US Army Corps Of Engineers®
Charleston District

BOEM
Bureau of Ocean Energy Management

DRAFT

ENVIRONMENTAL ASSESSMENT

STORM DAMAGE REDUCTION PROJECT

MYRTLE BEACH REACH 3

Garden City and Surfside Beach, South Carolina

Reviewed and Adopted by

Bureau of Ocean Energy Management

Issuance of Noncompetitive Lease for

Surfside Borrow Areas

May 2016

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1.0 Purpose and Need

1.1 Project Authorization

The Myrtle Beach Project was authorized for construction by Section 101 of the Water Resources Development Act of 1990, Public Law 101-640, dated November 28, 1990 (WRDA 90). "(20) MYRTLE BEACH, SOUTH CAROLINA.-The project for storm damage reduction, Myrtle Beach, South Carolina: Report of the Chief of Engineers, dated March 2, 1989, at a total cost of $59,730,000, with an estimated first Federal cost of $38,820,000 and an estimated first non-Federal cost of $20,910,000, and an average annual cost of $1,215,000 for periodic nourishment over the 50-year life of the project, with an estimated annual Federal cost of $790,000 and an estimated annual non-Federal cost of $425,000." Section 934 of the Water Resources Development Act of 1986 (WRDA86), Public Law 99-662, authorized the Government to extend the Federal participation in periodic beach nourishment until 2046.

The authorized U.S. Army Corps of Engineers (USACE) project required the construction of a protective beach in three separate reaches, North Myrtle Beach (Reach 1), Myrtle Beach (Reach 2), and Garden City/Surfside Beach (Reach 3). The total project reach was 25.3 miles (Figure 1). Periodic nourishment is required every 10 years at Reach 1, and every 8 years with one 10-year effort at Reaches 2 and 3. In addition to being separable reaches, each reach also has different sponsors. Reach 1 Sponsor is the City of North Myrtle Beach, Reach 2 Sponsor is the City of Myrtle Beach, and Reach 3 Sponsor is Horry County. For the current project, funding is only available for Reach 3 (Garden City/Surfside Beach).

1.2 Renourishment Trigger

The project's trigger point for renourishment is met when 25% of the project length has storm berm width less than 25% of the design berm. Recent monitoring reports from the respective sponsors show the reaches have varied success. In Reach 3, 17 of the 29 monitored stations (approximately 59%) reached or exceeded the renourishment trigger point (Table 1).

Table 1. Project Reach Lengths that have met or Exceeded Renourishment Trigger Point

REACH	REACH LENGTH (LINEAR FEET)	REACH LENGTH MEETING TRIGGER POINT (LINEAR FEET)	PERCENT OF PROJECT MEETING TRIGGER
Reach 3	40,656	24,000	59%

All Sponsor annual monitoring reports were submitted prior to October 2015. This is significant because the state experienced a historic flooding event October 1-5, 2015. The event was a combination of Hurricane Joaquin and a front that resulted in the state experiencing both intense wave activity and historic rainfall. This was exacerbated by a recent perigean spring tide. Subsequently, the state experienced severe flooding (both inland and coastal), a series of impoundment failures, and coastal erosion.

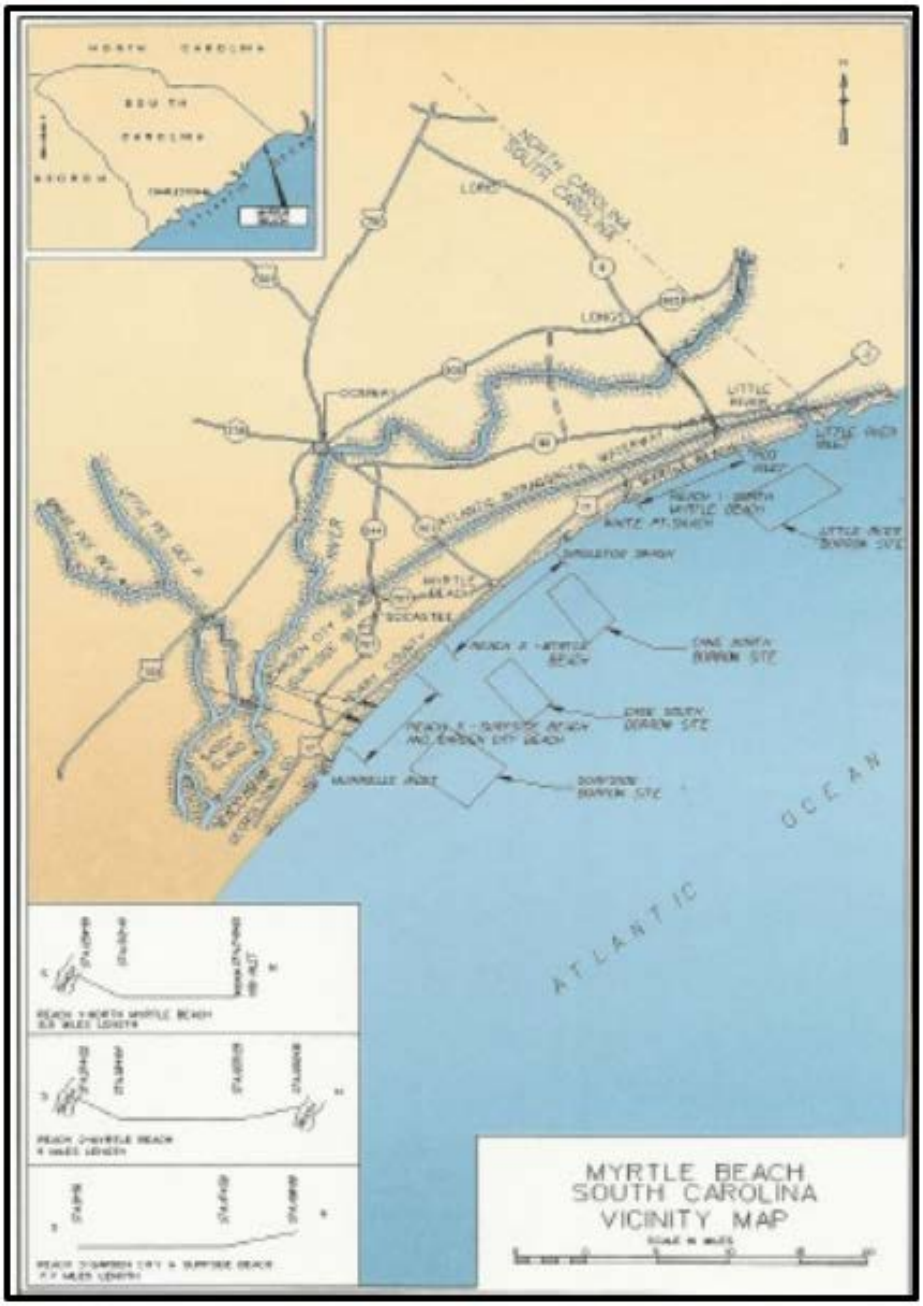

Figure 1. Myrtle Beach Shore Protection Project

As a result of this event, all three Reaches experienced significant losses when compared to their pre-storm condition surveys. The Preliminary Damage Assessments submitted by the Sponsors for all three Reaches documented significant impacts. The City of North Myrtle Beach reported losses of 80%, 50%, and 60% of their dunes along the northern third, middle third, and southern third of Reach 1, respectively, with multiple washouts and little dune left during high tides. Horry County

reported losses of 70% of the dunes in Reach 3. The City of Myrtle Beach did not provide numerical estimates, but provided photo documentation of significant impacts. Subsequently, all three sponsors requested assistance for recovery under Public Law (PL) 84-99. USACE completed Project Information Reports (PIRs) for all three Reaches. While no PL 84-99 funding was received for the project, USACE was informed that FY 16 funding was only available to complete Reach 3 of the larger project.

1.3 Environmental Compliance

This Environmental Assessment (EA) represents a supplement to the position of the USACE, Charleston District and the Bureau of Ocean Energy Management (BOEM) [formerly the Minerals Management Service (MMS)] regarding the environmental effects associated with the renourishment of Garden City/Surfside Beach, South Carolina (Reach 3 of the Myrtle Beach Project).

