11. DESCRIPTION OF THE OVERALL PROJECT AND OF EACH ACTIVITY IN OR AFFECTING U.S. WATERS OR STATE CRITICAL AREAS

The proposed activity is a beach nourishment project along the oceanfront of Edisto Beach, Colleton County, South Carolina (see Sheet 1). Work will include **placement via hydraulic dredge of up to 1,120,000 cubic yards (cy) of beach-quality sand along the oceanfront shoreline**. The project length is ~18,250 linear feet (lf). It includes ~3,200 lf within or adjacent to Edisto Beach State Park (ie, the reach north of groin 1) and ~15,000 lf along the Town of Edisto Beach shoreline (ie, between groins 1 and 27 as depicted on Sheets 2 & 3). The exact volume will depend on available funding and bid prices. The proposed project does **not** involve alterations to existing groins.

NOURISHMENT

Borrow Area

The proposed borrow area is an inlet shoal situated a minimum of 3,000 ft seaward of existing development and seaward of the Colregs line. The proposed borrow area encompasses ~75 acres of high energy ocean bottom, ranging in depth from mean lower low water (mllw) to (~) –12 ft mllw as depicted on Sheets 11,12, and 13. It includes the area of the 1995 nourishment project (P/N 94–1T–009) which filled in rapidly after excavation (cf, Van Dolah et al 1998). Dimensions of the borrow area are ~3,200 lf by 1,000 lf.

The proposed borrow area represents ~2 percent of the north shoal of South Edisto Inlet as depicted on Sheet 11. It represents ~0.5 percent of the ebb-tidal delta area of St. Helena Sound north of the buoyed entrance channel. The next down coast developed barrier island (Harbor Island) is situated ~6.8 miles from the proposed borrow area.

Approximately 36 borings (~ 1 per 2 acres) are available within the borrow area (see Sheets 12 and 13). Sediment quality has been confirmed to a depth of –15 ft mllw (approximately –18 ft NGVD). The 1995 project excavated the same shoal to (~)–20 ft NGVD. The applicant proposes the same depth of excavation for the present project based on operational considerations of cutterhead suction dredges.

Sediment Characteristics

Sediment characteristics for the native beach and proposed borrow area are given on Sheets 14–16. The native beach was sampled at ten (10) stations (four samples per station) between the foredune and low-tide terrace (Sheet 14). Statistical composite sediment characteristics of oceanfront-only and all stations are given at the bottom of Sheet 14. The overall composite (oceanfront-only) character of native sediments is mean

grain size = 0.43 mm (medium-coarse sand, poorly sorted, coarse-skewed). Sediments >2 mm in size comprise ~5–10 percent of the surficial sediments on the beach depending on the zone across the profiles. Large concentrations of oyster shells exist in patches near the landward end of each groin. Shell material ($CaCO_3$) makes up ~30 percent of surficial sediments on the beach (Sheets 14 & 15). The majority of shell material (>75 percent) is crushed fragments falling within the sand size range. The updrift source of sediment for Edisto Beach is Edingsville Beach. Edingsville Beach consists of a narrow washover berm with extensive exposures of marsh mud in the surf zone. Mud and shells predominate in these sediments and account for the high percentage of shell material reaching Edisto Beach. A nourishment project by the SC Highway Department in 1954, using marsh sediments behind Edisto Beach, also placed concentrations of shell material on the beach.

The proposed borrow area contains a similar range of sediment grain sizes and shell percentages as the native beach. The composite mean grain size for all cores is 0.52 mm with ~10 percent greater than 2 mm and ~30 percent shell material. Cores generally contained only trace mud (<<1 percent). Those with visible mud (three borings) tested ~1.5-6 percent (see Sheet 15). Sediment compatibility (Sheet 16) using the SPM (CERC 1984) overfill methodology shows average RA's (overfill factor) equaling less then 1.05 (typical). Based on experience with the 1995 nourishment project, borrow sediments closely match native sediments in terms of grain size distribution, color, percent shell, and percent mud. For planning purposes, the applicant assumes the borrow area will yield up to 2 percent mud, or ~22,500 cy out of the total excavation by hydraulic dredge. This estimate is reflected in Item 13 on the application form.

