

<p>Joint Federal and State Application Form For Activities Affecting Waters of the United States or Critical Areas of the State of South Carolina</p>	<p>This Space for Official Use Only.</p> <p>Application # _____</p> <p>Date Received: _____</p> <p>Project Manager: _____</p>
<p><i>Authorities:</i> 33 USC 401, 33 USC 403, 33 USC 407, 33 USC 408, 33 USC 1341, 33 USC 1344, 33 USC 1413 and Section 48-39-10 et seq of the South Carolina Code of Laws. These laws require permits for activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. The Corps of Engineers and the State of South Carolina have established a joint application process for activities requiring both federal and state review or approval. Under this joint process, you may use this form, together with the required drawings and supporting information, to apply for both the federal and/or state permit(s).</p> <p><i>Drawings and Supplemental Information Requirements:</i> In addition to the information on this form, you must submit a set of drawings and, in some cases, additional information. A completed application form together with all required drawings and supplemental information is required before an application can be considered complete. See the attached instruction sheets for details regarding these requirements. You may attach additional sheets if necessary to provide complete information.</p>	
<p>1. Applicant's Name.</p> <p>SC Dept. of Parks Recreation & Tourism Attn: Mr. David Simms, P.E.</p>	<p>4. Agent's Name (an agent is not required).</p> <p>Coastal Science & Engineering (CSE) c/o Dr. T.W. Kana</p>
<p>2. Applicant's Address.</p> <p>1205 Pendleton Street Columbia SC 29201</p>	<p>5. Agent's Address. [Street Address: 2615 Devine Street 29205] PO Box 8056 Columbia SC 29202-8056</p>
<p>3. Applicant's Contact Number (include area code).</p> <p>Residence:</p> <p>Business: 803-734-0258</p> <p>Fax: 803-734-1409</p>	<p>6. Agent's Contact Number (include area code).</p> <p>Residence:</p> <p>Business: 803-799-8949</p> <p>Fax: 803-799-9481</p>
<p>7. Project Title.</p> <p>Hunting Island State Park Beach Restoration</p>	<p>9. Project Location.</p> <p>Street Address: Highway 21</p> <p>County: Beaufort</p> <p>Latitude: 32° 22'N</p> <p>Longitude: 80° 26'W</p>
<p>8. Nearest Waterbody to Project Site (if known).</p> <p>Atlantic Ocean</p>	
<p>10. Directions to the Site (attach additional sheets if needed).</p> <p>Take Highway 21 south to Hunting Island. Enter park at the campground entrance (first left) for access to the northern (campground) work area. Enter park at the main entrance and follow signs to the lighthouse for the second (North Beach) work area, or proceed to the main beach parking area for the third (South Beach) work area.</p>	
<p>11. Description of the Overall Project and of Each Activity In or Affecting U.S. Waters or State Critical Areas (attach additional sheets in needed).</p> <p>See attached sheets.</p>	
<p>12. Overall Project Purpose and the Basic Purpose of Each Activity in or Affecting U.S. Waters (attach additional sheets if needed).</p> <p>See attached sheets.</p>	

13. Type and Quantity of Materials to be Discharged.		14. Type and Quantity of Impacts to U.S. Waters (including wetlands).			
Dirt or Topsoil:	<u>0</u> cy	Filling:	<u>100</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u>1,620,000</u> cy
Clean Sand:	<u>1,500,000</u> cy	Backfill and Bedding:	<u>NA</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u> </u> cy
Mud:	<u>up to 120,000</u> cy	Land Clearing:	<u>NA</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u> </u> cy
Clay:	<u>0</u> cy	Dredging or Excavation:	<u>200</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u>1,620,000</u> cy
Gravel, Rock, or Stone:	<u>0</u> cy	Flooding:	<u>NA</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u> </u> cy
Concrete:	<u>0</u> cy	Draining:	<u>NA</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u> </u> cy
Other (describe):	<u>minor shell</u>	Shading:	<u>NA</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u> </u> cy
TOTAL:	<u>1,620,000</u> cy	TOTALS:	<u>300</u>	<input type="checkbox"/> acres <input type="checkbox"/> sq. ft.	<u>1,620,000</u> cy

15. Names and Addresses of All Adjoining Property Owners (attach additional sheets if needed).

None. Project is bounded by undeveloped reaches of Hunting Island within park jurisdiction and two large tidal inlets, Johnson Creek to the north and Fripp Inlet to the south.

16. Has any portion of the work already commenced? If yes, describe all work that has been done and the dates of the work.

Federal Sections 14 and 103 – Cabin Road Shoreline Protection Project – US Army Corps of Engineers (Charleston District) – Constructed January–March 2003

17. List all certifications, approvals, and denials received from federal, state, or local agencies for work described in this application.

- State and federal permits to use three offshore borrow areas A, B, and C have already been received under Permit P/N# 2000–1W–363–P (issued 31 July 2001)
- Draft Environmental Assessment – Sep 2004 – Hunting Island Ecosystem Restoration Study – US Army Corps of Engineers (Charleston District)

18. Authorization of Agent. I hereby authorize the agent whose name is given in block number 4 of this application to act in my behalf in the processing of this application and to furnish supplemental information in support of this application.

