FINDING OF NO SIGNIFICANT IMPACT

Issuance of a Negotiated Agreement for Use of Outer Continental Shelf Sand from Borrow Area N-3 for the South Ponte Vedra Beach Restoration Project, St. Johns County, Florida

Pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), and Department of the Interior (DOI) regulations implementing NEPA (43 CFR 46), St. Johns County, Florida prepared an Environmental Assessment (EA) that considers the use of Outer Continental Shelf (OCS) sand to rebuild a portion of their beach and dune system severely eroded by Hurricanes Matthew and Irma in South Ponte Vedra Beach (SPVB) (Project). The Bureau of Ocean Energy Management (BOEM) contributed to the preparation of the EA and conducted its own independent review before adopting the document.

Proposed Action

The purpose of the Project is to reduce future storm damages to infrastructure, increase and maintain recreational opportunities, and improve environmental habitat along St. Johns County. The Project would place, on average, 20 cubic yards (cy) of sand per linear foot of shoreline along approximately 5.5 miles of beach between Florida Department of Environmental Protection (FDEP) monuments R-76 and R-103.5 in SPVB. The southern boundary of the Project would tie into the pending U.S. Army Corps of Engineers (USACE) Federal Shore Protection Project in Vilano Beach and taper from FDEP monuments R-102.5 to R-103.5.

BOEM's action is to enter a two-party Non-competitive Negotiated Agreement (NNA) with St. Johns County to authorize use of up to 1,100,000 Million Cubic Yards (MCY) of OCS sand from Borrow Area N-3 for construction of the Project. Borrow Area N-3, a subset of a larger borrow exploration site N-3, is located about 8 miles offshore the project area and 6 miles north of St. Augustine Inlet and contains approximately 9,500,000 cy of sand (Attachment 1). The beach construction template includes a 30-ft wide berm at elevation +10 ft NAVD88 and a dune with a 15-ft wide crest elevation at 14 ft NAVD88. Elevations may vary slightly throughout the project area based on existing conditions. The USACE Jacksonville District also plans to issue a Department of the Army Permit pursuant to Section 404 of the Clean Water Act (33 U.S.C. §1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403) for the Project.

Alternatives to the Proposed Action

St. Johns County and BOEM evaluated two alternatives: no action and beach and dune nourishment (including the use of Borrow Area N-3). The project proponents limited the number of beach nourishment alternatives in order to maintain a consistent design profile with the adjacent Federal project footprint.

Environmental Effects

In September 2019, the Federal Emergency Management Agency (FEMA) completed an EA for emergency beach berm and dune restoration activities along the St. Johns County coastline following Hurricanes Matthew and Irma. The FEMA 2019 EA evaluates the potential environmental effects related to beach placement activities within the Project area but does not analyze BOEM's action. In September 2020, St. Johns County prepared an EA evaluating the use of OCS sand from Borrow Area N-3. The 2020 EA incorporates by reference from and supplements the FEMA 2019 EA and focuses on the potential environmental effects associated with extracting and transporting sand from the borrow area to SPVB. The USACE issued a separate Statement of Findings in lieu of a joint EA and Finding of No Significant Impact.

St. Johns County, BOEM, and USACE identified a suite of environmental commitments necessary to avoid, minimize, and/or reduce and track any foreseeable adverse effects that may result from the Project. St. Johns County is responsible for implementing all environmental requirements prior to, during, and after construction, as described in the 2020 EA. BOEM and parties engendering mitigation measures are responsible for enforcing those requirements.

Significance Review

Pursuant to 40 CFR 1501.3(b), BOEM analyzed the significance of potential effects of the proposed action considering both the potentially affected environment and the degree of effects. Connected actions, including on-and-off site mobilization and beach placement activities, were considered.

BOEM considered the affected area and resources potentially present in both spatial and temporal context. The proposed action is considered site-specific; the project area is limited to approximately 935 acres (placement area (235 acres) and borrow area (700 acres)) of similar sandy submerged and subaerial habitat. Effects would be limited to that area which is dominated by storms and physical processes of waves and currents. Effects of the Project would generally be limited to the construction window and the time interval associated with equilibration of the placement material, recovery of the part of the borrow area disturbed, and any habitat change along the beach. BOEM considered the following when evaluating the degree of effects:

(i) Short- and long-term effects

Potential effects associated with the Project would be localized, short-lived, and generally reversible as described below. The only long-term effect within Borrow Area N-3 would be related to physical geomorphologic change due to the removal of OCS sand and limited infilling or reshaping expected. Borrow Area N-3 has never been dredged. The removal of sand from Borrow Area N-3 over multiple dredging cycles could change the shape and characteristics of the bottom habitat in that limited area. The effects would not be significant, as there is comparable, undisturbed habitat adjacent to the dredge area.

Dredging of Borrow Area N-3 would temporarily impact benthic infauna; however, long-term benthic effects in the same footprint would be avoided by limiting dredging depths and maintaining consistent pre- and post-dredge sediment characteristics. The typical range in recovery time of the affected benthic community is months to a few years; therefore, the potential for significant or chronic impact would be avoided.

Though current nesting opportunities along SPVB are diminished because of severe erosion and lower-quality habitat, Loggerhead, green, and leatherback sea turtles nest within the Project area. Hawksbill and Kemp’s ridley sea turtles occur in coastal waters off St. Johns County, but do not currently nest within the Project area. Borrow Area N-3 sand composition meets the State of Florida’s sediment criteria for native beach compatibility. Construction activities and staging of equipment may affect existing dune vegetation; however, the Project includes revegetation of areas that would be disturbed. Nesting habitat may be affected over the short-term, until the beach and dune system equilibrate post-construction and provide improved habitat. Loggerhead critical habitat (LOGG-N-14) and North Atlantic Right Whale critical habitat (Unit 2) occur in the Project area, but will not be adversely affected. BOEM and USACE will avoid and/or minimize effects to protected species and designated critical habitat in accordance with requirements outlined the U.S. Fish and Wildlife Service (USFWS) Statewide Programmatic Biological Opinion for beach placement activities (2015), the USFWS Programmatic Piping Plover Biological Opinion (2013), and the National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (SARBO) (2020).

NMFS has designated Essential Fish Habitat (EFH) in and adjacent to the Project area for various demersal, pelagic, and highly migratory species. Project construction would have minor, short-term effects to EFH from dredging and placement activities. St. Johns County will implement avoidance and minimization measures to minimize effects on those fish species and fish habitat including but not limited to: adherence to the State Water Quality Criteria at the edge of the 150-meter mixing zone, avoiding/minimizing construction overlap with peak recruitment windows for benthic infaunal assemblages and federally managed species, and avoidance of hard bottom and reef resources. The effects would not be significant, as there is comparable, undisturbed habitat adjacent to the dredge area.

(ii) Beneficial and adverse effects

BOEM considered potential effects to the physical environment, biological resources, cultural resources, and socioeconomic resources.

Borrow Area N-3 contains approximately 9,500,000 cy of sand relative to the 1,100,000 CY needed for construction of the Project. St. Johns County, in coordination with BOEM, developed a borrow area use plan strategy for the Project to optimize the use of sand and avoid and/or minimize environmental effects. Some coastal sand dependent species, such as migratory birds or sea turtles, may experience temporary disruptions to foraging and nesting during and following construction. However, those birds and sea turtles that use the beach for foraging or nesting may benefit in the long term from better quality habitat. St. Johns County plans to implement standard shorebird monitoring and sea turtle nesting protocols.

Dredging activities within Borrow Area N-3 overlap with the distribution of threatened loggerhead (Northwest Atlantic Distinct Populations Segment (DPS)) and green sea turtles (North Atlantic DPS), and endangered leatherback, hawksbill, and Kemps Ridley sea turtles protected under the Endangered Species Act. Placement of sediment within the designated project reaches may affect nesting sea turtles (loggerhead, leatherback, and greens) and piping plovers. Adherence to state and federal requirements, including sediment compatibility requirements, dredging operational constraints, endangered species observers, sea turtle nest monitoring, *etc.* would avoid and/or minimize effects. The Project would not occur in “optimal” piping plover habitat and is not likely to adversely affect the piping plover. The threatened West Indian manatee occurs in coastal and estuarine habitat within St. Johns County. The dredge and support vessels may encounter this species and may affect but are not likely to adversely affect the manatee because of slow speeds and relative water depth.

Seafloor-disturbing activities (e.g., dredging, anchoring, pipeline placement, etc.) would occur during proposed construction activities. The USACE and St. Johns County conducted cultural and hard bottom resource clearance surveys in the project area, including Borrow Area N-3, nearshore pipeline corridors, and beach placement area. The remote sensing surveys identified 14 magnetic anomalies, three sidescan targets, and no sub-bottom profile features; however, all magnetic anomalies or targets represent objects of modern origin. No adverse effects to historic or pre-contact resources are expected.

There are no hard-bottom resources in the borrow area, placement area, and pipeline corridors, as verified by resource surveys. Beach placement would not directly bury onshore coquina outcroppings, or indirectly bury nearshore hard bottom inshore of the Equilibration Toe of Fill (ETOF) through beach profile equilibration and along-shore / cross-shore transport processes. Construction activities are required to meet all state Water Quality Certification conditions, including turbidity monitoring, in accordance with FDEP Joint Coastal Permit (JCP) requirements (Permit No: 0340616-003-JC).

(iii) Effects on public health or safety

Significant effects to public health and safety are not expected. The Project would provide for increased recreational opportunity from the improved beach and dune habitat. Temporary disruption to recreation would occur in small alongshore reaches as the construction progresses along the Project area; however, the Project would result in long-term recreational improvements. Construction of the dune and beach profile extension would provide protection of existing infrastructure. Emissions from construction equipment may temporarily affect air quality in the immediate vicinity of operations. Noise would temporarily increase at the placement locations during construction, and then would return to ambient levels after project completion. BOEM determined that there are no minority or low-income populations in the Project area; therefore, the Project would not disproportionately affect populations outlined in Executive Order 12898.

(iv) Effects that would violate a Federal, State, Tribal, or local law protecting the environment.

Endangered Species Act and Magnuson-Stevens Fishery Management and Conservation Act consultations have been completed. BOEM determined that beach placement of sediment associated with the Project is within scope of the USFWS Statewide Programmatic Biological Opinion (revised 2015) and Programmatic Piping Plover Biological Opinion (2013). St. Johns County will comply with all relevant reasonable and prudent measures (RPMs) and associated terms and conditions (T&Cs). BOEM and USACE have determined that dredging activities associated with the Project are within scope and will operate under the NMFS SARBO (2020).

The proposed action complies with the Marine Mammal Protection Act. Marine mammals are not likely to be adversely affected by the project and incorporation of safeguards to protect threatened and endangered species during project construction (i.e., vessel speed requirements, protected species observers, etc.) would also protect non-listed marine mammals in the area.

Migratory birds may experience minor, short-term interruptions to foraging or resting activities linked to prey smothering or turbidity increases. St. Johns County will implement measures to avoid effects to migratory birds, hatchlings, or eggs along with pre- and post-project monitoring requirements.

As previously indicated, cultural resource clearance surveys were conducted within Borrow Area N-3, the beach placement area, nearshore pump out stations, and pipeline corridor locations. No targets of historical significance were identified. The USACE and BOEM coordinated with the Florida Division of Historical Resources and State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officers (THPOs), as required by Section 106 of the National Historic Preservation Act. The SHPO concurred with the determination that the proposed project would have no adverse effect to historic properties listed, eligible, or potentially eligible for listing in the NHRP provided avoidance of the three nearshore targets. The USACE and/or BOEM will require St. Johns County to immediately cease operations and notify SHPO if an unexpected discovery occurs.

The FDEP provided a consolidated JCP on 18 September 2020. The JCP constitutes a finding of consistency with Florida's Coastal Management Program, as required by Section 307 of the Coastal Zone Management Act; it also constitutes certification of compliance with Florida water quality standards pursuant to Section 401 of the Clean Water Act (33 U.S.C. 1341).

Consultations and Public Involvement

The USACE distributed a Public Notice to Federal, state, and local agencies and other interested stakeholders in February 2020 following receipt of St. Johns County's application for a Department of the Army permit. The Public Notice recognized BOEM's authority over the use of OCS sand resources under the OCS Lands Act. The USACE and BOEM considered all comments and integrated responses, as appropriate. This Finding will be made available to the public on boem.gov.

Mitigation and Monitoring

St. Johns County is responsible for complying with all environmental mitigation measures and monitoring requirements engendered by Federal, State, Tribal, and local laws, including those identified in the 2020 EA. BOEM will require St. Johns County to prepare an environmental compliance matrix to document and track all environmental mitigation requirements and identify roles and responsibilities for implementation to ensure compliance prior to, during, and after construction. Additionally, the dredging contractor will be required to provide an environmental protection plan that verifies compliance with relevant environmental requirements. Implementation of mitigation measures and monitoring requirements will ensure effects are not significant.

Any mitigation or monitoring uniquely specified by BOEM in its negotiated agreement is done pursuant to the authority established by the Outer Continental Shelf Lands Act and 30 CFR 583. Other Project mitigation is engendered by various authorities, including the Endangered Species Act, Clean Water Act, and Coastal Zone Management Act. Other federal or state agencies shall be responsible for enforcement of other mitigation measures. BOEM may terminate its authorization, or refer St. John's County to enforcing agencies, if the County does not comply with mitigation measures (30 CFR 583).

Conclusion

BOEM considered the consequences of entering into a negotiated agreement authorizing use of OCS sand from Borrow Area N-3 in the Project. BOEM contributed to the preparation of and conducted its own independent review of the 2020 EA before adopting the EA prepared by St. Johns County (Attachment 2). BOEM finds that the EA complies with the relevant provisions of the CEQ regulations implementing NEPA, DOI regulations implementing NEPA, and other Bureau requirements.

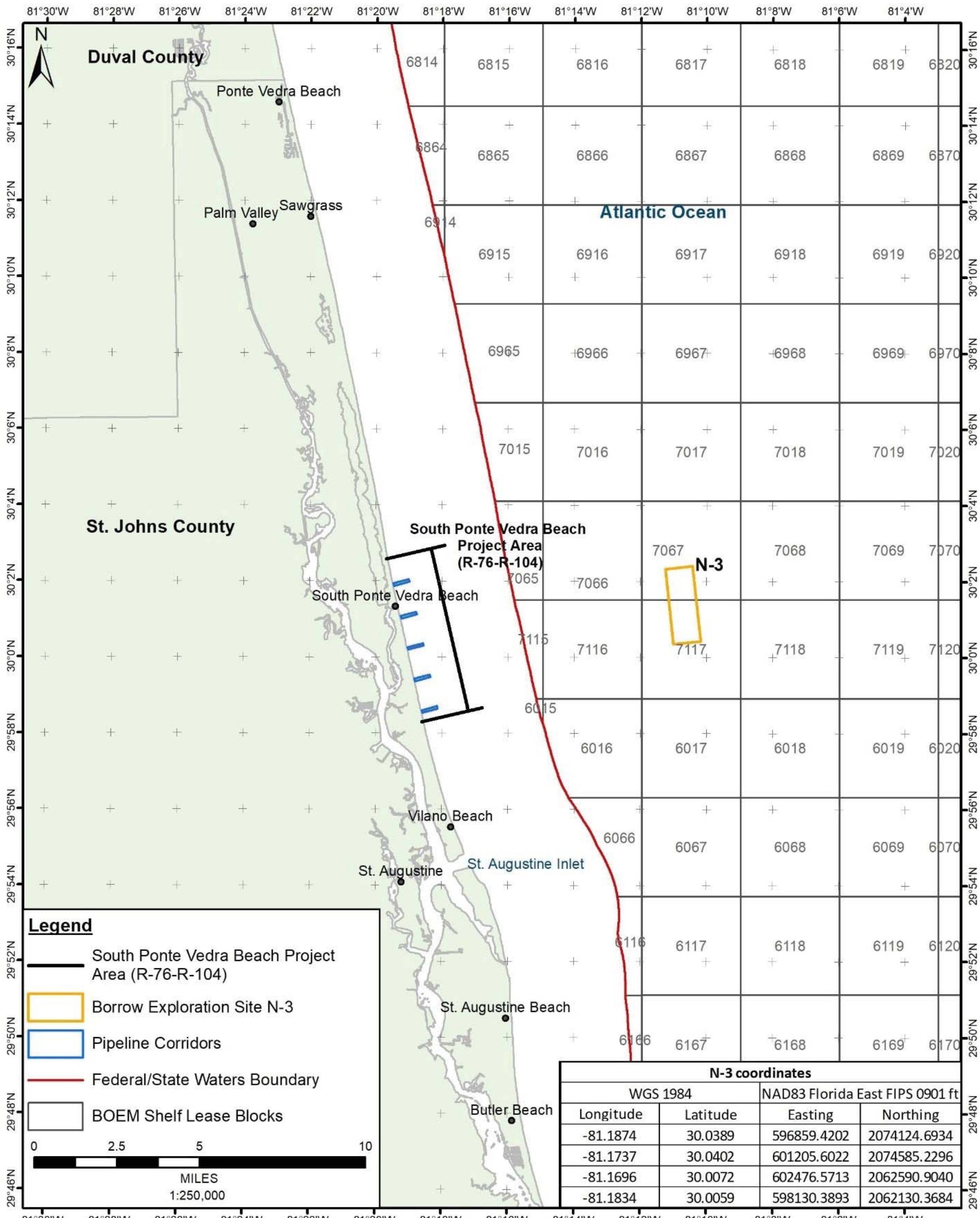
Based on the evaluation of potential effects and associated mitigation measures discussed in the 2020 EA, BOEM finds that entering into a negotiated agreement, with the implementation of the mitigating measures, does not constitute a major Federal action significantly affecting the quality of the human environment, in the sense of NEPA Section 102(2)(C), and would not require preparation of an EIS.

JEFFREY REIDENAUER Digitally signed by JEFFREY REIDENAUER
Date: 2020.11.03 15:10:55 -05'00'

Jeffrey Reidenauer
Chief, Marine Minerals Division

Date

Attachment 1
Borrow Area N-3 Map and Placement Sites



N-3 coordinates			
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Longitude	Latitude	Easting	Northing
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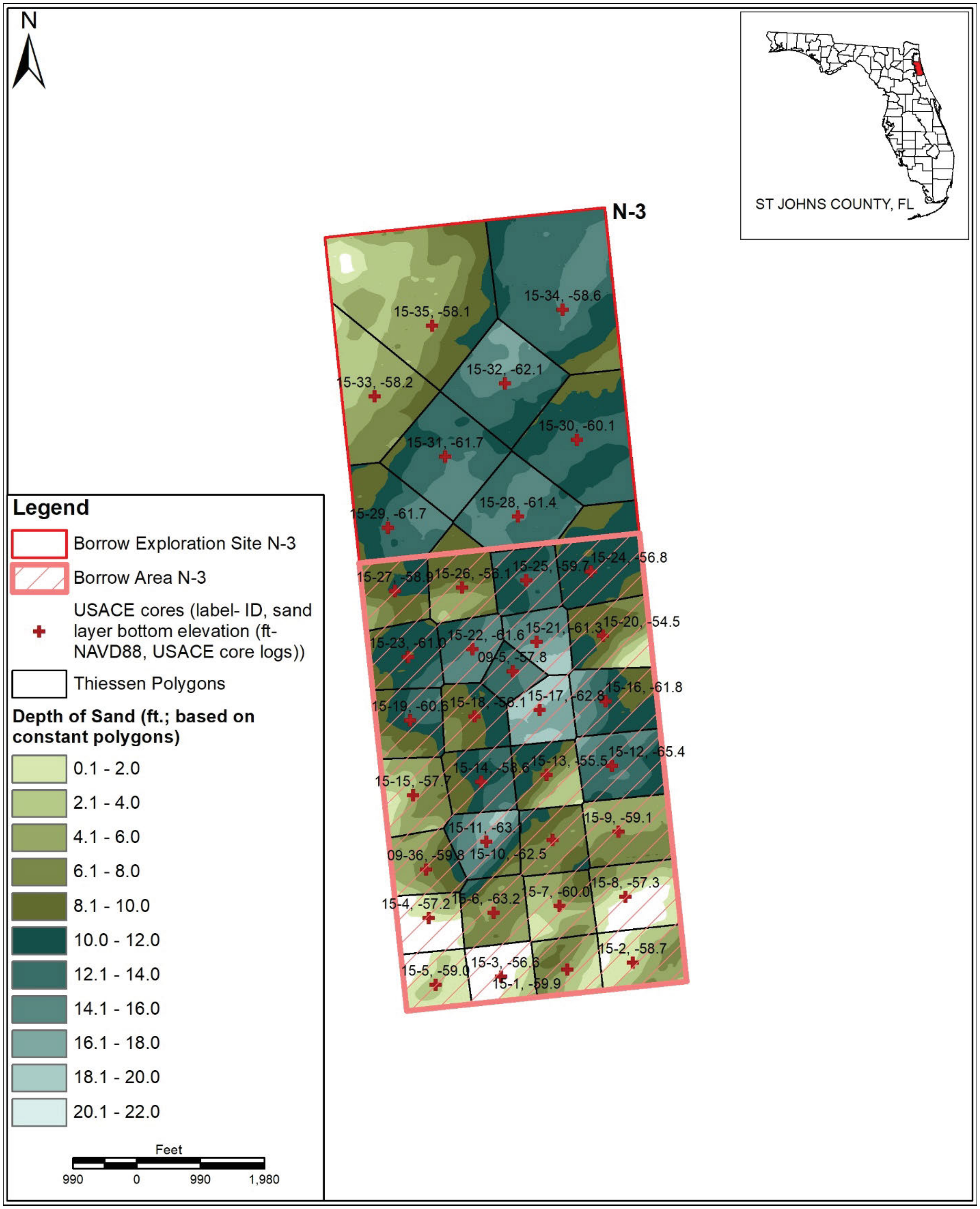
-81.1737	30.0402	601205.6022	2074585.2296
-81.1696	30.0072	602476.5713	2062590.9040
-81.1834	30.0059	598130.3893	2062130.3684

Borrow Area N-3 Location Map and Placement Area



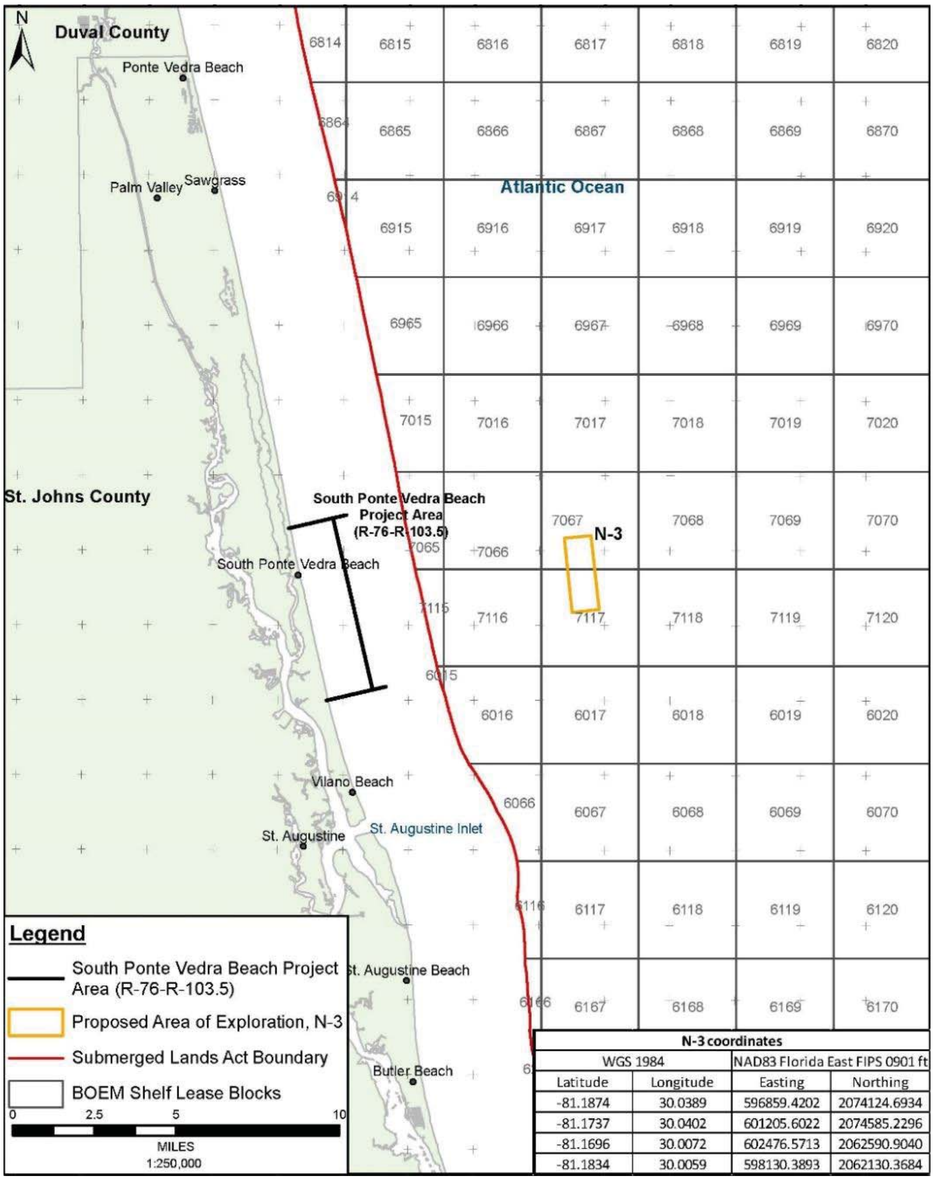
Borrow Area N-3 and Maximum Beach Quality Sand Depths.

Attachment 2

South Ponte Vedra Beach Restoration Project
Environmental Assessment

Use of Outer Continental Shelf Sand from Borrow Area N-3 for the South Ponte Vedra Beach Restoration Project

Environmental Assessment



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-81.1834	30.0059	598130.3893	2062130.3684

Prepared by:

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Jacksonville, Florida 32256

September 2020

Estimated Total Costs Associated with Developing and Producing This EA

$75,000

Table of Contents

**Sub-Appendices associated with Appendices A and B have been removed from this document and are available upon request.*

List of Figures

List of Tables

1.0 INTRODUCTION

St. Johns County is proposing to dredge beach-compatible sand by hopper dredge from an offshore borrow area to supply sand for a beach restoration project along approximately 5.5 miles of eroded shoreline, from Florida Department of Environmental Protection (FDEP) reference monument R-76 to R-103.5 in South Ponte Vedra Beach (SPVB), St. Johns County, Florida. In prior studies, the U.S. Army Corps of Engineers (USACE) has identified several potential sources of beach quality sand offshore St. Johns County that could serve as borrow areas for beach restoration north of St. Augustine Inlet. Based on review of geotechnical information provided by the USACE (2015), St. Johns County's coastal engineering consultant (Taylor Engineering, Inc.) identified site "N-3" as the most suitable borrow area for the proposed restoration project (Appendix A). Site N-3 lies east of the proposed restoration project within federal waters approximately eight miles offshore and six miles north of St. Augustine Inlet (Figure 1). The project would dredge sand from the N-3 borrow area and transport the sand to a nearshore location for offloading to support the project.

The borrow area lies within federal waters (>3 nautical miles offshore) on the Outer Continental Shelf (OCS). The Bureau of Ocean Energy Management (BOEM) is authorized under Public Law 103-426 [43 United States Code (U.S.C.) 1337(k)(2)] to negotiate on a non-competitive basis the rights to OCS sand resources for shore protection projects. BOEM's proposed connected action is to issue a negotiated agreement authorizing use of the sand source areas at the request of St. Johns County.

Pursuant to NEPA, this Environmental Assessment (EA) was prepared under contract to St. Johns County for adoption by BOEM in support of its decision to authorize use of up to 1,000,000 Cubic Yards (CY) of OCS sand from borrow area N-3 to support the SPVB beach restoration project. The SPVB restoration project aims to stabilize the shoreline in response to severe erosion caused by Hurricanes Matthew (2016) and Irma (2017). BOEM proposes to enter into a noncompetitive agreement with the St. Johns County Board of County Commissioners so that the project proponents can extract and transport sand in the shallow OCS for placement within the 5.5-mile SPVB project area. The scope of this EA includes assessment of the OCS borrow area environment and the environment between the borrow area and the project shoreline, the potential pipeline corridors used to convey sand from the hopper dredge hold to the placement locations, and the beach/dune placement locations.

In September 2019, in compliance with NEPA, the Federal Emergency Management Agency (FEMA) completed an Environmental Assessment (EA) for emergency beach berm and dune restoration activities along the St. Johns County coastline (Appendix B). The proposed SPVB beach/dune restoration area falls within the project area evaluated by FEMA's 2019 EA. The FEMA 2019 EA evaluates the potential environmental effects related to beach placement activities within the SPVB beach/dune restoration area and, therefore, is hereby incorporated by reference. This EA supplements the FEMA 2019 EA and focuses on the potential environmental effects associated with extracting and transporting sand from borrow area N-3 to the SPVB restoration project area.

2.0 PROJECT DESCRIPTION

St. Johns County proposes to place roughly 600,000 cy of beach-compatible sand along a portion of the St. Johns County, Florida Atlantic Ocean shoreline to restore the berm and dune severely eroded by Hurricanes Matthew and Irma as well as other storms and Nor'easters. The proposed project will place on average 20 cy per linear foot of shoreline along approximately 5.5 miles of beach between FDEP monuments R-76 and R-103.5 in SPVB. As described below, the borrow area volume (roughly 1,000,000 cy) exceeds the placement volume to account for losses and inefficiencies anticipated with hydraulic dredging operation and beach placement. The south end of the project will tie in with the upcoming federal shore protection project in Vilano Beach. Actual limits and volumes may vary slightly based upon conditions at the time of final project design and construction. The county plans to execute the proposed action occur during late winter or spring to avoid the impact of Nor'easters in fall/early winter that may quickly erode the fill before it has a chance to equilibrate and fully settle. The suggested period also offers the greatest opportunity for successful construction and minimizes potential impacts to nesting sea turtles. However, since project construction must occur during calm seas, while all attempts will be made to complete the project before the start of turtle nesting season, ocean conditions will dictate the realized project schedule and duration.

Project construction would involve a hopper dredge to dredge and transport sand to a nearshore location and to pump the sand from that point to the restoration area. To obtain the necessary volume, hopper dredging is expected to occur over approximately 90 days. The time estimated to complete each dredge and placement cycle, including idle time, is approximately 4 to 6 hours per load. Hopper dredging would operationally occur over a relatively small footprint within the designated borrow area, encompassing less than half the borrow area acreage. Efficient dredging practice entails excavating sand along relatively straight and adjacent runs along the crest of a shoal. The project will lower the shoal elevations but is not intended to result in a hole in the seabed. The sand dredged from the hydraulic suction heads would be discharged into the vessel's open hopper and most of the seawater collected with the sand would spill over the sides of the hopper back into the ocean. The hopper dredges would transport the dredged material approximately 8 statute miles to predetermined pump-out mooring buoys and associated pipeline corridors previously cleared for cultural resources and hard bottom that are positioned approximately 0.5 miles from shore, from which the material would be pumped directly from the hopper barge via pipeline to the construction area. The pump out location would be moved as necessary during construction to maintain the pipeline orientation perpendicular to the shoreline. The placement and relocation of the nearshore mooring buoys used during pump-out may involve the use of tender tugboats and a pipeline hauler or crane.

The project fill template extends from R-76 to R-103.5. The beach construction template includes a primarily 30-ft wide berm at elevation +10 ft NAVD88 and a dune with a 15-ft wide crest elevation at 14 ft NAVD88; however, the berm and dune widths and elevations vary slightly, as summarized in Table 1, throughout the project area based on existing conditions. The dune slopes 1V:4H down to the berm and primarily ties into existing seawalls. Where seawalls do not exist, the dune slopes 1V:4H landward to the existing grade. The berm slopes 1V:100H and the foreshore slope extends 1V:10H to its intersection with the existing seafloor (Table 1 and Appendix C – Project Drawings).

Table 1. Summary of SPVB Design Template Dimensions

DESIGN FEATURE		R76 TO R79	R80 TO R83	R84 TO R101	R102 TO R103.5
DUNE	ELEVATION	15 FT NAVD	15 FT NAVD	14 FT NAVD	16 FT NAVD
	CREST WIDTH	15 FT	15 FT	15 FT	15 FT
	SEAWARD SLOPE	4H:1V	4H:1V	4H:1V	4H:1V
	LANDWARD SLOPE (WHERE REQUIRED)	4H:1V	4H:1V	4H:1V	4H:1V
BERM	BERM SLOPE	100H:1V	100H:1V	100H:1V	100H:1V
	MAX. ELEVATION	12 FT NAVD	11 FT NAVD	10 FT NAVD	10 FT NAVD
	WIDTH	30 FT	30 FT	30 FT	40 FT
	SEAWARD SLOPE	10H:1V	10H:1V	10H:1V	10H:1V

The project will begin with assembly and placement of the pipeline on the beach, the settling area for separation of the sand from the pumped dredge slurry and construction and placement of the pipeline between the dredge and the shore placement area. The pipeline will be moved periodically to avoid the need for booster pumps or very long portions of dredge pipe to move sand from north to south within the project placement footprint. The sand slurry will be discharged onto the beach into a temporary settling area created by pushing up existing sand using a bulldozer. This settling area will remove a large portion of the suspended solids and allow the project to maintain acceptable turbidity within the nearshore waters as defined and required by state and federal permits. Bulldozers will be used to spread the sand into the proposed /permitted template. The use of up to three bulldozers and/or pipeline movers and two trucks is anticipated on the beach during construction to distribute and grade the hydraulically placed sand.

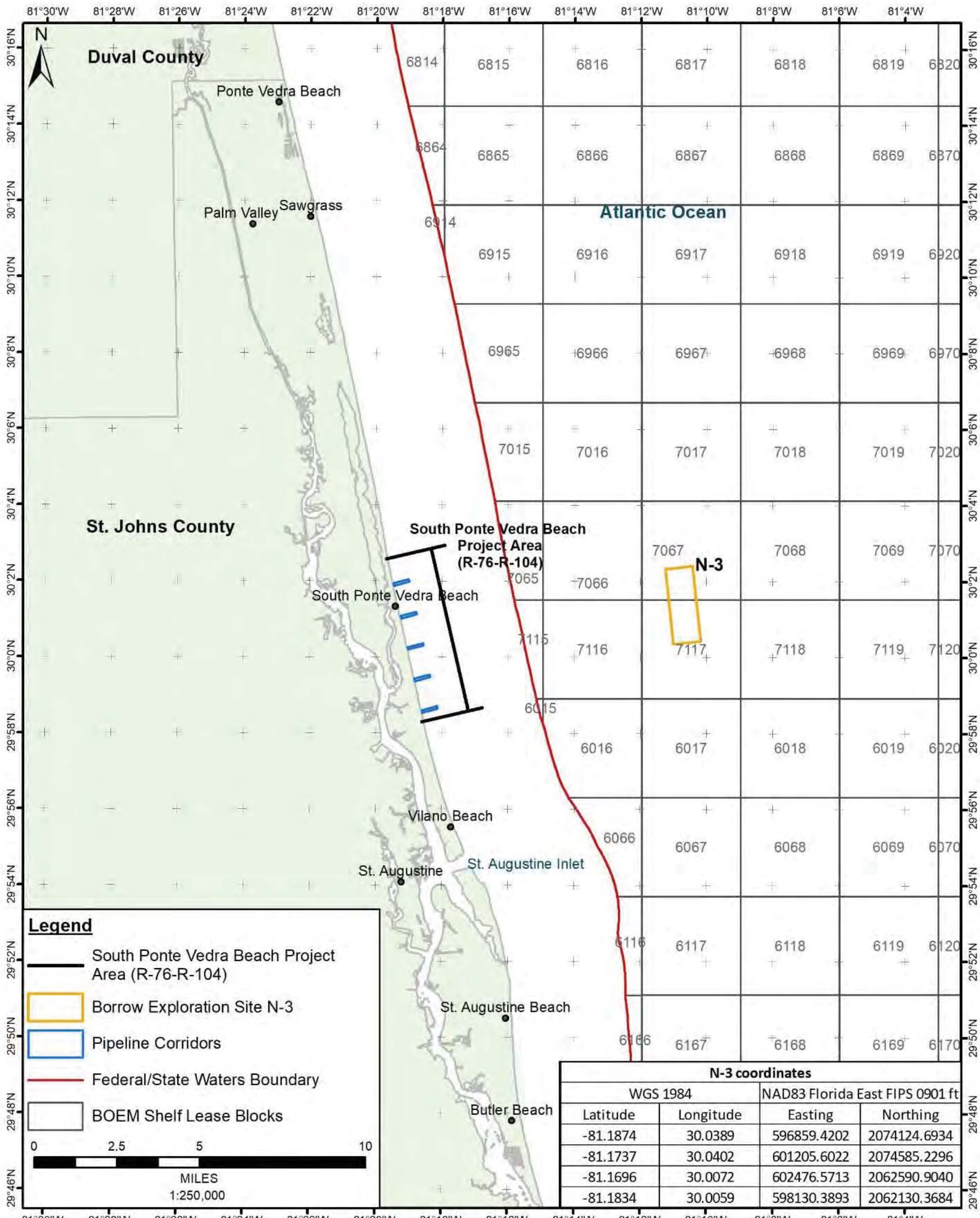
As the project moves down the beach, the contractor will move the pipe from the hopper dredge to the beach as necessary. After moving the pipeline, a new settling area will be constructed, and the project will proceed to fill the next portion of the template. Turbidity monitoring will occur regularly through each day of operation at required locations within the nearshore area downdrift of the settling area water discharge point. Surveys of the newly constructed berm will occur regularly to verify that the berm/dune design is properly constructed and to allow calculation of volumes placed. At the end of the project the pipelines will be removed, final surveys performed of borrow area and beach placement area, and a final review of the surveys will be conducted. After construction is complete, the areas with new foredune slope and top will be planted with sea oats.

The proposed offshore borrow area, a subset of USACE's borrow exploration site N-3, is located about 8 miles offshore the project area and 6 miles north of St. Augustine Inlet. Site N-3 contains approximately 9,500,000 cy of sand and elevations includes from -42 to -63 feet NAVD88 (Figures 1 and 2). This area has never been dredged. It is important to note that in this EA, the term "site N-3" refers to the larger USACE exploration site, and the term "borrow area N-3", "proposed borrow area", or "borrow area" refers to the 4,400 x 7,000 foot proposed borrow area within the southern and central region of site N-3 (Figure 2).

The common elevation of the beach quality/non-beach quality sand interface throughout the proposed borrow area is approximately -56 ft NAVD88, identified in analysis of geotechnical sampling data. The proposed dredge depth for the initial project is -49 ft NAVD88. This depth provides a significant buffer of high-quality surface sand at the bottom of the dredge template to avoid removal of sand that does not meet beach quality criteria. The proposed borrow area template holds approximately 1,000,000 cy of beach sand which should prove sufficient to satisfy the project's 600,000 cy fill requirement. The volume surplus (dredged vs. placed) accounts for dredging losses and inefficiencies. Core borings and sediment analyses indicate the substrate of the site consists of beach quality sand (medium sand) and meets state-issued criteria. See *Appendix A: South Ponte Vedra Beach Offshore Borrow Area Design Report* for additional details on the proposed borrow area design and management strategy.

The shoal proposed to supply the beach fill is a very low relief feature of the ocean bottom (between <0 and <10 feet above the general surrounding area within a much larger complex of similar condition (see *Appendix A: South Ponte Vedra Beach Offshore Borrow Area Design Report* and *Appendix C: Project Drawings, Figure C-16 – C18*). The proposed restoration project proposes dredging to a maximum elevation of -49 ft NAVD88, complying with the Project Design Criteria (PDC) identified in the South Atlantic Regional Biological Opinion (SARBO 2020), and dredging so that the result of the activity does not create increased risk of turtle takes. To that end, the borrow area design will use continuous lateral excavation at a uniform depth to the greatest extent practicable to avoid creating holes, valleys, or ridges within the borrow area. Continuous lateral excavation will help decrease the risk of marine turtle takes, increase dredging productivity (which shortens the project construction period), and avoid loss of material which could have been excavated from the borrow area.

The shallow depressions resulting from the dredging will have very shallow side slopes, will remain within the larger range of surrounding elevations, and will not create conditions where anoxia could develop. The distance from shore, water depths, shallow nature of the dredging activity, the dredging approach, and the scale of the dredging activity compared to surrounding similar regional conditions (see Section 5.1) are such that the project will not change wave climate conditions along the shoreline or create other changes that would increase or alter beach sand erosion or sand transport.



N-3 coordinates			
WGS 1984		NAD83 Florida East FIPS 0901 ft	
Latitude	Longitude	Easting	Northing
-81.1874	30.0389	596859.4202	2074124.6934
-81.1737	30.0402	601205.6022	2074585.2296
-81.1696	30.0072	602476.5713	2062590.9040
-81.1834	30.0059	598130.3893	2062130.3684

Figure 1. Location Map, Borrow Exploration Site N-3

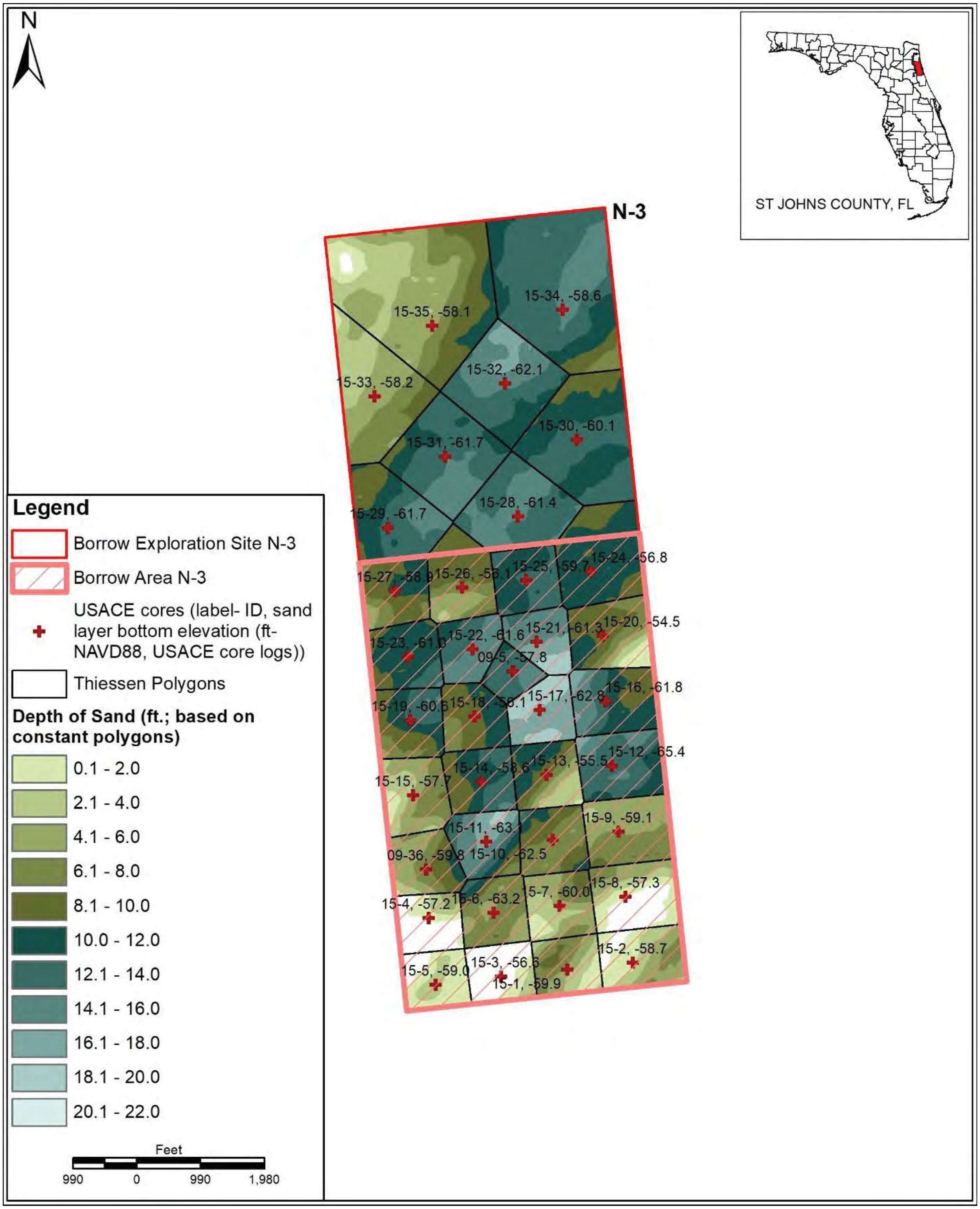


Figure 2. Maximum Beach Quality Sand Depth, Site N-3

3.0 PROJECT PURPOSE AND NEED

The purpose of the proposed project is to provide the necessary beach quality material for St. Johns County to complete the SPVB beach restoration project. The project will address severe erosion damage to the dune and beach system caused by hurricanes Matthew (2016) and Irma (2017). The need for this project is to provide protection to existing developed property and infrastructure, including public roads and residential homes adjacent to and in the vicinity of the project area. Prior to the severe coastal erosion, beach berms and dunes served as inland flood protection barriers and minimized loss of human life and property. The erosion has severely compromised the shoreline protection capacity of the beach and dune system. The SPVB restoration project will improve the capacity of the shoreline to withstand future storm events, thus reducing the risks to human life and property

4.0 ALTERNATIVES

4.1 Alternative 1: No-Action

Under the no-action alternative, sand would not be extracted from borrow area N-3 and the SPVB dune restoration would not occur. The no-action alternative would allow the beach and dune system to further erode over time and continue to increase the already significant threat of wave and tidal storm damage to residences and infrastructure along the shoreline. Continued erosion would virtually eliminate the beach and related oceanfront recreation within the SPVB restoration project area. Sea turtle nesting and shorebird foraging habitat would further degrade with continued erosion.

4.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

This alternative involves extracting beach quality material from borrow area N-3. The sand would be used to complete the SPVB restoration project. Beach compatible fill would be hopper-dredged from a portion of site N-3 (approximately eight miles offshore) and transported to a nearshore offloading location adjacent to the restoration project shoreline (Figure 1). Beach compatible fill is described in 62B-41.007 Florida Administrative Code (F.A.C); the borrow area sand characteristics, detailed in Appendix A, meet the beach fill compatibility standards. Project construction will involve using a hopper dredge in the late winter/spring timeframe. Hopper dredging, transport, and placement is expected to occur for approximately 90 days to obtain the necessary volume. Efficient dredging practice involves excavating sand along relatively straight and adjacent runs along the seabed. Dredged depths will not generally exceed 7 feet for the proposed SPVB restoration project; dredging will produce shallowly sloped borrow area edges and a flattened area no deeper than surrounding conditions. No steep-sided cuts with potential for development of anoxic conditions will result from the dredging. The dredged sand will travel through the dragheads into the dredge’s open hopper and most of the turbid seawater effluent will drain out the overflow structures in the hopper. The vessel will transport the dredged material to a pump-out location or locations approximately 0.5 mile from shore where the material will be pumped from the hopper via pipeline to the beach and dune restoration area. The pipeline will be relocated several times to facilitate pump-out along the project template. Pipeline will be rafted, floated into place, flooded, submerged to the sea floor, and marked with buoys. The placement and relocation of the nearshore mooring buoys may involve the use of tender tugboats and a barged pipeline hauler or crane. Pump-out buoys may be anchored using multi-ton point anchors and/or clump weights. Support vessels and tugs may support the hopper dredge in other activities, such as crew rotations and pump-out connection.

4.3 Alternatives Eliminated from Further Evaluation

Other borrow locations: Several local sites were examined for possible use using FDEP (2010) guidelines. Site N-3 was selected from those locations that have sufficient volumes of beach compatible sand because N-3 was closest to the project of those otherwise suitable local sites. Upland sourced sand was considered but the beach access points were insufficient to allow reasonable use of trucks and the beach itself is too narrow to accommodate a truck haul project.

Beach Nourishment: St. Johns County must rely on federal funding to achieve shoreline protection goals. The adjacent federal / U.S. Army Corps of Engineers (USACE) Civil Works shoreline projection project did not include the area included in the proposed project due to lack of sufficient public access to the beach, as required for participation in a USACE Coastal Storm Risk Management Project.

4.4 Impact Evaluation

The Council on Environmental Quality (CEQ) notes: "Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial" (40 CFR 1508.8).

When possible, quantitative information is provided to establish potential impacts; otherwise, the potential qualitative impacts are evaluated based on the criteria listed in Table 2.

Table 2. Impact Significance and Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	The resource area would not be affected and there would be no impact, OR changes or benefits would either be non-detectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale impacts/benefits. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures may be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences/benefits on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

4.5 Comparison of Alternatives

Table 3 lists the considered alternatives and summarizes the major features and consequences of the proposed action and alternatives. See Section 6.0 Environmental Effects for a more detailed discussion of impacts of alternatives.

Table 3. Summary of Direct and Indirect Impacts

Environmental Factor	Alternative 1: No-Action	Alternative 2: Proposed Action
Benthic Resources	None	Moderate. Benthos would be temporarily impacted during dredging. Long term suppression not expected because no other project is planned for the borrow area. Additionally, the project will adhere to the U.S. Army Corps of Engineers' Best Management Practice Design Criteria for Hopper Dredge/Sea Turtle Friendly Borrow Sites to minimize environmental impacts, optimize dredging productivity, and maximize the volume of remaining sand that future dredging events can feasibly extract via hopper dredging. These measures include, among others, limited dredge depths, a 2' buffer to ensure compatible post dredge sediment, utilizing a smaller subset of larger N-3 borrow area, and avoiding deep holes, as further described in Appendix A.
Cultural Resources	None	None. Site-specific cultural resource surveys and state database inquiries and prior assessments identified no cultural resources within borrow site N-3, proposed pipeline corridors, and the SPVB placement area.
Essential Fish Habitat	Moderate. Not extracting sand from borrow area N-3 would preclude the proposed SPVB restoration project. Potential adverse indirect effect includes intertidal habitat loss potentially lowering infaunal community populations within the intertidal zone.	Moderate. Temporary, localized impacts to marine water column during dredging due to elevated turbidity. Monitoring to ensure permit compliance would minimize adverse effects. Temporary, short-term impacts to unconsolidated substrate habitat and infaunal community within the dredging area. Long-term infaunal suppression not expected due to relatively rapid recolonization. Removal of the sediment volume proposed for this project will not impact the characteristics of the larger shoal complex and related essential fish habitat values.
Sea Turtles	Moderate/Major. Not extracting sand from borrow area N-3 would preclude the proposed SPVB restoration project. Potential adverse indirect effect of additional nesting habitat loss due to erosion.	Moderate. Dredging within borrow area N-3 may adversely affect sea turtles utilizing the nearshore reproductive critical habitat in which the project is found. However, the project will adhere to all applicable Project Design Criteria (PDC) as described in SARBO 2020. Therefore, any potential take associated with the dredging of borrow area N-3 and the transport of materials to the shore is covered under the SARBO 2020 incidental take statement. In the vicinity of the project area, turtles may be found foraging for food or resting along the seafloor, especially in and around hardbottom habitats. That said,

Environmental Factor	Alternative 1: No-Action	Alternative 2: Proposed Action
		previous surveys indicate there is no hardbottom present within the vicinity of both borrow area N-3 and the proposed pipeline corridors. Risks associated with hopper dredging include the entrainment of sea turtles resting or foraging on the seafloor. To minimize this risk, sea turtle deflectors will be added to the dragheads. Additionally, inflow and overflow screening will be conducted by approved observers throughout project construction to monitor, and, if necessary, report any entrained species. Other risks include increased levels of turbidity that may occur directly adjacent to the hopper dredge as a result of overflow that allows water to run off of the sediment collected in the hopper. However, sea turtles will be able to avoid localized areas of turbidity in open water environments such as the project area. Further, any turbidity will be temporary, lasting only for the duration of the proposed project. Dredging activities may also remove or bury areas inhabited by sea turtle prey species. These effects are limited in area, temporary, and benthic foraging resources are expected to recolonize these areas (as stated above). Swimming prey such as jellyfish as well as mobile prey like shrimp, may recover more quickly as they move from surrounding undisturbed areas. Sea turtles can continue to forage in surrounding areas until the dredge or placement location recolonizes, therefore the effect of any temporary loss of these foraging resources will be insignificant. Risks associated with both dredging itself and the pipeline corridors include the risk of sea turtles being physically injured if struck by transiting vessels working on a project. That said, a sea turtle being struck by a vessel operating for this project is extremely unlikely as work will be done by vessels that are slow moving or generally stationary while working. Per SARBO 2020, sea turtles should avoid interactions with these slow-moving vessels and equipment. Further, all vessel operators and crew are required to monitor for the presence of ESA-listed species. Nearshore reproductive habitat is located within 1 mile from shore in areas with sea turtle nesting beaches and found within the project area. Per SARBO 2020, dredging or the placement of materials and the transportation of materials may affect, but is not likely to adversely affect the waters sufficiently free of obstructions or artificial lighting

Environmental Factor	Alternative 1: No-Action	Alternative 2: Proposed Action
		to allow transit through the surf zone and outward toward open water feature of loggerhead sea turtle critical habitat. Any effects to this feature will be insignificant. The PDCs provide conditions that limit how and where material is placed and minimize lighting on construction equipment. Based on the PDCs, lighting on construction equipment near nesting beaches will be turtle friendly so as not to disorient hatchlings returning to the ocean. Equipment will be staged in a manner that would not block access of ESA-listed species, including the access of nesting sea turtles to the beach or of hatchlings returning to the water.
Whales	None	Moderate. Borrow Area N-3 is located within critical habitat for the North Atlantic Right Whale (NARW) and dredging is proposed to coincide with the NARW breeding and calving season. However, the project will adhere to all applicable Project Design Criteria (PDC) as described in SARBO 2020. In addition, blue, fin, sei, and sperm whales are expected to generally occur in deeper waters than where hopper dredging will occur, and the PDCs require that all work cease if whales are spotted in the area. No water quality effects that may adversely affect whales are anticipated as a result of hopper dredging as they can avoid localized areas of increased turbidity, if needed, and whales breathe air and can therefore both move away from areas of poor water quality and surface to breathe air. In addition, blue, fin, sei, and sperm whales are generally located in deeper waters off the continental shelf and therefore away from most dredging activities borrow area dredging. Additionally, any turbidity will be temporary, lasting only for the duration of the proposed project. North Atlantic right whales are particularly susceptible to vessel strikes due to their cryptic coloring and the lack of a dorsal fin, which make them hard to spot when at the surface. That said, a whale being struck by a vessel operating for this project is unlikely as work will be done by vessels that are slow moving or generally stationary while working. The project will adhere with all PDCs described in the North Atlantic Right Whale Conservation Plan, which requires that a trained observer be aboard the hopper dredge to observe for ESA-listed

Environmental Factor	Alternative 1: No-Action	Alternative 2: Proposed Action
		species and alert the captain of their presence to minimize the risk of a vessel strike. If a North Atlantic right whale is identified, whether by shipboard observation or aerial survey, all vessels within 38 nautical miles (nmi) and over 33 ft in length that are associated with a project covered will slow to 10 knots. Per SARBO 2020, the rarity of the NARW combined with strict adherence to the requirements of the North Atlantic Right Whale Conservation Plan makes a vessel strike extremely unlikely to occur. A vessel strike to the other ESA-listed whales in the action area (blue, fin, Sei, and sperm) is also unlikely to occur as these whales tend to be deeper water species. Further, while the PDCs in the North Atlantic Right Whale Conservation Plan are specifically designed for the protection of that species, the PDC requirement for slower speed vessels and observers on dredging vessels provide protection to all whale species, if present, by improving awareness of the potential presence of North Atlantic right whale in the area by aerial surveys and imposing speed restrictions when and where they may be present. There will be no effect to NARW critical habitat. The features of NARW critical habitat were designated to provide calving areas, which include specific sea surface conditions, sea surface temperatures, and water depth needed to be available for calving, nursing, and rearing calves. Dredging and transportation of dredged materials will have no effect on the sea state or temperature and will not change the availability of waters 20-92 ft deep, as defined to be the depth needed in the critical habitat rule.
West Indian Manatee	None	Minor with implementation of the Standard Manatee Conditions for In-Water Work (USFWS, 2011). All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible. Siltation or turbidity barriers shall be made of material in which manatees cannot become

Environmental Factor	Alternative 1: No-Action	Alternative 2: Proposed Action
		entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville and emailed to FWC at ImperiledSpecies@myFWC.com. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads Caution: Boaters must be posted. A second explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.
Smalltooth Sawfish	None	Minor due to rare occurrence in project vicinity.
Fish & Wildlife Resources	Moderate/Major. Not extracting sand from borrow area N-3 would preclude the proposed SPVB restoration project. Potential adverse indirect effect of additional fish and wildlife habitat loss due to erosion.	Moderate. Fish and wildlife temporarily displaced during dredging. Temporary loss of foraging habitat in dredging template while prey populations recover.
Water Quality	None	Minor-Moderate. Temporary, localized impacts to water column during dredging due to elevated turbidity. Monitoring to ensure permit compliance would minimize potential adverse effects.
Air Quality	None	Minor-Moderate. Temporary and localized decrease in air quality from construction equipment emissions. No long-term accumulation of particulates.

5.0 AFFECTED ENVIRONMENT

5.1 Geology

Offshore of the beaches and modern barrier islands of northeast Florida is the continental shelf. The continental shelf has a broad, shallow, low relief and extends approximately 80 miles offshore near St. Johns County. The shelf contains relic Pleistocene and Holocene terraces and submerged beach sand ridges. The wave climate and sediment transportation system create a linear sandy coastline. The northeast coast of Florida consists of a series of sandy barrier islands broken occasionally by inlets. The barrier islands are characterized by dunes and shore parallel beach ridges. Many of the islands display relic beach ridges formed during higher stands of sea level. The formations exposed at the surface are undifferentiated sediments and the Anastasia Formation of Pleistocene and Holocene age (Scott et al., 2001). These deposits consist of fine to medium quartz sand and lenses of shell and clay of varying thickness. Thick shell beds and erosion of the outcrops of the Anastasia Formation near the coast have been firmly cemented to form coquina rock. The erosion of this formation has resulted in a thick cover of quartz sand over the formation, of which the proposed borrow area is part. The quartz component of the modern barrier island sand has deposited from sand migrating southward along the Atlantic coast and reworked over time. The remaining component of coastal sediments are typically carbonates locally produced by calcite-producing plants and animals. Additional carbonate materials are reworked materials from outcropping Pleistocene formations offshore (Duane and Meisburger, 1969). Anderson et al. (2017) identified the project area as infralittoral (0 to -30 m) depths of the Carolinian subregion of the Mid-Atlantic Bight. The area, extending from Virginia to Cape Canaveral in Florida, is almost completely composed of soft sediments, ranging from shell to mud dominated sediments, with extensive sand shoals.

The project area is a miniscule portion of the above-mentioned seabed zone. The borrow area itself represents a fraction (<1% in area and volume) of a larger sand shoal complex off the St. Johns County coast. The borrow area lies within the USACE-designated exploration area NOBA, which encompasses 79 square miles and contains an estimated 65,000,000 cy of beach quality sand (USACE, 2017b) north of St. Augustine Inlet. South of the inlet lies SOBA, encompassing 30 square miles and containing an estimated 130,000,000 cy of beach quality sand. Thus, the proposed dredging area, encompassing less than 1 square mile and roughly 1,000,000 cy, does not represent a significant portion of the surrounding shoals in the region.

The proposed borrow area has a mean grain size of 1.78 phi (0.29 mm), standard deviation of 0.93 phi, 0.96% silt, 0.67% gravel, 14.12% visual shell, and predominant moist Munsell value/chroma of 7/1. Appendix A, Attachment E contains the statistics for every sample at every core location within borrow area N-3. All samples from the proposed borrow footprint include less than 2.5% fines (material passing a US standard sieve #230). The sand meets state of Florida standards for compatibility with the beach sand within the project area (F.A.C. 62B-41.007(2)(j)). The borrow area substrates were confirmed to be unconsolidated (sand) sediments with no features such as hardbottom or rock outcrops. The site characteristics and sand characteristics are detailed in Appendix A. Magnetometer, sidescan, and subbottom profile survey, completed by Panamerican Consultants, Inc. (Panamerican) and Sonographics, Inc., found four magnetic anomalies, two sidescan sonar contacts, and no subbottom acoustic contacts or subbottom impedance contrast features (Appendix A, Attachment B). A Panamerican registered archaeologist reviewed the survey data and concluded that the magnetic anomalies and sidescan sonar contacts did not meet the National Register of Historic Places criteria of potentially significant submerged cultural resources.

5.2 Benthic Resources

Benthic organisms such as crustaceans, echinoderms, anthozoans, annelid worms, mollusks, and demersal fish play a major role in altering underlying benthic substrates and in breaking down organic material which provides sustenance for economically important species of pelagic fishes (Sumich, 1988). These organisms are important marine ecological community members because they burrow within and oxygenate the sediments, may filter large volumes of water, contribute organic materials to the overall marine system, and serve as food for bottom-feeding fish and other invertebrates.

In general, seabed inhabitants along the Florida coast typically comprise a wide array of amphipods, crustaceans, cumaceans, echinoderms, gastropods, isopods, polychaetes, and pelecypods (Rhoads and Young, 1979; Johnson, 1982 as cited in Greene, 2002; Hammer et al., 2005). Benthic camera video shows that the benthic habitat in the general vicinity of the project area consists of variably defined sand waves overtopping coalescing sand ridge features and flat, silty bottom (Zarillo et al., 2009). Sand waves generally align north-northwest and south-south east. Adjacent flat bottom areas exhibit small depressions, polychaete mounds, and track marks. Polychaetes, amphipods, and bivalve mollusks were dominant benthic assemblages observed in benthic grab samples and video during biological sampling periods in November 2005 and June 2006 (Zarillo et al., 2009). Lotspeich and Associates (1997), studying potential impacts associated with the use of a dredged material disposal site offshore of Duval County, observed polychaetes, mollusks, and arthropods in highest abundance and greatest number of taxa. Dominant epifauna included echinoderms, such as sand dollar and sea stars. Brooks et al. (2006) suggested that seasonality is the principal control on species dominance and overall abundance and diversity. In the project area, greater differences in species richness, abundance, and community structure for infauna and epifauna attributed to seasonal compared to spatial variation (Zarillo et al., 2009; Lotspeich and Associates, 1997).

5.3 Fish and Wildlife Resources

Coastal waters off the southeastern U.S. are split into two zoogeographic provinces based on shore fishes and continental shelf invertebrate species. The Caribbean Province includes the Florida Keys and extends northward to approximately the Florida-Georgia border, but its northern boundary is not sharp (SAFMC, 1998). Marine life common to northeast Florida can be found within borrow area N-3. A wide variety of finfish and shellfish species that dwell in softbottom and coastal pelagic (i.e., at or near the sea surface in the water column) species are caught and landed off the coast of northeast Florida. Important commercial fisheries species from these groups include northern brown shrimp, northern white shrimp (softbottom), snappers, and king mackerel (coastal pelagic). Marine mammal species known to occur in the project area include bottlenose dolphin (*Tursiops truncatus*), Atlantic spotted dolphin (*Stenella frontalis*), and North Atlantic right whale (*Eubalaena glacialis*). Avian species most likely to occur in the offshore project area include pelagic birds, pelicans, gulls, and terns.

5.4 Essential Fish Habitat

The South Atlantic Fishery Management Council (SAFMC) identifies waters and substrate within the project area as Essential Fish Habitat (EFH) (SAFMC, 1998). EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity. The SAFMC has designated areas of vegetated and non-vegetated bottoms, live bottoms, and water columns within the general OCS off northeast Florida as EFH in compliance with the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996.

The SAFMC designates tidal inlets (including their ebb and flood tide shoals) as Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for penaeid shrimp, the snapper-grouper complex, and coastal migratory pelagics. The ecological function of tidal inlets (including their ebb and flood tide shoals) is widely recognized for its contributions to spawning, egg and larval dispersal, juvenile recruitment, and as foraging habitat. However, there are no tidal inlets within the general project area. All state-designated "nursery habitats of particular importance" also meet the criteria for EFH-HAPCs for penaeid shrimp, the snapper-grouper complex, and coastal migratory pelagics. Within Florida, state-designated nursery habitats of particular importance include Aquatic Preserves that have estuarine and marine attributes and are located on the Atlantic coast. Within the project area, the Guana River Marsh Aquatic Preserve extends approximately 3 miles offshore along much of the beach placement area.

EFH types within borrow area N-3 include benthic habitat (unconsolidated, unvegetated substrate) and the water column. The project area water column is considered essential fish habitat (EFH) for spiny lobster and snapper-grouper complex (Figure 3). The project area water column is also considered EFH for Coastal Migratory Pelagics, which include king mackerel (*Scomberomorus cavalla*), Atlantic Spanish mackerel (*Scomberomorus maculatus*), and cobia (*Rachycentron canadum*). No hardbottom, live bottom, or vegetated bottom occurs within borrow area N-3 or immediately adjacent (Figure 3). The site-specific geotechnical exploration involved collection of numerous vibracores, and the submerged cultural resources survey included sidescan and subbottom profile data collection. Neither of these data collection efforts identified hardbottom or rock outcrop features within borrow area N-3 (Appendices A and D).

EFH within the nearshore area where the pipelines will be placed to move the sand from the hopper to the beach placement area and where decanted water from the placement activities will flow includes benthic habitat (unconsolidated, unvegetated substrate), water column, and oceanic high-salinity surf zones. Foster, Spurgeon, and Cheng (2000) note that "a long and relatively significant headland feature" extends from about R-15 to R-75. This feature is associated with submerged coquina and/or beachrock outcrops in the nearshore zone and may contribute to the shell hash observed in beach sediments in SPVB. The SPVB project area occurs south of the referenced headland feature. In addition, review of existing hardbottom data sources including the South Atlantic Fisheries Management Council and Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute identified no hardbottom resources within the SPVB project areas (borrow and beach placement sites).

The Atlantic Ocean in the project area also provides essential forage, cover, and nursery habitats for other species that are commercially and recreationally important. Species managed by NMFS that are common within these areas are listed in Table 4 and described below.

Table 4. Managed Species That May Occur in the Project Area

Species/Management Unit	Life Stage(s)
Penaeid Shrimp (Brown Shrimp, Pink Shrimp, White Shrimp)	ALL
Coastal Migratory Pelagics	ALL
Snapper-Grouper Complex	ALL
Spiny Lobster	ALL

Species/Management Unit	Life Stage(s)
Atlantic Sharpnose Shark	ALL
Basking Shark	ALL
Blacknose Shark	ALL
Blacktip Shark	ALL
Bonnethead Shark	ALL
Bull Shark	Juvenile/Adult
Finetooth Shark	ALL
Lemon Shark	ALL
Sailfish	Juvenile/Adult
Sand Tiger Shark	ALL
Sandbar Shark	Adult
Scalloped Hammerhead Shark	ALL
Spinner Shark	ALL
Tiger Shark	ALL
White Shark	Juvenile/Adult

Source: National Oceanic and Atmospheric Administration (NOAA) EFH Mapper tool (http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html) and the South Atlantic Fisheries Marine Council (SAFMC) EFH Mapper tool (http://ocean.floridamarine.org/sa_efh/)

5.4.1 Penaeid Shrimp

For penaeid shrimp (Brown, Pink, and White shrimp), EFH includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non-vegetated flats. This applies from North Carolina through the Florida Keys. The coastal and shallow OCS waters off St. Johns County contain EFH for these species.

