

6.0 MITIGATION OF POTENTIAL EFFECTS

6.1 Introduction

Pursuant to the CEQ regulations for implementing NEPA, environmental impact analyses must consider all relevant and reasonable measures to mitigate the potential adverse effects of proposed actions. The CEQ regulations define mitigation as the incorporation of measures through which the impacts of a proposed action are avoided, minimized, rectified, reduced/eliminated over time, or compensated for through resource replacement. This section describes mitigation measures that would be implemented to reduce the impacts of the proposed action; including those related to the project design, construction scheduling, construction methods, and monitoring efforts to detect and rectify potential post-construction project impacts.

6.1.1 Construction Schedule

All sand placement, dredging, and associated construction activities would adhere to a 16 November to 30 April environmental window. Adherence to the environmental window would avoid or minimize potential impacts on the following resources:

West Indian Manatee

The environmental window would limit dredging operations to periods of cooler water temperatures when manatees are unlikely to occur in Permit Area waters, thereby minimizing the risk of manatee-dredge vessel collisions.

Sea Turtles

The environmental window would limit sand placement operations to periods outside of the 1 May - 15 Nov sea turtle nesting and hatching season in NC, thereby avoiding potential direct construction-related impacts on nesting females and hatchlings.

The environmental window would limit dredging operations to periods of cooler water temperatures when most sea turtles have migrated to warmer waters outside of the Permit Area, thereby minimizing the risk of sea turtle entrainment during dredging operations.

Shorebirds and Colonial Nesting Waterbirds

Sand placement operations would avoid the majority of the shorebird and colonial nesting waterbird breeding season in NC, including the hatching and brood-rearing seasons, thereby minimizing the potential for direct impacts on nesting success and productivity.

Sand placement operations would avoid the peak migration period for the federally listed red knot in NC (May); along with portions of the spring and fall migration periods for the federally listed piping plover and other shorebirds/waterbirds in NC.

Seabeach Amaranth

Sand placement operations would avoid the majority of the seabeach amaranth growing season in NC (May-Frost).

Marine and Estuarine-Dependent Fishes

Sand placement and dredging operations would avoid peak recruitment periods for surf zone fishes in NC.

Dredging operations would avoid peak larval ingress periods for estuarine-dependent fishes, thereby reducing rates of larval entrainment during dredging operations.

Benthic Invertebrate Communities

Sand placement operations would avoid peak spring benthic invertebrate recruitment periods in NC; thereby reducing the duration of direct effects on intertidal beach benthic infaunal communities and related indirect prey-base effects on shorebirds and surf zone fishes.

Dredging operations would avoid peak spring benthic invertebrate recruitment periods in NC; thereby reducing the duration of direct effects on soft bottom benthic invertebrate communities and related indirect prey-base effects on predatory demersal fishes.

6.1.2 Construction Methods

Sand Placement

- Construction equipment would access the beach via existing public access corridors to the maximum extent practicable.
- Temporary storage areas for construction equipment would be located off the beach to the maximum extent practicable.

- Construction staging areas and pipeline routes would be located so as to avoid piping plover critical habitat and other high-value shorebird/waterbird inlet complex habitats to the maximum extent practicable.
- Operations would avoid disturbing dunes to the maximum extent practicable. Any unavoidable dune alterations would be coordinated with NCDCM, and the disturbed areas would be restored to their original grade and position relative to the surveyed normal high water line. Once restored to grade, any impacted dunes would be replanted with native dune grass species during the optimal planting season.
- Pipelines would be equipped with spreaders to reduce effluent discharge velocities during sand-slurry placement. Temporary longitudinal sand dikes would be used to contain and direct the horizontal flow of the discharged sand-slurry along the beach. These measures would maximize sediment retention within the designated placement area, thereby minimizing potential surf zone turbidity effects.
- Sand delivery pipelines would be routinely inspected for pressurized leaks, and any leaks that are found would be immediately repaired.