_____ Date

Applicant's Signature

19. Certification. Application is hereby made for a permit or permits to authorize the work and use s of the work as described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent for the applicant.

_____ Date _____ Date

Applicant's Signature Agent's Signature

The application must be signed by the person who desires to undertake the proposed activity or it may be signed by a duly authorized agent if the authorization statement in blocks 4 and 8 have been completed and signed. 18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or used any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

Submit the completed application materials to:

Send all original application materials to: U.S. Army Corps of Engineers Charleston District, Regulatory Branch PO Box 919, Attn: CESAC-CO-P Charleston SC 29402-0919 843-727-4330	Send one complete copy to: SC Dept Health & Environmental Control Office of Ocean & Coastal Resource Management 1362 McMillan Avenue (400) Charleston SC 29405 843-744-5838	Send one complete copy to: SC Dept Health & Environmental Control Office of Environmental Quality Control 2600 Bull Street Columbia SC 29201 803-734-5300
---	--	--

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 restoration project along the oceanfront of Hunting Island, Beaufort County, South Carolina (see Sheet 1). Work will include **placement of up to 1,500,000 cubic yards (cy) of beach-quality sand along the oceanfront shoreline**. The exact length of shoreline covered and exact nourishment volume will depend on available funding and bid prices, but potentially up to 17,000 linear feet (ft) or approximately 75 percent of the oceanfront shoreline would be nourished. In addition, **construction of up to nine (9) sheet pile-type groins is planned to hold much of the nourishment sand in place**. The groins will extend seaward from the existing foredune/backshore and will be downward-sloping toward the ocean, so as to closely match the natural beach profile and allow passage of littoral sand over and around each structure. Location of the groins and beach fill are shown on Sheet 2.

NOURISHMENT

Borrow Areas

Two (2) potential borrow areas are being considered for the project (see Sheets 3 and 4):

- 1) Offshore area "C" adjacent to and north of the borrow area for the 1991 state-sponsored nourishment project (P/N 90-2T-320-P). Area "C" is approximately 0.5 mile square (~170 acres) centered ~1.8 miles offshore of the Hunting Island lighthouse in depths of -10 to -12 feet (ft) NGVD (See Sheet 2). Maximum excavation depth would be 10 ft (to accommodate operational requirements of cutterhead dredges), the same depth as the 1991 nourishment project using deposits immediately to the south. As Sheet 3 illustrates, Area "C" consists of 0.2-0.22 millimeter (mm) (mean diameter) fine sand with less than 7 percent "gravel" (>2 mm diameter). Previous geotechnical surveys (CSE 1991) indicated the mud content (<0.0625 mm mean diameter) in this area averages less than 7 percent to the target maximum dredging depth (-20 ft NGVD). Total area of borrow area "C" is 170 acres.
- 2) Offshore area "1" as described in USACE (2003) *Appendix B – Geotechnical Appendix for Feasibility Report – Ecosystem Restoration Project, Hunting Island, South Carolina*, and USACE (September 2004) *Draft Environmental Assessment for Hunting Island Ecosystem Restoration Study* (Charleston District). Area "1" is approximately 0.65 by 1.2 miles in size (~490 acres) centered ~1.7 miles offshore of "south" beach public recreation area in the center of Hunting Island. Geotechnical surveys by the Charleston District

(USACE 2003) indicated that acceptable borrow material, similar in nature to the native sand of Hunting Island, occurs to depths of up to 10 ft. See Sheet 4. Area "1" contains fine sand (D_{50} ranges from 0.6 mm to 0.25 mm) with the "mud" fraction (percent passing the #200 sieve at 0.074 mm mesh) testing an average of ~7 percent to 6 ft of section (USACE 2003). Total area of borrow area is ~490 acres.

Combined, areas "C" and "1" potentially can provide up to 2.7 million cubic yards and 7.9 million cubic yards (respectively). This represents about seven times more volume than is needed to accomplish the proposed project. The applicant is conducting additional geotechnical investigations to optimize placement of the dredge within areas "C" and "1." Following are the criteria sought for the final borrow area:

- Mean grain size (D_{50}) >2.2 mm
- Percent mud (<0.0625 mm) <5%
- Percent gravel (>2 mm) <15%
- Maximum dredging depth -20 ft NGVD

The dredging depth is based on minimum operational requirements for ocean-certified cutterhead dredges at low water tide stage. The existing fleet of US dredges typically requires a minimum of 17 ft operational depth. A depth of -20 ft NGVD at Hunting Island corresponds with a depth of approximately -17 ft mean low water. Based on an average cut-section ("embankment") of 8 ft and a dredging volume of ~1,500,000 cubic yards, approximately 120 acres will be excavated. The 1991 nourishment project impacted ~52 acres (CSE 1991, 1992).

The selection of borrow area(s) will be based on additional evaluations and comparison of sediment quality (in preparation), potential environmental and physical impacts, logistics, and economics in consultation with representatives of SC Department of Natural Resources.

