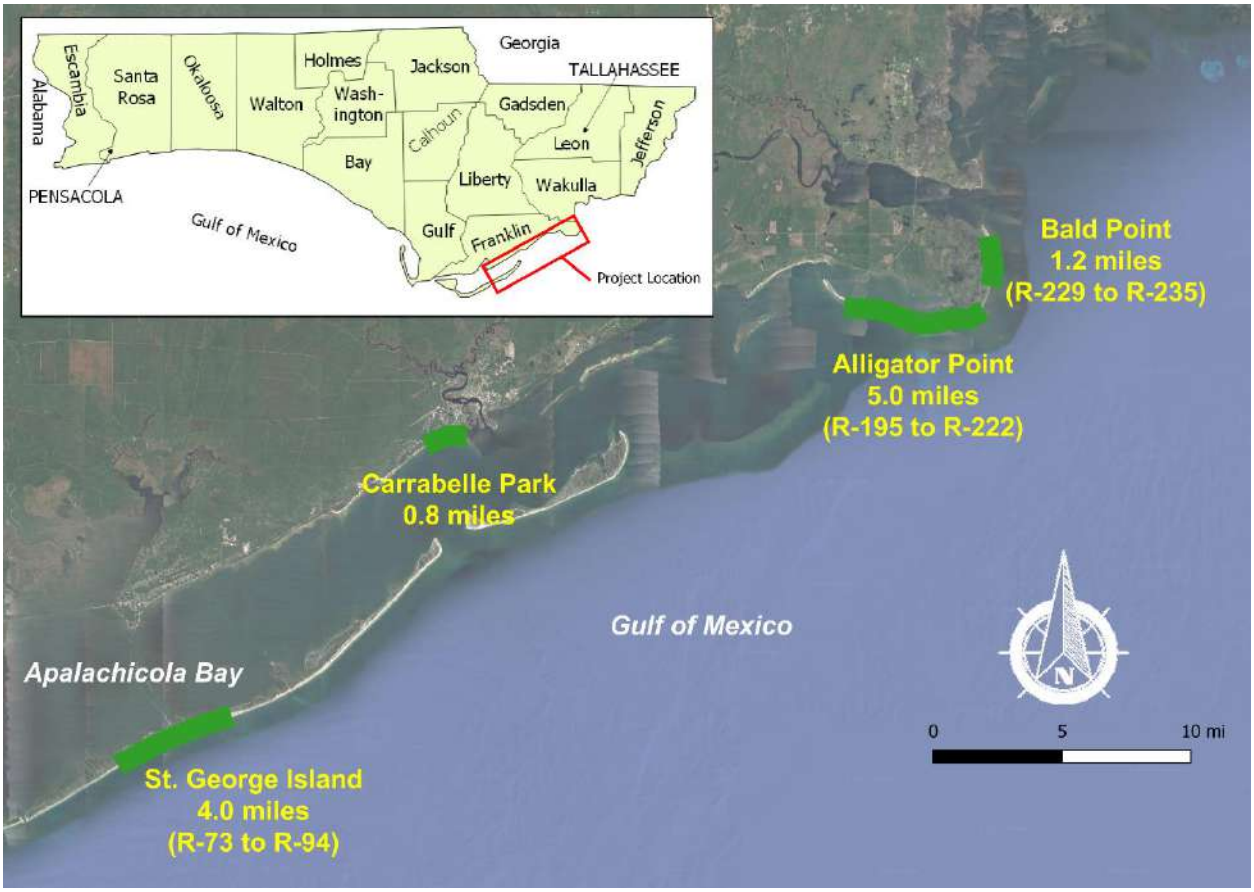

Figure 27. *County wide dune vegetation project limits*

10.7. Native Beach and Dune Vegetation

Native dune vegetation provides significant benefits to beaches, dunes, uplands and wildlife (FDEP, 2022). *Salt tolerant dune plants:*

- *build protective dunes by trapping and stabilizing wind-blown beach sand,*
- *reduce erosion losses by wind and storms,*
- *provide a buffer against storm surges and salt spray,*
- *provide shelter for wildlife, and*
- *block light pollution for nesting and hatchling sea turtles.*

Restored dunes should be planted with native vegetation within 14-days of project completion. However, there are shoreline segments on Alligator Point and Bald Point that do not have adequate space to fit any of the three dune types ("A", "B" and "C"). The placement of dunes within these areas may significantly decrease dry beach berm width or the dune feature may be eroded during small storm events if the dune is too close to the MHWL. In these locations, vegetation can be used to start, grow, and stabilize existing sand features. Planting native dune vegetation is typically appropriate for any type of beach and dune system. Even though this alternative may provide negligible storm protection, the establishment of resilient vegetation will grow dunes through the accumulation of wind-blown sediments. Sea oats (*Uniola paniculata*) typically cover 60-80% of the total area but will vary per project location and distance from the

MHWL. Bitter panicum (*Panicum amarum*), Beach Morning Glory (*Ipomoea imperati*) and Silver Sea Oxeye Daisy (*Borrichia frutescens*) are other typical native dune vegetation among others found along the NW Florida beaches that can be planted in the remaining areas. Some additional species provided by FDEP are listed below. Further guidance on the dune planting and suggested recommendations is provided within the *Dune Restoration and Enhancement for the Florida Panhandle* guide (https://edis.ifas.ufl.edu/sg156)

Figure 28. Sea oats (*Uniola paniculata*) (top left), Bitter panicum (*Panicum amarum*) (top right), Beach Morning Glory (*Ipomoea imperati*) (bottom left) and Silver Sea Oxeye Daisy (*Borrichia frutescens*) (bottom right).

Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
Coastal Construction Control Line Program
CCCL@dep.state.fl.us
(850) 245-2094

Recommended Florida Native Beach and Dune Plants for Beachfront Properties and Dune Restoration

Description

This plant list has been compiled by Coastal Construction Control Line (CCCL) staff to inform homeowners and professionals on attractive native plants expected to grow well on Florida dunes and to be available for sale in Florida nurseries. Beach dune plants are adapted to harsh environments, yet require a moderate level of protection from drought, saltspray, wind, sunburn and being eaten before the newly planted plants "harden off" and start growing on their own.

Notes:

1. Salt tolerance: high (tolerant of heavy and frequent salt spray, salt water flooding); moderate (tolerant of salt spray but subject to leaf burn from heavy salt spray or root damage from flooding); low (tolerant of salt laden air and short duration, infrequent salt water flooding but usually in protected areas).
2. Region: NW = northwest Florida Panhandle; SW = Pinellas to Collier counties; NE = Nassau to Volusia counties; SE = Brevard to Dade counties; Keys = restricted to the Florida Keys and adjacent Dade and Monroe County islands. Regions have primarily been determined by the historic distribution of the plant in Florida's coastal upland natural communities, not necessarily by the range of areas or habitats where the plant could survive.
3. Soil Moisture: moist (subject to flooding as within low dune swales); moderate (not subject to frequent flooding but not adapted to deepest sands or driest conditions; dry (adapted to deep sands, dune ridges, or well drained rocky soils); and variations for plants adapted across a range of conditions.
4. The native status of plants noted with an asterisk "*" has been questioned due to use of cultivars or artificial introduction of plant populations in Fla.

References:

1. Nelson, Gil. 2003. Florida's Best Native Landscape Plants: 200 readily available species for homeowners and professionals. Florida Association of Native Nurseries. University Presses of Florida.
2. Williams, M.J. 2007. Native Plants for Coastal Dune Restoration: what, when and how for Florida. USDA, NRCS, Brooksville Plant Materials Center, Brooksville, Florida.
3. Wunderlin, Richard P., et.al. Plant Atlas. University of South Florida.

Dune Grasses

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Distichlis spicata	salt grass	high	all	moist
Muhlenbergia capillaris var. filipes	Gulf hairawn muhly grass	moderate	all	moderate
Panicum amarum	bitter panic grass	high	all	dry
Paspalum vaginatum	seashore paspalum*(not sod)	high	all	moderate
Schizachyrium scoparium	coastal bluestem	high	all	moderate
Spartina patens	marshhay	high	all	moderate
Sporobolus virginicus	seashore dropseed	high	all	moist
Uniola paniculata	sea oats	high	all	dry

Groundcovers

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Borrichia arborescens	sea oxeye	high	SW, SE, Keys	moist
Borrichia frutescens	sea oxeye	high	all	moist
Conradina canescens	beach rosemary	moderate	NW	dry
Ernodea littoralis	golden beach creeper	high	SW, SE, Keys	moderate - dry
Gaillardia pulchella*	blanket flower	moderate	all	dry
Helianthus debilis	East Coast dune sunflower	high	NE, SE, Keys	dry
Helianthus debilis spp. cucumerifolius	cucumber leaf dune sunflower	high	NW, SW	dry
Helianthus debilis ssp. vestitus	West Coast dune sunflower	high	SW	dry
Hymenocallis latifolia	beach spider lily	high	SW, NE, SE, Keys	moist - dry
Ipomoea imperati	beach morning glory	high	all	moderate, dry
Ipomoea pes-caprae	railroad vine	high	all	moderate, dry
Iva imbricata	beach elder	high	all	moist – dry
Sesuvium portulacastrum	sea purslane	high	all	moist - moderate
Solidago sempervirens	seaside goldenrod	high	NW, SW, NE, SE	moist – moderate
Yucca filamentosa	Adam's needle	moderate	NW, SW, NE, SE	dry

