

Town of Southern Shores Shoreline Protection Project

The Town of Southern Shores is in the early stages of assessing long term needs to sustain the beaches that support a significant portion of their local economy and maintains the tax base of the Town. Infrastructure protection, storm damage mitigation and rapid recovery from storm events are important considerations. During initial public discussions regarding the assessment of the Town’s beaches, an erosion hot spot spanning approximately 1,500 ft. along the southern most portion of the Town was identified.

Recently, three other beach towns in Dare County (Kill Devil Hills, Kitty Hawk, and Duck) have obtained permits and authorizations to construct beach nourishment projects. These three projects are scheduled to begin construction in May, 2017 (Figure 1). In an attempt to address the immediate erosion hot spot identified along the Town’s southern boundary, while evaluating long-term shoreline management needs, the Town of Southern Shores is seeking their own permits and authorizations to provide a one-time beach nourishment project that would include sand placement along the most critically eroded portion of the Town’s shoreline. This project would coincide with the construction of the other three projects.

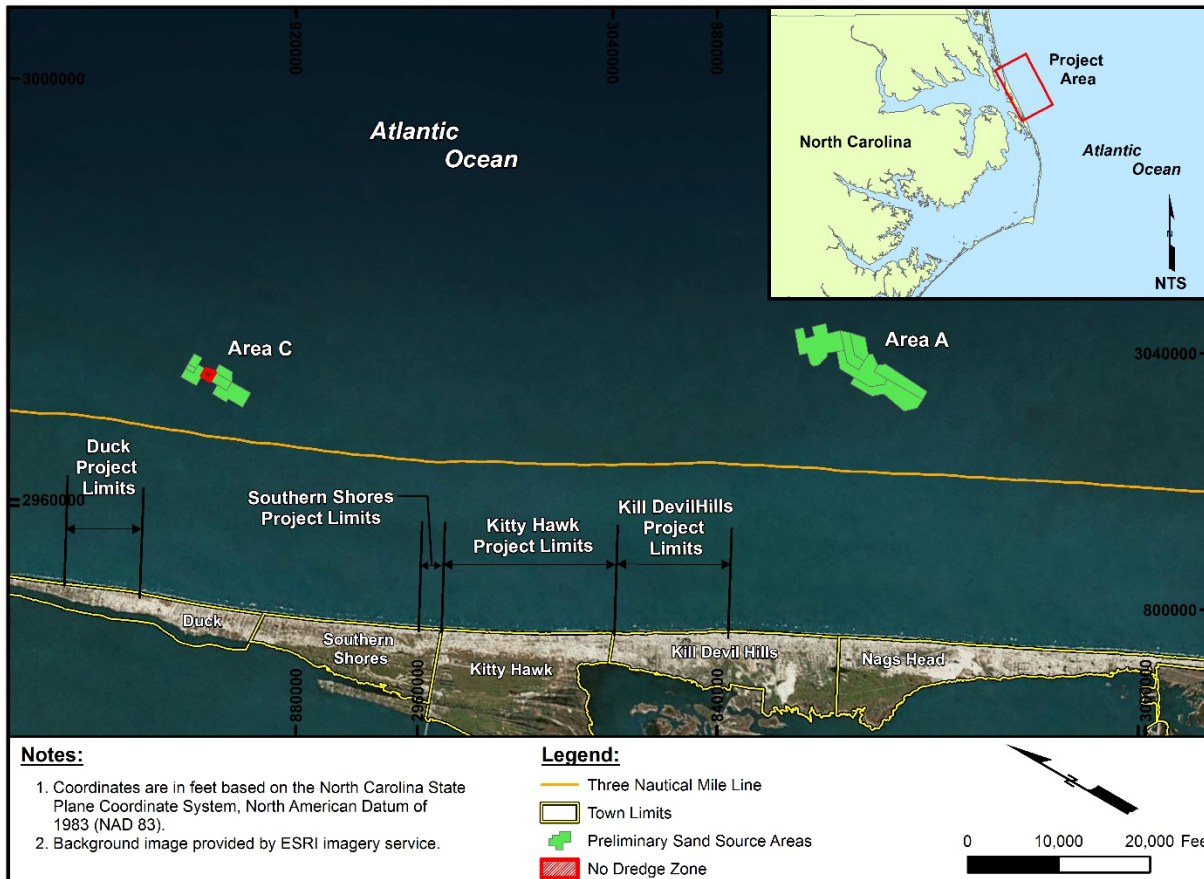


Figure 1. Location of the proposed Duck, Kitty Hawk, Kill Devil Hills, and Southern Shores Shoreline Protection Projects.