Fill Placement

Permitting of a range of fill volumes generally from 140 to 200 cubic yards per linear foot of beach is requested. The extent of the constructed fill will depend on the bid prices and the funding available. Profiles of the beach fill and groins are shown on Sheets 5 through 9. Nourishment sand will be pumped from the selected borrow area(s) via hydraulic dredge to areas along Hunting Island described below and listed in order of priority:

- 1) Reach II, North Beach Area – Placement of 140 to 200 cubic yards per linear foot of beach to create a berm width of 200 to 250 ft between groins 3, 4 and 5. This will provide a wide beach over some 2500 linear feet centered on the lighthouse (See Sheet 2).
- 2) Reach IV, South Beach Area – Placement of 140 to 200 cubic yards per linear foot to create a berm width of 200 to 250 ft between groins 6, 7, 8 and 9. This will provide a wide beach over a reach of approximately 3000 linear feet encompassing the recreation/parking area and northern end of the lagoon (Cabin Road).
- 3) Reach I, Campground Area – Placement of 140 to 200 cubic yards per linear foot of fill to create a berm width of 200 to 250 ft between groins 1 and 2. This will provide a wide beach over some 1200 linear feet centered on the campground beach area (see Sheet 2).
- 4) Reach III, Central – Placement of 35 to 50 cubic yards of fill per linear foot of beach to create a berm width of 50 to 75 ft between groins 5 and 6. This will provide a protective berm over 2600 ft of beach.
- 5) Reach V, Residential – Placement of 35 to 50 cubic yards of fill per linear foot of beach to create a berm width of 50 to 75 ft. This will provide a protective berm over approximately 4,400 ft of beach south of groin 9.

The total length of the beach fill from the end of the taper north of groin 1 (sta -35+02) to south of groin 9 (station 136+22) will be in excess of 17,000 ft with a total fill volume (based on highest estimate) of 1,500,000 cubic yards. Land-based equipment will spread and grade the nourishment to the typical slopes and elevations shown in the beach and groin profiles on Sheets 5 through 9. The volume of the nourishment will vary from ~40 cubic yards per foot (cy/ft) to a maximum of ~250 cy/ft according to priority areas and the availability of funding. Beach fill profiles on each side of groins 2, 3, 5, 6 and 9 reflect the differential in fill volumes from one side of the groin to the other. The goal of varying the placement quantities is to increase project longevity in priority areas and fill the sections where groins are proposed. The final extent of the constructed project will be adjusted after bids are received for construction and balanced with available funding.

If Hunting Island south spit is used as a borrow area, some excavations and transport to nourishment areas may be via land-based equipment (eg, scraper pans, dump trucks).

The total nourishment volume proposed is approximately twice the volume of the 1968, 1971, 1975, and 1991 projects and six times greater than the 2003 project.

GROINS

Up to nine (9) groins are proposed for purposes of retaining sand in priority areas along Hunting Island. The groin locations are illustrated in Sheet 2. The plan for groins follows a preliminary design prepared by CSE Baird (1998) and the USACE (September 2004) draft environmental assessment. Profiles of the groins are provided on Sheets 5 through 9. Groins will be placed in the reaches shown below and listed by priority.

- 1) Reach II, North Beach Area – Up to three groins in a cluster with typical spacing of ~1,200 ft (groins 3, 4, and 5). Maximum lengths of the north beach groins will be 650 to 750 ft.
- 2) Reach IV, South Beach Area – Up to four groins in a cluster with typical spacing of ~1,200 ft (groins 6, 7, 8 and 9). Maximum lengths of the south beach groins will be from 650 to 750 ft.
- 3) Reach I, Campground Area – Up to two groins (groins 1 and 2) situated ~1,500 ft south of the existing terminal groin (built in 1968). These groins will also have lengths of 650 to 750 ft.

The final number and dimensions of groins will depend on funds available and bid prices for nourishment and structure costs. The lengths will be balanced against the nourishment requirements to optimize sand-trapping by each structure. Detailed studies of the optimal configuration of groins and nourishment are in progress. The indicated groin lengths and nourishment volumes represent the maximum requested in the present permit application.

Groin profiles will follow the natural beach contours after nourishment with each groin containing a berm section (dry-beach zone), sloping beach-face section, and low-tide beach section (see Sheet 5). The beach-face section will slope at 1 on 30. Lengths will range from ~650 ft to 750 ft total so as to encompass the active beach zone of Hunting Island. Table 1 lists the groin lengths by groin number and baseline station.

TABLE 1. Proposed maximum groin lengths.

Groin #	Groin Station (CSE Baseline)	Groin Length (linear feet)
1	-26+94	750
2	-15+00	650
3	8+14	750
4	20+02	750
5	32+22	750
6	57+84	650
7	63+39	750
8	69+81	750
9	87+34	750

Groins will likely be constructed immediately after beach nourishment with most work performed “in the dry.” The proposed material will be precast concrete sheet pile with timber walers along both sides of the crest (similar design as the existing terminal groin at the northern end of Hunting Island). Installation will be by conventional marine construction methods with sheet piles both washed and driven into place. As shown on Sheet 10, the concrete sheet piles will be driven deeper over the beach face portion of the groin profile because this portion of the profile is the most likely to experience significant change. Following installation of the sheet piles, treated timber walers (0.8 pcf and 2.5 pcf, CCA) will be bolted along both sides of the length of each groin. Details of the groin section are shown on Sheet 12. The walers serve to stabilize the sheets and distribute lateral loads occurring at points on the groin over a longer length of structure. The plan and profile of a typical groin with toe protection is shown on Sheet 10.