USACE has previously described the affected environment and evaluated environmental effects with the Myrtle Beach Storm Damage Reduction Project in its Feasibility Report on Storm Damage Reduction (USACE, 1987), Environmental Assessment Beach Erosion Control Study (USACE, 1987b), Environmental Impact Statement (USACE, 1993a), General Design Memorandum (USACE, 1993b), and Environmental Assessment (2007) (Appendix 7). In 1996, the MMS also prepared an EA covering the initial nourishment of Surfside Beach using Federal Outer Continental Shelf (OCS) sand from the Surfside borrow area (MMS, 1996). The 1993 Environmental Impact Statement (EIS) and 2007 EA are incorporated in this document by reference and can be found in their entirety in Appendix 7. Pursuant to the National Environmental Policy Act of 1969 (NEPA), this EA describes the affected environment and evaluates new information from the previous environmental documentation. Its purpose is to update potential environmental effects resulting from the issuance of a new negotiated lease for sand within the previously identified borrow area, and to determine if the proposed action, in light of new information, would have a significant effect on the human environment and whether an EIS must be prepared.

The USACE, in cooperation with BOEM, identified and reviewed new information to determine if any resources should be re-evaluated or if the new information would alter effects determinations. While this EA further supports and elaborates on the analyses and information presented in existing NEPA documents, it does not change the conclusions of any of those prior NEPA analyses. Pursuant to 43 Code of Federal Regulations (CFR) 46, the analyses are still deemed valid and are incorporated by reference. No new information was identified that would lead to a determination of significantly different impacts or would necessitate a major revision of the impacts analyses previously prepared or related to the Myrtle Beach Storm Damage Reduction Project and required preparation of an EIS.

The USACE and BOEM have integrated the process of NEPA compliance with other environmental requirements, including the Coastal Zone Management Act (CZMA), Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), and National Historic Preservation Act (NHPA). The USACE has served in the role of lead Federal agency for environmental compliance activities, while BOEM has acted in a cooperating role.

1.4 Incorporation by Reference

This document is intended to communicate new environmental information and update the coordination between a number of Federal and State regulatory agencies. All other findings from the aforementioned documents are still valid, however are not reiterated in this EA. Specific details for the project are provided in the following reports and are hereby incorporated by reference in accordance with NEPA (Appendix 7):

US Army Corps of Engineers. 1993. Final Environmental Impact Statement for the Myrtle Beach and Vicinity Shore Protection Project, Horry and Georgetown Counties, South Carolina. USACE Charleston District. January 1993.

US Army Corps of Engineers. 2007. Final Environmental Assessment: Myrtle Beach Storm Damage Reduction Project. North Myrtle Beach, Myrtle Beach, and Horry County, SC. July 2007.

2.0 Description of the Proposed Action

The Myrtle Beach project consists of three separable reaches which have previously been constructed simultaneously at each nourishment project. Currently, funding has only been made available for Reach 3 (Garden City/Surfside), and therefore, this Environmental Assessment will only evaluate the effects related to this Reach of the Myrtle Beach Storm Damage Reduction Project.

The proposed project at Reach 3 consists of a protective storm berm and an advanced nourishment construction berm. The protective storm berm reduces damages expected to occur during severe storm events. The advanced nourishment berm acts as a buffer for the protective storm berm against long term erosional forces. The protective storm berm has a top elevation of 6.0 NAVD 88 and a crest width of ten feet. The fore slope of the protective berm is 1 vertical to 20 horizontal down to natural ground. The advance nourishment berm sits adjacent the protective storm berm. The advance nourishment berm has a top elevation of 6.0 NAVD 88. The fore slope of the advance nourishment is 1 vertical to 5 horizontal down to elevation 2.0 NAVD 88 then a variable fore slope down to the existing beach profile (Figure 2). At each location, the plan includes dune grass and dune fencing. Where possible, USACE would like to plant seabeach amaranth (*Amaranthus pumilus*) as a small component of the dune grass planting. The length of the dune and beachfill for the project is approximately 40,300 feet. Project maps depicting the plan view of the project extent can be found in Appendix 1.

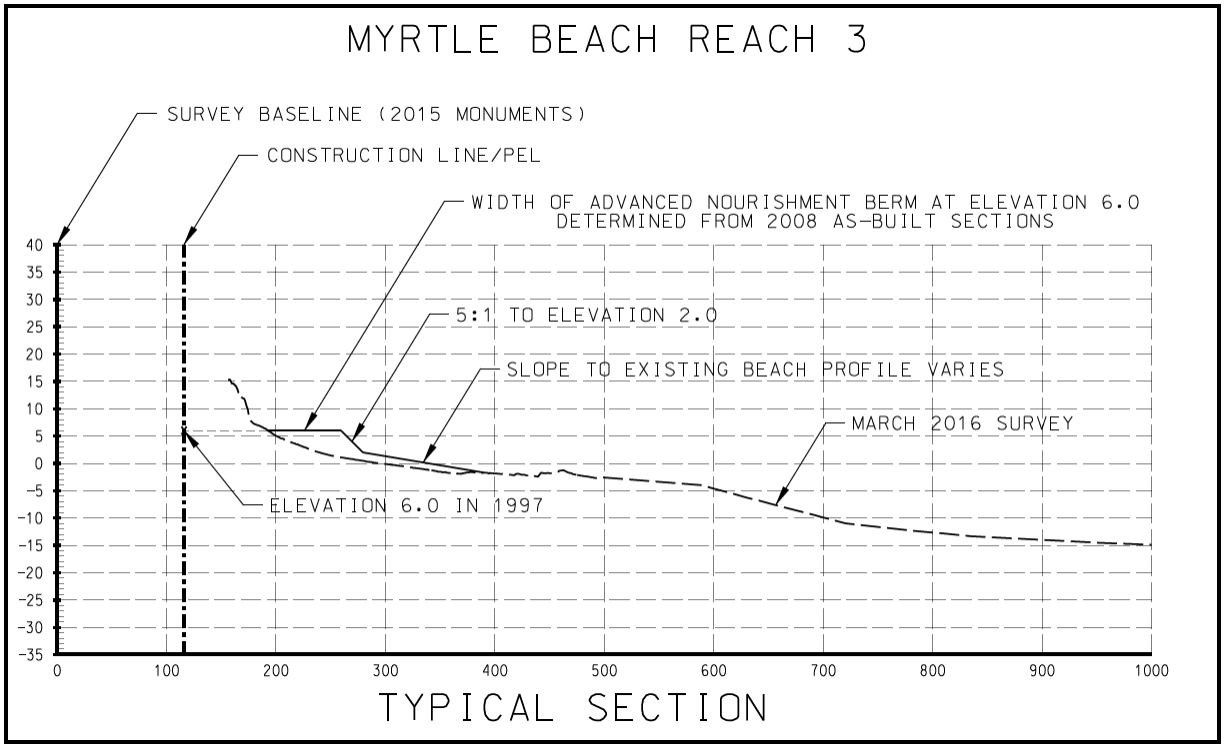

Figure 2. Representative profile for Reach 3

The project is anticipated to be constructed with a hopper dredge, booster pump, and land-based heavy equipment (i.e. bulldozers and front-end loaders); however, the use of a cutterhead dredge remains a possibility. SC Department of Natural Resources (SCDNR) and Coastal Carolina University (CCU), responsible for monitoring project impacts, have previously recommended the continued use of a hopper dredge of borrow areas associated with the Myrtle Beach project to minimize benthic impacts and foster quicker benthic recovery.

The borrow area for Reach 3 was identified in the March 1993 General Design Memorandum for the project as the Surfside Borrow Area (Figure 3). Portions of it have been used in the past for the 1998 and 2007/2008 nourishment projects. The area extends from two to five miles offshore and comprises approximately six square miles. The site is generally featureless and data indicates that it is relatively homogenous and sandy. This borrow area will serve as the source of sand for the current project. The mean phi size of the material in the borrow area is 1.77; the percent passing the #200 sieve is 5.1%; and the average usable depth is 4.5 feet. It is anticipated that approximately 700,000 cy of sand will be needed to complete this renourishment project to the full design template. A portion of this sand may come from the Outer Continental Shelf (OCS).