Recommended Florida Native Beach and Dune Plants (continued)

Vines

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Bignonia capreolata	cross vine	moderate	NW, SW, NE, SE	moderate
Gelsemium sempervirens	Carolina jessamine	moderate	NW, SW, NE, SE	moderate – dry
Ipomoea alba	moonflower	high	SW, SE, Keys	moist – dry
Pentalinon luteum	wild allamanda	high	SW, SE, Keys	dry
Vitis rotundifolia	muscadine	moderate	NW, SW, NE, SE	moderate – dry

Shrubs

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Ardisia escallonioides	marlberry	moderate	SW, SE, Keys	moderate
Argusia gnaphalodes	sea lavender	high	SE, Keys	dry
Chrysobalanus icaco	coco plum	moderate	SW, SE, Keys	moderate - dry
Erythrina herbacea	coral bean	low	all	moderate - dry
Eugenia axillaris	white stopper	low	SW, SE, Keys	moderate
Eugenia foetida	Spanish stopper	low	SW, SE, Keys	moderate
Forestiera segregata	Florida privet	low	SW, NE, SE, Keys	moist -moderate
Ilex vomitoria	yaupon	moderate	NW/SW, NE, SE	moderate - dry
Myrica cerifera	wax myrtle	moderate	all	moist - moderate
Quercus geminata	sand live oak	moderate	NW, SW, NE, SE	dry
Quercus myrtifolia	myrtle oak	moderate	NW, SW, NE, SE	dry
Rapanea punctata	myrsine	moderate	SW, SE, Keys	moist - dry
Serenoa repens	saw palmetto	high	all	moist - dry
Suriana maritima	bay cedar	high	SW, SE, Keys	dry
Zamia pumila	coontie	moderate	SW, NE, SE, Keys	dry

Thorn/Scrub Plants

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Agave decipiens	false sisal	high	SW, SE, Keys	dry
Guilandina bonduc	gray nickerbean	moderate	SW, SE, Keys	moderate - dry

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Erythrina herbacea	coral bean	low	all	dry
Opuntia spp.	prickly pears	high	all	moderate - dry
Serenoa repens	saw palmetto	high	all	moist - dry
Sideroxylon tenax	tough bully	low	NE, SE	dry
Smilax auriculata	earleaf catbrier	moderate	all	dry
Ximenia americana	hog plum	low	NE, SE	dry
Yucca aloifolia	Spanish bayonet	high	all	dry
Yucca filamentosa	Adam's needle	moderate	NW, SW, NE, SE	dry
Yucca gloriosa	moundlily yucca	moderate	NW, SW, NE	dry
Zanthoxylum clava-hercules	Hercules' club	moderate	NW, SW, NE, SE	dry
Zanthoxylum fagara	wild lime	moderate	SW, NE, SE, Keys	moderate - dry

Trees

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Acacia farnesiana	sweet acacia	moderate	all	moist - dry
Baccharis halimifolia	salt bush	high	all	moist - moderate
Bursera simaruba	gumbo limbo	moderate	SW, SE, Keys	moderate - dry
Capparis cynophallophora	Jamaica caper	moderate	SW, SE, Keys	dry
Celtis laevigata	hackberry	low	NW, SW, NE, SE	moist - moderate
Chrysophyllum oliviforme	satinleaf	moderate	SE, Keys	moderate - dry
Citharexylum spinosum	fiddleleaf	moderate	SE, Keys	dry
Coccoloba diversifolia	pigeon plum	high	SW, SE, Keys	moderate - dry
Coccoloba uvifera	sea grape	high	SW, SE, Keys	moderate - dry
Conocarpus erectus	buttonwood	high	SW, SE, Keys	moist - moderate
Cordia sebestena	Geiger tree	moderate	SW, SE, Keys	moderate - dry
Ficus aurea	golden fig	moderate	SW, SE, Keys	moderate
Ilex x. attenuata	East Palatka holly	low	NW, SW, NE, SE	moderate
Ilex cassine	dahoon holly	low	NW, SW, NE, SE	moist - moderate
Ilex opaca	American holly	low	NW, SW, NE, SE	moderate
Ilex vomitoria	yaupon holly	moderate	NW, SW, NE, SE	moderate - dry

Recommended Florida Native Beach and Dune Plants (continued)

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Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Juniperus silicicola	southern red cedar	moderate	NW, SW, NE, SE	moderate
Laguncularia racemosa	white mangrove	high	SW, SE, Keys	moist - moderate
Magnolia grandiflora	southern magnolia	moderate	NW, SW, NE	moderate
Pinus clausa	sand pine	moderate	NW, SW, NE, SE	dry
Pinus elliottii (S. Fla = var. densa)	slash pine	moderate	NW, SW, NE, SE , Keys	moist - moderate
Quercus geminata	sand live oak	moderate	NW, SW, NE, SE	moderate - dry
Quercus virginiana	live oak	moderate	NW, SW, NE, SE, Keys	moderate - dry
Sideroxylon foetidissimum	False mastic	moderate	SW, SE, Keys	moderate

Palms

Scientific Name	Common Name	Salt tolerance	NW/SW/NE/SE/Keys	Soil Moisture
Acoelorraphe wrightii	Everglades palm	moderate	SW, SE, Keys	moist - moderate
Coccothrinax argentata	silver palm	high	SE, Keys	dry
Sabal palmetto	cabbage palm	high	all	moist - moderate
Serenoa repens	saw palmetto	high	all	moist - dry
Leucothrinax morrisii	brittle thatch palm	moderate	Keys	dry
Thrinax radiata	Florida thatch palm	moderate	Keys	dry

For more information call Fritz Wettstein at 850/245-8020 or email fritz.wettstein@floridadep.gov.

Coastal Construction Control Line Program, Office of Resilience and Coastal Protection,
Florida Department of Environmental Protection, 2600 Blair Stone Road, Mail Station 3522, Tallahassee, Florida 32399-2400
850/245-8336 voice 850/245-8499 fax, cccl@dep.state.fl.us.

10.8. Sand Fencing Guidelines

Wind-blown sand is transported along the beach and may be trapped and collected by sand fences to assist in building sand dunes. Fences should be raised before the sand accumulates to a depth of 18 inches and can no longer trap sand. The installation of sand fencing may be restricted along high density marine turtle nesting beaches or where the dry beach area is too narrow to supply wind-blown sand to be effective or the shoreline is subjected to frequent erosion. The U.S. Fish and Wildlife Service also discourages the installation of long segments of sand fencing along marine turtle nesting beaches and should be installed along selective shorelines where sand fencing would be the most effective. The following Sand Fence Guidelines (FDEP, 2020) are provided below:

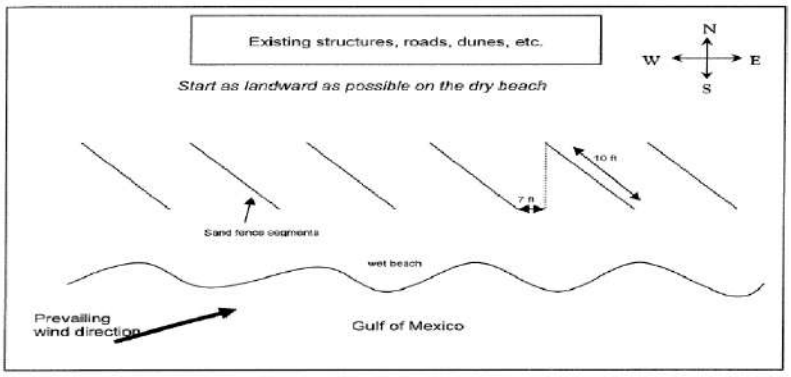
Sand Fencing Guidelines

Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
Coastal Construction Control Line Program
2600 Blair Stone Road, MS 3522
Tallahassee, Florida 32399-2400
cccl@dep.state.fl.us
(850) 245-8336

Sand fences can assist dune vegetation and placement of beach compatible sand in rebuilding sand dunes by trapping windblown sand. Standard fencing used in dune restoration projects consists of wooden slats wired together with space between the slats as originally designed for snow fences. Sand fence designs with woven fabric type fencing have also been successful. Whatever the material being used, the fence is recommended to have a 40% open space to 60% closed space ratio for most effective sand trapping. Fabric-type fences might not hold up as well as the wooden slats since they are more susceptible to ultraviolet degradation.

Sand fences are usually 2 to 4 feet high and recommended to be lifted and repositioned prior to becoming 50% buried. If completely buried in sand, the fence loses the ability to collect more sand and the fence materials become difficult to remove and potential safety hazards.