A geotechnical investigation was completed by S&ME (2004) to evaluate the engineering properties of the surficial and underlying soil strata in the areas where the groins are to be constructed. Three soundings were performed at equal spacing along the beach. The data collected were used to determine the feasibility of concrete sheet pile installation and stability. A copy of the report is provided as an attachment to these documents.

Generally, the beach consists of an upper strata of loose to medium dense sands approximately 20 ft thick. This is underlain by a layer of soft to firm silts from 8 to 20 ft thick. The recommendations in the report will be used to prepare the final design of the groin structures. These parameters will be balanced with riprap thickness, driving depth

and sheet thickness. Generally, the report confirms that the groins can be constructed as proposed.

Each groin will include a partially buried scour apron of riprap stone around the toe of the groin structure to hold the toe elevations in place. The riprap toe protection will be placed from the mean high water elevation out to the end of the groin with a head section anchoring the end of each groin. Details of the riprap placement are shown on Sheet 11. Stone in the armor portion will be graded granitic riprap weighing from 500 to 2000 pounds. Stone in the bedding and gabion layer will be graded riprap weighing from 5 to 200 pounds.

Other composite materials and profiles are being investigated with the goal of minimizing exposure of each structure and achieving optimal design life. Tradeoffs between riprap quantities and pile depth will be investigated in detail. Changes in the driving depth or riprap quantity will not change significantly from that shown in these permit documents.

The groin clusters are expected to produce and maintain shoreline salients, thereby reducing the erosion rate around the structures and reducing the overall sand loss on the island.

No groins are proposed along the southern ~33 percent of Hunting Island. Net longshore transport along most of Hunting Island is to the north.

REFERENCES

- CSE. 1992. Hunting Island State Park 1991 beach nourishment project, beach surveys. Survey Report No. 2 to South Carolina Department of Parks, Recreation & Tourism, Columbia; CSE, Columbia, SC, 18 pp. + appendix.
- CSE. 1991. Hunting Island State Park 1991 beach nourishment project. Survey Report No. 1 to South Carolina Department of Parks, Recreation & Tourism, Columbia; CSE, Columbia, SC, 26 pp. + appendices.
- USACE. 2003. Ecosystem restoration project, Hunting Island, South Carolina. Appendix B. Geotechnical appendix for feasibility report. US Army Corps of Engineers, Charleston District, South Carolina. 12 pp + app B1 and B2.
- USACE. 2004. Environmental assessment (EA), Hunting Island ecosystem restoration study, Beaufort County, South Carolina. USACE, Charleston District, South Carolina, 29 pp + appendices A–J.
- Zapata. 2002. Hunting Island offshore sub-bottom profiling and sidescan sonar surveys. Final Report for USACE, Charleston District (Contract DACW60-00-D-0002 DO 0008). Zapata Engineering, Charlotte, NC, 26 pp + appendices.
- S&ME. 2004 Report of Geotechnical Exploration, Beach Restoration Project, Hunting Island State Park, Hunting Island, South Carolina. Prepared for Coastal Science & Engineering. S&ME, Mt. Pleasant, SC, 10 pp + appendices.

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.
- Protect the lagoon area and minimize the threat of a breach inlet forming.
- Protect campsites and associated infrastructure from further damage.
- Cover exposed roots and mud outcrops which pose hazards to swimmers and liability to the state.
- Maintain park revenues which are dependent on a viable beach and campsite area.
- Minimize impacts to wilderness sections of the beach so as to preserve the aesthetic character of the oceanfront (including some driftwood areas where no infrastructure or wetlands are at risk).
- Provide beach habitat for shorebirds and turtles where none currently exist.

History

Hunting Island is one of the most rapidly eroding barrier islands on the US East Coast with losses averaging upward of 25 feet per year (ft/yr). The first beach restoration project was completed by the US Army Corps of Engineers in 1968 (Table 2). Subsequent renourishment was performed in 1971, 1975, and 1980, before the federal authorization expired in 1984. The state assumed responsibility for beach maintenance in the late 1980s, renourishing the central portion of the island in 1991. In the late 1990s, the US government resumed studies of the island under Section 14 (Emergency Streambank and Shore Protection), Section 103 (Hurricane and Storm Damage Reduction), and Section 206 (Ecosystem Restoration). A small-scale renourishment was completed under Sections 14 and 103 along an ~2,500 ft reach in 2003. As Table 2 shows, previous projects have added 4.5 million cubic yards (cy) to Hunting Island from various borrow sources.