Excavation will be performed by an ocean-certified cutterhead suction dredge which will access the borrow area via the main channel of South Edisto River Inlet (cf, Sheet 11). Project plans will call for excavations to –15 ft mllw with a 2-ft maximum overdraft allowed. This depth is based on operational requirements as well as sediment confirmation and experience from the 1995 project. The slurry will be pumped via submerged pipeline to shore landing areas, possibly with the aid of a booster pump and barge. Shore-based pipe will extend upcoast and downcoast from landing areas to accomplish the design nourishment sections.

The applicant proposes to accomplish all work within the standard environmental window for South Carolina nourishment projects (ie, winter months) between November and April as specified by resource and regulatory agencies.

Fill Placement

The fill will be placed and shaped along the beach by standard methods for hydraulic fills. Bulldozers will shape the fill template using temporary training dikes to direct the slurry discharge parallel to the shore. Section volumes will range from ~35 cy/ft to ~90 cy/ft as depicted in Sheets 4–10. Stationing is based on OCRM monuments (2200-series) and groin cell numbers. The groin cell number (1 or 2 digits) is followed by a plus sign and a three-digit number. The latter represents the distance in feet from the next upcoast groin. Cells and groins are numbered from north to south as shown on Sheet 2.

Fill section volumes decline from north to south in anticipation of higher erosion rates at the updrift end of the project. Sand from the project is expected to shift downcoast (south) and feed remaining (unnourished) sections of Edisto Beach along the South Edisto Inlet shoreline.

The volume of fill to be placed exceeds the trapping capacity of the existing groins by ~2 to 5 times. Many of the groins will initially be buried by the project and rendered nonfunctional until such time as erosion reaches the structures.

The design grades and slopes of the fill follow natural contours of the beach (see Sheets 4–10). Slope above 0 ft NGVD will be 1 on 15 (typical). Slope below 0 ft NGVD will be 1 on 30 (typical) after adjustment. The initial berm width at +8 ft NGVD varies from ~25 ft to ~130 ft according to the section volume.

The total nourishment volume proposed is approximately ten times greater than the 1995 project (P/N 94–1T–009), and ~1.5 times greater than the 1954 project. It is expected to provide benefits for a minimum of ten years (in terms of increased beach width compared with present conditions).

12. OVERALL PROJECT PURPOSE AND THE BASIC PURPOSE OF EACH ACTIVITY IN OR AFFECTING U.S. WATERS

The purpose of the project is for erosion control and beach restoration, including:

- Restore the recreational beach and protect associated infrastructure (access road, campsites, restrooms, and park office) at Edisto Beach State Park.
- Restore the recreational beach and protect public infrastructure (public access walkovers, Palmetto Boulevard) along the Town of Edisto Beach shoreline.
- Restore a protective beach seaward of houses such that dune enhancement may be initiated by the town and individual property owners. (Dune construction or revegetation is not part of the present application.)
- Bury a majority of exposed groins and, thereby, improve the visual appeal of the public beach.
- Maintain park revenues which are dependent on a viable beach and campsite area.
- Provide a protective buffer between interior wetlands and the ocean.
- Provide increased habitat for shorebirds and nesting turtles where little currently exists.
- Improve the overall aesthetics of the beach by burying many of the groins.

The state park is fully accessible to the public. The Town of Edisto Beach maintains over 20 public beach accesses with nearby parking along its entire three-mile oceanfront. The project is locally sponsored and will not involve any federal funds.

History

Edisto Beach has a long history of erosion as a result of the limited sand supply from Edingsville Beach and the strong tendency for sand to migrate from the north (updrift) end of the island to the shoreline along South Edisto River Inlet.

Major shore protection measures to date include:

- Construction of 34 groins between 1948 and 1975.
- Nourishment of the northern half of Edisto Beach in 1954 (~830,000 cubic yards) using sediment from the lagoon/marsh.
- Construction of isolated bulkheads and revetments by individual property owners 1950s to 1980s.
- Major repairs to 21 groins in 1995.
- Nourishment of the repaired groin cells* in 1995 (~150,000 cy) using sediment from an offshore shoal near the “point” (cells 24–27).

Other than Hurricane *David* in 1979, no major storms have directly impacted Edisto Beach in the past 40 years. [Note: *Hugo* in 1989 made landfall north of Charleston, leaving Edisto on the favorable side of its storm track.] Despite the general lack of damaging storms, chronic and localized erosion has caused considerable property damage. Houses were undermined by erosion between 1969 and 1974 around the "point" (Point Street area) and in 2001 in the 700 block of Palmetto Boulevard (between Portia Street and Dawhoo Street).