Sand fences require Coastal Construction Control Line permits and must be installed outside of sea turtle nesting season with minimal risk to nesting sea turtles. Sand fences are best located seaward of the crest of the primary dune and for sea turtle protection must be configured as follows: a maximum of ten (10) foot long spurs of sand fencing spaced at a minimum of seven (7) feet on a diagonal alignment (facing the predominate wind direction) along the shoreline. Only one row is allowed within sea turtle nesting habitat.



If the primary reason for sand fencing is to control pedestrian access, a post and rope fence with a single strand of rope a minimum of three feet in height is preferred to reduce the amount of material in the dune system.

Florida Fish and Wildlife Conservation Commission
Contact: Imperiled Species Management (850) 922-4330 or marineturtle@myfwc.com

10.9. Dune Walkover Guidelines

Dune Walkovers and designated Beach Access Points should be used to cross the dunes from the uplands to the beach and direct foot and vehicular traffic. Continual on-grade traffic will damage dune vegetation and cause the sand dunes to erode and become more susceptible to storm damage. A dune system with well-established vegetation will provide a strong defense against storms. The following Dune Walkover Guidelines (FDEP, 2021d) are provided below:

Florida Department of Environmental Protection
Office of Resilience and Coastal Protection
Coastal Construction Control Line Program
www.FloridaDEP.gov/CCCL
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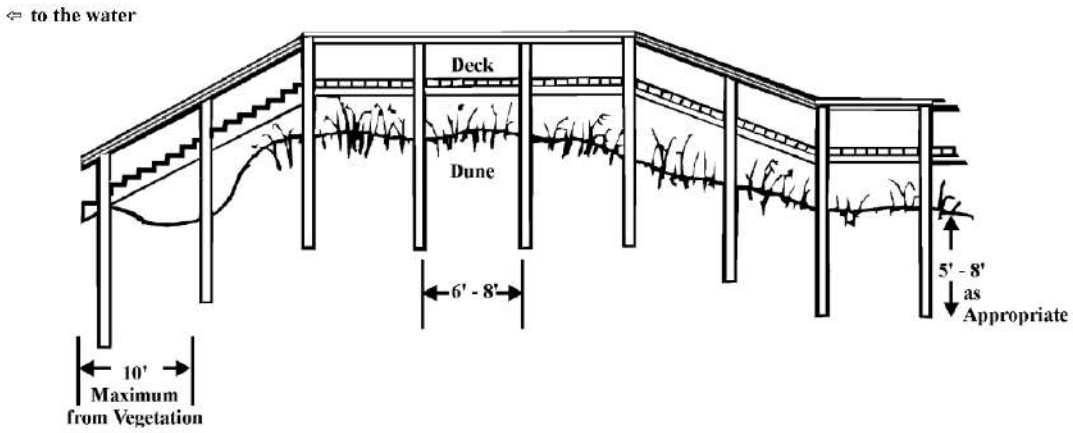
(850) 245-2094

COASTAL CONSTRUCTION CONTROL LINE
DUNE WALKOVER GUIDELINES

On many of Florida's beaches, coastal dunes provide significant protection to upland property, wildlife habitat, and the beach dune system. The Florida Department of Environmental Protection (DEP) encourages coastal resilience design features for beach access and dune walkovers to protect dune topography, dune plants and coastal wildlife from construction impacts, damaging foot traffic and to allow for the natural recovery of damaged or eroded dunes.

TYPICAL DUNE WALKOVER PROFILE



PERMIT REQUIREMENTS

A permit from DEP is required for construction of walkovers on most sandy beaches fronting on the open waters of the Atlantic Ocean or Gulf of Mexico. In areas where a Coastal Construction Control Line (CCCL) has been established pursuant to provisions of Section 161.053, Florida Statutes (F.S.), a permit is required for all excavation, construction, or other activities with the potential to cause beach erosion or damage coastal vegetation. On sandy shorelines where a CCCL line has not been established, a permit is required for construction activities within 50 feet of the mean high water line (see Section 161.052, F.S.).

Permits for walkovers contain standard conditions that require construction to be conducted in a manner that minimizes short-term disturbance to the dune system and existing vegetation. Replacing vegetation destroyed during construction with similar plants suitable for beach and dune stabilization is required. Only limited excavation for the placement of support posts is allowed, and walkovers cannot be constructed during the marine turtle-nesting season, which extends May 1 through October 31 (except for Brevard through Broward counties, which extends March 1 through October 31).

Dune Walkover Guidelines (continued)

GENERAL SITING GUIDELINES

The walkover must be located and designed to protect dune features, to minimize disturbance of native vegetation, to not obstruct lateral beach access and to minimize the amount of construction material that may become debris during a storm. Elevated walkovers are not required for all beach accesses, such as in sparsely vegetated, low profile dune areas where on-grade sand or shell paths are suitable for controlling foot traffic. Note that on-grade beach mats are considered to be structures that require CCCL permits. Walkovers are generally constructed over the frontal dune and perpendicular to the shoreline. Dune walkovers are designed to extend at least to the seaward toe of the frontal dune or the existing line of vegetation and are allowed no farther than 10 feet seaward of the vegetation. The optimum siting of the walkover structure can be determined by contacting a CCCL field inspector.

GENERAL DESIGN GUIDELINES

Walkovers are designed to be minor, expendable structures that pose only minimal interference with coastal processes and generate minimal amounts of debris. Walkovers constructed across native beach and dune vegetation need to be post-supported and elevated a sufficient distance above the existing or proposed vegetation to allow for sand build-up and clearance above the vegetation. Stairways and ramps leading from the dune bluff or crest down to the beach need to completely span the seaward slope of the dune without installing posts into unstable slopes steeper than approximately 30 degrees. The structure must be designed to minimize the quantity of material used in construction, such as avoiding the use of vertical wood pickets, and reducing the length and width of construction on the beach.

Single family walkovers are not to exceed 4 feet in overall width and the support posts are not to be greater than 4-inch wide posts. Multi-family walkovers are not to exceed 6 feet in overall width and the support posts are not to be greater than 6-inch wide posts. Round posts are preferred to square posts. Support posts cannot be encased in concrete nor installed into dune slopes that are steeper than approximately 30 degrees. Support posts are to have a minimum 5 feet of soil penetration or embedment. Cross bracing is not required for most structures when following the designs in the document "*Beach/Dune Walkover Structures*," referenced at the end of this document. Local governments and property owners are advised to consult with a CCCL Permit Manager prior to requesting a permit for a walkover that contains switchbacks, long ramps or other features required to comply with the Americans with Disabilities Act Accessibility Guidelines.

WALKOVER ELEVATION GUIDELINES

Walkover heights vary as the structure crosses the beach/dune system. The ground cover changes from the uplands, commonly covered with woody scrub or coastal strand vegetation (saw palmetto/sea grape/scrub oaks),over a dune bluff or one or several dune crest(s), covered with either coastal strand or coastal grassland (sea oats/bitter panicum/marsh hay), down the slope to the dry sand beach, either uncovered bare escarpment or partially covered with beach/dune vegetation (railroad vine/sea rocket/sea oats). Design of the structure and height of the deck from the dune bluff or crest down to the beach also must be considered in setting the walkover elevation with the goal of minimizing the amount of material on the beach.

Walkover Elevations in Uplands. The upland environment of coastal scrub/coastal strand habitat is characterized by more stable soil conditions with less blowing sands and infrequent storm overwash events. The stable conditions allow for the development of a mature woody vegetation and saw palmetto dominated plant community. In addition to thick above ground stem and leaf vegetation between 5 and 15 feet in height, this plant community has an extensive below ground woody root mat. Walkovers in these upland habitats need be elevated only a sufficient distance above the ground to avoid disturbance of the soil and root systems or cutting of low tree and palmetto trunks. An elevation of the stringers from 6" to 2'-0" above existing grade is expected to be sufficient in many cases. Walkover elevations crossing coastal wetlands within upland areas may require increased elevations. Elevation of the walkover above the leaf canopy is in most cases impractical in coastal

Dune Walkover Guidelines (06/21) Page 2

Dune Walkover Guidelines (continued)

scrub or coastal strand habitats where careful pruning needs to be limited to removal of only those aerial branches to create an open passage. Deck elevations need to be no higher than five feet above grade to provide clearance for vegetation, and the movement of sand, water and sea turtles underneath the structure.

Walkover Elevations over Bluffs. The low stringer elevation recommended for uplands can be carried to the landward side of the bluff line. This will reduce the length of a ramp or walkover from the crest down to the beach. Again the objective the walkover elevation is to reduce damage to coastal scrub soils and root systems.

Walkover Elevations over Dune Crests. Dune environments are characterized by mobile sands subject to storm effects (which lower grade elevations) and wind effects (which can raise elevation as sand is trapped). Dunes are dominated by coastal grassland plants adapted to the dynamic environment. These include sea oats, bitter panicum, and little bluestem. Walkovers sited within active dune systems are required to be elevated sufficiently to allow for sand movement and growth of vegetation. Walkover designs published in "Beach/Dune Walkover Structures" referenced below specify a 3'-10" minimum clearance from existing grade to the bottom of the stringers of an up to 6-foot wide (overall dimension) multi-family or public beach access structures, and a 3'-0" minimum clearance to the top of the deck for 4-foot wide single family walkovers.