Despite six additions of sand, Hunting Island has continued to lose land at a rapid rate, forcing relocation of infrastructure. Erosion has left barnacle-encrusted trees in the surf zone and made swimming hazardous along public beaches. Park cabins and campsites have had to be relocated because of erosion. Continued beach loss along the southern end of the island has increased the likelihood of a breach into the lagoon. If this occurs, Cabin Road will be cut off from the rest of the island.

TABLE 2. Beach nourishment projects along Hunting Island. [Sources: USACE 1977, London et al 1981, CSE 1991, USACE unpublished data 2004] [*USACE stations run north and south from the vicinity of the lighthouse (eg, 50+00N is 5,000 ft north of the lighthouse; 97+00S is 9,700 ft south of the lighthouse). Total length of Hunting Island is about 21,000 ft (± 4 miles), ranging from $\pm 70+00N$ to $\pm 140+00S$.] Costs do not include engineering and permitting.

*Project	Construction Dates	Volume (cy)	Limits of Placement	Net Unit Cost	Total Cost (\$)
1968	Feb– Dec '68	750,000	*50+00N to 50+00S	\$0.58/cy	\$435,178
1971	May–Dec '71	761,324	50+00N to 50+00S	\$0.70/cy	\$534,000
1975	Apr–Jun '75	612,974	60+00N to 30+00S	\$1.58/cy	\$971,540
1980	Jan–May '80	1,412,692	24+60N to 97+00S	\$1.60/cy	\$2,267,201
1991	Feb–Apr '91	757,644	~20+00N to 55+00S	\$3.80/cy	\$2,876,250
2003	Jan–Mar '03	230,181	~85+00S to 110+00S	\$10.78/cy	~\$2,480,250
	TOTALS	4,506,634		~\$2.11/cy	~\$9,564,419

Figures 1–3 show trends in erosion by reach for the 1991 to 1998 period. (See Sheet 2 for reach locations.) Overall, Hunting Island loses ~300,000 cy/yr with most of the sand shifting to the shoals of Johnson Creek Inlet and a lesser quantity shifting to Fripp Inlet. All sand placed along the north beach and the south beach in 1991 was eroded by ~1996. Since 1998, the shoreline near the lighthouse has eroded 75–100 ft of dunes and high ground. Average annual rates of erosion (Fig 3) were of the order 15 cubic yards per foot per year (cy/ft/yr) between 1991 and 1998. The general erosion and sand-transport patterns of Hunting Island are shown in Figure 4.

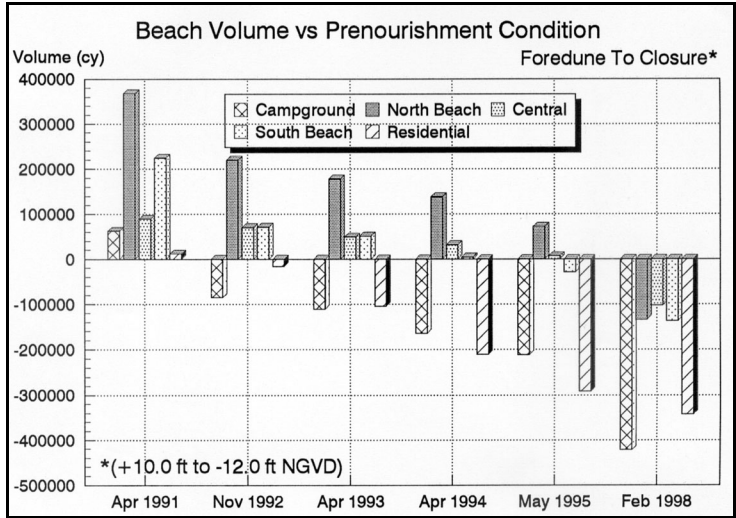


FIGURE 1.

Beach volume within the control boundaries [present foredune/backshore escarpment to (~)-12 ft NGVD]. Positive volumes reflect the gain from nourishment. Negative volumes reflect a deficit with respect to the February 1991 prenourishment condition. (See Sheet 2 for reach areas.) [From CSE Baird 1998]

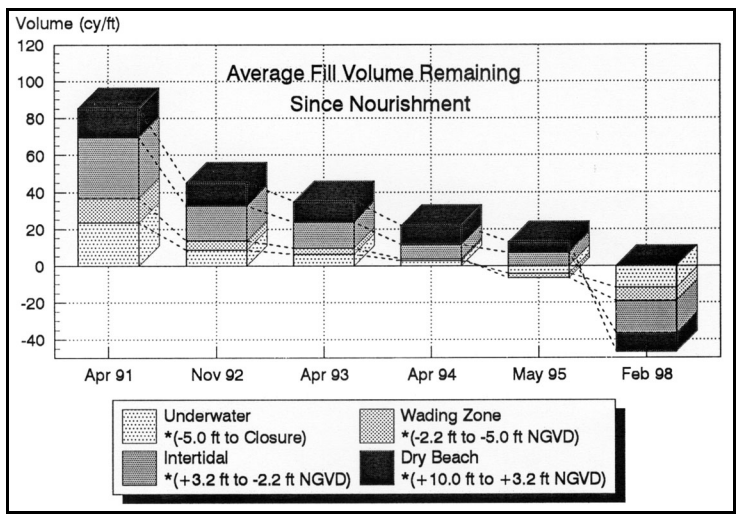


FIGURE 2.

