ENVIRONMENTAL IMPACT STATEMENT
APPENDIX J: Federal Consistency Determination for the South Carolina Coastal Zone Management Program

SAVANNAH HARBOR EXPANSION PROJECT

Chatham County, Georgia and Jasper County, South Carolina

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US Army Corps of Engineers
Savannah District
South Atlantic Division

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Federal Consistency Determination
for the
South Carolina Coastal Zone Management Program

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Federal Consistency Determination
South Carolina Coastal Zone Management Program

1.0 SUMMARY DETERMINATION

The Federal Coastal Zone Management Act (CZMA), 16 U.S.C. 1451 et seq., as amended, requires each Federal agency activity performed within or outside the coastal zone (including development projects) that affects land or water use, or natural resources of the coastal zone to be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs. A direct Federal activity is defined as any function, including the planning and/or construction of facilities that is performed by or on behalf of a Federal agency in the exercise of its statutory responsibilities. A Federal development project is a Federal activity involving the planning, construction, modification or removal of public works, facilities or other structures, and the acquisition, use or disposal of land or water resources.

To implement the CZMA and to establish procedures for compliance with its Federal consistency provisions, the US Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), has promulgated regulations which are contained in 15 C.F.R. Part 930. This Consistency Determination is being submitted in compliance with Part 930.30 through 930.44 of those regulations.

NOAA approved South Carolina's Coastal Management Plan (SCCMP) in 1977. Since the proposed action would affect estuarine waters and adjacent wetlands, the proposed action must be evaluated to determine its consistency with the State's CMP. This evaluation will be included in the Environmental Impact Statement (EIS) that is prepared for this proposal. This Consistency Determination will be submitted to the Office of Ocean and Coastal Resource Management of the South Carolina Department of Health and Environmental Control for review and approval.

The information contained within this Consistency Determination is derived primarily from the EIS prepared for the proposed action. References to that document are included in some of the discussions on the Project's compliance with certain individual state policies. Should further information concerning the proposed project be desired, please refer to the EIS, of which this Determination is a component.

In accordance with the CZMA, the US Army Corps of Engineers, Savannah District, has determined that the proposed deepening of the Federal navigation channel would be carried out in a manner that is fully consistent with the enforceable policies of the South Carolina Coastal Management Program. The evaluations supporting this determination are presented in Sections 6.00 and 11.00 of this document. In addition, this determination is supported by information and analysis in the EIS, which is incorporated by reference to

the extent relevant to South Carolina coastal zone consistency issues.

The proposed deepening would not adversely impact any beaches or dunes in South Carolina. Activities that would affect the coastal zone of South Carolina include deepening of the inner harbor and deepening and extending the entrance channel. Sediments that would be removed from the inner harbor channel would be placed into existing upland confined disposal facilities (CDFs) along Savannah Harbor including 12A, 12B, 13A, 13B, 14A, 14B and Jones/Oysterbed Island which are located in Jasper County, South Carolina. Sediments from the entrance channel would be placed in the Offshore Dredged Material Disposal Site (ODMDS) or one of the existing CDFs. Other activities associated with the proposed channel deepening project that would affect the coastal zone of the State of South Carolina include implementation of some of the mitigation features of the project which would include dredging in Little Back River to increase freshwater flows in that stream, construction of a flow diversion structure in McCoys Cut, a closure structure in the lower end of McCoys Cut, construction of a submerged berm in Back River across the mouth of the Sediment Basin, and removal of the Tidegate abutment in Back River on the South Carolina side of the river. Some of the concrete removed from the Tidegate would be placed along the bank of Back River and other appropriate locations to provide fish habitat.

The CDFs will continue to be used for the placement of maintenance sediments from the improved channel. The footprint of the existing diked CDFs will not be expanded as a result of the proposed action. Dike raising is performed from the inside of the CDF to prevent further encroachment into adjacent wetlands.

This Determination has been updated since the November 2010 Draft EIS which SC DHEC reviewed concerning the project's consistency with the State's Coastal Management Programs. The update is primary the result of new information that was developed or became available since the Draft EIS. Substantive information that Savannah District provided to SC DHEC since the Draft EIS can be found in Appendix N, Agency Coordination.

2.0 BACKGROUND

2.1 Purpose

This Consistency Determination addresses the consistency of the proposed deepening of the Savannah Harbor Navigation Project with the South Carolina Coastal Management Programs (CMP) as required by the Federal Coastal Zone Management Act (CZMA). Savannah Harbor was last deepened in 1993/1994. Since that time, container vessels have grown in size. In excess of 70% of the vessels do not call on Savannah Harbor at their maximum capacity or design draft. The "light loading" of vessels increase costs to the shipper, which are eventually passed onto the consumer. Smaller, less efficient vessels generally result in higher shipping costs. This situation is expected to worsen as the larger, Post-Panamax vessels replace the older, smaller vessels in the

near future. Studies indicate that harbor deepening is the only viable alternative to solve these problems. The proposed deepening of the Federal Navigation Project will not increase ship traffic volume calling at the port but would allow vessels to be loaded to their maximum capacity or design draft.