Areas which meet the criteria for EFH-Habitat Areas of Particular Concern (EFH-HAPCs) for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (i.e. aquatic preserves), and state-identified overwintering areas. No state-identified overwintering grounds have been identified for penaeid shrimp. Within the project area, the Guana River Marsh Aquatic Preserve extends approximately 3 miles offshore along much of the beach placement area.

5.4.2 Coastal Migratory Pelagics

Coastal Migratory Pelagic species include king mackerel (*Scomberomorus cavalla*), Atlantic Spanish mackerel (*Scomberomorus maculatus*), and cobia (*Rachycentron canadum*). EFH for these species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including Sargassum. For cobia EFH also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an EFH because it provides a mechanism to disperse coastal migratory pelagic larvae. For king and Spanish mackerel and cobia EFH occurs in the South Atlantic and Mid-Atlantic Bights. The coastal and shallow OCS waters off St. Johns County contain EFH for these species.

As stated in Section 5.4, EFH-HAPCs for coastal migratory pelagics includes tidal inlets. Other areas which meet the criteria for EFH-HAPCs for coastal migratory pelagic species include sandy shoals of Capes Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the Gulf Stream; The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); Phragmatopoma (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; Pelagic Sargassum; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the Estuarine Living Marine Resources Program. Additionally, EFH-HAPCs for coastal migratory pelagics includes all state-designated nursery habitats of particular importance (i.e. aquatic preserves). Within the project area, the Guana River Marsh Aquatic Preserve extends approximately 3 miles offshore along much of the beach placement area.

5.4.3 Snapper-Grouper Complex

EFH for the snapper-grouper complex includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including Sargassum, required for larval survival and growth up to and including settlement.

For specific life stages of estuarine dependent and nearshore snapper-grouper species, EFH includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom. The coastal and shallow OCS waters off St. Johns County contain EFH for these species.

As stated in Section 5.4, EFH-HAPCs for the snapper-grouper complex includes tidal inlets. Other areas which meet the criteria for EFH-HAPCs for the snapper grouper complex includes medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic Sargassum; Hoyt Hills for wreckfish; the Oculina Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). Additionally, EFH-HAPCs for the snapper-grouper complex includes all state-designated nursery habitats of particular importance (i.e. aquatic preserves) and deep-water marine protected areas. Within the project area, the Guana River Marsh Aquatic Preserve extends approximately 3 miles offshore along much of the beach placement area. No marine protected areas occur in the vicinity of the project area.

5.4.4 Spiny Lobster

EFH for spiny lobster includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities (*Laurencia* spp.); and mangrove habitat (prop roots). In addition, the Gulf Stream is an EFH because it provides a mechanism to disperse spiny lobster larvae. In practice, the northern limit for inshore benthic habitats designated EFH for spiny lobster is Sebastian Inlet, and the northern limit of the offshore benthic habitats designated as EFH for spiny lobster is the area offshore of the St. Johns River. The project area is well to the north of the northern limit for inshore benthic habitats, but within the extent of the offshore benthic habitats designated as EFH for spiny lobster.

Areas which meet the criteria EFH-HAPCs for spiny lobster include Florida Bay, Biscayne Bay, Card Sound, and coral/hard bottom habitat from Jupiter Inlet, Florida through the Dry Tortugas, Florida. The project area does not contain any EFH-HAPCs for spiny lobster.

5.4.5 Atlantic Sharpnose Shark

The Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) is a small coastal carcharhinid, inhabiting the waters of the northeast coast of North America. It is a common year-round resident along the coasts of South Carolina, Florida, and in the Gulf of Mexico and an abundant summer migrant off Virginia. Frequently, these sharks are found in schools of uniform size and sex (Castro, 1983). EFH for all lifecycles of the Atlantic Sharpnose Shark exists in the project area.

5.4.6 Basking Shark

The basking shark (*Cetorhinus maximus*) is the second-largest living shark, after the whale shark, and one of three plankton-eating shark species, along with the whale shark and megamouth shark. Adults typically reach 7.9 m in length. A slow-moving filter feeder, its common name derives from its habit of feeding at the surface, appearing to be basking in the warmer water there. The basking shark is a cosmopolitan migratory species, found in all the world's temperate oceans, from boreal to warm-temperate waters. This coastal-pelagic shark lives around the continental shelf and occasionally enters brackish waters. It is found from the surface down to at least 910 m. It is often seen close to land, including in bays with narrow openings. The shark follows plankton concentrations in the water column, so is often visible at the surface (Sims et al., 2005). It characteristically migrates with the seasons (Compagno, 1984). EFH for all lifecycles of the Basking Shark exists in the project area.

5.4.7 Blacknose Shark

The blacknose shark (*Carcharhinus acronotus*) is a common coastal species that inhabits the western north Atlantic from North Carolina to southeast Brazil (Bigelow and Schroeder, 1948). It is very abundant in coastal waters from the Carolinas to Florida and the Gulf of Mexico during summer and fall (Castro, 1983). Schwartz (1984) hypothesized that there are two separate populations in the West Atlantic. EFH for all lifecycles of the blacknose shark exists in the project area.

5.4.8 Blacktip Shark

The blacktip shark (*Carcharhinus limbatus*) is circumtropical in shallow coastal waters and offshore surface waters of the continental shelves. In the southeastern United States, it ranges from Virginia to Florida and the Gulf of Mexico. The blacktip shark is a fast-moving shark that is often seen at the surface, frequently leaping and spinning out of the water. It often forms large schools that migrate seasonally north south along the coast and exhibit a strong diel pattern in their aggregations thought to be related to predator avoidance or improved feeding efficiency (Heupel and Simpendorfer, 2005). EFH for all lifecycles of the Blacktip shark exists in the project area.

5.4.9 Bonnethead Shark

The Bonnethead (*Sphyrna tiburo*) is a small hammerhead shark that inhabits shallow coastal waters where it frequents sandy or muddy bottoms. It is confined to the warm waters of the western hemisphere (Castro, 1983). Bonnethead sharks feed mainly on benthic prey such as crustaceans and mollusks. They do not appear to exhibit long distance migratory behavior and thus, little or no mixing of populations (Lombardi-Carlson, 2007). EFH for all lifecycles of the Bonnethead shark exists in the project area.

5.4.10 Bull Shark

The bull shark (*Carcharhinus leucas*) is a large, shallow water shark that is cosmopolitan in warm seas and estuaries (Castro, 1983). It often enters fresh water and may penetrate hundreds of kilometers upstream; bull sharks are the only shark species that is known to be physiologically capable of spending extended periods in freshwater (Thorson et al., 1973). EFH for juvenile and adult life stages of the bull shark exists in the project area.

5.4.11 Finetooth Shark

The Finetooth shark (*Carcharhinus isodon*) is a common inshore species of the western Atlantic. It ranges from North Carolina to Brazil. It is abundant along the southeastern United States and the Gulf of Mexico (Castro, 1983). Finetooth sharks generally prefer water temperatures reach 22°C (mid-May) and remain until water temperatures drop to 20°C (October). EFH for all lifecycles of the Finetooth shark exists in the project area.

5.4.12 Lemon Shark

The lemon shark (*Negaprion brevirostris*) is common in the American tropics, inhabiting shallow coastal areas, especially around coral reefs. During migration, this species can be found in oceanic waters but tends to stay along the continental and insular shelves (Morgan, 2008). Lemon sharks are reported to use coastal mangroves as nursery habitats, although this is not well documented in the literature. EFH for all lifecycles of the Lemon shark exists in the project area.

5.4.13 Sailfish

The Atlantic sailfish (*Istiophorus albicans*) is a species of marine fish found in the Atlantic Oceans and the Caribbean Sea, except for large areas of the central North Atlantic and the central South Atlantic. The Atlantic sailfish is related to the marlin. It is a pelagic fish of tropical and temperate waters in the Atlantic Ocean. It ranges from approximately 40°N in the northwestern Atlantic to 40°S in the southwestern Atlantic, and 50°N in the northeastern Atlantic to 32°S in the southeastern Atlantic. It is a migratory species and moves about the open ocean and into the Mediterranean Sea. Its depth range is from warm surface waters down to about 200 m (656 ft) (Froese & Pauly, 2006). EFH for juvenile and adult life stages of the sailfish exists in the project area.

5.4.14 Sand Tiger Shark

The sand tiger shark (*Carcharias taurus*) is a species of shark that inhabits subtropical and temperate waters worldwide. Despite its name, it is not related to the tiger shark. It inhabits the continental shelf, from sandy shorelines and submerged reefs to a depth of around 191 m (Compagno, 1984). This species roams the epipelagic and mesopelagic regions of the ocean, sandy coastal waters, estuaries, shallow bays, and rocky or tropical reefs (Dicken et al., 2007). They dwell in the waters of Japan, Australia, South Africa, the Mediterranean and the east coasts of North and South America. In the Western Atlantic Ocean, it is found in coastal waters around from the Gulf of Maine to Florida, in the northern Gulf of Mexico around the Bahamas and Bermuda, and from southern Brazil to northern Argentina (Pollard & Smith, 2009). EFH for all lifecycles of the sand tiger shark exists in the project area.

5.4.15 Sandbar Shark

The sandbar shark (*Carcharhinus plumbeus*) is a species of requiem shark native to the Atlantic Ocean and the Indo-Pacific. It is not to be confused with the similarly named sand tiger shark. The sandbar shark is commonly found over muddy or sandy bottoms in shallow coastal waters such as bays, estuaries, harbors, or the mouths of rivers, but it also swims in deeper waters (200 m+) as well as intertidal zones. Sandbar sharks are found in tropical to temperate waters worldwide; in the western Atlantic they range from Massachusetts to Brazil. Juveniles are common in the lower Chesapeake Bay, and nursery grounds are found from Delaware Bay to South Carolina. Other nursery grounds include the Florida Keys (Baremore & Hale, 2012). EFH for the adult life stage for sandbar sharks exists in the project area.

5.4.16 Scalloped Hammerhead Shark

The scalloped hammerhead (*Sphyrna lewini*) is a very common, large, schooling hammerhead of warm waters. It is the most common hammerhead in the tropics and is readily available in abundance to inshore artisanal and small commercial fisheries as well as offshore operations (Compagno, 1984). It migrates seasonally north-south along the eastern United States. Scalloped hammerhead sharks are widely distributed, but they are also dependent on discrete coastal nursery areas (Duncan et al., 2006). Neonate and Young-of-the-Year (YOY) would be more common in the project area during the summer months. EFH for all lifecycles of the scalloped hammerhead exists in the project area.

5.4.17 Spinner Shark

The spinner shark (*Carcharhinus brevipinna*) is a common, coastal-pelagic, warm-temperate and tropical shark of the continental and insular shelves (Compagno, 1984). It is often seen in schools, leaping out of the water while spinning. It is a migratory species, but its patterns are poorly known. EFH for all lifecycles of the spinner shark exists in the project area.

5.4.18 Tiger Shark

The Tiger shark (*Galeocerdo cuvier*) inhabits warm waters in both deep oceanic and shallow coastal regions (Castro, 1983). In the western North Atlantic Ocean, tiger sharks occur in coastal and offshore waters from approximately 40° to 0°N and have been documented to make transoceanic migrations (Driggers et al., 2008). In the North Atlantic they are rarely encountered north of the Mid-Atlantic Bight (Skomal, 2007). A study by Heithaus et al. (2002) on tiger sharks in Australia showed they preferred shallow seagrass habitats, and this was influenced by prey availability, which is greater in shallow waters.

The tiger shark is one of the larger species of sharks, reaching over 550 cm TL and over 900 kg. Its characteristic tiger-like markings and unique teeth make it one of the easiest sharks to identify. It is one of the most dangerous sharks and is believed to be responsible for many attacks on humans (Castro, 1983). EFH for all lifecycles of the tiger shark exists in the project area.

5.4.19 White Shark

The white shark (*Carcharodon carcharias*) is the largest of the lamnid, or mackerel, sharks. It is a poorly known apex predator found throughout temperate, subtropical, and tropical waters. Its presence is usually sporadic throughout its range, although there are a few localities (e.g., off California, Australia, and South Africa) where it is seasonally common. Large adults' prey on seals and sea lions and are sometimes found around their rookeries. The white shark is also a scavenger of large dead whales. It has been described as the most voracious of the fish-like vertebrates and has been known to attack bathers, divers, and even boats. EFH for the juvenile and adult life stages is located in the project area.

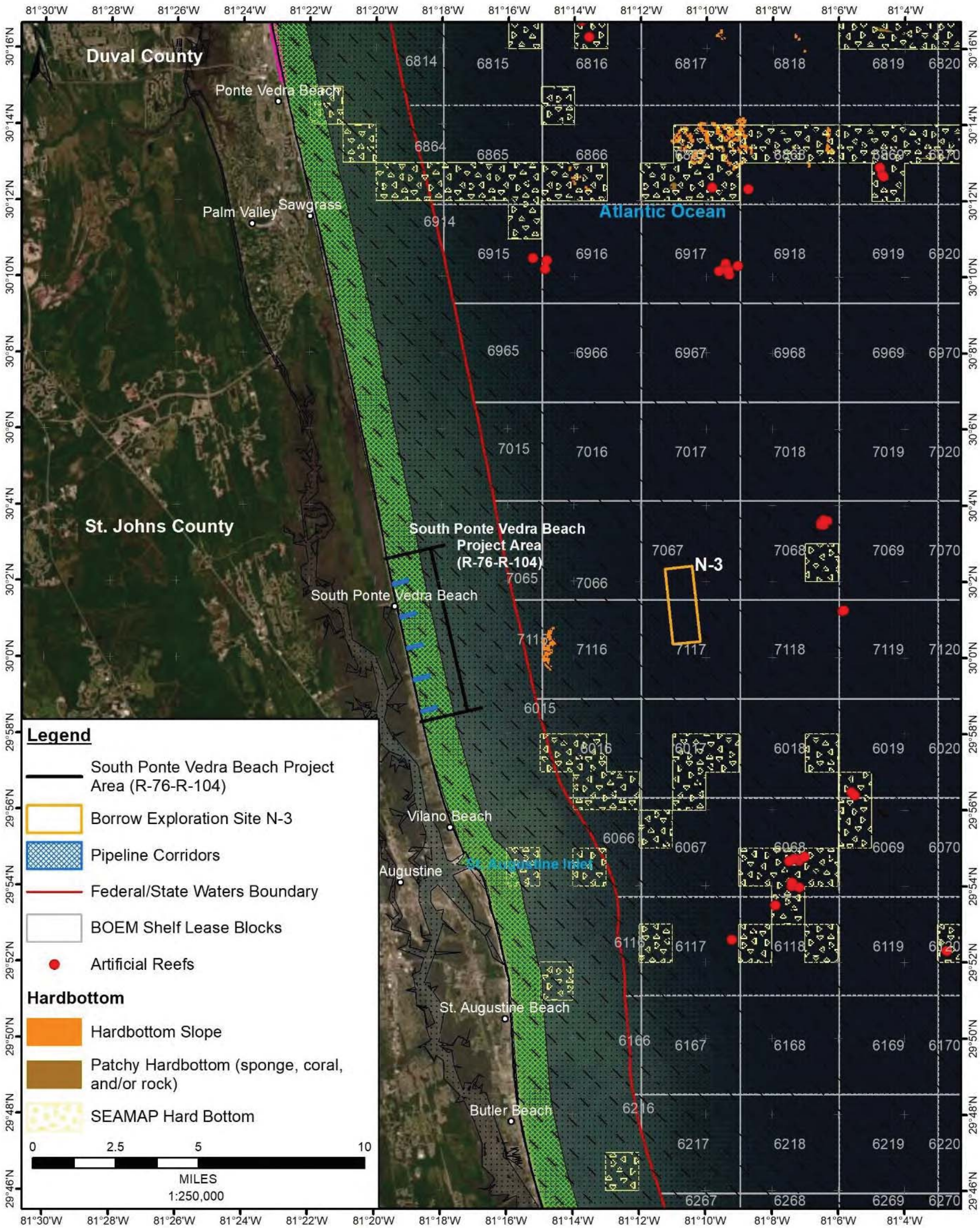


Figure 3. Natural Resources in Vicinity of Site N-3

5.5 Threatened and Endangered Species

A number of federally listed threatened and endangered species and their critical habitats may occur within the vicinity of site N-3 (Table 5).

Table 5. Federally-Listed Species and Critical Habitats That May Occur in the Project Area

Common Name	Scientific Name	Federal Listing Status	Critical Habitat Unit
Loggerhead Sea Turtle	*Caretta*	Threatened	LOGG-N-14
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	-
Green Sea Turtle	*Chelonia mydas*	Threatened	-
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	-
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	-
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered	2
West Indian Manatee	*Trichechus manatus*	Threatened	-
Smalltooth Sawfish	*Pristis pectinata*	Endangered	-
Giant Manta Ray	*Manta birostris*	Threatened	-

5.5.1 Sea Turtles

The ESA protects all sea turtles in U.S. territorial waters. Five listed species of sea turtles inhabit or are known to occur in the project area. The loggerhead sea turtle (*Caretta caretta*) (the most numerous of the five in the project area), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Demochelys coriacea*), occur in the project waters and nest on the beaches of St. Johns County. The Kemp's Ridley sea turtle (*Lepidochelys kempii*) may be found occasionally in shallow coast wasters off St. Johns County but only rarely nests in northeast Florida. The hawksbill sea turtle (*Eretmochelys imbricate*) is the rarest sea turtle that regularly occurs in Florida, but FWC data indicate that it has been known to nest north of Cape Canaveral (FWC 2019). The coastal and shallow OCS waters off St. Johns County primarily provide migratory and reproductive habitat for these species. Mating generally takes place in offshore waters near the nesting beach, and males rarely come ashore (Fuller 1978). Feeding and migrating individuals, mating individuals, nesting females, and hatchlings may traverse through the borrow area and in-water project areas.

Loggerhead turtles are present year-round in Florida waters, with peak abundance occurring during spring and fall migrations. The eastern coast of Florida appears to provide an important year-round habitat for loggerhead sea turtles along both the inner shelf (0 to 20 meters) and middle shelf (20 to 40 meters) depths. The USFWS considers the green turtle as common within the inner shelf waters of the project area. Adult leatherback turtles occur in east Florida waters primarily during summer; but this species has also been sighted in aerial surveys off northeast Florida between October through April. Hawksbill turtles occur in tropical and subtropical seas of the Atlantic, Pacific, and Indian oceans and are rare in the project waters. The Kemp's Ridley, the smallest and most endangered of the sea turtles, is very rare in the project waters, most likely seen as juveniles entering coastal waters after growing as hatchlings in drifting sargassum rafts farther offshore.

Loggerhead turtle critical habitat unit LOGG-N-14 occurs with the vicinity of the project area (Figure 3). LOGG-N-14 is designated as nearshore reproductive critical habitat and extends from Kathryn Abbey Hanna Park in Duval County to Matanzas Inlet in St. Johns County and covers the area from the mean high-water line seaward 1.6 kilometers. Nearshore reproductive habitat is a portion of the nearshore waters adjacent to the nesting beach that is used by hatchlings to egress to the open water environment as well as by nesting females to transit between the beach and open water during the nesting season.

5.5.2 North Atlantic Right Whale

The North Atlantic right whale (*Eubalaena glacialis*) — a large, dark, migratory whale — is one of the world's most endangered large whale species. Federal and state entities list the right whale as an endangered species and provide protection under the Endangered Species Act, Marine Mammal Protection Act, and Florida State Law. Right whales generally spend winters at latitudes below 50^o and stay above 40^o latitude during the spring, summer, and fall (Humphrey, 1992). Breeding and calving grounds for the right whale occur off the coast of southern Georgia and northeast Florida. During the winter months, right whales routinely come close to shore off Florida's east coast. Right whales concentrate off the northeast coast of Florida from November through April. Right whales are baleen whales — they filter their food through long baleen plates. Right whales primarily eat small crustaceans such as copepods and euphausiids (small shrimp-like animals) by grazing along the surface of the water.

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is the lead U.S. federal agency responsible for the protection and recovery of north Atlantic right whales. The NMFS designates right whale "critical habitat" from the mouth of the Altamaha River in Georgia south to Sebastian Inlet, Florida, and from the shoreline out to 15 miles off Georgia and northern Florida and five miles off central Florida (Figure 3). NMFS has established the Southeast Seasonal Management Area between November 15 and April 15 because the southeast Atlantic coast serves as the primary calving and nursery grounds for this endangered species.

5.5.3 West Indian Manatee

The West Indian manatee (*Trichechus manatus*), one of the most threatened marine mammals in coastal waters of the United States, is protected under the Endangered Species Act, the Marine Mammal Protection Act, and Florida State Law. The Florida manatee (*Trichechus manatus latirostris*), a subspecies of the West Indian Manatee, resides primarily in the fresh and estuarine waters of Georgia and Florida, but may also be found in the adjacent marine environment. Manatees, herbivores, feed on a wide variety of submerged, emergent, and floating vegetation and thus frequently inhabit shallow areas where seagrasses and other vegetation grow. Shallow grass beds with easy access to deep channels are ideal feeding areas in riverine and coastal habitats (USFWS, 2001). Manatees migrate seasonally, especially along the east coast of Florida, and occasionally use open ocean passages to travel to preferred habitats. During the warm summer months, manatees use a wide variety of habitats along the coast. Conversely, during the winter months, cold temperatures restrict their movement to warm water refuges such as natural springs or warm water discharges associated with power plants. Manatees commonly use the same summer and winter habitats year after year (USFWS, 2001). In St. John's County, manatees frequently visit inshore waters including the Matanzas and Tolomato Rivers. Manatee sightings within the nearshore waters of St. Johns County's Atlantic coast are less common.

Collisions with watercraft account for a large percentage of annual manatee mortality in Florida; such collisions, and destruction or degradation of habitat due to widespread development, pose the major threats to manatee survival (USFWS, 2001). However, due to the relatively low number of manatees found in marine waters, almost all the recorded collisions occur in fresh and estuarine waters.

5.5.4 Smalltooth Sawfish

The smalltooth sawfish (*Pristis pectinata*), currently listed as endangered by NMFS, rarely occurs within the project area. This species has become rare along the southeastern Atlantic and northern Gulf of Mexico coasts of the U.S. during the past 30 years, with its known primary range now reduced to the coastal waters of Everglades National Park in extreme southern Florida. Fishing and habitat degradation have extirpated the smalltooth sawfish from much of this former range.

The smalltooth sawfish, distributed in tropical and subtropical waters worldwide, normally inhabits shallow waters (10 m or less), often near river mouths or in estuarine lagoons over sandy or muddy substrates, but may also occur in deeper waters (20 m) of the continental shelf. Shallow water less than 1 m deep appears an important nursery area for young smalltooth sawfish. Maintenance and protection of habitat is an important component of the smalltooth sawfish recovery plan. Recent studies indicate that key habitat features (particularly for immature individuals) nominally consist of shallow water, proximity to mangroves, and estuarine conditions. Smalltooth sawfish grow slowly and mature at about 10 years of age. Females bear live young, and the litters reportedly range from 15 to 20 embryos requiring a year of gestation (NMFS 2009). Their diet consists of macroinvertebrates and fishes such as herrings and mullets.

5.5.5 Giant Manta Ray

The Giant Manta Ray (*Manta birostris*) was listed as threatened under the Endangered Species Act January 22, 2018. The species is a ray in the family Mobulidae, a member of the class Chondrichthyes, jawed vertebrates with skeletons made of cartilage rather than bone, similar to sharks and skates. It is the largest type of ray in the world, and is found worldwide in tropical, subtropical, and temperate bodies of water. The species information provided in this section is derived from Miller and Klimovich (2017) unless otherwise noted.

Commonly found offshore in oceanic waters, it also frequents productive coastlines. The giant manta ray is considered to be a migratory species, and estimated tor travel up to 1,500 km. NOAA has not defined critical habitat for the species. The species has a long lifespan and low reproductive rate. Live bearers, the female provides nutrition to the embryos during development; however, mantas do not provide parental care after birth. Age of sexual maturity is not well defined. Estimates range from 3-4 years to 15 years. Life history and population parameters are not well known. The species' diet is based on filter feeding and local numbers of the species may be correlated to zooplankton abundance in an area. Large schools of manta Rays have been identified off St. Augustine, FL between 2009 and 2012, where "vast schools of giant manta rays, with over 500 manta rays" were observed per 6-8 hr. day of aerial survey. These were the only reported Florida Atlantic coast data reported in Miller and Klimovich (2017), and they concluded that "Given that the species is rarely identified in the fisheries data in the Atlantic, it may be assumed that populations within the Atlantic are small and sparsely distributed".

The most significant threat to the giant manta ray is overutilization for commercial purposes. Giant manta rays are both targeted and caught as bycatch in a number of global fisheries throughout their range and are most susceptible to industrial purse-seine and artisanal gillnet fisheries. In the US Gillnet fishery, by catch of manta rays is low (zero to 16 per year) with about 89% discarded alive, based on 1998 – 2015 data from NMFS Southeast Gillnet Observer Program covering vessel operating from Florida to North Carolina The report also emphasizes that due to the likely small, scattered populations and life history characteristics, combined with "the species' inherent vulnerability to depletion" even low levels of mortality may result in dramatic population declines.

5.6 Marine Mammals

All marine mammals in US waters are protected under the Marine Mammal Protection Act (MMPA) of 1972 and are under the jurisdiction of NMFS. The MMPA prohibits, with certain exceptions, the taking of marine mammals in United States waters by U.S. citizens on the high seas and the importation of marine mammals and marine mammal products into the U.S. (NMFS 2005). There are several species also protected under the Endangered Species Act (ESA). Federally protected species that occur in the project vicinity include North Atlantic right whale and Florida manatee (both species detailed above). The humpback whale (*Megaptera novaeangliae*) passes through the Atlantic OCS offshore Florida on the way to winter feeding grounds. Its occurrence in the project vicinity is expected to be limited (Zarillo et al. 2009).

Various dolphins inhabit coastal and offshore waters of the Atlantic from approximately 10 m to 200 m depths. Only the bottlenose dolphin (*Tursiops truncates)* and the spotted dolphin (*Stenella frontalis*) are expected to regularly to occur in coastal waters less than 100 m deep. Both populations are estimated at more than 20,000 individuals and are likely to occur in the project area (Zarillo et al. 2009). Additional dolphin species observed offshore in deeper waters of the Atlantic (100 m depth or greater) and unlikely to occur in the project area include rough-toothed dolphin (*Steno bredanesis*), Risso's Dolphin (*Grampus griseus)*, pantropical spotted dolphin (*Stenella attenuate*), spinner dolphin (*Stenella longirostris*), clymene dolphin (*Stenella clymene*), striped dolphin (*Stenella coeruleoalba*), and Frasier's dolphin (*Lagenodelphis hosei*). The populations of deep-water dolphin species range from 200 to thousands of individuals. Although all of dolphins the listed above are protected by the MMPA, none are listed under the ESA. A number of non-listed cetaceans of the OCS identified in Zarillo et al (2009) rarely occur in waters less than 100 m deep unless stranded and are not considered further here.

5.7 Air Quality

The U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. Areas that meet the air quality standard for the criteria pollutants are designated as being in attainment. Areas that do not meet the air quality standard for one of the criteria pollutants are designated as being in nonattainment for that standard. According to 40 CFR Part 81.91, St. Johns County falls under the Jacksonville-Brunswick Interstate Air Quality Control Region. The U.S. Environmental Protection Agency (EPA) classifies St. Johns County as attainment with NAAQS for all criteria pollutants stipulated under NAAQS.

Urbanization, recreation, and tourism all contribute to the number of motorized vehicles and vessels along the coastal areas of St. Johns County. The frequent offshore and onshore winds typically associated with coastal environments readily disperse air pollutants in the project vicinity and result in generally good ambient air quality.

5.8 Water Quality

The state of Florida designates the waters offshore St. Johns County within the vicinity of the proposed borrow area as Class III - Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced

Population of Fish and Wildlife (popularly referred to as fishable/swimmable). The Florida Current dominates circulation along the east Florida continental shelf and is the local manifestation of the Gulf Stream, the intense western boundary current of the North Atlantic that transports heat north from the equator (Hammer et al. 2005).

5.9 Cultural and Historic Resources

Documented exploration and transportation activities along Florida's east coast date from the second half of the 16th century. Over the years, many ships off the St. John's County coast have been lost due to storms or grounding (and other causes).

In accordance with the National Historic Preservation Act of 1966, as amended, cultural resource assessments for this project included archival research and field investigations of the proposed borrow area and pipeline corridors to determine the presence or likely presence of sensitive historical resources in the project area.

Panamerican Consultants, Inc. (Panamerican) completed a cultural resources survey of offshore borrow area N-3 in September 2019 (Appendix A, Attachment B). Sonographics, Inc., under contract to Panamerican, completed a comprehensive remote sensing survey of site N-3 on August 10, 2019. The remote sensing survey comprised magnetometer, sidescan sonar, and subbottom profile data collection. The survey located four magnetic anomalies, two sidescan sonar contacts, and no subbottom acoustic contacts or subbottom impedance contrast features. Panamerican analyzed the data collected by Sonographics for the presence of cultural resources. After extensive review of the survey data, Panamerican determined that marine debris caused the two sidescan sonar contacts and the four magnetic anomalies were single point sources. Panamerican concluded that no potentially significant cultural resources existed within site N-3 and recommended no further archaeological work.

Panamerican completed submerged cultural resources survey of the pipeline corridors proposed for this project in late February 2020 (Appendix D). The remote sensing survey included magnetometer, sidescan sonar, and subbottom profiler investigations. The survey identified 14 magnetic anomalies, three sidescan targets, and no subbottom profile features. Panamerican determined that all 14 magnetic anomalies represent objects of modern origin and none warranted additional investigation. The three sidescan targets occurred outside of the proposed pipeline corridors and the sonar targets had no associated magnetic anomaly. Panamerican determined that the pipeline corridors contain no significant cultural resource, and that additional investigation is unwarranted.

The USACE is leading the coordination and consultations regarding cultural / historic investigations for this project with the State Historic Preservation Officer (SHPO) to determine whether the proposed project will impact any documented or potential historical resources. Consultation is ongoing and construction will not commence prior to the conclusion of the consultation. All SHPO recommendations will be implemented as applicable for the project.

5.9 Unexploded Ordnance

While previous investigations of the project areas sea bottom have not identified any, unexploded ordnance (UXO) may occur near the surface of the proposed borrow area. Munitions are present in U.S. waters as a result of live-fire testing and training (both ongoing and past); combat operations (acts of war through World War II); sea disposal (conducted through 1970); accidents (periodic); and disposal (e.g., jettisoning) during emergencies (Carlton et al 2017). Because Florida contains many active military bases along the Atlantic and has a long history of military base activity, a desktop assessment of the information present on UXO in the Outer Continental Shelf waters in the NE Florida Atlantic was appropriate to identify possible risks due to military munitions that might occur on the ocean bottom within the project footprint. A review of the information available on the Data.gov website (NOAA 2019) did not include any locations in the project area or nearby that have been identified to contain UXO. In the larger OCS region, the nearest identified UXO areas occurs 80 miles to the east and about 95 miles to the south at Cape Canaveral (NOAA 2019). Coastal Navigation information (US Department of Commerce et al. 2019) included no information regarding UXO in the project area or the nearby ocean. The nearest reference to UXO was associated with Cape Canaveral: “Trawlers or other vessels should exercise caution while dragging the ocean floor within a 40-mile radius of Cape Canaveral because missile debris containing unexploded ordnance exists in the area”. The project area lies about 95 miles north of the associated UXO area (NOAA 2019). Closer the project sites, a UXO investigation of Ft. Matanzas and immediate environs has been completed (Gregor et al 2017). The several cultural / historical resources field investigations conducted for or reviewed for this EA included no results that could be interpreted as UXO.

6.0 ENVIRONMENTAL EFFECTS

6.1 Benthic Resources

Benthic resources in the project area include only those associated with bare sand bottom. Desktop analysis of field surveys of the project borrow area and pipeline corridors identified no hardbottom habitat within or immediately adjacent to the project footprint. Dredging and beach / dune placement of sand would result in short-term adverse impacts to sessile organisms in the borrow area and in locations of the fill template below mean high water. Because the project activity footprint (dredge area, travel routes to the pipeline corridors, pipeline corridors, nearshore waters, and swash zone) occurs on bare sand, the organisms affected will be almost completely dominated by small invertebrate animals with rapid recolonization and population growth rates. Additionally, the borrow area and pipeline corridors have been surveyed and have been cleared of hard bottom resources.

6.1.1 Alternative 1: No-Action

There would be no impact to benthic resources if the proposed dredging and beach and dune placement did not occur.

6.1.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

OCS sand borrow areas are important as benthic habitats (Michel et al 2013). Dredging the surficial sand sheet in Borrow Site N3 will result in localized, lethal, and sub-lethal impacts to infauna and borrowing and motile epifauna within the dredging footprint due to likely entrainment, burial and sedimentation, and interruption of feeding. Potential effects include temporary and localized decreases in density, abundance, biomass, diversity, and productivity.

The benthic communities common to the northeast Florida shelf are exposed to frequent disturbances such as storms and algal blooms that alter the physical and biological conditions in the project area; they are expected to be resilient to a more localized physical disturbance. Sand ridges and linear shoals less than 20 m (63.3 ft) are known to move and restructure under both fair weather and storm currents (Hayes and Nairn 2004) and the benthic communities are adapted to these conditions. Since the benthic habitat and assemblage in the borrow area is similar to that in undisturbed surrounding areas, recruitment and recolonization should occur rapidly (one full season) in terms of total abundance and diversity and within 2-3 years in terms of stabilized functional groups (Wilber and Stern, 1992, Brooks et al 2006, Wilbur and Clark 2007).

Following dredging, initial colonization by opportunistic species will occur through larval settlement and adult migration. While abundance, species numbers, and diversity of benthic community are anticipated to recover relatively rapidly, species composition may take longer, especially if there are different textural characteristics of the seafloor following dredging. Multiple dredging events or dredging in immediately adjacent areas may prolong recovery relative to areas not previously dredged. However, given the relatively high densities and fecundity of benthic communities, coupled to the relatively small footprint of potential impact, minor, temporary impacts to benthic resources are expected.

Since spring, when the water temperatures increase, is generally a more productive period, the stress to benthic communities from offshore dredging can be minimized by dredging during less productive periods (Zarillo et al., 2009). USACE (2017a) and USACE (2017b) report potential effects of dredging and beach placement on benthic communities in some detail and identified detailed literature reviews. These impact statements concluded that a 2-3-year period would see benthic community recovery and noted that feeding opportunities were abundant in similar adjacent habitats. The same vast expanses of soft bottom sediments occur in the project area assessed here. While the project activity period focuses on winter and early spring (during cooler water temperatures), the need for calm seas during the construction period may result in construction activity extending into the spring period when warmer water and more benthic productivity occurs.

Construction activities will result in shallow, gently sloped depression of flat areas within the large bathymetric structure in the shoal system surrounding the proposed borrow area. The project dredging design avoids conditions suitable for development of anoxic zones, and rapid recolonization of the dredged areas should occur. The project dredging design includes preserving up to seven feet of beach-suitable sand at the bottom of the dredge template ensuring that the sediments exposed by dredging are similar to those previous surface sediments and so remain suitable for expected rapid benthic recolonization. These borrow design measures, further described in Appendix A, will be followed in order to mitigate risk to benthic resources. Other measures include, a 2' buffer to ensure compatible post dredge sediment, utilizing a smaller subset of larger N-3 site, and avoiding deep holes (Appendix A).

The infaunal communities of the sandy beaches and subtidal areas are include small, short-lived organisms with great reproductive potential. While burial due to filling and beach equilibration processes may temporarily impact these surficial communities, they typically recover relatively quickly from environmental disturbances such as beach restoration projects. A literature review by Newell et al. (1998) concluded that sand and gravel sediments may require 2-3 years to reestablish. In another literature review, Brooks et al. (2006) concluded that available literature on offshore benthic assemblages (OBA) residing along the U.S. east and Gulf of Mexico continental shelf suggested that "general recovery'' from anthropogenic disturbance. The FEIS for St. Lucie County South Beach and Dune Restoration Project concluded that recovery of benthic assemblages on the continental shelf occurs between three months and 2.5 years. USACE (2015 - Final Supplemental Environmental Assessment for maintenance dredging of St. Augustine Inlet and adjacent Intracoastal Waterway, including beach and nearshore placement) concluded that project effects on benthic resources would be temporary, and that those resources would quickly recover.

6.2 Fish and Wildlife Resources

6.2.1 Alternative 1: No-Action

There would be no direct impact to fish and wildlife resources if the proposed borrow area dredging did not occur. Not extracting sand from borrow area would preclude the SPVB restoration project. Potential adverse indirect effects may include additional fish and wildlife habitat loss due to continued erosion.

6.2.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

Dredging the borrow area would result in impacts to benthos (see Section 6.1 for details) and sessile organisms that may occur in the project activity areas. Temporary construction activities will reduce foraging resources for fish and wildlife during the construction period. Habitat quality will return to the project areas as the dredging footprint and beach fill areas equilibrate. The resulting benthic substrate in the dredge area would be re-colonized from abundant and adjacent similar habitat with benthic organisms common to the project area. Fish and wildlife would be temporarily displaced during dredging operations but return with the cessation of construction and re-equilibration. Negative impacts to fish and wildlife are expected to be minimal due to the limited extent of the dredging operations relative to the abundance of similar adjacent habitat and the mobility of these resources. This same conclusion has been reached in other NEPA documents for similar, nearby projects along the coast of east Florida (e.g. USACE, 2015; USACE, 2017a; USACE, 2017b).

6.3 Essential Fish Habitat

6.3.1 Alternative 1: No-Action

The presence of EFH in the study area is not likely to be altered from the existing conditions if the proposed dredging did not occur.

6.3.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

The proposed dredging of borrow area could impact approximately 700 acres of OCS bottom, including a long-term dredging area depth change and temporary impacts to benthic resources used by managed species. A large number of finfish and shellfish species managed by the SAFMC occur in the general project area (SAFMC, 1998). Most adult fish and mobile demersal fish species are able to avoid areas of active sediment removal but sediment entrainment and increased suspended sediments, smothering of fish eggs as sediments are redeposited, and removal of benthos food resources may impact finfishes. Michel et al (2013) concluded that "the most likely impacts would result from changes to the food supply from benthic resources, loss of spawning habitat, and loss of eggs and larvae of demersal species"). However, these effects occur in a very small area compared to the extent of similar habitat surrounding the borrow area. The USACE has determined that similar proposed actions in the St. Augustine Inlet area would not have a substantial adverse impact on EFH or federally managed fisheries along the eastern coast of Florida (USACE, 2011).

Placement of dredged material on the beach could directly and indirectly impact approximately 26,400 linear feet of ocean high salinity surf zone. Long-term adverse impacts (i.e. suppression of re-colonization of the infaunal community) are not anticipated if nourishment events are spaced more than five years apart. In addition, material placed will be beach-quality sediment similar in composition to the existing beach sediments. Beach placement is anticipated to take three to four months and migrating larvae and/or juvenile fish could be subject to project-related elevated turbidity and suspended sediment levels during that time period. Fish species in nearshore habitats likely have greater tolerance than offshore species to elevated suspended solids, (Michel et al. 2013). Beach construction techniques settle most of the sand, reducing the turbidity of the decanted water, and turbidity compliance monitoring will be used to maintain water quality within regulatory standards. While the use of seasonal window could minimize effects on important spawning grounds, there is no evidence that either the project nearshore or borrow area have such importance and there are limited and unresolved findings on the effectiveness of such measures (Michel et al 2013). The project construction is constrained to periods where calm seas predominate, which also tends to occur in winter and early spring, which may include spawning periods for some finfish. Therefore, some impact to non-motile life-stages of some species is unavoidable. However, the effects are of limited duration in time and space; once construction ceases, the impacts will also cease.

For all motile individuals, construction-related impacts would be temporary. These individuals can move away from the temporary disturbances. No long-lasting impacts to the water quality in or adjacent to the project area are expected. Turbidity plumes generated by dredging operations and beach placement are temporary and the sediment used for fill is expected to have low levels of fines, which constitute the large majority of turbidity plumes. When settled (which will occur relatively quickly in and outside the project footprint), the fines should be insufficient in volume to impact sessile benthic infauna.

One of the impacts to EFH in the project area would be the trophic effects caused by the temporary elimination of infaunal prey organisms and some epifaunal prey organisms for bottom-feeding, EFH-designated species. Infauna and smaller, less motile epifauna would be entrained as a result of dredging. Most of these organisms would be invertebrates. Rapid reproduction and recolonization from immediately adjacent undisturbed habitat are characteristic features of many invertebrate epi- and infauna that will contribute to the temporary nature of these impacts (See Section 6.1.2). Re-colonization of infaunal species will be stimulated by adult populations that inhabit similar environments adjacent to the project area. Construction duration is relatively short, and recolonization can begin as soon as the project is completed. Additionally, the project area represents a very small percentage of the extensive foraging grounds along the eastern coast of St. Johns County, thus the overall indirect impacts to EFH species and EFH will be minimal.

The temporary loss of benthic prey resources caused by dredging and beach placement activities would not have serious adverse effects on EFH for any species that feeds primarily on more motile epifaunal organisms (e.g., crabs, mysids, shrimp) or fish, since these motile organisms could move to avoid fill activities and could re-occupy the filled area very soon after dredging and beach placement activities are completed.

Table 6. Potential Impacts for EFH-Designated Species That May Occur in the Project Area

Species/Management Unit	Potential Impact
Penaeid Shrimp (Brown Shrimp, Pink Shrimp, White Shrimp)	Adult brown shrimp may be impacted as they often burrow offshore during winter. Eggs of all shrimp species may be impacted as they are demersal after spawning offshore. Other life stages are motile. There is extensive EFH adjacent to project area. Minimal impact to brown shrimp or EFH. No to minimal impact to pink/white shrimp or EFH.
Coastal Migratory Pelagics	Pelagic oceanic species mostly near inlets, mobile life stages. No impact on coastal migratory pelagics or EFH.
Snapper-Grouper Complex	Fish feed primarily on more mobile benthic epifaunal species and small fish available in adjacent areas of habitat. No or minimal impact to snapper-grouper or EFH.
Spiny Lobster	Possible but not likely presence. No impact to spiny lobster or EFH.
Atlantic Sharpnose Shark	Pelagic feeder able to avoid construction. No impact to Atlantic sharpnose shark or EFH.
Basking Shark	Pelagic feeder able to avoid construction. No impact to basking shark or EFH.
Blacknose Shark	Pelagic feeder able to avoid construction. No impact to blacknose shark or EFH.
Blacktip Shark	Pelagic feeder able to avoid construction. No impact to blacktip shark or EFH.
Bonnethead Shark	Mobile species that can avoid construction. A demersal feeder but with extensive EFH adjacent to the project area, no to minimal impact on bonnethead shark or EFH.
Bull Shark	Juveniles and adults are mobile; extensive EFH adjacent to project area. No impact bull shark or EFH.
Finetooth Shark	Pelagic feeder able to avoid construction. No impact to finetooth shark or EFH.
Lemon Shark	Motile species; extensive EFH adjacent to project area. No impact to lemon shark or EFH.
Sailfish	Juveniles and adults are mobile; extensive EFH adjacent to project area. No impact sailfish or EFH.
Sand Tiger Shark	Motile species; extensive EFH adjacent to project area. No impact to sand tiger shark or EFH.
Sandbar Shark	Adults are mobile; extensive EFH adjacent to project area. No impact to sandbar shark or EFH.
Scalloped Hammerhead Shark	Pelagic feeder able to avoid construction. No impact to scalloped hammerhead shark or EFH.
Spinner Shark	Pelagic feeder able to avoid construction. No impact to spinner shark or EFH.
Tiger Shark	Motile species mostly near inlets. No to minimal impact on tiger shark or EFH.

Species/Management Unit	Potential Impact
White Shark	Possible but not likely presence; pelagic feeder. No impact to white shark or EFH.

6.4 Threatened and Endangered Species

6.4.1 Alternative 1: No-Action

Not extracting sand from the proposed borrow area would preclude SPVB restoration project. Potential adverse indirect effects include additional sea turtle nesting habitat loss due to continued erosion.

6.4.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

6.4.2.1 Sea Turtles

The Corps has previously determined that the use of a hopper dredge may adversely affect sea turtles. Potential effects include lethal entrainment of adult, sub-adult, and juvenile sea turtles. The NMFS has concurred with this determination and believes that take resulting from hopper dredging operations will not jeopardize the continued existence of any sea turtle species. In compliance with the SARBO 2020, implementing the following Project Design Criteria (PDC) will minimize the risk of taking sea turtles during proposed hopper dredging activities:

- PDC EDUCATE.1: All personnel associated with the proposed project will be instructed about the potential presence of species protected under the ESA and MMPA and the appropriate protocols if they are encountered.
- PDC EDUCATE.2: All on-site project personnel will be responsible for observing water-related activities for the presence of ESA-listed species.
- PDC EDUCATE.3: All on-site project personnel will be informed of all ESA-listed species that may be present in the area and advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species or marine mammals.
- PDC EDUCATE.4: All on-site project personnel will be briefed that the disposal of waste materials into the marine environment is prohibited. All crew will attempt to remove and properly dispose of all marine debris discovered during dredging operations, to the maximum extent possible.
- PDC INWATER.1 – Species Movement: All work, including equipment, staging areas, and placement of materials, will be done in a manner that does not block access of ESA-listed species from moving around or past construction. Sand placed on the beach will be placed in a manner that does not create mounds or berms that could prevent nesting sea turtles or hatchings from entering or exiting the beach from nearshore waters. All pipeline equipment would be oriented perpendicular to the shoreline to minimize impacts to hatchling egress from the water's edge to open water and nesting female transit back and forth between the open water and the nesting beach during nesting season.
- PDC INWATER.2 – Equipment placement: Equipment will be staged, placed, and moved in areas and ways that minimize effects to species and resources in the area, to the maximum extent possible. All vessels associated with the project shall operate at 'no wake' speeds at all times while in shallow waters or channels where the draft of the boat provides less than three feet clearance from the bottom. Boats used to transport personnel shall be shallow draft vessels, preferably of

the light-displacement category, where navigational safety permits. All vessels will preferentially follow deep-water routes (e.g., marked channels) to avoid potential groundings or damaging bottom resources whenever possible and practicable. Shore crews shall use upland road access if available. Equipment will be positioned away from areas with sensitive bottom resources such as non-ESA-listed seagrasses, corals, and hardbottom, to the maximum extent possible. Pipelines will be placed in areas away from bottom resources and of sufficient size or weight to prevent movement or anchored to prevent movement. Additionally, there is no hardbottom within the project footprint (or other sensitive submerged resources such as coral or seagrasses), therefore no impacts to these resources is anticipated.

- PDC INWATER.3 – Turbidity control: During construction, the contractor will maintain a shore-parallel berm near the beach pipeline outfall to direct the effluent slurry laterally along the beach to allow ample time for the suspended sediment to settle. The contractor will adjust the berm length to optimize turbidity reduction and production rates. During construction of the beach, nearshore turbidity monitoring will provide evidence of compliance with permit requirements. Sampling will occur using techniques and intervals described in the permit for background stations and compliance stations. If the turbidity levels exceed authorized limits, dredging operations will immediately halt until turbidity decreases to acceptable levels as stated in the permit.
- PDC INWATER.8 – Lighting near sea turtle nesting beaches: For dredges and any support vessels operating at night in front of nesting beaches, lighting will be limited to the minimal lighting necessary to comply with U.S. Coast Guard and Occupational Safety and Health Administration requirements. Lighting associated with beach nourishment construction activities will be minimized through reduction, shielding, lowering, and/or use of turtle friendly lights, to the extent practicable without compromising safety.
- PDC HOPPER.1: During all hopper dredging operations, NMFS-approved PSOs will monitor for the presence of ESA-listed species. The dredge operator will maintain a safe working environment for the PSO to access and effectively monitor inflow screening, overflow screening, and dragheads for incidental take of ESA-listed species and associated bycatch after every load.
    - Draghead Observation: Upon completion of each load cycle, dragheads will be monitored as the draghead is lifted from the sea floor and placed on the saddle in order to assure that ESA-listed species that may be impinged within the draghead are observed and accounted for.
    - Inflow screening Observation: Inflow screening will be designed to capture and retain material for the PSO to monitor for the presence of ESA-listed species. The PSO will inspect the contents of all inflow screening boxes after every load, including opening the box and looking inside at all contents for evidence of ESA-listed species entrainment. The dredge operator will not open the hydraulic doors on the inflow boxes prior to inspection by the PSO for evidence of ESA-listed take. If the inflow box cannot be observed due to clogging, the box contents will not be dumped or flushed unless overflow screening that captures contents for observation by the PSO is operational and monitored for evidence of take. Once overflow screening is operational, PSOs will also visually monitor box contents as they are dumped or flushed into the hopper.
    - Overflow Screening Observations: The hopper dredge will have operational overflow screening and monitor for take after each load. Overflow screening will be designed to capture and retain material larger than the screen size for the PSO to monitor for the presence of ESA-listed species. The screened area will be accessible to the PSO to inspect for evidence of ESA-listed species take.

- PDC HOPPER.2: To prevent impingement or entrainment of ESA-listed species within the water column, dredging pumps will be disengaged by the operator when the dragheads are not actively dredging and therefore working to keep the draghead firmly on the bottom. Pumps will be disengaged when lowering dragheads to the bottom to start dredging, turning, or lifting dragheads off the bottom at the completion of dredging.
- PDC HOPPER.3: Pumping water through the dragheads will not occur while maneuvering or during travel to/from the disposal or pumpout area.
- PDC HOPPER.4: All waterport or other openings on the hopper dredge will be screened to prevent ESA-listed species from entering the dredge.
- PDC HOPPER.5: A state-of-the-art solid-faced deflector that is attached to the draghead will always be used during dredging.
- PDC OBSERVE.1 – Borrow Area & Beach Placement Area: All personnel working on the project will report ESA-listed species observed in the area to the on-site crew member in charge of operations. Operations of moving equipment will cease if an ESA-listed species is observed within 150 ft of operations by any personnel working on a project covered by SARBO 2020. Activities will not resume until the ESA-listed species has departed the project area.
- PDC OBSERVE.2 - Transit: All personnel working onboard will report ESA-listed species observed in the area to the vessel captain. If an ESA-listed species is spotted within the vessel's path, initiate evasive maneuvers to avoid collision.
- PDC OBSERVE.4: Any collision(s) with an ESA-listed species will be immediately reported to the USACE and/or BOEM according to their internal protocol and to NMFS. Sea turtle collisions will also be reported to the appropriate state species representative.
- All handling, tagging, and/or genetic sampling of ESA-listed species captured on projects covered under 2020 SARBO will be conducted by a PSO that meets the qualifications provided by NMFS, per PDC PSO.1 and PDC PSO.2.
- The number of PSOs and responsibilities of PSOs for the proposed project will comply with the requirements outlined in PDC PSO.3. Reporting captures of ESA-listed species will comply with PDC PSO.4. Photo documentation of captured ESA-listed species will comply with PDC PSO.5. Written documentation of captured ESA-listed species will comply with PDC PSO.6. Tagging will occur as applicable for any species captured and ultimately released alive from a hopper dredge after being evaluated by a specialist and/or rehabilitated in compliance with PDC PSO.7. Genetic sampling of those species captured and ultimately released alive will occur in compliance with PDC PSO.8 through PDC PSO.10.
- All dead ESA-listed species collected within the construction area or by equipment used for the proposed project will be handled and recorded in compliance with PDC PSO.16 and PDC PSO.18.
- The project will also adhere to the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006).

The presence of the hopper dredge in the nearshore waters could temporarily impact the physical or biological features (PBF) and primary constituent elements (PCE) of loggerhead nearshore critical habitat unit LOGG-N-14 during construction. Hatchling egress from the water's edge to open water and nesting female transit back and forth between the open water and the nesting beach during nesting season could be hindered by the presence of the hopper dredge and pipeline. Material placement will be staged in a manner that would not block access of nesting sea turtles to the beach or of hatchlings returning to the water, except for the temporary placement of sand berms during beach nourishment projects designed to minimize turbidity during placement of sand. All pipeline equipment would be oriented perpendicular to the shoreline to further minimize equipment-related impacts (PDC IN-WATER.1). Vessels will preferentially follow deep-water routes (e.g., marked channels) to avoid potential groundings or damaging bottom resources whenever possible and practicable. Pipelines will be placed in areas away from bottom resources and of sufficient size or weight to prevent movement or anchored to prevent movement. Additionally, there is no hardbottom within the project footprint (or other sensitive submerged resources such as coral or seagrasses), therefore no impacts to these resources is anticipated. (PDC INWATER.2) Lighting on construction and dredge equipment will be turtle friendly so as not to disorient hatchlings returning to the ocean (PDC INWATER.8) An analysis of dredging effects to in-water critical habitat designations for loggerhead sea turtles was included as part of the SARBO 2020 consultation which concluded dredging projects to be covered by SARBO 2020 have no adverse effects to critical habitat. SARBO 2020 and the 2015 Statewide Programmatic Biological Opinion (SPBO 2015) include conditions that minimize incidental take of sea turtles. The dredging project supports placement of sand on the beach, which may increase sea turtle nesting habitat as the borrow area sand is highly compatible (i.e., grain size, shape, color, etc.) with naturally occurring beach sediments in the area.

6.4.2.2 North Atlantic Right Whale, West Indian Manatee, Smalltooth Sawfish, and Giant Manta Ray

Standard protective measures would be taken during dredging activities to ensure the safety of manatees, whales, sawfish, and giant manta rays. To make the contractor and his personnel aware of the potential presence of these species in the project area, their endangered status, and the need for precautionary measures, the contract specifications would include the following PDCs:

- PDC EDUCATE.1: All personnel associated with the proposed project will be instructed about the potential presence of species protected under the ESA and MMPA and the appropriate protocols if they are encountered.
- PDC EDUCATE.2: All on-site project personnel will be responsible for observing water-related activities for the presence of ESA-listed species.
- PDC EDUCATE.3: All on-site project personnel will be informed of all ESA-listed species that may be present in the area and advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species or marine mammals.
- PDC EDUCATE.4: All on-site project personnel will be briefed that the disposal of waste materials into the marine environment is prohibited. All crew will attempt to remove and properly dispose of all marine debris discovered during dredging operations, to the maximum extent possible.
- PDC INWATER.1 – Species Movement: All work, including equipment, staging areas, and placement of materials, will be done in a manner that does not block access of ESA-listed species from moving around or past construction.
- PDC INWATER.2 – Equipment placement: Equipment will be staged, placed, and moved in areas and ways that minimize effects to species and resources in the area, to the maximum extent possible. All vessels associated with the project shall operate at 'no wake' speeds at all times while in shallow waters or channels where the draft of the boat provides less than three feet clearance from the bottom. Boats used to transport personnel shall be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. All vessels will preferentially follow deep-water routes (e.g., marked channels) to avoid potential groundings or damaging bottom resources whenever possible and practicable. Shore crews shall use upland road access if available. Equipment will be positioned away from areas with sensitive bottom resources such as non-ESA-listed seagrasses, corals, and hardbottom, to the maximum extent possible. Pipelines will be placed in areas away from bottom resources and of sufficient size or weight to prevent movement or anchored to prevent movement. Additionally, there is no hardbottom within the

project footprint (or other sensitive submerged resources such as coral or seagrasses), therefore no impacts to these resources is anticipated.

- PDC INWATER.3 – Turbidity control: During construction, the contractor will maintain a shore-parallel berm near the beach pipeline outfall to direct the effluent slurry laterally along the beach to allow ample time for the suspended sediment to settle. The contractor will adjust the berm length to optimize turbidity reduction and production rates. During construction of the beach, nearshore turbidity monitoring will provide evidence of compliance with permit requirements. Sampling will occur using techniques and intervals described in the permit for background stations and compliance stations. If the turbidity levels exceed authorized limits, dredging operations will immediately halt until turbidity decreases to acceptable levels as stated in the permit.
- PDC HOPPER.1: During all hopper dredging operations, NMFS-approved PSOs will monitor for the presence of ESA-listed species. The dredge operator will maintain a safe working environment for the PSO to access and effectively monitor inflow screening, overflow screening, and dragheads for incidental take of ESA-listed species and associated bycatch after every load.
    - Draghead Observation: Upon completion of each load cycle, dragheads will be monitored as the draghead is lifted from the sea floor and placed on the saddle in order to assure that ESA-listed species that may be impinged within the draghead are observed and accounted for.
    - Inflow screening Observation: Inflow screening will be designed to capture and retain material for the PSO to monitor for the presence of ESA-listed species. The PSO will inspect the contents of all inflow screening boxes after every load, including opening the box and looking inside at all contents for evidence of ESA-listed species entrainment. The dredge operator will not open the hydraulic doors on the inflow boxes prior to inspection by the PSO for evidence of ESA-listed take. If the inflow box cannot be observed due to clogging, the box contents will not be dumped or flushed unless overflow screening that captures contents for observation by the PSO is operational and monitored for evidence of take. Once overflow screening is operational, PSOs will also visually monitor box contents as they are dumped or flushed into the hopper.
    - Overflow Screening Observations: The hopper dredge will have operational overflow screening and monitor for take after each load. Overflow screening will be designed to capture and retain material larger than the screen size for the PSO to monitor for the presence of ESA-listed species. The screened area will be accessible to the PSO to inspect for evidence of ESA-listed species take.
- PDC HOPPER.2: To prevent impingement or entrainment of ESA-listed species within the water column, dredging pumps will be disengaged by the operator when the dragheads are not actively dredging and therefore working to keep the draghead firmly on the bottom. Pumps will be disengaged when lowering dragheads to the bottom to start dredging, turning, or lifting dragheads off the bottom at the completion of dredging.
- PDC HOPPER.3: Pumping water through the dragheads will not occur while maneuvering or during travel to/from the disposal or pumpout area.
- PDC HOPPER.4: All waterports or other openings on the hopper dredge will be screened to prevent ESA-listed species from entering the dredge.
- PDC HOPPER.5: A state-of-the-art solid-faced deflector that is attached to the draghead will always be used during dredging.
- PDC NARW.1 – Dredge Project Scheduling: The proposed project would likely occur during late winter or spring. Nor’easters in fall/early winter may quickly erode the fill before it has a chance to equilibrate and fully settle. While dredging and beach material placement occur during the

North Atlantic right whale migration and calving season, the proposed period offers the greatest opportunity for successful construction and minimizes potential impacts to nesting sea turtles, as suggested in SARBO 2020.

- PDC NARW.2 – Captains and crew of USACE and USACE vessels, contracted vessels, and PSO requirements: All transiting vessels wills comply with right whale requirements. Any vessel used on this project finding itself within the 500-yard (1500 ft) buffer zone created by a surfacing right whale must depart immediately at a safe, slow speed. Federal regulations prohibit approaching a right whale within a 500-yard (1500 ft) buffer zone. The operators of the barges will be provided this information in writing and orally prior to leaving the dock for each deployment. Any sighting of any whale or striking of a whale will be reported immediately to 877-942-4357 (877-WHALE-HELP).
- PDC NARW.3 – Vessel Speed Requirements: Speed requirements must be followed if a North Atlantic right whale has been spotted or reported in the area. North Atlantic right whale presence may be determined by observers on the vessel, reports from aerial surveys, EWS, or confirmed public sighting reports. When a whale is observed or reported within 38 nmi of dredge or support vessels, vessels will slow to 10 knots or slowest safe navigable speed for 36 hours or until next North Atlantic right whale survey when no whales are observed, whichever is shorter.
- PDC OBSERVE.1 – Borrow Area & Beach Placement Area: All personnel working on the project will report ESA-listed species observed in the area to the on-site crew member in charge of operations. Operations of moving equipment will cease if an ESA-listed species is observed within 150 ft of operations by any personnel working on a project covered by SARBO 2020. Activities will not resume until the ESA-listed species has departed the project area.
- PDC OBSERVE.2 - Transit: All personnel working onboard will report ESA-listed species observed in the area to the vessel captain. If an ESA-listed species is spotted within the vessel's path, initiate evasive maneuvers to avoid collision. If a North Atlantic right whale is spotted, slow to 10 knots and maintain a distance of at least 1,500 ft. If a whale (other than a North Atlantic right whale) is spotted, maintain a distance of at least 300 ft.
- PDC OBSERVE.3: Sightings will be reported for the North Atlantic Right whale and Smalltooth sawfish.
- PDC OBSERVE.4: Any collisions with a manatee, whale, sturgeon, smalltooth sawfish, or giant manta ray or sighting of any injured or incapacitated animal shall be reported immediately to the Corps. The Contractor shall also immediately report any collision with and/or injury to: a manatee to the Florida Fish and Wildlife Conservation Commission "Manatee Hotline" 1-888-404-FWCC (3922) as well as the U.S. Fish and Wildlife Service, Jacksonville Field Office; a whale to the NMFS Whale Stranding Network pager number at 305-862-2850; and a giant manta ray, smalltooth sawfish, or sturgeon to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.
- PDC OBSERVE.5: Any collision with a marine mammal will be reported immediately to the Southeast Regional Marine Mammal Stranding hotline at 1-877-WHALE-HELP (1-877-942-5343) for guidance. This includes both ESA and non-ESA listed marine mammals.
- All handling, tagging, and/or genetic sampling of ESA-listed species captured on projects covered under 2020 SARBO will be conducted by a PSO that meets the qualifications provided by NMFS, per PDC PSO.1 and PDC PSO.2.
- The number of PSOs and responsibilities of PSOs for the proposed project will comply with the requirements outlined in PDC PSO.3. Reporting captures of ESA-listed species will comply with PDC PSO.4. Photo documentation of captured ESA-listed species will comply with PDC PSO.5. Written documentation of captured ESA-listed species will comply with PDC PSO.6. Tagging will

occur as applicable for any species captured and ultimately released alive from a hopper dredge after being evaluated by a specialist and/or rehabilitated in compliance with PDC PSO.7. Genetic sampling of those species captured and ultimately released alive will occur in compliance with PDC PSO.8 through PDC PSO.10.

- All dead ESA-listed species collected within the construction area or by equipment used for the proposed project will be handled and recorded in compliance with PDC PSO.16 and PDC PSO.18.

There will be no effect to North Atlantic right whale critical habitat from the proposed project. The features of North Atlantic right whale critical habitat were designated to provide calving areas, which include specific sea surface conditions, sea surface temperatures, and water depth needed to be available for calving, nursing, and rearing North Atlantic right whale calves. Dredging and transportation of dredged materials will have no effect on the sea state or temperature and will not change the availability of waters 20-92 ft deep, as defined to be the depth needed in the critical habitat rule. Critical Habitat for the Smalltooth Sawfish and West Indian Manatee do not occur in the vicinity of the project area, though the project will adhere to both the Standard Manatee Conditions for In-Water Work (USFWS 2011) and the Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS 2006) to minimize any potential effects to these species. No critical habitat has been defined for the Giant Manta Ray.

6.5 Marine Mammals

6.5.1 Alternative 1: No-Action

There would be no impact to marine mammals is the proposed dredging did not occur.

6.5.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

Project dredging activities and hopper dredge movements may result in injury to or collision with marine mammals. Noise from the dredging itself and vessel operation in general may disrupt marine mammals' ability to detect, recognize, or discriminate between acoustic signals if interested (e.g. prey detection, predator avoidance, intraspecific communications, and social interactions) (Federal Register 84 FR 51118). However, marine mammals are not likely to be adversely affected by the project and incorporation of safeguards to protect threatened and endangered species during project construction would also protect marine mammals in the area. The project and project vessels will adhere to the 10 knot speed restrictions and other project PDCs for species identified in SARBO 2020. Given the short construction period and slow vessel speeds, ship strike is unlikely to occur as marine mammals should easily avoid the hopper dredge. The observer for the North Atlantic Right Whale will also observe for other marine mammals for ship avoidance movements, inform the vessel operator of the sightings, and record all sightings.

6.6 Air Quality

6.6.1 Alternative 1: No-Action

The No-Action alternative would have no effect on air quality.

6.6.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

The preferred alternative would result in localized, short term impacts to air quality in the project area due to emissions from dredges and other fossil fuel burning construction equipment. Frequent on- and offshore winds typical of the coastal environment would readily disperse pollutants, lessening potential impacts. The proposed project would not result in long-term accumulation of particulates in the project area and would not require air quality permits.

6.7 Water Quality

6.7.1 Alternative 1: No-Action

The No-Action alternative would have no effect on water quality.

6.7.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

Past studies indicate that the extent of the sediment plume from offshore dredging activities is generally limited to between 1,640 – 4,000 ft from the dredge and that elevated turbidity levels are generally short-lived, on the order of an hour or less (USACE 1983; Hitchcock et al. 1999; MMS 1999; Anchor Environmental 2003; Wilber et al. 2006). The size and shape of the plume depend on factors including the hydrodynamics of the water column and sediment grain size. The predominant sand material within the borrow area should settle rapidly causing less turbidity and oxygen demand compared to fine-grained sediments. Borrow area dredging should not adversely affect water parameters such as dissolved oxygen, pH, or temperature due to low sediment organic content and biological oxygen demand. Dredging activities would occur within the open ocean where the hydrodynamics of the water column are subject to mixing and exchange with oxygen rich surface waters. Elevated turbidity within the water column would be short and should not extend more than several thousand feet from the dredging operation. Dredging operations should only result in minor impacts on water quality at the offshore borrow area.

According to Chapter 62-4.244, Florida Administrative Code, the boundary of a dredge and fill mixing zone shall not exceed 150 meters in radius, defined as the distance from the cutterhead, return flow, discharge, or other points of generation of turbidity or other pollutants. Discharge operations within the beach restoration area will require a water quality variance to meet the FDEP's Class III water quality standards for turbidity. A discharge plume analysis will support the variance request for an increased distance within which water quality may exceed the standard. The State standards maintain that turbidity outside the mixing zone shall not exceed 29 NTUs above background. Implementing various protective measures and a monitoring program would ensure that the project complies with state water quality standards. If turbidity levels outside of the permitted mixing zone exceed state standards, the contractor will cease construction activities until turbidity falls within an acceptable range.

6.8 Cultural and Historic Resources

6.8.1 Alternative 1: No-Action

The No-Action alternative would have no effect on cultural and historic resources.