Average unit-width volume remaining in the project area since the 1991 nourishment project (by lens). The February 1998 deficit averages ~45 cubic yards per foot (cy/ft) compared to the prenourishment condition of February 1991. [From CSE Baird 1998]

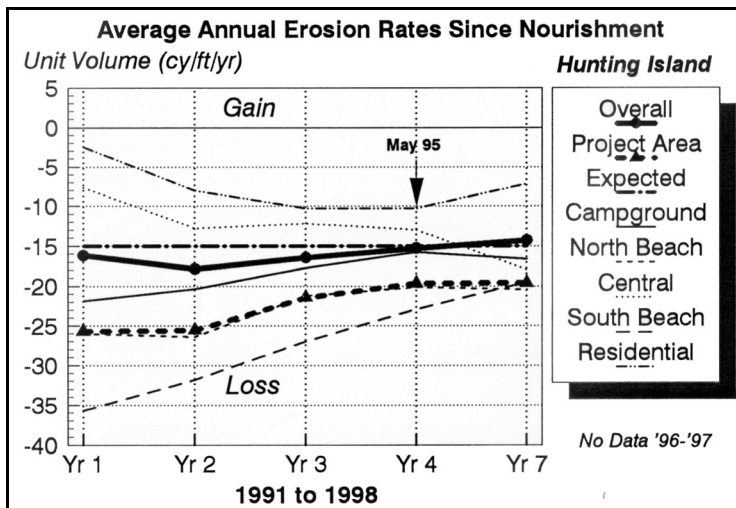


FIGURE 3.

Trends in average annual erosion rates by reach since the 1991 project. Note tendency for rates to converge toward 20 cy/ft/yr in the project reaches (north beach, central reach, south beach) and toward 15 cy/ft/yr island-wide. [From CSE Baird 1998]