Fewer than 33 percent of oceanfront properties have "ten-year" protection** as defined by FEMA. Over half of the oceanfront properties along Edisto Beach have grossly inadequate setbacks for purposes of protection during a major storm. No oceanfront houses in cells 1 through 14 are set back more than 75 ft from the normal high watermark (~+7 ft NGVD).

Edisto Beach property is more vulnerable to storm damage compared to other South Carolina beaches because its beach slope is steeper. This lessens the width of the wet beach and allows more damaging runup and comparatively higher waves during storms. Combined with low dune elevations, the result is frequent overtopping of the foredune and washovers into Palmetto Boulevard. The main access road for the community, Palmetto Boulevard, is less than 100 ft from the high watermark in many areas. If damaged during a major storm, water lines and other infrastructure would be destroyed.

Prior Studies & Projects

There have been numerous studies of erosion and shore-protection of Edisto Beach. These include early studies by the US Army Corps of Engineers (1949, 1969), the University of South Carolina (eg, Stephen et al 1975), CSE (1990, 1992, 1993), and others. These references should be consulted for detailed explanation of erosion-causing processes.

Erosion along Edisto Beach during the past century has resulted mainly from a general divergence of sand transport away from Edingsville Beach (Fig 1). Waves move sand north toward Deveaux Bank (off Seabrook Island), south toward Edisto Beach, and inland across the low barrier of Edingsville Beach. This has reduced the natural replenishment of Edisto Beach. Edingsville Beach is eroding at over 15 feet per year (ft/yr) (OCRM, official long-term erosion rate data).

* Groin cells are the lengths of beach between adjacent groins beginning with cell 1 at the pavilion between groins 1 and 2.

** "Ten-year" protection under FEMA criteria consists of a volume of sand (>6 cubic yards per foot) situated above the ten-year return-period surge level (~12 ft NGVD).