6.8.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

Panamerican Consultants, Inc. (Panamerican) completed a cultural resources survey of the proposed borrow area within offshore Site N-3 in September 2019 (Appendix A, Attachment B). Sonographics, Inc., under contract to Panamerican, completed a comprehensive remote sensing survey of the proposed borrow area on August 10, 2019. The remote sensing survey comprised magnetometer, sidescan sonar, and subbottom profile data collection. The survey located four magnetic anomalies, two sidescan sonar contacts, and no subbottom acoustic contacts or subbottom impedance contrast features. A Panamerican registered archaeologist analyzed the data collected by Sonographics for the presence of cultural resources. After extensive review of the survey data, Panamerican determined that marine debris caused the two sidescan sonar contacts and the four magnetic anomalies were single point sources. Panamerican concluded that no potentially significant cultural resources existed within rgw borrow area and recommended no further archaeological work.

Panamerican completed submerged cultural resources survey of the proposed pipeline corridors in late February 2020 (Appendix D). The remote sensing survey included magnetometer, sidescan sonar, and subbottom profiler investigations. The survey identified 14 magnetic anomalies, three sidescan targets, and no subbottom profile features. Panamerican determined that all 14 magnetic anomalies represent objects of modern origin and none warranted additional investigation. The three sidescan targets occurred outside of the proposed pipeline corridors and the sonar targets had no associated magnetic anomaly. Panamerican determined that the pipeline corridors contain no significant cultural resource, and that additional investigation is unwarranted.

At the request of the Applicant, The State Division of Historic Resources performed a search of the entire project site (including a polygon encompassing the borrow area, ocean between the borrow area and project beach, the pipeline corridors, and the project beach for historic / cultural resources. That search (Appendix E) identified only four structures, outside and west of the project footprint. The 2019 FEMA EA (Appendix B) reported an assessment of cultural and historic resources and formal consultation with SHPO, stating that restoration of the coastal beach and dune system (same landward boundary as the project assessed in this EA) received concurrence from SHPO with a determination of no adverse effects to historic properties.

USACE is serving as the lead agency, with BOEM in a cooperating role, with respect to Section 106 consultation for the borrow area and pipeline corridors. At this time, consultation is ongoing with SHPO. This consultation will be completed prior to construction commencement and all relevant SHPO recommendations will be implemented, if necessary.

6.9 Unexploded Ordnance (UXO)

6.9.1 Alternative 1: No-Action

The No-Action Alternative would not result in any discovery of UXO or require any action in that regard.

6.9.2 Alternative 2: Dredging Sand from Borrow Area N-3 for Beach/Dune Restoration (Proposed Action)

Due to the general location of the project borrow area and the past history of UXO disposal on the Atlantic Outer Continental Shelf, dredging sand from Borrow Area N-3 has the potential to uncover previously deposited UXO. If the dredger suspects that the draghead has contacted a UXO, actions will include contacting, local police and state and federal compliance agency staff with the information, avoiding the area where the potential UXO was identified by 1,000 feet, and as necessary adding protective devices such as draghead screens or other structures to avoid and minimize entrainment of UXO during dredging.

6.9 Cumulative Effects

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Table 7 summarizes the impact of such cumulative actions by identifying the past, present, and reasonably foreseeable future condition of the various resources which are directly or indirectly impacted by the proposed action and its alternatives. The table also illustrates the with-project and without-project condition (the difference being the incremental impact of the project). Also illustrated is the future condition with any reasonable alternatives (or range of alternatives).

Table 7. Summary of Cumulative Effects

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Sea turtles	No previous dredging projects. Historic mortality from commercial shellfish harvesting bycatch and recreational boating	No current/ ongoing project. Boating and fishing remain the primary risks to swimming sea turtles	No change in existing conditions for or impacts to swimming sea turtles	Hopper dredging may adversely affect swimming sea turtles. Project will adhere to all SARBO 2020 PDCs. Beach placement will likely occur during late winter/early spring to avoid/minimize impacts to nesting sea turtles. If expected to occur during beach nesting period, daily pre-construction beach nesting surveys and nest relocations as necessary will occur.
Manatees	No previous dredging or beach fill project. No records of ocean-related manatee mortality. Potential mortality from recreational and commercial vessels	No difference from past conditions; boating (recreational/commercial) represents primary risks to manatees	No change from existing conditions	Minimal effect with use of Standard Manatee Conditions for In-Water Work (USFWS 2011).
Smalltooth sawfish	Mortality from commercial fishing by-catch	Mortality from commercial fishing by-catch	Mortality from commercial fishing by-catch	Minimal effect of hopper dredging with use of Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006). Fish will avoid active construction area.

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Giant Manta Ray	Mortality from commercial fishing by-catch	Mortality from commercial fishing by-catch	Mortality from commercial fishing by-catch	Minimal effect of hopper dredging with use of standard protection in-water construction measures. Giant manta rays will avoid active construction area.
North Atlantic Right Whale	Danger of collision with recreational and commercial vessels	Danger of collision with recreational and commercial vessels	Danger of collision with recreational and commercial vessels	Right whales will avoid dredging area and related sediment plume. Observers during the day to avoid impacts. Strict adherence to the vessel speed restrictions associated with the North Atlantic Right Whale Conservation Plan (as described in SARBO 2020) will minimize likelihood of vessel strikes. Project will adhere to all SARBO 2020 PDCs.
Marine Mammals	No significant impacts	No significant impacts	No significant impacts	Marine mammals will avoid dredging area and related sediment plume. Observers during the day to avoid impacts. Strict adherence to the vessel speed restrictions associated with the North Atlantic Right Whale Conservation Plan (as described in SARBO 2020) will minimize likelihood of vessel strikes.

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Water quality	Water quality typical of regional OCS conditions near the coastline	Water quality typical of regional OCS conditions near the coastline	No change from existing conditions	Temporary increase in turbidity near active dredging site within borrow area. Turbidity monitoring and compliance with permit authorized turbidity levels will maintain appropriate water quality conditions in the nearshore adjacent to beach / dune fill activities.
Essential Fish Habitat	Past effects of EFH effects associated with commercial fishing (particularly shrimping) disturbance of benthic habitat. Shrimp net "doors" dragged along the bottom disturb surface sediments	Effects associated with commercial fishing (particularly shrimping) disturbance of benthic habitat.	No change from existing conditions and related impacts.	Motile species will avoid dredging activity. Temporary reduction in sessile benthic habitat prey species and immature or small finfish and shellfish unable to avoid the dredging. Benthic habitat recovery expected within 2-3 years (USACE 2017a, USACE 2017b). Motile species will avoid turbidity plume. Potential impacts to planktonic or slow-moving water column species.

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Fish and Wildlife Resources	No fish and wildlife impacts other than those from historic fishing activities and vessel use	No change from historic human activity impacts	No change from current human activity impacts	Dredging and beach placement would impact benthic communities for up to a few years. Minimal impact to seabirds that often feed in the dredging plume or along shorelines, as ample habitat north and south of the site would allow feeding while benthic populations redevelop. Other wildlife temporarily displaced from dredging and dredging plume areas would return after construction is complete.
Air Quality	Minor local emissions from historic recreational and commercial vessel activity	No change from historic conditions	No change from present conditions	Minor emissions from dredging equipment for the several months of dredging and transport to the beach location. Air quality changes will not exceed target levels due to wind environment and open water OCS location of the borrow area. Minor and temporary emissions from beach construction activities will not exceed target levels due to expected and typical wind environment along the project shoreline

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Cultural Resources	No cultural / historic resources identified in the project area	No cultural / historic resources identified in the project area	No cultural / historic resources identified in the project area	No cultural / historic resources identified in the project area – beach nearshore, pipeline corridors, travel routes, and borrow area.
Recreation	No historic construction of activities other than commercial fishing that might disturb recreational activity, even temporarily	No current activities that would disturb recreation except for commercial fishing, that recreational boaters will avoid	No change from existing conditions	Recreational and commercial vessels will have to avoid dredging and hopper dredge transit areas during construction. Once completed, no additional impacts to recreation. Beach recreation will be temporarily halted during construction. Extensive and accessible beach north and south of the project area will provide alternative recreation locations during construction. Higher quality beach will be available after construction.

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Aesthetic Resources	No aesthetic resource impacts, temporary or permanent	No aesthetic resource impacts, temporary or permanent	No aesthetic resource impacts, temporary or permanent	The proposed borrow area is about 8 miles offshore, below the horizon at the shoreline. Hopper dredge activities would temporarily affect aesthetic resources when visible during transits to the material transfer point near the beach. Post-project no further impacts to aesthetic resources would occur. Temporary reduction in beach aesthetics will return after construction. Removal of scarps and beach plowing to ensure appropriate sand density will maintain beach aesthetics during equilibration.
Noise	No noise impacts other than typical boating activity	No noise impacts other than typical boating activity	No noise impacts other than typical boating activity	Equipment noise would be minimal at the shoreline, as dredging activities are about 8 miles offshore. Some noise from hopper dredge when transferring sand to the beach. Noise will occur during beach construction from equipment used to shape the sand and transport workers, etc.

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Unexploded Ordnance (UXO)	No effect as project area is not within any known UXO areas. The nearest UXO area is >80 miles to the east. No reports of prior UXO discovery in or near project area is known.	No effect as project area is not within any known UXO areas. The nearest UXO area is >80 miles to the east.	No effect as project area is not within any known UXO areas. The nearest UXO area is >80 miles to the east.	A very low probability exists that UXO could be located during the project dredging or filling due to the long history of military activity on the US and Florida Atlantic coast. The project area is not within any known UXO areas. The nearest UXO area is >80 miles to the east. Discovery of a UXO would implement approved measures for the hopper dredge (e.g. draghead screens, outflow screening boxes) and dredging activities shifted to another location while the UXO threat was assessed and managed Sufficient borrow area is available to continue dredging in another area.
Shoreline Stabilization	No effect of previous waterside activities offshore of the beach project area the dredging will serve	No current in-water activities that would impact shoreline stability	No effect	Project dredging supports beach and dune creation for shoreline stabilization. Vessel activity at sand transfer point insufficient to impact shoreline stability. Borrow area bathymetric changes are insufficient and too distant to affect shoreline wave climate and stability.

Resource	Past (historical) Impacts	Existing Condition	Future without Project	Future with Proposed Dredging and Beach Sand Placement
Navigation	No official navigation channels in project area; ongoing general use of the area by recreation and commercial vessels; no navigation restrictions or dangers	No change from historic conditions; no impacts	No change from historic conditions; no impacts	Vessels will have to avoid active dredging and hopper dredges transiting to and from offload locations nearer the beach fill site. Activities and activity areas will be published in USCG Local Notice to Mariners.

7.0 Environmental Commitments

7.1 Introduction

This chapter summarizes the environmental and related commitments that have been made by St. Johns County, detailed in this EA, and incorporated into the proposed project plan.

The commitments described below would be implemented by St. Johns County or required of contractors to St. Johns County associated with project implementation and monitoring. Commitments for pre-construction activities would generally be completed by St. Johns County or by their contractors during the final design process and prior to construction activities. Management of wildlife, wetland, cultural resource, and other resources mitigation would be completed by St. Johns County and their contractors, and coordinated with appropriate local, state, federal authorities and agencies, as described below.

7.2 General Commitments

Throughout the planning process for the proposed project, efforts have been made to avoid impacts where practicable. If avoidance was not possible, mitigation measures have been developed to minimize impacts to the lowest practicable level. Proposed mitigation measures for each resource, if appropriate, are discussed in Chapter 6, and key measures are summarized here. In addition to specific mitigation measures identified in Chapter 6, other management practices would be employed during construction activities to minimize environmental effects and would be included in construction specifications. Many of these measures are required to comply with Federal, state, or local laws and regulations, project permits, and Biological Opinions applicable to the project. Regardless of whether they are specifically or completely identified in this document. St. Johns County will comply with the spirit as well as the letter of all relevant Federal, state, and local laws, ordinances, regulations, and standards during the implementation of the preferred alternative. St. Johns County will comply with all applicable conditions of SARBO 2020 and SPBO 2015 as detailed in Section 6.4.

7.3 Marine Resources Commitments

Borrow area management will comply with the U.S. Army Corps of Engineers' Best Management Practice Design Criteria for Hopper Dredge/Sea Turtle Friendly Borrow Sites to minimize environmental impacts, optimize dredging productivity, and maximize the volume of remaining sand that future dredging events can feasibly extract via hopper dredging. Particularly, borrow area design includes continuous lateral excavation at a uniform depth to the greatest extent practicable to avoid creating holes, valleys, or ridges within the borrow area; continuous lateral excavation will help decrease the risk of marine turtle takes, increase dredging productivity, and avoid loss of material which could have been excavated from the borrow area. The design maintains a minimum 2 ft buffer of beach quality sand at all locations within the borrow area, which will maintain sediment quality conditions existing prior to dredging. These design components avoid and minimize impacts to benthic communities, essential fish habitat, and listed species that use the benthic resources.

St. Johns County commits to avoidance of impacts to North Atlantic Right Whale (NARW) by carefully following to the extent possible all avoidance measures identified in SARBO 2020. St. Johns County commits to:

- Project completion in as efficient a manner as possible to minimize the construction period.
- Instructions on the presence of NARW and other ESA-listed species and all requirements to observe, avoid and report NARW activity in the area, maintain required vessel distances, etc. for all on-site project personnel expected to be activity on any project vessel
- Understand and maintain 100% protected species observer coverage on each hopper dredge
- Understand and execute all NARW reporting requirements
- Ensure that all captains maintain and use text messaging to receive real time alerts regarding NARW.
- Ensure maintenance of all observer-related responsibilities for training, observation activities, correspondences to be received and sent to any or all vessels, sent to all vessels active for the project, reporting requirements, and all other activities identified in SARBO 2020.
- All project vessels will carry and maintain operational automatic identification system transmitters required by U.S. Coast Guard and ensure that all transmitters are on and transmitting during all vessel operations.
- Maintain SARBO 2020 vessel speed requirements

7.4 Beach and Dune Resources Commitments

St. Johns County commits to complying with all conditions (general and special) listed in state and federal authorizations for the project and project design criteria listed in Biological Opinions relevant to this project and to educating the contractors to these conditions to support the full protection of these resources. Many of the beach and dune resources commitments are detailed in Attachment F of the FEMA 2019 EA (Appendix B) and include:

- Sand quality specifications and implementation of agreed mitigation measures for sand not meeting regulatory standards.
- Sand quality monitoring during construction and monitoring for / maintenance of appropriate sand densities after construction.
- Management of escarpments for three years post construction
- Protections for sea turtles including as defined in the FEMA 2019 EA; daily early morning surveys (depending on project start and end dates)
- Turtle nest marking and relocations, as appropriate
- Protection of beach mice as described in the FEMA 2019 EA
- Actions for protection of piping plovers as described in the FEMA 2019 EA and P3BO. Note that optimal habitat as defined in P3BO does not occur in the project area. However, this species and other similar listed species (rufa red knot) may use the project area for feeding and loafing and St. Johns County commits to the reasonable and prudent measures listed in P3BO applicable to this project for preferred habits such as wrack lines and ephemeral pools that may occur in the project area.
- Compliance with appropriate standard shoreline protection guidelines provided in the Migratory Bird Treaty Act to protect against impacts to nesting shorebirds between April 1 – August 31.

LIST OF PREPARERS

Table 8 lists the people responsible for preparing this EA.

Table 8. List of Preparers

Name	Organization	Role
David L. Stites, Ph.D.	Taylor Engineering, Inc.	Ecologist
Christopher B. Ellis	Taylor Engineering, Inc.	Environmental Scientist
Michael E. Trudnak, P.E.	Taylor Engineering, Inc.	Coastal Engineer
Kierstin Masse	Taylor Engineering, Inc.	Environmental Scientist

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Appendix A

South Ponte Vedra Beach Offshore Borrow Area Design Report

TAYLOR ENGINEERING, INC.

South Ponte Vedra Beach Offshore Borrow Area Design Report

St. Johns County, FL

Revised April 2020

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SOUTH PONTE VEDRA BEACH
OFFSHORE BORROW AREA DESIGN REPORT

ST. JOHNS COUNTY, FLORIDA

Prepared for

ST. JOHNS COUNTY, FLORIDA

By

Michael Trudnak, P.E.
Wendy K. Laurent, E.I.

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September 2019

C2018-055

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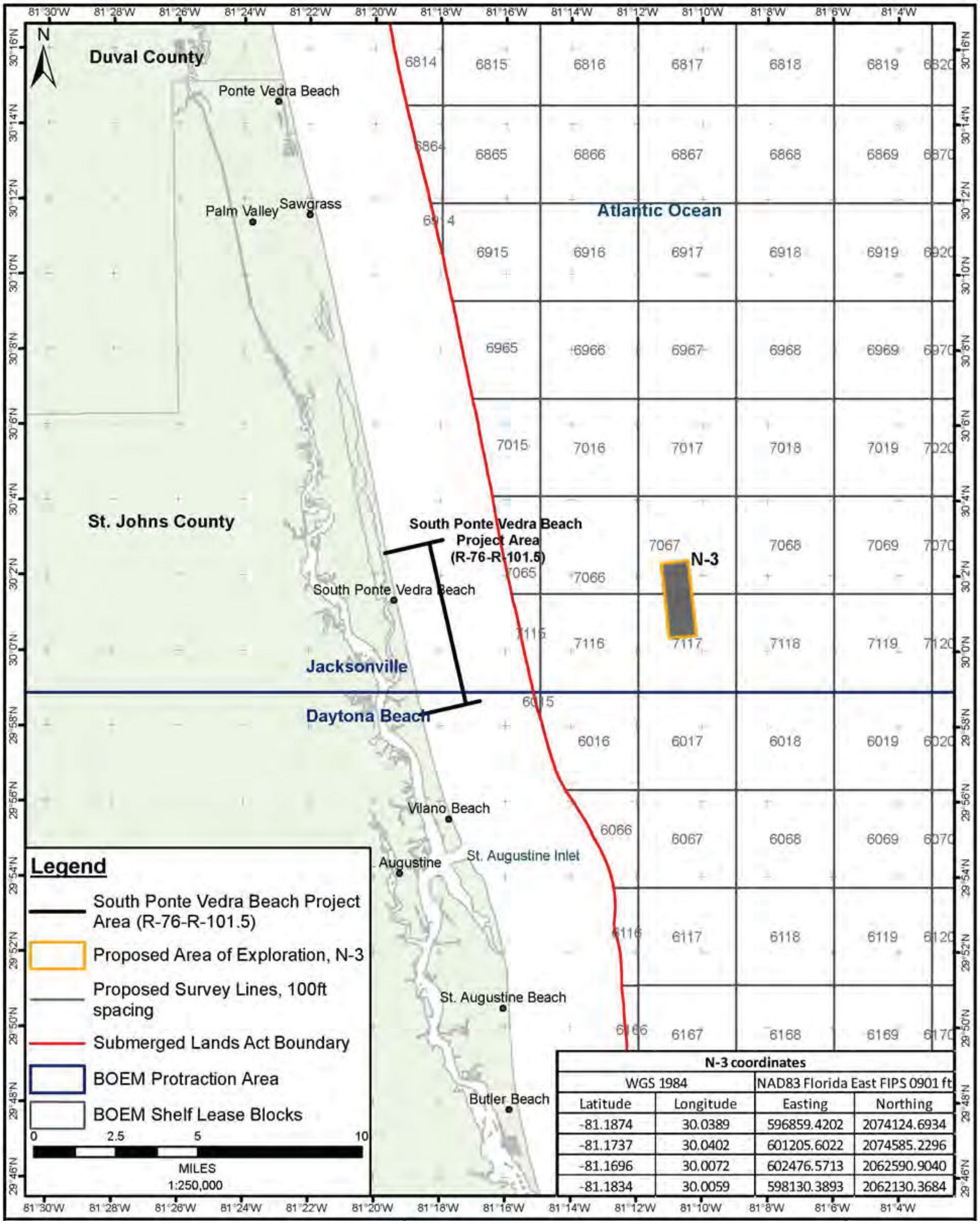
1.0 INTRODUCTION

St. Johns County contracted Taylor Engineering, Inc. to conduct the final design of an offshore sand source to support dune restoration of approximately five miles of shoreline within South Ponte Vedra Beach, St. Johns County, Florida from Florida Department of Environmental Protection (FDEP) reference monument R-76 to R-101.5. Prior studies conducted by the U.S. Army Corps of Engineers (USACE) have identified several potential sources of beach quality sand offshore St. Johns County that could serve as borrow sites for beach restoration north of St. Augustine Inlet. Based on review of the geotechnical data provided by USACE (2015), Taylor Engineering identified the exploration site labeled “N-3”, located in federal waters about 8 miles offshore and 6 miles north of St. Augustine inlet, as the most suitable borrow area for the proposed beach/dune restoration project area.

Prior USACE studies have collected sufficient geotechnical data (i.e., vibracores at 1,000-ft grid spacing) within site N-3 for detailed borrow area design. Accordingly, this investigation used the existing geotechnical data, supplemented by new bathymetry and remote sensing surveys, to design a borrow area dredging template for the proposed beach/dune restoration project and develop a borrow area management strategy to support future nourishment projects. Prior to conducting the remote sensing survey, Taylor Engineering coordinated with and obtained a surveying permit (Permit Number E18-004) from the Bureau of Ocean Energy Management (BOEM).

This report summarizes the data collection and design of the proposed borrow area. Taylor Engineering, on behalf of St. Johns County, will submit this report to FDEP, USACE, and BOEM to obtain authorizations to dredge the proposed borrow area. Of note, the proposed borrow area is a subset of USACE’s borrow exploration site N-3. Throughout this report, the term “site N-3” refers to the larger exploration site, and the term “borrow area N-3” refers to the proposed dredging area within the southern and central region of site N-3.



N-3 coordinates			
WGS 1984		NAD83 Florida East FIPS 0901 ft	
Latitude	Longitude	Easting	Northing
-81.1874	30.0389	596859.4202	2074124.6934
-81.1737	30.0402	601205.6022	2074585.2296
-81.1696	30.0072	602476.5713	2062590.9040
-81.1834	30.0059	598130.3893	2062130.3684

Figure 1.1 Site N-3 Location Map

2.0 FIELD INVESTIGATION

2.1 Previous Investigations

Through a series of previous geotechnical data collection and analysis investigations, USACE identified site N-3, among others, as a suitable sand source for beach restoration north of St. Augustine Inlet. As further described in USACE (2015) (Attachment A), USACE initiated the St. Johns County Beach Nourishment Exploration Program in 1996 with collection of geophysical data and 20 vibracores (CB-SJ96-1 through CB-SJ96-20). The program identified four potential sand sources labeled North Offshore Borrow Area (NOBA), South Offshore Borrow Area (SOBA), South Nearshore Borrow Area, and Ebb Shoal Borrow Area; site N-3 lies within NOBA. USACE collected another 45 vibracores in 2006 (within NOBA, SOBA, and the south nearshore) and 87 vibracores in 2009 (within NOBA, SOBA, and the ebb shoal) to further define the potential sand reserves. In 2015, USACE collected 101 vibracores within the limits of the flood shoal, the south nearshore, and NOBA subsites N-2 and N-3; these vibracores were tightly spaced to facilitate final borrow site design and permitting (Figure 2.1).

USACE (2015) indicates N-2 and N-3 contain very similar beach quality material, as summarized in Table 2.1, with each site containing approximately 8,000,000 cy within the areas explored with 1,000-ft vibracore spacing. The proximity of N-3 to the project area would prove more economical than N-2 for construction; thus, this study focused on further investigation of N-3. Field investigations included a bathymetry survey and remote sensing survey as discussed in Section 2.2. Figure 2.2 shows the vibracore locations within N-3 (as well as cross-section locations), and Figures 2.3 and 2.4 illustrate geologic cross-sections of N-3 developed by USACE (2015).

Table 2.1 Summary of N-2 and N-3 Characteristics

Location	Mean (mm)	Mean (phi)	Fine Gravel Amount* (%)	Silt Amount** (%)	St. Dev (phi)	Visual Shell (%)	Munsell Color
Site N-2	0.26	1.95	0.74	2.17	0.88	2-59	2.5Y 6/1
Site N-3	0.26	1.95	2.33	2.33	0.92	0-36	2.5Y 6/1

*Retained on the #4 Sieve, **Passing the #230 Sieve

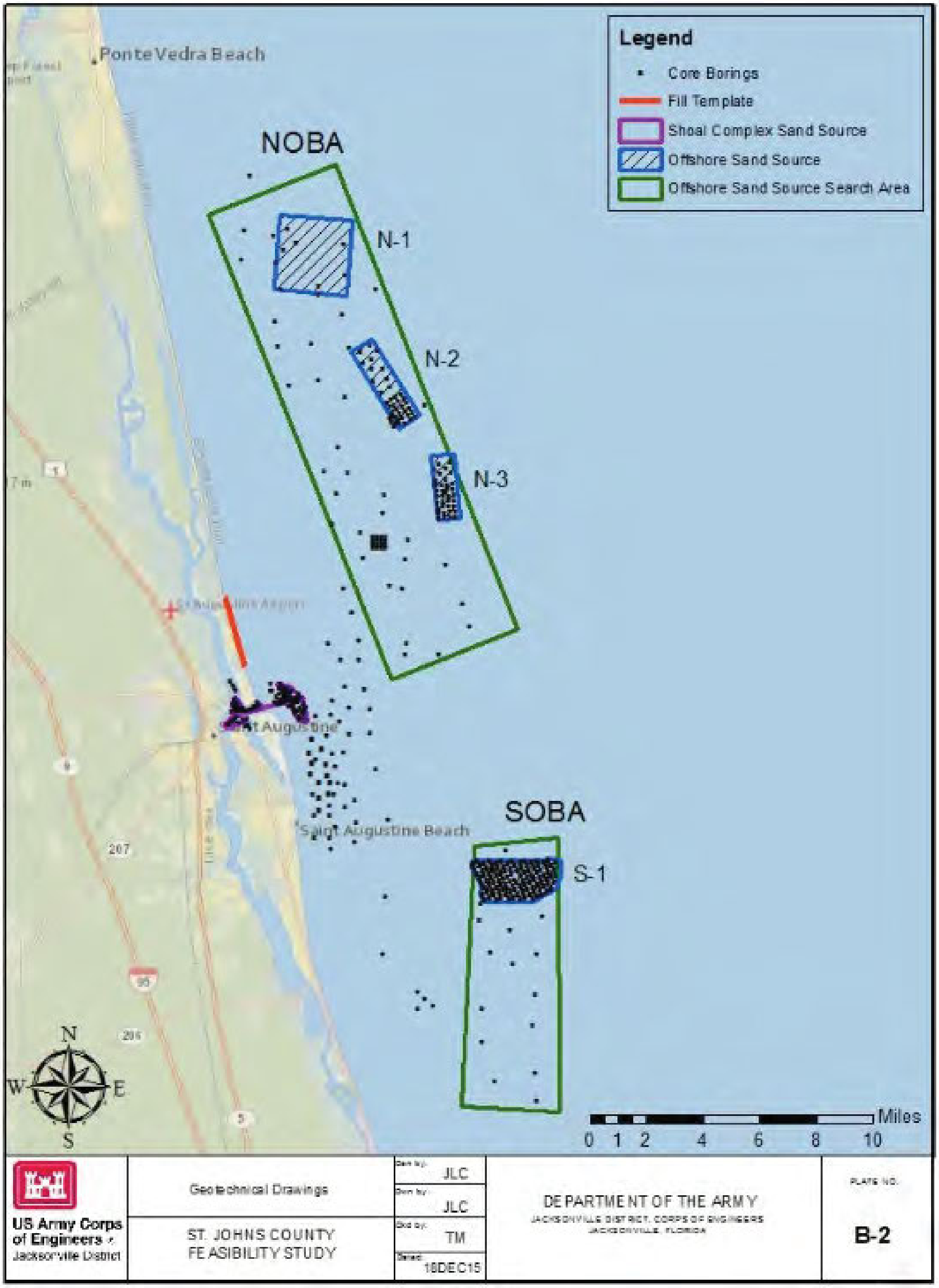


Figure 2.1 USACE-Designated Potential Sand Source Areas [Source: USACE (2015)]

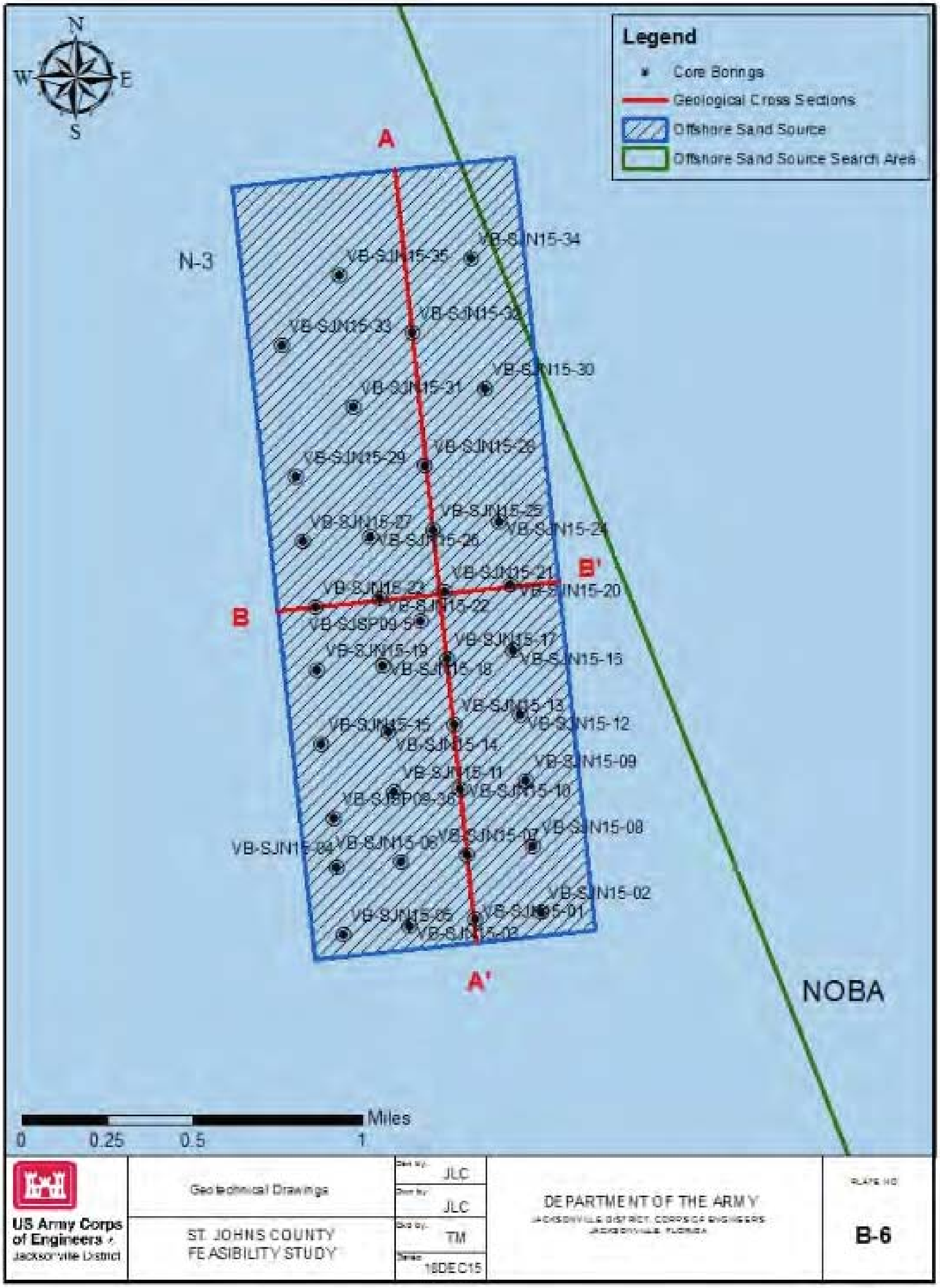


Figure 2.2 USACE NOBA Vibracore Locations [Source: USACE (2015)]

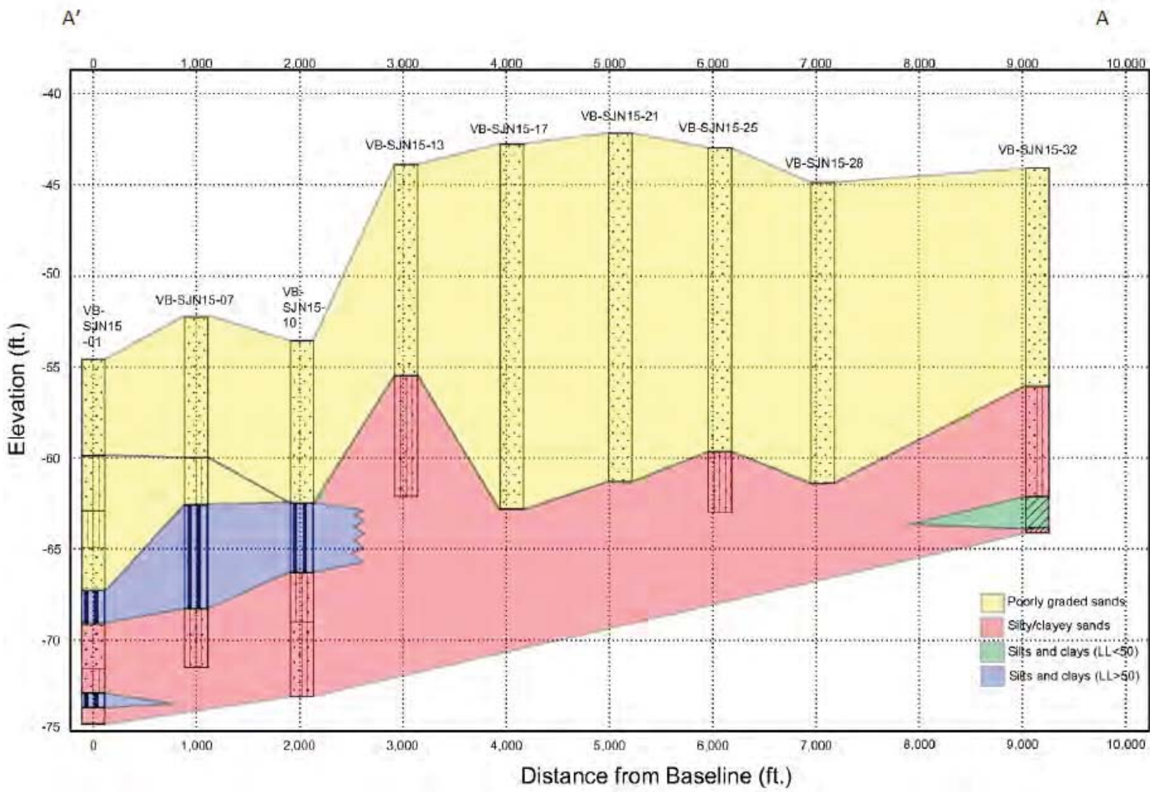


Figure 2.3 NOBA Geologic Cross Section A-A' [Source: USACE (2015)]

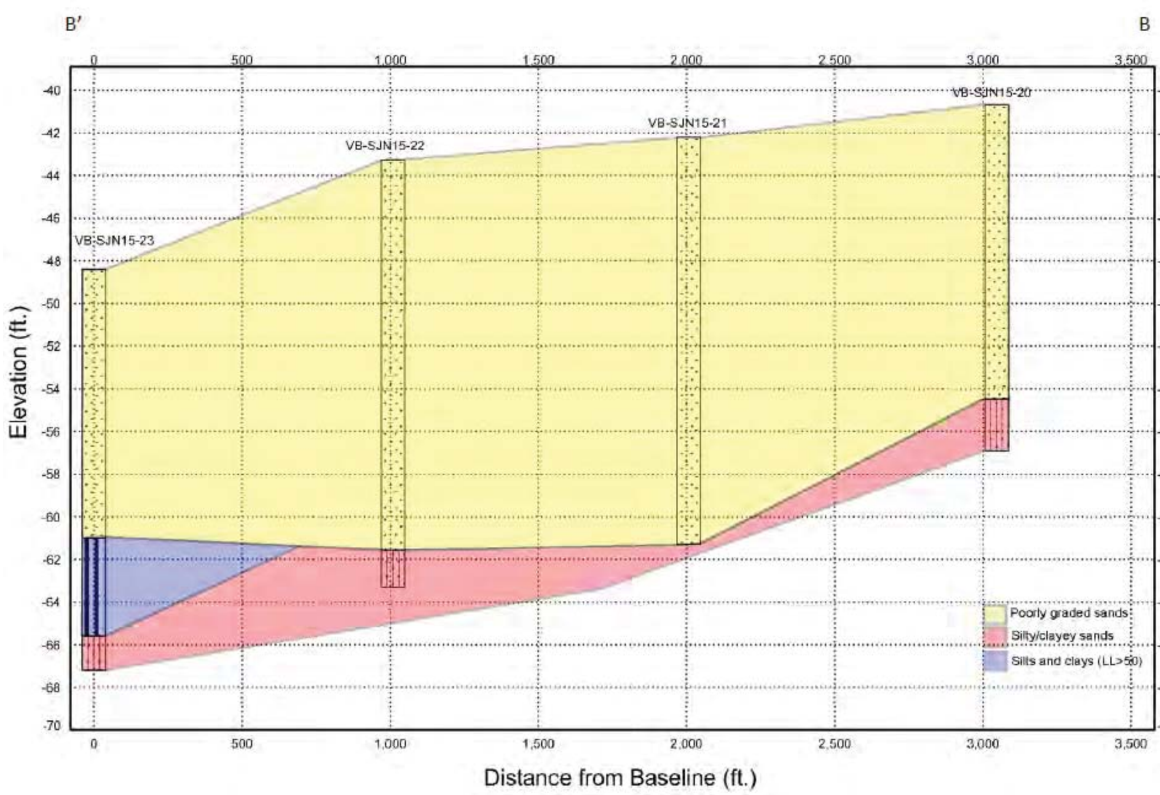


Figure 2.4 NOBA Geologic Cross Section B-B' [Source: USACE (2015)]

2.2 Updated Bathymetry and Cultural Resources Survey of Site N-3

Taylor Engineering subcontracted Morgan & Eklund, Inc. to conduct a bathymetry survey of site N-3 with 250-ft survey line spacing. The survey data, collected by Morgan & Eklund on December 7, 2018, defines existing conditions for the borrow area design discussed in Chapter 3.

Taylor Engineering teamed with Sonographics, Inc. and Panamerican Consultants, Inc. to conduct a comprehensive remote sensing survey comprised of a 105-mile grid magnetometer, sidescan sonar, and subbottom profiler survey. Sonographics conducted the survey, authorized by BOEM Permit No. E18-004 and Florida 1A-32 Permit No. 1920.006, on July 30 and 31st, August 1st and 10th, 2019. Ideal weather and data collection conditions were encountered on July 30 and 31st. After mid-day on August 1st the sea state increased to over 2 ft and operations were stopped until late afternoon to maintain data and survey quality. The survey was delayed due to weather until August 10th when better weather conditions permitted the completion of the survey.

Panamerican Consultants analyzed the survey data for the presence of cultural resources. The survey located four magnetic anomalies, two sidescan sonar contacts, and no subbottom acoustic contacts or subbottom impedance contrast features. After extensive review and analysis of the data as discussed in Attachment B, Panamerican Consultants determined the magnetic anomalies and sidescan sonar contacts did not meet the National Register of Historic Places criteria of potentially significant submerged cultural resources. Thus, site N-3 appears free and clear of any cultural resources that would require incorporation of a dredging buffer into the borrow area design.

3.0 RESULTS AND RECOMMENDATIONS

3.1 Beach Sediment Compliance Criteria

To protect the environmental functions of Florida's beaches, the Florida Statutes specify that only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Prior studies have evaluated the native beach data for the general study area as discussed below.

The Florida Geological Survey collected beach sand throughout St. Johns County in 2002 and 2003 (Phelps et al., 2009), including six sampling locations (spaced approximately every mile) throughout the proposed South Ponte Vedra Beach project area (R-76 to R-101.5). Sampling primarily occurred at the swash zone, mid-beach, and back beach. Phelps et al. (2009) reported an average mean grain size of 0.564 mm (0.827 phi), carbonate content of 40.1%, and post-carbonate removal mean grain size of 0.323 mm (1.628 phi) along the St. Johns County beaches north of St. Augustine Inlet. The report also provided general descriptions of each sand sample. However, the report did not provide detailed statistics of each sample; thus, the available data does not allow for specific characterization of the beach sand within South Ponte Vedra Beach.

Other prior studies have documented the native sediment characteristics of the project area beach. Attachment C contains *Geotechnical Analysis of Native Beach Samples Collected from St. Johns County, Florida*, an appendix of *St. Johns County Shore Stabilization Feasibility Study for South Ponte Vedra and Vilano Beach Regions* (PBS&J, 2009). The report provides geotechnical data and photographs of native beach samples collected along 8 transects — at FDEP monuments R70, R-77, R-84, R-91, R-98, R-105, R-112, and R-120 — north of St. Augustine Inlet. The study analyzed 9 samples — representing the 15, 7, 3, 0, -3, -6, -9, and -15 ft elevations (datum not specified) and a composite of all samples — per transect to determine grain size statistics and Munsell color. Carbonate content was determined for 32 samples. On average, PBS&J (2009) reports the native beach sand has a 0.55 mm mean grain size, 38% carbonate content, and Munsell color in the range of 10YR 8.5/1 to 10 YR 8/2. The grain size correlated with carbonate content, as samples with a large mean grain size generally contained a high percentage of carbonate. PBS&J (2009) states the post-carbonate removal mean grain size ranged from 0.20 mm to 0.25 mm; however, the report did not provide tabulated post-carbonate removal data of individual samples.

USACE (2015) collected 30 native beach samples in 2010 between FDEP reference monuments R-101 and R-117 in Vilano Beach, immediately south of the proposed dune restoration area. The study analyzed 6 samples—representing the mid-berm, mid-tide, -3, -15, -10, and -15 ft locations—per transect to determine grain size, visual shell content, carbonate content, and color. USACE repeated the tests following removal of carbonates from all samples. The results, summarized in Table 3.1, indicate the beach has a mean grain size of 0.42 mm corresponding to an average carbonate content of 26%, while the non-carbonate (i.e., quartz) fraction has a mean grain size of 0.24 mm. Test results for individual samples (Attachment A) indicated the mean grain size ranged from 0.13–1.42 mm (corresponding to 5.6% and 70.4% carbonate content) for native beach samples and 0.13–0.60 mm for the quartz fraction. The visual shell content of the native beach samples ranged from 2.9–83.7%, Munsell color values and chroma ranged from 5–7 and 1–4 (5/3–7/4), and the silt and fine gravel content did not exceed 5%, except for an anomaly of 18% fine gravel at the R-113 mid-tide location.

Based on the above information, Taylor Engineering developed the sediment compliance values summarized in Table 3.2 to evaluate the potential borrow material in N-3. Analysis of available geotechnical data indicates N-3 predominantly contains quartz and a relatively low visual shell content (11%). Thus, the compliance values are generally based on the sediment statistic ranges observed in the native beach quartz fraction, with some deviation to account for the minor carbonate content.

Table 3.1 Summary of Vilano Beach Sediment Characteristics (USACE, 2015)

Composite	Mean Grain Size (mm)	Mean Grain Size (phi)	Fine Gravel* (%)	Silt** (%)	St. Dev (phi)	Carbonate Content (%)	Visual Shell (%)	Munsell Color
Native Beach	0.42	1.26	2.04	1.35	1.2	27.10	25.94	10YR 6/2
Native Beach Quartz Fraction	0.24	2.09	0.00	0.02	0.59	0	0	10YR 7/1

*Passing #230 Sieve, ** Retained on #4 Sieve

Table 3.2 Beach Sediment Compliance Values

Sediment Parameter	FDEP-Approved Compliance Value for South Ponte Vedra Beach (File No. 0340616-002-JC)
Max. Silt Content (passing #230 sieve)	5%
Max. Gravel Content (retained on #4 sieve)	5%
Mean Grain Size Range	0.13 to 0.6 mm
Munsell Color Value (moist)	>5.0 Value; < 2 Chroma
Visual Shell Content	40%

3.2 Recommended Borrow Site Design

The core logs (Attachment D) and laboratory testing results, including the gradation tables in Attachment B and gradation curves in Attachment E, provide a representation of the sediment strata within the potential borrow area (site N-3). Specifically, the data provides the locations and suitability (i.e., compatibility) of sediments available for beach or nearshore placement. Attachment F provides photographs of the cores collected in 2009 within site N-3; USACE did not take photographs of the 2015 cores.

Based on comparison of the core logs and laboratory results to the compliance criteria, Taylor Engineering identified the maximum depth (ft) of the beach quality sand layer within each core and the corresponding elevation (ft-NAVD) at the bottom of the sand layer. Figure 3.1 shows the sand layer depths and Figure 3.2 shows the sand layer elevations at each core boring location. Figures 3.1–3.2 also show the Thiessen polygons, which identify the area of influence of each core, and label site N-3 and the proposed borrow area encompassing the southern and central region of site N-3. In the northern section of site N-3, the vibracores are spaced approximately 2,000 ft apart as opposed to the 1,000-ft spacing required for detail-level borrow site design and permitting. Thus, the proposed borrow area is limited to the area defined by vibracores VB-SJN15-01 – VB-SJN15-27 with 1,000-ft grid spacing.

Comparison of the sand layer bottom elevations to the 2018 bathymetry data provided an estimated volume of beach quality sand within each core's Thiessen polygon, and the summation of the individual volumes provided the total approximated volume of beach quality sand. The total estimated volume of beach compatible sand equals 9,500,000 cy within the proposed borrow area and 18,000,000 cy within site N-3 overall. Aside from the deeper waters at the south end of the proposed borrow area where a few cores had less than 5 ft of sand, the cores throughout the proposed borrow area and the northern portion of site N-3 showed a significant amount of sand with the sand layer depths ranging from about 8 ft to 20 ft. Figure 3.3 shows contours of the depth of the beach quality sand layer within each Thiessen polygon based on the above-mentioned sand layer elevations and 2018 bathymetry data. The sand depth is greatest towards the center of the site along the crest of the shoal. Surface elevations of core borings collected by USACE ranged from -40.7 ft NAVD at the shoal crest to -55.7 ft NAVD at the south end of site N-3.

Current sand conservation policies limit the borrow area volume to approximately 150% of the required beach fill volume. The surplus volume allows for typical construction losses during dredging and transport and provides dredging flexibility should the dredge encounter unexpected areas of poor-quality material that the contractor must subsequently avoid. Placing a limit on the surplus volume helps manage the sand resources for future events. Assuming a fill placement density of 20 cy/ft over the 5.5-mile proposed project length (R-76 to R-103.5), the proposed dune restoration project requires approximately 600,000 cy. Including the allowable 50% surplus, the proposed borrow area should contain 900,000 cy.

Table 3.3 summarizes the results for uniform dredge elevations ranging from -48 ft NAVD to -54 ft NAVD. Given the above-mentioned beach fill and borrow material volume requirements and the values presented in Table 3.3, Taylor Engineering recommends a maximum dredge elevation of -49 ft NAVD for the proposed borrow area. This dredge elevation provides slightly more volume than required at the upper limit (i.e., 1,064,000 cy vs 900,000 cy). Figure 3.4 shows the sand layer depth contours above -49 ft NAVD to illustrate the sediment available for dredging. Table 3.4 summarizes the average sediment characteristics of the beach quality sediment at each core within the proposed dredging template. Overall, the proposed borrow area has a mean grain size of 1.77 phi (0.29 mm), standard deviation of 0.93 phi, 0.96% silt, 0.67% gravel, 14.1% visual shell, and predominant moist Munsell value/chroma of 7/1. Attachment E contains the statistics for every sample at every core location within N-3.

Of note, borrow site design typically requires a 2-ft buffer between the maximum dredge elevation and non-compatible material to minimize the risk of placing unacceptable sediment on the beach. The maximum common elevation of beach quality sand throughout the proposed borrow area is approximately -56 ft NAVD. Thus, the proposed dredge elevation of -49 ft NAVD has a 7-ft buffer. A dredge elevation of -54 ft NAVD, with a 2-ft buffer between -54 ft and -56 ft NAVD, is the maximum recommended uniform dredge elevation for future dredging projects (i.e., beach nourishment projects). Figure 3.5 illustrates the depth of sand above -54 ft NAVD.

3.3 Borrow Area Conservation

As discussed above, the proposed borrow area contains more sand than is needed for the proposed beach restoration project. Future nourishment projects of South Ponte Vedra Beach or the federal Vilano Beach project area may need to use the surplus sand. Thus, borrow area management is important to guide borrow area excavation such that the excluded volume and the unused surplus remain in sufficient thicknesses, uniformity, and lateral extents for future dredging events.

The borrow material volumes presented in Table 3.3 demonstrate that incremental increases in the dredge depth can substantially increase the available dredge volume (e.g., an increase from -52 ft to -53 ft NAVD increases the volume by 690,000 cy). With the future dredging needs currently unavailable, a detailed borrow area management plan is difficult to produce. Generally, for each dredging event, the specified maximum dredge volume should be based on new bathymetry data and the specific volume requirements for the project of interest. Further geotechnical exploration of the northern portion of Site N-3 should be considered if additional borrow material is required or if a larger dredging area is required to reduce project costs. Borrow area management should comply with the U.S. Army Corps of Engineers' *Best Management Practice Design Criteria for Hopper Dredge/Sea Turtle Friendly Borrow Sites* to minimize environmental impacts, optimize dredging productivity, and maximize the volume of remaining sand that future dredging events can feasibly extract via hopper dredging. Particularly, borrow area design should promote continuous lateral excavation at a uniform depth to the greatest extent practicable to avoid creating holes, valleys, or ridges within the borrow area; continuous lateral excavation will help decrease the risk of marine turtle takes, increase dredging productivity, and avoid loss of material which could have been excavated from the borrow area.

Table 3.3 Borrow Material Volumes within the Proposed Borrow Area

Dredge Elevation (ft NAVD)	Volume Above Dredge Elevation (cy)	Incremental Volume Increase (cy)
-48 ft[1]	676,000	-
-49 ft	1,064,000	388,000
-50 ft	1,507,000	443,000
-51 ft	2,019,000	512,000
-52 ft	2,617,000	598,000
-53 ft	3,307,000	690,000
-54 ft	4,081,000	774,000
-56 ft	5,841,000	1,760,000[2]

[1]Insufficient volume for proposed project

[2]Approximates the volume within a 2-ft buffer layer above the maximum common depth of beach quality sand (i.e., from -54 ft to -56 ft)

Table 3.4 Proposed Borrow Area Average Sediment Characteristics Above -49 ft NAVD

Core	Mean (mm)	Mean (ϕ)	Sorting (ϕ)	Passing #230 (%)	Retained #4 (%))	Visual Shell %)	Moist Munsell Value/Chroma
SJS09-05	0.25	2.00	-	2.18	>1	11.0	6/1
SJS09-36	-	-	-	-	-	-	-
SJN15-01	-	-	-	-	-	-	-
SJN15-02	-	-	-	-	-	-	-
SJN15-03	-	-	-	-	-	-	-
SJN15-04	-	-	-	-	-	-	-
SJN15-05	-	-	-	-	-	-	-
SJN15-06	-	-	-	-	-	-	-
SJN15-07	-	-	-	-	-	-	-
SJN15-08	-	-	-	-	-	-	-
SJN15-09	-	-	-	-	-	-	-
SJN15-10	-	-	-	-	-	-	-
SJN15-11	0.32	1.70	0.90	0.60	0.54	13.95	7/1
SJN15-12	-	-	-	-	-	-	-
SJN15-13	0.27	1.88	0.80	0.85	0.48	7.75	7/1
SJN15-14	0.28	1.85	0.87	0.70	0.29	12.90	7/1
SJN15-15	-	-	-	-	-	-	-
SJN15-16	0.27	1.89	0.80	0.96	0.04	14.80	6/2
SJN15-17	0.30	1.77	0.96	0.60	1.01	13.50	7/1
SJN15-18	0.29	1.82	0.86	0.66	0.16	13.75	7/1
SJN15-19	0.32	1.66	1.02	0.76	1.40	6.70	7/1
SJN15-20	0.30	1.72	0.88	0.97	0.32	13.27	7/1
SJN15-21	0.29	1.79	0.92	1.19	0.41	15.80	5/1
SJN15-22	0.28	1.86	0.98	1.62	0.56	15.35	6/1
SJN15-23	-	-	-	-	-	-	-
SJN15-24	0.32	1.66	0.95	0.79	0.32	17.2	7/1
SJN15-25	0.29	1.80	1.07	1.05	1.39	13.35	7/1
SJN15-26	0.29	1.78	0.94	0.66	0.24	17.10	7/2
SJN15-27	0.35	1.53	1.15	0.80	2.24	25.40	6/1
Composite	**0.29**	**1.78**	**0.93**	**0.96**	**0.67**	**14.12**	-

Note: The symbol "-" indicates the -49 ft NAVD dredge depth is shallower than the top of core elevation; thus, dredging will not occur at the core location.

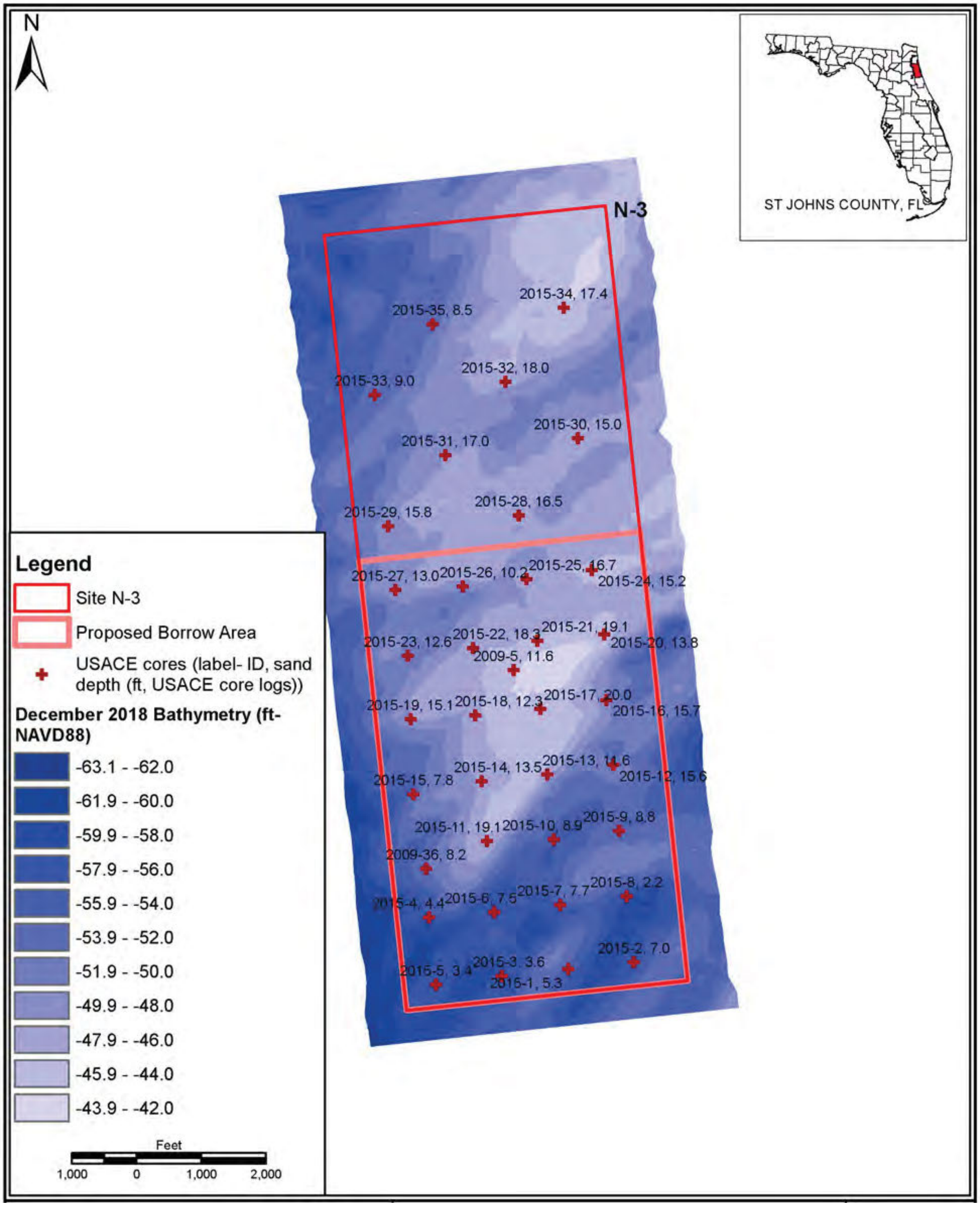


Figure 3.1 Beach Compatible Sand Depths at each Core within N-3

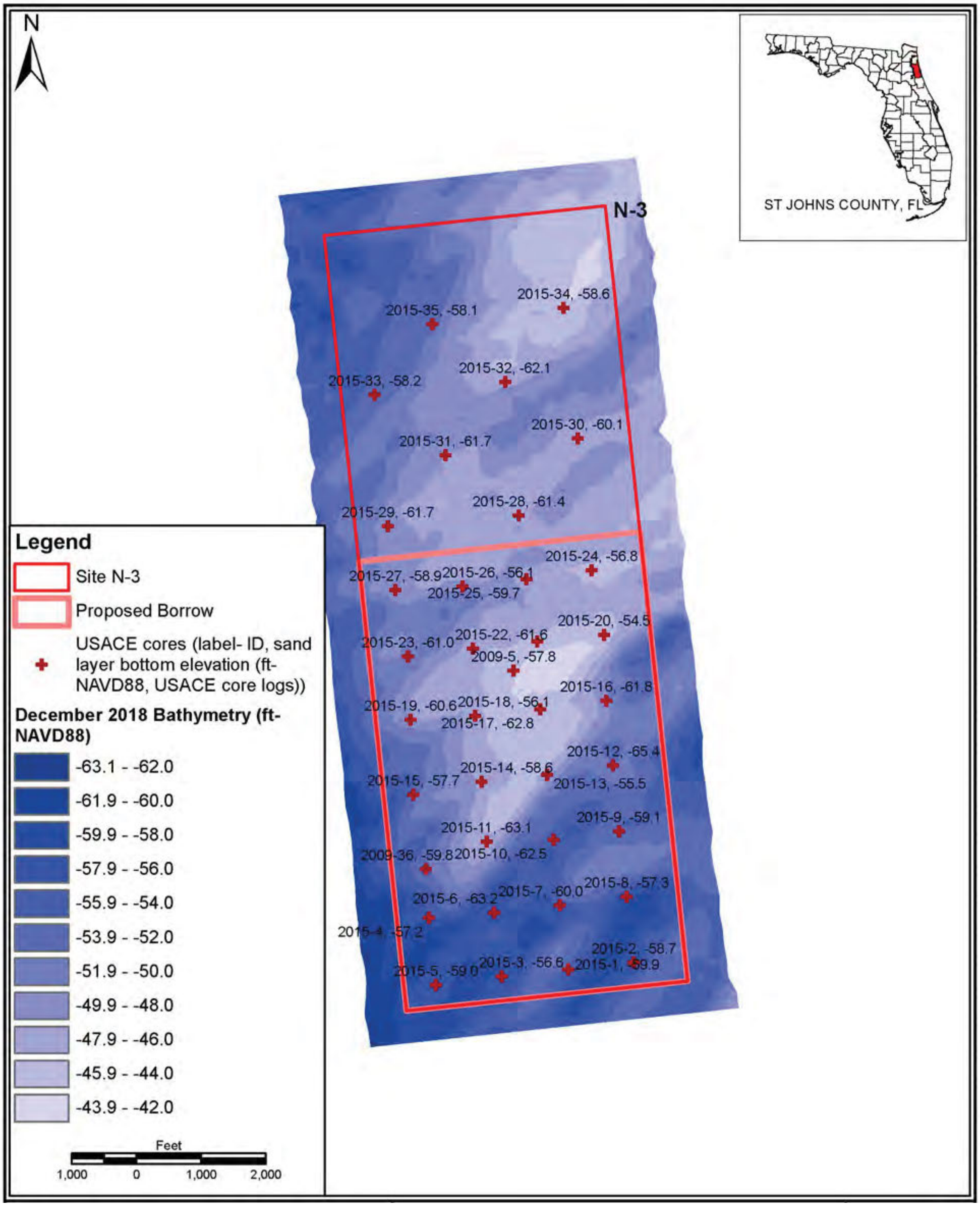


Figure 3.2 Beach Compatible Sand Layer Bottom Elevations at each Core within N-3

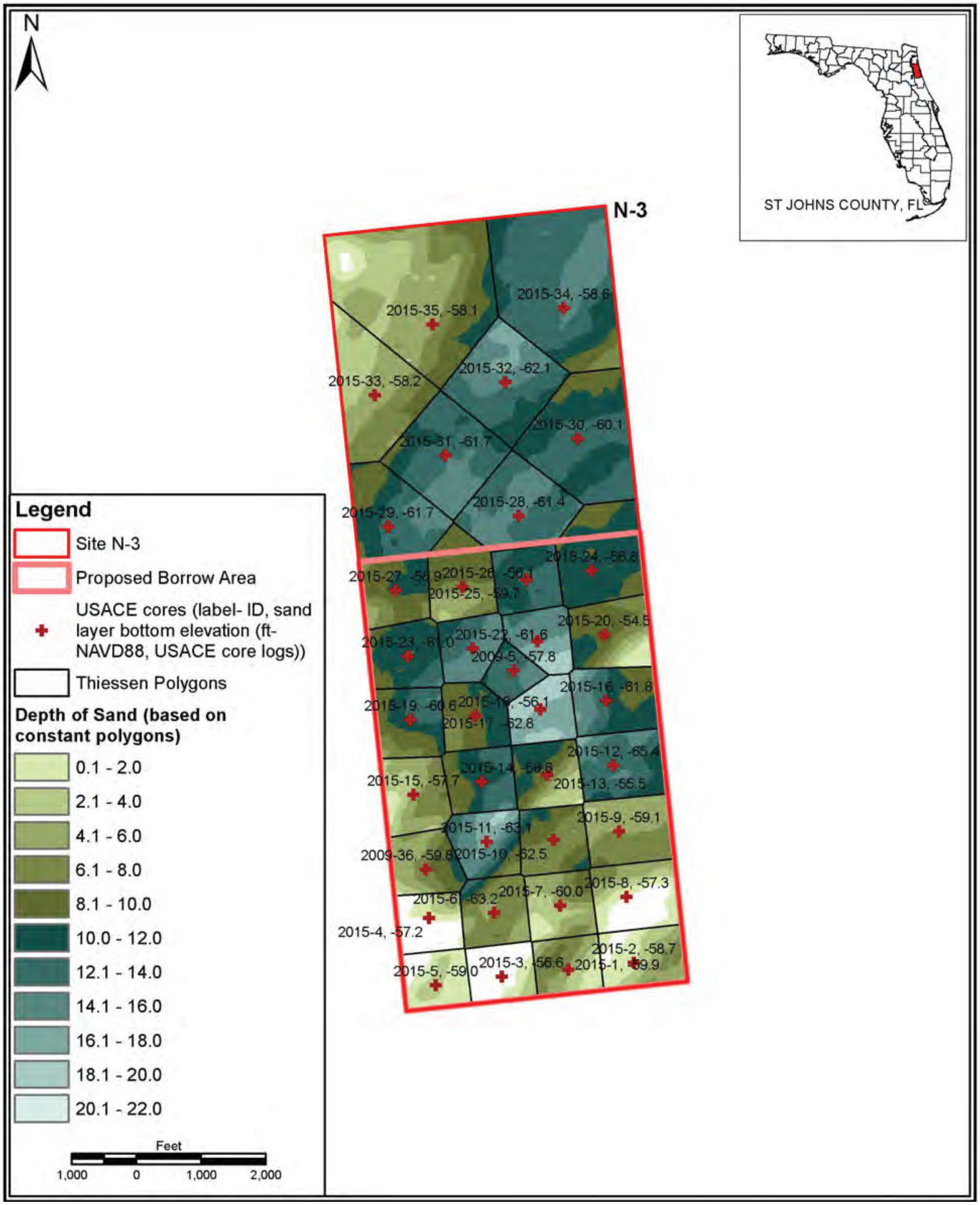


Figure 3.3 Maximum Beach Quality Sand Depth Contours within N-3

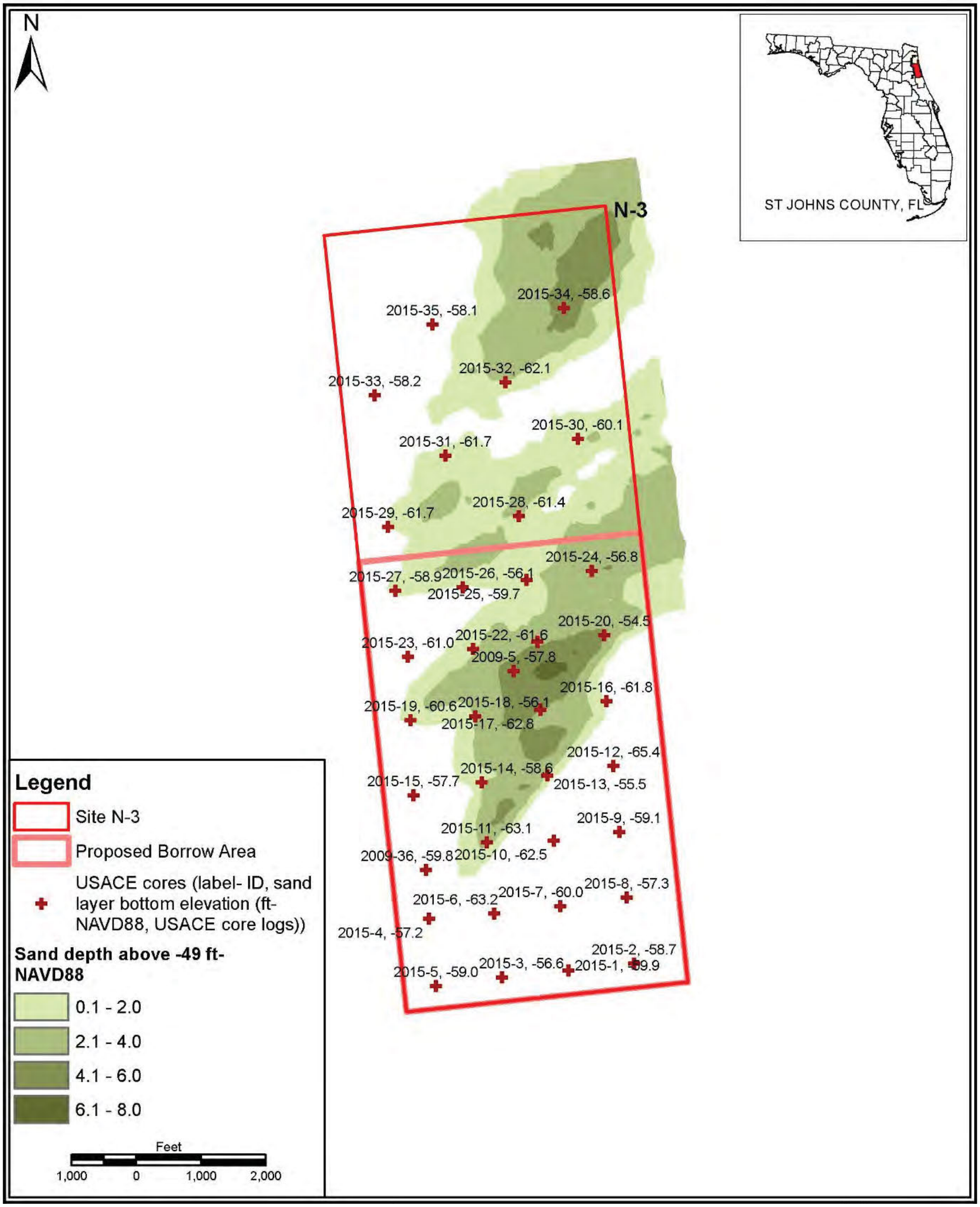


Figure 3.4 Beach Quality Sand Depth Contours Above -49 ft NAVD within Proposed Borrow Area

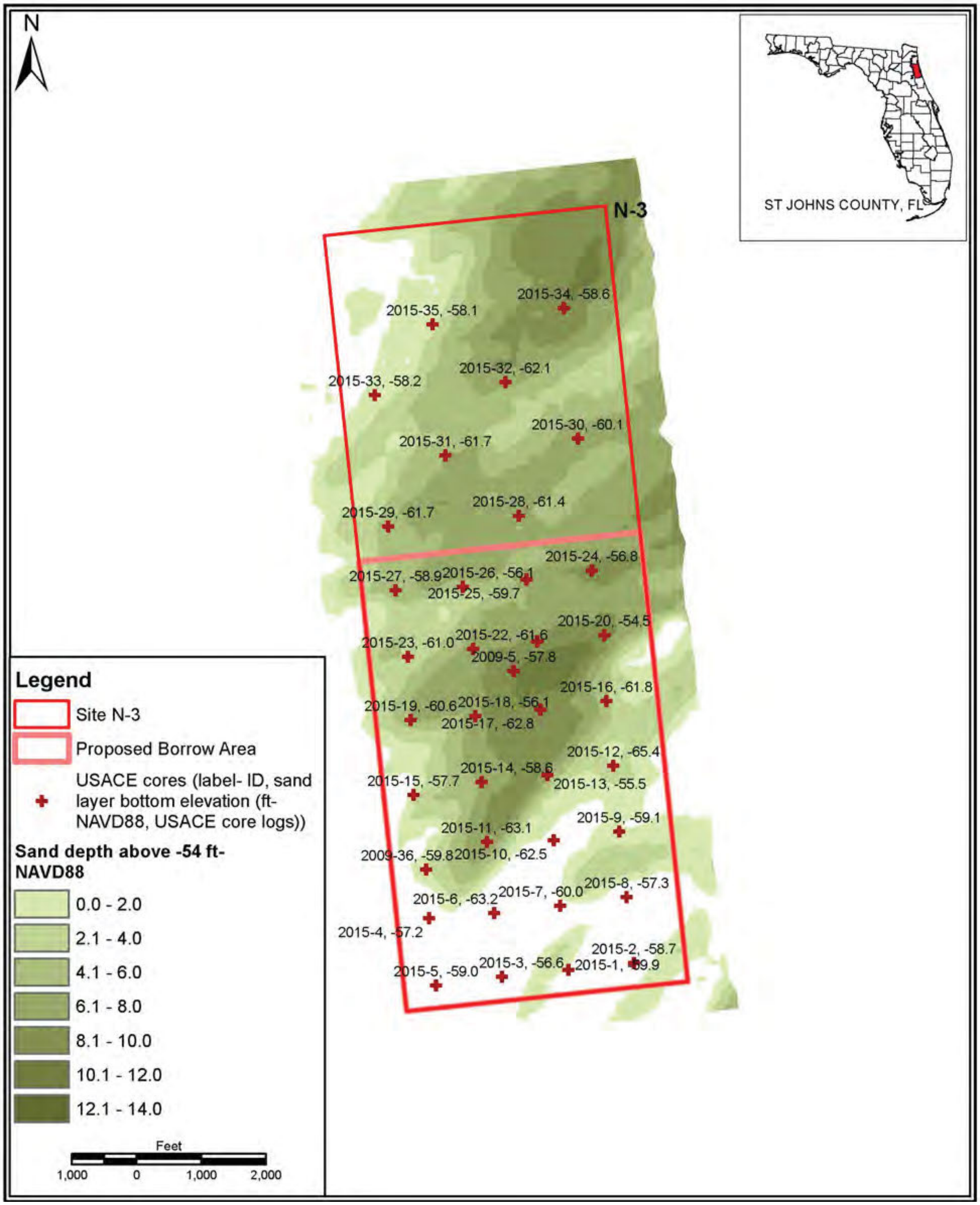


Figure 3.5 Beach Quality Sand Depth Contours Above -54 ft NAVD within Proposed Borrow Area

REFERENCES

PBS&J. 2009. *St. Johns County Shore Stabilization Feasibility Study for South Ponte Vedra and Vilano Beach Region.* Tampa, Florida.