Figure 3 shows the areas within the borrow area that dredged material was removed for placement along Reach 3 in 1998 and 2007/2008. In 2005, borrow area investigations determined that the Surfside borrow area contained at least 15.2 million cubic yards (cy) of beach-compatible material. The 2007/2008 renourishment project borrowed 857,633 cy from the borrow area. Based on the volume calculations from 2007, there is sufficient quantity of material within the site to complete the proposed renourishment of Reach 3. The dredge will remove the sand to a depth not to

exceed 10 feet within the borrow areas. The borrow area will be divided into dredging zones and the contract specifications will require the contractor remove material completely from one borrow zone prior to moving to another borrow zone.

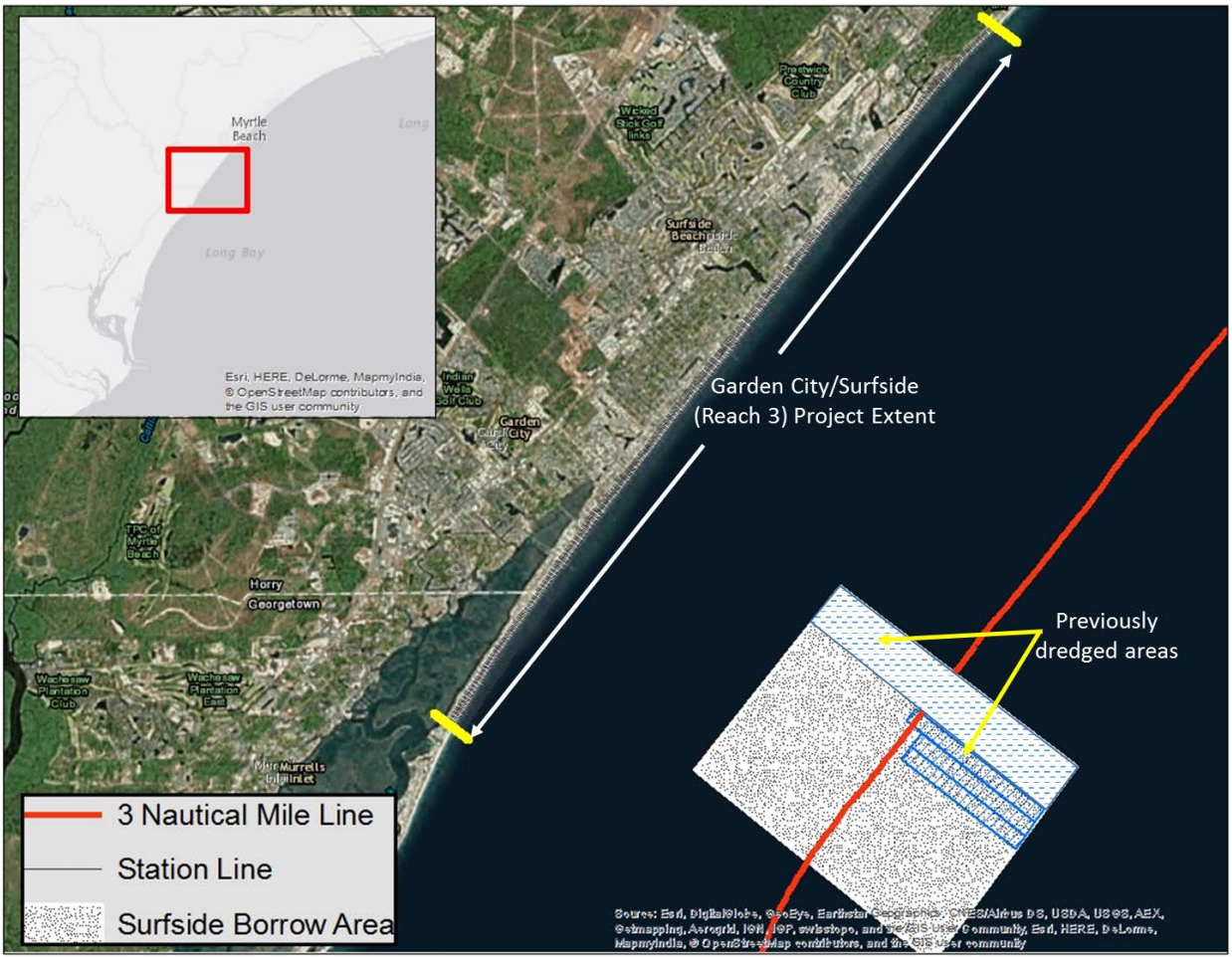

Figure 3. Garden City/Surfside (Reach 3) Project Extent and Surfside Borrow Area

Coastal Carolina University performed bathymetric monitoring associated with the 2007 renourishment. Their results indicated that the borrow area used in 2007 accreted approximately 452,660 cy within 1 year post-construction (Figure 4) (McCoy et al., 2010). SCDNR performed monitoring of the physical characteristics of the infill following construction. While the Surfside borrow area was not specifically monitored, results from Little River and Cane South borrow areas indicate that beach compatible material (e.g., < 10% fines) was accreting. These data indicate that the previously dredged portion of the borrow area may have recharged with beach compatible material and may be able to be used again because the borrow areas are roughly the same distance from shore and have no large estuarine sources of fine grained material. While the historic data indicate that the borrow area has sufficient quantity for this periodic nourishment effort, detailed borrow area investigations are ongoing to determine if previously dredged areas have recharged with beach-compatible material. Figure 5 shows the locations of the 2006 vibracores that were performed, as well as the locations of the 2016 targets. The ongoing geotechnical refinements

include both bathymetric surveys and vibracores to determine the amount and quality of the material. The intent of this effort is to maximize the most efficient use of the borrow area for the continued longevity of the project. If suitable material is not located in previously dredged areas, undredged portions of the larger identified borrow area with known beach-compatible material will be used. This information will be shared with resource agencies prior to construction.

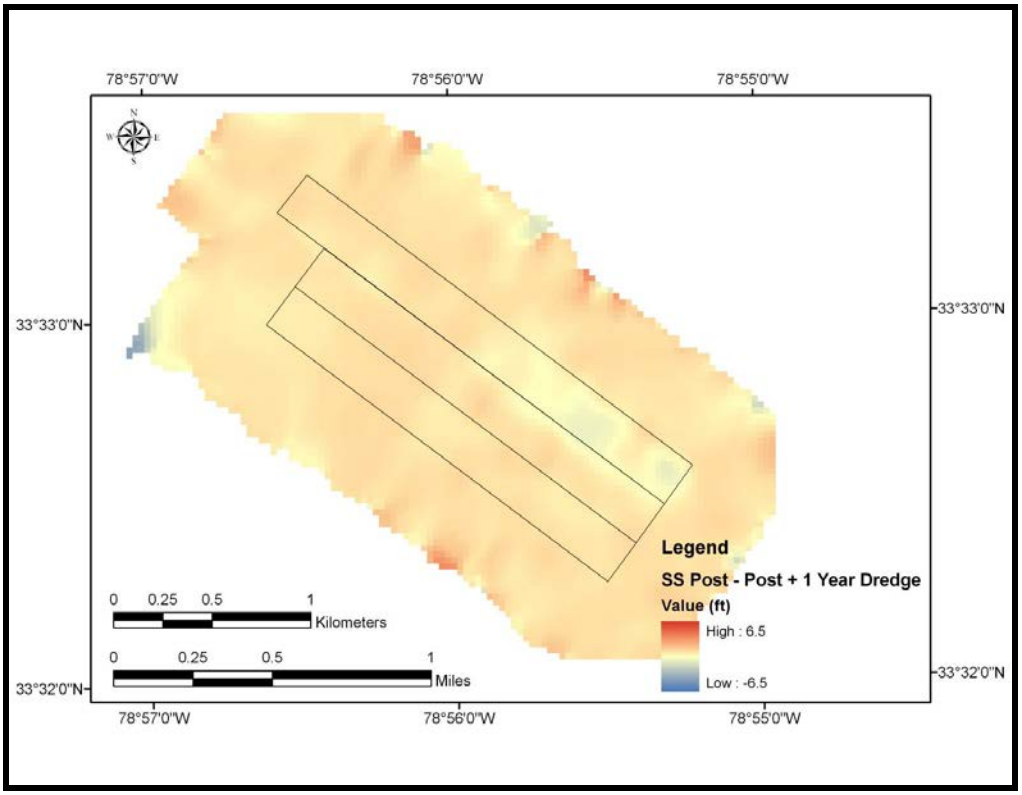

Figure 4. Surfside borrow area post dredging +1 year change map (CCU 2009)