Walkover Elevations on Seaward Dune or Bluff Slopes. The elevation of the walkover at the dune crest and the distance of the seaward terminus from the water's edge determine the height of the steps or ramps crossing the seaward slope. The design objective is to get the structure down to the beach in as short a shore-normal (perpendicular to the shoreline) distance as possible while reducing the shore-parallel coverage of the slope. Department guidelines require that the seaward terminus of the structure be no farther seaward than 10 feet from the line of permanent beach dune vegetation or the toe of the frontal dune. Reducing the seaward encroachment and shore-parallel width decreases the potential for storms interacting with the structure, occupation of sea turtle nesting habitat by the structure, and interference with lateral public beach access. Walkovers designed for the Americans with Disabilities Act often increase the length of walkover ramps on the beach. This requires the need for a site specific review for environmental impacts. The burial of the ramp or step terminus a minimum amount (0.5 to 1.0 feet)-foot below grade may allow for use of the walkover after some lowering of the beach elevation from minor storms. However, placement of this terminus below the depth of a post storm beach profile is discouraged as this portion of the walkover will most likely have been damaged by larger storms and to have interfered with coastal processes.

On Grade Walkovers. Elevated walkovers are not necessary in all site conditions and use situations. Where dune development is minimal, beach dune vegetation is sparse and the use infrequent, on-grade footpaths may be preferred. The Department discourages solid concrete walks and footpath surfaces such as stepping stones that create debris or missiles. Other surfaces such as geotextile fabrics, cabled wood planks, or shell require a case by case review. No permanent path surfaces are allowed farther seaward than 10-feet from the dune or vegetation line or within sea turtle nesting habitat.

Reference

Beach/Dune Walkover Structures, SUSF-SG-76 by Todd L. Walton, Jr., and Thomas C. Skinner. Published by the Marine Advisory Program of the Florida Cooperative Extension Service and the Florida Sea Grant, March, 1983.

11.0. Permit Feasibility

Any activity seaward of the CCCL and the MHW line will require a CCCL permit from FDEP which would likely be necessary for any of the proposed projects discussed within. FDEP encourages the placement of beach quality sand and native dune vegetation to restore and enhance dune systems, therefore permitting is relatively straight forward. The establishment of an Erosion Control Line (ECL) or a Joint Coastal Permit (JCP) would not be required provided sand is not placed below the MHW line that would extend the shoreline seaward. A USACE permit or Biological Opinion from the U.S. Fish and Wildlife or National Marine Fisheries Service should not be required because the proposed activities will occur upland of the High Tide line. These sections of beach do not contain "critical beach mouse habitat", however it is within critical nesting habitat for loggerhead sea turtles so construction may be limited to outside of sea turtle nesting season which extends from May 1 to October 30. Florida Fish and Wildlife Conservation Commission (FWC) will also provide comments during the permitting process. Permits and authorization from FDEP can be obtained in approximately 6-months or less from submitting a complete permit application that will also identify the borrow area(s) and sand quality.

12.0. Summary

The purpose of this investigation was to identify cost-effective solutions to rebuild and increase the stability of the dunes throughout the Franklin County study shoreline. There are four (4) shoreline segments included in this study 1) St. George Island shoreline between R-73 to R-94, 2) Alligator Point between R-195 to R-222, 3) Bald Point between R-229 to R-235, and 4) Carrabelle Beach.

The primary constraints that determined the types of dunes possible for a particular stretch of shoreline were: 1) the height (or lack) of the existing dune system, 2) the width of the existing dry beach berm, 3) the location of upland structures and infrastructure relative to the shoreline, and 4) the level of storm protection (level of risk) provided by the existing beach and dune system. The greatest benefit of constructing a continuous, contiguous dune feature along the Franklin County beaches is to provide a barrier to storm events, reduce overtopping and flooding to the back dune areas, mitigating for historic dune erosion and creating wildlife habitat.

Three conceptual dune types (A, B and C) were developed through an iterative process by revising the crest height and width to optimize the level of storm protection through SBEACH modeling while maintaining a minimum berm width of 80-feet, where possible. A fourth option consists solely of vegetation and sand fencing where there is not an adequate amount of room to construct a dune feature.

1) Portions of Alligator Point and Bald Point are typically characterized by having wide berms, low flat dune features with elevations typically less than +8 feet, NAVD88 and significant structural setbacks from the Gulf of Mexico. The conceptual Type A Dune would have a crest elevation of +10-foot, NAVD88 so not to impede views, crest width varying between 20 to 30-feet and side slopes from 1V:4H to 1V:3H. This dune type is suitable for areas having an existing berm width of a 100-feet or greater. The wider dune crest and more gradual slope of this dune type (1V:4H) allows for greater storm protection and a more natural transition from the dune to the beach berm.

2) The entire beach segment of St. George Island between R-73 and R-94 and portions of Alligator Point and Bald Point are typically characterized by wide beach berms, eroded dune faces with and fairly significant structural setbacks from the Gulf of Mexico. The Type B Dune concept extends from an existing dune crest elevation of +10 ft, NAVD88 so not to impede views to the Gulf from the upland structures and can be placed in locations with narrow or wide existing beach berm widths by varying the crest width between 20 to 30 feet and side slopes from 1V:3H to 1V:4H.

3) Portions of Alligator Point are typically characterized by narrow berm widths, eroded dune peaks and smaller structural setbacks from the Gulf of Mexico. The Type C Dune concept is similar to the Type A Dune and is suitable for existing dune elevations that are less than +8 feet, NAVD88, and consist of narrower and lower elevation beach berms than beaches suitable for a Type A Dune. The conceptual Type C Dune would have a crest elevation at +10 feet NAVD 1988 so not to impede views, narrow crest width of 10 to 20 feet, and steeper front and back slopes of 1V:3H.

4) There are some areas on Alligator Point and Bald Point where there is not adequate room between the existing structures and the shoreline to construct a dune feature. In these locations vegetation and sand fence can be placed to assist in the development and growth of dunes. Initially this option would not provide any storm protection but may increase with the growth of the dune naturally. It should be noted that the sand fence requires periodic maintenance to ensure the optimal long-term performance to capture wind-blown sediments. It is recommended that the fencing be pulled up and reinstalled before it is buried by 2 feet of sand. Otherwise, it will be difficult to impossible to remove the fence and may eventually completely covered becoming ineffective to trap sand.

Post and rope fencing is used to direct pedestrian traffic away from the dunes and to dune walkovers, beach and vehicular accesses and paths. “Keep Off the Dunes” signs should also be installed at the toe of the dune to inform and educate beach goes on the ecological importance of dunes systems.

The conceptual construction templates may need to be refined to fit along a particular beach segment depending on the specific conditions existing at the time of final design. Updated surveys will document the existing grades that will be used to develop the construction templates and update construction volumes. The preliminary opinion of probable construction costs in 2022 dollars are found in ***Table 13***, ***14***, ***15***, and ***16*** and were based on Gulf County dune projects that were bid and constructed in 2020 and 2021-2022. A price escalation was applied to these unit costs to account for the increased fuel costs since these projects were bid. The preparation of a budget for grant applications or construction should include an adjustment in the unit costs based on the anticipated design, permitting and construction schedule.

The proposed activities seaward of the CCCL will require a CCCL permit from FDEP. FDEP encourages the placement of beach quality sand and native dune vegetation to restore and enhance dune systems, therefore permitting is relatively straight forward. A USACE permit should not be required provided the

proposed activity will occur upland of the High Tide line. Construction may be limited to outside of sea turtle nesting season which extends from May 1 to October 30. Permits and authorization from FDEP can be obtained in approximately 6-months or less from submitting a complete permit application that will also identify the borrow area(s) and sand quality.

13.0. Glossary of Coastal Engineering Terminology

The following terms were obtained from a number of sources and refined for use in this report. The majority of these terms were obtained from the Coastal Engineering Manual (USACE, 2002), www.Beachapedia.org, and Chapter 62B-33, Florida Administrative Code (FAC).

ACCRETION

The accumulation of (beach) sediment, deposited by natural fluid flow processes. Growth (vertical and/or horizontal) of morphological structures (beach, bar, dune, sand bank, tidal flat, salt marsh, tidal channel, etc.) by sedimentation. May be either natural or artificial. Natural accretion is the buildup of land, solely by the action of the forces of nature, on a beach by deposition of water-borne or airborne material. Artificial accretion is a similar buildup of land by reason of an act of man, such as the accretion formed by a groin, breakwater, or beach fill deposited by mechanical means.

BACKSHORE

That zone of the shore or beach lying between the foreshore and the dunes comprising the BERM or BERMS and acted upon by waves only during severe storms, especially when combined with exceptionally high water. Generally referred to as the landward portion of the dry recreational beach area. The backshore is dry under normal conditions and only exposed to waves under extreme events with high tide and storm surge. Vegetation is generally sparse or absent.