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USACE. 2015. *St. Johns County, Florida South Ponte Vedra Beach, Vilano Beach, and Summer Haven Reaches Coastal Storm Damage Risk Management Project Draft Integrated Feasibility Study and Environmental Assessment*. Jacksonville, Florida.

ATTACHMENT A

ST. JOHNS COUNTY, FLORIDA SOUTH PONTE VEDRA BEACH, VILANO BEACH, AND SUMMER HAVEN REACHES COASTAL STORM RISK MANAGEMENT PROJECT DRAFT INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT APPENDIX D GEOTECHNIAL

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

ATTACHMENT B

SUBMERGED CULTURAL RESOURCES SURVEY, OFFSHORE BORROW AREA N-3, ST. JOHNS COUNTY, FLORIDA

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

ATTACHMENT C

GEOTECHNICAL ANALYSIS OF NATIVE BEACH SAMPLES COLLECTED FROM ST. JOHNS COUNTY, FLORIDA

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

ATTACHMENT D

SITE N-3 CORE LOGS

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

ATTACHMENT E

SITE N-3 GRADATION CURVES

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

ATTACHMENT F

SITE N-3 CORE PHOTOS

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

ATTACHMENT G

SEDIMENT SAMPLE DATA SUMMARY TABLE

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

Appendix B

Environmental Assessment
St. Johns County Emergency Beach Berms

Environmental Assessment

St. Johns County Emergency Beach Berms
St. Johns County, Florida

FEMA-DR-4283-FL
FEMA-DR-4337-FL

September 2019

U.S. Department of Homeland Security
Federal Emergency Management Agency
Region IV Atlanta, Georgia

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Correspondence E – State Historic Preservation Office (SHPO) Concurrence Letter

LIST OF ACRONYMS

BO	Biological Opinion
CBIA	Coastal Barrier Improvement Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
CY	Cubic Yards
CZMA	Coastal Zone Management Act
DHS	Department of Homeland Security
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
IPaC	Information for Planning and Consultation
JCP	Joint Coastal Permit
MBTA	Migratory Bird Treaty Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PA	Public Assistance
PL	Public Law
SHPO	State Historic Preservation Office
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
US SR A1A	United States State Road A1A
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WSS	Web Soil Survey

1.0 INTRODUCTION

Hurricane Matthew impacted Florida between October 3, 2016 and October 19, 2016, bringing strong winds, storm surge, and flooding. President Obama signed a disaster declaration (FEMA-4283-DR-FL) on October 8, 2016 authorizing the Department of Homeland Security's (DHS) Federal Emergency Management Agency (FEMA) to provide federal assistance to the designated areas of Florida. Subsequently, Hurricane Irma impacted the State of Florida between September 4, 2017 and October 18, 2017, also bringing strong winds, storm surge, and flooding. President Trump signed a disaster declaration (FEMA-4337-DR-FL) on September 10, 2017 authorizing federal assistance in Florida. This is assistance is provided pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), and Public Law (PL) 93-288, as amended. Section 403 of the Stafford Act authorizes FEMA's Public Assistance (PA) Program to provide assistance essential to meeting immediate threats to life and property resulting from a major disaster.

St. Johns County, Florida was designated in both disasters to received federal assistance. St. Johns County has applied through the PA Program to receive funding to install emergency beach berms along a total of nine (9) beach reaches, encompassing approximately 30.6 miles within a 41.5 miles stretch of coastline, situated east of United States State Road A1A (US SR A1A), between Florida Department of Environmental Protection (FDEP) reference monuments R-1 on the north end and R-209 on the south end. The berms within the project area were all existing prior to both Hurricane Matthew and Hurricane Irma. Most of the beach reaches are natural beaches with no previous sand placement activities; the two exceptions are the beach reach between R-100 and R-117 (South Ponte Vedra Beach III), and the beach reach between R-197 and R-209 (Summer Haven Beach). A single sand placement event occurred within the South Ponte Vedra Beach III reach in May 2017, prior to Hurricane Irma, and approximately eleven (11) sand placement events have occurred within the Summer Haven Beach reach between 1992 and 2017.

The subrecipient will be coordinating with USACE and FDEP to obtain any necessary permits and will comply with applicable conditions.

This draft Environmental Assessment (EA) has been conducted in accordance with the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508) and regulations adopted pursuant to Department of Homeland Security Directive 023-01, Rev 01, and FEMA Directive 108-1.

2.0 PURPOSE AND NEED

The purpose of this project is to address erosion damage from Hurricane Matthew and Hurricane Irma to the existing eroded dune system, or beach berms, along the coastline in St. Johns County. The need for this project is to address concerns regarding the protection of existing developed property, including public roads and residential homes, in the vicinity of the project area. Prior to the erosion of the coastline, the beach berms served as inland flood protection barriers and minimized the loss of human life and property. Therefore, the need for repairing the dune system erosion will temporarily improve the capacity of the shoreline to withstand future storm events, reducing the risks to human life and improved property, as well as reducing further erosion of the coastal dune system.

3.0 PROJECT LOCATION AND BACKGROUND

The project is located in St. Johns County, Florida along the Atlantic Coast, encompassing approximately 30.6 miles within a 41.5 miles stretch of coastline east of Ponte Vedra Boulevard, also known as US SR A1A, between FDEP St. Johns County reference monuments R-1 and R-46 (Ponte Vedra Beach I and II), R-67 and R-122 (South Ponte Vedra Beach I, II, and III, and Vilano Beach), R-151 and R-194 (Butler Beach and Crescent Beach), and R-197 and R-209 excluding R-198.4 to R-202 (Summer Haven Beach). US SR A1A extends along the coast in a north-south direction and, in most areas, is roughly 200 to 600 feet inland from the dune system. Residential homes are generally located about 100 to 400 feet inland. The coast of St. Johns County was damaged via storm surge and erosion incurred during Hurricane Matthew in October 2016 and Hurricane Irma in September 2017.

4.0 ALTERNATIVES

The alternatives considered in addressing the purpose and need stated are the No Action Alternative and the Preferred Action Alternative, which is the replacement of sand along the coast between FDEP St. Johns County reference monuments R-1 and R-209.

4.1 Alternative 1: No Action Alternative

Under the No Action Alternative, the coastal dune (beach berm) restoration project would not be constructed. Consequently, the area and improved property in the vicinity of the shoreline would not be protected from future storm events. Additionally, ongoing erosion would continue along the shoreline, the available habitat for listed threatened and endangered species would continue to degrade, and the recreational value created by the beaches would continue to decrease. Therefore, the No Action Alternative has the potential to negatively affect improved property, the environmental habitat, and tourism and economy in the vicinity of the coastline.

4.2 Alternative 2: Sand Placement to Restore the Beach Berms (Proposed Action)

Under the Proposed Action Alternative, the temporary beach berm project would proceed along portions of the approximately 41.5 mile stretch of St. Johns County coastline using commercial upland sources of beach compatible sand. The proposed project will temporarily increase the level of storm protection to the existing shoreline, available habitat, and existing improved property to withstand a 5-year flooding event. The proposed project will maintain a viable beach and dune system for nesting habitat for threatened and endangered species, such as sea turtle and beach mice species, as well as protect and maintain nesting habitat for shorebird species, including the piping plover. The proposed project will also restore the recreational value of the publicly-accessible shoreline along the beaches within St. Johns County.

St. Johns County has submitted applications to FEMA for funding under the PA program to repair damages as a result of Hurricane Matthew (FEMA-4283-DR-FL) and Hurricane Irma (FEMA-4337-DR-FL). The proposed projects will replace sand lost along approximately 41.5 miles of beaches in St. Johns County associated with nine (9) different beach reaches. St. Johns County is proposing to replace approximately 585,396 cubic yards (CY) of lost sand attributable to Hurricane Matthew and approximately 471,036 CY of lost sand attributable to Hurricane Irma, for a collective total of approximately 1,056,432 CY of sand. St. Johns County will obtain beach compatible sand from commercial upland sources. The project is located between FDEP St. Johns County reference monuments R-1 (30.252931, -81.380869) and R-46 (30.127754, -81.347772), R-67 (30.068446, -81.333530) and R-122 (29.914020, -81.289171), R-151 (29.832208, -81.264581) and R-194 (29.717161, -81.230789), and R-197 (29.704106, -81.227547) and R-209 (29.672008, -81.214031) excluding R-198.4 to R-202.

4.3 Impact Evaluation

The Council on Environmental Quality (CEQ) notes: “Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial” (40 CFR 1508.8).

When possible, quantitative information is provided to establish potential impacts; otherwise, the potential qualitative impacts are evaluated based on the criteria listed in Table 4.0.1:

Table 4.0.1: Impact Significance and Context Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	The resource area would not be affected and there would be no impact, OR changes or benefits would either be non-detectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale impacts/benefits. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences/benefits on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

The Scoping Checklist (Appendix A) evaluates the potential environmental direct and indirect impacts to Physical, Water, Coastal, Biological, Cultural, and Socioeconomic Resources for the No Action and Proposed Action alternative. If the potential impact to the resource was determined to be “None/Negligible” or “Minor”, the impacts to those resources are only included within the Scoping Checklist. The impacts anticipated to be “Moderate” are further discussed below. No resources are anticipated to have “Major” impacts. A summary of the potential impacts of the No Action and Proposed Action alternatives on Biological Resources is discussed in the table below:

Table 4.0.1: Summary of Affected Environment and Potential Impacts from Section 5 of this EA for the No Action Alternative and the Preferred Action Alternative

Area of Evaluation	Alternative 1: No Action	Alternative 2: Proposed Action
Physical Resources	**None/Negligible**: No impacts to the existing geology and soils, air quality, aesthetics, and climate change; the existing eroded coastal dunes would remain, with the potential of further erosion from future storm events.	**Minor**: The existing geology and soils are anticipated to be restored to pre-disaster conditions, however, the sand would be sourced from commercial upland sources. Minor short-term impacts to air quality may occur due to exhaust emissions from construction equipment.
Water Resources	**None/Negligible**: No impact to the water quality, floodplain, or wetlands, however, the risk of continued flooding exists to improved property near the project areas.	**Minor:** The restoration of the coastal dune system would occur within the floodplain and reduce the flood risk to improved property. Short-term impacts to wetlands may occur as the placement of sand could increase the turbidity of the water, causing short-term impacts to commercial and recreational fisheries. The long-term impact to the marine wetlands would be beneficial for preserving habitat and the recreational value of the shoreline, as well as reducing the rate of sand loss and erosion of the coastal dune system from future storms.
Coastal Resources	**None/Negligible:** No impacts to the coastal zones would occur as no work would be conducted, and the erosion of the coastline may continue.	**Minor:** The activity and construction would occur in the coastal zones, and the project would restore the eroded areas of the shoreline by replacing beach compatible sand to a designed beach profile meant to mimic the natural dune system.

Area of Evaluation	Alternative 1: No Action	Alternative 2: Proposed Action
Biological Resources	**None/Negligible:** No impacts to biological resources would be anticipated, as no work would be conducted. The continuing erosion could lead to ongoing dune vegetation loss due to escarpment, and suitable habitat, nesting habitat, and foraging habitat would continue to be reduced. The possibility of a "take" would not occur since there would be no destruction or adverse modification of the surrounding habitat.	**Moderate:** The restoration of the coastal dune system would likely cause short-term impacts to species along the shoreline. These actions may adversely affect nesting sea turtles and their hatchlings, and potentially cause a disruption in the foraging habitat for species during construction. However, once the project is complete, the coastal dune system will provide long-term positive effects by providing a restored habitat and foraging area.
Cultural Resources	**None/Negligible:** No impacts to cultural resources would be anticipated, as no work would be conducted.	**Minor:** The restoration of the coastal dune system project received concurrence from the SHPO with the determination of no adverse effects to historic properties.
Socioeconomic Resources	**None/Negligible:** No disproportionate impacts on minority or low-income populations would be anticipated.	**None/Negligible:** No disproportionate or adverse impacts to minority or low-income populations would be anticipated. The coastal dune system would be restored with no changes to the pre-existing design and footprint. The project would benefit all population members.

5.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

5.1 BIOLOGICAL RESOURCES

5.1.1 Wildlife and Fish

5.1.1.1 Existing Conditions

Ponte Vedra Beach I and II, South Point Vedra Beach I and II, Vilano Beach, Butler Beach, and Crescent beach are natural beaches; portions of South Ponte Vedra III, Vilano Beach, and Summer Haven Beach have previously been re-nourished. The beaches and coastal dune system along the shoreline in St. Johns County are extensively eroded from storm surge and wave action as a result of Hurricane Matthew and Hurricane Irma. The natural sandy beaches serve as foraging and nesting habitats for species, such as crabs, insects, and birds. Sea oats and other beach plants can be found along undisturbed areas of the beach and coastal dune system.

5.1.1.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative, no work would occur. There would be no impacts to infaunal populations or foraging and nesting habitat for shorebirds and seabirds.

Alternative 2: Proposed Alternative

Under the Proposed Action Alternative, environmental impacts to species along the shoreline and coastal dune system are anticipated due to the sand placement activities. The intertidal areas of sandy beaches are generally populated by small, short-lived organisms with high reproductive potential. The sand placement activities will bury the majority of the existing benthic infauna within the project areas, resulting in nearly complete mortality of infaunal communities. Changes in the infaunal community structure following the sand placement are anticipated based upon differences in generation time and reproductive strategies of infaunal organisms. Additionally, crab and clam species may experience short-term adverse impacts. However, the affected areas are expected to recover over time, so the long-term impacts are expected to be minor.

The foraging habitat for shorebirds would also be affected, as the majority of the impacts to the infauna populations will be in the shallow waters of the surf zone. The decline in the infaunal prey density may contribute to the short-term decline in shorebird and seabird presence and usage of the project areas. Also, the construction activities may occur during nesting season, which increases the potential for short-term adverse impacts to bird species. The restored coastal dune system may also increase the recreational usage of the beaches, which may adversely affect nesting shorebirds by the increased human disturbance on the beach.

5.1.2 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 provides for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead Federal agencies for implementing ESA are the USFWS and the U.S. National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). The law requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a “take” of any listed species of endangered fish or wildlife.

5.1.2.1 Existing Conditions

Potential threatened and endangered species that may be present in the project area were identified by accessing the USFWS Information for Planning and Consultation (IPaC) database on March 19, 2019. The endangered species likely to occur in the project area are the Anastasia Island beach mouse (*Peromyscus polionotus phasma*), Red-cockaded woodpecker (*Picoides borealis*), Hawksbill sea turtle (*Eretmochelys imbricate*), and Leatherback sea turtle (*Dermochelys coriacea*). The threatened species likely to occur in the project area are the West Indian manatee (*Trichechus manatus*), Piping plover (*Charadrius melodus*), Red knot (*Calidris canutus rufa*), Wood stork (*Mycteria Americana*), Eastern indigo snake (*Drymarchon corais couperi*), Green sea turtle (*Chelonia mydas*), Loggerhead sea turtle (*Caretta caretta*), and Frosted flatwoods salamander (*Ambystoma cingulatum*). While there is no designated critical habitat within the boundaries of the project areas, there is designated critical habitat for the Loggerhead sea turtle located immediately north of FDEP reference monument R-1 (beginning at the county line between Duval County and St. Johns County), and immediately south of FDEP reference monument R-194 at the Matanzas Inlet. The shoreline and associated coastal dune system associated with the project area is suitable habitat for the Anastasia Island beach mouse, suitable nesting habitat for the listed sea turtles, as well as foraging habitat for the piping plover and red knot.

5.1.2.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative, no work would occur. Therefore, there would be no potential for effects and no further responsibility under the ESA. Suitable beach mouse habitat, sea turtle nesting habitat, and foraging habitat for shore birds would continue to be reduced in the project area due to coastal erosion.

Alternative 2: Sand Placement to Restore the Beach Berms (Proposed Action)

Under the Proposed Action Alternative, environmental impacts to species along the shoreline and coastal dune system are anticipated due to the sand placement activities. Therefore, the project will be required to meet the terms and conditions of the USFWS Biological Opinion (BO) for FEMA Emergency Berm Repair for the Florida Coast (dated April 3, 2008). If the sand placement activities occur during sea turtle nesting season, these actions may adversely affect nesting sea turtles and their hatchlings. The terms and conditions require the following: installation of beach compatible sand; monitoring, surveying, and potential relocation of nests; escarpment monitoring; nighttime storage of equipment off the beach during nesting season; and the compaction of sand. These conditions will minimize impacts to species during the construction of the emergency berm as well as the potential impacts the altered beach conditions may have on nesting sea turtles and their hatchlings, including long-term impacts related to nesting capabilities of the beach. Additionally, the terms and conditions of the USFWS BO specify existing beach access points to be utilized to facilitate reduced impacts to beach mice and their associated habitat.

Short-term adverse impacts may also be expected to the piping plover and other shorebird species due to the disruption in the foraging habitat during construction activities. The terms and conditions of the USFWS BO requires surveys for piping plovers, their habitat, and the removal of exotic vegetation to assist in minimizing the potential affects to piping plovers and other shorebirds.

5.1.3 Migratory Birds

The Migratory Bird Treaty Act (MBTA) of 1918 provides a program for the conservation of migratory birds that fly through lands of the United States. The lead Federal agency for implementing the MBTA is the USFWS. The law requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any migratory birds or result in the destruction or adverse modification of designated critical habitat of such species. The law makes it illegal for anyone to "take," possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, feathers, nests, or eggs. "Take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities."

5.1.3.1 Existing Conditions

The entire state of Florida is considered a flyway zone for migratory birds. Approximately fifty (50) migratory bird species were identified as being potentially within the project areas by accessing the USFWS IPaC database on March 19, 2019. The listed migratory bird species have a varying range for probability of presence within the project vicinity throughout the year, and approximately half of the species have a designated breeding season which could occur within the project vicinity. The shoreline and coastal dune system associated with the project area is suitable foraging habitat for the species known to occur along the coast and near aquatic habitats.

5.1.3.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative, no work would occur. Therefore, there would be no potential for effects and a "take" would not occur since there would be no destruction or adverse modification of the surrounding habitat. Suitable foraging habitat for shore birds would continue to be reduced in the project area due to coastal erosion.

Alternative 2: Sand Placement to Restore the Beach Berms (Proposed Action)

Under the Proposed Action Alternative, impacts to species which may be found along the shoreline and coastal dune system could occur due to the sand placement activities. If the sand placement activities occur during breeding season, these actions may adversely affect nesting shore birds and their young, and the disruption in the foraging habitat during construction activities could cause short-term impacts for migratory bird species near the project area. However, once the project is complete, the coastal dune system will begin to provide long-term positive affects by providing a restored habitat and foraging area for these species.

The project will be required to meet the terms and conditions of the USFWS Biological Opinion for FEMA Emergency Berm Repair for the Florida Coast (dated April 3, 2008), and applicable FDEP permit if required, for the project, which will include shorebird conditions and requirements that will mitigate impacts to migratory bird species.

6.0 CUMULATIVE IMPACTS

Per the Council on Environmental Quality (CEQ) regulations, cumulative impacts are the impacts on the environment which, "results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). In accordance with NEPA, this EA considered the combined effect of the preferred alternative and other actions occurring or proposed in the vicinity of the proposed project site.

The shoreline of the project area is currently largely developed with residential housing. The proposed project will temporarily increase the level of storm protection to the existing shoreline, available habitat, and existing improved property to withstand a 5-year flooding event. The overall impacts on the functionality of the floodplain is anticipated to be minor, as the project will facilitate temporary restoration of the shoreline damaged by Hurricane Matthew and Hurricane Irma. The proposed project is not anticipated to result in significant adverse impacts on floodplains, as the continued occupancy of the floodplain by existing residences should not result in long-term alteration of the natural beach dynamics and floodplain hydrology within the project areas. Federal and state permits, as applicable, will be obtained which will outline any possible compensatory mitigation for impacts to surface waters and wetlands incurred by the proposed projects.

The St. Johns County shoreline and associated coastal dune system has regularly sustained damages from tropical storms and hurricanes. The natural fluctuation in the topography of the existing beaches is compounded by previous and current ongoing attempts to restore the areas through dredging and placing sand along the shoreline. Future construction of engineered beaches is planned in conjunction with the USACE for Vilano Beach and Summer Haven Beach. These beaches will become engineered and maintained facilities, likely requiring future re-nourishments due to storm and background erosion as part of the ongoing shoreline stabilization efforts in St. Johns County. Specifically, in 2019, the USACE plans to dredge from the Atlantic Intercoastal Waterway and place the dredge material along Summer Haven Beach southward from near R-204, which includes a former breach area caused by Hurricane Matthew. Additionally, the St. Augustine Port, Water, and Beach District plans to dredge the Summer Haven River and place the dredged material along Summer Haven Beach north of R-204 in 2019.

The proposed action to reconstruct beach berms is not expected to have significant adverse cumulative impacts on any resource based on the review conducted when added to past, present, and reasonably foreseeable future actions within the proposed project area.

7.0 PERMITS AND PROJECT CONDITIONS

1) FDEP Joint Coastal Permit (JCP) or Coastal Construction Control Line (CCCL) Permit, as applicable, and associated applicable conditions;

2) USACE Individual Permit, if required, and associated applicable conditions;

3) USFWS Biological Opinion for FEMA Emergency Berm Repair for the Florida Coast (dated April 3, 2008), and applicable conditions, including modifications to sand specifications and sand inspection requirements as approved by USFWS under FWS Log No. 2019-I-0974 (dated September 17, 2019):

   a) For berm material obtained from an upland source:
      i) Sand Specifications
         (1) The fill material shall be beach compatible and meet the specifications required by Florida Administrative Codes 62B-41.007 (2)(j) and 62B-33.002 (8). In addition, the fill shall meet the following requirements:
         (2) The fill material to be placed at the work area shall be clean sand from a permitted upland source, free of construction debris, asphalt, gravel, rocks, clay balls, branches, leaves and other organics, components prone to cause cementation, oil, pollutants and any other non-beach compatible materials. The sand shall be similar to the existing beach sediments in color and texture.
         (3) Beach compatible fill that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system, similar to the characteristics of native beach sediment, predominately comprised of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm and 4.76mm (classified as sand by either the Unified Soils or the Wentworth classification), and shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the native beach sediment or to the material in the existing coastal system at the disposal site and shall not contain:
            (a) Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve,
            (b) Greater than 5 percent, by weight, fine gravel retained on the #4 sieve,
            (c) Coarse gravel, cobbles or material retained on the ¾-inch sieve in a percentage or size greater than found on the native beach,
            (d) Construction debris, toxic material or other foreign matter; and,
            (e) Not result in cementation of the beach.
         (4) If sand from multiple sources is used, the materials should be mixed at the beach access sites before it is transferred to the beach so that sand will be consistent throughout the placement areas. On site mixing should not be done to achieve beach

quality material, rather mixing would be done to make the fill aesthetically consistent due to the fact that the multiple sources are beach quality material.

ii) Post Placement Sampling

(1) After material is placed on the beach and graded to template, sand sample will be collected along the constructed dune at a rate of one sample per 1,000 cubic yards of placed material. The location of the sampling sites will be recorded with GPS. These samples will be quantitatively assessed for grain size analysis using the No. 230, 200, 170, 140, 80, 60, 45, 35, 25, 18, 14, 10, 7, 5, 4 and 3/4" sieves. Samples will also be assessed for color and carbonate content. The results from the quantitative analysis will be submitted to DEP within 90 days after completing construction.

iii) Compliance and Remediation

(1) Continuous inspection of material upon arrival to the beach access site will minimize the likelihood of non-compliant material being placed. If initial post placement sampling indicates non-compliant material may have been placed, more extensive sampling and quantitative assessment will be conducted for the area in question to determine the extent of non-compliance, if any. In the event it is concluded that material has been placed that does not meet the specifications required by Florida Administrative Codes 62B-4 l .007 (j) and 62B-33.002 (8) the applicant will consult with the Service and FDEP to determine the most appropriate solution, including removal and replacement of the material if necessary; subject to constraints imposed by marine turtle nesting activity.

(2) For emergency berm construction and repair projects in St. Johns County, Florida, emergency berm construction and repair activities may occur during the nesting season except on publicly owned conservation lands such as state parks and areas where such work is prohibited under local land use codes.

(a) Prior to any sand placement, all disaster related debris including derelict coastal armoring shall be removed from the beach to the maximum extent practicable. Debris removal activities shall be conducted during daylight hours and during the dates of April 15 to November 30 and shall not commence until completion of the sea turtle survey each day.

(b) The emergency berm shall have a slope of l.5:1 followed by a gradual slope of 4:1 for approximately 20 feet seaward.

(3) The FEMA grant applicant shall ensure that the contractors conducting the work provide predator proof trash receptacles for the construction workers. All contractors and their employees shall be briefed on the importance of not littering and keeping the project area trash and debris free. Predator proof trash receptacles shall be installed and maintained at all access points, eating areas, and rest-room areas.

(4) Educational signs shall be placed where appropriate at beach access points explaining the importance of species such as sea turtles, beach mice, and piping plovers that are dependent on coastal habitats and ways to minimize human impacts. The Service can provide design ideas (Share the Shore Signs). These signs shall also include existing ordinances such as Animal Control Ordinances, informing beach users about the County/Municipality's ordinance that will minimize the harassment of sea turtles, beach mice and piping plovers. These signs shall be maintained for the life of the project, or five (5) years, whichever is lesser.

(5) The FEMA grant applicant shall arrange a meeting between representatives of the contractor, the Service, the FWC, and the permitted sea turtle surveyor at least 10 days prior to the commencement of work on this project. At least 5 days advance notice shall be provided prior to conducting this meeting. This will provide an opportunity for explanation and clarification of the species protection measures as well as additional guidelines when construction occurs such as storing equipment, minimizing driving, and follow up meetings during construction.

iv) Protection of Sea Turtles

(1) For emergency berm construction and repair projects in St. Johns County, Florida:

(a) Daily early morning surveys for sea turtle nests will be required if any portion of the berm construction occurs as follows:

(b) For St. Johns County, nesting surveys shall be initiated 65 days prior to berm placement or by April 15 whichever is later. Nesting surveys shall continue through the end of the project or through November 30 whichever is earlier. If nests are constructed in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed below;

(c) Nesting surveys and egg relocations will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures. All nesting surveys, nest relocations screening or caging activities etc. shall be conducted only by persons with prior experience and training in these activities and who is duly authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-l. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones). The contractor shall not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

(i) Only those nests that may be affected by construction activities will be relocated. Nests requiring relocation shall be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Relocated nests shall not be placed in organized groupings; relocated nests shall be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, or subject to artificial lighting. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests.

(ii) Nests deposited within areas where construction activities have ceased or will not occur for 65 days shall be marked and left *in situ* unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at a point landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest. No activity will occur within this area nor will any activities occur which could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the restoration activity.

(d) Immediately after completion of the project and prior to April 15 for 3 subsequent years, sand compaction shall be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the FWC, and the Applicant or local sponsor. At a minimum, the protocol provided below shall be followed. If tilling is required, the area shall be tilled to a depth of 36 inches. All tilling activity shall be completed prior to those dates listed above.

(e) Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling. If the project is completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. (NOTE: The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.) A report on the results of the compaction monitoring shall be submitted to the Service's North Florida Ecological Service Office, 6620 Southpoint Drive South, Suite #310, Jacksonville, Florida 32216, prior to any tilling actions being taken.

(i) Compaction sampling stations shall be located at 500-foot intervals along the project area One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station shall be midway between the dune line and the high water line (normal wrack line).

(ii) At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole and disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final 6 averaged compaction values.

(iii) If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area shall be tilled immediately prior to the following dates listed above.

(iv) If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

(v) Tilling shall occur landward of the wrack line and avoid all vegetated areas three square feet or greater with a 3 square foot buffer around the vegetated areas.

Visual surveys for escarpments along the project area shall be made immediately after completion of the project and prior to April 15 for 3 subsequent years. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation.

If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. Surveys for escarpments shall be conducted weekly. Results of the surveys shall be submitted within one month to the Service's appropriate Field Office prior to any action being taken during the nesting season. The Service shall be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted to the Service. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach).

Staging areas for construction equipment shall be located off the beach to the maximum extent practicable from April 15 to November 30.

Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes shall be off the beach to the maximum extent possible. Temporary storage of pipes on the beach shall be in such a manner so as to impact the least amount of nesting habitat and shall not compromise the integrity of the dune systems. Pipes placed parallel to the dune shall be five to ten feet away from the toe of the dune (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

v) Protection of Beach Mice

(1) Existing beach access points shall be used for vehicle and equipment beach access to the maximum extent practicable. Existing access may be expanded to accommodate project work equipment and vehicles. These accesses shall be delineated by fence or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The accesses shall be fully restored to pre-project work configuration following project completion. Equipment and material staging/storage areas for the project shall be located outside of vegetated dune habitat and public lands. No storage of equipment or materials shall occur on the beach or dunes at any time of year. Parking areas for construction crews shall be located as close as possible to the work sites, but outside of vegetated dunes to minimize impacts to existing habitat and the need to transport workers along the beachfront. The number of beach access sites for vehicles and equipment shall be minimal, clearly marked. All access and staging areas shall be restored upon completion of emergency berm construction and repair.

(2) The creation of new or expansion of existing beach accesses within beach mouse habitat for vehicles and equipment authorized no more than every 4 miles. The accesses shall be delineated by fence or other suitable material to ensure vehicles and equipment transport stay within the access corridor. These accesses shall be fully restored following project completion.

vi) Protection of Piping Plovers

(1) The FEMA or their grant applicant shall consult individually for the following emergency berm construction and repair projects located in:

(a) Designated piping plover critical habitat units;

(b) Florida State Parks and other non-federal public lands except to protect "existing structures" such as offices or restroom facilities. Berm placement to protect coastal roads, parking lots, boardwalks, picnic tables, gazebos, light poles, and benches require separate consultations and are not covered under "existing structures". Federal lands are exempt for FEMA berm funds.

(2) FEMA or their grant applicant shall conduct either the following Term and Condition or "Protection of Piping Plovers prior, during, and after the project (b)(i)-(ix):"

(a) FEMA or their grant applicant shall contribute at least $3,100 for each mile or $0.60 per linear foot of berm constructed. The Service will take the lead and work with FEMA or the grant applicant to develop a mechanism for receiving and allocating these monies. The funds will be used towards the management and monitoring of piping plovers and their habitat on public or private lands which have a demonstrated use or potential use by piping plovers. Management may include but not be limited to posting and roping important use areas, enforcement of pet ordinances, and protection of closed off areas. Monitoring may assist in summarizing the status of plovers and their habitat. Trends in areas used by piping plovers may also be assessed in portions of Florida depending on data collected as funding allows." An oversight committee will be formed and they will determine funding allocation. Funds (federal, state or private) from outside sources may contribute to this "Shorebird Conservation Funding Program." These funds are to be used to minimize potential impacts to areas that may be used by piping plover that may be displaced permanently or temporarily by the project.

OR

(b) Protection of piping plover prior, during, and after the project:

(i) Prior to construction, survey and map onto aerial photography, throughout the project area, optimal non-breeding piping plover habitat (low lying areas, washover passes, inlets, ephemeral ponds, lagoons, and mud and sand flats).

(ii) Avoid berm placement in optimal piping plover habitat whether existing or newly created by storm events. If these areas cannot be avoided, the FEMA grant applicant shall arrange a meeting between representatives of the contractor, the Service, and the FWC, at least 10 days prior to the commencement of work on this project to discuss avoidance and minimization of impacts to the habitat.

(iii) Avoid berm placement within 300 feet of inlets (dune lakes, bay inlets, island inlets, etc.) and any open body of water except GOM or Atlantic Ocean. If this requirement is not feasible, the FEMA grant applicant shall arrange a meeting between representatives of the contractor and the Service at least 10 days prior to the commencement of work on this project to discuss avoidance and minimization of impacts to the habitat.

(iv) If piping plovers are reported in the project area, poles or pier pilings occurring within 300 feet of optimal piping plover habitat shall be reported to the Service. The FEMA grant applicant shall coordinate a meeting with the Service to discuss retro-fitting these poles to reduce avian predation.

(v) Conduct surveys for non-breeding piping plover in the project area daily starting two weeks prior to project initiation for the duration of the berm construction period between July 15 and May 15 (10 months of the year), if optimal non-breeding piping plover habitat is documented in the project area. Submit daily piping plover survey results to the Service with maps documenting the locations of piping plovers (with GPS coordinates or latitude and longitude coordinates) if seen during this survey period.

(vi) Conduct bi-monthly surveys for piping plovers in the project areas from July 15 through May 15 of each year (10 months of the year) beginning two weeks post construction and continuing for the duration of the berm. Maintain information in a database (e.g. Access or Excel). Report negative and positive survey data and the amount and type of recreational use documented. Record piping plover locations with a Global Positioning System (GPS), habitat type used (intertidal area, mid-beach, etc.), and observed behavior (foraging, roosting, etc.). Incorporate all information collected into the database. Guidelines for conducting surveys are included in Appendix C. Submit yearly piping plover survey results (datasheets and database) to the Service (Table 20) with maps documenting the locations of piping plovers (with GPS coordinates or latitude and longitude coordinates) when seen.

Conduct at least one of the bi-monthly shorebird surveys April through October on a weekend to document the amount of recreational pressure potentially occurring along the shoreline.

(vii) The FEMA or their grant applicant shall meet with the Service and FWC to discuss areas within the project area where natural organic material (wrack) can remain along the shoreline year-round. Wrack provides important foraging and roosting habitat by piping plovers on winter and migration grounds as well as an abundance of other shorebirds. Protection of wrack will help to offset the impacts of shorebird habitat directly or indirectly impacted by berm placement and ensuing human disturbance.

(viii) When piping plovers or optimal habitat are documented in the project area, "Disturbance Free Zones" shall be posted and roped off at least 300 feet away from the berm construction areas where potential bird resting and feeding are occurring. These areas shall remain roped off for the duration of the project.

(ix) Excluding the Florida Panhandle Counties (Escambia to Jefferson County), surveys for and removal of exotic vegetation shall be conducted annually on the berm and within ten (10) feet on either side of the berm for the duration of the project or five (5) years, whichever is lesser to minimize the chances of an exotic seed source contained in the berm material becomes established on the beach.

Surveys should focus on the removal of all exotics, including the following which are known to impact coastal areas in Florida: Australian pine (*Casuarina equisetifolia*), melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthifolius*), beach naupaka (*Scaevola taccada*), latherleaf (*Colubrina asiatica*), carrotwood (*Cupaniopsis anacardioides*), lantana (*Lantana camara*), sisal (*Agave sisalana*), beach vitex (*Vitex rotundifolia*) and bowstring hemp (*Sansevieria hyacinthoides*).

b) Stabilization of Berms with Vegetation

i) Berms constructed within Perdido Key beach mouse habitat shall be stabilized by planting of native dune vegetation per the requirements provided below. The need to stabilize berms with vegetation in Choctawhatchee, St. Andrew, Anastasia Island, and Southeastern beach mouse habitat shall be coordinated with the North Florida Ecological Service Office, 6620 Southpoint Drive, South Suite # 310, Jacksonville, Florida 32216.

ii) Planting of vegetation on the berms may occur year-round with the following conditions implemented:

(1) Daily early morning sea turtle nesting surveys shall be conducted during the period from May 1 through October 31. Nest surveys shall only be conducted by personnel with prior experience and training in nest surveys. Surveyors shall have a valid FWC permit. Nest surveys shall be conducted daily between sunrise and 9 am. (all times). No dune planting activity shall occur until after the daily turtle survey and nest conservation and protection efforts have been completed.

(2) Nesting surveys shall be initiated 65 days prior to dune planting activities or by May 1, whichever is later. Nesting surveys shall continue through the end of the project or through September 1, whichever is earlier. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys.

(3) Any nests deposited in the dune planting area not requiring relocation for conservation purposes shall be left in situ. The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and highly visible survey ribbon or string shall be installed to establish an area of 3-foot radius surrounding the nest. No planting or other activity shall occur within this area or will any activities occur

which could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the planting activity.

(4) If a nest is disturbed or uncovered during planting activity, the Applicant or their contractors shall cease all work and immediately contact the responsible turtle permit holder. If a nest(s) cannot be safely avoided during planting, all activity within the affected project site shall be delayed until hatching and emerging success monitoring of the nest is completed.

(5) All berm planting activities shall be conducted by hand and only during daylight hours.

(6) All dune vegetation shall consist of coastal dune species native to the local area; (i.e., native to coastal dunes in the respective county and grown from plant stock from that region of Florida). Seedlings shall be at least 1 inch by 1 inch with a 2.5-inch pot. Planting shall be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the area to be planted. Vegetation shall be planted with an appropriate amount of fertilizer and anti-desiccant material, as appropriate, for the plant size.

(7) No use of heavy equipment (trucks) shall occur on the dunes or seaward for planting purposes. A lightweight (ATV-type) vehicle, with tire pressures of 10 psi or less, may be operated on the beach.

(8) All irrigation equipment shall be installed as authorized under a FDEP permit.

iii) Reporting

(1) A report describing the projects conducted during the year and actions taken to implement the reasonable and prudent measures and terms and conditions of this incidental take statement shall be submitted to the Service by March 1 of the following year of completing the proposed work for each year when the activity has occurred. This report will include the project location (include FDEP R-Monuments), project description, dates of actual construction activities, sand source and beach compatibility analysis, names and qualifications of personnel involved in sea turtle nest surveys and relocation activities, descriptions and locations of self-release beach sites, sea turtle nest survey and relocation results and the information outlined in Table 1, acreage of new or widened access areas affected in beach mouse habitat, vegetation completed for new or widened access areas, success rate of vegetation of vegetation, names and qualifications of personnel involved in piping plover surveys, results of the daily piping plover surveys shall be submitted, with maps documenting the locations of piping plover (with GPS points or latitude and longitude coordinates), if observed during the survey period, post-construction maps.

(2) In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project shall be notified so the eggs can be moved to a suitable relocation site.

(3) Upon locating a sea turtle adult, hatchling, or egg, beach mouse, or piping plover, that have been harmed, destroyed, killed or injured as a direct or indirect result of the project, notification shall be immediately made to the FWC at 1-888-404-3922 and the North Florida Ecological Service Office at 904-232-2580.
Care shall be taken in handling injured turtles or eggs, beach mice or piping plovers to ensure effective treatment or disposition and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

Table 1. Sea Turtle Monitoring for Emergency Berm Construction and Repair Projects.

CHARACTERISTIC	PARAMETER	MEASUREMENT	VARIABLE
Nesting Success	False crawls – number	Visual assessment of all false crawls	Number and location of false crawls in nourished area and non-nourished areas: any interaction of the turtle with obstructions, such as groins, seawalls, or scarps, should be noted.
Nesting Success	False crawl – type	Categorization of the stage at which nesting was abandoned	Number in each of the following categories: emergence-no digging, preliminary body pit, abandoned egg chamber.

CHARACTERISTIC	PARAMETER	MEASUREMENT	VARIABLE
Nesting Success	Nests	Number	The number of sea turtle nests in nourished and non-nourished areas should be noted. If possible, the location of all sea turtle nests shall be marked on map of project, and approximate distance to sea walls or scarps measured using a meter tape. Any abnormal cavity morphologies should be reported as well as whether turtle touched groins, seawalls, or scarps during nest excavation
Nesting Success	Nests	Lost Nests	The number of nests lost to inundation, erosion or the number with lost markers that could not be found.
Nesting Success	Lighting Impacts	Disoriented sea turtles	The number of disoriented hatchlings and adults shall be documented and reported in accordance with existing FWC protocol for disorientation events.
Reproductive Success	Emergence & hatching success	Standard survey protocol	Numbers of the following: unhatched eggs, depredated nests and eggs, live pipped eggs, dead pipped eggs, live hatchlings in nest, dead hatchlings in nest, hatchlings emerged, disoriented hatchlings, depredated hatchlings

4) State Historic Preservation Office (SHPO)/ National Historic Preservation Act (NHPA) Conditions:
    a) If human remains or intact archaeological deposits are uncovered, work in the vicinity of the discovery will stop immediately and all reasonable measures to avoid or minimize harm to the finds will be taken. The applicant will assure that archaeological discoveries are secured in place, that access to the sensitive area is restricted, and that all reasonable measures are taken to avoid further disturbance of the discoveries. The applicant's contractor will provide immediate notice of such discoveries to the applicant. The applicant will contact the Florida Division of Historical Resources, St. Johns County Cultural Resource Coordinator (904-209-0623), and FEMA within 24 hours of the discovery. Work in the vicinity of the discovery may not resume until FEMA has completed consultation with the State Historic Preservation Office, County, tribes, and other consulting parties as necessary. If unmarked human remains are encountered during permitted activities, all work will stop immediately, and the proper authorities will be notified in accordance with Florida Statutes, Section 872.05.
    b) Construction vehicles and equipment will be stored onsite during the project or at existing access points within the applicant's right-of-way.
    c) Prior to conducting repairs, applicant must identify the source and location of fill material and provide this information to FDEM and FEMA. If the borrow pit is privately owned, or is located on previously undisturbed land, or if the fill is obtained by the horizontal expansion of a pre-existing borrow pit, FEMA consultation with the State Historic Preservation Officer will be required. Failure to comply with this condition may jeopardize FEMA funding; verification of compliance will be required at project closeout.
    d) Any changes to the approved scope of work will require submission to, evaluation, and approval by the State of Florida, County, and FEMA prior to initiation of any work, for compliance with Section 106 of the NHPA.

8.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

The following agencies and organizations were contacted during the preparation of this EA:

- U.S. Fish and Wildlife Service (North Florida Ecological Services Field Office)
- Florida Division of Historical Resources (SHPO)

FEMA issued a disaster-wide initial public notice for Hurricane Matthew on November 21, 2016, and for Hurricane Irma on October 6, 2017 to notify the public of projects under the Public Assistance program that may be occurring within floodplains.

9.0 LIST OF PREPARERS

Name	Organization	Title
Stephanie Madson	FEMA	Regional Environmental Officer
Larissa Hyatt	FEMA	Environmental and Historic Preservation Advisor
Amanda Calhoun	FEMA	Environmental Specialist
Steven Wirtz	FEMA	Historic Preservation Specialist

APPENDIX A:

Scoping Checklist

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

APPENDIX B:

Documents

NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

APPENDIX C:

Correspondence and Consultations

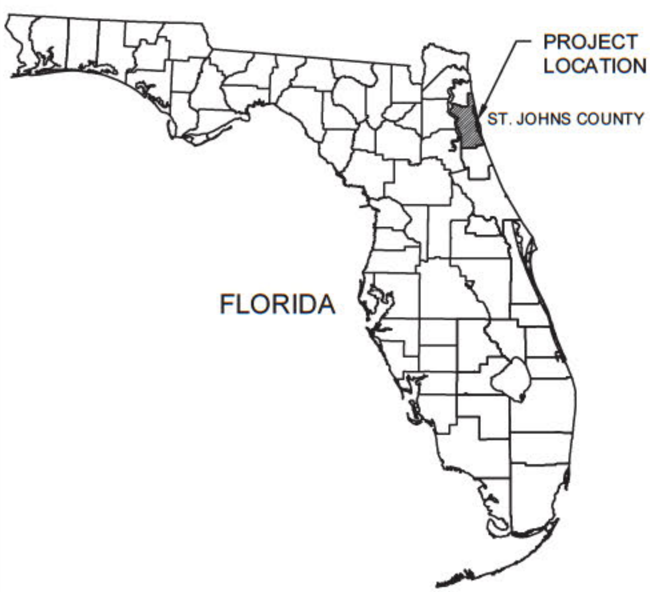
NOTE: THIS SUB-APPENDIX HAS BEEN REMOVED AND CAN BE MADE AVAILABLE UPON REQUEST.

Appendix C

Project Drawings
South Ponte Vedra Beach Restoration Project

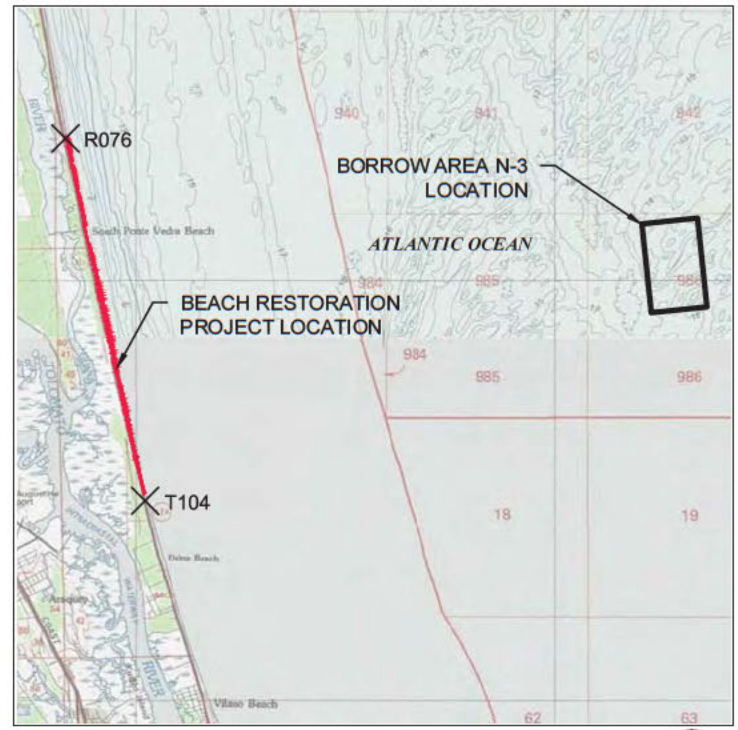
SOUTH PONTE VEDRA BEACH RESTORATION

ST. JOHNS COUNTY, FLORIDA



LOCATION MAP
N.T.S.

DRAWING INDEX



VICINITY MAP
1"= 15,000'

TAYLOR ENGINEERING INC. 10199 SOUTHSIDE BLVD SUITE 310 JACKSONVILLE, FLORIDA 32256 REGISTRY # 4815	FIGURE C-1 TITLE SHEET SOUTH PONTE VEDRA BEACH RESTORATION ST. JOHNS COUNTY, FLORIDA	PROJECT C2018-055 DRAWN BY AF SHEET 1 of 18 DATE APR 2020	SEAL	MICHAEL E. TRUDNAK P.E.# 58200 DATE

PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

CATHY SHELL X:\SYS\PROJECTS\C2018-055-02_ST.JOHNS_BEACH\PERMIT\C2018-055-P-TITLE SHEET.DWG 4/13/2020 12 28 36 PM

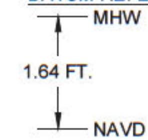
GENERAL NOTES - BEACH RESTORATION:

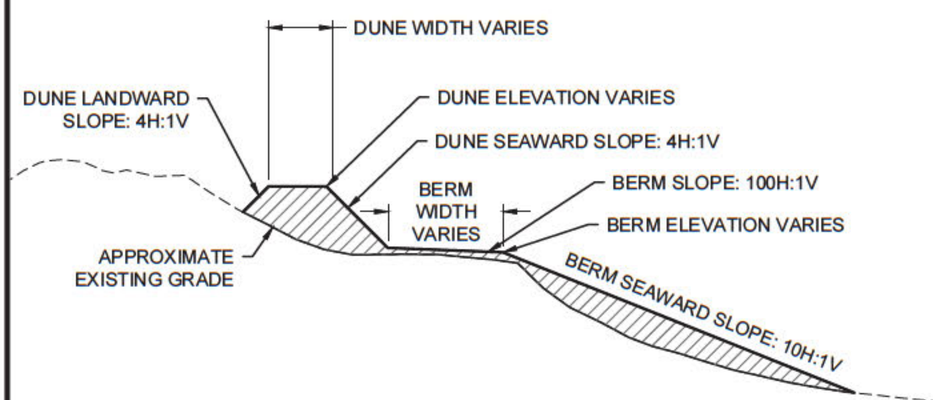
1. ALL ELEVATIONS REFERENCE THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD).
2. ALL COORDINATES REFERENCE STATE PLANE FLORIDA EAST NAD 83.
3. EXISTING BEACH GRADE SURVEYED JUL-AUG 2019 (R80 TO R104) BY DEGROVE SURVEYORS AND NOV 2019 (R76 TO R79) BY MORGAN & EKLUND.
4. CONSTRUCTION TEMPLATE DESIGNED WITH THE FOLLOWING FEATURES:

DESIGN FEATURE		R76 TO R79	R80 TO R83	R84 TO R101	R102 TO R103.5
DUNE	ELEVATION	15 FT NAVD	15 FT NAVD	14 FT NAVD	16 FT NAVD
	CREST WIDTH	15 FT	15 FT	15 FT	15 FT
	SEAWARD SLOPE	4H:1V	4H:1V	4H:1V	4H:1V
	LANDWARD SLOPE (WHERE REQUIRED)	4H:1V	4H:1V	4H:1V	4H:1V
BERM	BERM SLOPE	100H:1V	100H:1V	100H:1V	100H:1V
	MAX. ELEVATION	12 FT NAVD	11 FT NAVD	10 FT NAVD	10 FT NAVD
	WIDTH	30 FT	30 FT	30 FT	40 FT
	SEAWARD SLOPE	10H:1V	10H:1V	10H:1V	10H:1V

5. DUNE RESTORATION INCLUDES ONE REACH EXTENDING FROM FDEP REFERENCE MONUMENT R76 TO R103.5.
6. AERIALS OBTAINED FROM TAYLOR ENGINEERING (NOVEMBER 2019) UNLESS NOTED OTHERWISE. AERIAL REFERENCE SHOWN IS FOR VISUAL REFERENCE AND MAY NOT REPRESENT CURRENT CONDITIONS.
7. DUNE CREST WIDTH PREDOMINANTLY 15 FT BUT MAY VARY IN TRANSITION AREAS.
8. SEAWALL LOCATIONS BASED ON USACE SURVEY (APRIL 2019) AND TAYLOR ENGINEERING AERIAL IMAGERY/SITE VISITS (NOVEMBER 2019).
9. MEAN HIGH WATER (MHW) = +1.64 FT NAVD.

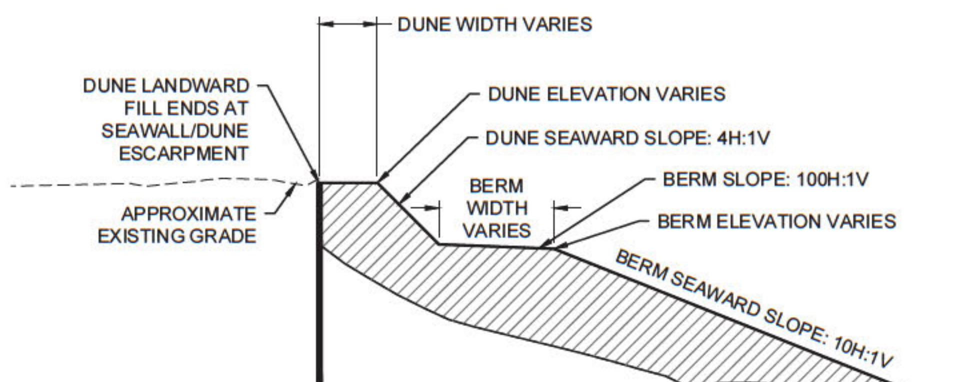
DATUM REFERENCE:





TYPICAL BEACH FILL SECTION
WHERE DUNE BACKSLOPE IS REQUIRED

NOT TO SCALE



TYPICAL BEACH FILL SECTION AT
SEAWALL/DUNE ESCARPMENT

NOT TO SCALE

TAYLOR ENGINEERING INC.
10199 SOUTHSIDE BLVD
SUITE 310
JACKSONVILLE, FLORIDA 32256
REGISTRY # 4815

FIGURE C-2
GENERAL NOTES AND TYPICAL SECTION
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	2 of 18
DATE	APR 2020

SEAL

MICHAEL E. TRUDNAK P.E.# 58200 DATE

PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

MONUMENT TABLE		
POINT	EASTING	NORTHING
R076	552333.33	2075761.23
R077	552544.79	2074717.61
T078	552749.38	2073673.59
R079	552986.84	2072587.46
R080	553221.69	2071589.43
R081	553451.43	2070504.14
R082	553687.17	2069511.51
R083	553869.00	2068459.47
R084	554120.03	2067396.82
R085	554356.02	2066379.28
R086	554556.60	2065377.36
R087	554819.38	2064355.48
R088	555042.04	2063334.80
R089	555233.72	2062398.22
R090	555472.62	2061397.66
R091	555664.56	2060368.98
R092	555876.17	2059333.59
R093	556112.12	2058361.01
R094	556301.45	2057355.72
R095	556495.90	2056383.43
R096	556760.02	2055374.38
R097	557002.40	2054378.39
R098	557200.08	2053382.52
R099	557425.03	2052355.00
R100	557661.96	2051340.16
R101	557879.74	2050324.66
R102	558103.42	2049348.97
R103	558321.91	2048381.47
T104	558557.68	2047420.02

AERIAL: GOOGLE EARTH, 2018

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FIGURE C-3
PROJECT OVERVIEW
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	3 of 18
DATE	APR 2020

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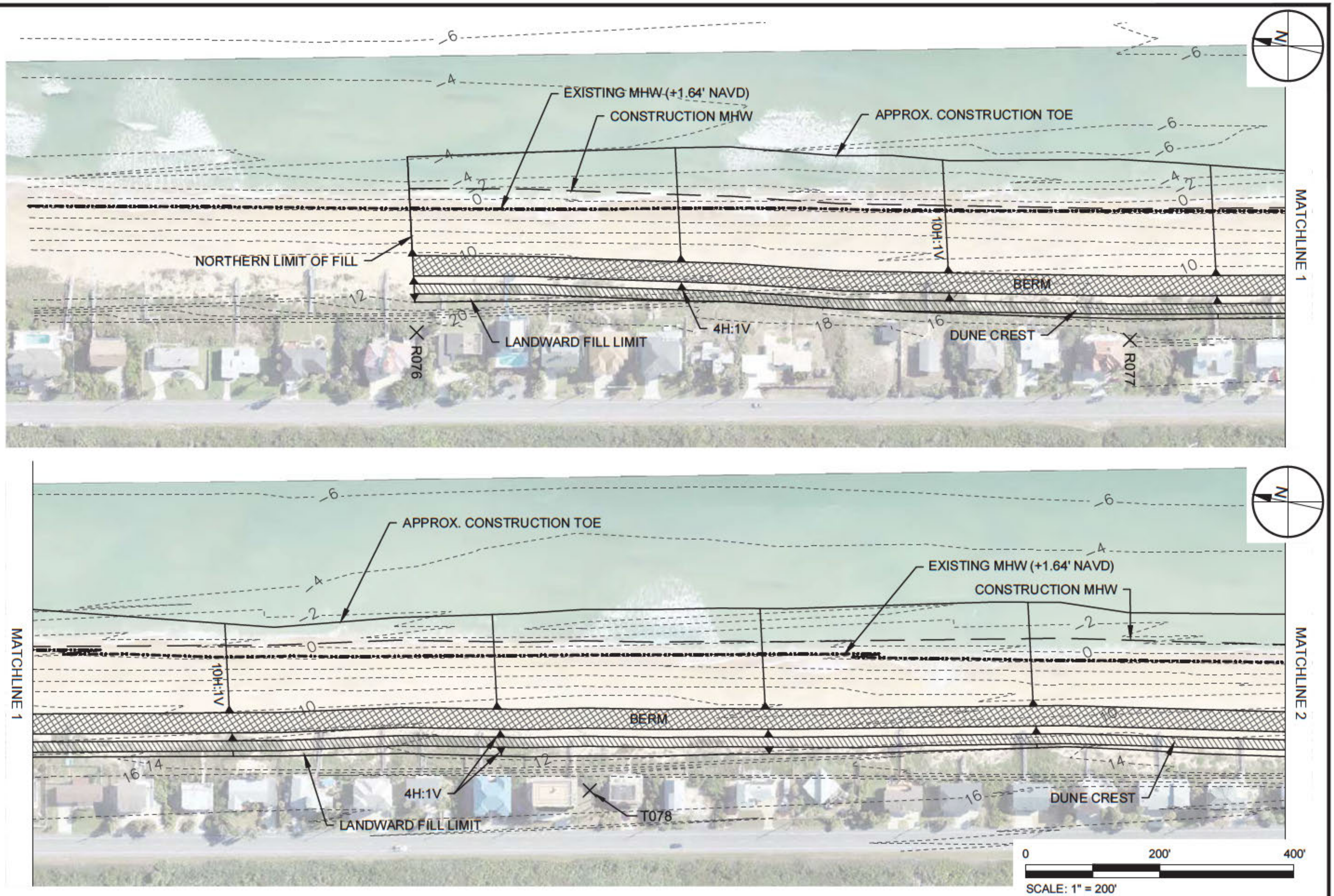

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FIGURE C-4
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	4 of 18
DATE	APR 2020

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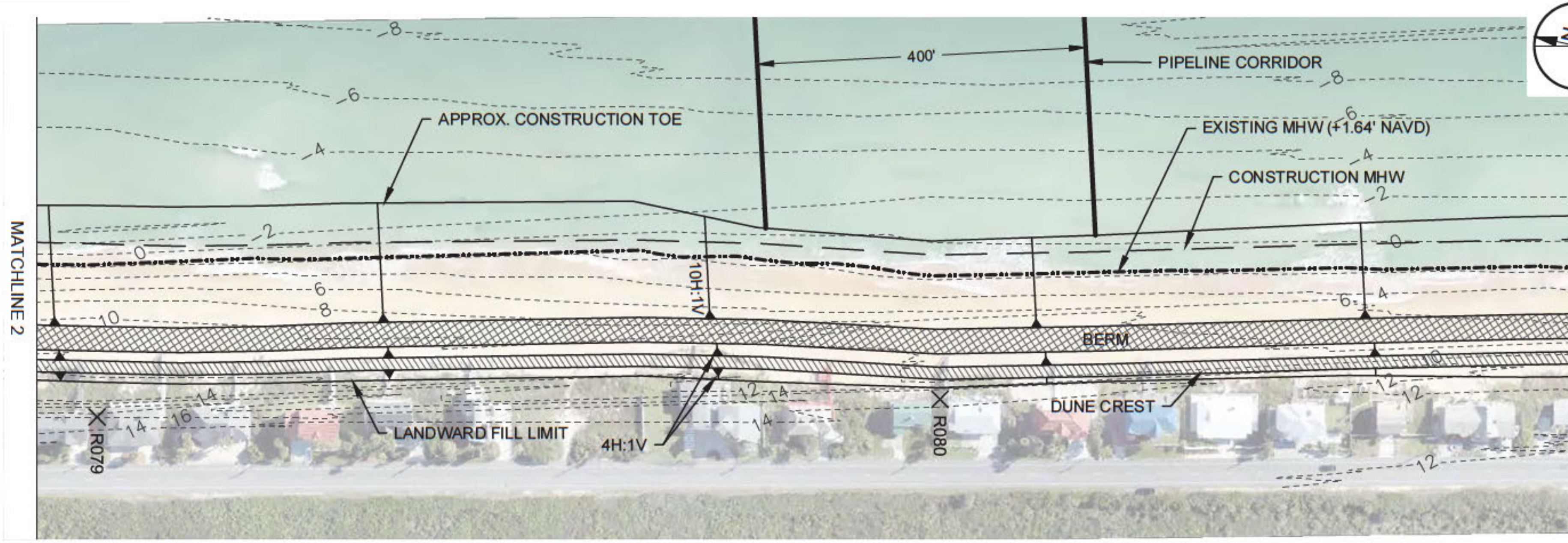

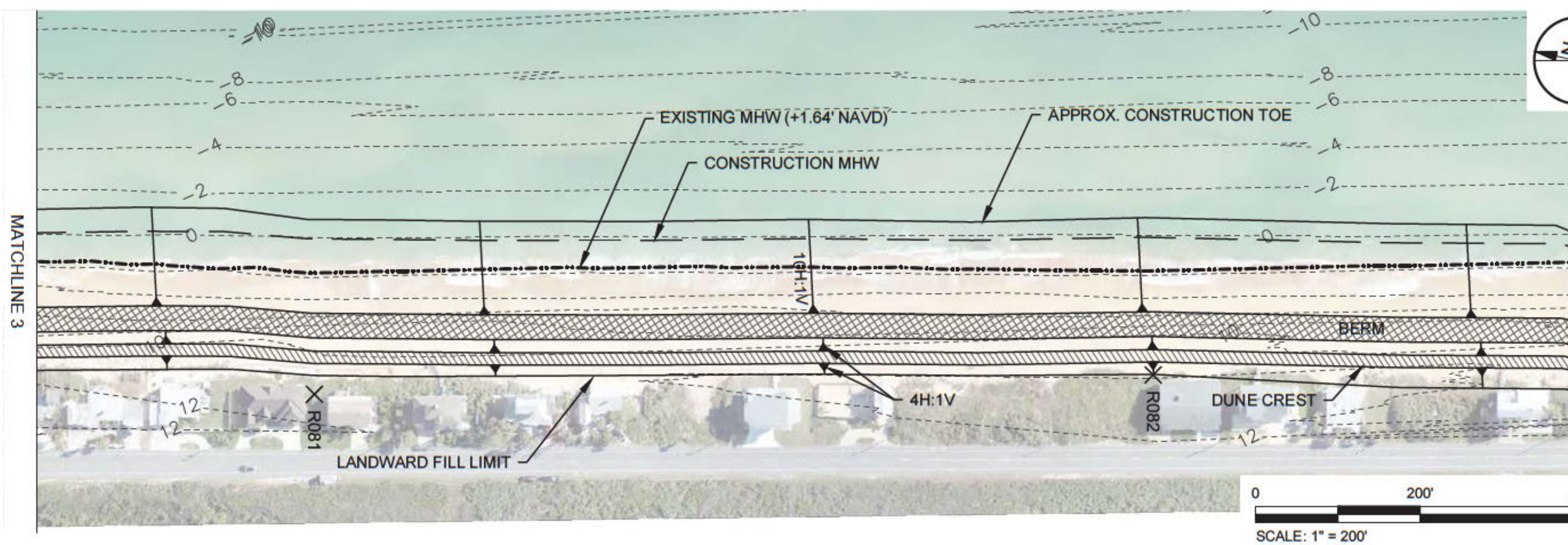

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FIGURE C-5
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
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SHEET	5 of 18
DATE	APR 2020