The SHEP EIS and GRR were prepared as directed by the authorization for the project which was provided in the Water Resources Development Act of 1999 (Public Law 106-53, Section 102 (b)(9)). The project was authorized to include (1) an analysis of the impacts of project depth alternatives ranging from 42 feet through 48 feet, and (2) a selected plan for navigation and an associated mitigation plan as required under Section 906 (a) of the Water Resources Development Act of 1986 (33 U.S.C. 2283 (a)).

2.2 Authority

The Federal Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451 et seq., as amended, is the legislative authority regarding the consistency of Federal actions with state coastal policies. Section 1456(c)(1)(A) of the CZMA states: "Each Federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall he carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs." A Federal activity is defined as any function, including the planning and/or construction of facilities that is performed on behalf of a Federal agency in the exercise of its statutory responsibilities.

To implement the CZMA and to establish procedures for compliance with its federal consistency provisions, the US Department of Commerce, National Oceanographic and Atmospheric Administration, has promulgated regulations, 15 C.F.R. Part 930. This Consistency Determination was prepared in compliance with § 930.30 through 930.44 of those regulations.

3.0 PROJECT DESCRIPTION

3.1 Identification of Alternatives

The Savannah Harbor Expansion Project involves various investigations relating to the feasibility and need to deepen the Savannah Harbor Navigation Project. The six detailed alternative plans evaluated include the No Action Alternative (maintaining the existing inner harbor depth of -42 feet MLW between Stations 000+000 and 103+000) as well as deepening the inner harbor channel to -44, -45, -46, -47 or -48 feet MLW. All five of the alternative plans that would provide for deepening of the existing -42 foot channel would include deepening and expanding the existing Kings Island Turning Basin, deepening of eight container vessel berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9), construction of two meeting areas, construction of two bend wideners along the inner harbor, deepening the existing entrance channel, extending the entrance channel from its end at Station -60+000B, and construction of a bend widener in the entrance channel (Station -14+000B to -23+000B).

All of the proposed deepening alternatives are designed to maintain the existing side slopes of the channel. Although maintaining the existing side slopes would result in a narrower channel, this design would reduce the environmental impacts associated with deepening the harbor by confining the dredging impacts to the existing channel... Consequently, the adjacent marine and estuarine habitat (substrate and tidal marsh) would not be adversely impacted. Moreover, by not disturbing the existing channel side slopes, sedimentation and shoaling within the new deeper channel would be minimized. The navigation channel side slopes will be 5H:1V in the entrance channel area (Stations 0+000 to -98+600B) and 3H:1V in the rest of the harbor. 5H:1V and 3H:1V means for every 5 and 3 feet of horizontal distance there would be a change of 1 foot of vertical distance. Although maintaining the existing side slopes of the channel would greatly reduce the adverse environmental impacts of the project, some channel widening would be necessary in those areas where the construction of meeting areas and bend wideners are required.

For all dredging alternatives, dredging depths will include 2 feet of allowable over depth and advanced maintenance (See Table 1 below). The practice of allowing 2 feet of over depth during dredging accounts for the inaccuracies of the dredging process. The practice of advance maintenance dredging (used in heavy shoaling areas) allows the project to remain at the authorized project depth between maintenance dredging cycles.

The environmental impacts and effects of the No Action Alternative and the five deepening plans are found in Chapters 4 and 5 of the EIS, respectively and in Tables 5 and 6 below. The following is a brief summary of the alternatives that have been evaluated in the EIS:

3.2 Alternatives

Six harbor deepening plans (i.e., No Action Alternative or the Without Project Condition, which is the existing project depth of -42 feet MLW, -44 feet MLW, -45 feet MLW, -46 feet MLW, -47 feet MLW, and -48 feet MLW) were considered in detail for Savannah Harbor. Please see Figure 1 below for a review of the project vicinity. All of the harbor deepening alternatives would include the existing Kings Island Turning Basin, the eight berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9), two proposed meeting areas (see Table 2), two proposed bend wideners (see Table 3). However, the length of the bar channel extension varies with the proposed depth alternative (Table 4).