BACK BARRIER

Sandy region in the lee of a coastal barrier island, barrier spit, or baymouth barrier, often containing significant coarse sediment that has washed in from the seaward side.

BACKRUSH

The seaward return of water following the uprush of the waves. For any given tide stage, the point of farthest return seaward of the backrush is known as the limit of backrush.

BACKSHORE

That zone of shore or beach lying between the foreshore and the dunes and acted upon by waves only during severe storms, especially when combined with exceptionally high water. It includes the berm or groins.

BACKSLOPE

The part of the profile of a hillslope that forms the steepest, typically linear portion of the slope, generally located in the middle and bounded by a convex shoulder above and a concave foot slope below. The backslope may or may not include vertical or near-vertical cliffs.

BAR

A submerged or emerged embankment of sand, gravel, or other unconsolidated material built on the sea floor in shallow water by waves and currents.

BARRIER ISLAND

A coastal landform that runs parallel to the coastline, often created when offshore bars are driven onshore by rising sea levels.

BATHYMETRY

The measurement of depths of water in oceans, seas, and lakes, and also the information derived from such measurements.

BEACH

A zone of unconsolidated material that extends landward from the low water line to the place where there is marked change in material or physiographic form such as the toe of the dune, or to the line of permanent vegetation (usually the effective limit of storm waves).

BEACH BERM

A nearly horizontal shore parallel ridge formed on the beach formed by the landward transport of the coarsest fraction of the beach material by the wave uprush. Some beaches have no berms, others have one or several. Under normal conditions a beach berm is formed on the upper part of the beach face, and over the backshore during severe events. Beach berms are sometimes artificially reinforced as coastal protection measure.

BEACH CUSPS

One of a series of short scallop-like ridges on the foreshore separated by crescent-shaped troughs or depressions spaced at more or less regular intervals along the beach. Typically, these are spaced between a few meters and a few tens of meters consisting of small embayment between protruding horns.

BEACH FACE

Is the zone between the mean low water (MLW) and the seaward beach berm, which is equivalent to the upper limit of wave run-up at high tide. The beach face is the part of the beach which is wetted due to the varying tide and swash under normal conditions.

BEACH FILL

Material placed on a beach to nourish eroding shorelines, usually pumped and placed by a dredge but sometimes delivered by trucks. The supply of beach sand for the construction of an artificial beach.

BEACH NOURISHMENT

Beach nourishment is the supply of sand to the beach to increase the recreational value and/or to compensate for the effect of shore erosion by feeding sand on the beach.

BEACH WIDTH

The horizontal dimension for the beach measured normal to the shoreline and landward of the higher-high tide line.

BERM

In a barrier beach system, the relatively flat, sandy area between the berm crest and the dunes formed by the deposit of material by wave action. Some beaches have no berm, others have one or several.

BERM CREST

The seaward limit of a berm.

BEACH COMPATIBILITY MATERIAL OR BEACH QUALITY SAND

In general, fill material shall be sand that is similar in coloration and grain size as the existing natural sands. It shall be free of debris, rock, clay, organic matter or other foreign matter and shall not result in cementation of the beach. Beach-compatible fill material will be predominantly quartz sand of a mean grain size diameter between 0.20mm and 0.45mm, with a moist Munsell color value/chroma of 7/1 or lighter and a similar quantity of shell as the existing natural beach.

BEACH AND OFFSHORE PROFILES

Survey measurement of the elevations of the beach surface taken along a line that runs from the dune across the beach to the Depth of Closure. A profile is the shape of the beach and offshore if one had taken a vertical cut from the dune to the offshore and looked at from the side. Profiles taken at different dates can be compared to illustrate and quantify storm, seasonal, and longer-term changes in beach width, height, volume, and shape.

BORROW AREA OR SITES

Located offshore in the form of drowned barrier islands, oblique sand bodies and longshore sand bars, near to shore in the form of flood and ebb tidal deltas, or on land. This sand is used for beach and dune nourishment by excavating the material from these features, transporting, placing and forming to the specified construction template. Sand may also come from navigation channel maintenance dredging activity.

BRUUN RULE

A linear relationship between sea level rise and shoreline recession based on equilibrium profile theory, which asserts that shore face profile maintains an equilibrium shape, and as sea level rises the increasing accommodation space forces this equilibrium profile landward and upward to preserve its shape relative to the new sea level.

COAST

A strip of land of indefinite width that extends from the shoreline inland to the first major change in terrain features. Coastal zones are regions where the interaction of terrestrial and marine processes occurs.

COASTAL CONSTRUCTION CONTROL LINE (CCCL) OR CONTROL LINE

Is the line established pursuant to the provisions of Section 161.053, F.S., and recorded in the official records of the county, which defines that portion of the beach-dune system subject to severe fluctuations based on a 100-year storm surge, storm waves, or other predictable weather conditions.

COASTAL ZONE

The transition zone where the land meets the water, the region that is directly influenced by marine and lacustrine hydrodynamic processes. Extends offshore to the continental shelf break and onshore to the first major change in topography above the reach of major storm waves. On barrier coasts, includes the bays and lagoons between the barrier island and the mainland.

CONSTRUCTION TEMPLATE

The specified grade, elevations, slope that sand will be placed and shaped to nourish a beach.

CONTOUR

A line marked on a topographic map or chart which connects points of equal elevation above or below a specified reference datum. Multiple contour lines, each representing a different elevation, are depicted together to show the shape of the terrain within the map area.

CRITICALLY ERODED SHORELINE

Pursuant to Rule 62B-36.002(5), Florida Administrative Code (FAC), *where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost*.

CROSS-SHORE

Perpendicular to the shoreline.

CUTTERHEAD DREDGE

A hydraulic dredge that uses a rotating steel head consisting of hardened cutting blades and backing ring to dislodge bottom material. The head is mounted at the suction entrance of the hydraulic pipeline, and fluidized material is picked up by suction and carried away through the pipeline.

DATUM

Any permanent line, plane or surface used as a reference datum to which elevations are referred. The National Geodetic Vertical Datum of 1929 (NGVD29) was the official vertical datum established for vertical control surveying in the lower 48 states and Alaska. The datum was used to measure the elevation of a point above and depression below mean sea level (MSL). NGVD29 was superseded by the North American Vertical Datum of 1988 (NAVD 88) in 1993.

DEPTH OF CLOSURE

The theoretical depth along a beach profile where sediment transport is very small or non-existent, dependent on wave height and period, and occasionally, sediment grain size." Based on this definition, there should be no or very little volume changes seaward of the Depth of Closure.

DESIGN STORM

A hypothetical extreme storm whose waves coastal protection structures and/or beaches will often be designed to withstand. The severity of the storm (return period) is chosen in view of the acceptable level of risk of damage or failure. A design storm consists of a design wave conditions, a design water level and a duration.

DOWNDRIFT

The direction of predominant movement of littoral materials.

DUNE

Ridges or mounds of loose sediment (fine to medium) landward of a coastal berm deposited by wind or by storm overwash. Sediment deposited by artificial means serves the purpose of storm-damage prevention and flood control. These coastal features are somewhat parallel to the shoreline and are more or less vegetated. Dunes are an active coastal form acting as a sand reservoir and providing flexible natural protection against erosion and flooding.

DUNE CREST

Top of the natural of artificial created dune feature.

DUNE, TOE

Occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope either on the seaward or landward side of the dune feature.

DREDGING

The removal of sediment or the excavation of tidal or subtidal bottom to provide sufficient depths for navigation or anchorage, or to obtain material for construction or for beach nourishment.

EROSION, RECESSION

The wearing away of land by the action of natural forces. On a beach, the carrying away of beach material by wave action, tidal currents, littoral currents, or by deflation. A continuing net landward movement of the shoreline over a specified time.

EROSION CONTROL LINE (ECL)

In accordance with Rule 62B-41.002(15), FAC … *in connection with beach restoration projects. Where established, an erosion control line represents the landward extent of the claims of the state in its capacity as sovereign title holder of the submerged bottoms and shores of the … the Gulf of Mexico …* The ECL establishes the boundary between upland private property and the State of Florida and is

delineated along the MHW line at the time of the pre-construction survey. Any dry beach created seaward of the ECL will be public property and can be passively used by the public including activities such as sunbathing, fishing, etc.

ESCARPMENT OR SCARP

An almost vertical slope along the beach caused by erosion by wave action. It may vary in height from a few inches to several feet, depending on wave action and the nature and composition of the beach.

EQUILIBRIUM PROFILE

For sediment of a given size, there will be a unique beach profile shape in equilibrium with the specified wave and tidal characteristics of the beach where the constructive and destructive forces on the sand grains are in balance. If the forces change, a new equilibrium profile will evolve and form.

FEEDER BEACH

An artificially widened beach serving to nourish downdrift beaches by natural littoral currents or forces.

FOREDUNE

The front dune immediately behind the backshore.

FORESHORE

The part of the shore, lying between the crest of the seaward berm (or upper limit of wave wash at high tide) and the ordinary low water mark, that is ordinarily traversed by the uprush and backrush of the waves as the tides rise and fall.