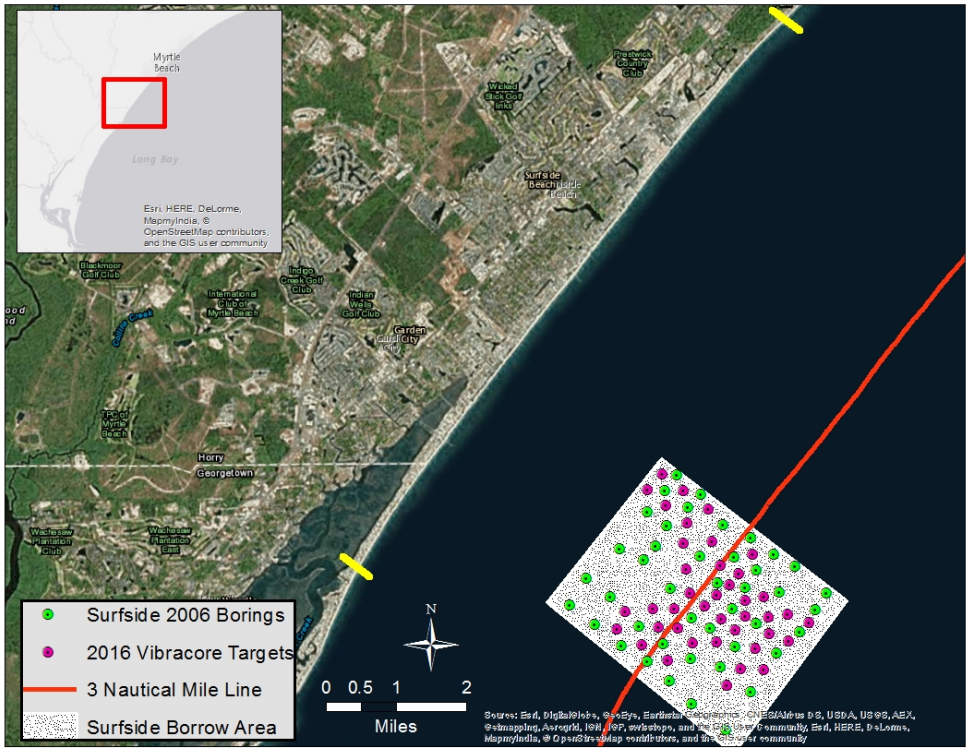

Figure 5. Vibracore Locations in Surfside Borrow Area

The beach renourishment is anticipated to start in the winter of 2016/2017 and continue 24 hours per day, 7 days per week for a period of approximately 4-5 months including mobilization.

Sand fencing will be placed along the landward edge of the nourishment fill to promote dune growth (Figure 6). Native vegetation will be planted to further expedite dune formation and stabilization, as well as creating beach dune habitat. Fencing will be installed according to sea turtle friendly design standards specified in the SC Department of Health and Environmental Control – Office of Ocean and Coastal Resource Management (SCDHEC- OCRM) "How to Build a Dune" brochure. Similar sand fencing was completed in the 1998 project and the 2007/2008 project. Work is expected to take place only during daylight hours and a limited amount of equipment, such as small backhoes and tractors, is expected to be used on the beach. Sand fencing will be installed per the USACE Charleston District's standard design with 5.5-foot spacing between panels. The planting matrix will consist of the following plants: bitter panicum (*Panicum amarum "Northpa"*), sea oats (*Uniola paniulata*), seashore elder (*Iva imbricate*), and saltmeadow cordgrass (*Spartina patens*). Sweet grass (*Muhlenbergia "filipes")* will be planted on the toe of the backside of the dune system. The plants will be spaced two feet on center, and rows will be spaced at two to four feet depending on which plant species is in the row. Fertilizer will be placed in the hole at the time of planting. As stated earlier, USACE would like to plant seabeach amaranth as a small component of the planting matrix since it is within the historic range of the plant.

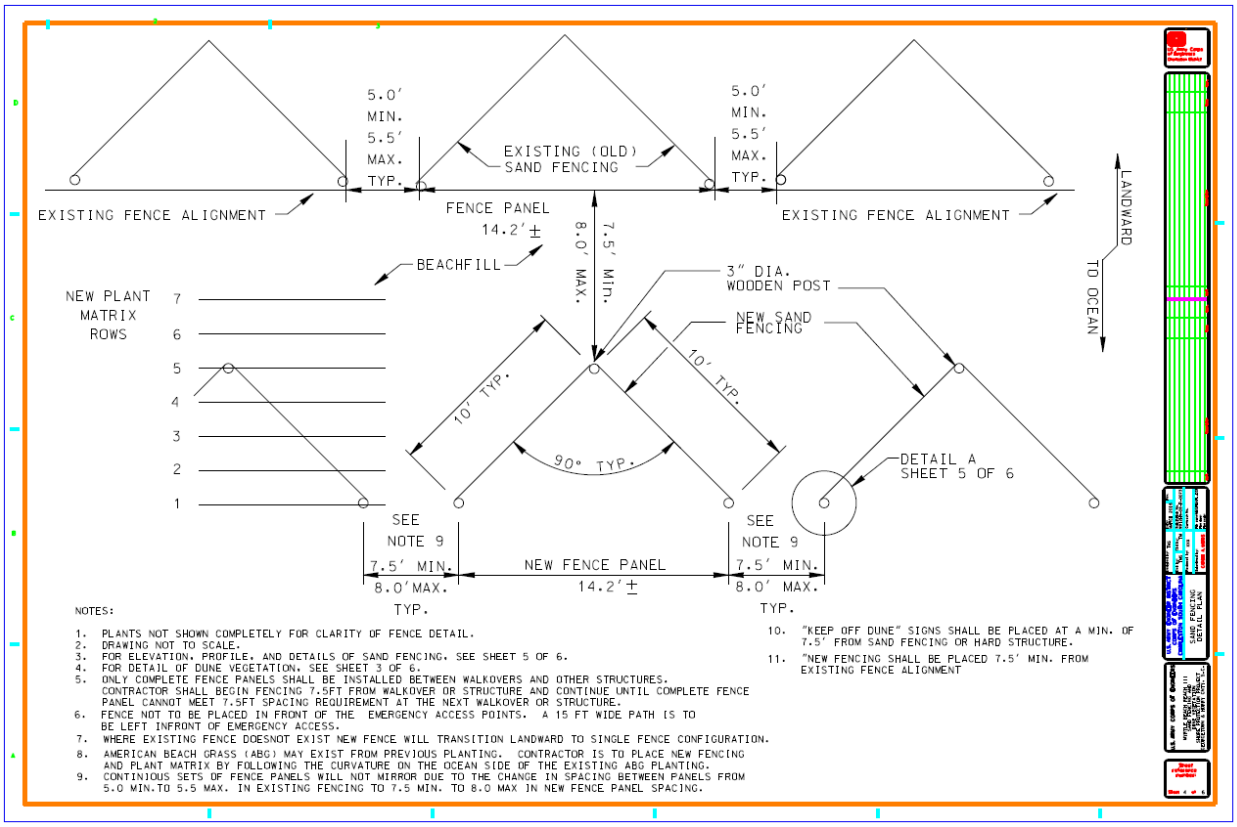

Figure 6. Sand Fencing Typical Design

This project will both protect infrastructure and restore and preserve dry sand and dune habitat used by shorebirds and endangered species, such as nesting sea turtles. Impacts of beach nourishment projects are relatively well understood. When projects are designed properly and the appropriate mitigation measures are incorporated, the impacts are limited to a minimal temporal and spatial extent.