All of the proposed deepening alternatives would produce a narrower channel at the project depth than currently exists by maintaining the existing side slopes. By slightly decreasing the channel width (by maintaining the existing side slopes at different depths), the adjacent marine and estuarine habitat (substrate and tidal marsh) would not be adversely impacted. Moreover, by not disturbing the existing channel side slopes, the effects on sedimentation and shoaling within the new deeper channel would be minimized.

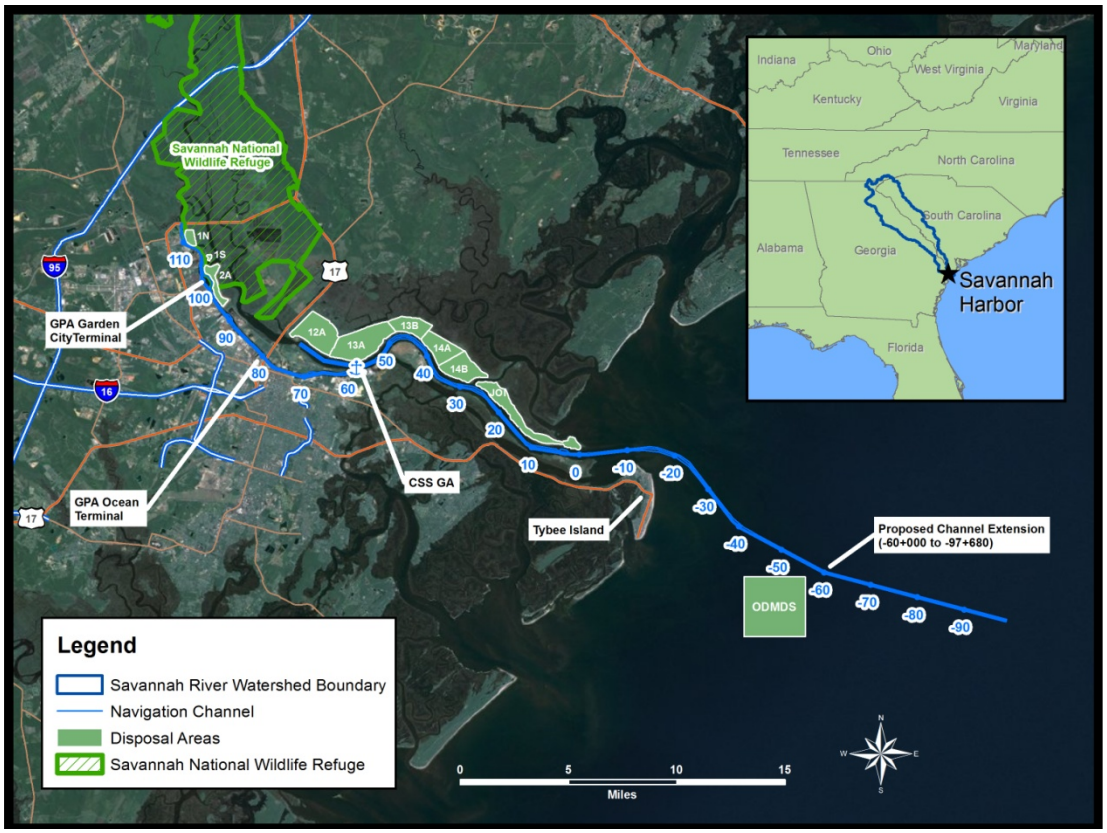

Figure 1. Current Savannah Harbor navigation project.

The navigation channel side slopes will be 5H:1V in the ocean bar area (Stations 0+000 to -98+600B) and 3H:1V in the rest of the harbor. 5H:1V and 3H:1V means for every 5 and 3 feet of horizontal distance there would be a change of 1 foot of vertical distance.

For all dredging alternatives, dredging depths will include 2 feet of allowable overdepth and advanced maintenance. The allowable overdepths and advance maintenance allow for dredging inaccuracies and help the project remain at project depth between maintenance events).

3.3 Alternative A: No Action Alternative (-42 feet depth MLW) or Without Project Condition

Savannah Harbor is an approximately 32 mile Federal navigation project located along the Savannah River in southeastern Georgia. The current Savannah Harbor Navigation Project (Figure 1) has an authorized project depth of 30 feet Mean Low Water (MLW) in the inner harbor (Stations112+000 to 105+000), 36 feet MLW (Stations 105+000 to 103+000), 42 feet MLW (Stations 103+000 to 0+000), 42 feet MLW in the entrance channel (Stations 0+000 to –14+000B), and 44 feet MLW in the remainder of the entrance channel (Stations –14+000B to –60+000B). The current channel width is 600 feet across the ocean bar to the entrance channel (Stations -14+000B to -60+000B), 500

feet from the entrance channel to Kings Island Turning Basin (Stations -14+000B to 103+000, with the exception of 400 feet wide from stations 58+000 to 59+000), 400 feet from the Kings Island Turning Basin to the Argyle Island Turning Basin, and 200 feet from the Argyle Turning Basin to the upstream limit of the authorized project.