HIGH TIDE, HIGH WATER (HW)

The maximum elevation reached by each rising tide. The height may be solely due to the periodic tidal forces, or it may have superimposed upon it the effects of prevailing meteorological conditions.

HOPPER DREDGE

Self-propelled floating plant, which is capable of dredging material, storing it onboard, and transporting and placing the material at a specified disposal site. Often used to dredge inlets and deposit the along the open coast or offshore.

HURRICANE

An intense tropical cyclone with winds that move counterclockwise around a low-pressure system. Maximum sustained winds of 74 miles per hour or greater.

JETTY

On open seacoasts, a structure extending into a body of water, which is designed to prevent shoaling of a channel by littoral materials and to direct and confine the stream or tidal flow. Jetties are built at the mouths of rivers or tidal inlet to help deepen and stabilize a channel.

LEE

Shelter, or the part or side sheltered or turned away from the wind or waves. The quarter or region toward which the wind blows.

LEEWARD

The direction toward which the wind is blowing; the direction toward which waves are traveling.

LEVEL OF STORM PROTECTION OR PROTECTIVE VALUE

The measurable protection level afforded by the dune system to upland property and structures from the predictable erosion and storm surge levels associated with coastal storm events.

LITTORAL

Pertaining to a shore, especially of the sea. Often used as a general term for the coastal zone influenced by wave action, or, more specifically, the shore zone between the high and low water marks.

LONGSHORE

Parallel to and near the shoreline.

LOW TIDE, LOW WATER (LW)

The minimum elevation reached by each falling tide.

MUNSELL COLOR

A color system is a color space that specifies colors based on three properties of color: hue (basic color), chroma (color intensity), and value (lightness). The Munsell Chart is used to compare beach sand color and compatibility.

NATIVE SAND

The sand that occurs naturally on the beach.

NAUTICAL MILE

Generally, one minute of latitude is considered equal to one nautical mile. The accepted United States value as of 1 July 1959 is 1,852 meters (6,076.115 feet), approximately 1.15 times as long as the U.S. statute mile of 5,280 feet.

NEARSHORE

In beach terminology an indefinite zone extending seaward from the shoreline well beyond the breaker zone.

NON-CRITICALLY ERODED SHORELINE

Pursuant to Rule 62B-36.002(5), FAC, *Where many areas have significant historic or contemporary erosion conditions, yet the erosion processes do not currently threaten public or private interests. These areas are therefore designated as non-critically eroded beaches and require close monitoring in case the conditions become critical.*

NOURISHMENT

The placement of sediment on a beach or dunes by mechanical means. Sand is extracted (generally by dredging) from nearby sources and applied to the beach, the shoreface or the dunes. The costs highly depend on the location of available sand sources, which should be situated outside (seaward of) the active coastal zone. Dune nourishment is usually meant for safety against flooding, beach nourishment for restoration of the beach and shoreface nourishment for stabilizing the shoreline.

OVERWASH

The uprush and overtopping of a coastal dune by storm waters. Sediment is usually carried with the overwashing water and deposited, usually in a fan shape, on the landward side of the dune or barrier.

PLANFORM EVOLUTION

The changes in the outline or shape of a body of water as determined by the still-water line over a period of time.

REFERENCE MONUMENT

"R-Monuments" are reference points spaced approximately 1,000 feet apart along the gulf shoreline. These FDEP maintained monuments which are either physical monuments driven into the ground or virtual locations are referenced to vertical and horizontal datums. They are used to correlate survey data over time to monitor various shoreline changes within the littoral zone and upland topography and are also used to reference the location of coastal features.

REVETMENT

A sloped, facing structure made of an armoring material designed to protect an escarpment or embankment or an upland structure from erosion by wave or current action. Designed to dissipate the force of storm waves and prevent undermining of a seawall, dune or placed fill.

RUBBLE-MOUND STRUCTURE

A mound of random-shaped and random-placed stones protected with a cover layer of selected stones or specially shaped concrete armor units. Armor units in a primary cover layer may be placed in an orderly manner or dumped at random.

SAND

Sediment particles, often largely composed of quartz, with diameter between 0.062mm and 2mm, generally classified as fine, medium, coarse or very coarse. Beach sand may sometimes be composed of organic sediments such as calcareous reef debris or shell fragments.

SEA LEVEL RISE (SLR)

The so-called greenhouse effect or global warming causes a rise of the mean sea level, which will have a great impact on long-term coastal morphology, see Sea level rise. The long-term gradual sea-level rise will cause a general coastline retreat and an increased flooding risk depending on local conditions. An estimate of coastline retreat due to relative sea-level rise can be derived from the so-called Bruun rule, which is valid under certain rather restrictive conditions.

SEAWALL

A vertical, wall-like coastal-engineering structure built parallel to the beach or dune line and usually located at the back of the beach or the seaward edge of the dune to prevent erosion and other damage due to wave or current action.

SEDIMENT

Loose, fragments of rocks, minerals or organic material which are transported form their source for varying distances and deposited by air, wind, ice and water. Other sediments are precipitated from the overlying water or form chemically, in place. Sediment includes all the unconsolidated materials on the sea floor.

SETUP, WAVE

Superelevation of the water surface over normal surge elevation due to onshore mass transport of the water by wave action alone.

SHORE

The fringe of land at the edge of a large body of water, such as an ocean, sea, or lake.

SHORELINE

The intersection between the water line and the shore. The line delineating the shoreline on Nautical Charts approximates the Mean High Water (MHW) Line.

SHORELINE CHANGE RATE

The average annual horizontal shift of the intersection of the foreshore slope of the beach with the referenced water plane, based on recorded historical measurements.

SPRING TIDE

A tide that occurs at or near the time of new or full moon (syzygy) and that rises highest and falls lowest from the mean sea level.

STORM RETURN PERIOD

The inverse of probability (generally expressed in %), it gives the estimated time interval between events of a similar size or intensity. Return periods for a defined storm event is given as the

probability of being equaled or exceeded in any one year (i.e., for a 100-year event, exceedance = 1/return period = 1/100 year = 0.01 or 1% chance per year) compared to a hurricane category which are based on the measured "Sustained Winds" in accordance with the Saffir-Simpson Hurricane Wind Scale.

STORM SURGE
: The rise in water-level on an open coast as a result of the combined impact of the wind stress on the water surface, the atmospheric pressure reduction and local topographic features. The storm surge does not include the effect of the astronomical tide.

SURF ZONE
: The area between the outermost breaker and the limit of wave uprush.

TIDE
: The periodic rising and falling of the water that results from gravitational attraction of the moon, the sun and other astronomical bodies acting upon the rotating earth.

UPDRIFT
: The direction opposite that of the predominant movement of sediment along the shore. The side of a groin, jetty or other structure where sand accumulates.

UPLAND
: A general term for land or ground that is higher than the floodplain or shoreline.

UPRUSH
: The landward flow of water up onto the beach that occurs when a wave breaks.

VOLUME CHANGE RATE
: The average annual volume changes along a beach profile and along the shoreline, based on recorded historical measurements.

14.0. References

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EXHIBIT 2

Preliminary Project Scope and Budget for St. George Island Stormwater Improvements

Dewberry

OWNER:	ESTIMATED BY:
Franklin County	**AS**
CLIENT:	CHECKED BY:
Franklin County	**GL**
PROJECT TITLE:	APPROVED BY:
Saint George Island Stormwater Drainage Improvements Option 5	**JB**
DEWBERRY ENGINEERS, INC	DATE:
50141160	**6/23/2022**
ESTIMATE TYPE (ROM, BUDGET, DEFINITIVE):	CONSTRUCTION OR PROJECT ESTIMATE:
Budget	**Construction Cost Estimate**

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
MOT	LS	1	$ 120,000.00	$ 120,000
Environmental Protection	LS	1	$ 25,000	$ 25,000
Dewatering	LS	1	$ 35,000.00	$ 35,000
PIPING				
18" RCP	LF	1,489	$ 135.00	$ 201,015
24" RCP	LF	3,186	$ 175.00	$ 557,550
Storm Inlet	EA	39	$ 8,500.00	$ 331,500
Manhole	EA	0	$ 6,500.00	$ -
MES 24"	EA	12	$ 3,500.00	$ 42,000
Drop Curb	LF	600	$ 40.00	$ 24,000
RESTORATION				
Concrete	SY	480	$ 55.00	$ 26,400
Asphalt Patching	SY	3,270	$ 100.00	$ 327,000
Asphalt Resurfacing	LS	1	$ 965,000.00	$ 965,000
Sod	SY	1,420	$ 4.50	$ 6,390
Pond	LS	1	$ 75,000.00	$ 75,000
SUBTOTAL			SUBTOTAL	$ 2,735,855
MOBILIZATION AND GENERAL CONDITIONS		10%		$ 273,586
			SUBTOTAL	$ 3,009,441
OVERHEAD AND PROFIT		15%		$ 451,416.08
			SUBTOTAL	$ 3,460,856.58
CONTINGENCY		30%		$ 1,038,256.97
			SUBTOTAL	$ 4,499,113.55
OPINION OF PROBABLE COST (ROUNDED)				**$ 4,499,100**

*This Estimate does not include the cost of easement acquisition

Dewberry

Dewberry Engineers Inc.
324 Marina Drive
Port St. Joe, FL 32456
850.227.7200

FRANKLIN COUNTY
ST. GEORGE ISLAND STORMWATER DRAINAGE IMPROVEMENTS
COUNTY COMMISSIONERS
WAKULLA COUNTY, FLORIDA

SEAL NOT APPROVED UNLESS ACCOMPANIED WITH A VALID SIGNATURE

EB # 8794

PRELIMINARY DOCUMENTS
NOT FOR CONSTRUCTION

SCALE 0' 30' 60' 120'
SCALE: 1" = 60'

REVISIONS

NO.	DESCRIPTION	DATE

DRAWN BY	G. LICARI
APPROVED BY	C. KENNEDY
CHECKED BY	J. BAXLEY
DATE	MAY 2022

TITLE

STORMWATER IMPROV. CONCEPT PLANS

OPTION 4

PROJECT NO. 50141160

SHEET NO.