Portions of the borrow area are located in Federal waters (>3 nautical miles offshore) on the OCS, therefore BOEM is acting as a cooperating agency on this NEPA document. The BOEM portion of this proposed action is the issuance of a negotiated agreement to authorize use of the new sand borrow source so that the USACE, along with the projects local sponsor, can obtain the necessary sand resources for the renourishment effort.

3.0 Alternatives Analysis

As previously mentioned, an assessment was performed in accordance with NEPA in the early 1990's and documented within an Environmental Impact Statement (USACE, 1993a). This document fully evaluated the alternatives for the Storm Damage Reduction Project. Since the project is authorized for 50 years of Federal involvement, these alternatives are still considered valid and were not reevaluated in the 2007 Environmental Assessment, nor will they be reevaluated here. This section serves to re-evaluate the precise source of material since options are available within the existing larger borrow area.

3.1 No Action

Due to the erosion that has occurred along the Grand Strand and because of the Federal Government's commitment to renourish the beach when necessary over the life of the project, the No Action alternative was rejected.

3.2 Use Previously Un-dredged Sand from State Waters

Sufficient sand exists in the Surfside borrow area to dredge only virgin sites in state waters. However, this alternative was eliminated from further analysis for the following reasons:

1. USACE would like to avoid dredging entirely new areas of sand within a designated borrow area if previously dredged areas have recharged with beach-compatible sands.
2. May involve greater impact to benthic habitat.
3. Does not fully consider the potential for increased erosion of the beaches due to climatological changes and effects from sea level rise. Increased erosion could increase the amount of material needed for future beach nourishments, which may not be available from un-dredged portions of the Surfside borrow area.

3.3 Use Previously Un-dredged Sand from the OCS

The Surfside borrow area has sufficient sand to dredge only virgin sites within the OCS portion of the borrow area. However, for the same reasons mentioned in Section 3.2, this alternative was eliminated from further consideration.

3.4 Use Sand from Previously Dredged Portions of Borrow Area

Not enough sand exists to only use previously dredged areas in the Surfside borrow area; therefore, this alternative was eliminated from further consideration.

3.5 Combination of Previously Dredged and Un-dredged Sand from both OCS and State Sand

This is the most environmentally acceptable alternative because it maximizes the opportunity to use sand that has recharged within the previously dredged areas of the Surfside borrow area. It also has the least environmental impacts because it minimizes impacts to previously undredged benthic habitat.

4.0 Environmental Consequences

4.1 Water Quality

Temporary degradation of water quality will occur at both the dredging site (i.e., offshore impacts) and the nourishment site (i.e., onshore impacts) due to re-suspension of silt material. Regarding beach placement impacts, multiple studies have been conducted on past beach nourishment projects to determine the extent and duration of elevated suspended solids levels downcurrent of a dredge's discharge pipe along the placement site. In general, elevated concentrations were limited to within an area 1,300 to 1,650 feet of the discharge pipe in the swash

zone. Given that the beach fill material proposed for this project has a low amount of fine-grained sediment, it is expected that the turbidity plume generated at the placement site would be comparable to those reported in similar projects: concentrated within the swash zone, dissipating between 1,000 to 2,000 feet alongshore; and short term, only lasting several hours.

Regarding offshore impacts from dredging operations, studies of past hopper dredge projects indicate that the extent of the sediment plume is generally limited to between 1,650 to 4,000 feet from the dredge and that elevated turbidity levels are generally short-lived (on the order of an hour or less). The length and shape of the plume depend on the hydrodynamics of the water column and the sediment grain size. Usually, this plume is mostly the result of overflow of the hopper bin and not at the suction end of the dredge's drag arm. Monitoring studies done on the impacts of offshore dredging indicate that sediments suspended within the water column during offshore dredging are generally localized and rapidly dissipate or settle out when dredging ceases (Naqvi and Pullen 1982, Bowen and Marsh 1988, Van Dolah et al. 1992). Given that the dominant substrate at the borrow sites is sand, it is expected that any disturbed sediment would settle rapidly and cause less turbidity and oxygen demand than finer-grained sediments. No appreciable effects on dissolved oxygen, pH, or temperature are anticipated, because the dredged material has low levels of organics and low biological oxygen demand. Additionally, 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. Any resultant water column turbidity would be short term (i.e., present for approximately an hour) and would not be expected to extend more than several thousand feet from the dredging operation. Accordingly, it is anticipated that the project would have only minor water quality impacts at the offshore borrow areas.

The original nourishment project was granted a water quality certification by the South Carolina Department of Health and Environmental Control (SCDHEC) on November 19, 1993. On March 30, 2007, SCDHEC issued another water quality certification with the following conditions:

1. All necessary measures must be taken to prevent oil, tar, trash, debris, and other pollutants from entering the adjacent waters or wetlands during construction.

2. Only clean sand, free of all potential sources of pollution, must be used for beach nourishment.

3. Sand used for the project must consist of appropriate grain sizes to be compatible for beach nourishment.

4. Sand used must be at least 80% sand.

5. The permittee must adhere to any recommendations of the US Fish and Wildlife Service (FWS) and/or the SCDNR to protect any identified threatened and/or endangered species and the habitats of such species in the area of the proposed project.

SCDHEC has temporarily waived the requirement for water quality certification for beach nourishment projects (see Appendix 5); therefore, a new/updated water quality certification is not

needed for this renourishment project. Regardless, USACE is committed to ensuring that all previous conditions will continue to be adhered to during project construction.

4.2 Endangered/Threatened Species

Coordination was previously conducted in compliance with the Endangered Species Act (ESA) with the submission of a Biological Assessment (BA) to the FWS in September, 2006. The FWS Biological Opinion (BO) was received in January 2007. Both documents are present in their entirety in Appendix 7. For this renourishment effort, consultation is ongoing with the FWS. A new BA was recently prepared and submitted to the FWS for this project (Appendix 2). Its purpose is to evaluate new species and habitat listings since the 2007 project; based on the analysis provided in the BA, the following determinations have been made:

- It has been determined that the proposed project is not likely to adversely affect the manatee.
- It has been determined that the proposed project is not likely to adversely affect Kemp's ridley, leatherback, or hawksbill sea turtles.
- It has been determined that the proposed project will have no effect on the shortnose sturgeon.
- It has been determined that the proposed project is not likely to adversely affect the Atlantic sturgeon.
- It has been determined that the proposed project is not likely to adversely affect the piping plover.
- It has been determined that the proposed project is not likely to adversely affect the rufa red knot.
- It has been determined that the proposed project is not likely to adversely affect seabeach amaranth.
- It has been determined that the proposed project will have no effect on critical habitat for the wintering piping plover.
- It has been determined that the proposed project may adversely affect the nesting loggerhead and green sea turtle and any resulting hatchlings.
- It has been determined that the proposed project will have no effect on critical habitat for the loggerhead sea turtle.
- It has been determined that the proposed project will not adversely modify critical habitat for the North Atlantic right whale.

The following protective measures were presented in the report. Please see Appendix 2 for more details.

West Indian Manatee

When work occurs during the manatee migration period, personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing manatees. The Contractor may be held responsible for any manatee harmed, harassed, or killed as a result of vessel collisions or construction activities. Failure of the Contractor to follow these specifications is a violation of the ESA and could result in prosecution of the Contractor under the ESA or the Marine Mammals Protection Act (MMPA). The standard manatee conditions will be implemented from 15 April to 31 October, if construction takes place during these months. The Contractor will be instructed to take necessary precautions to avoid any contact with manatees. If manatees are sighted within 100 yards of the dredging area, all appropriate precautions will be implemented to insure protection of the manatee. The Contractor will stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than 100 yards of the manatee. Operation of equipment closer than 50 feet to a manatee will necessitate immediate shutdown of that equipment.