Town of Southern Shores Shore Protection Project
 Coastal Planning & Engineering of North Carolina, Inc.

The main placement area of the proposed project would begin at the Kitty Hawk/Southern Shores border at baseline station 0+00 and extend 1,500 feet. The proposed construction template consists of a berm ranging from approximately 100 to 160 feet wide, at an elevation of +6 feet NAVD88. A 1,000 foot taper section would tie into the main fill area and terminate at baseline station -25+00 (Figure 2). The amount of material required to construct the main fill template (Station 0+00 to -15+00) is approximately 80,000 cy. Actual dredge volume could be up to 20% higher than the fill volume, dependent upon the loss rate. Using a conservative estimate of 20% loss rate, the total volume dredged from the borrow area would be approximately 96,000 cy.

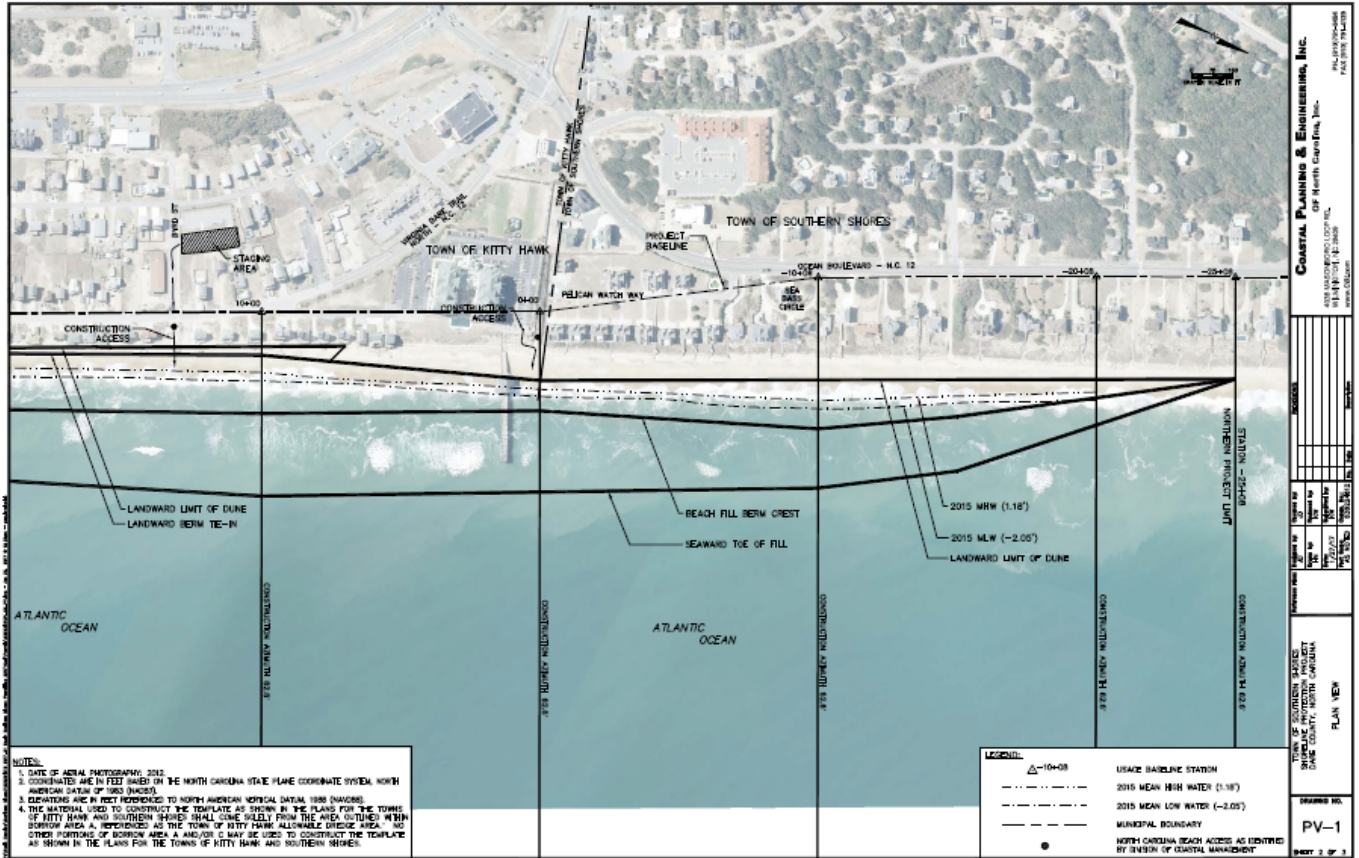


Figure 2. Plan view drawing of the proposed Southern Shores Shoreline Protection Project.

The beach quality sand will be dredged from Outer Continental Shelf borrow areas using a self-contained ocean-certified hopper dredge, a cutterhead pipeline dredge, or a combination of the two. The borrow area utilized for the Southern Shores Shoreline Protection Project is known as Borrow Area A. This borrow area is located entirely within federal waters, i.e. seaward of the Three Nautical Mile Line, placing them under the jurisdiction of BOEM (Figure 1). Dare County has secured a lease from BOEM for the extraction of up to 4,825,000 cubic yards of material to be used for the aforementioned three beach town projects which includes Borrow Area A and Borrow Area C (which will be used for the Town of Duck only). The lease will be modified as needed such that the volumetric limitations of the lease will allow for the inclusion of this proposed project.

Construction Methods

For the use of a cutterhead dredge, sand will be transported from the borrow area to the beach as a slurry via pipeline; use of a hopper dredge would involve transport to a nearshore pump-out location, and subsequent pumping to the beach via pipeline. A sand dike will be constructed on the seaward side of the discharge area. The sand slurry will be discharged behind the temporary dike, and excess water will be directed parallel to the shoreline and around the edge of the dike. Once discharged onto the beach, the material will be shaped and graded using loaders, dozers, and other earth moving