EX-1

Dewberry

Dewberry Engineers Inc.
324 Marina Drive
Port St. Joe, FL 32456
850.227.7200

FRANKLIN COUNTY
ST. GEORGE ISLAND STORMWATER DRAINAGE IMPROVEMENTS
COUNTY COMMISSIONERS
WAKULLA COUNTY, FLORIDA

E:\007.000\ST. GEORGE ISLAND STORMWATER\COST ESTIMATE (RESURFACING)\EXHIBITS\CONCEPT EXHIBITS_OPTIONS.DWG

SEAL — NOT APPROVED UNLESS ACCOMPANIED WITH A VALID SIGNATURE

-
-
EB # 8794

PRELIMINARY DOCUMENTS
NOT FOR CONSTRUCTION

SCALE
0' 30' 60' 120'
SCALE: 1" = 60'

N

REVISIONS

NO.	DESCRIPTION	DATE

DRAWN BY	G. LICARI
APPROVED BY	C. KENNEDY
CHECKED BY	J. BAXLEY
DATE	MAY 2022

TITLE

STORMWATER IMPROV. CONCEPT PLANS

OPTION 4

PROJECT NO. 50141160

EX-2

SHEET NO.

EXHIBIT 3

45-Day Public Comment Period Documentation

NOTICE OF 45-DAY PUBLIC COMMENT PERIOD
FOR AMENDMENT #01 TO THE FRANKLIN COUNTY RESTORE ACT
MULTI-YEAR IMPLEMENTATION PLAN (MYP)

This is a notice that Franklin County has revised its initial, approved Multi-Year Implementation Plan (MYP) and will be submitting the Plan to the U.S. Department of Treasury, Office of Gulf Coast Restoration, in accordance with RESTORE Act Standard Terms and Conditions, as amended. The Plan will be made available to the public on **November 10 th, 2022** for a period of forty-five (45) days. The Plan will be available on the Franklin County Website at https://www.franklincountyflorida.com or to view in-person at the Franklin County Courthouse, 33 Market Street, Suite 203, Apalachicola, Florida 32320 and the Franklin County Courthouse Annex, 912 N.W. Avenue A, Carrabelle, Florida 32322. The public comment period will close on **December 29th, 2022**. To submit a comment, e-mail Michael Moron, County Coordinator michael@franklincountyflorida.com and Erin Griffith, Fiscal Manager/Grants Coordinator erin@franklincountyflorida.com or mail your letter to **Franklin County Board of County Commissioners, Attn: Erin Griffith, Fiscal Manager, 33 Market Street, Suite 203, Apalachicola, FL 32320**. The Plan outlines the funding allocation plan for monies coming from the Deepwater Horizon Oil Spill in accordance with eligible activities as set forth in the RESTORE Act.

AFFIDAVIT OF
PROOF OF PUBLICATION
(S.50.05 I, FS)

THE TIMES
Published Weekly
Apalachicola, Franklin County, Florida

STATE OF FLORIDA
COUNTY OF FRANKLIN

Before the undersigned authority personally appeared
That he/she is an employee of the The Apalachicola Times

Gail Brannan

Who on oath says a weekly newspaper published at
129 Commerce Street Franklin County, Florida; that the
attached copy of advertisement, being in the matter of

See attached

was published in said newspaper in the

Issue(s) of Nov 10 + 17 2022 ~~2021~~

Affiant further says *The Times* is a newspaper published at
129 Commerce Street, in said Franklin County
Florida and that said newspaper has heretofore been
Continuously published in said Franklin County, Florida,
and each Thursday and has been entered as second class
mail matter at the post office in Apalachicola,
Franklin County, for a period of I year next preceding the
First publication of the attached copy of advertisement;
And Affiant further says that he or she has neither paid
nor promised any person, firm or corporation any discount,
rebate, commission or refund for the purpose of securing
this advertisement for publication in the said newspaper.

Sworn to and subscribed before me this

19th day of December 2022 ~~2021~~

By _____, who is

X personally known to me or _____ who has produced

_____ (type of identification),

As Identification.

Gail Brannan

Signature of Notary

WENDOLYN GAIL BRANNAN
MY COMMISSION # HH 157359
EXPIRES: September 23, 2025
Bonded Thru Notary Public Underwriters

Print, Type, or Stamp Commissioned
Name of Notary Public

NOTICE OF 45-DAY PUBLIC COMMENT PERIOD FOR AMENDMENT #01 TO THE FRANKLIN COUNTY RESTORE ACT MULTI-YEAR IMPLEMENTATION PLAN (MYP)

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GL#: 001.20.511.4900
Amount: $ 206.00
Descr: Restore 45 Day Public Cmt
Vendor: 3520
Invoice: 2022ci-3115

LOCALiQ

The Gainesville Sun | The Ledger
Daily Commercial | Ocala StarBanner
News Chief | Herald-Tribune | News Herald
Northwest Florida Daily News

PO Box 631244 Cincinnati, OH 45263-1244

PROOF OF PUBLICATION

ERIN GRIFFITH
Franklin Co Board Commiss
33 MARKET ST SUITE 203
Apalachicola FL 32320

STATE OF FLORIDA, COUNTY OF BAY

The Panama City News Herald, a newspaper printed and published in the city of Panama City, and of general circulation in the County of Bay, State of Florida, and personal knowledge of the facts herein state and that the notice hereto annexed was Published in said newspapers in the issue dated or by publication on the newspaper's website, if authorized, on:

11/10/2022, 11/17/2022

and that the fees charged are legal.
Sworn to and subscribed before on 11/17/2022

Legal Clerk

Notary, State of WI, County of Brown 9.29.25

My commision expires

Publication Cost:	$185.32	
Order No:	8028482	# of Copies:
Customer No:	536079	1
PO #:	45 day comment perio	

THIS IS NOT AN INVOICE!

Please do not use this form for payment remittance.

VICKY FELTY
Notary Public
State of Wisconsin

NOTICE OF 45-DAY PUBLIC COMMENT PERIOD FOR AMENDMENT #01 TO THE FRANKLIN COUNTY RESTORE ACT MULTI-YEAR IMPLEMENTATION PLAN (MYP)

This is a notice that Franklin County has revised its initial, approved Multi-Year Implementation Plan (MYP) and will be submitting the Plan to the U.S. Department of Treasury, Office of Gulf Coast Restoration, in accordance with RESTORE Act Standard Terms and Conditions, as amended. The Plan will be made available to the public on November 10th, 2022 for a period of forty-five (45) days. The Plan will be available on the Franklin County Website at https://www.franklincountyflorida.com or to view in-person at the Franklin County Courthouse, 33 Market Street, Suite 203, Apalachicola, Florida 32320 and the Franklin County Courthouse Annex, 912 N.W. Avenue A, Carrabelle, Florida 32322. The public comment period will close on December 29th, 2022. To submit a comment, e-mail Michael Moron, County Coordinator michael@franklincountyflorida.com and Erin Griffith, Fiscal Manager/Grants Coordinator erin@franklincountyflorida.com or mail your letter to Franklin County Board of County Commissioners, Attn: Erin Griffith, Fiscal Manager, 33 Market Street, Suite 203, Apalachicola, FL 32320. The Plan outlines the funding allocation plan for monies coming from the Deepwater Horizon Oil Spill in accordance with eligible activities as set forth in the RESTORE Act.

Pub: Nov. 10 & 17, 2022; #8028482

GL#: 001.20.511.4900
Amount: $ 185.32
Descr: Restore 45 Day Public Cmt
Vendor: 3510
Invoice: 8028482

EXHIBIT 4

Board of County Commissioners
Approval to Submit MYP Amendment
#01 to Treasury

FRANKLIN COUNTY BOARD OF COUNTY COMMISSIONERS
REGULAR MEETING
COURTHOUSE ANNEX, COMMISSION MEETING ROOM
FEBRUARY 7, 2023
9:00 AM
MINUTES

Commissioners Present: Ricky Jones-Chairman, Jessica Ward-Vice-Chairman, Cheryl Sanders, Ottice Amison, and Noah Lockley
Others Present: Michele Maxwell-Clerk of Court, Michael Shuler-County Attorney, Michael Moron-County Coordinator, Erin Griffith-Fiscal Manager/Grants Coordinator, and Jessica Gay-Deputy Clerk to the Board

Call to Order
Chairman Jones called the meeting to order.