Annual maintenance dredging requires the removal of about 6 million cubic yards of material from the inner harbor and about 1 million cubic yards of material from the entrance channel. Material removed from the inner harbor is placed in Confined Disposal Facilities (CDFs) located along Savannah Harbor. Material removed from the entrance channel is placed in the Savannah Harbor Offshore Dredged Material Disposal Site (ODMDS) or in submerged berms just south of the entrance channel. Use of these sediments to construct submerged berms in the nearshore area makes that material available to be moved by wave action towards the Tybee Island Beach.

3.4 Alternative B: -44-FOOT ALTERNATIVE MLW (2 FEET DEEPER). This plan would involve dredging the inner harbor (described in Section 3.3, above) to -44 feet (2 feet deeper) from the mouth of the harbor (Station 000+000) to the end of the project Station 103+000. Dredging improvements in the inner harbor would also include deepening and expanding the Kings Island Turning Basin and deepening of the eight container vessel berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9). Inner harbor channel deepening would also require the construction of two meeting areas (see Table 2, below), and two bend wideners (see Table 3, below). Improvements in the entrance channel would involve deepening of the existing channel to -46 feet MLW from Stations -14+000B to -60+000B. The depth of -46 feet MLW would extend an additional 35,680 feet for the ocean bar channel extension (from Stations -60+000B to -95+680B). A bend widener would be constructed between Station -14+000B and -23+000B. The total volume of excavated sediment associated with this project is about 10.3 million cubic yards. Estimated annual volume for maintenance dredging would be approximately 7.2 million cubic yards.

3.5 Alternative C: -45-FOOT ALTERNATIVE MLW(3 FEET DEEPER). This plan would involve dredging the inner harbor (described in Section 3.3, above) to -45 feet MLW (3 feet deeper) from the mouth of the harbor (Station 0+000) to the end of the project Station 103+000. Dredging improvements in the inner harbor would also include deepening and expanding the Kings Island Turning Basin and deepening of the eight container vessel berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9). Inner harbor channel deepening would also require the construction of two meeting areas (see Table 2), and two bend wideners (see Table 3). Improvements in the entrance channel would involve deepening of the existing channel to -47 feet MLW from Stations -14+000B to -60+000B and to -45 feet MLW from Stations -14+000B to Station 0+000. The depth of -47 feet MLW would extend an additional 36,880 feet for the ocean bar channel extension (from Stations -60+000B to -96+800B) (Table 4). A bend widener would be constructed between Station -14+000B and -23+000B. The total volume of excavated sediment associated with this project is about 14.6 million cubic yards. Estimated annual volume for maintenance dredging would be approximately 7.2 million cubic yards.

Table 1. Present Advance Maintenance Sections

Begin Station	End Station	Authorized Advanced Maintenance (feet)	Required Contract Depth (feet MLLW)
Inner Harbor			
112+500	105+500	2.0	32.0
105+500	103+000	2.0	38.0
103+000	102+000	0.0	42.0
102+000	100+000	2.0	44.0
100+000	79+600	2.0	44.0
79+600	70+000	2.0	44.0
70+000	50+000	4.0	46.0
50+000	37+000	4.0	46.0
37+000	35+000	6.0	48.0
35+000	24+000	4.0	46.0
24+000	0+000	2.0	44.0
Port Wentworth TB		0.0	30.0
Argyle Island TB		0.0	30.0
Kings Island TB		8.0	50.0
Marsh Island TB		0	34.0
Fig Island TB		4.0	38.0
Entrance Channel			
0+000	-14+000(B)	2	44.0
-14+000(B)	-60+000(B)	0	44.0

No advance maintenance is presently performed between Stations 58+000 and 59+000 to reduce potential impacts to the CSS GEORGIA, which is located along that reach.

Table 2. Proposed Two New Meeting Areas (see Figure 3-1)

Location	Description
GA waters: Station 14+000 to 22+000	The existing 400 foot wide channel would be widened 100 feet on the south to provide an average width of 500 feet. Side slopes would be 3H:1V.
GA and SC waters: Station 55+000 to 59+000	The existing 400 foot wide channel would be widened 100 feet to the north to provide an average width of 500 feet. Side slopes would be 3H:1V.

Table 3. Proposed New Channel Bend Wideners (see Figure 1-1)

Widener N	Location	Description
1	SC waters: Stations -23+000 to -14+000	76-foot bottom width plus side slope of ~20 feet. North side of channel.
2	GA waters: Stations 27+500 to 31+500	156-foot bottom width plus slide slope of less than 100 feet. North side of channel
3	SC waters: Stations 52+250 to 55+000	76-foot width plus slope of less than 100 feet. North side of channel.