equipment. The staging area for this project will be located within the eastern portion of the public parking lot at Byrd Street and the associated construction access includes the portion of Byrd Street extending from the parking lot to the beach. No impervious surfaces or alterations to the dunes will be required for use of this area. A construction access will also be located just north of the Kitty Hawk pier, extending from the public parking lot at the Hilton Garden Inn onto the beach.

Borrow Areas and Sediment Analysis

Coastal Planning & Engineering, Inc. of North Carolina (CPE-NC) conducted a comprehensive sand search using a systematic methodology involving three sequential phases of investigation. Phase I involves a comprehensive desktop study that examined previously collected information within the geologic context of the investigation area in order to identify features with the highest potential of containing project compatible sand. Results of jetprobe investigations of several shoal features offshore Dare County by CPE-NC in 2013 as part of a feasibility study for the Town of Kill Devil Hills were also considered during this phase. Surveying, sampling, and analysis of the Kitty Hawk native beach was also conducted during Phase I. In keeping with the requirements set forth in the North Carolina State Sediment Criteria, CPE-NC performed shore-perpendicular topographic and bathymetric surveys of the native beach to determine the beach profile. The locations of the profiles surveyed by CPE-NC were based off a data set previously collected by the US Army Corps of Engineers, Wilmington District. Each profile was surveyed from a point 150 ft. landward of the vegetation line seaward out to an elevation no less than -20 ft. NAVD88. Of the profiles surveyed, characterization of the Kitty Hawk native beach was generated from samples collected along five generally evenly spaced profiles within the Kitty Hawk project area: 0+00, 50+00, 75+00, 110+00 and 160+00. As required by the State Sediment Criteria, samples were taken at 13 locations along each of the 5 sampling profiles, including: the dune, toe of dune, mid-berm, berm crest, mean high water, mean tide level, mean low water, trough, bar crest and at -12.5, -15.0, -17.5 and -20.0. In total, CPE-NC collected a total of 65 samples within the proposed project area in Kitty Hawk. The composite summary and grain size analysis results are displayed in Table 1 of this project narrative.