Invocation and Pledge of Allegiance Approval of the Agenda
Commissioner Ward led the Board in prayer followed by the Pledge of Allegiance.

Chairman Jones stated the following changes to the agenda:

- Remove Item 12. Valentina Webb & Betsy Nofziger - Elder Care Community Council - Senior Services Update & Request until the next meeting
- Add Ms. Jenna Harper from ANERR request.

On a motion by Commissioner Ward, seconded by Commissioner Sanders, and by a unanimous vote of the Board present, the Board approved the agenda with the changes notated above. Motion carried 5-0.

Approval of Minutes and Payment of County Bills

County Bill List for Payment
Approval of Minutes

- Regular Meeting 1/17/2023
- Workshop 1/3/2023
- Workshop 12/6/2023

Commissioner Ward noted a change to be made in the minutes from the Regular Meeting 1/17/2023. On page 4 during the Alliant Weems presentation, edit name in paragraph one, sentence two. It should read Mr. Kozar instead of Mr. Lewis. Chairman Jones clarified the regular meeting minutes were from January 17th not February 7th meeting.

On a motion by Commissioner Ward, seconded by Commissioner Sanders, and by a unanimous vote of the Board present, the Board approved the Payment of County Bills and the meeting minutes from Regular Meeting 1/17/2023, Workshop 1/3/2023, and Workshop 12/6/2022 contingent upon the changes as stated above. Motion carried 5-0.

At the January 17th meeting, the county opened bids for the Carrabelle Beach Wayside Park Repairs Project. Two bids were received and released to project architect Doug Shuler with BFBS Architects of Tallahassee for review and recommendation. Doug Shuler has reviewed the bids which were submitted and recommends award to the lowest bidder Arris General Contractors, Inc. as all paperwork and documentation was in order.

Board action to approve and authorize the chairman to sign the attached notice of award and contract documents once available for the Carrabelle Beach Wayside Park Repairs.

On a motion by Commissioner Ward seconded by Commissioner Sanders and Commissioner Amison, and by a unanimous vote of the Board present, the Board approved and authorized the Chairman to sign the attached notice of award and contract documents once available for the Carrabelle Beach Wayside Park Repairs. Commissioner Ward wants to assure the public the park will keep the same style and look, it is just being refurbished. **Motion carried 5-0.**

11. **BOARD ACTION: RESTORE MULTI-YEAR IMPLEMENTATION PLAN AMENDMENT: Current RESTORE Projects: County-Wide Dune Restoration and SGI Storm Water Improvements**

The county has formulated scopes, project details, preliminary construction cost estimates and has completed the 45-day public comment period for the US Treasury for the RESTORE County-Wide Dune Restoration, the St. George Island Storm Water Improvements Project, and the Landfill Transfer Station required for a multi-year implementation plan amendment.

During the public comment period, only one comment was received, and it was regarding the county-wide dune restoration project. The comment suggested alternative beach-restoration strategies and after discussion with coastal engineers MRD and Associates, it was decided that the current strategy explained in the dune restoration study was the best approach as it was financially feasible and in compliance with the RESTORE Act Program guidelines.

In the attached amendment, the start dates for construction activities were changed from early fall to November due to the slow eight-month progression of the right-of-way transfer agreement for the existing two retention ponds and the proposed third through the various legal departments of the State of Florida. The county requested the ROW acquisition in May of 2022 and received a draft agreement just last week. This agreement is in review with the project engineers and we hope to have the agreement ready for approval at the next meeting.

A. *Board action to approve and adopt the attached resolution authorizing the attached amendment to the multi-year implementation plan.*

On a motion by Commissioner Ward, seconded by Commissioner Sanders, and by a unanimous vote of the Board present, the Board approved and adopted the attached resolution authorizing the attached amendment to the multi-year implementation plan. Motion carried 5-0.

B. *Board action to submit the construction funding grant application to Treasury.*

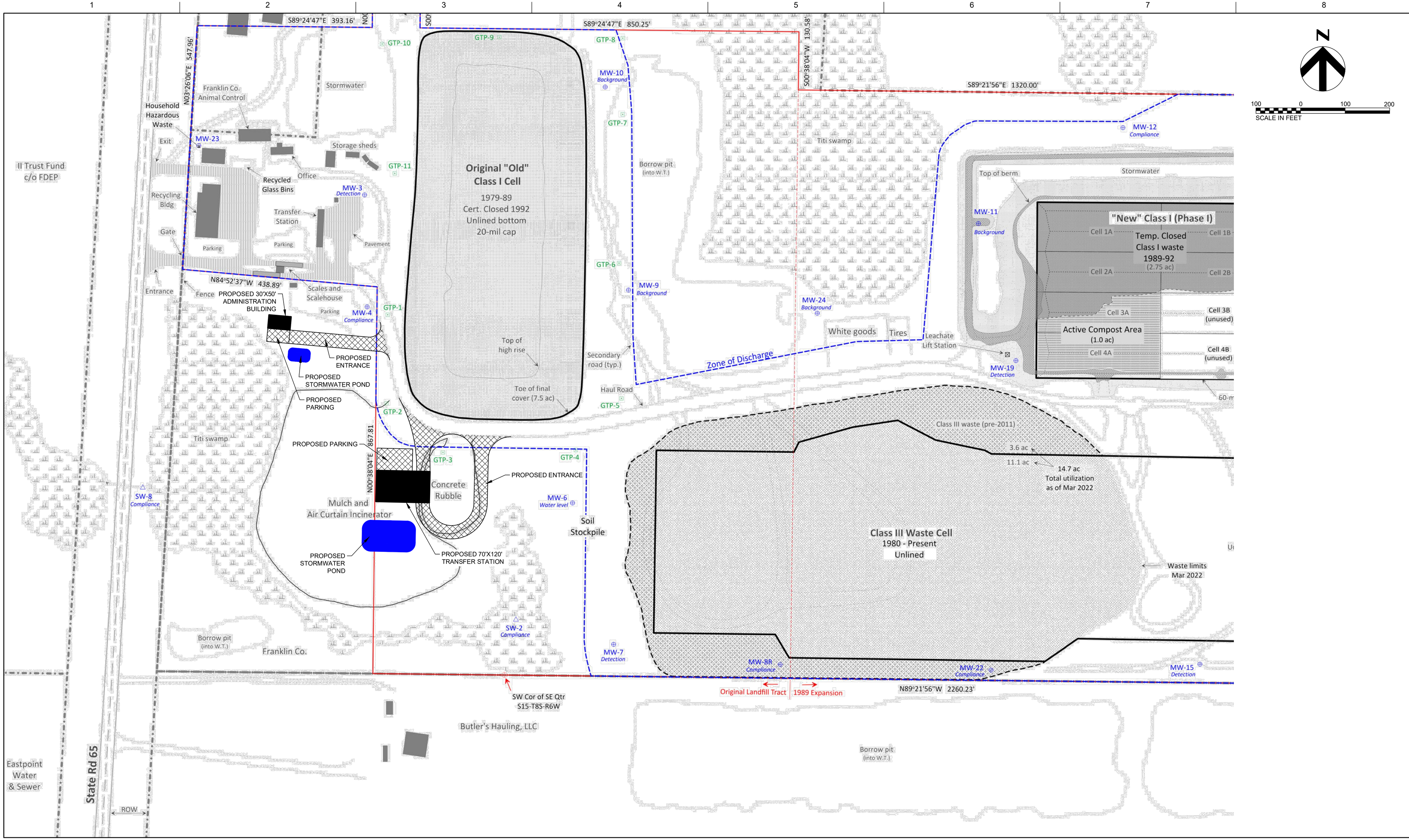
On a motion by Commissioner Ward, seconded by Commissioner Sanders, and by a unanimous vote of the Board present, the Board approved submitting the construction funding grant application to Treasury. Motion carried 5-0.

For information only:

The purpose and objective of the estimated $1.5 million dollar County-Wide Dune Restoration Project as outlined in the attached Multiyear Plan Amendment Narrative:

EXHIBIT 5

Draft Site Plan of Project #3
Franklin County Municipal Solid
Waste Transfer Station
(from Draft Feasibility Study)



PROJECT MANAGER	M. ROBERTS, P.E.		
DRAWN BY	J. RAYMOND		
ISSUE	DATE	DESCRIPTION	
PROJECT NUMBER	10358127		

FRANKLIN COUNTY CENTRAL LANDFILL
TRANSFER STATION FEASIBILITY STUDY
FRANKLIN COUNTY, FLORIDA

PROPOSED SITE PLAN

0 1" 2"

FILENAME Site Plan.dwg

SCALE 1" = 100'

SHEET 1