North Atlantic Right Whale

Since the construction is anticipated to be scheduled during the right whale migration period, personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing right whales. The Contractor may be held responsible for any whale harmed, harassed, or killed as a result of vessel collisions or construction activities. Failure of the Contractor to follow these specifications is a violation of the ESA and could result in prosecution of the Contractor under the ESA or the MMPA. The time when most right whale sightings occur in the area is December, January, and February. The Contractor will be instructed to take necessary precautions to avoid any contact with whales. If whales are sighted within 1,000 feet of the borrow area, all appropriate precautions will be implemented to ensure protection of the whale. In addition, the Contractor will stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than this distance.

Sea Turtles

If work occurs during the sea turtle nesting period, in order to minimize impacts to nesting sea turtles and emerging hatchlings, a beach monitoring and nest relocation program for sea turtles will be implemented. This program will include daily patrols of sand placement areas at sunrise, relocation of any nests laid in areas to be impacted by sand placement, and monitoring of hatching success of the relocated nests. Sea turtle nests will be relocated to an area suitable to both the FWS and the SCDNR. The USACE will perform any necessary maintenance of beach profile (tilling and shaping or knocking down escarpments) during construction and prior to each nesting season.

During construction of this project, staging areas for construction equipment will be located off the beach to the maximum extent practicable. 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 dredge pipes that are placed on the beach will be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes will be off the beach to the maximum extent possible. Temporary storage of pipes

on the beach will be in such a manner so as to impact the least amount of nesting habitat and will likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline will be recommended as the method of storage).

During construction of this project, all on-beach lighting associated with the project will be limited to the immediate area of active construction only. Such lighting will be shielded, low-pressure sodium vapor lights to minimize illumination of the nesting beach and nearshore waters. Red filters will be placed over vehicle headlights (i.e., bulldozers, front end loaders). Lighting on offshore equipment will be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all US Coast Guard and Occupational Safety and Health Administration (OSHA) requirements. Shielded, low pressure sodium vapor lights will be highly recommended for lights on any offshore equipment that cannot be eliminated.

New coordination with the National Marine Fisheries Service (NMFS) with regard to marine species protected under the ESA was not conducted due to the existence of a Regional Biological Opinion (RBO) for the South Atlantic Region. The USACE previously determined that the use of a hopper dredge may adversely affect sea turtles. NMFS has concurred with this determination in their 1995/1997 RBO and July 30, 2009, concurrence, and determined that take resulting from hopper dredging activity will not jeopardize the continued existence of any sea turtle species. The USACE notified NMFS of its intent to utilize the RBO for this proposed renourishment by letter and email on April 11, 2016. The RBO addresses dredging operations and provides guidance and requirements on a state by state basis. The RBO and the terms and conditions outlined within it can be viewed via the internet at: http://155.82.164.219/Applications/OPJ/A067_DQM/ODESS/ODESS_Public/documents/1997SADBO.pdf.

The USACE determination is that the proposed project will either have “no effect” or “is not likely to adversely affect” all listed species except for the loggerhead and green sea turtle. Because the beach nourishment work may impact nesting sea turtles or emerging hatchlings, we determined that the proposed project “may effect and is likely to adversely affect” the loggerhead sea turtle; however, we do not believe the proposed project will jeopardize the species.

4.3 Coastal Zone Consistency (CZC)

The existing Grand Strand Storm Damage Reduction Project satisfied the restrictions and guidelines of the South Carolina Coastal Management Program pursuant to the Coastal Zone Management Act (CZMA). The 2007 project also received a Coastal Zone Consistency Determination on April 24, 2006. Since it has been approximately ten years since the last coordination with the agency (SCDHEC-OCRM) that enforces the provisions of CZMA in South Carolina, a letter of intent, the CZC checklist, and this EA were sent to SCDHEC-OCRM to request CZC (Appendix 3).

4.4 Coastal Barrier Resources System (CBRS)

There are no CBRS units near the project area. SC-03 (Huntington Beach) is the closest and is approximately two miles south of the south end of the proposed project.

4.5 Essential Fish Habitat (EFH)

An EFH Assessment was completed for the 2007 project as required by the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended through 1996 (Magnuson-Stevens Act). The objectives of this EFH Assessment were to describe how the actions of the USACE, their non-Federal sponsors, and BOEM potentially influence the quality of habitat designated by NMFS and the South Atlantic Fisheries Management Council (SAFMC). The EFH Assessment describes fish, coral, and benthic species common to the sandy borrow and nearshore areas and hardbottom habitats and discusses the potential impacts of the proposed action on those species. The EFH Assessment and the Conservation Recommendations from NMFS are contained in Appendix 7. NMFS responded to the EFH Assessment by letter stating that:

> *Beaches and nearshore areas along the Grand Strand provide habitat for numerous species that serve as prey for finfish and crustaceans that have economic and recreational importance, such as southern flounder (*Paralichthys lethostigma*), Florida pompano (*Trachinotus carolinus*), summer flounder (*Paralichthys dentatus*), red drum (*Sciaenops ocellatus*), spot (*Leiostomus xanthurus*), bluefish (*Pomatomus saltatrix*), white shrimp (*Litopenaeus setiferus*), and blue crab (*Callinectes sapidus*). Sea turtles also are common in the nearshore coastal waters of the project area, and the beach is used by sea turtles, including the threatened loggerhead sea turtle (*Caretta caretta*), for nesting. The influx of transient fauna and heightened biological activity in the late spring and summer through late fall necessitates certain work limitations if significant harm to living marine resources is to be avoided. Ideally, beach nourishment should be restricted to winter months when possible.*
>
> *The South Atlantic Fishery Management Council (SAFMC) provides detailed information on types and locations of EFH in a comprehensive amendment that applies to all fishery management plans prepared by the SAFMC. The amendment was prepared in 1998 as required by the Magnuson-Stevens Act. SAFMC has identified the surf zone of ocean beaches as EFH for sub adult and adult red drum. As juvenile red drum develop into sub adults and adults, they utilize and become concentrated in progressively higher salinity estuarine and beachfront surf zones where their prey is most abundant. Areas of hard bottom habitat also are present within the project area, and the SAFMC has designated hard bottom habitat as EFH for snapper-grouper species and coastal migratory pelagic species. The importance of hard bottom habitat is also addressed in the SAFMC's policy (dated March 2003) on protecting EFH from large-scale coastal engineering projects, which stresses the importance of examining cumulative impacts to this EFH.*

Adjacent to the project area, there is a designated EFH - Habitat Area of Particular Concern (HAPC) known as Hurl Rocks. Hurl Rocks was designated as an HAPC after the initial construction of the Grand Strand Project.

In 2007, NMFS concluded that adverse impacts were likely to result from the nourishment project and provided 4 conservation recommendations. USACE responded to these

recommendations with the following measures to avoid, mitigate or offset adverse impacts of the project:

1. *"To the extent practicable, construction activities will take place in seasons of limited biological activity. Currently, the plan is to begin construction in the month of November, 2007. This date was chosen in an attempt to avoid seasonal activity of certain biological resources. Constraints associated with the cost and time of building this project make it impractical to perform construction only during the December to April window as recommended.*
2. *No-dredging buffers of at least 600 feet have been prescribed around all hard bottom areas within the defined borrow sites. This prohibition extends to mooring, anchoring, laying of submerged pipeline, and lowering of spuds within the exclusion zone. In addition, all areas of the defined Essential Fish Habitat-Habitat Area of Particular Concern known as Hurl Rocks have been given the same protections.*
3. *The Charleston District has gone to great lengths to identify suitable borrow material that is compatible with the existing beach material. Methods employed to identify compatible sands include side scan sonar and vibra-core borings. In addition, it has been stipulated that unsuitable material (clay, mud, and debris) that is inadvertently dredged will be removed from the disposal area and disposed of in an approved land fill.*
4. *As your review has affirmed, the Charleston District has gone to significant lengths and expense to identify and document impacts to EFH before, during, and after the nourishment cycle. After the final report by the South Carolina Department of Natural Resources, if it is determined that significant impacts to EFH have occurred as a result of this project, the Charleston District will consult with NMFS to determine the appropriate action."*

A four-year study by the CCU Center for Marine and Wetland Studies in association with the SCDNR and USACE concluded that offshore habitats had not been significantly impacted by dredging conducted for the initial beach fill (McCoy et al., 2011). The study found that while some areas of hard bottom experienced deposition and burial, other hard bottom habitats were uncovered due to erosion of their surface sediments. Consequently, the dredging and placement activities were found to have only marginally greater impacts on hard bottom habitat than the system's own natural variability (Ojeda et. al, 2001).