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MICHAEL E. TRUDNAK P.E.# 58200 DATE

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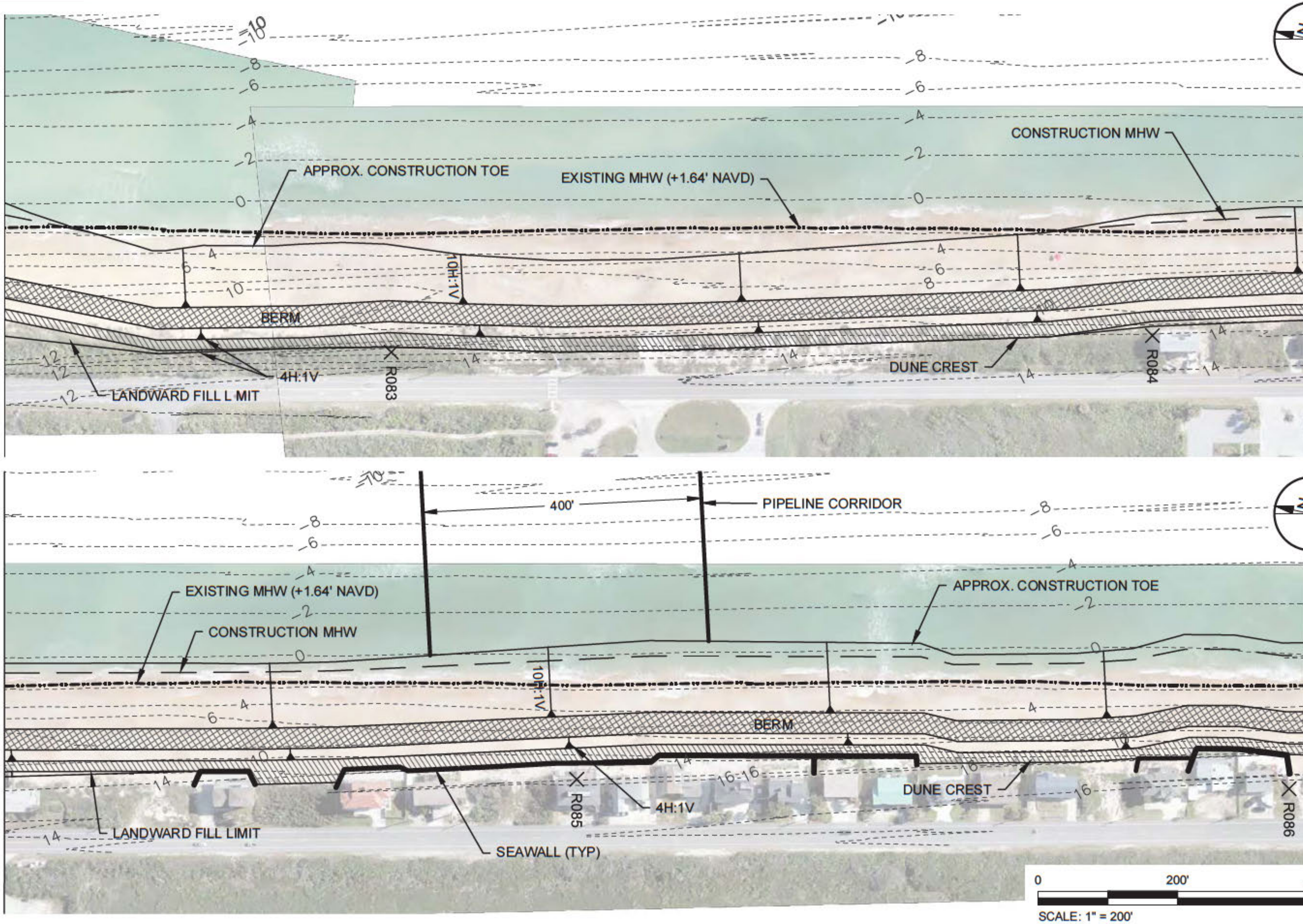

PROJECT	C2018-055
DRAWN BY	AF
SHEET	6 of 18
DATE	APR 2020

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FIGURE C-6
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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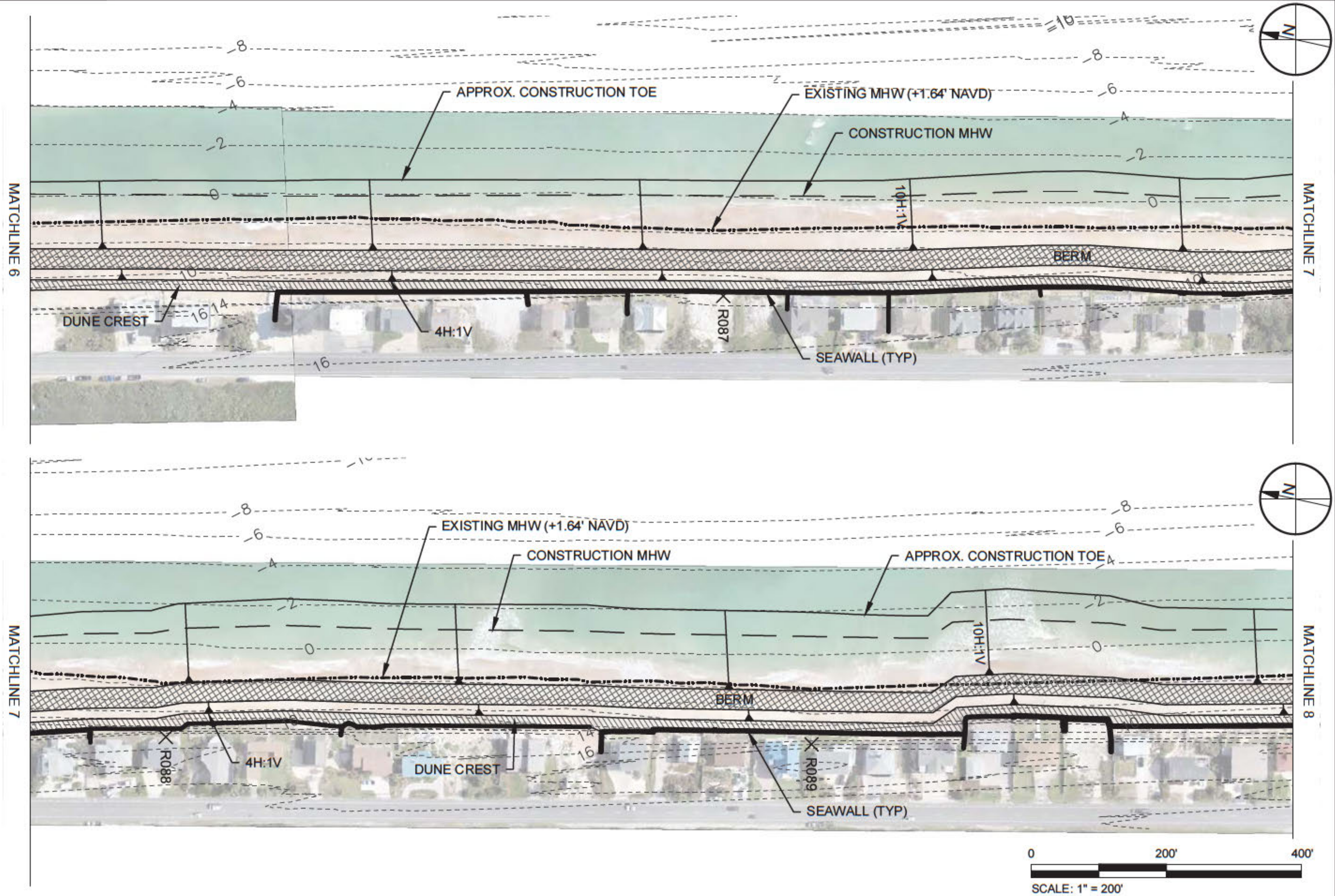

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REGISTRY # 4815

FIGURE C-7
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	7 of 18
DATE	APR 2020

SEAL

MICHAEL E. TRUDNAK P.E.# 58200 DATE

PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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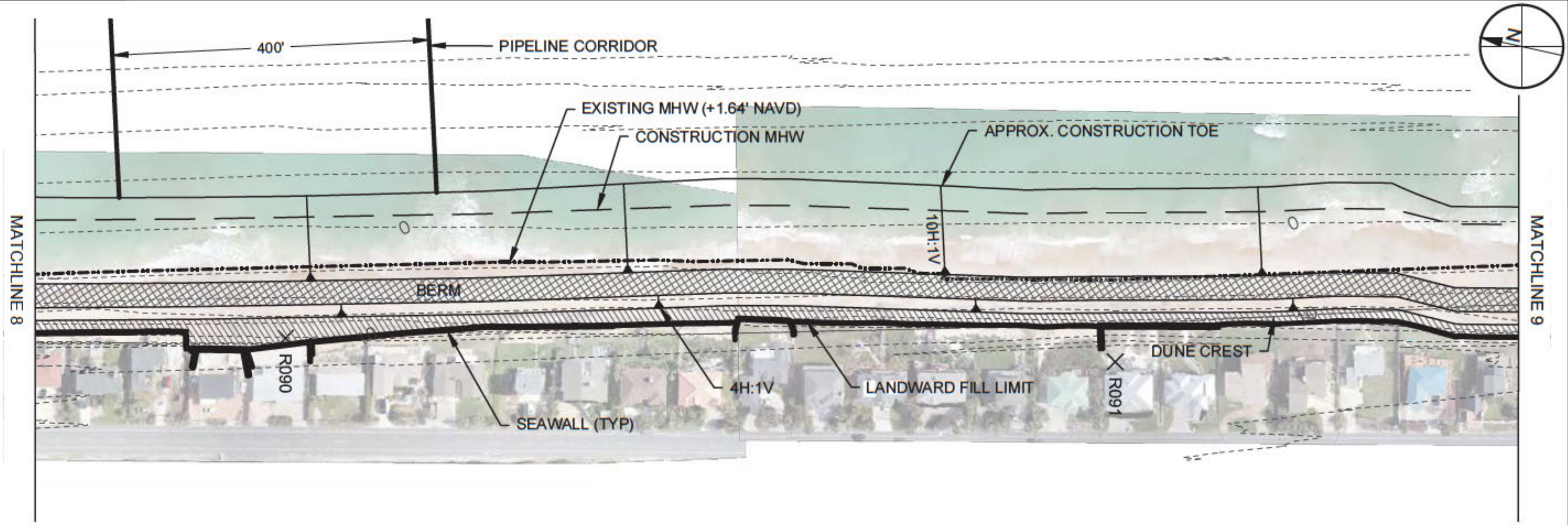

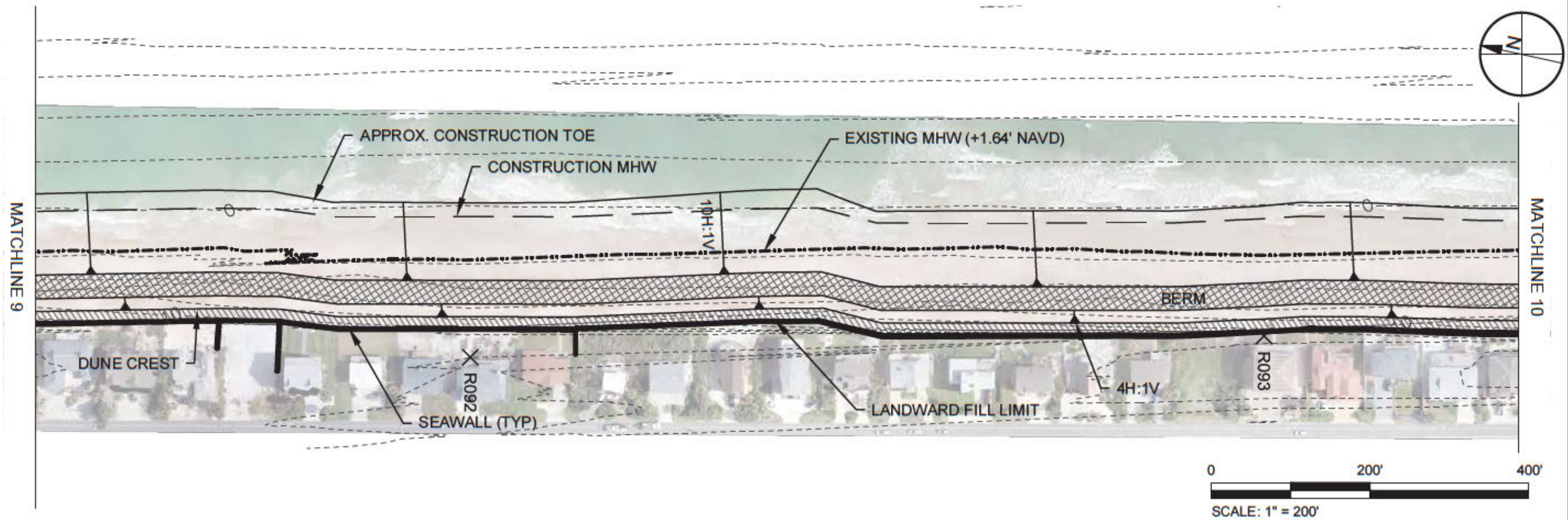

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FIGURE C-8
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	8 of 18
DATE	APR 2020

SEAL

MICHAEL E. TRUDNAK P.E.# 58200 DATE

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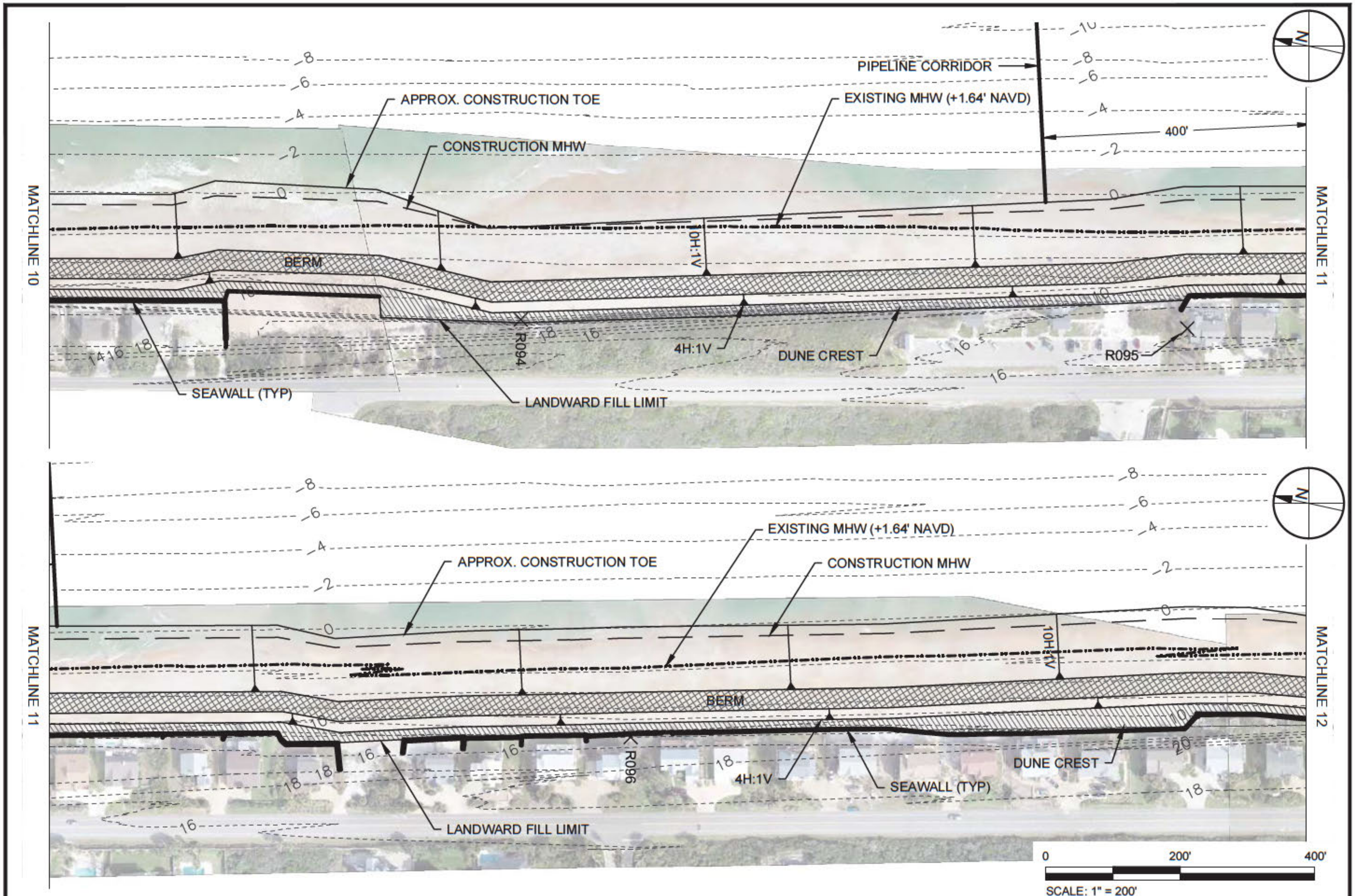

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SUITE 310
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REGISTRY # 4815

FIGURE C-9
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	9 of 18
DATE	APR 2020

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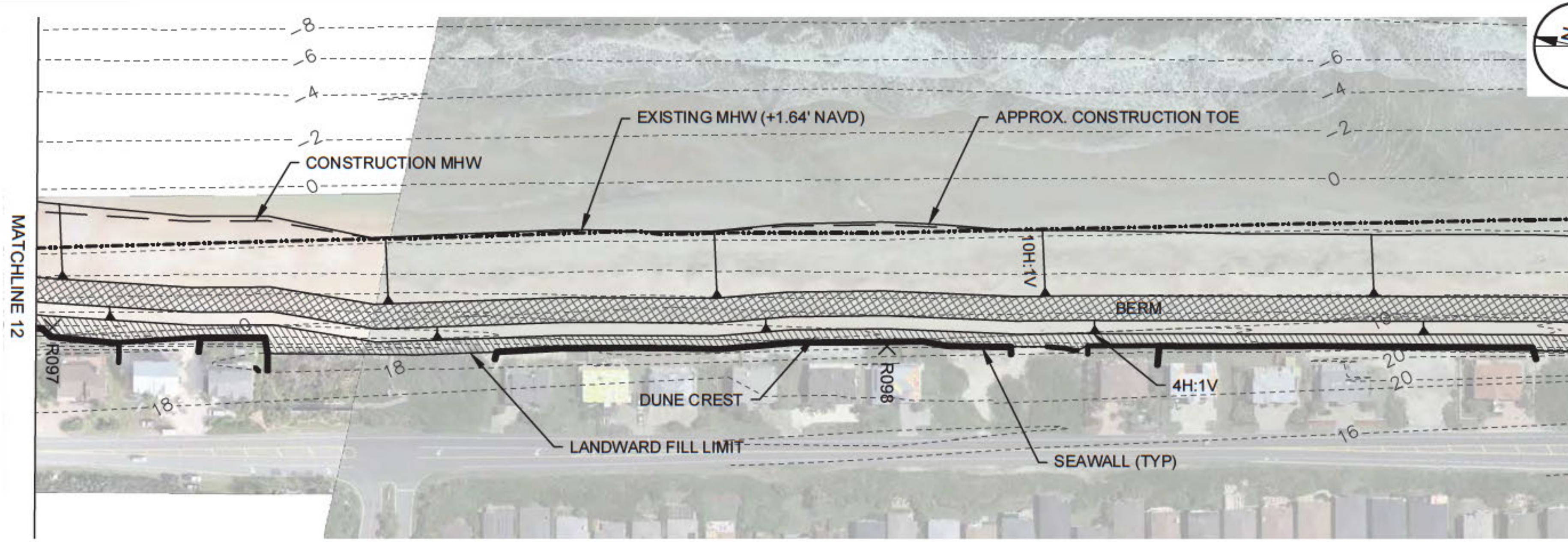
MICHAEL E. TRUDNAK P.E.# 58200 DATE

PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



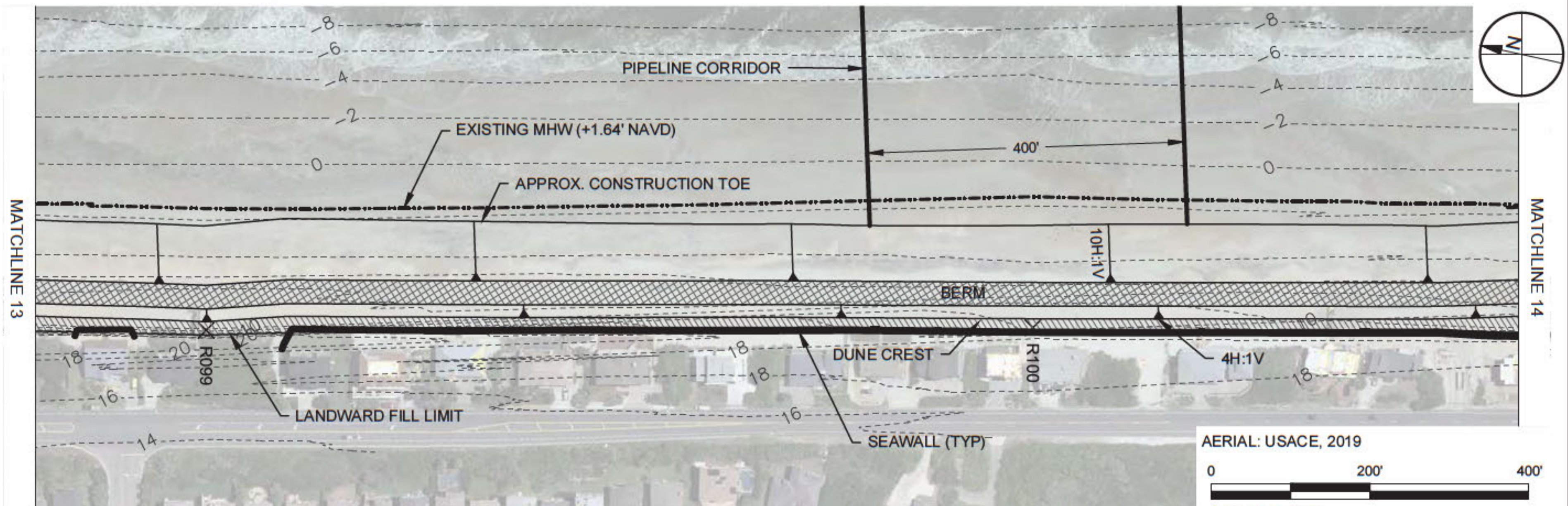


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FIGURE C-10
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
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DATE	APR 2020

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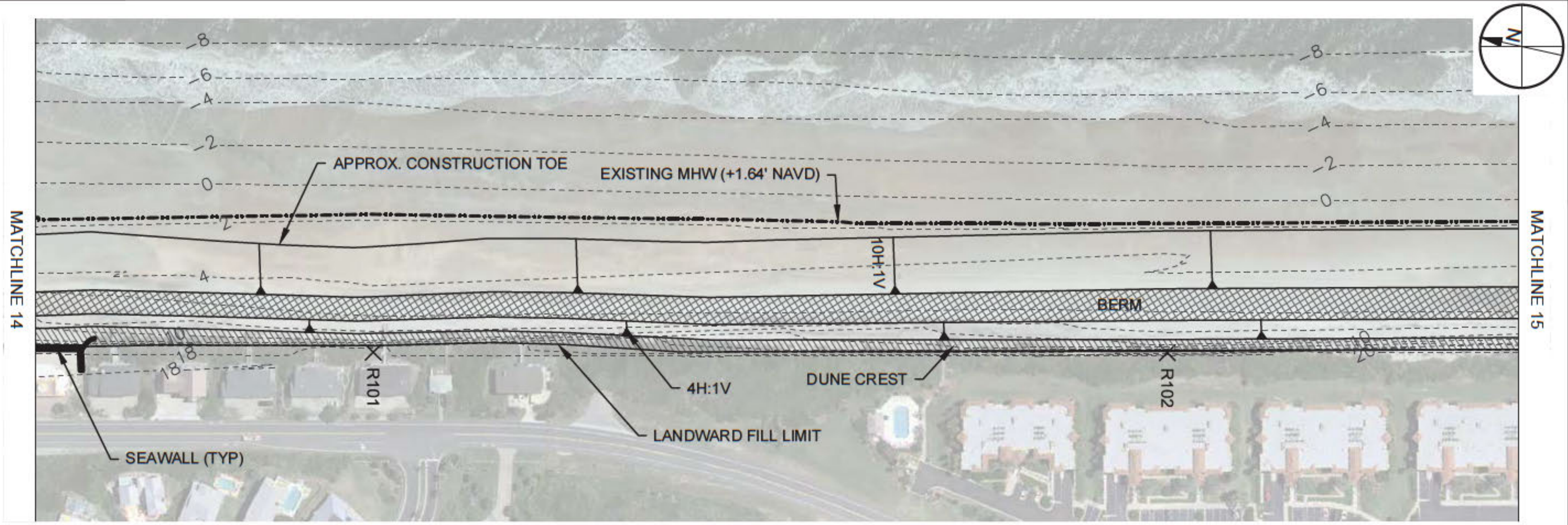

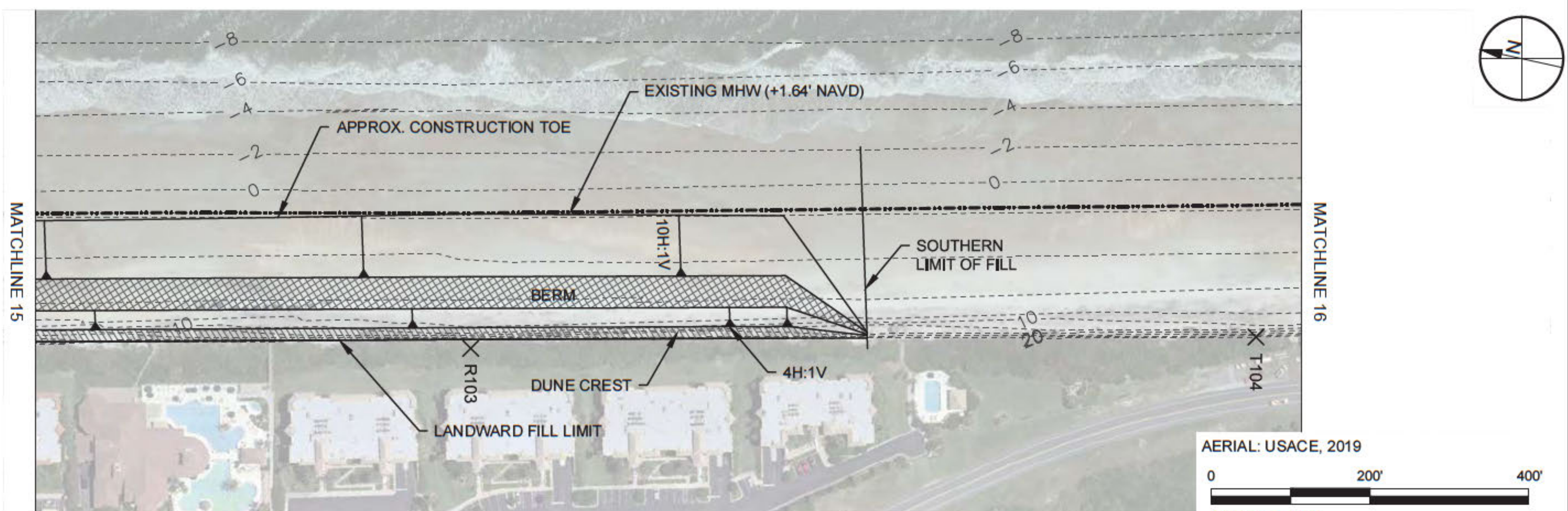

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FIGURE C-11
BEACH PLANS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
SHEET	11 of 18
DATE	APR 2020

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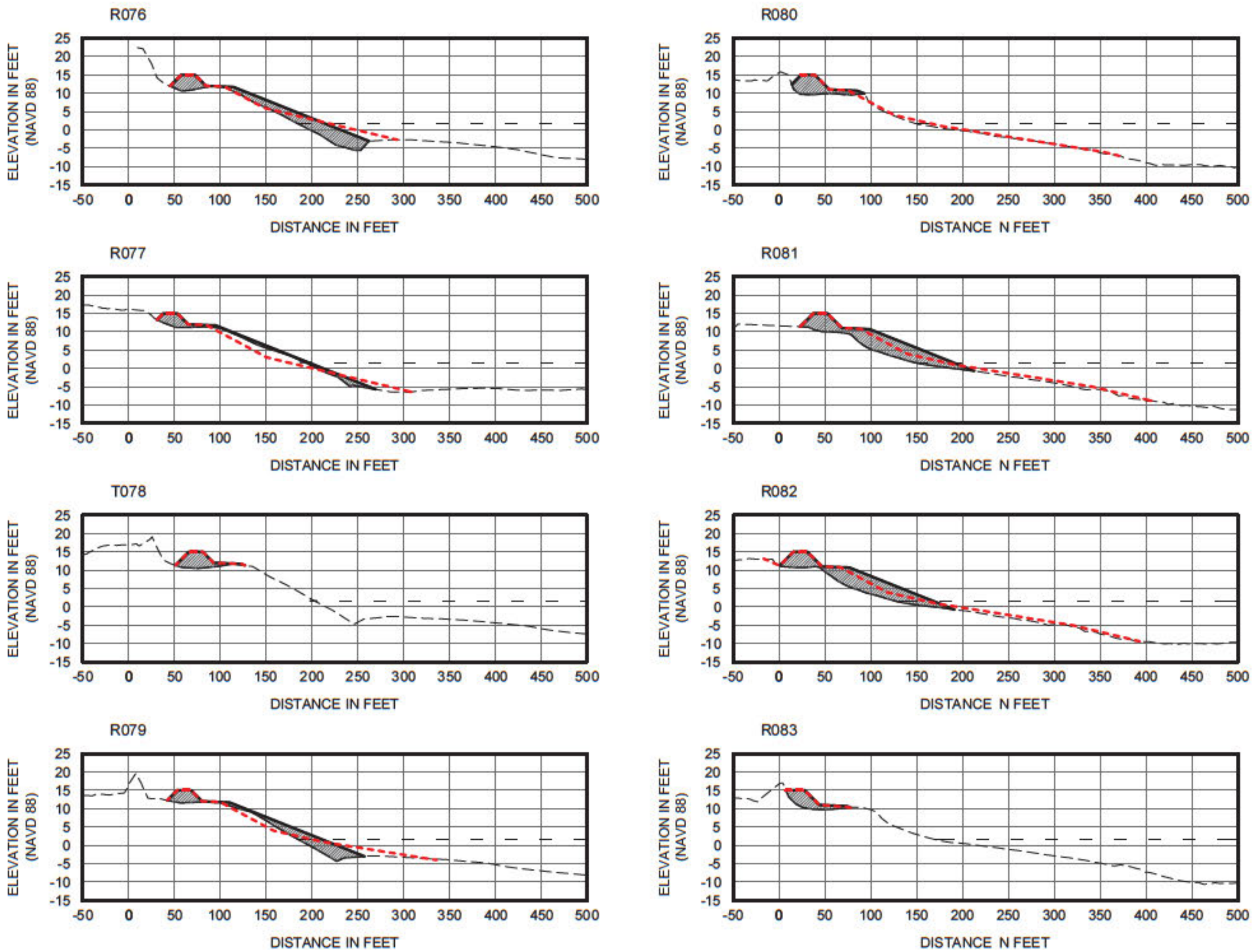

0 200' 400'

H. SCALE: 1" = 200'
V. SCALE: 1" =50'

LEGEND:
- EXISTING GRADE (SEE NOTE 3, SHEET C-2)
- MEAN HIGH WATER (MHW) +1.64 ft-NAVD
- EQUILIBRIUM PROFILE
- PROPOSED BEACH FILL

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FIGURE C-12
BEACH CROSS-SECTIONS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
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DATE	APR 2020

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PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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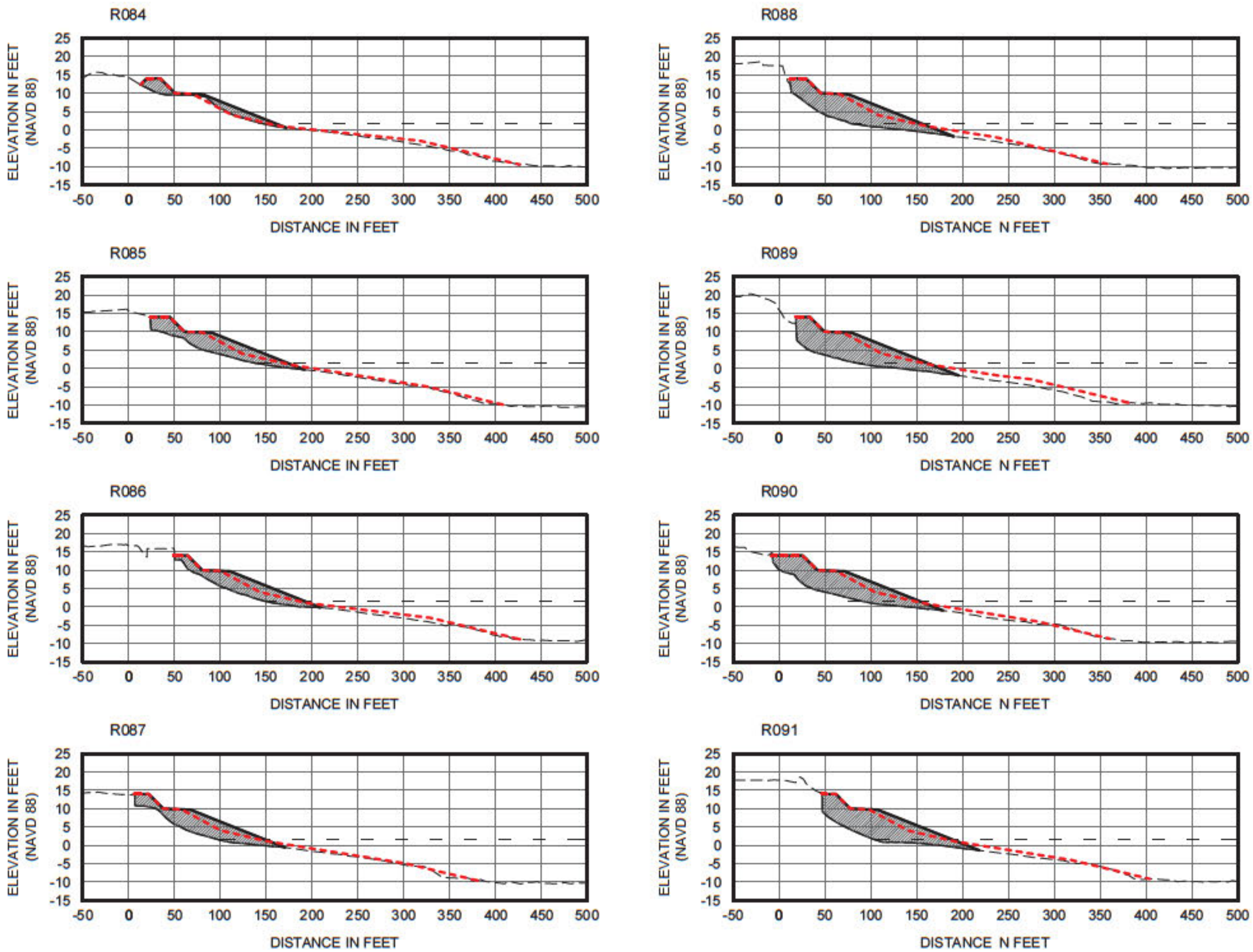

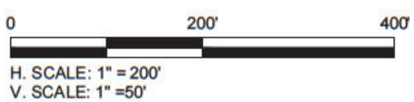

LEGEND:
- EXISTING GRADE (SEE NOTE 3, SHEET C-2)
- MEAN HIGH WATER (MHW) +1.64 ft-NAVD
- EQUILIBRIUM PROFILE
- PROPOSED BEACH FILL

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FIGURE C-13
BEACH CROSS-SECTIONS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
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SHEET	13 of 18
DATE	APR 2020

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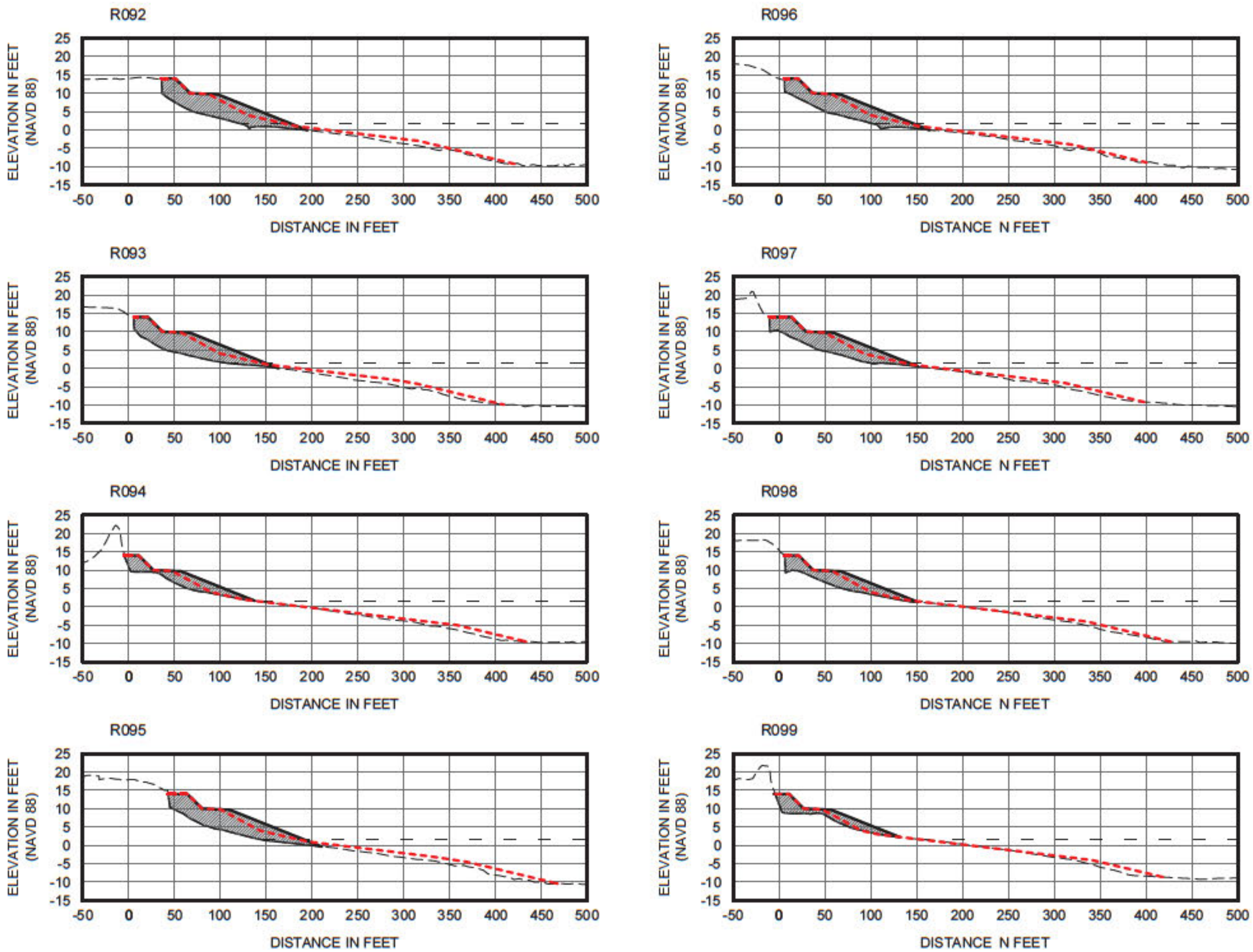

0 200' 400'

H. SCALE: 1" = 200'
V. SCALE: 1" =50'

LEGEND:
- EXISTING GRADE (SEE NOTE 3, SHEET C-2)
- MEAN HIGH WATER (MHW) +1.64 ft-NAVD
- EQUILIBRIUM PROFILE
- PROPOSED BEACH FILL

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FIGURE C-14
BEACH CROSS-SECTIONS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
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DATE	APR 2020

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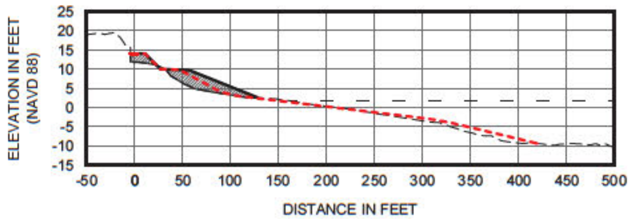
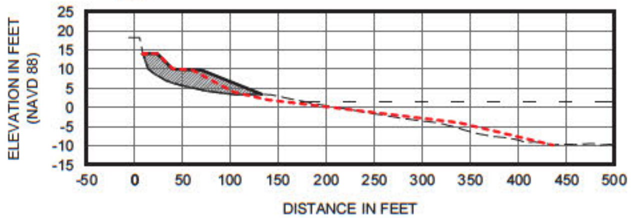
PRELIMINARY DRAWINGS: THESE DRAW NGS ARE NOT N FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

R100



R101



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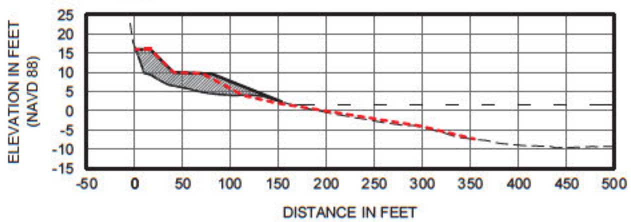

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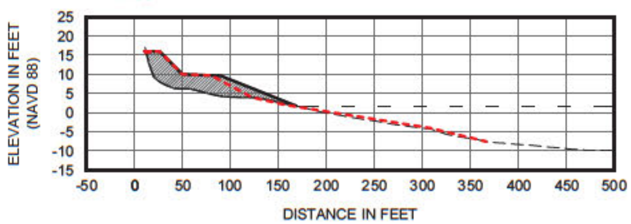

0 200' 400'

H. SCALE: 1" = 200'
V. SCALE: 1" =50'

LEGEND:
- EXISTING GRADE (SEE NOTE 3, SHEET C-2)
- MEAN HIGH WATER (MHW) +1.64 ft-NAVD
- EQUILIBRIUM PROFILE
- PROPOSED BEACH FILL

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FIGURE C-15
BEACH CROSS-SECTIONS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
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DATE	APR 2020

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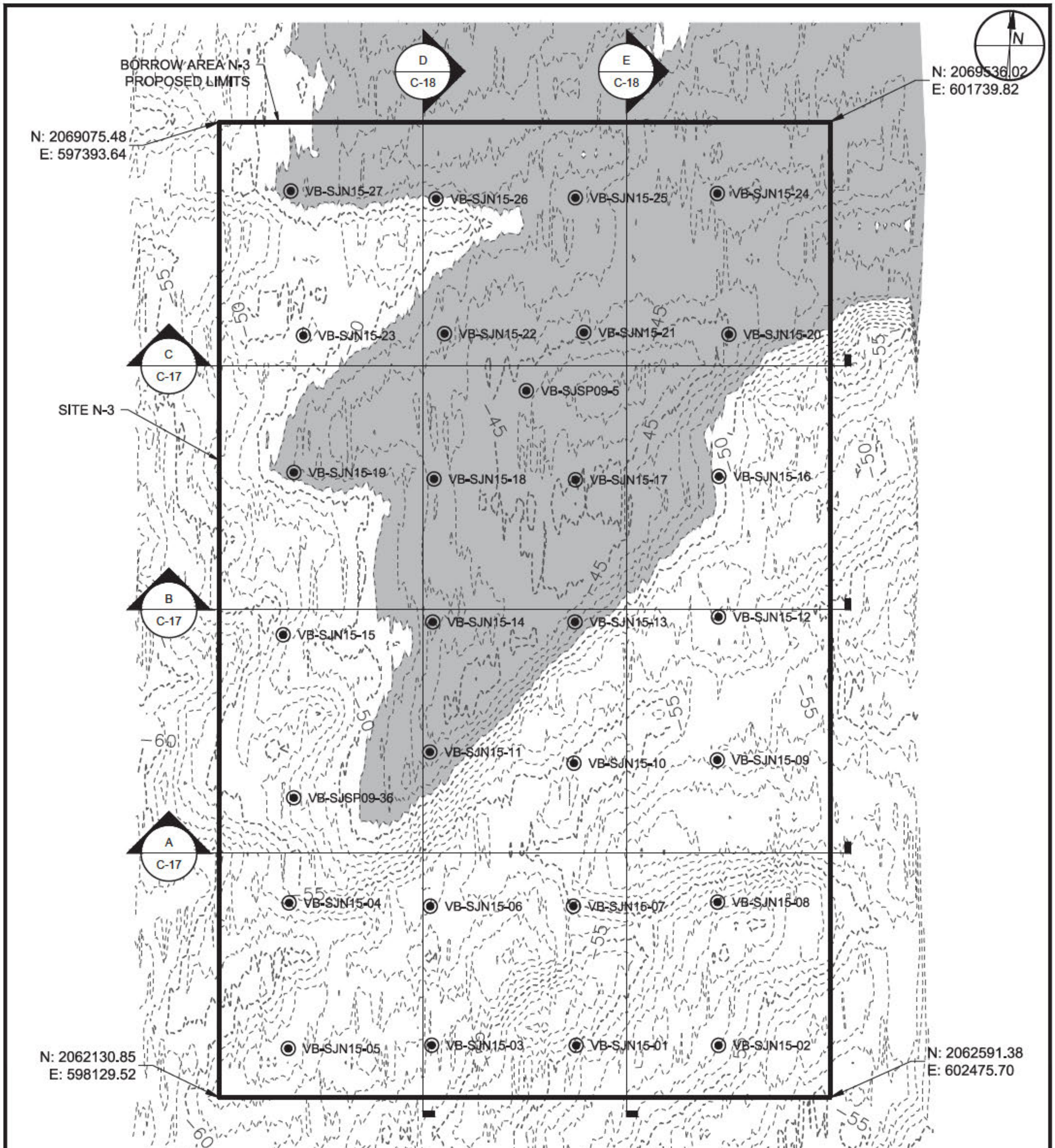

LEGEND:

-------- EXISTING BATHYMETRY (DEC 2018)

AVAILABLE MATERIAL ABOVE -49 ft-NAVD

SECTION ID — A

FIGURE # — C-17

0 1,000' 2,000'

H. SCALE: 1" = 1,000'

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FIGURE C-16
BORROW AREA N-3 PLAN
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2018-055	AF	15 of 18	APR 2020

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PRELIM NARY DRAWINGS: THESE DRAW NGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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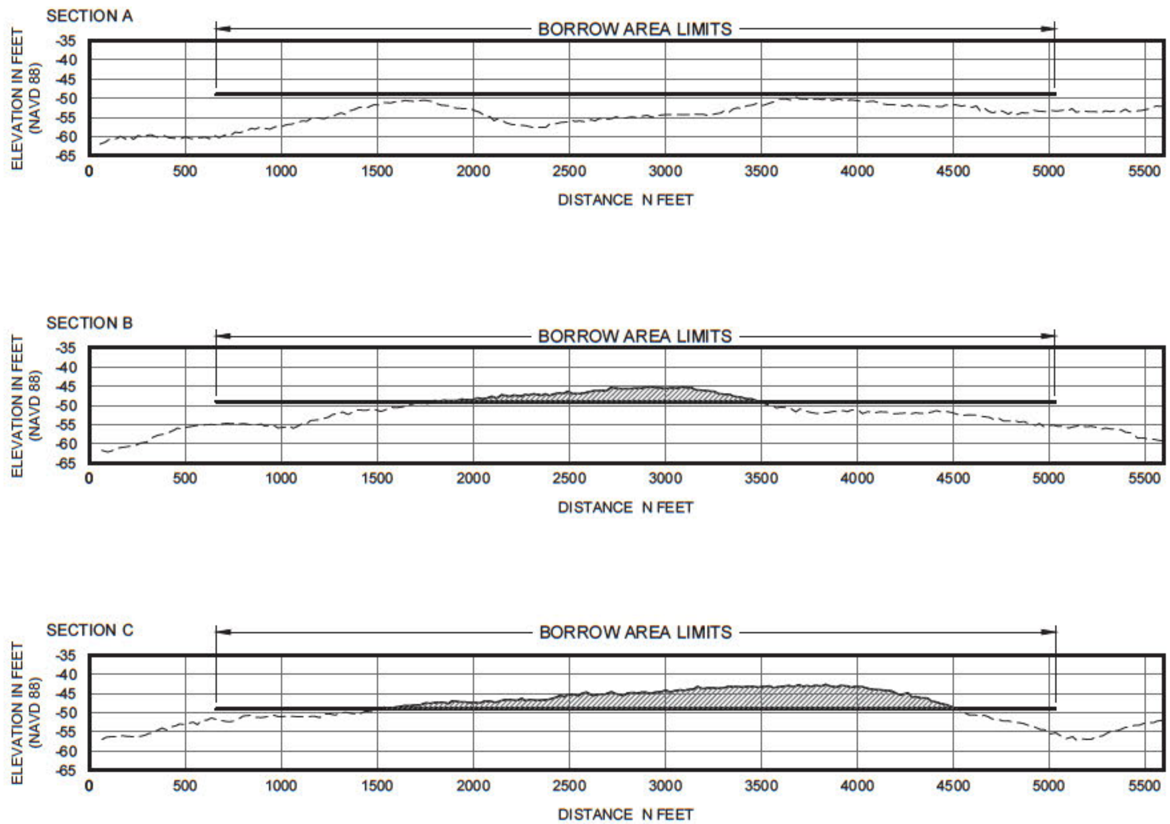

LEGEND:

- – – – – EXISTING BATHYMETRY (DEC 2018)
- ——— DREDGE TEMPLATE -49 ft-NAVD
- ▨ AVAILABLE MATERIAL

0 1,000' 2,000'

H. SCALE: 1" = 1,000'
V. SCALE: 1" =50'

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FIGURE C-17
BORROW AREA N-3 CROSS-SECTIONS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
DRAWN BY	AF
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DATE	APR 2020

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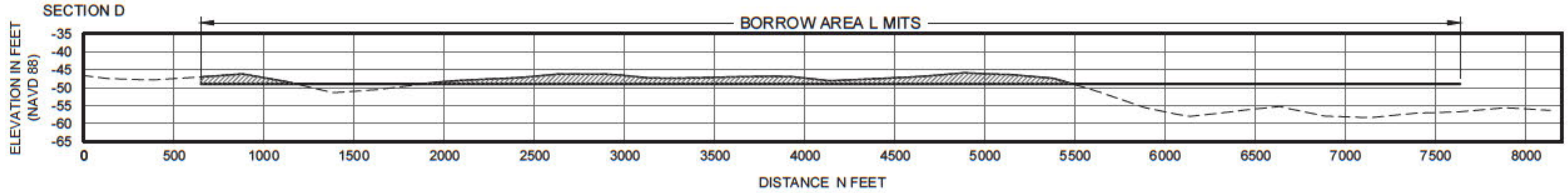

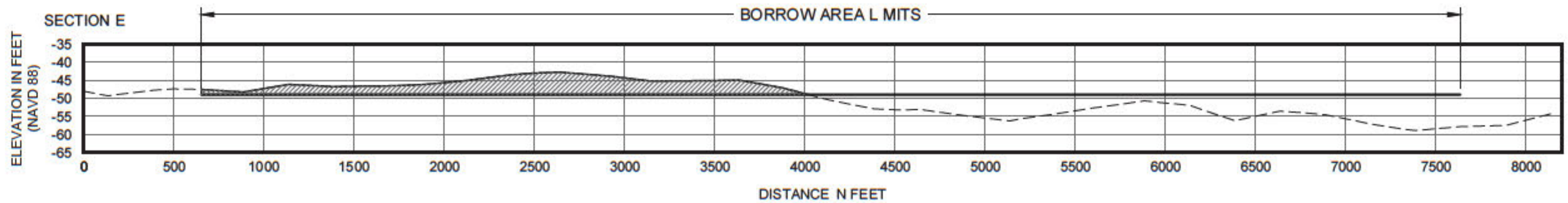

0 1,000' 2,000'

H. SCALE: 1" = 1,000'
V. SCALE: 1" =50'

LEGEND:
- EXISTING BATHYMETRY (DEC 2018)
- DREDGE TEMPLATE -49 ft-NAVD
- AVAILABLE MATERIAL

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FIGURE C-18
BORROW AREA N-3 CROSS-SECTIONS
SOUTH PONTE VEDRA BEACH RESTORATION
ST. JOHNS COUNTY, FLORIDA

PROJECT	C2018-055
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DATE	APR 2020

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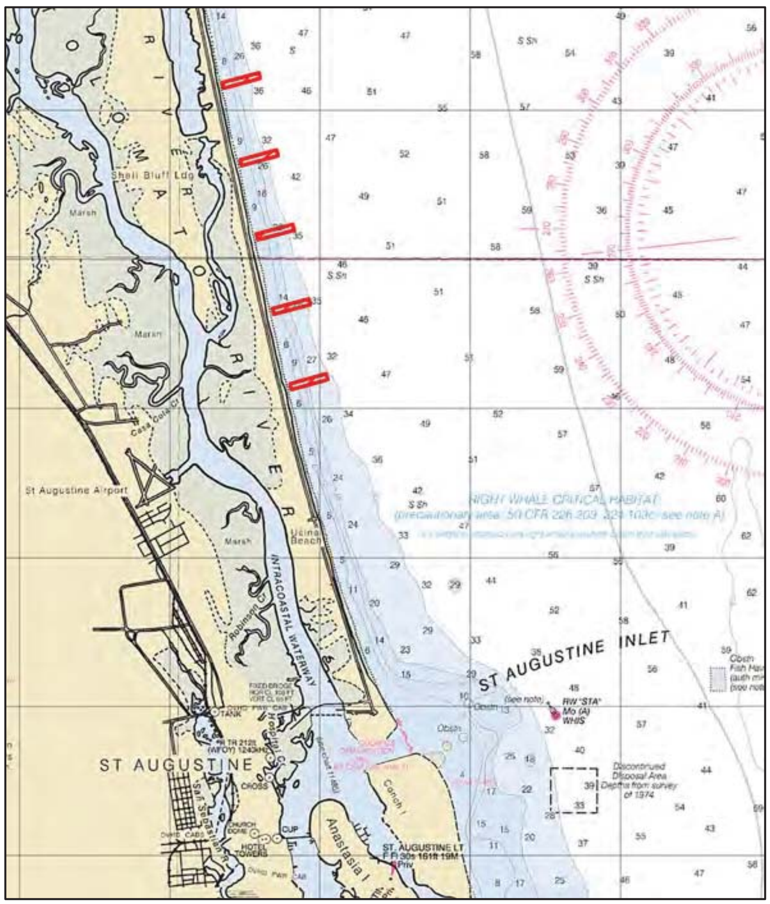
Appendix D

Submerged Cultural Resources Survey
Pipeline Corridors

REPORT OF FINDINGS

UBMERGED CULTURAL ESOURCES URVEY FOR OUTH PONTE VEDRA BEACH ESTORATION, T. JOHNS COUNTY, FLORIDA



SUBMITTED T :

St. Johns County
St. Augustine, Florida

UNDER SUBCONTRACT T :

Taylor Engineering, Inc.
Jacksonville, Florida

SUBMITTED BY:

Panamerican Consultants, Inc.
Memphis, Tennessee

JULY 2020

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REVISED REPORT OF FINDINGS

UBMERGED CULTURAL ESOURCES URVEY FOR OUTH PONTE VEDRA BEACH ESTORATION, T. JOHNS COUNTY, FLORIDA

ONDUCTED UNDER
FLORIDA RCHAEOLOGICAL RESEARCH PERMIT NO. 1920.054

SUBMITTED T :

St. Johns County
Board of County Commissioners
500 San Sebastian View
St. Augustine, Florida 32084

UNDER SUBCONTRACT T :

Taylor Engineering, Inc.
10151 Deerwood Park Boulevard
Building 300, Suite 300
Jacksonville, Florida 32256

SUBMITTED BY:

Panamerican Consultants, Inc.
91 Tillman Street
Memphis, Tennessee 38111
Panamerican Report No. 40021.MAR

AUTHORED BY:
Andrew M. Derlikowski, MA, RPA and Stephen R. James, Jr., MA, RPA

Andrew M. Derlikowski, MA, RPA
Principal Investigator

JULY ♦ 2020

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ABSTRACT

St. Johns County, Florida, Board of County Commissioners has partnered with the U.S. Army Corps of Engineers–Jacksonville District and the State of Florida to restore and rebuild South Ponte Vedra Beach and Vilano Beach. As part of the beach restoration project, five nearshore pipeline corridors are proposed to be employed to pump sand from the St. Augustine Inlet flood shoal and the Intracoastal Waterway channel onto the beaches. The remote sensing survey area includes five potential pipeline corridors at Florida Department of Environmental Protection reference monuments R-80, R-85, R-90, R-95, and R-100. The corridors will be 400 feet wide and extend from shore out to a distance of 2,500 feet. As part of the permit requirements, the agencies must consider the effects that their project activities will have on cultural resources. Therefore, St. Johns County Board of County Commissioners has been tasked with the responsibility for determining if any potential cultural resources are located within the propose pipeline corridors, and if so, are eligible for listing on the National Register of Historic Places prior to the implementation of any project activities. In order to comply with the St. Johns County Board of County Commissioners responsibilities towards cultural resources, Panamerican Consultants, Inc. of Memphis, Tennessee, was contracted by Taylor Engineering, Inc. of Jacksonville, Florida to conduct a comprehensive submerged cultural resources remote sensing survey of the five possible pipeline corridors under: Master Contract No. 17-MAS-TAY-0769; RFQ No. 17-19; Taylor Contract No. C2018-055; and Florida 1A-32 Archaeological Research Permit No. 1920.054. The remote sensing investigation identified 14 magnetic anomalies, three sonar contacts, and no subbottom reflector. All are considered nonsignificant, and no further investigation is recommended.

ACKNOWLEDGEMENTS

The successful completion of this project is the direct result of the input and hard work of numerous individuals. The authors would first like to thank the U.S. Army Corps of Engineers–Jacksonville District, and Taylor Engineering for allowing Panamerican Consultants, Inc. the opportunity to conduct this investigation. Mr. Stephan R. James, Jr. acted as the Project Manager and Coauthor; Mr. Andrew Derlikowski acted as the Principle Investigator, Field Director, Remote-Sensing Specialist, and Coauthor, as well as conducted archival research for the investigations. Mr. Jeffrey Pardee acted as Remote-Sensing Specialist and Boat Operator.

In-house Panamerican Consultants, Inc. personnel, who must be thanked for their assistance with this report production, include Ms. Kate Gilow, Office Manager, and Ms. Anna Hinnenkamp-Faulk, Editor.

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I. INTRODUCTION

St. Johns County, Florida, Board of County Commissioners (County) has partnered with the U.S. Army Corps of Engineers (USACE)–Jacksonville District and the State of Florida to restore and rebuild South Ponte Vedra and Vilano beaches. As part of the beach restoration project, five nearshore pipeline corridors are proposed to be employed to pump sand from the St. Augustine Inlet flood shoal and the Atlantic Intracoastal Waterway (AIWW) channel onto the beaches (Figures 1-01 and 1-02). As part of the project's permit requirements, the agencies must consider the effects that project activities will have on cultural resources. Therefore, the County has been tasked with the responsibility for determining if any potential cultural resources are located within the proposed pipeline corridors, and if so, are eligible for listing on the National Register of Historic Places (NRHP) prior to the implementation of any project activities.

Work completed for this cultural resources investigation was conducted in compliance with the National Historic Preservation Act of 1966, as amended (PL 89-665), the Archeological and Historic Preservation Act, as amended (PL 93-291), the Abandoned Shipwreck Act of 1987, and the Advisory Council on Historic Preservation revised 36 CFR Part 800 Regulations. This was also conducted in compliance with Chapter 267, Florida Statues of the Florida Administrative Code. Additionally, it was permitted by the Florida Division of Historical Resources under Chapter 1A-32 (*Appendix A: Florida 1A-32 Archaeological Research Permit*).

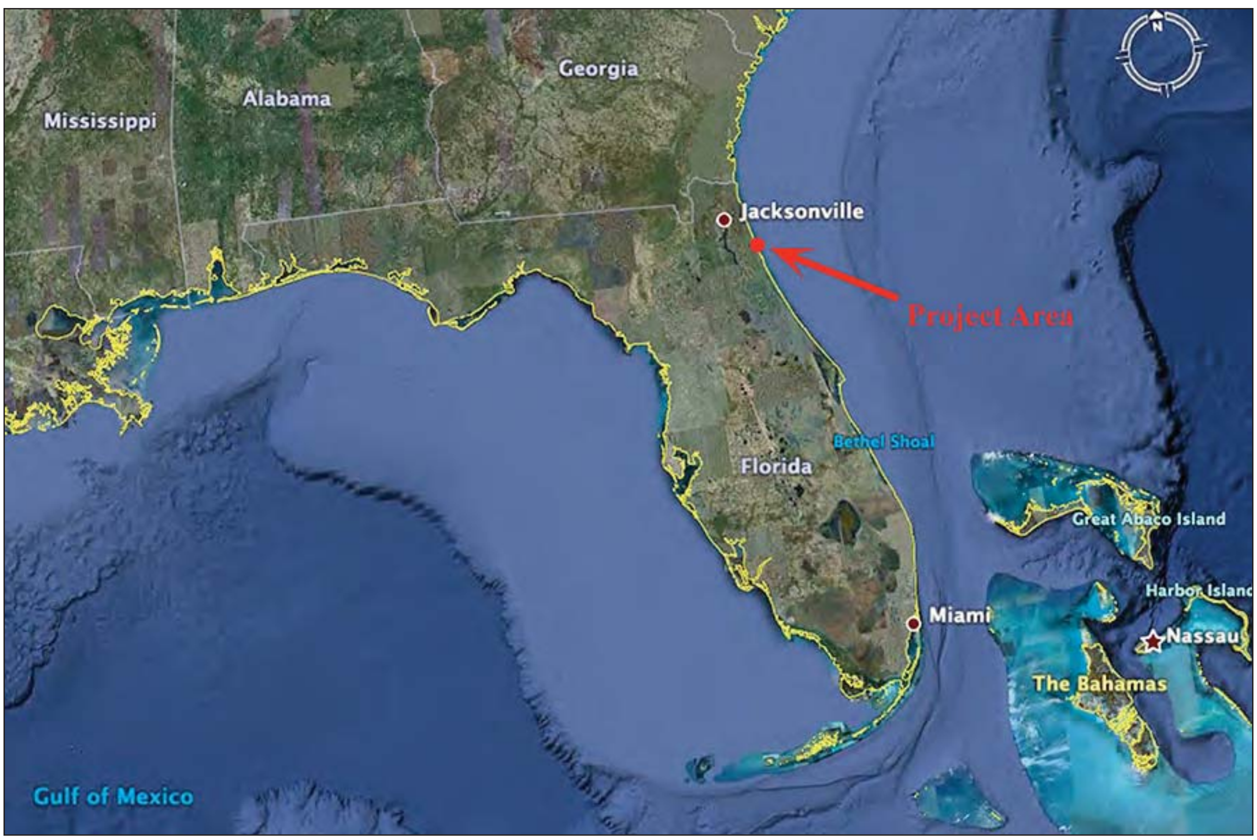

Figure 1-01. General Project Area location map (courtesy of Google Earth).

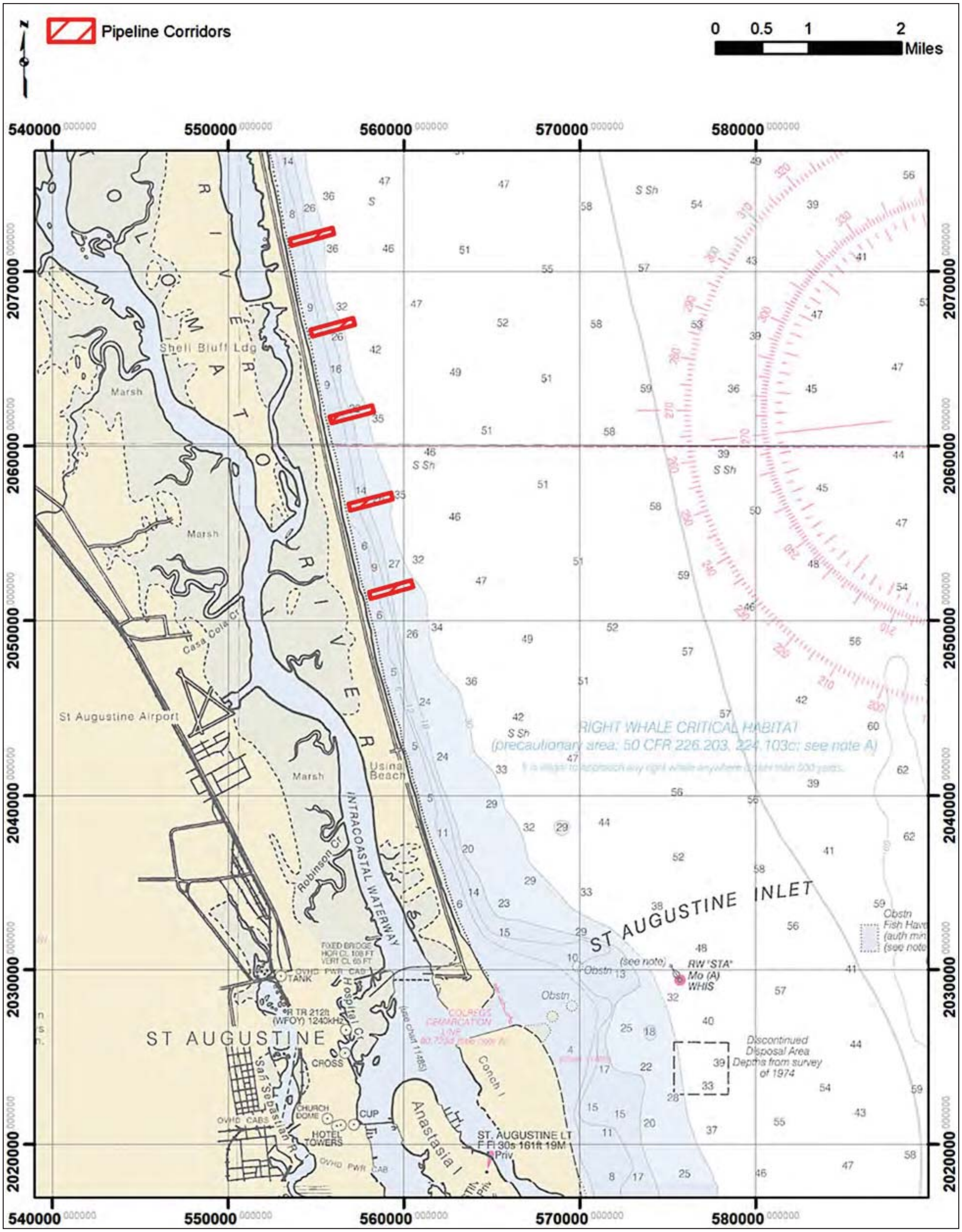

Figure 1-02. Location of the five pipeline corridor survey areas (Excerpt from NOAA Chart No. 11488, "Amelia Island to St. Augustine").