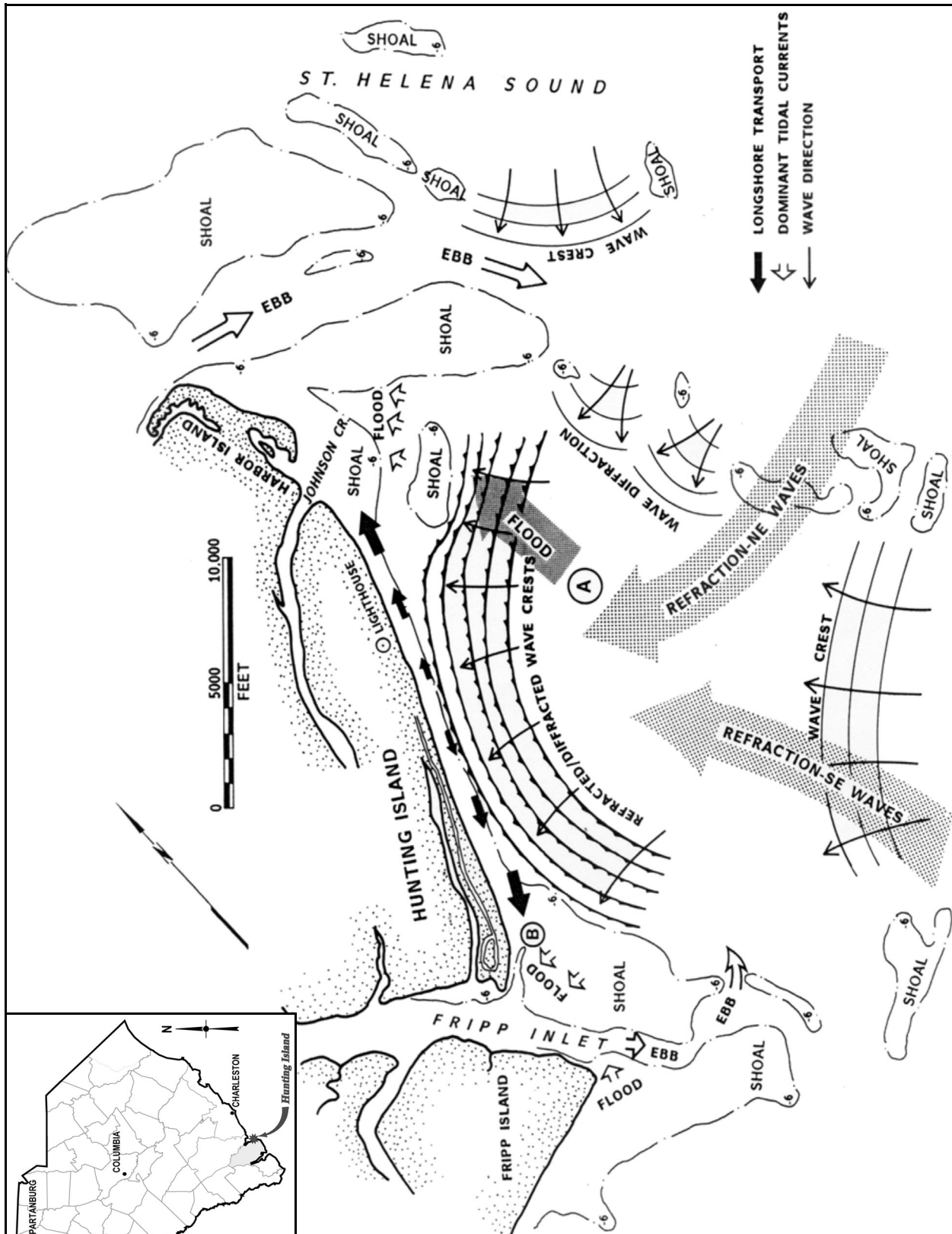


FIGURE 4. Conceptual model shows general pattern of wave crest refraction and diffraction around shoals and resulting sand transport away from the center of Hunting Island. Zero and -6 ft contours are based on NOS chart 11513, and datum is mean low water. [From CSE Baird 1998, Fig 3-1]

Purpose and Rationale of the Project

The proposed beach restoration plan seeks to divide the shoreline into several minor littoral cells. The clusters of groins would function as "headlands," at a smaller scale but with similar effect as the attached shoals at each end of the island. They would "anchor" the shoreline at intermediate spots and provide control points around which a new beach planform could evolve. Headlands can take the form of rocky promontories, inlet deltas, submarine bars, or other nearshore obstructions. In each case, the headland changes the incoming wave direction and speed, lessening sand losses.

Downdrift erosion will be ameliorated by filling the groins to capacity with nourishment sand and constructing them in a template following the natural beach slope, which will allow passage of sand over in addition to around the ends of the groins. One purpose of the project is to slow but not eliminate future erosion in the unnourished sections, once the nourishment sand migrates out of the priority recreational areas to the rest of the island. Without the project, the shoreline will continue to erode at upward of 20 ft/yr.

The project shoreline will be surveyed periodically after nourishment to track the movement of sand and longevity of the fill. Erosion rates along the unnourished tract after the project will be compared with the historical background erosion rate of ~20 ft/yr. The project will be considered successful if a minimal dry beach is maintained for beach recreation in the primary recreational areas during the next decade.

Hunting Island's specific erosion problem is highly unusual and localized compared to most beaches in South Carolina. Previous shore-protection efforts have been inadequate because the island is adjusting its shape in response to a complex set of processes. The proposed plan is the next step in slowing, if not eliminating, erosion. The most important points regarding any downdrift impacts are:

- Careful monitoring of the project area over the next ten years will provide guidance for future remedial measures.
- Use of sheet pile-type structures offers the benefit of easier adjustment and/or removal if future conditions change.

The applicant anticipates performing environmental monitoring studies before and after the project, based on guidance from state and federal resource agencies. For information on previous environmental monitoring studies, reviewers should consult studies by CSE/CSA (1992), Kana and Mohan (1998), and Van Dolah et al (1998).

13. TYPE AND QUANTITY OF MATERIALS TO BE DISCHARGED

Table 3 provides representative borrow sediment data comparing with the “native beach” sand. Hunting Island consists of well-sorted, fine sand averaging ~0.20 mm diameter. Offshore borrow areas “C” is incrementally coarser, averaging ~0.22 mm with a mud content of ~6 percent. Borrow area “1” contains similar fine sand averaging 0.16–0.25 mm mean diameter with an average of <7 percent mud (USACE 2003). Total volumes of sediment moved will depend on budgetary limits on the total nourishment. Assuming the maximum mud content is ~7.5 percent, approximately 1,620,000 cy will be required to yield 1,500,000 cy of sand-sized material.

TABLE 3. Comparison between native beach sand and vibracore samples (from USACE 2003)

*Hunting Island, SC
Renourishment Project*

Criteria D50>.18mm
% passing <10%

Borings 1-43 from June 2002 (from 0'-5')

Boring #	Average % passing	% passing <10%	Avg D50 >.18mm	Color
1	3.04	Y	Y/N	B
2	2.62	Y	Y	A
3	1.88	Y	Y/N	B
4	2.38	Y	Y/N	B
6	2.48	Y	Y/N	B
7	3.54	Y	Y/N	B
9	3.10	Y	Y	A
10	2.84	Y	Y	A
11	6.76	Y	N	C
12	3.26	Y	Y/N	B
14	2.64	Y	Y/N	B
15	5.34	Y	Y	A
18	5.38	Y	Y	A
19	23.16	N	N	C
55	2.90	Y	Y	A
57	6.10	Y	Y	A
61	4.85	Y	Y	A
63	3.52	Y	Y	A
70	2.47	Y	Y	A
71	2.52	Y	Y	A
72	1.92	Y	Y	A
73	2.17	Y	Y	A
74	2.03	Y	Y	A

Legend:

A = Acceptable

B = Marginally Acceptable

C = Not Acceptable

14. TYPE AND QUANTITY OF IMPACTS TO U.S. WATERS (INCLUDING WETLANDS)

The USACE (Sep 2004) draft environmental assessment for a similar project at Hunting Island found that there “will be short-term adverse water quality impacts during the construction period of (the) project.” However, because most of the dredged material will be sand-sized, turbidity impacts will be limited to the immediate vicinity of operations. The impacts are expected to be of similar magnitude as natural levels of turbidity during high-wave action events. Ecological impacts are expected to be minor and temporary as found by SC DNR and others in studies following the 1991 project (cf, CSE/CSA 1992, Van Dolah et al 1998).