The Grand Strand hosts one of the few significant aggregations of nearshore hard bottom habitats in South Carolina, portions of which are considered EFH (e.g., Hurl Rocks), as defined in the Magnuson-Stevens Fishery Conservation and Management Act. Monitoring associated with the 2007/2008 renourishment project was conducted one year pre-nourishment and one year post-nourishment to assess impacts of migrating beach fill on habitat-structuring invertebrate communities in these hard bottom areas (Burgess et al., 2011). Twenty-one sites were established in two parallel strata extending from approximately one kilometer (km) north of the Myrtle Beach State Park to approximately five km south of the park using a Before-After-Impact-Reference design. Stations directly adjacent to the unnourished park shoreline were designated as "reference," and

stations along the nourished beach north and south of the park were designated as "impact." Each station was equipped with a biological monitoring array containing eight settlement tiles and four hard bottom monitoring transects. The tiles were deployed on a steel frame in the fall of 2007 and replaced every six or twleve months through the fall of 2009. The tiles were retrieved and analyzed for total surface cover of various sessile invertebrate taxa. At each site, four 5.0-meter transects were video surveyed, and sessile fauna in the video were identified to the lowest practical taxonomic or structural/functional group. Invertebrate communities on recruitment tiles were dominated by early-successional, fast-growing taxa such as tubiculous polychaetes, bryozoans, hydroids, amphipods, and bivalves.

Both recruitment and video data were analyzed using Analysis of Variance (ANOVA) to determine whether invertebrate recruitment at impact and reference areas responded differently between the before and after time periods. The amount of total surface cover on recruitment tiles was greater after nourishment than before nourishment and was generally greater overall at stations adjacent to nourished sections of the beach. Several specific taxa present in some recruitment tile sub-habitats (e.g., top versus bottom surface, high versus low elevation) showed a pattern of differential recruitment success between the reference and impact areas following nourishment; however, these responses were not consistent across taxa or sub-habitats. Invertebrate communities on natural hard bottoms were dominated by slow-growing, late-successional octocorals and sponges. All of these taxa showed a tendency to increase in density at reference areas following nourishment while decreasing or remaining constant at the impact areas. None of these changes were statistically significant, likely due to very strong spatial and temporal variability in hard bottom communities in the region. Overall, there was little statistically significant evidence to suggest that invertebrate recruitment or community composition were impacted within one year of the completion of nourishment. The SCDNR monitoring report suggested that future efforts to examine the impacts of nourishment on the hard bottoms of the Grand Strand should reduce study complexity (types and configurations of deployments) and increase sample size to improve impact detection.

Since the proposed project is similar in scope and impacts as the 2007 project and based on post-project monitoring, no significant changes to EFH have occurred since the last project, USACE considers the EFH conservation recommendations to still be valid.

4.6 Archeological and Cultural Resources

Federal undertakings will comply with the Archaeological and Historical Preservation Act of 1974 (16 USC 469-469c), the Abandoned Shipwreck Act of 1987 (PL 100-298; 43 USC 2101- 2106), The National Historic Preservation Act of 1966, as amended (54 USC 2106) and the Advisory Council on Historic Preservation's implementing regulations 36 CFR Part 800 (protection of Historic Properties). Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to provide the Advisory Council on Historic Preservation with a reasonable opportunity to comment on a Federal undertaking. The placement of sand on beaches and the use of sand from offshore borrow areas are typically subjected to cultural resources investigations in order to locate potentially significant resources, including historic properties for purposes of NHPA Section 106 review. Previous investigations revealed that there are no historical or archaeological resources within the beach

nourishment zone which would be affected by the placement and movement of sand. In 2006, an archaeological survey was completed for the Surfside borrow area and one potentially significant feature was identified. The anomaly will be avoided with a minimum buffer of 200 feet. In a letter dated April 19, 2007, the State Historic Preservation Officer (SHPO) concurred with this approach and provided a NHPA Section 106 concurrence, which is still considered valid. If any new areas will be dredged, archaeological investigations will occur and the SHPO will be consulted for compliance with Section 106 of the NHPA. Additionally, the contractor will be required to perform side scan sonar and magnetometer surveys prior to construction and establishment of a pipeline corridor placement.

4.7 Beach Benthic Impacts

Due to the handling and pumping activities, the dredged sand would likely be devoid of live benthos. As a result, the recovery of benthos at the placement area would rely on immigration of adult organisms from adjacent undisturbed areas, as well as larval colonization from the water column. However, raising the elevation of the existing beach from intertidal to dry beach would effectively limit the landward extent of water-driven organismal transport. In the longer term, the re-establishment of an elevated beach berm would reduce the extent of the more biologically diverse intertidal zone.

Recovery time of benthos within the surf zone is expected to be more rapid than the offshore borrow area given the dynamic conditions within the nearshore and surf zones. Studies have shown that the recovery time for benthos ranged from approximately two to six months when there is a good match between the fill material and the natural beach sediment. In the case of the proposed project, the fill material would not be substantially different (though slightly coarser) than native material; therefore, it is expected that recovery time would be similar to the two to six month estimate.

In a monitoring program performed along with the 2007 nourishment project (Bergquist et al., 2011a), the Surfside/Garden City section was evaluated to determine the impact on, and recovery of, sediment characteristics and a dominant beach indicator species, the ghost crab *Ocypode quadrata*. The sediment characteristics and ghost crab population densities and size structures were studied at two stations representing nourished beach bounded by two stations representing non-nourished reference beach using a Before-After-Control-Impact (BACI) study design. Sediments became coarser and shellier in both nourished and reference areas following renourishment, suggesting the changes were due to background changes in sediment characteristics rather than to the placement of beach fill. All sediment characteristics post-nourishment were well within the range that is typical for Grand Strand beaches further indicating either a good match of borrow area sediments to pre-nourishment beach sediment or recovery of beach sediment to pre-nourishment conditions within three months. Overall densities of ghost crabs as well as adult, juvenile, and new juvenile size classes indicated few differences in the responses of nourished and reference areas following nourishment. The data collected here indicated that factors other than renouishment may have been more important in determining changes in ghost crab densities over the course of this study. Two recommendations were suggested based on study outcomes: 1) maintain the careful matching of borrow sediments to the receiving beach, and 2) focus future environmental monitoring

efforts on addressing the consequences of the sediment and/or biological changes detected in this and similar monitoring programs. Results of this monitoring effort confirm that impacts of beach nourishment on invertebrate species is short term and relatively minor, especially for ghost crab populations.

4.8 Borrow Area Benthic Impacts

Understanding the impacts and recovery of borrow sites is important in the long term management of offshore sand resources. An impact analysis was conducted as part of the 2007 project in order to address potential changes that may occur in the project area resulting from excavating material from within the identified borrow areas. This analysis focused on impacts to coastal processes by using the steadystate spectral wave model (STWAVE), and concluded that the wave height changes and effects on coastal processes were not significant.

Dredging of sediments from borrow areas, whether in state waters or within the OCS, will remove benthic marine invertebrates. Polychaetes, amphipods, oliogchaetes, pelecycpods, and decapods are major infaunal assemblages inhabiting the borrow areas. Sessile benthic organisms may be buried by resuspended and redeposited sandy sediments. Hardbottom areas in and adjacent to the borrow areas, that support complex communities described above, have been identified by surveys performed in 2005 and will be avoided.