In order to comply with the County's responsibilities towards cultural resources, Panamerican Consultants, Inc. (Panamerican) of Memphis, Tennessee, was contracted by Taylor Engineering, Inc. (Taylor) of Jacksonville, Florida, to conduct a comprehensive submerged cultural resources remote sensing survey of the five possible pipeline corridors under: Master Contract No. 17-MAS-TAY-0769; RFQ No. 17-19; and Taylor Contract No. C2018-0554. The remote sensing survey of the Project Area includes five potential pipeline corridors (see Figure 1-02) at the Florida Department of Environmental Protection (FDEP) reference monuments R-80, R-85, R-90, R-95, and R-100 (i.e., roughly every mile from about 4.5 to 8.5 miles north of St. Augustine Inlet). The corridors will be 400 feet wide and extend from shore out to a distance of 2,500 feet.

Conducted under Florida 1A-32 Archaeological Research Permit No. 1920.054 (Appendix A), Panamerican performed the corridor survey during the last week of February 2020. Comprised of a magnetometer, sidescan sonar, and subbottom profiler survey, 14 magnetic anomalies, three sidescan sonar targets, and no subbottom paleofeature were recorded during the current survey of the corridors. Therefore, it is the opinion of the Principal Investigator that the corridors contain no significant cultural resource; therefore, no additional archaeological work is warranted.

Divided into chapters on Historical Background, Field Methods, Investigative Findings, and Conclusions and Recommendations, References, and appendices, the following report presents the conduct and the results of the investigation.

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II. HISTORICAL BACKGROUND

ENVIRONMENTAL SETTING

This section on historical context provides information about the local geology and evolution of the environment, prehistoric cultural history relevant to modeling for submerged prehistoric sites, and historic narratives to predict the range of historic resources potential for South Ponte Vedra and Vilano Beach, Florida.

The potential for prehistoric sites is based on the local geologic setting and the abundance of evidence for prehistoric presence at times when the Project Area would have been exposed landscape, based on models of local apparent sea level history. The Project Area is located 4.7 miles north of the St. Augustine Inlet in the Atlantic Ocean.

GEOLOGY AND PALEOENVIRONMENT

The Florida Atlantic coast is a complex set of sediment ridges that overlie karstified limestone bedrock. The sediment ridges were formed from multiple sea level oscillations over the last 2,000,000 years of the Pleistocene epoch. The cyclical nature of low stands of sea level occurred as the result of glacial accretion, and high stands of sea level occurred as the result of those glaciers melting. These cycles occur roughly every 100,000 to 125,000 years because of orbital parameters.

The most prominent of these ridges is the Atlantic Coastal Ridge, which was formed with sea levels 30 feet higher than today's, probably during the last high stand of sea level, called the "Sangamon" (White 1970:86). The most well-known and last sea level high stand deposit of the Florida Atlantic coast is the Pleistocene-aged Anastasia Formation (Burdett et al. 2009), a cemented, shelly, beach sedimentary rock often used for construction in historic times. Locally, the Anastasia Formation outcrops along and near shore and it forms the core of the Atlantic Coastal Ridge. At the beach, and immediately offshore, the shoreface and beach sands are active, recent deposits.

Offshore, but relevant to the Project Area, Meisburger and Field (1975) studied for the USACE a large area of the Atlantic continental shelf with seismic remote sensing and vibracoring from Cape Canaveral to Georgia in a search for sand of beach quality to mine for replenishment of east coast beaches. They noted the paucity of studies before theirs, which allows for a base for the geology of the offshore area. Remnants of an earlier barrier island complex are preserved locally (intermittently) offshore of central-northern St. Johns County and confirm that there were past configurations of coastline with lowered sea level, but they are altered by the dynamic character of the Atlantic shelf.

Phelps et al. (2003, 2004, 2005, 2006) were also conducting a study in search of sand resources for beach replenishment in an area that has relevance to the current Project Area. This valuable four-year study is available from the Florida Geologic Survey in the form of Digital Versatile Disc/Geographic Information System (DVD/GIS) products. Phelps et al.'s (2003, 2004, 2005, 2006) products include a bibliography of previous studies, seismic data gathering, beach samples of native sand, seabed grab sampling, and vibracoring collected from offshore of Nassau and Duval counties. The channels remotely sensed and mapped near the Project Area were not in the same configuration as Phelps et al. (2006; Figure 2-01). One radiocarbon age gathered by Phelps et al. (2006) that may be useful is 14,140 ±60 (Beta-188958). It is from "organic material of a woody nature" at 16.8 feet in the core (VDU-01-16.8RC) at a water depth of 45 feet, isobaths considered submerged at 8,000 years before present (YBP).

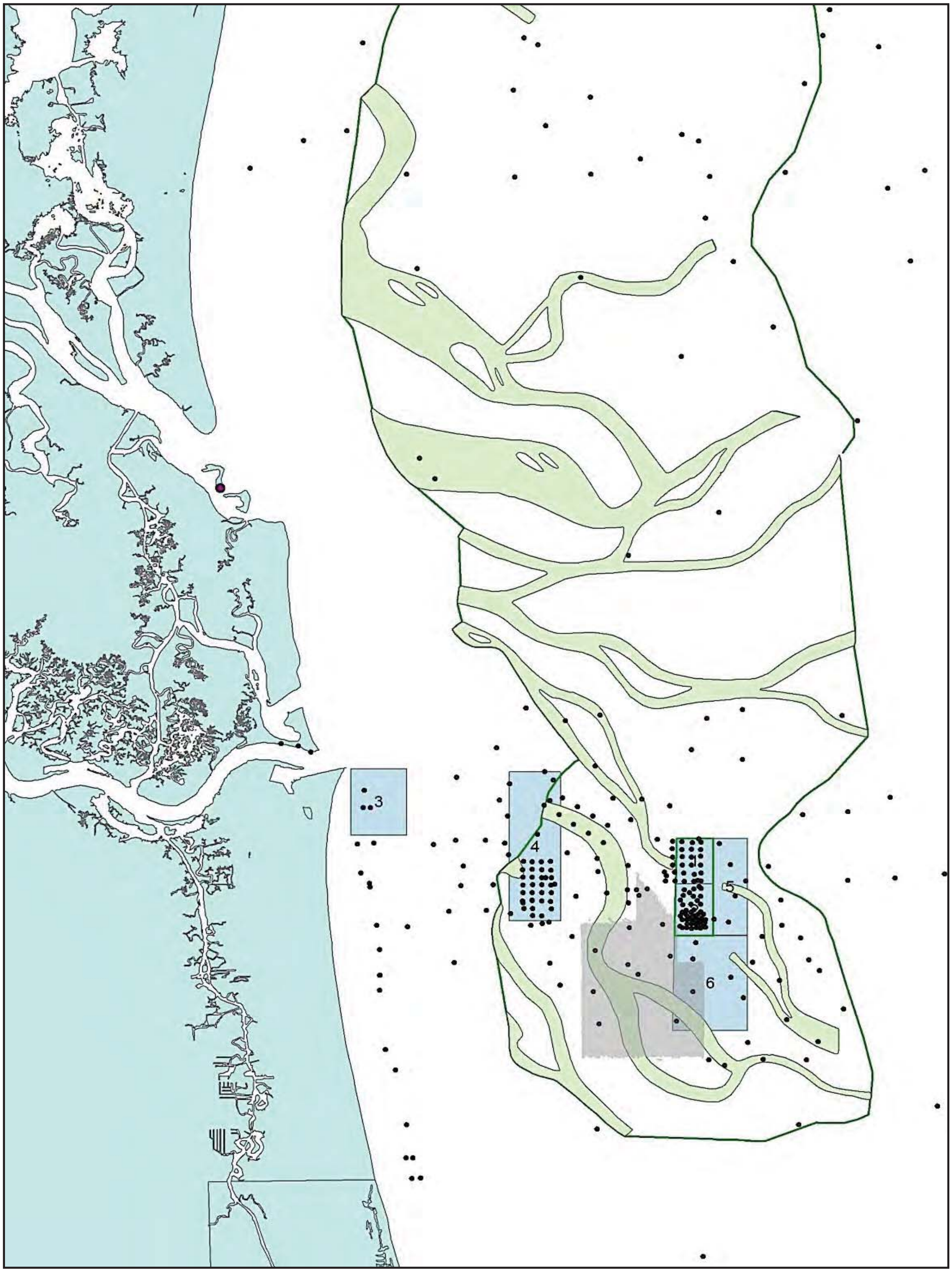

Figure 2-01. Information layers from Phelps et al. (2006) showing the northeastern Florida coastline, drainage systems, inferred paleochannels, and core locations north of the Project Area.

SEA EVEL FLUCTUATIONS

Sea level curves for the Gulf of Mexico constructed by Balsillie and Donoghue (2004) and Global Eustatic estimates by Siddall et al. (2003) are shown in Figure 2-02. Post-glacial sea level rise (not shown) was rapid before 7,000 YBP and Figure 2-02 shows that it was slower after. These graphs are useful to model base-level changes for the Project Area, which varied from 30 to ≈4 feet in depth. This model shows a fluctuating sea level curve (history) after 7,000 YBP, when base levels were approximately 6 meters (20 feet) below today's, when people are known to be living on the coast in this area, to 4,800 YBP, when levels were still approximately 2 meters (6 feet) below today's (see Figure 2-02).

The Balsillie and Donoghue (2004) sea level curve was generated from a robust compilation of data from the Gulf of Mexico. Figure 2-02 shows a comparison of their three data sets: one from submerged contexts (data set A); one from terrestrial (data set B); and one considered eustatic (Siddall et al. 2003).

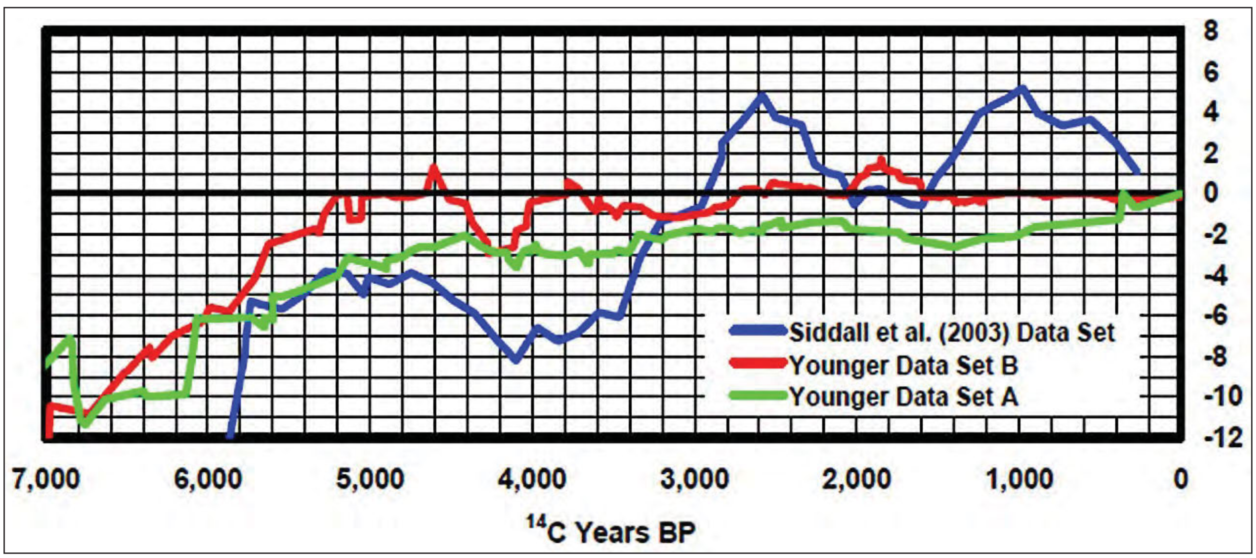

Figure 2-02. A portion of the sea level reconstruction for the Gulf of Mexico comparing three sample sets discussed in the text (Bassille and Donoghue 2004:Figure 10). Horizontal axis is in radiocarbon years before present (RCYBP).

Cronin et al. (2007) interpret data from cores in the Upper Tampa Bay as that the sea level was about 8 meters (26 feet) below that of today's between 5,900 and 6,300 YBP, which is consistent with the Balsillie and Donoghue (2004) curve presented. Brooks and Doyle (1998:402) state that Tampa Bay saw "initial flooding about 6,000 years ago," and that it (the lower Bay) was fully marine by 5,500 YBP in its deeper portions.

Widmer (1988), using data specific to southwestern Florida, showed sea levels between 20 and 4 meters below today's between 7,600 and 4,000 YBP. Walker et al. (1995) summarized geoarchaeological data for the southwestern Florida Gulf coast and showed that some sites were formed when sea levels were lower (because their lower stratigraphic levels were flooded). Higher stands are also proposed and, although they are not relevant to this project, they indicate the Prehistoric potential for people to move inland back then, and the fluctuations of coastal environments through time.

PREHISTORIC CONTEXT

The following outlines a brief prehistory of the Project Area relevant to the presence and potential for human occupation sites offshore.

PALEOINDIAN AND EARLY ARCHAIC (12,000 TO 9,000 YBP)

A discussion of nearby Clovis-related Paleoindian and Early Archaic settlement patterns to identify the locations of areas potential for site discovery are not much use here, because no site and few isolated points indicating the presence of these Late Pleistocene/Early Holocene people have been found in northeastern Florida. From a wider perspective, Paleoindian and Early Archaic sites and isolated finds (i.e., fluted and unfluted lanceolates, notched Bolen points, and familiar plethora of formal uniface tools) occur to the north in Georgia and South Carolina, and to the west in a crescentic pattern apparently focused on the Gulf of Mexico side of the peninsula (Miller 1992:102). As illustrated in Figure 2-03, the majority of Paleoindian and Early Archaic sites occur easterly, where the water table is nearer the surface (Thulman 2008).

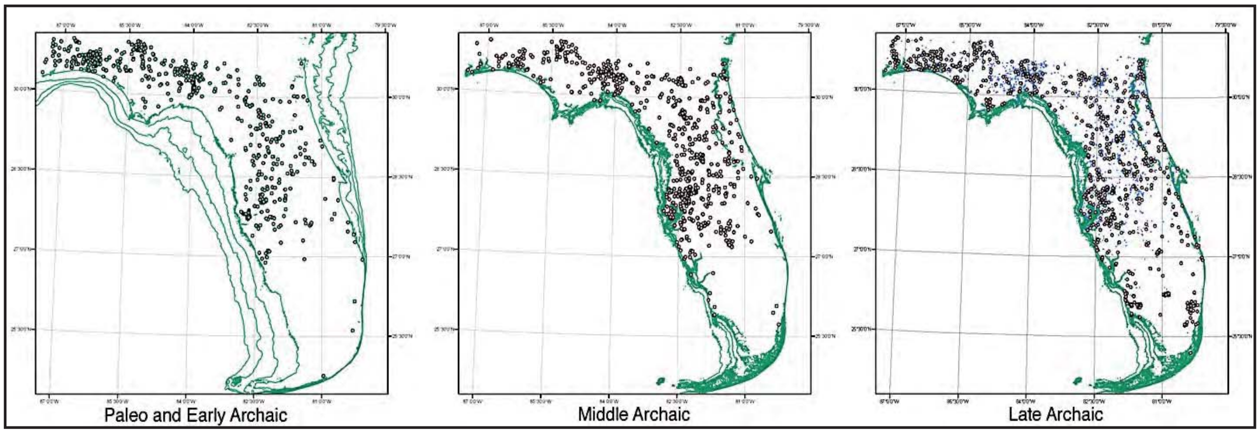

Figure 2-03. eries of GIS-based maps of sites in the Florida Master Site File that show distribution for Paleoindian to Late Archaic sites.

Dunbar reports one fluted point found in Jacksonville Beach in the 1950s (James Dunbar, personal communication, 2009). One conclusion from this lack of data is that Paleoindian and Early Archaic people were not utilizing the area in numbers sufficient for archaeological visibility. That chipped-stone resources, seemingly important to these early people, are also not known as being present in this region (Austin and Eastabrook 2000; Endonino 2007) and that freshwater resources may not have been as abundant are factors that are consistent with a lack of early archaeological sites (Miller 1998; Thulman 2008).

Elsewhere in the state, Paleoindian and Early Archaic sites are found around groundwater connected by freshwater sources in exposed or shallow buried karst, especially where chipping stone resources were available (Dunbar 1991). The geomorphology of the Project Area is not conducive to that pattern. Sand covers most of the area of concern to this project. Chert quarries have not been identified anywhere near the Project Area, but the possibility remains that quarries are present, but covered by rising sea levels or shifting sediments, especially since hard limestone rock is known to have been impacted by dredging operations in the St. Johns River to the west (Buker 1980). Four of the subbottom targets investigated by Faught and James (2011) were bedrock exposures. Nevertheless, the potential for encountering Paleoindian and Early Archaic site remains low for the Project Area. This is in contrast to the likelihood of Middle Archaic site remains, which is higher. With that said, the presence of Red Snapper Sink southeast of St. Augustine Inlet and Crescent Beach Spring just to the northeast of the Inlet suggests the potential for submerged Paleoindian and Early Archaic site types within the Project Area.

MIDDLE ARCHAIC (8,000 TO 5,000 YBP)

The Atlantic coastal lagoons in the St. Johns River valley became more significantly populated during the Middle Archaic, perhaps as a result of increased utilization of river and forest resources or possibly from a migration of peoples from other places (Milanich 1994). The Middle Archaic as used here considers the time from 7,500 to 50 YBP. The Windover Site shows that people were nearby by 8,000 YBP (9,000 cal. YBP).

Both freshwater and saltwater shell middens are common site types for Middle and Late Archaic and for the later, ceramic-producing cultures and they could be analogs for site characteristics offshore (Milanich 1994). In terms of cultural materials, the Middle Archaic is distinguished by the occurrence of a variety of artifacts, including well developed bone- and shell-tool industries, mostly expedient chipped-stone tools, and the production of bifacially flaked projectile points/knives (PPKs); grooved groundstone axes, stone pendants, and bannerstones are known, but not as frequent. Middle Archaic PP/K types include stemmed broad-bladed points, of which two types occur most frequently in the area, Newnan and Marion (Bullen 1975).

The custom of shallow water burial in peat is a hallmark of the Middle Archaic in Florida with sites, such as Windover, Bay West, and Little Salt Spring, etc. (Beriault et al. 1981; Clausen et al. 1979; Doran 2002). This appears to be an earlier burial method, with burials in terrestrial middens occurring at later sites, such as Tick Island and Gauthier (Milanich 1994). These kinds of sites could be present in the Project Area. Presented below, one inset terrace-like feature remotely sensed on the offshore that may be an analog for these features is recommended for avoidance, or to be investigated more.

There is no need to review additional archaeological understanding of the culture history of the local area because the Project Area was submerged and not available for occupation after 7,000 YBP (7,800 cal. YBP).

HISTORIC PERIOD

FIRST SPANISH PERIOD (1513 TO 1763)

The first European known to visit and explore Florida was Ponce de Leon. With permission from King Ferdinand to find new lands, de Leon left Puerto Rico in 1513, to search for wealth and "The Fountain of Youth." After traveling through the Bahamas, he landed just above the midpoint of the eastern coast of Florida near the Guana River in early April in what is now South Vilano Beach. Turning south, de Leon coasted along the Atlantic shore of Florida, through the Keys and approximately one-third of the way up the Gulf Coast. After being savagely attacked by the local inhabitants, who had no knowledge of The Fountain of Youth, he left Florida in mid-June after a month and a half of exploration (Morison 1974a:507-511). Later, in 1521, de Leon attempted to settle a colony in Florida, believed to be on Sanibel Island, but he died after receiving a fatal wound from the Natives (Morison 1974a:515); thus, began the Spanish and other European settlement of the North American mainland.

After the de Leon expedition, several attempts were made by Europeans to capture Natives along the eastern coast of Florida for use as slaves (Hall 2001:7) and to colonize. In 1520, Francisco Gordillo explored the coast of the Carolinas. Another Spanish exploratory expedition visited the area in 1525. A year later Lucas Vazquez de Ayllon coasted up the Carolinas with approximately 500 colonists. Shipwrecks and disease took their toll on the colony, and in 1527, the survivors numbering less than 200, departed (Coker 1987:2); however, by 530 the existence of Florida and the lower eastern coast of North America were well known to the world. The 1516 Martin Waldseemuller map shows the outline of Florida off Cuba. Thirteen years later a more accurate map of Florida was produced by Diego Ribero (Whitfield 1996:28-31). The information for these maps and charts was gleaned from various exploratory expeditions along the Florida coast.

The Spanish set up several small-scale settlements around Florida to either minister to the Natives or to aid shipwrecked mariners. Most of these settlements did not survive long, due either to Native resistance or simple abandonment. Later, a concentrated effort to place missions among the Natives by the Franciscans was attempted. Approximately 80 sites were set up over the years of Spanish domination of the area, but most were failures. European disease, foreign interlopers, and Native resistance were generally the cause for the decline of Spanish power (Hall 2001:8).

The most well-known of these Spanish settlements is St. Augustine, which was founded in 1565, by Pedro Menendez de Aviles as a base of operations against the French at Fort Caroline to the north. The Spanish, in an attempt to maintain sovereignty over the region, settled at Port Royal in 1566. When Sir Francis Drake captured and burned St. Augustine in 1586 (Figure 2-04), this post was abandoned; however, the raids of other European powers and brigands were only irritants, as Spanish power put a temporary halt to other European nations encroaching down the eastern coast.

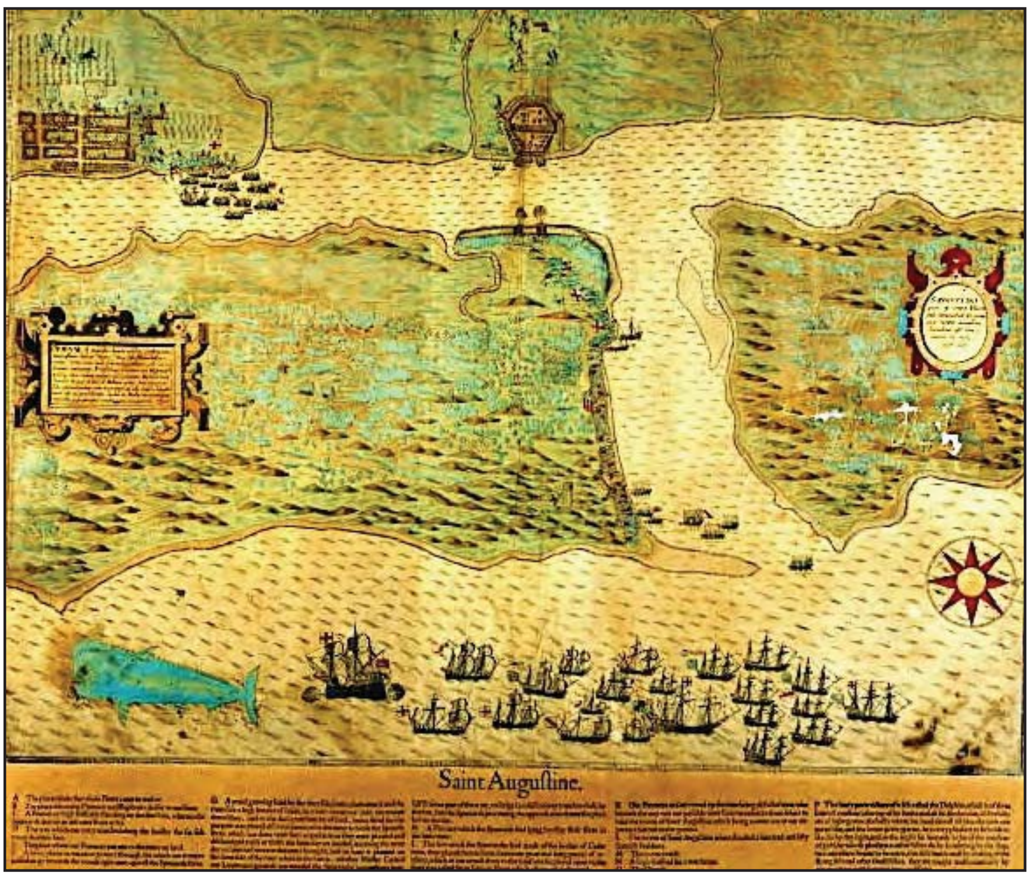

Figure -04. Map depicting ir Francis Drake's attack on t. Augustine on 28 and 29 May 1589. This map is the oldest item in the Florida State Archives. It was drawn by Italian cartographer Baptista Boazio in 1589 (courtesy of the State Library and Archives of Florida).

In the initial years after the founding of St. Augustine, the settlement was defended by nine successive wooden forts. Following the 1668 attack by the English pirate Robert Searle, construction began on a masonry star fort (Figure 2-05). Coquina, quarried on Anastasia Island, was used in the construction, which lasted 23 years. The fort was modified and expanded various times under the various jurisdictions. In 1738, after the fort passed its first test in 1702, during the siege of St. Augustine by the British, the Spanish reconstructed and expanded the fort, adding more guns and increasing the height of the walls. Shortly after, the British declared war on Spain (The War of Jenkins' Ear). The British captured several forts in Spanish Florida, but again failed to take St. Augustine. The British would take possession of the fort, along with the rest of Florida in 1763, at the end of the French and Indian War.

Figure 2-05. Immediately southwest of the inshore Project Area lays the Castillo de San Marcos National Monument (courtesy of the State Library and Archives of Florida).

FRENCH PERIOD (1524 TO 1586)

In 1524, the French, emboldened by Verrazano's voyage along the eastern coast of the New World, took action to claim some of this terra nova for themselves. During 1562, the French sent two vessels to explore along the present Carolinas coast. Jean Ribault took possession of the area in the name of the King of France, Charles IX. His original settlement of Santa Elena (Port Royal, South Carolina) did not survive long, as there was internal dissention, and the post was abandoned. The French were not to be discouraged, and two years later a second attempt, under Rene de Laudonnière, established a settlement at Fort Caroline, on the St. Johns River in Florida (Coker 1987:3), close to present-day Jacksonville.

The French settlement in Florida was a danger to the homeward fleets carrying New World wealth to Spain. King Philip II of Spain dispatched Menendez de Aviles to eradicate the problem in 1565. At the same time King Charles sent Jean Ribault with a powerful seven-vessel fleet (although the number of ships is in dispute) along with ,000 colonists and troops to re-supply Fort Caroline. Meeting at the mouth of the St. Johns River, Ribault immediately sailed southward to attack St. Augustine, but his fleet was destroyed by a hurricane sinking his ships from Cape Canaveral to Mantanzas Inlet (Meide et al. 2014), the inlet being just south of the current survey areas. Subsequently, Fort Caroline was taken by a land assault and the defenders were all put to death. The French avenged this treachery three years later when the fort was retaken and all Spanish prisoners were murdered (Morison 1974b:470).

BRITISH PERIOD (1763 TO 1783)

With the ceding of Florida to the British in 1763, as part of the Treaty of Paris, ending the French and Indian War, more settlement and economic activities are recorded in the area (Johnson 2002:35). The British split Florida into eastern and western territories, with St. Augustine designated as the capital of "East Florida." The name of the fort, *Castillo de San Marcos* (see Figure 2-05), was changed to Fort St. Mark.

St. Augustine and the territory of East Florida were of secondary importance among Britain's North American holdings until 1775, when unrest in the British colonies of North America resulted in the Declaration of Independence. East Florida, a colony loyal to King George III, came to be of strategic importance to Britain. Fort St. Marks became the regimental headquarters and served as a prison for captured American soldiers. In 1779, Spain entered the conflict against Britain, hoping to regain its former lands, and distracted the British at St. Augustine enough that they were not able to mobilize efficiently against the rebellion to the north. Fighting east from Louisiana, Spanish forces took Mobile and Pensacola. Lands from there and to the east were ceded back to Spain as part of the Treaty of Paris in 1783.

SECOND SPANISH PERIOD (1783 TO 1821)

Although Spain regained control of Florida after the Revolution, they soon faced increasing pressure on the border with the new Republic. Florida became a destination for runaway slaves, destitute Native Americans, and criminals from north of the border. In spite of this, Spain maintained a military presence in the area, upgrading and improving the defenses at St. Augustine and the fort, which was once again named Castillo de San Marco. On 20 July 1821, after heavy pressure from the U.S. government, applied in part because of the increasing use of Florida as a base for pirates, Spain ceded Florida to the U.S. with the signing of the Adams-Onis Treaty.

TERRITORIAL PERIOD (1821 TO 1844)

The American Territorial period began with the arrival of Andrew Jackson, who established the first territorial government. In 1821, Florida was a sparsely inhabited wilderness, with a scattering of Spaniards, Native Americans, and freed slaves. With the American takeover, Florida was opened up to settlement and scores of people from the older southern plantation regions on the Carolinas, Georgia, and Virginia began to immigrate. By 1824, East and West Florida were merged into "Florida Territory," with the new capital city located in Tallahassee, chosen because of its location between the two previous administrative centers of Pensacola and St. Augustine.

As the population of the new territory increased, so did the frequency of conflicts between the newcomers and the native Creek and Miccosukee. Settlers increased pressure on the Federal government to remove the native people, both because they occupied land the settlers wanted, and because native communities provided sanctuary for runaway slaves. Under the Treaty of Moultrie Creek, the Seminoles agreed to give up all claims to land in Florida in exchange for a 4,000,000-acre reservation in the center of the territory. Under the terms of the treaty, the Federal government was obligated to protect the Seminoles as long as they remained peaceful and law-abiding; however, problems and delays in implementing the terms of the treaty led to impatience and unrest among the Seminoles, resulting in scattered violence between the Seminoles and the settlers. By 1830, public pressure to remove the Native Americans entirely from Florida resulted in the Indian Removal Act, which required all Native Americans in Florida Territory to move west of the Mississippi River. The Treaty of Paine's Landing, ratified in 1834, formalized this with the Seminoles. While some went quietly, other resisted, leading to the Second Seminole War (1835 to 1842). As a result, the few remaining Seminoles were allowed to stay on an informal reservation in southwestern Florida.

Economic development of the territory continued in rapid pace, with the population reaching 54,000 by 1840. In the mid-1840s, Florida Territory applied for entry into the U.S. as the twenty-seventh state. *Castillo de San Marcos* was changed to "Fort Marion," and was used as part of the American Coastal Defense System as well as a prison during the Second Seminole War.

STATEHOOD PERIOD

Florida became a state on 3 March 1845, with William Moseley elected governor. By 1855, the uneasy peace between settlers and Native Americans again broke down, and the resulting call for Native Americans removal led to the Third Seminole War (1855 to 1858). By the end of the war, only scattered Seminole families remained in the state.

CIVIL WAR PERIOD

Florida, joining other Southern states, succeeded from the Union on January 1861. After existing as an independent republic for a month, Florida became a founding member of the Confederate States of America (CSA). Although not in the midst of the major land war, Florida was an important supply route for CSA forces. Union forces blockaded the Florida coast and occupied key ports such as Pensacola, Jacksonville, and Key West.

St. Augustine and its surrounding areas were relatively quiet during the war. In the days before succession, Florida state forces took the fort from the small Union garrison. Four days later, Federal troops with the USS *Wabash* recaptured the fort after the CSA forces abandoned it, and maintained control throughout the war. Florida was readmitted to the Union on 25 July 1868.

POST-CIVIL WAR PERIOD

The golden age of St. Augustine began in 1883, when Henry M. Flagler arrived. A wealthy oil tycoon from New York, Flagler vacationed in St. Augustine and came to see the area as America's answer to the French Riviera. Within five years, in 1888, he had built and opened the Ponce de Leon Hotel. It was soon joined by the Cordova, a competing hotel he purchased and then rebuilt, and the Alzacar, a smaller hotel designed for the less affluent traveler. The grand Ponce de Leon cost $2,500,000 and employed 1,200 skilled workers from all over the world (Figure 2-06). Along with the hotels, Flagler also contributed to improvements in the city infrastructure, including sanitation, street paving, and building hospitals and churches. He also constructed and improved the Florida East Coast (FEC) Railway system down the eastern seaboard of Florida. This influx of tourists and investors gave rise to Mineral City in 1886, located, between Jacksonville and St. Augustine in what is now Vilano Beach. Plans for development were proposed by the San Pablo and Diego Company, but no real progress was made until the company's holdings were sold in 1917, to Buckman and Pritchard, Inc. (Robinson 2008).

Figure 2-06. Ponce de Leon Hotel, now part of Flagler College (courtesy of the tate Library and Archives of Florida).

TWENTIETH CENTURY

Northern Florida experienced a "decade of progress," fueled at first by tourist traffic from Europe, which would normally be taken by European resorts, closed due to the First World War (WWI). Upgrades to roads, fire protection, electricity, and telephone service attracted automobile travelers for long summer vacations at area beaches. Infrastructure upgrades spread between St. Augustine and Jacksonville, which enticed Buckman and Prichard, Inc. to exploit the discovery of rare minerals found in the Vilano Beach dunes.

The company was able to mine the minerals directly from the sand without undertaking a traditional mining operation. Present on the surface of the sand dunes was titanium, rutile, and zircon. The most significant mineral of these was titanium, which was used to strengthen steel in production of cannon used during WWI. Since the Germans controlled the main source of titanium in Europe, Buckman and Pritchard, Inc. was one of the main providers of the mineral to the U.S. government during wartime. After the war mining continued, the minerals could be found in tires, paint, porcelain, and high transmission wires (Robinson 2008).

By the end of WWI the demand for the minerals had all but halted, forcing mining operations to stop. A new development company bought Mineral City and its surrounding land in 1928. By the late 1930s most traces of the mining town had vanished, due to new development and the tides. Mineral City was gone and replaced by the tourist destination Vilano Beach.

During World War II (WWII) tourism effectively ended for St. Augustine and surrounding towns, at least temporarily, as the region adopted wartime rationing. Almost immediately after the war ended, the region experienced another tourism boom, which continues today. Vilano Beach remains a typical Florida tourist destination, having numerous golf courses and beautiful beaches.

PREVIOUS SUBMERGED CULTURAL RESOURCES INVESTIGATIONS

One of the best tools for accurately assessing the potential for unknown submerged cultural resources is to compare the Project Area with findings and results of previous investigations, including both remote sensing and cultural resources surveys that have been completed in or near the Project Area. Varying in degree of applicability to the current research, these studies allow for the identification of potentially significant resources, and the studies aid in the recognition of specific problems or aspects inherent in the assessment of the survey data and in the identification of potential resources.

In order to ascertain the presence of submerged archaeological sites and investigations in or adjacent to the Project Area, the Florida Master Site File (FMSF) was reviewed. The review indicates several submerged cultural resources investigations have been conducted within or near the Project Area. The closest of these investigations took place between the northern survey corridors R80 and R85, ocean-side north of St. Augustine Inlet, as well as numerous surveys conducted in and around the City of St. Augustine. Surveys conducted in or near St. Augustine have been included in *Appendix B: Previous Submerged Cultural Resources Investigations* to illustrate the amount of submerged cultural resources present in northern St Johns County. Examples of work conducted inside the channel and AIWW are presented in Table 2-01. These surveys described in Appendix B exceed the 1-mile search radius for South Ponte Vedra or Vilano Beach corridors; they have been included for context.

Table 2-01. Previous Submerged Cultural Resources Investigations near or in the Project Area.

FMSF No.	Title	References
1805	*Cultural Resources Magnetometer Survey, St Johns County Beach Erosion Control Project, St Augustine, Florida*	OSM Archeological Consultants 1989
4451	*The St. Augustine Shipwreck Survey. Phase One*	Franklin and Morris 1996
4460	*A Cultural Resources Remote Sensing Survey of Two Channel Maintenance Sites in St. Augustine Harbor, St. Johns County, Florida [draft]*	Watts 1996a
4531	*A Submerged Cultural Resource Diver Investigation of Magnetic Anomalies at St. Augustine Harbor, St. Johns County, Florida*	Watts 1996b
5210	*Submerged Historic Properties Survey St. Augustine Inlet Maintenance Dredging St. Johns County, Florida*	Hall 1998a
5214	*Submerged Historic Properties Survey Shore Protection Project St. Johns County Florida*	Hall 1997
5314	*Archaeological Diver Identification and Evaluation of Twelve Potentially Significant Submerged Targets in St. Augustine Inlet, St. Johns County, Florida*	Hall 2000a
5376	*Archaeological Diver Identification and Evaluation of Eleven Potentially Significant Submerged Targets in Proposed Borrow Area, St. Johns County, Florida*	Hall 1998b
6565	*Cultural Resources Marine Remote Sensing Survey and Terrestrial Survey at St. Augustine Entrance Channel, St. Johns County, Florida*	Hall 2000b
7227	*The St. Johns County Submerged Cultural Resources Inventory and Management Plan 2001-2002 Phase I, Volumes I and II*	Morris et al. 2002
8930	*The St. Johns County Submerged Cultural Resources Inventory and Management Plan 2002-2003 Phase II*	Morris et al. 2003
11754	*The St. Johns County Submerged Cultural Resources Inventory and Management Plan 2003-2005 Phase IIA*	Morris et al. 2006
12789	*A Remote Sensing Survey of the Proposed Salt Run Docking Facilities on Anastasia State Park, St. Johns County, Florida*	Moore and Morris 2006

FMSF No.	Title	References
13331	*Submerged Cultural Resources Monitoring Report for the 2005, St. Augustine Beach Renourishment Project*	Moore 2006
15294 and 15562	*An Archaeological Survey of the Salt Run Dredging Project Options B&C, St. Johns County, Florida (SAME REPORT)*	Turner et al. 2008
16122	*Historical and Archaeological Resources Survey of Matanzas Harbor, St. Augustine, St. Johns County, Florida*	Burns 2008
17239	*Historic Assessment and Remote Sensing Survey of the St. Johns County Beach Erosion Control Project, St. Johns County, Florida*	Burns 2009
17391	*First Coast Maritime Archaeology Project 2007-2009: Report on Archaeological and Historical Investigations and other Project Activities*	Meide et al. 2010
17852	*Addendum Report: Archaeological Diver Identification and Evaluation of Ten Potentially Significant Submerged Targets, Intracoastal Waterway Near St. Augustine, St. Johns County, Florida*	Krivor 2010b
17883	*Historic Assessment and Remote Sensing Survey of the Intracoastal Water Way near St. Augustine, St. Johns County, Florida*	Krivor 2010a
17916	*Addendum Report: Archaeological Diver Identification and Evaluation of Twenty-Eight Potentially Significant Submerged Targets, St. Johns County Beach Erosion control Project, St. Johns County, Florida*	Burns 2010
17947	*Remote Sensing Survey, Historic Assessment and Diver Evaluations of Suspected Submerged Resources Near St. Augustine, St. Johns County, Florida*	Lydecker and James 2008
21408	*First Coast Maritime Archaeology Project 2011-2012: Report on Archaeological Investigations*	Meide et al. 2014
23500	*Submerged Cultural Resources Remote Sensing Survey of the Proposed St. Augustine Borrow Area, St Johns County, Florida*	James et al. 2017
24688	*First Coast Maritime Archaeology Project 2013: Report on Archaeological Investigations*	Meide et al. 2017
26144	*Archaeological Diver Identification of Remote Sensing Anomalies in the St. Augustine Flood Shoal, Davis Shores Shoals, and Intracoastal Waterway, St. Johns County, Florida*	Wilson et al. 2019
-In Progress-	*First Coast Maritime Archaeology Project 2016-2018:Report on Archaeological Investigations*	Meide et al. 2019

SHIPWRECKS, AUTOMATED WRECK AND OBSTRUCTION NFORMATION SYSTEM, AND HISTORIC SITES NVENTORY

Both the FMSF and the current online edition of the National Oceanic and Atmospheric Administration's (NOAA's) Automated Wreck and Obstruction Information System (AWOIS) were queried for historic shipwreck sites in or adjacent to the Project Area. In addition, the FMSF was queried for historic sites in St. Johns County within the immediate Project Area. According to the FMSF, 23 nearby archaeological sites or submerged cultural resources have been identified in the 1-mile buffer radius surrounding the Project Area.

AUTOMATED WRECK AND OBSTRUCTION INFORMATION SYSTEM

The most comprehensive and up to date list of shipwrecks for the U.S. is NOAA's AWOIS and Electronic Navigation Chart (ENC). These databases were consulted relative to known wreck sites or obstructions within or near the current survey corridor. The AWOIS database contains information on over 10,000 wreck sites and obstructions/hangs in the coastal waters of the US. Information within the database includes a latitude and longitude of each feature along with any known historic and/or descriptive details. The AWOIS website, which may be accessed at http://historicals.ncd.noaa.gov/awois/awoisdbsearch.asp, allows researchers to search for wrecks based on Latitude/Longitude coordinates for a given area. An Access Database file, it has been projected here into Google Earth to allow the researcher to view what wrecks or obstructions are within a given area.

An examination of survey area via AWOIS and ENC databases did not identify any wrecks or obstructions within 8 miles of the Project Area. All wrecks and obstructions are found south at St. Augustine Inlet. It must be stated that position accuracy of AWOIS/ENC wrecks and/or obstructions is highly variable and usually poor. It also appears the AWOIS program routinely includes wrecks, obstruction, and unknowns located outside the prescribed coordinates or chart.

OTHER SHIPWRECK SOURCES

An early and comprehensive collection of shipwreck information was compiled by Robert Marx (1971). Entitled *Shipwrecks in the Americas,* the book is divided into two basic parts. The first concerns the general history and development of shipping with an emphasis on being able to identify shipwreck sites. The second part of the book focuses on specific shipwrecks and their locations. A section in this part is devoted to Florida, as the author states, "more work has been done on shipwrecks in Florida Waters than throughout the rest of the Western Hemisphere" (Marx 1971:191). The reasons are many, but generally come down to history (Spanish treasure) and geography. Hundreds of wrecks are listed and most are noted as being strewn across the Atlantic Coast or the Keys with none listed in the Project Area.

A more scholarly publication, *Ships and Shipwrecks of the Americas*, edited by Bass (1988) is a survey of numerous shipwrecks that can enlighten us through archaeological study of our past cultural traditions. Vessels from both North and South America are included. Much more selective than the previously noted volume, inclusion in this tome is limited to vessels of historic importance that have offered up information of the past through archaeological investigation. No maritime loss is listed in Bass's work pertaining to the Project Area.

Another collection of shipwreck site locations is presented in *Shipwrecks of Florida* (Singer 1992). Over 2,100 vessels are listed as being lost off the Florida coast. Only one vessel is listed off Vilano Beach, *Dixie Crystal*. The vessel, an oil-fired engine and screw propulsion, is believed to be located inside Matanzas Bay (Hall 2000).

CARTOGRAPHIC REVIEW

Another excellent tool for identifying shipwrecks within or adjacent to the Project Area is a review of historic navigation maps and charts for the area. Often noting shipwrecks, obstructions, and other various hazards for the mariner, many of these maps can be accessed from NOAA's Office of Coast Survey's Historical Map and Chart Collection (www.historicalcharts.noaa.gov/historicals/search), while others are found in various repositories, publications, or websites. The NOAA website allows the researcher to specify the area or region of interest and then review all available maps for that area. Another valuable utility provided by this site is the virtual magnification feature, which allows the researcher to zoom in and out of specific areas. Multiple nautical charts were examined regarding the different survey areas and the charts which best represented the areas or contain valuable information are presented below.

The earliest navigation chart available relative to the Project Area dates to 1864 (Figure 2-07). No cultural feature (i.e., shipwreck or obstruction) is represented at or near the Project Area on the map. The next available map from NOAA dates to 1933 (Figure 2-08). The chart closely resembles the previous map with its hydrographical data for offshore area. No cultural feature (i.e., shipwreck or obstruction) is represented at or near the Project Area on the map.

The next navigation chart from the NOAA website dates to 1957 (Figure 2-09). Again, this chart does not show cultural resources near South Ponte Vedra or Vilano Beach. This same can be said for the following charts: 1984, and the most recent 2017 (Figures 2-10 and 2-11).

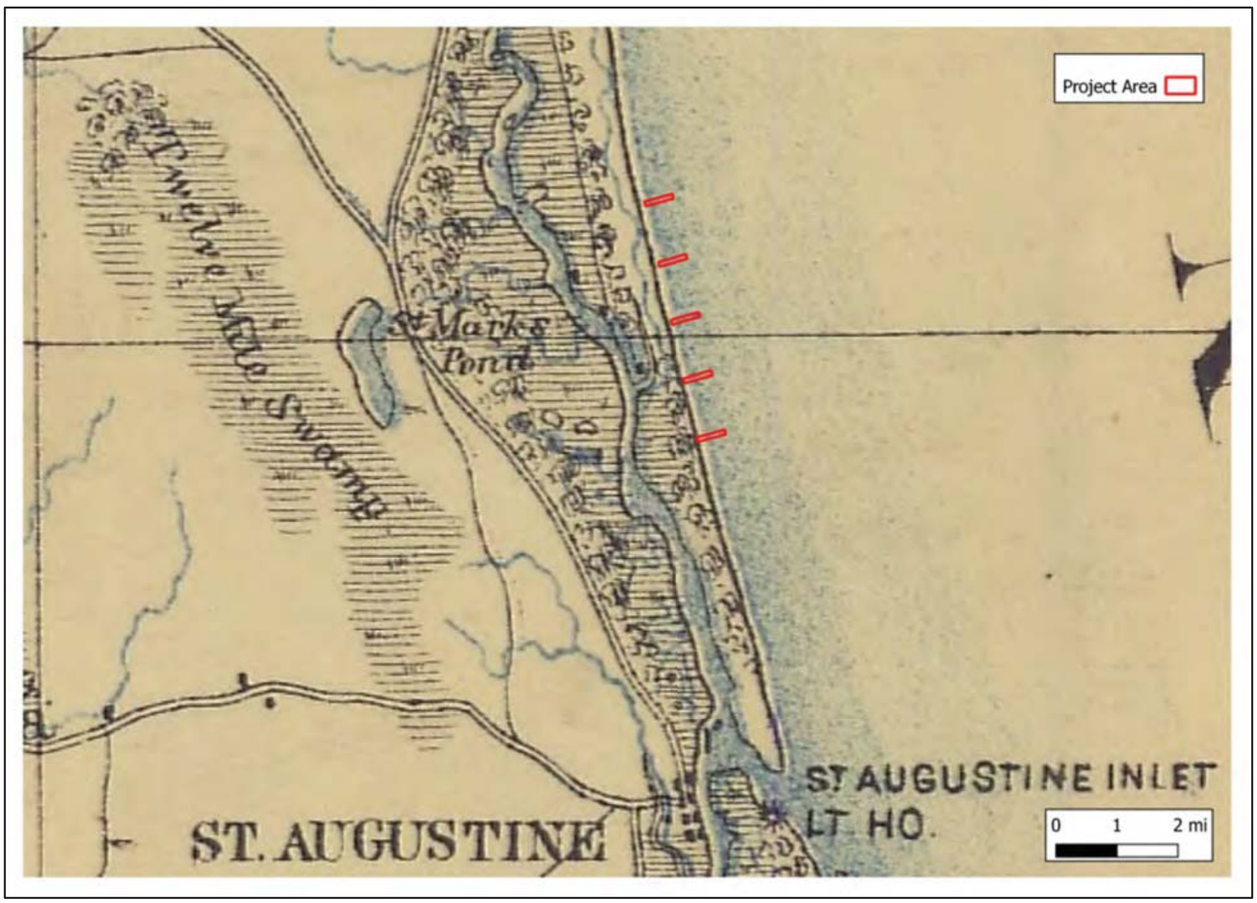

Figure 2-07. 1864 chart excerpt showing Vilano Beach, the area north of St. Augustine containing the Project Area (Chart No. 53865 from NOAA's Office of Coast Survey's Historical Map and Chart Collection).

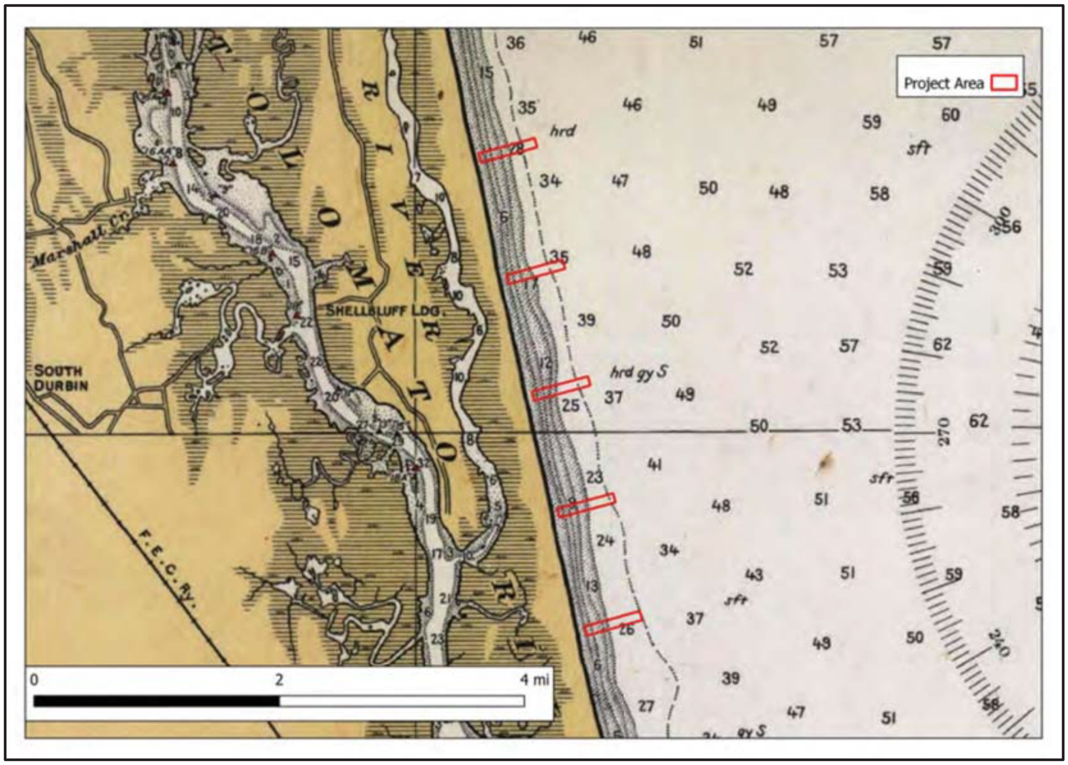

Figure 2-08. 1933 chart excerpt showing the Project Area in red north of t. Augustine (Chart No. 1243-7 from NOAA's Office of Coast Survey's Historical Map and Chart Collection).

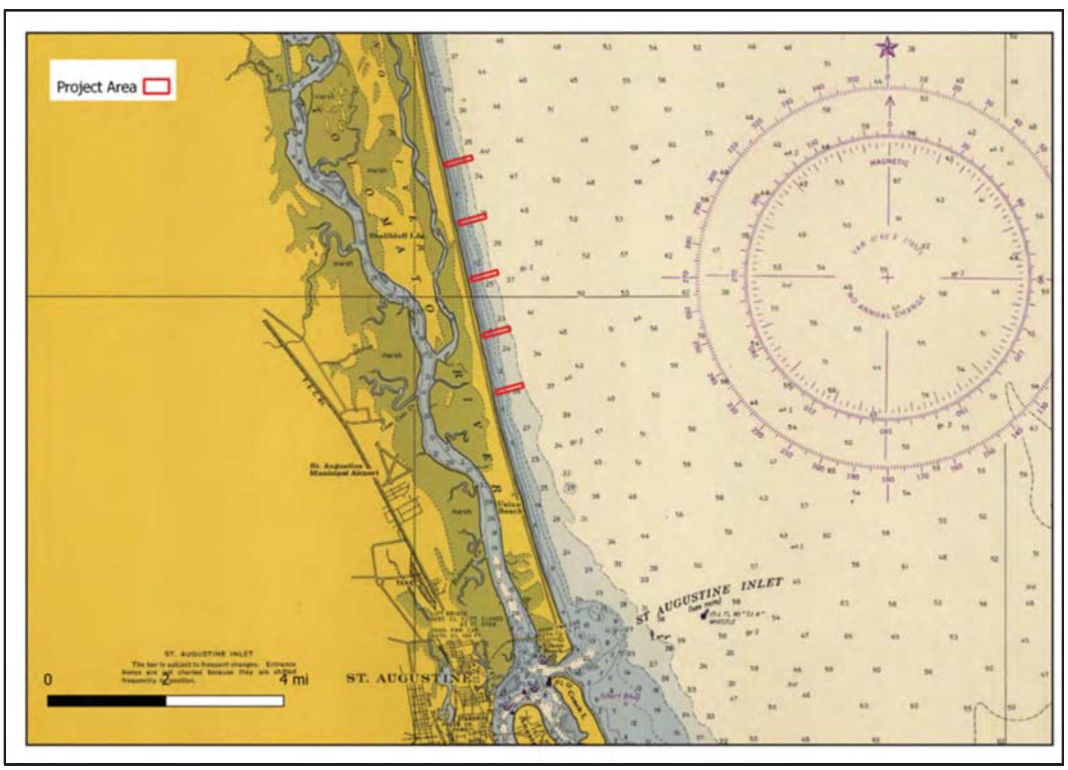

Figure 2-09. 1957 chart excerpt showing the area north of St. Augustine with no shipwrecks nearby the Project Area (Chart No. 1243-3 from NOAA's Office of Coast Survey's Historical Map and Chart Collection).

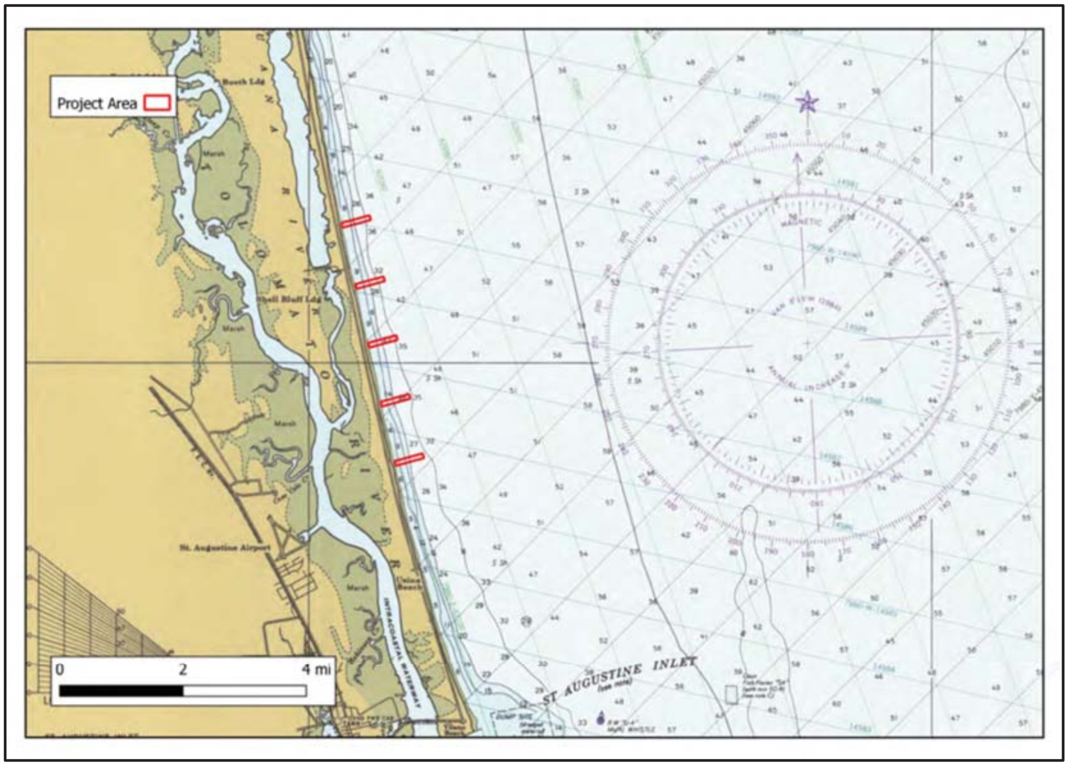

Figure 2-10. 1984 chart excerpt showing the area north of St. Augustine with no shipwrecks (Chart No. 11488 from NOAA's Office of Coast Survey's Historical Map and Chart Collection).

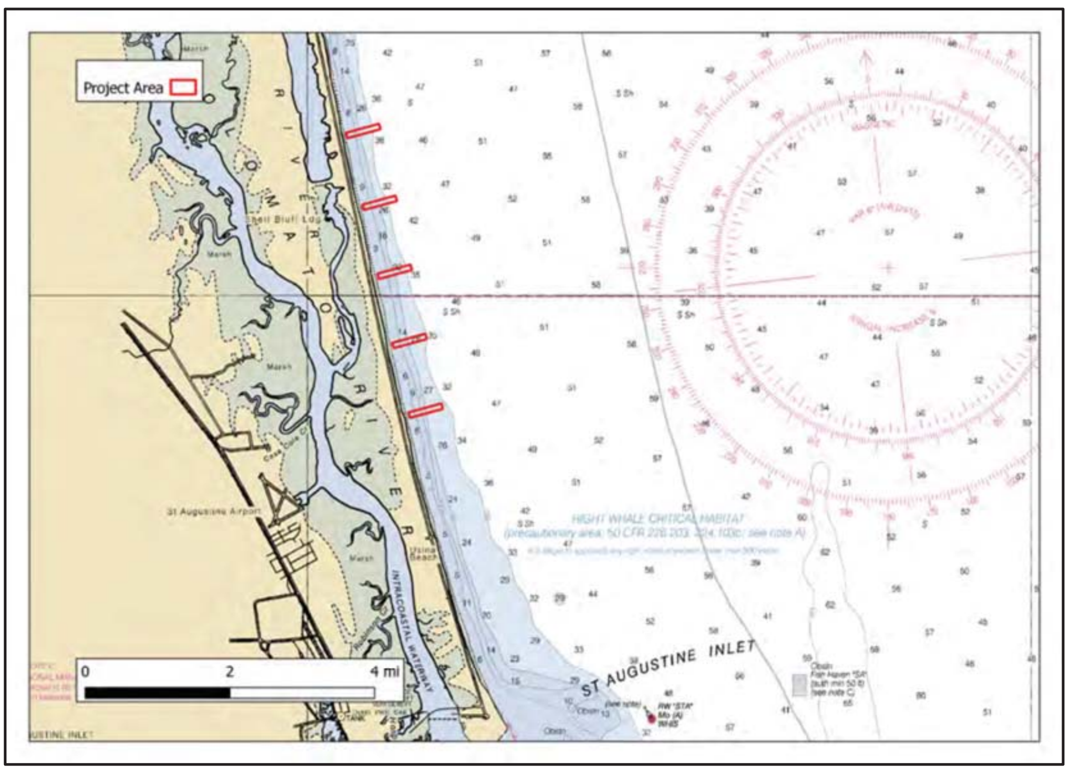

Figure 2-11. 2017 chart excerpt showing the area north of St. Augustine inlet with no shipwrecks (Chart No. 11488 from NOAA's Office of Coast Survey's Historical Map and Chart Collection).

III. METHODS

PROJECT AREA ENVIRONMENT

The survey areas examined during this investigation were located 4.7 miles north of the St. Augustine. The Project Area (Figure 3-01) consisted of deep water (including depths as great as -40 feet mean sea level [msl]) on the western edge of the survey area. The shoreline portion (Figure 3-02) was much shallower. There, depths ranged from -3 to -15 feet msl. During the shallow water portion of the survey a "float" was used on the magnetometer, in order to maintain a consistent instrument altitude. The sidescan was towed from the bow of the vessel, and the subbottom was deployed from a fixed davit located amidships. n deeper water a stern tow was used for the magnetometer and sidescan to achieve the proper instrument depth.

PERSONNEL

All of the personnel involved with this remote sensing survey had the requisite experience to effectively and safely complete the project as proposed. Mr. Stephen James, M.A., Register of Professional Archaeologists (RPA) acted as the Project Manager and Coauthor; Mr. Andrew Derlikowski, M.A., RPA, acted as the Principle Investigator, Field Director, Remote Sensing Specialist, and Coauthor; and Mr. Jeffrey Pardee, M.A., RPA, acted as Remote Sensing Technician and Boat Operator. Additionally, Mr. Derlikowski, M.A., RPA conducted archival research and authored *Chapter II: Historical Background*

EMOTE ENSING URVEY EQUIPMENT

The remote sensing tools chosen for this investigation were the magnetometer (to detect ferrous materials), sidescan sonar (to create images of the bottom), and the subbottom profiler (to reconstruct the structure of the underlying sediment beds). Locational control was with Differential Global Positioning System (DGPS) technology. Analyses of these data were conducted with HYPACK 2019 and SonarWiz 7.

DIFFERENTIAL GLOBAL POSITIONING YSTEM

The primary consideration in the search for any submerged item is positioning. Accurate positioning is essential during the running of survey tracklines and returning to recorded locations for refinement or diver investigations. Positioning was accomplished on this project using a SBG Systems Ellipse2-D navigation and inertial compensator with dual-antenna GNSS, with high-speed binary data streams supplied to the navigation computer (Figure 3-03).

The Ellipse2-D uses an enhanced Extended Kalman Filter (EKF) and contains a MEMS-based Inertial Measurement Unit (IMU). Thus, the unit is able to combine Global Navigation GNSS with inertial data, and perfect for conducting marine remote sensing surveys, which rely on these data streams to accurate positioning and orientation of survey instruments. The unit achieves true heading through the use of its dual antenna, eliminating magnetic calibration issues in areas with unreliable magnetic conditions. The Ellipse2-D integrates real time corrections from base stations (RTCM) and satellites (Wide Area Augmentation System [WAAS]), allowing for sub-meter accuracy during survey (SBG Systems North America 2018:2-3).

Figure 3-01. Project Area environment; view facing south.

Figure 3-02. Project Area closest line to shore; facing west. Beach homes in the background.

Figure 3-03. SBG Systems Ellipse2-D navigation and inertial compensator used during the investigation.

The project was planned in NAD83 Florida State Plane East, in US survey feet, using the 2011 adjustment, and all sidescan, subbottom, and magnetometer target data were converted to this Florida East grid. The navigation data streams were in geographic format, WGS84 (i.e., latitude, longitude). The raw data from the sidescan and subbottom devices are archived in this format, and the magnetic data are in the projected format. Navigation was conducted with a Lenovo Thinkpad E520, using HYPACK Max 2019 for navigation. HYPACK, a Xylem company, was written specifically for marine survey applications. The magnetometer data were acquired with this program as well. All positioning coordinates are based on the position of the DGPS antennae relative to the sensor location. Offsets from the antenna to tow point locations, in conjunction with cable out, are input into HYPACK's towed systems driver to determine layback on the fly (Figure 3-04). This layback information is critical for accurate positioning of targets in the data analysis phase and to relocate any targets for additional investigations.

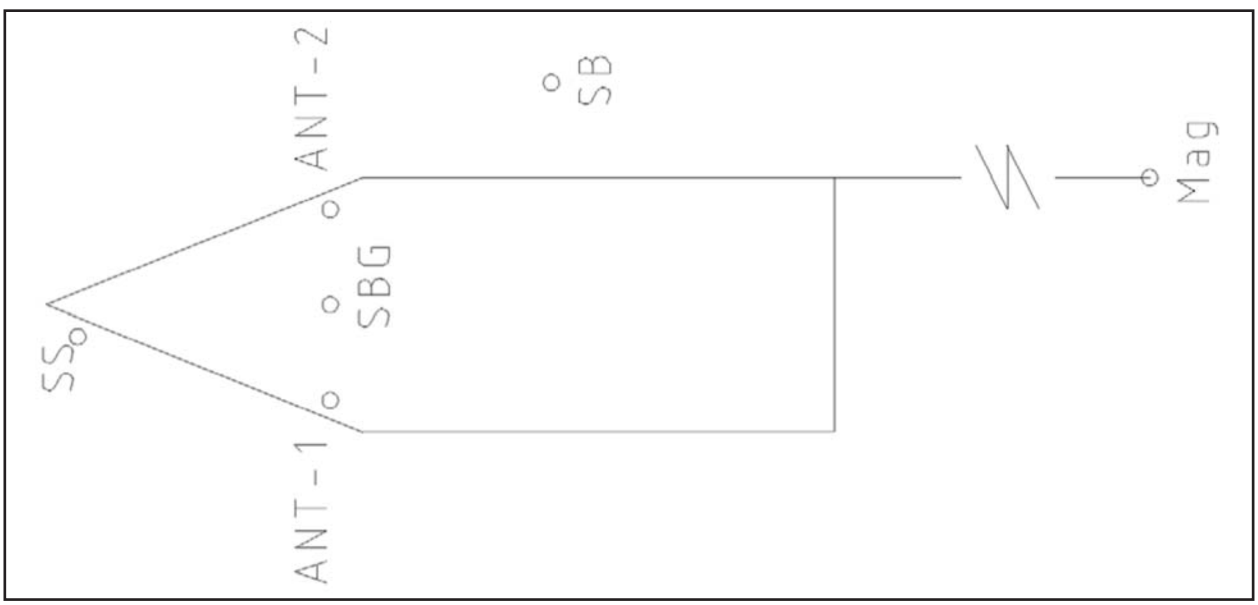

Figure 3-04. Vessel schematic illustrating instrument positions relative to the tracking point. SS=sidescan sonar, SBG=positioning system receiver, ANT-1=antenna one, ANT-2=antenna two, SB=subbottom profiler, Mag=Magnetometer.

MAGNETOMETER

Magnetometers measure the intensity of magnetic forces with a sensor that measures and records the ambient (background) magnetic strength and if present, deviations from the ambient background (anomalies) caused by magnetic fields of ferrous objects and other sources such as high voltage cables (Breiner 1973). These measurements are recorded in nanoteslas, the standard unit of magnetic intensity.

The success of the magnetometer to detect anomalies in local magnetic fields has resulted in the instrument being a principal remote sensing tool of maritime archaeologists because anomalies can represent components of shipwrecks and other historic debris or objects hazardous to dredging or navigation. While it is not possible to identify specific ferrous objects from the magnetic field contours, it is occasionally possible to approximate shape, mass, and alignment characteristics of wrecks or other structures based on complex magnetic field patterns. In addition, other data (historic accounts, use patterns of the area, diver inspection), which overlap data from other remote sensing technologies, such as the sidescan sonar and prior knowledge of similar targets, can lead to an accurate identification of potential targets.