Table 4. Length of Bar Channel Extension Required for Depth Alternatives

Length of Bar Channel Extension Required for Depth Alternatives		
Depth (Feet)	**Bar Channel Extension (Stations)**	**Length of Extension (Feet)**
44	-60+000B to -95+680B	35,680
45	-60+000B to -96+880B	36,880
46	-60+000B to -97+510B	37,510
47	-60+000B to -97+680B	37,680
48	-60+000B to -98+600B	38,600

3.6 Alternative D: -46-FOOT ALTERNATIVE MLW (4 FEET DEEPER). This plan would involve dredging the inner harbor (described in Section 3.3 above) to -46 feet MLW (4 feet deeper) from the mouth of the harbor (Station 000+000) to the end of the project Station 103+000. Dredging improvements in the inner harbor would also include deepening and expanding the Kings Island Turning Basin and deepening of the eight container vessel berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9). Inner harbor channel deepening would also require the construction of two meeting areas (see Table2, above), three bend wideners (see Table 3, above). Improvements in the entrance channel would involve deepening of the existing channel to -48 feet MLW from Stations-14+000B to -60+000B and -46 feet MLW from Station -14+000B to 0+000. The depth of -48 feet MLW would extend an additional 37,510 feet for the ocean bar channel extension (from Stations -60+000B to -97+510B) (Table 4). A bend widener would be constructed between Station -14+000B and -23+000B. The total volume of excavated

sediment associated with this project is about 19.0 million cubic yards. Estimated annual volume for maintenance dredging would be approximately 7.2 million cubic yards.

3.7 Alternative E: -47-FOOT ALTERNATIVE MLW (5 FEET DEEPER). This plan would involve dredging the inner harbor (described in Section 3.3, above) to -47 feet MLW (5 feet deeper) from the mouth of the harbor (Station 000+000) to the end of the project Station 103+000. Dredging improvements in the inner harbor would also include deepening and expanding the Kings Island Turning Basin and deepening of the eight container vessel berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9). Inner harbor channel deepening would also require the construction of two meeting areas (see Table 2, above), three bend wideners (see Table 3, above). Improvements in the entrance channel would involve deepening of the existing channel to -49 feet MLW from Stations 0+000B to -60+000B and -47 feet MLW between Stations -14+000B and 0+000. The depth of -49 feet MLW would extend an additional 37,680 feet for the ocean bar channel extension (from Stations -60+000B to -97+680B) (Table 4). A bend widener would be constructed between Station -14+000B and -23+000B. The total volume of excavated sediment associated with this project is about 23.6 million cubic yards. Estimated annual volume for maintenance dredging would be approximately 7.2 million cubic yards.

3.8 Alternative F: -48-FOOT ALTERNATIVE MLW (6 FEET DEEPER). This plan would involve dredging the inner harbor (described in Section 3.3, above) to -48 feet MLW (6 feet deeper) from the mouth of the harbor (Station 000+000) to the end of the project Station 103+000. Dredging improvements in the inner harbor would also include deepening and expanding the Kings Island Turning Basin and deepening of the eight container vessel berths at Garden City Terminal (Berths 2, 3, 4, 5, 6, 7, 8, and 9). Inner harbor channel deepening would also require the construction of two meeting areas (see Table 2, above), three bend wideners (see Table 3 above). Improvements in the entrance channel would involve deepening of the existing channel to -50 feet MLW from Stations 000+000B to -60+000B and -48 feet MLW from Station -14+000B to 0+000. The depth of -50 feet MLW would extend an additional 38,600 feet for the ocean bar channel extension (from Stations -60+000B to -98+600B) (Table-4). A bend widener would be constructed between Station -14+000B and -23+000B. The total volume of excavated sediment associated with this project is about 28.3 million cubic yards. Estimated annual volume for maintenance dredging would be approximately 7.2 million cubic yards.

3.9 SELECTED PLAN

The District developed and evaluated five channel deepening alternatives, in addition to the No Action Alternative. Each channel deepening alternative contains mitigation features to address adverse environmental impacts that they would otherwise produce. With inclusion of the mitigation features, each depth alternative is environmentally acceptable. The 47-foot depth alternative is the National Economic Development (NED) Plan, the plan that maximizes net economic benefits to the Nation (See GRR). Under current Federal planning policy, the NED plan would be recommended for implementation unless there are overriding considerations that favor recommendation of another plan. Benefits that would accrue from the deepening of Savannah Harbor include

reductions in light loading of vessels and vessel delays. Shippers will also be able to use larger, more efficient vessels. The economic benefits increase with each additional increment of channel deepening. Environmental impacts associated with a shallower depth would be less than those associated with the NED plan, but the lesser impacts of the 44-foot depth, 45-foot depth, and 46-foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED Plan. The 47-foot depth alternative is the selected plan.