Recovery of infaunal communities after dredging has been shown to occur through larval transport of recruits from adjacent areas, along with juvenile and adult settlement, but can vary based on several factors including seasonality, habitat type, size of disturbance, and species' life history characteristics (e.g., larval development mode, sediment depth distribution). Although studies have shown that while recovery rates are variable, the abundance and diversity of benthic infauna within the borrow areas frequently returns to pre-nourishment levels relatively quickly, often within post-dredging recovery periods of 1 to 2 years. Most studies indicate that dredging had only temporary effects on the infaunal community, and in some studies, differences in infaunal communities were attributed to seasonal variability or to hurricanes rather than to dredging.

In a study performed following the 2007/2008 nourishment project, the Cane South and Little River borrow areas were evaluated for both surficial sediment composition and benthic community recovery (Bergquist et al., 2011b). The Surfside borrow area was not studied due to limited resources at the time, but the results are presented here because the locations of the borrow areas are similar in physical and biological environments and are also within the Long Bay area of South Carolina. The study used a BACI design in order to document the changes in two of the borrow areas used for the renourishment project relative to a non-impacted control site. All areas were sampled multiple times before and after dredging in order to assess the recovery of the resources. Samples were analyzed for percent sand, silt, clay, $CaCO_3$, organic matter content, and sand grain size distribution. The remainder of each sample was analyzed for the benthic community structure. Each benthic infauna sample was sieved, preserved, and identified to the lowest taxonomic level under microscopes.

The borrow areas responded differently to dredging. The Little River borrow area experienced minor changes in sediment composition. The Cane South borrow area saw a significant increase in silt/clay content, sand phi size, and organic matter after dredging relative to the reference area. After twelve months post-dredging, the differences between the reference area and the borrow area were no longer significant. The changes in sediment composition at both areas were similar to those changes that occurred during the 1996 initial nourishment project. In 1996, Cane South was dredged with a pipeline cutterhead dredge. Jutte et al. (1999) hypothesized that the cutterhead dredge excavates deeper holes which leaves little native surficial sediments and inhibits recovery. A hopper dredge excavates shallow cuts and can leave ridges that can facilitate quicker recovery of the borrow area. The 2007 project used a hopper dredge at all borrow areas which suggests that other factors could play into borrow area recovery, such as season, local sediment characteristics, oceanographic conditions, etc. The changes in sediment characteristics in both borrow areas were smaller than many other southeastern US borrow areas (Bergquist et al. 2011b). This could have to do with the lack of a large estuarine source of fine material. The sediment characteristics measured in the Grand Strand borrow areas during the current study generally fell within the range of values typical of offshore sand deposits in the region (Bergquist et al. 2011b, Jutte et al 1999, 2001a,b). The percent sand in all borrow areas remained greater than 10% at all post-dredging sampling events.

4.9 Hazardous, Toxic and Radioactive Waste (HTRW)

There are currently no known HTRW producers adjacent to the project site or any entity that discharges toxic effluent nearby. Since the project has been constructed multiple times, there is minimal risk of encountering HTRW on the beach face or in the borrow area.

4.10 Air, Noise, and Aesthetics

These issues were addressed in the 1993 EIS (Appendix 7) and while the findings are still considered valid, they are re-analyzed here to update the documentation. Temporary increases in exhaust emissions from construction equipment are expected during the construction of the proposed project at Garden City/Surfside Beach; however, the pollution produced would be similar to that produced by other large pieces of machinery and would be readily dispersed. All dredges must comply with the applicable US Environmental Protection Agency (EPA) standards. The air quality in Horry and Georgetown Counties, South Carolina, is designated as an attainment area. A conformity determination is not required for this project because of the following reasons: 1) it is located in an attainment area; 2) the direct and indirect emissions from the project fall below the prescribed de minimus levels; and 3) the ambient air quality for the impacted Counties has been determined to be in compliance with the National Ambient Air Quality Standards.

Noise in the outside environment associated with beach construction activities would be expected to minimally exceed normal ambient noise in the project area. However, construction noise would be attenuated by background sounds from wind and surf. In-water noise would be expected in association with the dredging activities. Specifically, noise associated with dredging could occur from (1) ship/machinery noise—noise associated with onboard machinery and propeller and thruster

noise, (2) pump noise—noise associated with pump driving the suction through the pipe, (3) collection noise—noise associated with the operation and collection of material on the sea floor, (4) deposition noise—noise associated with the placement of the material within the barge or hopper, and (5) transport noise—noise associated with transport of material up the suction pipe.

Reine et al. (2012) found that the majority of underwater sounds produced by hydraulic cutterhead dredging operations were of relatively low frequency (< 1000 Hz). Their study was conducted during rock fragmentation and therefore represented a worst case scenario. The source level was estimated to be between 170 and 175 dB re 1uPa@1-m. These sound levels decreased with increasing distance from the source. The authors determined that the area of influence was limited to less than 100 m from the source. At 100 m, received levels were less than 150 dB re 1uPa rms. NMFS is developing new guidelines for determining sound pressure level thresholds for fish and marine mammals. However, based on existing studies, NMFS' current thresholds for determining impacts to marine mammals is between 180 and 190 dB re 1 uPa for potential injury to cetaceans and pinnipeds respectively, and 160 dB re 1 uPa for behavioral disturbance/harassment from an impulsive noise source, and 120 dB re 1 uPa from a continuous source. Reine et al. (2012) found that the 120 dB re 1uPa proposed threshold was exceeded by ambient noises in their study area. Based on reviews by Popper et al. (2006) and Southall et al. (2007), it is unlikely that underwater sound from conventional dredging operations can cause physical injury to fish species.

Aesthetics will not be impacted because the project is the continuation of a long term storm damage reduction project and is only designed to rebuild the originally constructed beach, so the presence of construction equipment both offshore and on the beach would be temporary.

4.11 Irreversible and Irretrievable Commitments

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. Other than the use of fuel, equipment and supplies, there would be no irreversible commitment of resources.

4.12 Cumulative Impacts

Cumulative impacts were fully evaluated in the 2007 EA. The following paragraph summarizes the conclusion of that impact assessment:

> *"A relatively small segment of the South Carolina coastline and nearshore, including the borrow areas, are likely to be affected by the proposed action. The impact area would not increase significantly since portions of the areas proposed for dredging and fill have previously been dredged or had sand deposition. On a statewide scale, the existing and approved placement sites are well distributed in northern, central and southern parts of the state. It is unlikely that cumulative impacts from space crowded perturbation are occurring or will occur due to the construction of this project. The analysis suggests that the potential impact area from the proposed and existing actions is small relative to the area of available similar habitat on a vicinity, statewide, and basin basis. Also, for some species, such as sea turtles and seabeach amaranth, beach projects may provide additional habitat or improve*

existing habitat by replacing beach material lost to erosion. Invertebrates are expected to recover in and adjacent to the borrow areas."

4.13 Environmental Monitoring

For the 2007/2008 project, coordination with NMFS and SCDNR resulted in an agreement to monitor biological recovery and hard-bottom habitat impacts for two years post-construction. The purpose of this sampling and analysis was threefold:

- Document changes in beach profile and determine the ecological impacts on and recovery rates of sediment characteristics and burrowing ghost crabs on nourished beaches.
- Determine the impacts on nearshore hard-bottom habitats and biological recruitment to those habitats.
- Document the impacts on and recovery of native bathymetry, sediment characteristics, and benthic infaunal communities in sand borrow areas

USACE will arrange a meeting with the agencies to discuss the future of the monitoring efforts along the Myrtle Beach project, and in this case, Reach 3.

5.0 Conclusions

The proposed action does not constitute a major Federal action significantly affecting the quality of the human environment; therefore, the preparation of an Environmental Impact Statement (EIS) is not required.

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Appendix 1

Garden City / Surfside Beach Storm Damage Reduction Project Maps

Appendix 2

Threatened and Endangered Species Coordination

Appendix 3

Coastal Zone Consistency Coordination

Appendix 4

Geotechnical Survey of Surfside Borrow Area

Coming Soon (June 2016)

Will be available at Final EA release

Appendix 5

Water Quality Certification

SCDHEC – Waiver Memo

Appendix 6

Scoping Letters and

Resource Agency and Public Comment

Appendix 7

Previous Supporting Documentation

2007 Environmental Assessment and Appendices