There are three types of commercially available marine magnetometers: proton precession, cesium vapor, and Overhauser. Over the course of the project Panamerican employed a Geometrics 881 cesium vapor magnetometer (Figure 3-05). Data were stored in the navigation computer and archived. The Geometrics 881 is capable of sub-second recordation for precise location control, and data were collected at 10 hertz, providing a record of both the ambient field as well as the character and amplitude of the anomalies encountered. A 110-volt gasoline powered generator powered all survey devices.

Figure 3-05. Survey instruments employed during the investigation included (clockwise from top left) the magnetometer, the subbottom profiler, and sidescan sonar.

IDESCAN ONAR

The remote sensing instrument used to search for physical features on or above the ocean floor was an Edgetech 4125 sidescan sonar system (see Figure 3-05). The sidescan sonar is an instrument that, through the transmission of dual fan-shaped pulses of sound and reception of reflected sound pulses, produces an acoustic image of the bottom. Under ideal circumstances, the sidescan sonar is capable of providing a near-photographic representation of the bottom on either side of the trackline of a survey vessel.

The Edgetech 4125 has internal capability for removal of the water column from the instrument's video printout, as well as correction for slant range distortion. This sidescan sonar was utilized with the navigation system to provide manual positioning of fix or target points on the digital printout. Sidescan sonar data are useful in searching for the physical features indicative of submerged cultural resources. Specifically, the record is examined for features showing characteristics such as height above bottom, linearity, and structural form. Additionally, potential acoustic targets are checked for any locational match with the data derived from the magnetometer and the subbottom profiler.

The Edgetech 4125 sidescan sonar was linked to a towfish that employed a 600-kilohertz frequency setting and a variable side range of 30 meters-per-channel (100 feet) on each of the survey lines. The 30-meters-per-channel setting was chosen to provide detail and 200% overlapping coverage with the 100-foot line spacing and ensure full coverage of the survey area. The sonar frequency was selected in order to provide maximum possible detail on the record generated.

UBBOTTOM PROFILER

Employed to determine the character of near-surface geologic features over the survey area, subbottom profilers generate low frequency (0.5 to 30 kilohertz) sound pulses capable of penetrating the seabed and reflecting off sediment boundaries or larger objects below the surface. The data are then processed and reproduced as cross sections based on two-way travel time (the time taken for the pulse to travel from the source to the reflector and back to the receiver). This travel time is then interpolated to depth in the sediment column by calculating at 1,500 meters-per-second (the average speed of sound in water).

Subbottom profilers have different ranges of sound wave frequency (sparkers, boomers, pingers, and chirp systems). Sparkers and boomers operate at low frequency (0.005 to 2 kilohertz) and afford deep geologic penetration and low resolution, useful for deep geologic time. Pingers (3.5 and 7 kilohertz) are more useful to penetrate late Pleistocene and Holocene aged deposits or paleolandscape features of interest to prehistoric archaeologists. CHIRP systems sweep multiple frequency ranges and are the most precise and accurate of the subbottom profiler systems, and they operate at ranges of 3–40 kilohertz. The resolution can be on the order of 10 centimeters (6 inches) depending sediment type and the quality of the acoustic return. Panamerican employed an EdgeTech 3100 CHIRP subbottom profiler system with a topside power unit, laptop processor and SB-424 tow fish (Figure 3-05). The device was operated at a setting of 4 to 24 kilohertz for maximum penetration and resolution.

Seismic cross sections reconstruct the shapes and extents of reflectors such as facies in channel sediments, rock/sediment interfaces, marine sand bed cover, and so forth. In addition to subbottom profiling, and depending on the density of data points, the first bottom return data can be used for high-resolution bathymetry. Shipwrecks can be studied with subbottom profilers once their location is known. Finding shipwrecks with subbottom profiler survey is less useful.

High and low amplitude reflectors (light and dark returns) distinguish differences of sediment characteristics such as particle size and consolidation (Stevenson et al. 2002). Facies contacts can be identified by discontinuities in the extent, slope angle, or shape of the reflector returns. This latter fact is important when identifying the sinusoidal shapes of drowned channel systems and other relict and buried fluvial system features (e.g., estuarine, tidal, lowland, upland areas around drainage features). Parabolic-shaped reflectors indicate individual objects of sufficient size and consolidation. The parabolic shape is the result of sound propagating outwardly from the item. There are also five types of signals that may cause misinterpretation in the two dimensional records: direct arrivals from the sound source; water surface reflection; side echoes; reflection multiples; and point source reflections. Judicious analysis is required to identify them.

URVEY ESSEL

Panamerican's 25-foot 2520 Sport Cabin Parker, a modified V-hull motor vessel powered by a Yamaha 200-horsepower engine, was employed for the survey (Figure 3-06). The vessel has a covered cabin and an ample, covered-deck area for the operation of all remote sensing equipment. The vessel conformed to all U.S. Coast Guard (USCG) specifications, according to class, and carried a full complement of safety equipment. It carried all appropriate emergency supplies, including life jackets, a spare parts kit, a tool kit, first-aid supplies, a flare gun, and air horns.

Figure 3-06. Panamerican's 25-foot 2520 Sport Cabin Parker.

URVEY PROCEDURES

Survey lines were spaced at 30-meter intervals, survey lines were programmed into the navigation computer (Figure 3-07). The magnetometer and DGPS were mobilized, tested, found operational, and the trackline running began. The helmsman viewed a video monitor, linked to the DGPS and navigational computer, to aid in directing the course of the vessel down the survey tracklines. The monitor displayed the pre-plotted trackline, the real time position of the survey vessel, and the path of the survey vessel. The speed of the survey vessel was maintained at approximately 3 to 4 knots for uniform acquisition of data. As the survey vessel maneuvered down each trackline, the navigation system monitored the position of the survey vessel relative to the tracklines every second, each of which was recorded by the computer. Event marks delineated the start and end of each trackline. The positioning points along the traveled line were recorded on the computer hard drive and all remote sensing data were also stored digitally.

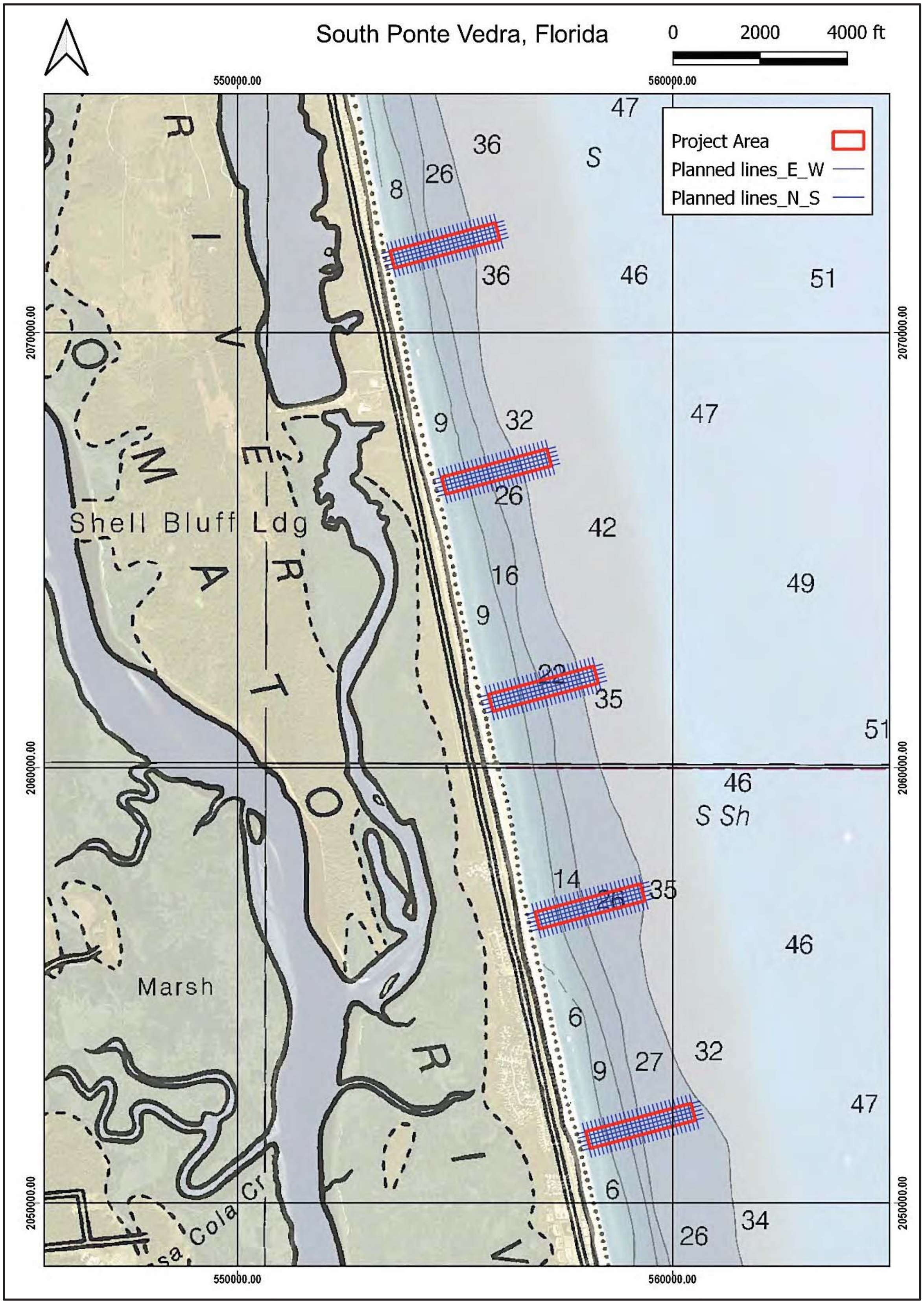

Figure 3-07. Example of planned lines generated for the Project Area at 15-meter intervals. Note aerial view of Fort Clinch on the southeastern side of the map.

DATA ANALYSIS

DATA PROCESSING

Once collected, survey data are processed and analyzed using an array of software packages designed to display, edit, manipulate, map, and compare proximities of raster, vector, and tabular data. These packages include SonarWiz 7 for mosaicing sidescan sonar and subbottom profiler data, mapping target extents and generating target reports, figure details, and GIS layers; HYPACK Magnetometer Editor, Surfer 9, and HYPACK Export for tabulating anomaly characteristics and contouring magnetic data, and generating Geographic Information System (GIS) data layers. ESRI ArcMap is used to display the data on background charts, to conduct a "proximity analysis" for each of the three types of targets (e.g., see which magnetometer, sidescan, and subbottom profiler anomalies are near each other and may explain each other) and to create maps and figures for this report.

MAGNETIC DATA COLLECTION AND PROCESSING

Data from the magnetometer are collected using HYPACK Max. The data are stored as *.RAW files by line, time, and day. *.RAW data files are opened and layback parameters are set. Contour maps are produced of the magnetic data with Surfer 9 using a Minimum Curvature gridding algorithm. The *.DXF file is saved and exported into the combined GIS database. The contour maps allow a graphic illustration of anomaly locations, spatial extent, and association with other anomalies. Magnetic data are reviewed by HYPACK Magnetometer Editor (Figure 3-08), and the location, strength, duration, altitude of the sensor, and type of anomaly are transcribed to a spreadsheet along with comments. For potentially significant anomalies, depth of burial is estimated using the half-width rule (Breiner 1999:31)

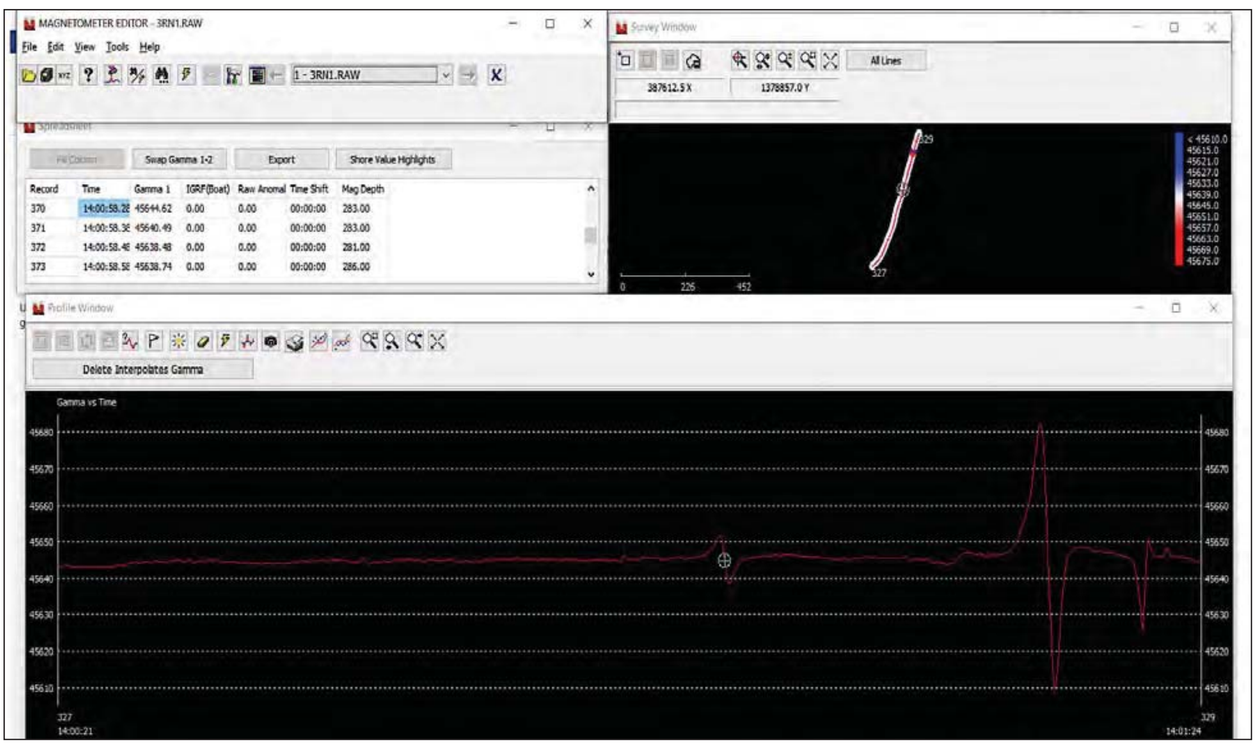

Figure 3-08. HYPACK agnetometer Editor magnetic data display of a survey line. Using these windows one can analyze anomaly position, strength, duration, and type. Target locations are selected based on their type (e.g., monopoles are selected at peak amplitude deviation), and their width is the duration.

SIDESCAN SONAR DATA COLLECTION AND PROCESSING

Post-processing of sidescan sonar is accomplished using SonarWiz 7, a product that enables the user to view the sidescan data in digitizer waterfall format, pick targets, and enter target parameters including length, width, height, material, and other characterizations into a database of contacts. In addition, SonarWiz 7 "mosaics" the sidescan data by associating each pixel (equivalent to about 10 centimeters) of the sidescan image with its geographic location determined from the real-time Hypack corrected position. SonarWiz 7 is the industry standard for mosaicing capability, and the results are exported as geo-referenced *.TIFFs for importing to the GIS database of the project (Figures 3-09 and 3-10). SonarWiz 7 can generate target reports in *.PDF, Word, or Excel format. Panamerican utilizes the Word format for reports.

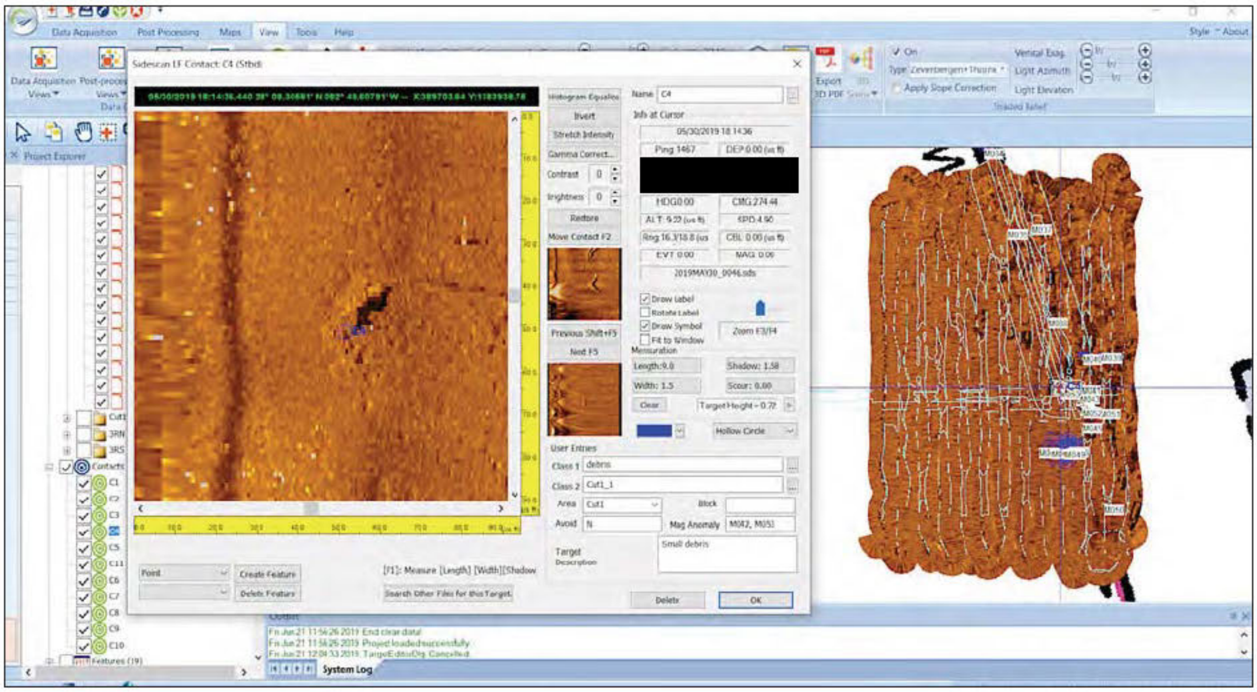

Figure 3-09. SonarWiz 7 software with mosaic example in the background, and a target selection zoom image to the left. Magnetic contours, anomaly locations, and annotations are overlaid.

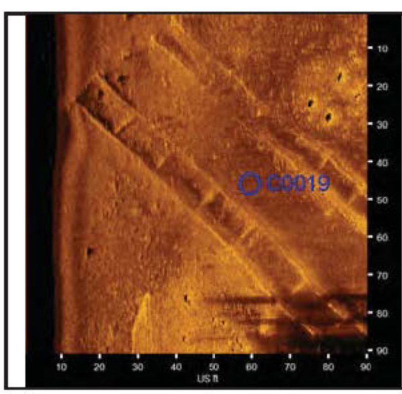	**C0019** • Sonar Time at Target: 10/6/2017 4:06:39 P[redacted] • [redacted]ction: FL83-WF • Acoustic Source File: C:\Users\Tardis\Desktop\Anclote River 2017\Raw Data\SS\2017OCT06_0003.sds [redacted]	**Dimensions and attributes** • Target Width: 34.92 US ft • Target Height: 0.48 US ft • Target Length: 102.11 US ft • [redacted]

Figure 3-10. SonarWiz 7 sonar contact tabular format, automatically generated.

UBBOTTOM PROFILER DATA PROCESSING AND ANALYSIS

Post-processing of subbottom profiler data, like the sidescan data, is done with SonarWiz 7, which in this case enables the user to view the subbottom data in a planar, trackline format. The user may view the data in a digitizer window as a waterfall format, allowing the digitizing of subbottom features of interest, linear extent, depth, and type (Figure 3-11). SonarWiz 7 batch processes waterfall images to *.JPG formats in order to generate figures. Digitized reflectors and the contact databases are exported to the GIS database as *.SHP files. SonarWiz 7 also allows the user to calculate the amount of sonar coverage and illuminate gaps to ensure full coverage of the Project Area.

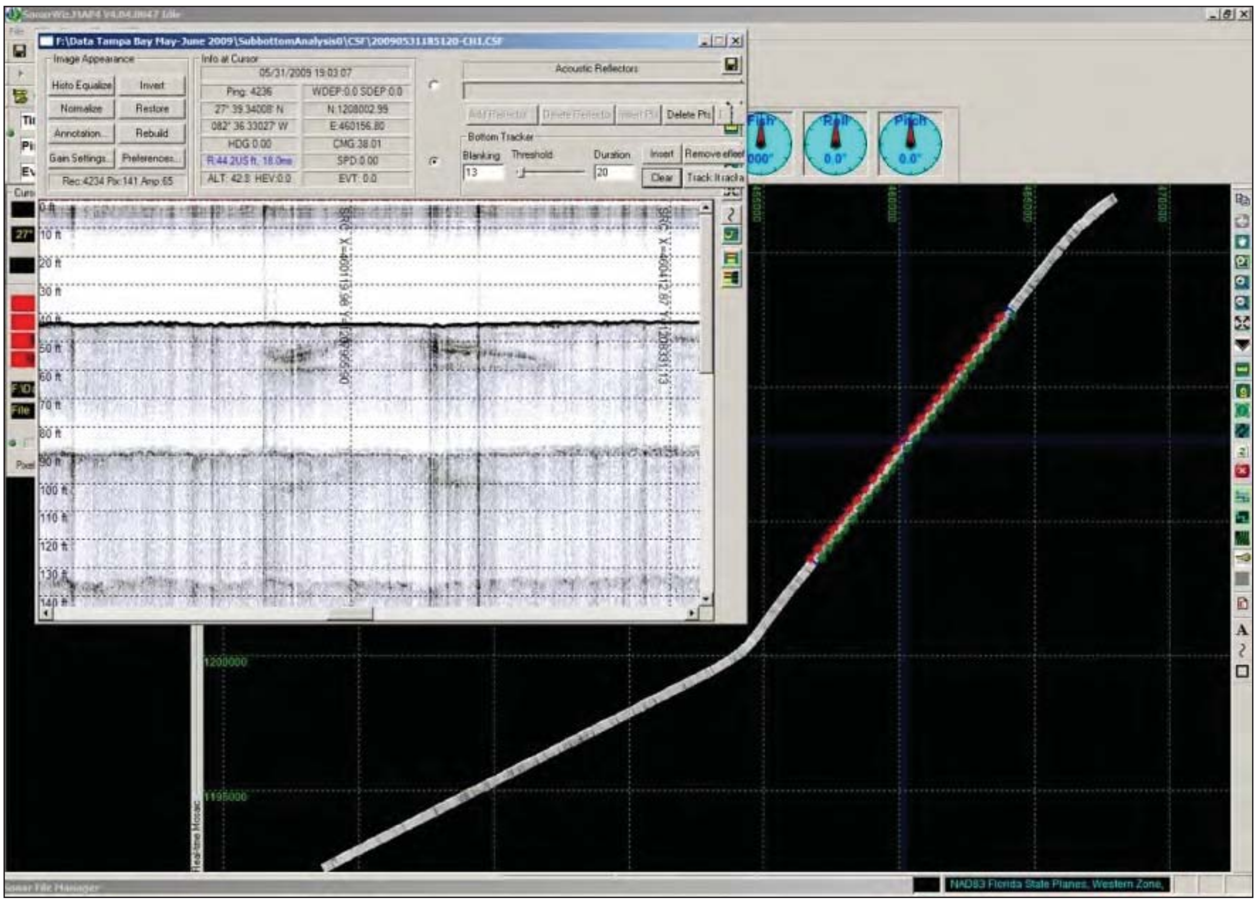

Figure 3-11. SonarWiz subbottom waterfall image showing the seismic profile-digitizing window. The blue cross hairs in the background chart show the location of the cursor, which at the time of the image was directly over the peak of the positive relief feature shown. This image is from a past survey conducted in Tampa Bay (see Faught and James 2009).

GEOGRAPHIC INFORMATION YSTEMS ANALYSIS

A project GIS database is constructed using geo-referenced images and layers generated during the magnetometer, sidescan, and subbottom data analyses. Other layers can be added, such as orthographic aerial imagery or navigation charts. Several important things are accomplished by GIS compilation. First, the collected data are compared to one another and evaluated for accuracy and consistency of the positioning information. Second, magnetic, sidescan, and other remote sensing targets are compared for relationships (proximity analysis).

Data Analysis Criteria, Theory, and Commentary

The remote sensing survey of the Project Area intended to locate and identify the presence or absence of potentially significant submerged cultural resources that if present might be adversely affected by proposed navigation improvement activities. However, the interpretation of remote sensing data obtained from both the magnetometer and sidescan sonar, as stated by Pearson et al. (1991) "relies on a combination of sound scientific knowledge and practical experience." The evaluation of remote sensing anomalies, with regard to a determination that the anomaly does or does not represent shipwreck remains, depends on a variety of factors. These include the detected characteristics of the individual anomalies (e.g., magnetic anomaly strength and duration, sidescan image configuration) associated with other sidescan or magnetic targets on the same or adjacent lines and relationships to observable target sources, such as channel buoys or pipeline crossings, etc.

Magnetometer

Interpretation of data collected by the magnetometer, the tool of choice by the underwater archaeologist for locating shipwrecks, is perhaps the most problematic. Magnetic anomalies are evaluated and prioritized based on magnetic amplitude or deflection of nanotesla intensity from the ambient background in concert with duration or spatial extent (distance in feet along a trackline of an anomaly influences the ambient background); they are also correlated with sidescan targets. Because the sonar record gives a visible indication of the target, identification or evaluation of potential significance is based on visible target shape, size, and presence of structure, as well as association with magnetic anomalies. Targets, such as isolated sections of pipe, can normally be immediately discarded as non-significant, while large areas of above-sediment wreckage are generally easy to identify.

The problems of differentiating between modern debris and shipwrecks, based on remote sensing data, have been discussed by several authors. This difficulty is particularly true in the case of magnetic data; therefore, it has received the most attention in the current body of literature dealing with the subject. Pearson and Saltus (1990:32) state "even though a considerable body of magnetic signature data for shipwrecks is now available, it is impossible to positively associate any specific signature with a shipwreck or any other feature." There is no doubt that the only positive way to verify a magnetic source object is through physical examination. However, the size and complexity of a magnetic signature does provide a usable key for distinguishing modern debris and shipwreck remains (see also Garrison et al. 1989; Irion and Bond 1984; Pearson et al. 1993). Specifically, the magnetic signatures of most shipwrecks tend to be large in area and tend to display multiple magnetic peaks of differing amplitude.

In a study conducted for BOEM for magnetic anomalies in the northern Gulf of Mexico, Garrison et al. (1989) indicate that a shipwreck signature will cover an area between 10,000 and 50,000 square meters. Using the Garrison et al. (1989) study, as well as years of "practical experience," in an effort to assess potential significance of remote sensing targets, the Pearson et al. (1991) study developed general characteristics of magnetometer signatures most likely to represent shipwrecks. The report states that "the amplitude of magnetic anomalies associated with shipwrecks varies considerably, but, in general, the signature of large watercraft or portions of watercraft, range from moderate to high intensity (> 50 nanoteslas) when the sensor is at distances of 20 feet or so" (Pearson et al. 1991:70). Employing a table of magnetic data from various sources as baseline data, the report goes on to state that "data suggests that at a distance of 20 feet or less, watercraft of moderate size are likely to produce a magnetic anomaly (this would be a complex signature [i.e., a cluster of dipoles and/or monopoles]) greater than 80 or 90 feet across the smallest dimension..." (Pearson et al. 1991:70).

While establishing baseline amounts of amplitude and duration reflective of the magnetic characteristics for a shipwreck site, the report "recognizes that a considerable amount of variability does occur" (Pearson et al. 1991:70). Generated in an effort to test the 50-nanotesla/

80-foot criteria and to determine the amount of variability, Table 3-01 lists numerous shipwrecks as well as single and multiple-source objects located by magnetic survey and verified by divers. All shipwrecks met and surpassed the 50-nanotesla/80-foot criteria, with one exception. Emanuel Point II's magnetic deviation falls below the cut off, although duration is above. Subsequent archaeological examinations have determined that Emanuel Point II contains very little iron (Greg Cook personal communication, 2011). The majority of single-object readings fell below the criteria (with the exception of the pipeline, the two sections of pipe, and one of the seven rocket motors). However, the signature of the pipeline should appear as a linear feature on a magnetic contour map and should not be confused with a single source object. The strengths of the two sections of pipe represent refinement readings that sought to produce the highest reading possible and should perhaps be discounted from the sample. Further, because of their association with the space program, rocket motors, which are single source objects, must be considered potentially significant. While the shipwrecks and most single source objects adhere to the 50-nanotesla/80-foot criteria, the multiple-source objects do not. If all targets listed on the table required prioritization of potential significance based on the 50-nanotesla/80-foot criteria, the two multiple-source object targets would be classified as potentially significant.

While the 50-nanotesla/80-foot criteria is a good general guide for most conditions, several recent studies have suggested that a 50-nanotesla/80-foot duration applied to remote sensing data as a baseline for all wreck sites is much too low. Allowing for a larger and more focused database on which to assess signature characteristics of specific vessel classes, the findings from these investigations argue for higher nanotesla and duration criteria for specific types of sites.

Table 3-02 indicates the sizable magnetic deviation and duration of previously recorded and located steamboat wreck sites. However, there is one exception, each of the known steamboat wrecks investigated has a magnetic deviation of at least 500 nanoteslas and a duration of no fewer than 110 feet, usually in the 200-plus feet range. As opposed to single objects, steamboat wrecks documented during previous investigations are generally much larger in magnetic strength (although not always), tend to have a longer duration, and typically have multi-component signatures. It should be noted, however, that each steamboat wreck signature differs markedly due to environmental conditions, amount of hull/machinery remaining, and the depth of water/overburden over the wreck site.

Table 3-01. Compilation of Magnetic Data from Various Sources.

Vessel (Object)	Type and Size	Magnetic Deviation	Duration (ft.)	Reference
Shipwrecks				
J.D. Hinde	129-ft. wooden sternwheeler	573	110	Gearhart and Hoyt 1990
Mary	234-ft. iron-hulled sidewheeler	1180	200	Hoyt 1990
Confederate Obstructions	numerous vessels with machinery removed and filled with construction rubble	110	long duration	Irion and Bond 1984
Utina	267-ft. wooden freighter	690	150	James and Pearson 1991; Pearson and Simmons 1995
Gen C.B. Comstock	177-ft. wooden hopper dredge	200	200	James et al. 1991
Egmont Shoal wreck	19th century Wooden-hulled copper clad sailing vessel	67	160	Krivor 2005
USS Narcissus	Civil War wooden tug	582	176	Krivor 2005
El Nuevo Constante	126-ft. wooden collier	65	250	Pearson et al. 1991
James Stockton	55-ft. wooden schooner	80	130	Pearson et al. 1991
modern shrimp boat	segment 27-x-5 ft.	350	90	Pearson et al. 1991
Mary Somers	iron-hulled sidewheeler	5000	400	Pearson et al. 1993

Vessel (Object)	Type and Size	Magnetic Deviation	Duration (ft.)	Reference
Homer	148-ft. wooden side-wheeler	810	200	Pearson and Saltus 1990
Shrimp Boat	modern	162	110	Watts 2000
Pappy's Lane Shipwreck	165-ft. steel-hulled World War II landing craft	685	350	James et al. 2016
USS Tecumseh	223 ft. Civil War Cannonicus-class monitor	11600	850	James et al. 2019
8SJ4889 (Possibly *Dixie Crystal*)	125 ft. late 19th/early 20th-century cargo freighter	1960	250	Wilson et al. 2019
Single Objects				
pipeline	18-in. diameter	1570	200	Duff 1996
Pipe	3 in. by 10 ft.	55	352	Krivor 2005
Pipe/mast/davit	18 in. by 26 ft.	475	104	Lydecker 2007(b)
anchor	6-ft. shaft	30	270	Pearson et al. 1991
iron anvil	150 lbs.	598	26	Pearson et al. 1991
engine block	modern gasoline	357	60	Rogers et al. 1990
steel drum	55 gallon	191	35	Rogers et al. 1990
pipe	8-ft. long by 3 in. diameter	121	40	Rogers et al. 1990
railroad rail segment	4-ft. section	216	40	Rogers et al. 1990
7 Rocket Motors	8 ft. to 34 ft. in length	61 to 422	75 to 180	Watts 2000
Multiple Objects				
cable and chain	5 ft.	30	50	Pearson et al. 1991
scattered ferrous metal	14-x-3 ft.	100	110	Pearson et al. 1991
anchor/wire rope	8-ft. modern stockless/large coil	910	140	Rogers et al. 1990

Table 3-02. Magnetic Data from Steamboat Wreck Sites.

Vessel (object)	Type & Size	Magnetic Deviation	Duration (feet)	Reference
Shipwrecks				
3MO69 (unidentified)	wooden sidewheeler	2,961	299	Buchner and Krivor 2001
New Mattie	130-ft. wooden sternwheeler	1,491	200	Buchner and Krivor 2001
J.D. Hinde	129-ft. wooden sternwheeler	573	110	Gearhart and Hoyt 1990
Caney Creek Wreck	sidewheeler	2,790	unknown	Hedrick 1998
Undine	sternwheeler	200	300	James and Krivor 2000
John Walsh	275-ft. sidewheeler	1,602	280	James et al. 2002
Scotland	sidewheeler	1,322	200	Kane et al. 1998
Hartford City	150-ton sidewheeler	856	400	Krivor et al. 2002
Choctaw	223-ton sternwheel towboat	797	250	Krivor et al. 2002
Star of the West	172-ton ocean-going sidewheel	8,300	400	Krivor et al. 2002
E.F. Dix/Eastport	sidewheeler/ironclad	800	360	Pearson and Birchett 1995
Mary Somers	iron-hulled sidewheeler	5000	325	Pearson et al. 1993
Homer	148-ft. wooden sidewheeler	810	200	Pearson and Saltus 1993
Mary E. Keene	236-ft. sidewheeler	1,700	220	Robinson and Seidel 1995
35th Parallel	sidewheeler	1,414	320	Saltus 1993
"Boiler" wreck	sidewheeler/sternwheeler (?)	1,164	500	Saltus 1993

Vessel (object)	Type & Size	Magnetic Deviation	Duration (feet)	Reference
(unidentified steamboat)				
Oklahoma Wreck	sidewheeler	497	300	M.C. Krivor, personal communication, 2005
Drumelzier	340 ft. late 19th-century British steamship	15,000	800	James et al. 2016

Furthermore, it should be inferred that one of the biggest influences on a wreck site's magnetic signature is directly related to the distance from the magnetometer sensor to the wreck site. As stated in Pearson and Birchett:

> "For a typical iron object, the intensity of its magnetic signature [i.e., anomaly] is inversely proportional to the cube of the distance. One pound of iron, for example, would produce an anomaly of 100 nanoteslas at a distance of 2 feet. At a distance of 10 feet the same pound of iron would produce an anomaly of only 1 nanotesla. A 1,000-ton ship could produce a 700-nanotesla anomaly at 100 feet and a barely discernible 0.7-nanotesla anomaly at 1,000 feet" [Pearson and Birchett 1999:4-13].

An example of a steamboat wreck that produces a magnetic signature of less than 500 nanoteslas involves the purported *Undine* site investigated by Panamerican in 1999 and 2000. During 1999, remote sensing operations located a magnetic anomaly with a magnetic deflection of 193 nanoteslas with a duration of 300 feet. During the 2000 field investigations, the anomaly was identified as the remnant of a charred steamboat ≈ 38–40 feet below the river's surface, and buried 8 feet below riverbed sediments. Historic records indicate the *Undine* was extensively salvaged after the scuttling incident whereupon everything of value including all iron plating, machinery, and cannon were removed from the wreck, but the hull remained in place (James and Krivor 2000:16-17). While only a small portion of the wreck site was uncovered (due to the extensive amount of overburden) it was evident that little of the hull is extant, only just to the turn of the bilge.

It should also be stated that two of the wreck sites with either small areas of deviation or low nanotesla deflections, the *J.D. Hinde* and the purported *Undine*, represent either partial hull remains (*J.D. Hinde*) or were heavily burned and salvaged (*Undine*). Historic records indicate the *J.D. Hinde* was also salvaged after the wrecking process. Retaining none of her steam machinery or wheels, half of the vessel was no longer present, most likely as a result of dredging; both salvage and dredging the obvious reason for its small magnetic duration (James and Pearson 1993:22). Salvage efforts often sought to remove any cargo as well as any machinery, cannon, anchors, or other goods of value. During the Civil War, the salvage of iron for reuse was often paramount. As stated by John B. Jones on 11 August 1863, "the iron was wanted more than anything else but men" (Black 1958:200). Therefore, it may be speculated that any wreck site that (1) has been salvaged in the past; (2) has been exposed to excessive environmental processes (i.e., current); or (3) has been impacted by channelization efforts (i.e., dredging) will produce a lower nanotesla deflection (due to less ferrous metal on site) than a wreck not exposed to similar processes.

Table 3-02 are averaged, an average magnetic deviation of 2,627 nanoteslas with an average duration of 321 feet is obtained. While the sensor distance, environmental factors, and the amount of ferrous metal remaining on any given steamboat site must be taken into account, previously identified wreck sites have tended to produce sizable +200-nanotesla magnetic deviations with a minimum duration of 110 feet. While the 110-foot duration represents the lowest duration of any of the known steamboat wreck sites, it must be stated that in such cases a portion of the wreck is no longer extant due to previous salvage and dredging/channelization efforts. However, until further surveys show that this short duration is an "anomaly" so to speak, it must be employed as the baseline duration. Similarly, with the exception of the *Undine* site, which as stated previously was heavily salvaged, all other surveyed steamboats have nanotesla deviations approaching 500 nanoteslas or above, but its 200-nanotesla reading must be employed as the baseline amplitude.

While the data indicates the validity of employing specific nanotesla strength and duration criteria when assessing magnetic anomalies, other factors must be taken into account. Pearson and Hudson (1990) have argued that the past and recent use of a water body must be an important, and often the most important, consideration in the interpretation of remote sensing data Unless the remote sensing data, the historical record, or the specific environment (i.e., harbor entrance channel) provides compelling and overriding evidence, it is otherwise believed that the history of use should be a primary consideration in the interpretation. The constitution of "compelling evidence" is, to some extent, left to the discretion of the researcher. However, in settings where modern commercial traffic and historic use have been intensive, the presence of a large quantity of modern debris must be anticipated. In harbor, bay, or riverine situations where traffic is heavy, this debris will be scattered along the channel right-of-way, although it may be concentrated in areas where traffic would slow or halt, and it will appear on remote sensing survey records as discrete, small objects.

In addition to anomaly strength and duration considerations, all anomalies were assessed for type (monopole [negative or positive influence], dipole [negative and positive influence], or complex) and association with other magnetic anomalies (i.e., clustering) and sidescan sonar targets. With regard to analysis of these anomalies, relative to potential significance, many will be found to represent a small, single source object (a localized deviation), and are generally identified and labeled as non-significant, especially in an area of high use. As seen on contour maps, the contour lines for this type of anomaly can be seen to approach, or go to but not beyond, the adjacent survey trackline on which it is located. This visual interpretation is corroborated during the analysis of the electronic magnetometer strip-chart data of each survey trackline. An examination of the strip-chart will show that the target was recorded only on a single transect, and that it was not recorded (i.e., did not influence the ambient magnetic background) on adjacent lines. This is an important distinction when an anomaly's readings are large deviations but are recorded on only one line. This indicates the source for this target must be a small, discrete object, and the magnetometer sensor must have passed closely by or directly over the object in order to generate the large readings on this survey line, yet not be recorded or have had an influence on adjacent lines. Because these anomalies represent single source objects, they are not considered representative of a potentially significant submerged cultural resource and are not recommended for avoidance.

Additionally, false positives can be recorded as a result of geomagnetic storm activity (Carrier et al. 2016). These solar-originating magnetic field disturbances can confound magnetic records, generating deceptive signatures. There are several ways to mitigate these disturbances. One possibility is through the use of a transverse gradiometer. As gradiometers measure the change in magnetic field between two nearby sensors, the wide-reaching disturbances are recorded equally between the sensors, nullifying the deviation. Another method, used primarily by Panamerican, is through the comparison of project magnetic strips to the nearest magnetic observatory (such as those listed on http://www.intermagnet.org/). However, as Carrier et al. (2016) observed, geomagnetic storms during periods of Kp 5 or higher diminishes the ability of the researcher to identify storm sudden onset signatures within a dataset. For this reason, NOAA's Geomagnetic Forecast (found at https://www.swpc.noaa.gov/products/3-day-geomagnetic-forecast) is consulted to ensure that data is not collected on days of Kp 5 or higher.

It cannot be understated that the majority of anomalies recorded during any survey are generated by debris and not shipwrecks. As stated by Gearhart (2011:91-92), "archaeologists have repeatedly struggled to characterize reliable differences between magnetic signatures of shipwrecks and debris," employing amplitude, duration (i.e., spatial extent), and complexity of the signature as vague defining criteria, along with judgmental experience, and further states that "present methods for marine magnetic data interpretation are uncertain at best and scientifically unfounded at worst."

In Garrison et al.'s (1989) study to establish an interpretive framework that would help identify the nature of magnetic anomalies, it was predicted correctly that anomalies caused by debris might be differentiated from shipwreck anomalies based on the contrast between permanent and induced magnetism. The study states:

> "While it may not be analytically possible to contrast iron and steel by remnant magnetization one may be able to characterize anomalies as to their inductive magnetization…The argument here would rely on the structural complexity of a shipwreck having a large or detectable inductive magnetization. Anomalies without this component could be classified as exclusively ferromagnetic features and by local extension debris" [Garrison et al. 1989:2:224].

In his article entitled *Archaeological Interpretation of Marine Magnetic Data*, Gearhart (2011) expands on Garrison et al.'s 1998 premise and convincingly shows that while "one cannot distinguish between the anomaly produced by a shipwreck and one produced by a similarly complex concentration of magnetic debris…shipwreck anomalies can be characterized by their induced magnetic fields and are distinguishable from a significant proportion of simple-source anomalies." He goes on to state, "the most important parameter to consider when interpreting anomalies based on magnetic induction is the direction of magnetic moment" (Gearhart 2011:106) and "deviation from the northerly magnetic moment direction, common to all induced anomalies, has proven to be the single most powerful discriminator between simple-source anomalies and complex-source anomalies, including shipwrecks" (Gearhart 2011:102).

In simplistic terms, the contour map of the magnetic moment of an induced anomaly will have its negative value to the north and its positive value to the south Gearhart presents contours of numerous known wreck and debris anomalies and illustrates that magnetic moments of shipwrecks (in the earth's northern hemisphere) are oriented to the north (no more than a 26-degree deviation), as are those of complex debris sites (i.e., large areas of wire rope), while those of simple-source debris anomalies are not. He concludes by suggesting ±20 degrees from magnetic north as an orientation that will allow the successful differentiation of simple-source debris anomalies from most complex-source anomalies and virtually all shipwrecks (Gearhart 2011). Several examples from recent Panamerican projects demonstrate the validity of this model. While not an exhaustive review, we found these same principles apply with no deviation from Gearhart's findings and leads us to also conclude that identifying and categorizing the magnetic moment of an induced anomaly does allow the researcher the ability to differentiate a large percentage of debris source anomalies from potentially significant resources during analysis. A case in point is the recent diver investigation of 13 magnetic anomalies in the Skyway Gulf Intracoastal Waterway (James et al. 2011). Employing the above criteria of inclination of magnetic moment, of the 13 magnetic anomalies investigated, seven anomalies had magnetic moments that did not meet the characteristics of complex-source anomalies including shipwrecks, but rather had signatures representative of simple-source debris. Subsequent diver investigation clearly showed that these anomalies did indeed represent debris and were not significant. Representing over half the total number of anomalies, if this inclination of magnetic moment method had been employed they would not have been recommended for avoidance or subsequent investigation. The remaining six anomalies that had magnetic moment characteristics indicative of shipwrecks or complex debris sites were also found to represent debris (James et al. 2011). This, however, is not unexpected given that this method does not rule out complex source debris anomalies or all simple-source debris anomalies, just a much larger percentage than would have been ruled out if the method had not been employed. The inclination of magnetic moment characteristic as an indicator of potential significance will, we believe, be proven and accepted. The end result could well be the reduction of a significant number of anomalies currently recommended for avoidance or subsequent investigation.

IDESCAN ONAR

In contrast to magnetic data, sidescan interpretation is less problematic, as objects are reconstructed as they look to the eye. Targets, such as isolated sections of pipe, can normally be immediately discarded as non-significant, while large areas of above-sediment wreckage as well as some exposed potential paleofeatures (i.e., rock outcrops) are generally apparent. The chief factors considered in analyzing sidescan data, with regard to wreckage, include: linearity, height off bottom, size, associated magnetics, and environmental context. Since historic resources in the form of shipwrecks usually contain large amounts of ferrous compounds, complex sidescan targets with complex magnetic anomalies are of the greatest importance. The usual outcome of targets with no associated magnetics are items, such as rocks, trees, and other non-historic debris of limited interest to the archaeologist.

CLUSTERING

Since an archaeological remote sensing survey involves the collection of several different types of data, each of which has the potential to locate significant cultural resources, attention must be given to groups of targets. These groups, referred to as clusters, occur when a target exists that produces both a sidescan sonar return and a magnetic signature. Also, a magnetic source that extends across several survey lines will produce an anomaly on each line, and since these anomalies are related, they will form a cluster. Previously discovered archaeological sites will also be considered as part of a cluster. Although criteria used to determine a cluster is somewhat subjective, anomalies, sidescan targets, and previously identified archaeological sites will generally be included in a cluster if they lie within 65 feet of one another.

UBBOTTOM PROFILER ANALYSIS

Subbottom profilers generate low-frequency acoustic waves that penetrate the seabed and reflect off boundaries or objects located in the subsurface. The data are then processed and reproduced as a cross section using two-way travel time to determine depth (the time taken for the pulse to travel from the source to the reflector and back to the receiver by a constant). The shapes and extent of reflectors are used to identify bottom and subbottom profile characteristics.

In general, high and low amplitude linear reflectors (light and dark lines) distinguish between sediment beds; parabolic reflectors indicate point-source objects with sound propagating out from them; and erosional or non-depositional contacts can be identified by discontinuities in extent, slope angle, and the shape of the reflector morphology. This latter fact is important when identifying drowned channel systems, other relicts, and buried fluvial system features (e.g., estuarine, tidal, lowland, and upland areas around drainage features).

As a cautionary tale, there are five types of spurious signals that may cause confusion in the two-dimensional records that specialists recognize: direct arrival from the sound source; reflection multiples; water surface reflection; side echoes; and point-source reflections. Judicious analysis is required to identify these acoustic imagery phenomena. In all cases, precise inference of a sediment bed or other anomaly from the subbottom profiler data would necessitate coring.

In analysis, seismic impedance contrast returns indicating positive relief features such as possible mounds and negative relief features as a probable paleochannel or other fluvial feature with margins and sediment beds indicate high potential for prehistoric remains. Other features of interest are buried surface continuations.

Positive relief features on subbottom records are predictable phenomena, given that piles of erosion resistant material of differential character than the surrounding sediments should be perceivable with sound underwater imagery (e.g., subbottom profiler), and therefore, they have long drawn submerged prehistoric archaeologists as potentially identifiable features to find in places that have otherwise impossibly similar images to search (Stright 1990).

METHOD AND THEORY FOR ECOGNITION OF A UBMERGED PREHISTORIC ITE

Panamerican's methodology for identifying submerged prehistoric sites entails developing criteria for the discovery of a "site" in any particular setting. The criteria are based on the geology and archaeology of the Project Area and models of site submergence. Models for the presence and preservation of submerged archaeological sites are discussed by several researchers, including Waters (1992) in his chapter on coastal processes, Kraft et al. (1983), and others. Much of this has to do with the identification of landforms identifiable with remote sensing that have the potential for archaeological site presence. For instance, two models used in this project were horizontal surfaces near channel features and positive relief features considered potentially to represent midden feature(s). Causeways, fishing weirs, or other prehistoric infrastructure features are difficult to identify.

Publications are more limited that are specific to recognizing sedimentary signatures of the deposits that make up sites that have been transgressed by rising sea levels and then remained submerged, perhaps buried, until exposure. One study specifically focused on such information is Gagliano et al.'s (1982) *Sedimentary Studies of Prehistoric Archaeological Sites: Criteria for the identification of submerged archaeological Sites of the Northern Gulf of Mexico Continental Shelf* This document is one of high value but limited distribution. Gagliano's group chose 15 terrestrial sites in Louisiana and Texas as analogs from eight identifiable and mapable landforms commonly and consistently associated with archaeological sites on land, terrestrially. Their local geomorphic features included major natural levee, minor natural levee, Chenier and accretion ridges, barrier island, salt dome margin, estuarine margin, channel on Pleistocene terrace, and lake margins. They sampled sediments with excavations and box core sampling; recorded color, bedding, and contact descriptions; sorted the sediments to particle size; conducted point count and grain size analysis; and then geochemically analyzed the samples by levels. They showed that sites were recognized most frequently by shell content, fish bones, and charred wood. Some ceramic and lithic artifacts were identified, but they were rare and often small.

Another aspect to realize about submerged prehistoric sites is that virtually all examples of inundated sites are partially, or wholly, reworked in ways somewhat analogous to deflation (Fischer 1995; Masters and Flemming 1983). This is caused by fluidization of sediments at times of inundation and the removal of fine particles that are often re-deposited with material by subsidence of the inundation or wave action. Faught (1996, 2002–2004) has shown sites with late Pleistocene, early Holocene, and middle Holocene artifacts to be re-worked by sea level rise and submergence, but that artifact arrays remain cohesive as surface and near surface remains.

Because of these factors, recognition that deposits are indeed cultural is not always immediately apparent to the diver, or at first glance of the collected materials. Artifacts are important, but not always part of the site, as Gagliano et al. (1982) have systematically determined. Expectations for midden deposits include dominance of unarticulated specimens of particular mollusk species, faunal bone, and manuports (i.e., geologic items out of place). On the other hand, discovery of any artifact would be important, especially in any sediment bed below a marine bed.

TARGET EFINEMENT URVEY PROCEDURES

Prior to diving investigations, geophysical remote sensing refinement surveys were conducted at each of the targets employing all survey instrumentation. Spaced at approximately 15-foot intervals and centered on the target coordinates, survey lines were conducted to effectively cover the area surrounding each target.

Once the refinement survey was completed, refinement magnetic contour maps were produced of each target. Based on proven principles of magnetism, the source material for a dipole anomaly is located directly between the positive and negative fields (see Figure 3-12). Buoys were placed at this refined source material location between the largest positive and negative contours for each anomaly prior to the commencement of diving operations at each target.

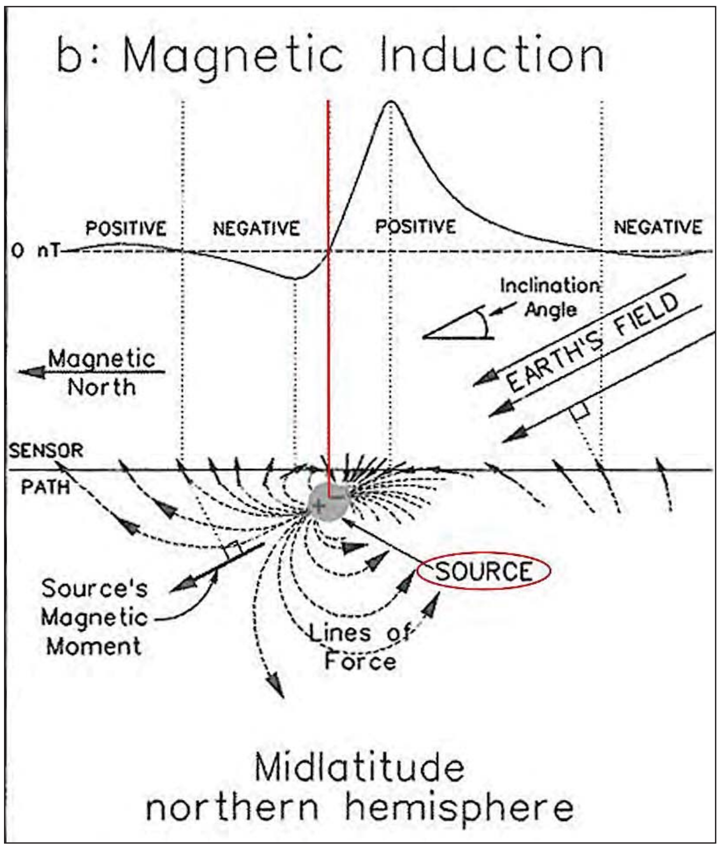

Figure 3-12. Location of source material between positive and negative magnetic readings of a dipole (as presented in Gearhart 2011:94).

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IV. INVESTIGATIVE FINDINGS

The remote sensing survey of the Project Area was conducted during the last week of February 2020 (Figure 4-01). Recorded within the 1,318-acre survey area were 14 magnetic anomalies, three sidescan sonar contacts, and no subbottom impedance contrast feature representing a relict landform. Of these, no target was identified as potentially significant and not recommended for further investigation (Figure 4-02). Employing the previous discussions on target analysis, magnetic anomalies were assessed for potential significance based on magnetic deviation (above and/or below ambient background), duration (distance in feet along a trackline), type (monopole, dipole, or complex), and association with other magnetic anomalies (i.e., clustering) and/or sidescan sonar contacts. Sidescan sonar contacts, as visual images, were assessed for morphology, height off bottom, size, associated magnetics, backscatter characteristics, and visual surface associations (e.g., jetties, buoys, etc.).

REMOTE SENSING RESULTS

Analysis of the magnetic data indicated that of the 14 magnetic anomalies identified, all were classified as single-point source (SPS). With regard to analysis of these anomalies, relative to potential significance, many will be found to represent a small, single-source object (a localized deviation), and are generally identified and labeled as nonsignificant (Table 4-01). Magnetic contour maps can be found in Figures 4-02 to 4-07. During this survey, the magnetometer was maintained at an altitude ranging from to 10 feet above the bottom, dependent on water depth.

The sidescan sonar records revealed three contacts; all were outside of the survey areas (Tables 4-02 and 4-03). Sonar contacts had no associated magnetic anomaly, and are not recommended for further investigation. Sonar mosaics for the survey areas within the Project Area are presented in Figure 4-08.

Figure 4-01. Project Area towards Vilano Beach; facing southwest.

Table 4-01. Magnetic Anomaly Data for the Project Area.

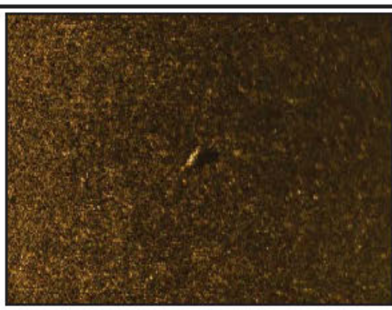
Name	X	Y	Line	Duration (ft.)	Intensity (nT)	Type	Associations	Notes	Map
M001	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M002	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M003	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M004	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M005	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	2
M006	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	2
M007	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	3
M008	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	3
M009	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	3
M010	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M011	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M012	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M013	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M014	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	5

[redacted]

Table 4-02. Sonar Contacts in the Project Area.

Name	X	Y	Description	Length (ft.)	Width (ft.)	Height (ft.)	Scour (ft.)	Line	Associations
C01	[redacted]	[redacted]	[redacted]	8.4	5.1	0.0	17.9	[redacted]	N
C02	[redacted]	[redacted]	[redacted]	5.3	1.5	4.8	18.5	[redacted]	N
C03	[redacted]	[redacted]	[redacted]	2.8	2.1	0.0	19.8	[redacted]	N

Table 4-03. Sonar Contact Images.

Target Image	Target Info	User Entered Info
	**C01** [redacted] • Map Projection: NAD 1983 State Plane Florida East ft • Acoustic Source File: Capture File 02-04-2020_11-23-22_9.JPG [redacted] • Water Depth: 0.00 US ft	**Dimensions and attributes** • Target Width: 5.1 US ft • Target Height: 0 US ft • Target Length: 8.4 US ft • Target Shadow: 0 US ft [redacted]
	**C02** [redacted] • Map Projection: NAD 1983 State Plane Florida East ft • Acoustic Source File: Capture File 02-04-2020_11-06-36_8.JPG [redacted] • Water Depth: 0.00 US ft	**Dimensions and attributes** • Target Width: 1.5 US ft • Target Height: 0 US ft • Target Length: 5.3 US ft • Target Shadow: 0 US ft [redacted]
	**C03** [redacted] • Map Projection: NAD 1983 State Plane Florida East ft • Acoustic Source File: Capture File 02-04-2020_10-18-49_7.JPG [redacted] • Water Depth: 0.00 US ft	**Dimensions and attributes** • Target Width: 2.1 US ft • Target Height: 0 US ft • Target Length: 2.8 US ft • Target Shadow: 0 US ft [redacted]

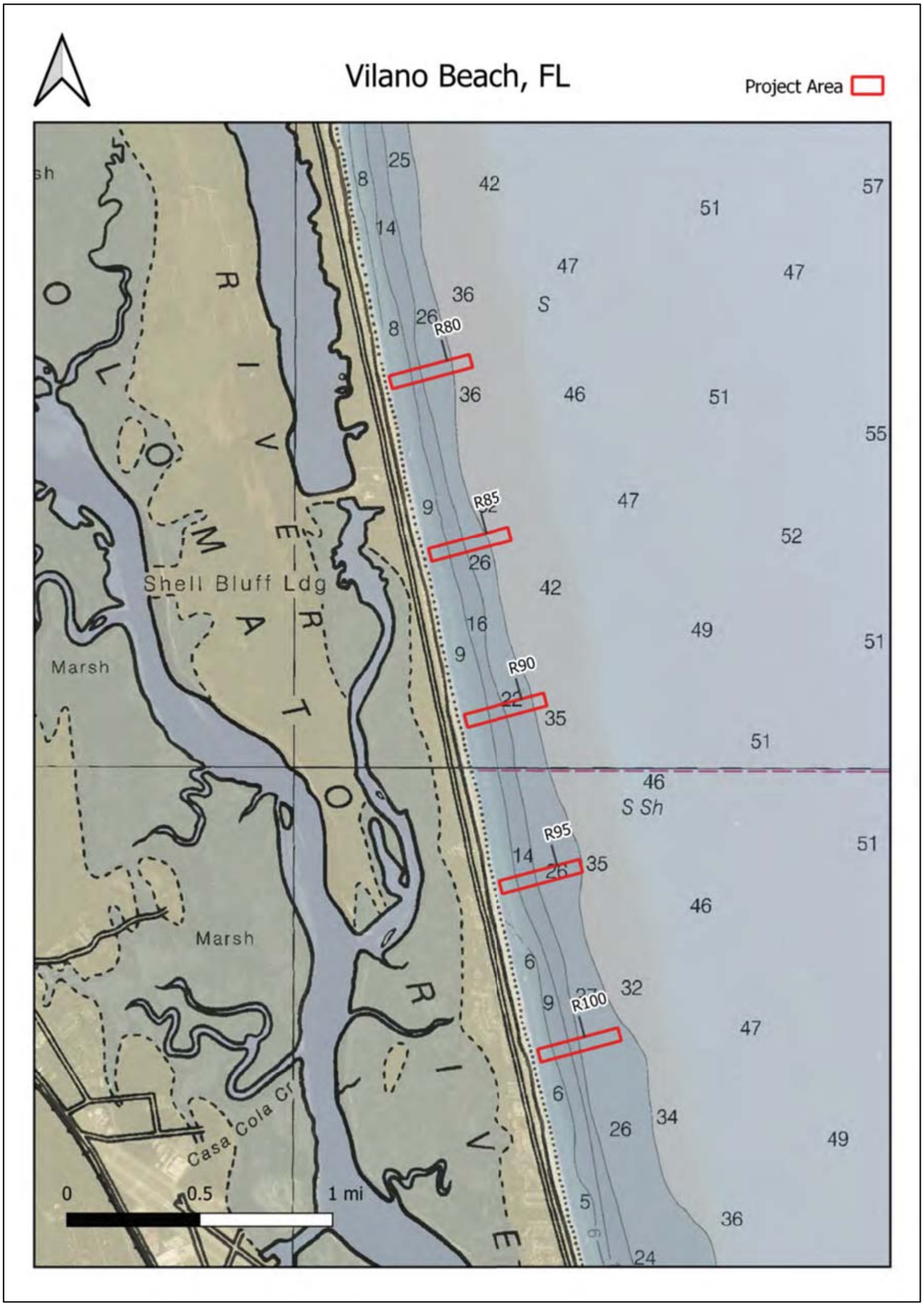


Figure 4-02. Project Area Map Key.

[redacted]

NOTE: FIGURE 4-03 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure 4-03. Survey Cell R80, showing magnetic contours [redacted].

[redacted]

NOTE: FIGURE 4-04 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure 4-04. urvey Cell R85, showing magnetic contours [redacted] with an overlay of its sidescan mosaic illustrating [redacted] in relation to magne

NOTE: FIGURE 4-05 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure 4-05. Survey Cell R90, showing magnetic contours [redacted].

NOTE: FIGURE 4-06 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure 4-06. Survey Cell R95, showing magnetic contours [redacted].

[redacted]

NOTE: FIGURE 4-07 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure 4-07. Survey Cell R100, showing magnetic contour [redacted].

NOTE: FIGURE 4-08 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure 4-08. idescan sonar mosaic of the Project Area. The types of sediment deposition are evidenced by the dynamic backscatter intensity, from bright (coarse sediments) to dark (softer, fine sediments).

SUBBOTTOM PROFILER RESULTS

With respect to the subbottom profiler record, analysis indicated the Project Area consists solely of unconsolidated marine sediments (coarse sand) to the depth of the instrument capability—typically between 3 and 5 meters. The shallow seismic records were dominated by a surface facies composed of coarse sands and occasional sand waves (Figure 4-09). No buried surface, paleochannel, positive relief feature, or other buried geomorphological feature is present in the data. No further work regarding potential submerged prehistori archaeological sites is recommended.

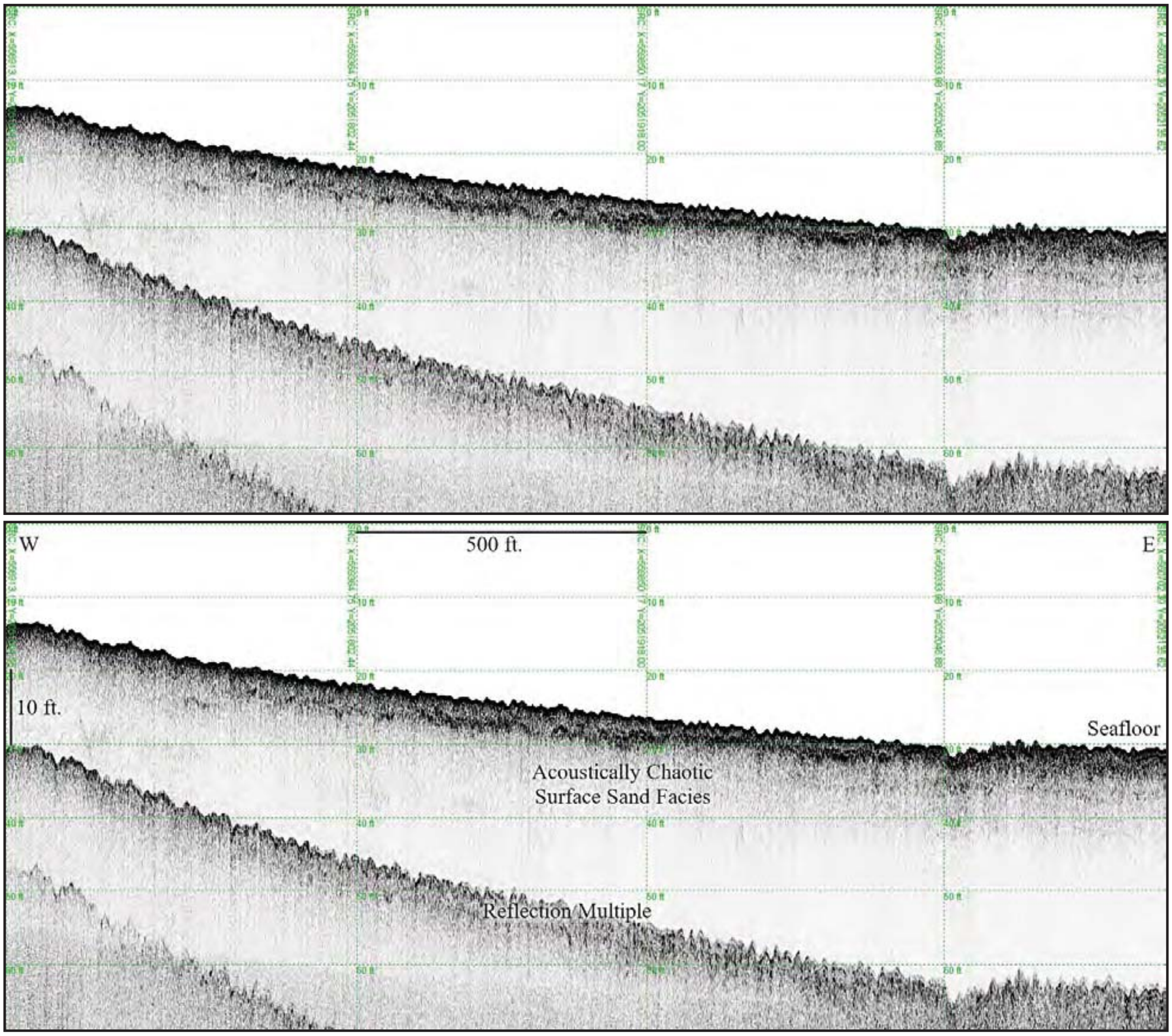


Figure 4-09. Example subbottom profiler record. This profile is from Line R100L_3, running from west (left) to east (right). Note the lack of subsurface features and the homogenous surface facies composed of transgressive marine sand. This profile is provided in both non-annotated (above) and annotated (below).

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V. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The County has partnered with the USACE–Jacksonville District and the State of Florida to restore and rebuild South Ponte Vedra and Vilano beaches. Five corridors are proposed to be employed to pump sand from the St. Augustine Inlet flood shoal and the AIWW channel onto the beaches. As part of the project's permit requirements, the agencies must consider the effects that project activities will have on cultural resources. Therefore, the County has been tasked with the responsibility for determining if any potential cultural resources are located within the proposed pipeline corridors. Performed under Master Contract No. 17-MAS-TAY-0769; RFQ No. 17-19; Taylor Contract No. C2018-0554, and Florida 1A-32 Permit No. 1920.054 (Appendix A), Panamerican completed the investigations the last week of February 2020. The project was divided into five "cells" each was 2,500 feet long and separated by 5,000 feet.

Comprised of a magnetometer, sidescan sonar, and subbottom profiler survey, 14 magnetic anomalies, three sidescan sonar targets, and no subbottom paleofeature were recorded during survey of the corridors. Therefore, it is the opinion of the Principal Investigator that the corridors contain no significant cultural resource; therefore, no additional archaeological work is warranted.