The State of Georgia has asked the Corps to consider the 48-foot depth alternative as the Locally Preferred Plan (LPP). After reviewing the comments on the Draft GRR and DEIS and after further discussions with the non-Federal sponsor, the Corps has selected the NED 47-foot depth alternative for implementation.

4.0 EFFECTS OF PROPOSED PROJECT

State-of-the-art hydrodynamic and water quality models were used to assess potential impacts of the project in the inner harbor. State-of-the-art models were also used to assess potential impacts in the nearshore area. The development of the various models was accomplished through coordination with the various Cooperating Agencies and state resource agencies. Development and approval of the inner harbor models occurred between 1999 and 2005. After the agencies approved use of the models on this project, the tools were applied and the modeling was performed (2006 and 2007). The project-related impacts (without mitigation) predicted by the various models for the deepening alternatives are summarized in Table 5.

Table 5. Summary of Project-Related Impacts Without Mitigation

	---------- DEPTH ALTERNATIVES ----------				
	44-Foot	**45-Foot**	**46-Foot**	**47-Foot**	**48-Foot**
Salinity	Move further into estuary	Same effect, but greater amount	Same effect, but greater amount	Same effect, but greater amount	Same effect, but greater amount
Freshwater Wetlands	-551 acres	-967 acres	-1,057 acres	-1,177 acres	-1,212 acres
Brackish Marsh	-7.2 acres	Same	Same	Same	Same
Dissolved Oxygen	Reductions at mid-depth and bottom	Same effect, but greater amount	Same effect, but greater amount	Same effect, But greater amount	Same effect, but greater amount
Fisheries	Loss (-) of Acceptable Habitat				
- Striped bass spawning	- 8.0 % (-83.0 acres)	- 12.2 % (-127.0 acres)	- 13.0 % (-135.0 acres)	-18.1 % (-188.0 acres)	- 19.7 % (-205.0 acres)
- Striped bass eggs	-9.7 % (-163.0 acres)	- 11.2 % (-188.0 acres)	- 15.9 % (-266.0 acres)	-20.5 % (-344.0 acres)	-24.5 % (-411.0 acres)
- Striped bass larvae	-13.5% (-76.0 acres)	- 18.6 % (-105.0 acres)	- 21.0 % (-119.0 acres)	-13.8 % (-78.0 acres)	- 13.8 % (-78.0 acres)
- American shad (Jan)	0 %	0 %	0 %	0%	0 %
- American shad (May)	0 %	0 %	0 %	0%	0 %
- American shad (Aug)	0 %	0 %	0 %	0 %	0 %
- Shortnose sturgeon adult (January)	- 0.5% (-20.0 acres)	- 0.5 % (-20.0 acres)	-0.8 % (-32.0 acres)	-0.8% (-32.0 acres)	-1.1 % (-44.0 acres)
- Shortnose sturgeon adult (August)	- 3.2 % (- 45.0 acres)	- 6.4 % (- 89.0 acres)	- 9.5 % (- 132.0 acres)	-13.3 % (185.0)	- 15.80 % (- 220.0 acres)
- Shortnose sturgeon juvenile (January)	-5.0 % (-86.0 acres)	-10.4 % (-179.0 acres)	-15.9 % (-274.0 acres)	- 19.0 % (-328.0 acres)	- 21.6 % (-373.0 acres)
- Southern flounder	- 0.3 % (-6.0 acres)	- 2.4 % (-45.0 acres)	- 2.4 % (-45.0 acres)	-7.8 % (-146.0 acres)	0.0 %
Chlorides @ City's M&I Water Treatment Plant	Max hourly increase of 77 mg/L	Max hourly increase of 105 mg/L	Max hourly increase of 121 mg/L	Max hourly increase of 149 mg/L	Max hourly increase of 170 mg/L
Drinking Water Aquifer	Same type of effect, but less than 45-foot alternative	Same type of effect, but less than 46-foot alternative	Same type of effect, but less than 47-foot alternative	Same type of effect, but less than 48-foot alternative	Increase flow through confining unit by 3-4%
Hurricane Surge	Minor, max increase in WSE of 0.3 feet	Minor, max increase in WSE of 0.5 feet	Minor, max increase in WSE of 0.6 feet	Minor, max Increase in WSE of 0.8 feet	Minor, max increase in WSE of 0.9 feet
Beach Erosion	Minor; within accuracy of evaluation	Same	Same	Same	Same
Bank Erosion due to ship traffic	No measurable addition to ongoing erosion	Same	Same	Same	Same
Shoaling	Minimal upstream shift	Same	Same	Same	Same
Velocity	Theoretical reduction, but not measurable	Same	Same	Same	Same