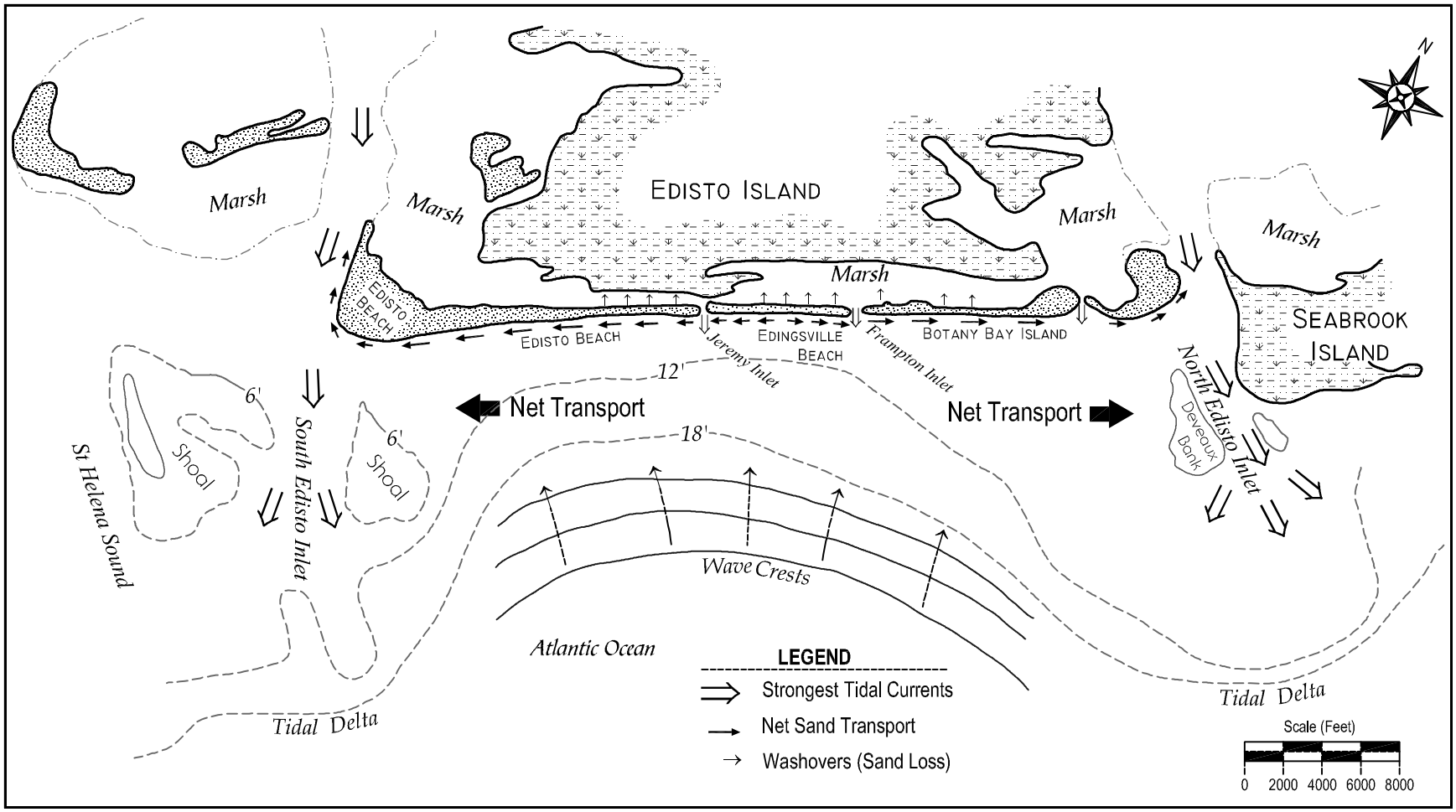

FIGURE 1. General diagram of primary wave and current directions and net sand-transport patterns affecting Edisto Beach during the past century. Lack of available sand from Edingsville Beach and losses to the major inlets and washovers are fundamentally responsible for erosion along Edisto's oceanfront. [Bathymetry based on NOS Chart No 11521; from CSE 2001a]

Based on best-available data, long-term erosion rates prior to nourishment in 1954 and construction of groins varied from ~15 ft/yr along Edingsville Beach, to about 10 ft/yr along the state park, to near zero around Marianne Street (groin 18). South of Marianne Street, the century-long historical trend had been accretion. Sediment accumulated around the "point" and along the South Edisto Inlet shoreline. These trends account for the wider setbacks of houses and Palmetto Boulevard from north to south. Groins have reduced the rate of erosion along the northern half of Edisto Beach. However, insufficient new sand from Edingsville Beach is reaching the groin cells. This has also caused a reduction in sand supply along the South Edisto Inlet shoreline. One purpose of the proposed project is to augment the supply of sand for the entire island such that normal sand transport processes can resume.

Environmental Impacts

The proposed project will be constructed during the standard winter environmental window for South Carolina beach nourishment projects (November through April) with cut-off dates as specified by resource and regulatory agencies. Construction will take place over a 60–75 day period, working 24 hours per day. Turbidity associated with the project will be localized and short-term, given the coarse nature of the borrow area sediments and experience during the 1995 nourishment project. Ecological impacts are expected to be minor and temporary as found by SCDNR and others in studies following the 1995 project (cf, CSE Baird 1996, Van Dolah et al 1998). Van Dolah et al (1998) found that the 1995 borrow area refilled within 1.75 years. They reported that rapid refilling was likely due to the small size of the area as well as its depositional setting within a high energy shoal area.

Van Dolah et al (1998) recommended ". . . locating future borrow sites in areas that are likely to fill with beach compatible sands during the time period between nourishment projects. . ." (pg 72). Borings obtained in connection with the proposed project confirm that the 1995 borrow area refilled with beach quality sands and negligible mud.

The proposed project will result in excavation and mortality of ~75 acres of surficial benthic organisms in the borrow area (mollusks, crustaceans, and annelids adapted to high-energy sand shoals). Filling operations will bury up to 200 acres of shallow beach and inshore habitat (ocean shoreline), resulting in mortality or displacement of existing benthic populations. The resulting fill will provide an additional ~20 acres of dry sand beach (turtle nesting habitat, seabeach amaranth habitat, and ghost crab habitat). A wider dry beach will allow natural expansion of the foredune and its associated vegetation. An equal or greater area of wet sand beach and shallow surf zone habitat will be created (compared with the areas buried by fill). It is expected that these areas will recolonize naturally and rapidly with a similar suite of species.

Some existing seawalls will be buried or removed from direct impact by waves. Existing groins and the rocky substrate habitat associated with them will be buried, causing mortality to attached organisms (mostly barnacles and mollusks). Burial of many of the groins will create safer conditions for swimmers and bathers.

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