A list of related project reports is given in Table 4.

TABLE 4. Selected references on Hunting Island beach erosion and restoration projects.

-
- CSE Baird. 1998. Phase I – beach restoration alternatives for Hunting Island, South Carolina. Three volumes: Executive Summary, Technical Report, Appendices for SC Parks, Recreation & Tourism, Columbia, SC, 129 pp + appendices.
- Kana, T.W., and R.K. Mohan. 1998. Analysis of nourished profile stability following the fifth Hunting Island (SC) beach nourishment project. *Jour. Coastal Engineering*, Vol. 33, pp. 117-136.
- Van Dolah, R.F., V.J. Digre, P.T. Gayes, P. Donovan-Ealy, and M.W. Dowd. 1998. An evaluation of physical recovery rates in sand borrow sites used for beach nourishment projects in South Carolina. Final Report to SC Task Force on Offshore Resources and Minerals Management Service Office of International Activities and Marine Minerals; SCDNR, Charleston, SC, 76 pp. + appendices.
- CSE-Baird. 1996. Postproject borrow area survey: Hunting Island 1991 beach nourishment project. Survey Report to SC Dept. Parks, Recreation and Tourism, Columbia. CSE-Baird, Columbia, SC, 14 pp. + app.
- CSE. 1995. Hunting Island State Park 1991 beach nourishment project. Survey Report No. 5 to South Carolina Department of Parks, Recreation & Tourism, Columbia; Coastal Science & Engineering, Inc., Columbia, SC, 45 pp. + appendices.
- Kana, T.W., and C.J. Andrassy. 1995. Beach profile spacing: practical guidance for monitoring nourishment projects. In *Proc. 24th Intl. Conf. Coastal Engineering*, ASCE, New York, NY, pp. 2100-2114.
- CSE. 1994. Hunting Island State Park 1991 beach nourishment project, beach surveys. Survey Report No. 4 to South Carolina Department of Parks, Recreation & Tourism, Columbia; CSE, Columbia, S.C., 32 pp. + appendices.
- Kana, T.W., and C.J. Andrassy. 1993. Performance evaluation of recent South Carolina nourishment projects. Final Report, Contract DACW39-92-C-0115, USACE, Waterways Experiment Station, Vicksburg, Miss. CSE, Columbia, SC, 314 pp. + appendices.
- Krishnamohan, R., T.W. Kana, and C.J. Andrassy. 1993. Comparison of geotechnical properties of beach fill versus borrow area sediments for the fifth Hunting Island (SC) beach nourishment project. Tech. Report, Contract DACW39-92-C-0110, USACE, WES, Vicksburg, Miss. CSE, Columbia, SC, 48 pp. + appendices.
- CSE/CSA. 1992. Hunting Island State Park beach nourishment project: environmental surveys. Final Report to South Carolina Department of Parks, Recreation & Tourism, Columbia; CSE with Coastal Science Associates, Inc., Columbia, SC, 31 pp.
- CSE. 1991. Geotechnical study for the Hunting Island beach nourishment project. Technical Report for South Carolina Department of Parks, Recreation and Tourism. CSE, Columbia, S.C., 35 pp. + appendices.
- CSE. 1990. Erosion assessment and beach restoration alternatives for Hunting Island, South Carolina. Feasibility Report for South Carolina Department of Parks, Recreation and Tourism. Coastal Science & Engineer, Inc. (CSE), Columbia, S.C., 66 pp. + appendices.
- McCreesh, C.M. 1982. A beach process-response study at Hunting Island, South Carolina. M.S. Thesis, Dept. Geol., Univ. South Carolina, Columbia, 72 pp.
- Zarillo, GA, WE Jones, and CM McCreesh. 1981. Beach erosion and shoreline processes: Hunting Island, South Carolina. Dept Geol, Univ South Carolina, Columbia, 88 pp.
- Sill, B.L., J.S. Fisher, and B.L. Edge. 1981. Hunting Island, South Carolina, hydraulic model studies. Dept. Civil Eng., Clemson Univ., South Carolina, 27 pp.
- Stapor, F.W., Jr., and J.P. May. 1981. Sediment transport at Hunting Island, South Carolina. South Carolina Marine Resources Research Institute and The Citadel, Charleston, SC, 48 pp.
- London, J.B., et al. 1981. A study of shore erosion management issues and options in South Carolina. South Carolina Sea Grant Consortium, Charleston, 246 pp.
- USACE. 1977. Hunting Island Beach, South Carolina: project evaluation and proposals for FY 1977 construction. U.S. Army Corps of Engineers, Charleston District, 37 pp.