After the expected impacts to these resources were identified, the hydrodynamic and water quality models were used to evaluate ways to reduce those impacts. Major impacts of concern that were evaluated included a predicted increase in upstream salinity levels and a decrease in dissolved oxygen levels that would be caused by harbor deepening. A flow diversion plan was developed for each depth alternative that decreases the amount of salty water entering Middle River and Little Back River and increases the amount of freshwater entering these streams. Consequently, these mitigation plans would minimize the adverse affects to tidal freshwater marsh, Striped bass habitat, and Shortnose sturgeon habitat that would result from increased salinity levels.

Additional studies identified oxygen injection as being the best method to improve dissolved oxygen levels in the harbor. Mitigation of low dissolved oxygen levels caused by harbor deepening would require the injection of oxygen at various locations in Savannah Harbor. The exact locations where oxygen injection would be required and the amount of oxygen that would have to be injected depend on the deepening alternative selected. The mitigation plan for the 47-foot project includes construction and operation of three oxygen injection systems, all in Georgia. Two of these systems would be located on Hutchinson Island (one discharging in Back River and one discharging in Front River) while the third system would be located upstream of the Georgia Highway 25 crossing near Georgia Power's Plant McIntosh. Table 6 shows the impacts of the deepening alternatives with the flow diversion and oxygen injection plans in place.

Even with the flow diversion plan and oxygen injection, impacts to Striped bass habitat, Shortnose sturgeon habitat, and tidal freshwater wetlands would not be totally mitigated (See Table 6). Consequently, other mitigation features of the project include funding for the Georgia Department of Natural Resources to stock Striped bass in the Savannah River, construction of a fish passage facility at New Savannah Bluff Lock and Dam to benefit Shortnose sturgeon, and purchase of lands to be deeded to the US Fish and Wildlife Service for preservation. The mitigation plan for the project also includes restoration of 40.3 acres of estuarine emergent wetlands in Disposal Area 1S in Savannah Harbor as in-kind mitigation for wetlands that would be excavated as a result of the Kings Turning Basin expansion, removal of the Tidegate Structure end walls, and other project requirements.