Additionally, CPE-NC conducted a survey of 50,000 square foot portion of the Kitty Hawk project area, from a point approximately 545 ft. north to 80 ft. south of Bleriot Street, to determine the total number of clasts greater than 3 inches in diameter. A total of 403 clasts greater than 3 inches in diameter were identified during the survey.

Information gathered during the Phase I archival literature studies regarding the geological setting of the project area give no indication that hardbottom habitats are present within or in the vicinity of the borrow areas. Additionally, previous geotechnical and geophysical investigations

Town of Southern Shores Shore Protection Project
Coastal Planning & Engineering of North Carolina, Inc.

conducted by the USACE have not indicated the presence of hardbottoms in the area. Finally, analysis of the sidescan sonar data acquired by CPE-NC for the present project indicated no presence of hardbottom habitats or consolidated rock exposures or outcroppings within or in the vicinity of the borrow areas.

Phase II investigations involved reconnaissance level geophysical surveys in order to 1) define the extent of sediment layers identified during Phase I research of past jetprobe data and historic vibracore and surface sediment data; 2) develop a vibracore plan to be implemented during Phase III investigations, and 3) identify potential environmental or cultural resources for avoidance during Phase III vibracore investigations.

Results of the geotechnical investigations, including geophysical (sonar) surveys, vibracores, hydrographic surveys, archaeological resource surveys and sand compatibility analyses, were performed to develop the final borrow area designs. Design considerations for the proposed borrow areas included:

- Construction of the project may be accomplished using a hopper or cutterhead dredge
- Location of sufficient sand to construct the three proposed beach nourishment projects for the Towns of Duck, Kitty Hawk, Kill Devil Hills
- Beach compatible sand with similar mean grain size and sorting of the project beaches
- Avoidance of environmentally sensitive areas such as hardbottom, seagrass beds, etc.
- Avoidance of potentially significant cultural resources
- Avoidance of nearshore impacts due to wave refraction over borrow areas

A summary of the sand compatibility analyses for each area is displayed in Table 1, and indicates these areas contain material deemed compliant with the Kitty Hawk native beach according to standards set forth in the NC State Sediment Criteria (15A NCAC 07H.0312). There are no State Standard Allowances for mean grain size or Munsell color, however, these values are listed in the table for comparison between native beach and borrow areas.

Table 1. Results of the compatibility analyses performed for Borrow Area A and C. Allowable limits for the Town of Kitty Hawk native beach are defined by Rule 15A NCAC 07H.0312.

Parameter	Kitty Hawk Native Beach	Allowable Limits	Borrow Area A	Borrow Area C
Wet/Dry Munsell Color	5/7	n/a	5/6	5/6
Mean Grain Size (mm)	0.38	n/a	0.36	0.27
Sorting (Phi)	1.41	n/a	0.90	1.09
Silt (%) (<0.0625mm)	0.94	5.94	0.83	1.59
Granular (%) (2mm < and < 4.76mm)	6.38	11.38	1.48	2.05
Gravel (%) (>4.76mm)	1.64	6.64	0.52	1.07
Carbonate	2.0	17.0	1.0	7.0

To determine the projects effects on potentially significant submerged cultural resources, Tidewater Atlantic Research (TAR) carried out a background literature review and supervised a cultural resource investigation of the proposed borrow area. The cultural resource report compiled by TAR is provided in Appendix B. A registered archaeologist from TAR identified 9 magnetic anomalies in the vicinity of Area A, 4 of which were considered potentially significant (Appendix A, sheet 26). In area C, there were 65 magnetic anomalies, 25 of which were considered potentially significant (Appendix A, sheet 30). As a result, three buffer areas were established within Area A – two are located within the borrow area and one is located outside the western perimeter (Appendix A, sheet 26). Likewise, 14 buffers were established in the vicinity of Area C, five of which are located within or partially within the borrow area. These areas will be avoided during dredging.