Dredging

- Dredges would adhere to a speed limit of ten knots or less during the North Atlantic right whale calving season, thereby minimizing the risk of collisions with large whales.
- Dredging contractors would be required to implement USFWS *Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters*.
- All hopper dredges would be equipped with rigid draghead deflectors, thereby minimizing the risk of sea turtle and sturgeon entrainment. Dredging contracts would include specifications for the proper installation and operation of rigid dragheads to ensure effective mitigation of the entrainment risk.
- All hopper dredges would be equipped with the DQM automated dredging quality assurance monitoring system. Division of Quality Management data would be used to monitor draghead performance and contractor compliance with other hopper dredge operational requirements, thereby minimizing the potential for sea turtle interactions due to operator error.

- To reduce the risk of sea turtle entrainment, relocation trawling would be initiated at the onset of each hopper dredging project as determined through Section 7 consultations with NMFS.
- Prior to the initiation of each dredging project, proposed pump-out station anchor point locations and sand delivery pipeline routes would be evaluated by the awarded Contractor for the presence of hardbottom habitats and cultural resources. Based on the survey results, proposed anchor points and pipeline routes would be adjusted by the Contractor to avoid any hardbottom sites in accordance with NC CAMA regulations (500-m buffer). Similarly, anchor points and pipeline routes would be adjusted to avoid any cultural resource sites based on coordination with the SHPO.
- Dredging contractors would be required to maintain spill control plans and waste management plans for all dredging fleet equipment.

6.1.3 Sediment Compatibility

All material placed on the beach and in associated dune systems would consist of beach compatible sand that meets NC Technical Standards for Beach Fill Projects (15A NCAC 07H .0312). Monitoring of fill material at the pipeline outfall would be conducted throughout sand placement operations. If dredging operations encounter non-compatible material, the contractor would cease operations and immediately contact the USACE Wilmington District Regulatory Branch and NCDQM to determine the appropriate course of corrective action. The use of only sand that is compatible with the native beach would reduce the extent and duration of dry beach habitat modification, thereby minimizing the potential for adverse effects on sea turtle nesting and hatching, ghost crabs, and seabeach amaranth. Furthermore, the use of only compatible sand would minimize the duration of direct effects on intertidal beach benthic infaunal communities, thereby reducing the extent and duration of indirect prey-base effects on shorebirds and surf zone fishes.

6.1.4 Monitoring

Endangered Species Observers

During daylight hours (dawn to dusk), one NMFS-approved endangered species observer would record and report all threatened and endangered species interactions, including sea turtle, sturgeon, and large whales. The observer must have at sea identification experience to conduct observations for these species. If a right whale is sighted within 500 yards during active dredging, operations would cease until the observers are confident that the whale has left the area. If a whale is sighted during transit, the crew would reduce speed and alter course as

necessary to maintain a distance of 500 yards between the vessel and the whale. All whale sightings would be documented and reported to the NMFS.

Sediment Compaction

Immediately after construction and to the maximum extent practicable prior to 1 May, the limits of construction areas would be evaluated for sediment compaction in coordination with the USFWS and NCWRC. If it is determined that tilling is required for sea turtle nesting habitat suitability, the construction areas would be tilled to a depth of 36 inches. All tilling activity shall be completed prior to 1 May to the maximum extent practicable. Any tilling activities that are required after 1 May would be coordinated with the USFWS or NCWRC. A summary of compaction monitoring efforts and tilling actions taken would be submitted to the USACE and the USFWS.

Escarments

Immediately after construction and to the maximum extent practicable prior to 1 May, surveys for escarpments would be conducted within the limits of construction areas. Identified escarpments that may interfere with sea turtle nesting (>18 inches in height and \geq 100 ft in length) would be leveled to the natural beach profile. If it is determined that escarpment leveling is required after 1 May, leveling activities would be coordinated with the USFWS or NCWRC. An annual summary of escarpment surveys and leveling actions taken would be submitted to the USACE and USFWS.

Adaptive Management Plan

Due to the 50-year timeframe of the proposed project, periodic interagency reviews of project impacts, construction activities, placement volumes and thresholds will take place. An adaptive management plan will be built into the process for future project requests. Prior to implementing any single construction event, a notification request will be required and such notification would be coordinated with appropriate federal and state resource and regulatory agencies. During these notification reviews, past unforeseen impacts and circumstances will be reviewed and considered prior to authorizing the construction event. Special permit conditions and requirements will be included as needed and determined.