Analysis of the magnetic data indicated that of the 14 magnetic anomalies identified, all represent SPS objects of probable modern origin. None is considered potentially significant, and no further work is recommended (Table 5-01). The sidescan sonar records revealed three contacts; all were outside of the Project Area (Table5-02). The sonar contacts had no associated magnetic anomaly, and are not recommended for further investigation.

Table 5-01. Magnetic Anomaly Data for the Project Area.

Name	X	Y	Line	Duration (ft.)	Intensity (nT)	Type	Associations	Notes	Map
M001	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M002	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M003	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M004	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	1
M005	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	2
M006	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	2
M007	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	3
M008	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	3
M009	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	3
M010	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M011	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M012	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M013	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	4
M014	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	None	[redacted]	5

Table 5-02. Sonar Contacts in the Project Area.

Name	X	Y	Description	Length (ft.)	Width (ft.)	Height (ft.)	Scour (ft.)	Line	Associations
C01	[redacted]	[redacted]	[redacted]	8.4	5.1	0.0	17.9	[redacted]	N
C02	[redacted]	[redacted]	[redacted]	5.3	1.5	4.8	18.5	[redacted]	N
C03	[redacted]	[redacted]	[redacted]	2.8	2.1	0.0	19.8	[redacted]	N

PROCEDURES TO DEAL WITH UNEXPECTED DISCOVERIES

As indicated by the methodology and results described in the preceding chapters, reasonable effort was made during this investigation to identify and evaluate possible locations of historic archaeological sites and potential prehistoric site locations; however, the possibility exists that evidence of prehistoric and historic resources may yet be encountered within the project limits not previously identified in the above conclusions and recommendations. Should any evidence of historic resources be discovered during dredging activities, all work in that portion of the project site should stop. Evidence of historic resources includes aboriginal pottery, prehistoric stone tools, bone or shell tools, as well as historic shipwreck remains. Should questionable materials be uncovered during dredging of the Project Area, procedures contained in the Advisory Council on Historic Preservation Procedures for the *Protection of Historic and Cultural Properties* (36 CFR Part 800B) will take effect.

Although unlikely, if human remains are encountered within the Project Area during proposed project activities, procedures to deal with the unanticipated discovery must adhere to Chapter 872.07 of the Florida Statutes (*Offenses Concerning Dead Bodies and Graves*). As stipulated, work shall cease at the location of remains and the County Medical Examiner immediately notified, a qualified archaeologist retained to investigate the remains, and proper agency personnel notified (i.e., State Historic Preservation Office [SHPO], State Archaeologist) to determine and implement correct procedural treatment of the remains.

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APPENDIX A:
FLORIDA 1A-32 ARCHAEOLOGICAL RESEARCH PERMIT

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FLORIDA DEPARTMENT OF STATE
Laurel M. Lee
Secretary of State
DIVISION OF HISTORICAL RESOURCES

ARCHAEOLOGICAL RESEARCH PERMIT

Permit No. 1920.054 Field Begin Date: 2020-02-24 Field End Date: 2020-02-27

PERMITTEE/AUTHORIZED ENTITY:
Stephen James

Panamerican Consultants, Inc. Memphis Office
91 Tilman Street Memphis, TN 38111
38111

Report/Artifact Due Date: 2021-02-27
Submerged Cultural Resources Survey of Five Pipeline Corridors, Vilano Beach, St. Johns

This permit is issued under the authority of Chapters 267.031 (1) and 267.12, Florida Statutes (F.S.) and Rule 1A-32, Florida Administrative Code (F.A.C.), and is administered by the Florida Bureau of Archaeological Research (BAR), Florida Division of Historical Resources (DHR).

ACTIVITY DESCRIPTION:
Remote-Sensing survey

LOCATION DESCRIPTION:
Waters off of Vilano Beach, St. Johns County
DEP, Sovereignty Submerged Lands

GENERAL CONDITIONS:

1. The Principal Investigator listed above or another qualified archaeologist designated by the applicant shall be responsible for all archaeological investigations, production of a final report, and be on site during all fieldwork.
2. A copy of this permit shall be provided to the land managing agency (when applicable) and field personnel shall carry a copy during fieldwork.
3. The permittee shall (initial each item as indicated):
   a. prepare a final report that meets standards and guidelines required by Rule 1A-46, F.A.C., including the necessary Florida Master Site File forms;______
   b. inform the BAR permit administrator that a report has been completed and submitted to the Division of Historical Resources; or submit a copy of the final report to the BAR permit administrator;______
   c. provide proper curation and conservation of recovered artifacts and other recovered site materials

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Figure A-01. First page of the signed archaeological research Permit No. 1920.054.

e. convey copies of all notes, maps, photographs, videotapes, and other field records pertaining to research conducted under this permit to the BAR permit administrator following completion of the project ________;

f. and not remove from a stable environment artifacts and materials which the permit recipient is unable to properly curate and conserve before conveying to BAR. ________

4. The effective field investigation dates are subject to receipt of permission from the land management agency and, in some instances, State/Federal dredge-and-fill permitting programs. Those agencies may also require work performance conditions relevant to their natural resource management and permitting responsibilities. A representative of the land managing agency (if one exists) will need to sign this permit document prior to BAR executing this permit (see page 3).

5. Unless approved in writing by BAR, no work beyond that described in the "ACTIVITY DESCRIPTION" and attached to your application shall be performed.

6. This permit is valid for up to one year following the requested report due date. Requests for approval for amendments to fieldwork, fieldwork end date and report/artifact due date are required during this time. Such requests may be made and approved by phone, email, or in writing during this time and do not require amendments to this document.

7. In any release of information, including public presentations, media contacts, and the final written report, there shall be acknowledgement that the portion of the project involving state-owned and controlled land was conducted under the terms of an archaeological research permit issued by the Florida Department of State, Division of Historical Resources, Bureau of Archaeological Research.

8. If Unmarked Human Burials are discovered, permit recipient shall comply with the provisions of 872.05, F.S., and when appropriate, Rule 1A-44, F.A.C. Specifically, upon discovery of unmarked human remains, all activities that might further affect those remains shall be halted and the remains protected from further disturbance until an appropriate course of action has been determined by the local medical examiner or by the State Archaeologist, as appropriate.

9. In issuing this permit, the State assumes no liability for the acts, omissions to act or negligence of the permittee, its agents, servants or employees; nor shall this permittee exclude liability for its own acts, omissions to act or negligence to the State.

10. The permittee, unless the permittee is an agency of the State, agrees to assume all responsibility for, indemnify, defend and hold harmless the Division of Historical Resources from and against any and all claims, demands, or liabilities, or suits of any nature whatsoever arising out of, because of, or due to any act or occurrence of omission or commission arising out of the permittee's operations pursuant to this permit and shall investigate all claims at its own expense. In addition, the permittee hereby agrees to be responsible for any injury or property damage resulting from any activities conducted by the permittee.

11. The parties hereto agree that the permittee, its officers, agents and employees, in performance of this permit, shall act in the capacity of an independent contractor and not as an officer, employee, or agent of the State.

Figure A-02. Second page of the signed archaeological research Permit No. 1920.054.

The undersigned, as representative of the Permittee/Authorized Entity, understands and accepts the terms of this 1A-32 Archaeological Research Permit.

Signature ____________ Date: 2/19/20

This permit will not become effective until it has been executed by the Chief of BAR. Before BAR can execute this permit, the Permittee must have a land management representative (if applicable) sign in the space provided above. Please send the signed permit to the Permit Administrator at the address above.

A copy of the executed permit will be sent to you prior to commencing fieldwork.

Executed in Tallahassee, Florida — STATE OF FLORIDA
DEPARTMENT OF STATE

Mary Glowacki, Ph.D.
Chief, Bureau of Archaeological Research

2-19-20
Date of Issue

Enclosures:
- DHR Curation Guidelines
- DHR Conservation Field Guide
- DHR Destructive Analysis Protocol
- DHR Florida Master Site File Requirements
- DHR Report Compliance Requirements

Copies furnished to:
MG

Figure A-03. Third page of the signed archaeological research Permit No. 1920.054.

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APPENDIX B: PREVIOUS SUBMERGED CULTURAL RESOURCES INVESTIGATIONS

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A number of marine remote sensing surveys have been completed at the St. Augustine Inlet and in Matanzas Bay, with some of these studies including parts of the current Project Area including: Franklin and Morris (1996); Hall (1998a, 2000a), Krivor (2010a, 2010b), and James et al. (2017). A number of remotely sensed targets have been classified as potentially significant cultural resources, many of which have yet to be dived or recorded.

The earliest remote sensing survey in the vicinity of St. Augustine Inlet was conducted by OSM Archeological Consultants (1989) in 1988. Performed for the USACE–Jacksonville District, the survey located a number of magnetic anomalies in two borrow areas (shown in Figure B-03as Borrow Area A & B). Forty-three anomalies were recorded in Area A, immediately outside the St. Augustine Inlet, with two clusters reflecting possible shipwrecks. No significant anomaly was found in Borrow Area B, offshore of St. Augustine Beach, and dredging was recommended for Area B and the northeastern corner of Area A.

In a survey conducted off Conch Island (see Figure B-03) by Southern Oceans Archaeological Research, Inc. (SOAR), in 1995, 48 magnetic targets were identified offshore and seven targets inshore (Franklin and Morris 1996). The inshore area was selected to survey the former St. Augustine channel, which is now a swash channel (Figure B-04; TableB-01). Two of the best seven targets (D and F) were investigated by divers, but could not be found, and due to the heavy sediment encountered, hydraulic jet probes were recommended for future projects. Additionally, the archaeologists noted that the inshore area's magnetic contour "suggests that most targets located in the western portion…may have been generated by submerged dayboards that were once used to mark the dredged channel" (Franklin and Morris 1996:32).

In June 1995, the USACE–Jacksonville District proposed dredging two areas west of the St. Augustine Inlet, in the St. Augustine Harbor, to alleviate shoaling along the AIWW. Tidewater Atlantic Research (TAR) conducted a magnetometer and sidescan sonar survey of two small areas as part of this project. Four targets were identified, with three recommended for further investigation or avoidance (Watts 1996a). Later the same year, TAR was contracted to identify and assess the three targets (Watts 1996b). All three targets were determined to be modern maritime related debris and navigation aids. Note that the two survey areas and associated targets were south of the seven targets investigated under the current investigation, and well north of the Davis Shoals Shore survey area and three targets investigated (Figure B-05).

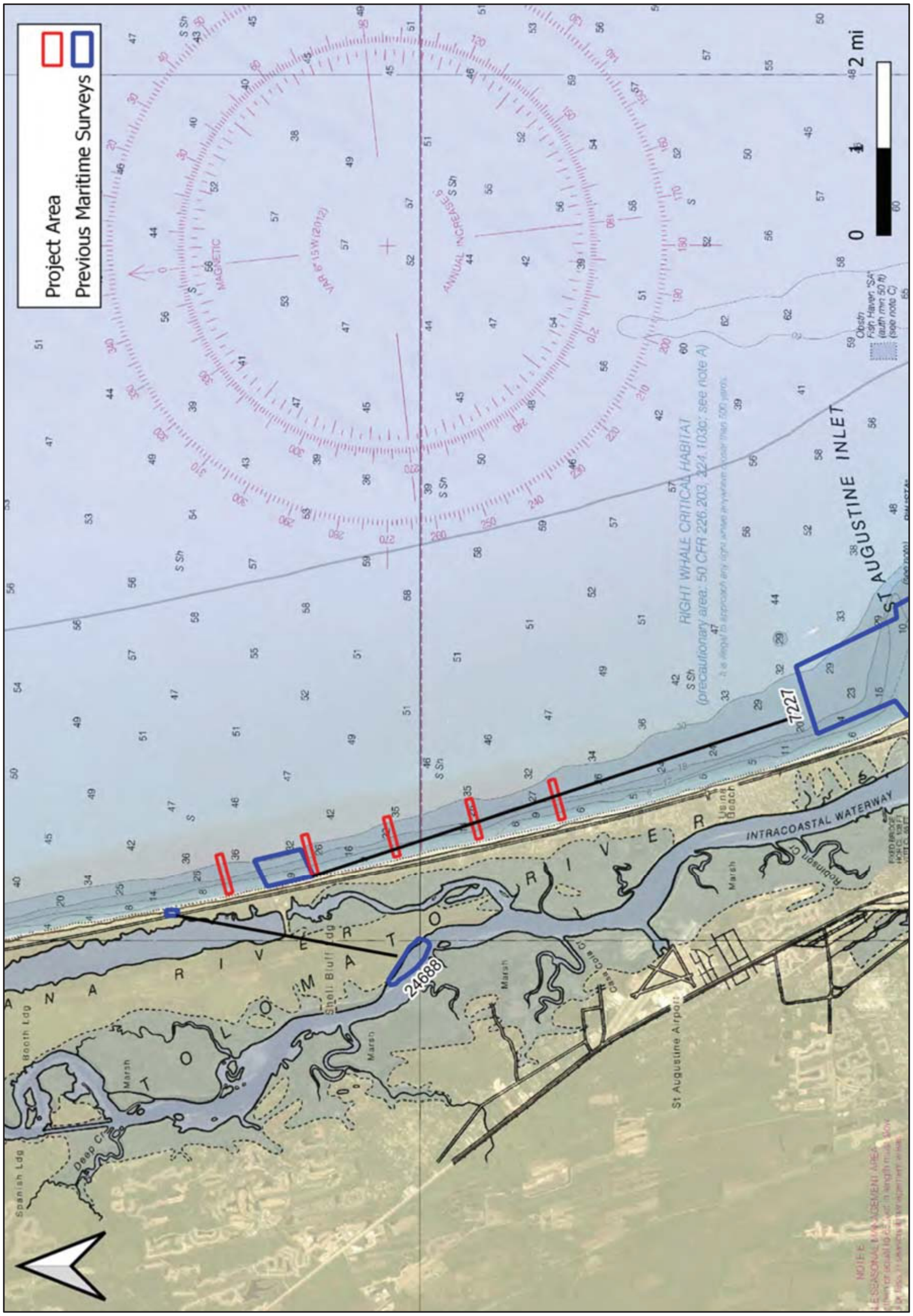

Figure B-01. Map indicating locations of previously recorded maritime sites in relation to the South Ponte Vedra and Vilano Beach Project Area.

[redacted]

NOTE: FIGURE B-02 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-02. autical chart of the St. Augustine Inlet showing the submerged cultural resources investigations (blue outlined areas) near the Project Area with initial targets and Davis Shores Shoal marked.

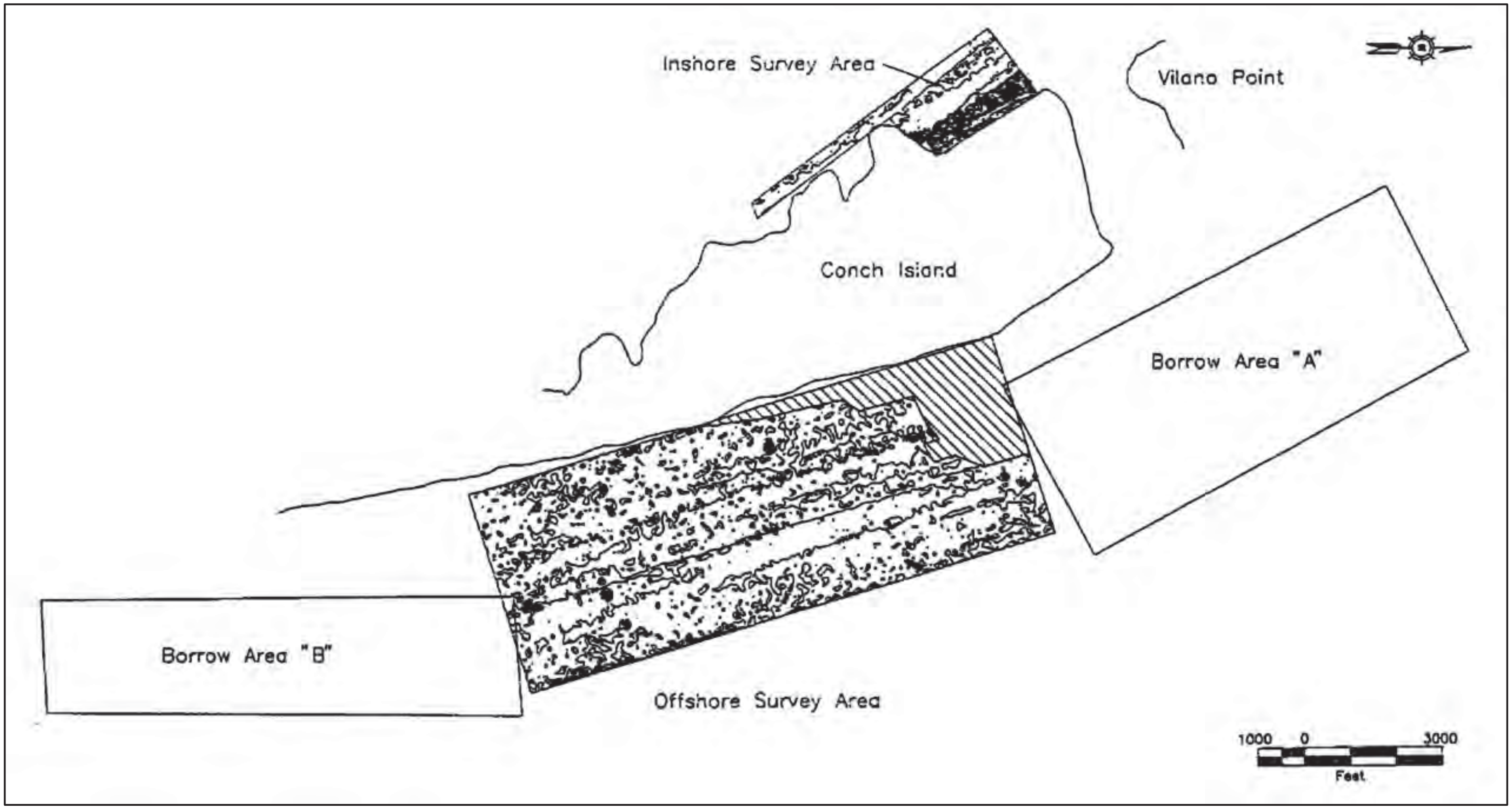

Figure B-03. Previously surveyed areas by Franklin and Morris (1996:20) with the " Inshore Survey Area" immediately south of the current Project Area. Borrow Areas A and B were a part of OSM Archeological Consultants' 1989 survey.

[redacted]

NOTE: FIGURE B-04 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-04. Inshore area surveyed by Franklin and Morris (1996:34) containing some of the current Project Area.

TableB-01. Magnetic Anomalies found by Franklin and Morris during their 1996 survey.

Anomaly	Easting	Northing	Type	Range	Pulse
A	[redacted]	[redacted]	[redacted]	33	12
B	[redacted]	[redacted]	[redacted]	20	9
C	[redacted]	[redacted]	[redacted]	209	233
D	[redacted]	[redacted]	[redacted]	32	9
E	[redacted]	[redacted]	[redacted]	33	13
F	[redacted]	[redacted]	[redacted]	22	10
G	[redacted]	[redacted]	[redacted]	31	7

NOTE: FIGURE B-05 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-05. Enlarged excerpt from Figure B-02 showing two Watts (1996b) survey areas and associated targets well south of the seven targets investigated under the current investigation, and well north of the Davis Shoals Shore survey area and targets.

In 1997, Mid-Atlantic Technology and Environmental Research (M-AT/ER) conducted a remote sensing survey for the USACE–Jacksonville District that included historical background research and literature review (Hall 1998a). Encompassing most of the survey area immediately west of the St. Augustine Inlet, the project identified 12 targets; six were deemed potentially significant archaeologically, with a number characterized as historic shipwrecks. Recommendations included identification and assessment rather than avoidance, as the removal of sand from around any site might cause destabilization (Hall 1998a:15). Five of the remaining six targets were also potentially significant. Although not exhibiting shipwreck-like signatures, the long use and importance of St. Augustine as a port increased the likelihood that these targets could represent historically significant properties. The remaining target was positively identified as a modern shrimping vessel wreck and was not recommended for further investigation.

In 1997, M-AT/ER conducted remote sensing investigations on a five-sided polygon survey area offshore of St. Augustine. Twelve targets were identified with six potentially being a significant cultural resource, five targets had less potential and one target was identified as a modern shrimp boat wreck (Hall 1997). M-AT/ER returned in 1998 to investigate the potentially significant targets (Hall 1998b). Target E, corresponding to a target hit by the dredge during sand recovery operations in the borrow area, was determined to be the remains of a collapsed navigation tower and no further work was recommended. The remains of modern fishing vessels were found at Targets B, F, G, H, and K. Other targets were determined to be modern debris. None of the project's targets fit the requirements of NRHP and no additional archaeological investigation was warranted.

In 1998, the USACE–Jacksonville District proposed maintenance dredging of the western side of St. Augustine Inlet. M-AT/ER was contracted to conduct a field investigation and historical research for the proposed survey area. The study, utilizing marine magnetometer and sidescan sonar, located seven targets, six of which were recommended for additional investigations to assess the historic significance, if any, of the targets. The remaining target was identified as a sunken navigation buoy.

As part of a proposed maintenance dredging and channel realignment project at the St. Augustine Inlet, M-AT/ER conducted and identification and assessment investigation to identify fourteen targets located by M-AT/ER and 12 targets located by SOAR in previous investigations (Hall 2000a). Three of the targets were not relocated. Of the remaining targets, one was identified as a wooden historic wreck (potentially the *Dixie Crystal*, 8SJ4889), and the remaining targets identified as railroad iron, possibly used in conjunction with navigation aids. This previous survey area is a part of the current APE. Site 8SJ4889 will be focused on in the following section.

In 2000, M-AT/ER conducted a literature search and remote sensing survey for submerged cultural resources in an area proposed for maintenance dredging and channel realignment by the USACE–Jacksonville District. Areas surveyed were located in and immediately outside of St. Augustine Inlet. Investigations located six targets consisting of magnetic and/or acoustic returns. Of these six, four were recommended for avoidance or further investigation as potentially significant. Recommendations included the establishment of a 200-foot zone of avoidance around each target (Hall 2000b).

In 2001, archaeologists from the Lighthouse Archaeological Maritime Program (LAMP) continued the survey undertaken by SOAR in 1995. Although part of the larger, countywide *St. Johns Submerged Cultural Resources Inventory and Management Plan* (Phase I; Morris et al. 2002), the study surveyed one area outside and north of the St. Augustine Inlet, called the "Northern Survey Area". The survey identified 18 magnetic anomalies as potentially significant; divers investigated seven of the 18 targets and none were determined to be shipwrecks or significant cultural resources. LAMP released Phase II in 2003 and Phase IIA in 2006, which focused on anomalies noted in the first phase in the countywide survey by remote sensing, site investigation, and the identification of new archaeology sites (Morris et al. 2003; Morris et al. 2006). The 2006 report does not contain information concerning previous work by LAMP in the inshore or offshore portions of the current Project Area.

Archaeologists with LAMP performed a remote sensing survey at the northwestern tip of Anastasia Park on Conch Island in the Salt Run for a proposed boat dock and boardwalk (Moore and Morris 2006). One anomaly was noted, a concrete block with iron-rod reinforcement, and appeared similar to shore protection groins placed along Salt Run Lagoon on Anastasia Island by the USACE in the 1890s (such as archaeology Sites 8SJ4874–8SJ4877). The area surveyed appears outside of the current Project Area. The block was considered disarticulated and no cultural resource or new archaeological site was found during the investigation.

As part of their St. Augustine Beach Renourishment Project, the USACE–Jacksonville District, in 2001–2002 and 2005 impacted what were thought to be at least two submerged cultural resources during dredging operations for the project. With artifacts appearing on the beach in the renourishment sands, the USACE–Jacksonville District contracted archaeologists with LAMP to monitor dredge effluent, collect any and all artifacts, and attempt to correlate the onshore artifact disposal locations with offshore dredging locations. Presented in their report of findings entitled *Submerged Cultural Resources Monitoring Report for the 2005, St. Augustine Beach Renourishment Project* (Moore 2006), the monitoring archaeologists located and recovered artifacts from two large concentrations along the beach, and determined that the diagnostic artifacts originated from distinct, but fairly broad, dredging areas in the Ebb Shoal Borrow Area located just outside the mouth of the St. Augustine Inlet. Artifacts recovered on the beach from Group A included coal, clinker, pieces of iron concretion, and wood fragments. Vessel type specific artifacts recovered included a significant amount of clinker and coal, suggesting a steam-powered vessel, and a drift-pin head concretion and a treenail fragment, suggesting a wooden hulled vessel. Artifacts recovered from Group B included concretions of square fasteners, probable iron strapping concretions, along with many fragments of Middle-Style olive jars, suggesting a colonial-era wooden shipwreck. Also recovered were several fragments of World War II-era ordnance.

During 2007, Panamerican undertook a cultural resources investigation involving historic background research, remote sensing investigation, and diver investigation of targets in response to the recommendations contained in the LAMP monitoring report (Lydecker and James 2008). The remote sensing phase of the project was conducted in early 2007, with the identification of 55 magnetic anomalies, seven sidescan sonar targets, and 21 subbottom feature targets incorporated into 12 dive targets. Diver investigation of the identified targets indicated no historically significant submerged cultural resource was present in the survey area, with all targets either modern debris or deeply buried. It was concluded that either the entire vessel(s) were destroyed during the dredging or that the artifacts found during the monitoring represent an independent artifact scatter either not associated with a wreck site or associated with a wreck site not located in the survey area. Of the two obstruction targets located by the dredging contractor, one was identified as a previously investigated target determined to be the remains of a navigation tower. Diver investigation of the same target during this project confirmed the existence of modern iron debris. The remaining target was not investigated due to its location in the surf zone requiring very specific environmental conditions.

LAMP conducted a cultural resources survey for a proposed dredging project of Salt Run, which runs south of the St. Augustine Inlet along the inshore side of Conch Island (Turner et al. 2008). The survey included 105 acres with the northern most anomaly (M04) noted as a segment of rebar, which “may have emanated from the adjacent rock revetment lining the southern inlet shoreline” (Turner et al. 2008:24). Also, in the northern extent, one magnetic target (M05) was identified as possible intact historic shipwreck sitting in 14 feet of water and the target was recommended to be avoided with a 60-foot buffer. Target M05 sits south and outside of the current Project Area (Figure B-06).

NOTE: FIGURE B-06 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-06. Lighthouse Archaeological Maritime Program's 2008 survey of the Salt Run Lagoon where the northern extent of their survey area sits south of the current Project Area (Turner et al. 2008:43).

In 2008, Southeastern Archaeological Research, Inc. (SEARCH) preformed a remote sensing survey and diver identification of three inshore mooring areas in Matanzas Harbor adjacent to the *Castillo de San Marcos* (Burns 2008). The northernmost area of the survey sits east of the *Castillo de San Marcos* as shown in Figure B-07, called "the north mooring field." In the northern mooring field, 131 magnetic targets and six sidescan targets were noted with four magnetic and two sidescan targets suggested for investigation. Of these anomalies, three were identified and considered insignificant. Two of the targets could not be identified and were recommended to be avoided. The final anomaly was determined to be a historic ballast dump (Bayfront Ballast Pile, 8SJ5400), which was also recommended for avoidance.

During the summer of 2009, SEARCH conducted a remote sensing survey of the AIWW for submerged cultural resources prior to dredging the channel (Krivor 2010, 2010a). The 240-acre survey area of the waterway was divided into three reaches: north, mid, and south (see Figure B-07). A portion of the current Project Area was surveyed during the 2009 SEARCH project. The North Reach lies outside the current Project Area while the Mid- and South Reaches are a part of the current diver investigation. Four anomalies clusters located by SEARCH are to be examined and are listed in Table B-02.

South of the Vilano Beach Bridge and within the mid-reach, SEARCH noted two magnetic clusters, three isolated magnetic targets, and five sonar targets that were associated with two of the isolated magnetic targets (Figures B-08 and B-09). All of these clusters and targets were recommended for avoidance due to their magnetic signatures, which marked them as potentially significant. Two of these anomalies were selected for examination during this project: anomalies MR-25 (Figures B-10 and B-11) and MR-64 (Figures B-12 and B-13). Within the South Reach (see Figure B-10), six magnetic anomalies and one sidescan target were identified as potentially significant. All of these clusters and targets were recommended for avoidance due to their magnetic signatures. Regarding the current investigation, two of the South Reach cluster anomalies (SR-1 and SR-2) are to be examined (see TableB-02). Locations and magnetic contours are shown below for targets SR-1 (Figures B-14 and B-15) and SR-2 (Figures B-16 and B-17).

Figure B-07. Location of the SEARCH 2008 Matanzas Harbor survey southwest of the current Project Area; the Bayfront Ballast Pile (8SJ5400) was identified in the survey area north of the Bridge of Lions (Burns 2008:2).

TableB-02. List of magnetic clusters recommended by SEARCH for avoidance within the Project Area.

Cluster/Anomaly	Easting	Northing	Notes
SR-1	[redacted]	[redacted]	[redacted]
SR-2	[redacted]	[redacted]	[redacted]
MR-25	[redacted]	[redacted]	[redacted]
MR-64	[redacted]	[redacted]	[redacted]

Source: Krivor 2010:6 and 92

NOTE: FIGURE B-08 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-08. SEARCH's 2009 survey of the AIWW showing a magnetic contour map of the Mid-Reach and part of the current Project Area, which is found south of the Vilano Beach Bridge and the Vilano Beach Pier (contour interval equals 5 nanoteslas; Krivor 2010:91).

NOTE: FIGURE B-09 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-09. SEARCH's 2009 survey of the AIWW showing a magnetic contour map of the South Reach and part of the current Project Area (contour interval equals 5 nanoteslas; Krivor 2010:115).

[redacted]

NOTE: FIGURE B-10 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-10. SEARCH's 2009 survey showing the location of isolated magnetic target [redacted], which potentially will be found during the current project (Krivor 2010:101).

[redacted]

NOTE: FIGURE B-11 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-11. Contour map of isolated magnetic target [redacted] (contour interval equals 5 nanoteslas; Krivor 2010:101).

[redacted]

NOTE: FIGURE B-12 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-12. SEARCH's 2009 survey showing the location of isolated magnetic target [redacted], which potentially will be found during the current project (Krivor 2010:102).

[redacted]

NOTE: FIGURE B-13 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-13. Contour map of isolated magnetic target [redacted] (contour interval equals 5 nanoteslas; Krivor 2010:102).

[redacted]

NOTE: FIGURE B-14 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-14. SEARCH's 2009 survey showing the location of Clus[redacted]), which are a part of the current project (Krivor 2010:116).

[redacted]

NOTE: FIGURE B-15 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-15. Contour map of Cluster [redacted] showing the individual magnetic targets (contour interval equals 5 nanoteslas; Krivor 2010:117).

[redacted]

NOTE: FIGURE B-16 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

[redacted]

Figure B-16. SEARCH's 2009 survey showing the location of Clus [redacted]

[redacted]

NOTE: FIGURE B-17 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

[redacted]

Figure B-17. Contour map of Cluster [redacted] **showing magnetic contour (contour interval equals 5 nanoteslas; Krivor 2010:119).**

In 2010, SEARCH returned for diver investigation and evaluation of ten potentially significant anomalies in the AIWW located in 2009 (Krivor 2010, 2010a). Of the ten, two clusters from the Mid-Reach (MR-2 and MR-3) and three from the South Reach were selected for diving (SR-4, SR-5, and SR-6); however, the clusters chosen for ground-truthing were outside of the current portion of the Project Area.

Furthermore, in 2009, SEARCH returned for a survey near the St. Augustine entrance channel where the USACE proposed dredging sand from the Ebb Shoal Borrow Area to be placed on St. Augustine Beach (Burns 2009). The survey determined "70 anomalies represented in 25 anomaly clusters and two isolated anomalies located in the dredge block are recommended for avoidance during project activities" (Burns 2009:79). Additionally, the North Shoal Vessel (8SJ4784) was refined to determine the vessel's actual position; however, "no wreckage was visible in the sidescan sonar indicating the vessel may be deeply buried on the North Shoal" (Burns 2009:79).

The next year, SEARCH revisited the same borrow area for evaluation of 26 potentially significant magnetic clusters, one isolated magnetic anomaly, and one isolated sidescan sonar target (Burns 2010). Seven of the clusters were determined to be modern debris. Eighteen clusters and the single anomaly could not be identified with their 10-foot hydraulic probe, as the source targets were too small or too deeply buried. The final cluster was associated with the wreckage of the North Shoal Vessel (8SJ4784) and archaeologists recommended a 100-meter diameter buffer zone at the site.

In addition to these investigations, LAMP has conducted a large number of remote sensing surveys and diver investigations throughout St. Johns County (Meide et al. 2010, 2011, 2012, 2014). Reports detailing the findings of LAMP's summer field schools and other local field investigations were examined for insight into the current Project Area. Many of these reports summarize projects that were submitted to the State of Florida or sites that were further examined; those that pertain to the current Project Area have already been discussed above.

In 2016, the USACE–Jacksonville District proposed to use three new sand borrow areas for beach renourishment—the Ebb Shoal Borrow Area, located outside the mouth of the St. Augustine Inlet; the Ocean Borrow Area, located just offshore of St. Augustine; and the third inside the AIWW Channel (Figures B-18 to B-21). Panamerican was contracted to conduct a comprehensive remote sensing survey of the submerged Project Area (James et al. 2017). Comprised of a magnetometer, sidescan sonar, and a subbottom profiler survey, 117 magnetic anomalies, 30 sidescan sonar targets, and one subbottom feature were recorded during the survey. Analysis of the magnetic data indicated that of the 117 magnetic anomalies, 24 (comprising seven anomaly clusters and a single isolated anomaly) were classified as unknowns and all have signatures that were recorded on multiple lines and are characteristic of potentially significant resources. Focusing on the AIWW Channel Borrow Area, the area contained four potentially significant clusters of anomalies some with associated acoustic targets, a single isolated anomaly with an associated acoustic target, and no situation potential for submerged prehistoric sites. Significant anomalies located in the AIWW are shown in TableB-03.

Table B-03. Potentially significant anomalies/targets located by Panamerican's 2016 survey.

AIWW Channel Borrow Area			
Target	**Easting†**	**Northing†**	**Association**
M05	[redacted]	[redacted]	[redacted]
M06	[redacted]	[redacted]	[redacted]
M023	[redacted]	[redacted]	[redacted]
M024	[redacted]	[redacted]	[redacted]
M025	[redacted]	[redacted]	[redacted]
M026	[redacted]	[redacted]	[redacted]
M027	[redacted]	[redacted]	[redacted]
M028	[redacted]	[redacted]	[redacted]
M029	[redacted]	[redacted]	[redacted]
M030	[redacted]	[redacted]	[redacted]
M031	[redacted]	[redacted]	[redacted]

Source: James et al. 2017
†Coordinates in NAD83 Florida State Plane East U.S. Survey Feet
Bolded targets are part of the current investigation

The AIWW Channel Borrow Area had numerous anomalies/targets of interest that were considered potentially significant (James et al. 2017:73-74). A large cluster of anomalies projected into the survey area borders of the northernmost portion of the AIWW Channel Borrow Area. Containing anomalies M026 and M027, the cluster projects slightly into the northern border. Associated with sonar contacts C016 and C017 (see Figures B-19 and B-20), the contacts appear to show linear features. This target was previously located in 2009 by SEARCH as "Cluster MR-25" and considered potentially significant (Krivor 2009:95, 134). While considered potentially significant, these anomalies were not investigated during the subsequent 2010 diver assessment and remain unidentified (Krivor 2010, 2010a).

Another potentially significant anomaly was located in the center of the northern portion of the AIWW Channel Borrow Area survey area. Labeled "M029," it has an associated sonar contact, C019 (Figure B-21; James et al. 2017:74). This target was previously located in 2009 as "Anomaly MR-64" and considered potentially significant (Krivor 2010:95, 134). While considered potentially significant, this anomaly was not investigated during the subsequent 2010 diver assessment and remains unidentified (Krivor 2010, 2010a).

To the west of M029/C019 was a small cluster of anomalies comprised of M30 and M31 (see Figure B-18; James et al. 2017:74). Of unknown origin and without a sonar contact, the size, duration, and clustering of these anomalies suggest they should also be considered potentially significant.

Because the parameters of the proposed USACE project were unknown (i.e., dredging depth), it was not known if any of these potentially significant cultural resources would be adversely impacted by project activities. It was recommended that the USACE determine the exact parameters of the project impact and subsequently determine if any of the potentially significant sites will be adversely impacted. If the potentially significant sites would be impacted and cannot be avoided, Panamerican recommended that the USACE conduct an assessment of the integrity of the sites and their historical significance, based on the NRHP nomination eligibility criteria (James et al. 2017).

NOTE: FIGURE B-18 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-18. Potentially significant targets in the AIWW Channel Borrow Area from Panamerican's 2016 survey (James et al. 2017).

[redacted]

NOTE: FIGURE B-19 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-19. Sonar contact [redacted], several linear objects, is associated with a small magnetic cluster composed of anomalies [redacted] in Panamerican's survey of the AIWW Channel Borrow Area (James et al. 2017:93).

[redacted]

NOTE: FIGURE B-20 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-20. Sonar contact [redacted] several linear objects, is associated with a small magnetic cluster composed of anomalies [redacted] in Panamerican's survey of the AIWW Channel Borrow Area (James et al. 2017:93).

[redacted]

NOTE: FIGURE B-21 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-21. Sonar contact [redacted] is associated anomaly [redacted] in Panamerican's survey of the AIWW Channel Borrow Area (James et al. 2017:94).

[redacted]

NOTE: FIGURE B-22 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-22. Enlarged excerpt of targets tested in the Davis Shores Shoal survey area (base map: NOAA Chart No. 11485; Tolomato River to Palm Shores).

In summary, Target 1 (USACE-0013) was documented as an extremely large anomaly with a source burial depth of less than 6 feet bml. However, extensive probing to a depth of 10 feet below the mudline (bml) for a distance of 30 feet in each cardinal direction from the target center encountered no resistance or source for the anomaly, indicating a lack of a potentially significant resource. Similarly, Target 2 (USACE-0014), a cluster of smaller, discrete anomalies, also had a source burial depth of less than 6 feet bml. And like Target 1, extensive probing to a depth of 10-ft bml for a distance of 30 feet in each cardinal direction from the target center encountered no resistance or source for the anomaly, indicating a lack of a potentially significant resource. Refined signal characteristics for Target 2 (USACE-0014), and probing results for both Target 1 and 2 (USACE-0013 and USACE-0014), indicated the anomaly sources for each were likely composed of modern, ephemeral debris, such as small piping or (more likely) wire rope, which concurred with the lack of confirmation during probing. Target 3 (USACE-0015), however, had broader anomalies composed primarily of three large monopoles with smaller surrounding complex anomalies, as well as subbottom reflectors throughout the anomaly area. Extensive probing failed to encounter any subsurface resistance, achieving only negative results up to a maximum of 10 feet bml. The previously identified subbottom reflector(s) also produced no discernible change in resistance during probing. Found to be located within a 1998 dredge area, it is quite likely that the subbottom reflectors of Target 3 (USACE-0015) are previously dredged surfaces. The source of the magnetics, while not confirmed, may be geologic in nature, but probably more likely ephemeral debris associated with the dredging episode (i.e., wire rope).

The seven targets and shipwreck site selected for diver investigation, with the exception of possible *Dixie Crystal* shipwreck site (Site 8SJ4889/USACE-0012), all are considered not significant.

In 2019, Panamerican conducted diving investigations focused on seven targets and a shipwreck site *Dixie Crystal* (8SJ4889) located north of St. Augustine Inlet (Figures B-23 and B-24). Prior to diver investigation, all target locations were refined with a magnetometer, sidescan sonar, and subbottom profiler. Target investigation commenced with diver sweeps using a hand-held metal detector. Targets not identified during diver sweeps were probed with a 10-foot hydroprobe at 1-foot intervals in each cardinal direction out to 5 feet, and then at 5-foot intervals in each cardinal direction.

Of the seven targets, two were composed of iron-reinforced concrete pillars and identified as probable remains of bridge construction, and four were not observed on the surface and not located with the probing pattern to a depth of 10 feet below sediment (Tables B-04 and B-05). Four of the targets likely represent isolated marine debris of a non-historic nature, or magnetic deflections originating from a geological source. Target SR-2, which correlated to the location of the wreck of the *Dixie Crystal* (Site 8SJ4889), was probed extensively both by diver and from the vessel using a 20-foot hydroprobe down to 15 feet bml, for a total of 169 probes conducted.

Table B-04. Original Data for the Investigated Targets.

Target	X	Y	Anomaly/Contact Association	Reference
M25	[redacted]	[redacted]	[redacted]	James et al. 2016
M26	[redacted]	[redacted]	[redacted]	James et al. 2016
M29	[redacted]	[redacted]	[redacted]	James et al. 2016
M30	[redacted]	[redacted]	[redacted]	James et al. 2016
M31	[redacted]	[redacted]	[redacted]	James et al. 2016
SR-1	[redacted]	[redacted]	[redacted]	Krivor 2010, 2010a
SR-2	[redacted]	[redacted]	[redacted]	Krivor 2010, 2010a
8SJ4889	[redacted]	[redacted]	[redacted]	Hall 2000a, 2000b

Table B-05. Target Investigation Results.

Target	X	Y	Result	Comments
M25	[redacted]	[redacted]	[redacted]	[redacted]
M26	[redacted]	[redacted]	[redacted]	[redacted]
M29	[redacted]	[redacted]	[redacted]	[redacted]
M30	[redacted]	[redacted]	[redacted]	[redacted]
M31	[redacted]	[redacted]	[redacted]	[redacted]
SR-1	[redacted]	[redacted]	[redacted]	[redacted]
SR-2 / 8SJ4889	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

NOTE: FIGURE B-23 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

[redacted]

Figure B-23. Magnetic contour map of [redacted] showing original anomaly locations and refined magnetic contour map.

[redacted]

NOTE: FIGURE B-24 HAS BEEN REMOVED AND MAY BE MADE AVAILABLE UPON REQUEST

Figure B-24. Magnetic mosaic illustrating the refined location of Target [redacted], as well as subsequent hydroprobe locations; no contact was present on sonar records. Diver-operated, 0-foot deep probes are presented in gray; note only one hydroprobe in this investigation was positive (solid black dot).

In addition to these investigations, LAMP has conducted a large number of remote sensing surveys and diver investigations throughout St. Johns County (Meide et al. 2010, 2011, 2012, 2014, 2018, 2019). Reports detailing the findings of LAMP's summer field schools and other local field investigations were examined for insight into the current Project Area (Figure B-25). There are three wrecks relevant to the current project area, Vilano Shrimp Boat Wreck (8SJ5645) investigated in 2013, the Owen's A-Fame Wreck (8SJ5646) discovered in 2014, and The Spring Break Wreck (8SJ06572) found in 2018.

In 2013, LAMP archaeologists were contacted about an exposed shipwreck above the high tide line near the tow of the dunes. Visible wreck components were exposed during a strong nor'easter. The keel, keelson, floor timbers, planking, fasteners, and engine bed were all observed, 8SJ5645 site extents are 4.41 meters. According to LAMP archaeologists, the wreck is indicative of an early twentieth century Florida-style trawler. The Vilano Shrimp Boat Wreck (8SJ5645) is considered to be a unique example of a transitional construction in response to a growing fishery (Meide et al. 2018). The site was left *in situ* and is currently buried.

Like site 8SJ5645, Owen's A-frame Wreck (8SJ5646) was exposed at the tide-line in 2014, after a strong nor'easter. Recorded during the investigation was a large "A"-shaped iron structure, iron frames behind the superstructure, and parallel wooden beams extending outward from the structure. Archaeologists were not able to locate any other related material in the area. While the site is considered to be maritime in nature, at this time remains unidentified according to LAMP archaeologists. No further action has been taken; 8SJ5645 was left *in situ* and is currently buried (Meide et al. 2019).

Site 8SJ06572, the Spring break Wreck washed ashore and was identified by beachgoers in March of 2018. LAMP archaeologists immediately began to document and analyze the site, as well as formulate a preservation plan. Archaeologists were able to identify the remains as a well-preserved starboard side of a large-oceangoing sailing vessel. Overall, the wreckage measured 50 feet. It was decided to move the hull remains to a safer location within the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM-NERR) educational center. Site 8SJ06572 is currently located along the trailhead within the reserve (Figure B-26).

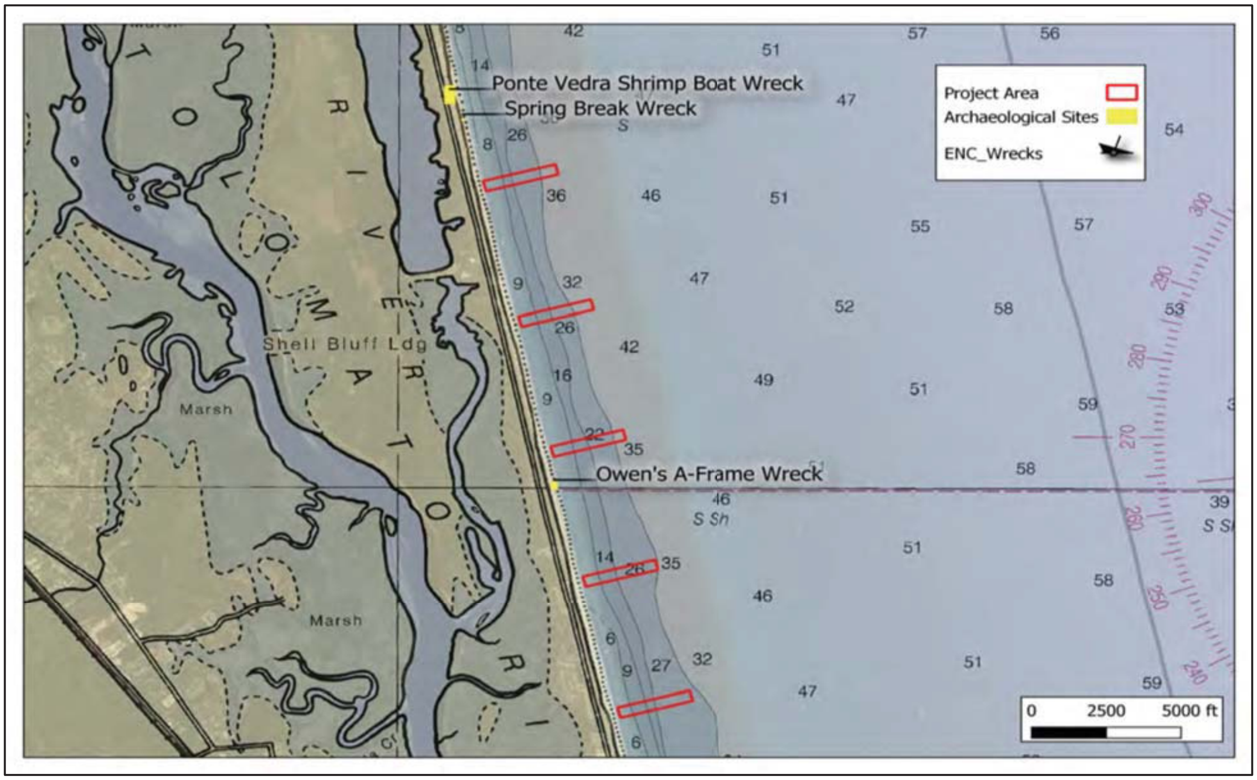

Figure B-25. Map of previously recorded sites and wrecks within the Project Area.

Figure B-26. A side-by-side comparison of the Spring Break Wreck (image provided by LAMP).

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APPENDIX C:
FLORIDA MASTER SITE FILE SURVEY LOG SHEET

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Page 1

Ent D (FMSF only) ______

Survey Log Sheet

Florida Master Site File
Version 4.1 1/07

Survey # (FMSF only) ______

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Identification and Bibliographic Information

Survey Project (name and project phase) Submerged Remote Sensing Survey of five pipeline corridors for South Ponte Vedra Beach Restoration Project

Report Title (exactly as on title page) Submerged Cultural Resources Survey for South Ponte Vedra Beach Restoration, St. Johns County, Florida

Report Authors (as on title page, last names first) 1. Derlikowski, Andrew M. 3. ______
2. James, Stephen R 4. ______

Publication Date (year) 2020 **Total Number of Pages in Report** (count text, figures, tables, not site forms) 99

Publication Information (Give series, number in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)

______

Supervisors of Fieldwork (even if same as author) Names Stephen R. James

Affiliation of Fieldworkers: Organization PanAmerican Consultants, Inc. City Memphis

Key Words/Phrases (Don't use county name, or common words like *archaeology, structure, survey, architecture, etc.*)

1. Remote Sensing 3. Underwater 5. ______ 7. ______
2. New Smyrna Beach 4. ______ 6. ______ 8. ______

Survey Sponsors (corporation, government unit, organization or person directly funding fieldwork)

Name Marc Tiemann Organization US Army Corps of Engineers - Jax

Address/Phone/E-mail 904-232-1557, Marc.A.Tiemann@usace.army.mil

Recorder of Log Sheet Andrew Derlikowski **Date Log Sheet Completed** 3/2/2020

Is this survey or project a continuation of a previous project? ☒ No ☐ Yes: Previous survey #s (FMSF only) ______

Mapping

Clear Mapping Values

Counties (List each one in which field survey was done; attach additional sheet if necessary)

1. St. Johns 3. ______ 5. ______
2. ______ 4. ______ 6. ______

USGS 1:24,000 Map Names/Year of Latest Revision (attach additional sheet if necessary)

1. Name ______ Year ______ 4. Name ______ Year ______
2. Name ______ Year ______ 5. Name ______ Year ______
3. Name ______ Year ______ 6. Name ______ Year ______

Description of Survey Area

Dates for Fieldwork: Start 2-24-2020 End 2-26-2020 **Total Area Surveyed** (fill in one) ______ hectares 125 acres

Number of Distinct Tracts or Areas Surveyed 5

If Corridor (fill in one for each) Width: ______ meters ______ feet Length: ______ kilometers ______ miles

HR6E066R0107 Florida Master Site File, Division of Historical Resources, Gray Building, 500 South Bronough Street, Tallahassee, Florida 32399-0250
Phone 850-245-6440, FAX 850-245-6439, Email: SiteFile@dos.state.fl.us

Figure C-01. First page of the Florida Master Site File Survey Log Sheet.

Page 2 **Survey Log Sheet** Survey #________

Research and Field Methods

Types of Survey (check all that apply): ☒archaeological ☐architectural ☐historical/archival ☒underwater ☐damage assessment ☐monitoring report ☐other(describe): ________

Scope/Intensity/Procedures 100 foot line spacing with magnetometer, sidescan sonar, subbottom profiler, DGPS. Diver hydroprobing of anomalies

Preliminary Methods (check as many as apply to the project as a whole)

☐Florida Archives (Gray Building) ☒library research- *local public* ☐local property or tax records ☐other historic maps
☐Florida Photo Archives (Gray Building) ☐library-special collection - *nonlocal* ☐newspaper files ☐soils maps or data
☐Site File property search ☐Public Lands Survey (maps at DEP) ☒literature search ☐windshield survey
☒Site File survey search ☐local informant(s) ☐Sanborn Insurance maps ☐aerial photography
☐other (describe): ________

Archaeological Methods (check as many as apply to the project as a whole)

☐Check here if NO archaeological methods were used.

☐surface collection, controlled ☐shovel test-other screen size ☐block excavation (at least 2x2 m)
☐surface collection, uncontrolled ☐water screen ☐soil resistivity
☐shovel test-1/4"screen ☐posthole tests ☒magnetometer
☐shovel test-1/8" screen ☐auger tests ☒side scan sonar
☐shovel test 1/16"screen ☐coring ☐pedestrian survey
☐shovel test-unscreened ☐test excavation (at least 1x2 m) ☐unknown
☒other (describe): subbottom profiler

Historical/Architectural Methods (check as many as apply to the project as a whole)

☒Check here if NO historical/architectural methods were used.

☐building permits ☐demolition permits ☐neighbor interview ☐subdivision maps
☐commercial permits ☐exposed ground inspected ☐occupant interview ☐tax records
☐interior documentation ☐local property records ☐occupation permits ☐unknown
☐other (describe): ________

Survey Results (cultural resources recorded)

Site Significance Evaluated? ☐Yes ☒No Clear Check Boxes

Count of Previously Recorded Sites 0 **Count of Newly Recorded Sites** 0

Previously Recorded Site #'s with Site File Update Forms (List site #'s without "8". Attach additional pages if necessary.) ________

Newly Recorded Site #'s (Are all originals and not updates? List site #'s without "8". Attach additional pages if necessary.) ________

Site Forms Used: ☐Site File Paper Form ☐Site File Electronic Recording Form

*****REQUIRED: ATTACH PLOT OF SURVEY AREA ON PHOTOCOPY OF USGS 1:24,000 MAP(S)*****

SHPO USE ONLY **SHPO USE ONLY** **SHPO USE ONLY**

Origin of Report: ☐872 ☐CARL ☐UW ☐1A32 # ________ ☐Academic ☐Contract ☐Avocational ☐Grant Project # ________ ☐Compliance Review: CRAT # ________

Type of Document: ☐Archaeological Survey ☐Historical/Architectural Survey ☐Marine Survey ☐Cell Tower CRAS ☐Monitoring Report ☐Overview ☐Excavation Report ☐Multi-Site Excavation Report ☐Structure Detailed Report ☐Library, Hist. or Archival Doc ☐MPS ☐MRA ☐TG ☐Other: ________

Document Destination: ________ **Plotability:** ________

HR6E066R0107 Florida Master Site File, Division of Historical Resources, Gray Building, 500 South Bronough Street, Tallahassee, Florida 32399-0250
Phone 850-245-6440, FAX 850-245-6439, Email: SiteFile@dos.state.fl.us

Figure C-02. Second page of the Florida Master Site File Survey Log Sheet.

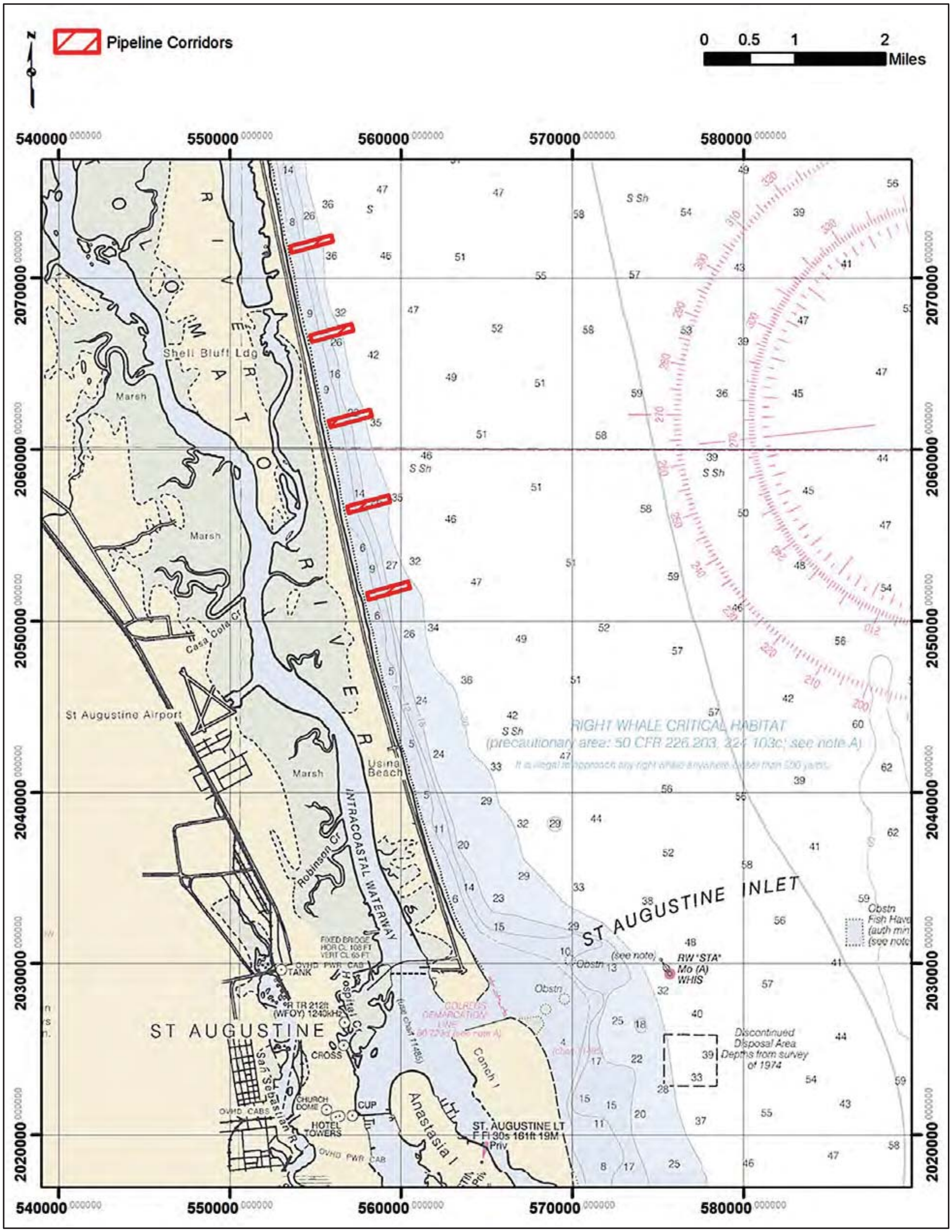

Figure C-03. Final page of the Florida Master Site File Survey Log Sheet containing Project Area map.

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Appendix E

Florida Master Site File
Search Results

This record search is for informational purposes only and does NOT constitute a project review. This search only identifies resources recorded at the Florida Master Site File and does NOT provide project approval from the Division of Historical Resources. Contact the Compliance and Review Section of the Division of Historical Resources at 850-245-6333 for project review information.

February 28, 2020

Florida Master Site File

Kierstin Masse | **Environmental Scientist/GIS Analyst**

Taylor Engineering, Inc.
10199 Southside Blvd., Suite 310, Jacksonville, FL 32256
Main: 904-731-7040 | Direct: 904-256-1321
www.taylorengineering.com #
Destin | Jacksonville | Sarasota | Tampa
E-mail: kmasse@taylorengineering.com

Quad: South Ponte Vedra Beach, FL & St Augustine, FL

In response to your inquiry of February 28, 2020, Florida Master Site File lists two archeological sites, and four standing structures recorded at the designated area of St. Johns County, Florida. The search includes 100-meters buffer.

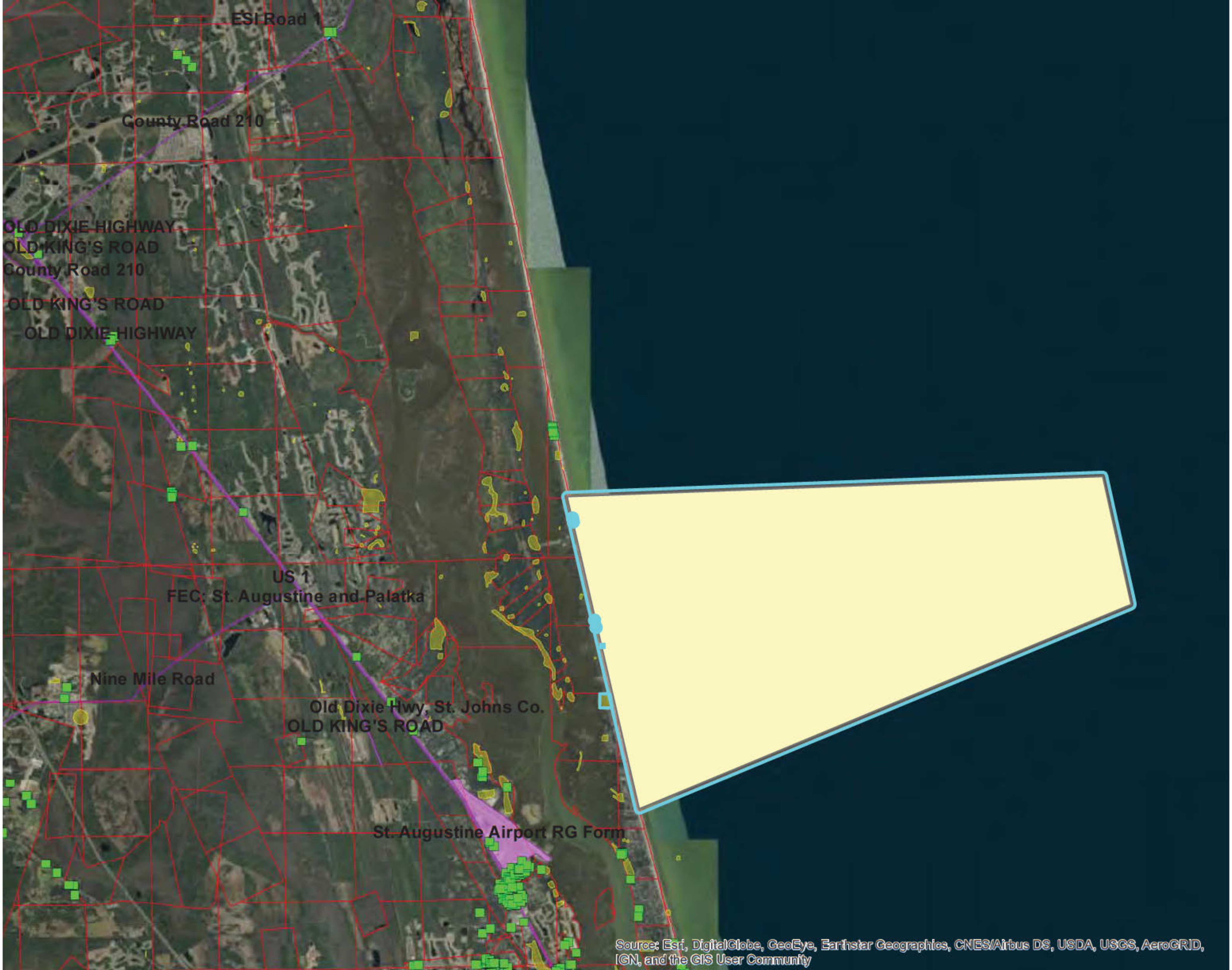
When interpreting the results of our search, please consider the following information:

- **This search area may contain *unrecorded* archaeological sites, historical structures or other resources even if previously surveyed for cultural resources.**
- **Because vandalism and looting are common at Florida sites, we ask that you limit the distribution of location information on archaeological sites.**
- **While many of our records document historically significant resources, the documentation of a resource at the Florida Master Site File does not necessarily mean the resource is historically significant.**
- **Federal, state and local laws require formal environmental review for most projects. This search DOES NOT constitute such a review. If your project falls under these laws, you should contact the Compliance and Review Section of the Division of Historical Resources at 850-245-6333.**

Please do not hesitate to contact us if you have any questions regarding the results of this search.

Sincerely,

Eman M. Vovsi, Ph.D.
Sr. Historical Data Analyst
Florida Master Site File
EMVovsi@DOS.MyFlorida.com



ESI Road 1
County Road 210
OLD DIXIE HIGHWAY
OLD KING'S ROAD
County Road 210
OLD KING'S ROAD
OLD DIXIE HIGHWAY
US 1
FEC: St. Augustine and Palatka
Nine Mile Road
Old Dixie Hwy, St. Johns Co.
OLD KING'S ROAD
St. Augustine Airport RG Form
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Florida Master Site File

AR=2
SS=4
CM=0
RG=0
BR=0
Total=6

Cultural Resource Roster

SiteID	Type	Site Name	Address	Additional Info	SHPO Eval	NR Status
SJ03286	AR	BEACHSIDE SHELL MIDDEN	ST AUGUSTINE			
SJ03883	SS	2665 STATE ROAD A1A		c1940 Frame Vernacular		
SJ03884	SS	2659 STATE ROAD A1A		c1950 Masonry Vernacular		
SJ03890	SS	2855 STATE ROAD A1A	2885 State A1A RD, Vilano Beach	1915 Ranch		
SJ03891	SS	2871 STATE ROAD A1A	2871 State A1A RD, Vilano Beach	1915 Frame Vernacular		
SJ05646	AR	Owen's A-Frame Wreck				

Attachment 3
Environmental Commitments

St. Johns County and/or its Contractors shall commit to mitigation measures and monitoring requirements outlined in the EA and associated consultation and permit documents. These requirements shall be reflected in the contract plans and specifications as appropriate. St. Johns County shall comply with all environmental mitigation requirements prior to, during, and after construction. Before solicitation, St. Johns County shall also prepare an Environmental Compliance Matrix (ECM), in coordination with BOEM, documenting all mitigation measures and monitoring requirements and associated lead Agency roles and responsibilities for implementation. The following referenced documents contain all required mitigation measures and monitoring requirements for implementation by St. Johns County, as appropriate. Documents containing BOEM mitigation enforceable through a lease and binding on the County and its contractor(s) are bolded, including relevant sections and pages.

NEPA:

- 2019. St. Johns County Emergency Beach Berms, St. Johns County, FL. Environmental Assessment (FEMA-DR-4283; FEBA-DR-4337-FL). U.S. Department of Homeland Security Federal Emergency Management Agency. September 2019.
- ***2020. Use of Outer Continental Shelf Sand from Borrow Area N-3 for the South Ponte Vedra Beach Restoration Project. Final Environmental Assessment. Prepared by St. Johns County. September 2020.***
    - ***Section 7.0; pages 53-54.***

ESA:

- *2013. U.S. Fish and Wildlife Service Programmatic Piping Plover Biological Opinion (P3BO) (May 22, 2013).*
- *2015. U.S. Fish and Wildlife Statewide Programmatic Biological Opinion (SPBO) (March 13, 2015).*
- ***2020. National Marine Fisheries Service. South Atlantic Regional Biological Opinion (SARBO) for dredging and material placement activities in the Southeastern United States. 27 March 2020****.*
    - ***Section 2.9.1 (USACE and/or BOEM Project-Specific Review for a Project to be Covered under SARBO)***
    - ***2.9.3 (SARBO Team Communication and Reporting)****; Section 2.9.3.3-2.9.3.5.2*
    - ***Appendix A****; pages 519-520*
    - ***Appendix B****; Section 1.1 (DREDGE.2); Section 1.2 (PLACE.2); Section 1.3; Section 2 (pages 525-528); Section 3.1 (pages 529-531); Section 3.5 (pages 532-533)*
    - ***Appendix F;*** *(pages 589-596)*
    - ***Appendix H;*** *(*pages 599-628)
    - ***Appendix I;*** (pages 629-632)

EFH:

- *2020. Letter dated 3 March 2020 from NMFS Southeast Regional Office to Col. Andrew Kelly (USACE Jacksonville District).*

SHPO:

- *2020. USACE letter to Tim Parsons, Ph.D., SHPO (dated 24 August 2020). Consultation associated with borrow area N-3 and associated pipeline corridors.*
- *2020. SHPO response letter to USACE (Pending)*

FDEP:

- *Consolidated Joint Coastal Permit and Sovereign Submerged Lands Authorization. Permit No. 0340616-003-JC. Issued 18 September 2020.*

DA Permit

- Pending