Conservation Measures

The same conservation measures described in the NEPA documents and Batched Biological Opinions for the three Dare County beach towns will apply to this proposed project at Southern Shores as well.

Should hopper dredging be utilized, the proposed project will employ relocation trawling as a means to reduce the potential for entrainment of protected species, such as sea turtles and Atlantic sturgeon. The protocols and techniques of relocation trawling were researched and developed by the USACE, and have become a standard practice for reducing lethal sea turtle takes during dredging projects. Two types of trawls are used during hopper dredging projects. Sea turtle abundance trawling is employed several days before commencement of dredging activity, and is used to determine the abundance of sea turtles in the area. Relocation trawling will be performed during active hopper dredging or in coordination with the NMFS. Essentially, this method employs a capture-relocation technique, and is targeted at the active dredging site within the borrow area. The distance covered by each tow may vary as dictated by large vessel traffic in the area, or by the size and configuration of the borrow site. A separate vessel, usually a shrimp trawler, deploys a trawling net ahead of the approaching dredge to remove sea turtles from the dredge's path. Typically, trawlers tow two specially designed 60-foot trawl nets in the vicinity of the dredge on a 12 or 24 hour schedule. The position at the beginning of each tow is determined from GPS positioning equipment, and tow speed is recorded at the approximate midpoint of each tow. Abundance trawling will be employed 5 days prior to the commencement of hopper dredging if SST is above 10°C, to determine relative abundance of sea turtles in the area. If 1 turtle is captured during preliminary abundance trawling, then relocation trawling shall be employed during the remainder of the dredging operation. If no turtles are captured during abundance trawling, relocation trawling shall not be required and dredging may proceed. Water temperature measurements are also taken twice per day, and weather conditions (air temperature, wind velocity and direction, sea state, wave height, precipitation) are recorded by instrumentation and visual observations aboard the trawler. If relocation trawling is implemented, standard relocation trawling conditions will be observed as set forth by NMFS including specification for trawl time, handling, holding conditions, take and release, any tagging, etc.

In addition to relocation trawling, other measures will be implemented to reduce the threat of takes during hopper or cutterhead dredging. These include use of a turtle deflector on the hopper

Town of Southern Shores Shore Protection Project
Coastal Planning & Engineering of North Carolina, Inc.

dredge draghead, insuring pumps are disengaged if a drag head or rotating cutterhead is lifted from the bottom, and use of NMFS-certified Protected Species Observers aboard hopper dredges. On the beach, several steps will be taken to minimize construction impacts to nesting and hatchling sea turtles. Artificial lighting used during nighttime construction activities will be angled and/or shielded to reduce deterrence of sea turtle nesting and hatchling disorientation. Sea turtle nest monitoring is also considered an important part of sea turtle conservation, therefore a sea turtle nest monitoring and avoidance/relocation plan will be implemented through coordination with USFWS and NCWRC. Dare County is included in surveys conducted by Network for Endangered Sea Turtles (N.E.S.T), the volunteer organization which performs systematic surveys of the northern Outer Banks from the Virginia border to the southern tip of Nags Head. Surveys are performed throughout the nesting season (May through August), and include daily morning patrols to mark and protect newly laid nests, as well as monitoring during incubation period and emergence. These surveys have been performed since 1981. Because the Southern Shores project proposes nourishment during the summer months (nesting season), monitoring will be needed to identify, and subsequently avoid burial or excavation of, existing nests during construction. This monitoring will be performed by trained individuals knowledgeable of the beach construction operations. In addition to monitoring surveys, nest relocation will be implemented by highly trained individuals and in coordination with the appropriate agencies.