Table 6. Summary of Project-Related Impacts With Mitigation

	---------- DEPTH ALTERNATIVES ----------				
	44-Foot	**45-Foot**	**46-Foot**	**47-Foot**	**48-Foot**
Salinity	Move further into estuary up Front River	Same effect, but greater amount	Same effect, but greater amount	Same effect, But greater Amount	Same effect, but greater amount
Freshwater Wetlands (Conversion)	+ 322 acres	- 32 acres	- 201 acres	-223 acres	- 337 acres
Brackish Marsh (Conversion)	+ 488 acres	+ 861 acres	+959 acres	+964 acres	+1068 acres
Salt Marsh (Conversion)	- 808 acres	-828 acres	-757 acres	-740 acres	-730 acres
Brackish Marsh (Loss)	-15.68 acres	Same	Same	Same	Same
Dissolved Oxygen	Minimal Net improvement	Same	Same	Same	Same
Fisheries	**Loss (-) or Gain (+) of Acceptable Habitat**				
- Striped bass spawning	- 2.9 % (-30.0 acres)	- 9.2 % (-96.0 acres)	- 10.0 % (-104.0 acres)	-13.5 % (-140.0 acres)	- 16.1 % (-167.0 acres)
- Striped bass eggs	- 9.4 % (-157.0 acres)	+5.2 % (+87.0 acres)	0 %	-11.1 % (-186.0 acres)	-10.8 % (-181.0 acres)
- Striped bass larvae	-5.6 % (-32.0 acres)	+ 1.7 % (+9.0 acres)	+ 5.6 % (+32.0 acres)	-5.0 % (-28.0 acres)	-3.5 % (-20.0 acres)
- American shad (Jan)	-0.2 % (- 9.0 acres)	-0.2 % (-9.0 acres)	- 0.2 % (-9.0 acres)	-0.2 % (-9.0 acres)	- 0.2 % (-9.0 acres)
- American shad (May)	- 0.2 % (-12.0 acres)	- 0.2 % (-11.0 acres)	- 0.2 % (-11.0 acres)	-0.2 % (-11.0 acres)	- 0.2 % (-11.0 acres)
- American shad (Aug)	-0.3 % (-16.0 acres)	-0.3 % (-15.0 acres)	-0.2 % (-11.0 acres)	-0.2 % (-11.0 acres)	-0.2 % (-11.0 acres)
- Shortnose sturgeon adult (January)	-3.9 % (-153.0 acres)	-4.6 % (-179.0 acres)	-6.2 % (-240.0 acres)	- 6.9 % (-266.0 acres)	- 8.4 % (-326.0 acres)
- Shortnose sturgeon adult (August)	+19.0 % (+260.0 acres)	+9.8 % (+134.0 acres)	+7.3 % (+100.0 acres)	+6.5 % (+89.0)	+2.8 % (+39.0 acres)
- Shortnose sturgeon juvenile (January)	- 6.7% (-220.0 acres)	- 7.0 % (-231.0 acres)	-7.3 % (-238.0 acres)	-7.6% (-251.0 acres)	-11.5 % (-376.0 acres)
- Southern flounder	+74.1 % (+1387.0acres)	+ 54.2 % (+1014.0acres)	+ 57.3 % (+1072.0acres)	+57.3 % (+1072.0acres)	+ 52.9 % (+989.0 acres)
Chlorides @ City's M&I Water Treatment Plant	Max hourly increase of 4 mg/L	Max hourly increase of 4 mg/L	Max hourly increase of 4 mg/L	Max hourly increase of 4 mg/L	Max hourly increase of 4 mg/L
Drinking Water Aquifer	Same type of effect, but less than 45-foot alternative	Same type of effect, but less than 46-foot alternative	Same type of effect, but less than 47-foot alternative	Same type of effect, but less than 48-foot alternative	Increase flow through confining unit by 3-4%
Hurricane Surge	Minor, Max increase in WSEL = 0.5 ft	Minor, Max increase in WSEL = 0.6 ft	Minor, Max increase in WSEL = 0.7 ft	Minor, Max Increase in WSEL= 0.8ft	Minor, Max increase in WSEL = 0.8 ft
Beach Erosion	Minor; within accuracy of evaluation	Same	Same	Same	Same
Bank Erosion due to ship traffic	No measurable addition to ongoing erosion	Same	Same	Same	Same
Shoaling	Minimal upstream shift	Same	Same	Same	Same
Velocity	Theoretical reduction, but not measurable	Same	Same	Same	Same

The project's mitigation plan (Appendix C) includes funding for the Georgia Department of Natural Resources to stock Striped bass fingerlings in the lower Savannah River to compensate for the loss of spawning, egg, and larvae habitat. The project's monitoring and adaptive management plan (Appendix D) includes a study during the post-construction monitoring to quantify the impacts on Striped bass habitat. The hydrodynamic and water quality models would be used along with the field data collected to assess project impacts on Striped bass habitat. Further mitigation could be provided should the results of this study indicate that to be appropriate.

A horseshoe rock ramp fish passage structure at New Savannah Bluff Lock and Dam was proposed in the DEIS as mitigation for the loss of Shortnose sturgeon habitat in the lower Savannah River. This fish passage facility would permit Shortnose sturgeon (and other species of anadromous fish to move above the dam to traditional upstream spawning areas. Comments on the DEIS indicated that some of the resource agencies had concerns about the fish passage efficiency of the horseshoe design (mainly based on flow volume through the structure). As a result, the Corps convened a fish passage workshop in April 2011. Based on the guidance received at that workshop and later coordination with NOAA Fisheries, the Corps revised the fish passage design (off-channel rock ramp) at the New Savannah Bluff Lock and Dam. This structure would capture much more of the river flow (100% vs 5%), which is expected to produce a much higher fish passage effectiveness (See Appendix C for more details).

As shown in Table 6, the project would have both indirect and indirect effects on wetlands. Approximately 15.68 acres (14.83 acres in Georgia and 0.85 acres in South Carolina) of brackish marsh would be lost as a result of various excavation requirements of the project. The excavation requirements (in regards to the amount of wetlands that would be affected) for all five channel depth alternatives are the same. Approximately 2.2 acres would be removed at Station 102+600 and 0.8 acres would be removed as part of the Kings Island Turning Basin expansion. The project would remove brackish marsh from two locations on Hutchinson Island, where approximately 3.4 acres would be excavated at Station 88+000 and 0.8 acres at Station 70+00. The project also includes the removal of the Tidegate Structure abutments on both the Georgia and South Carolina sides of the river. Removal of the Tidegate abutment on the Georgia side would result in the loss of about 7.63 acres of brackish marsh while about 0.85 acres would be lost on the South Carolina side of the River.

The project's mitigation plan includes restoration of 40.3 acres of brackish marsh in Disposal Area 1S to compensate for the loss of 15.68 acres of brackish marsh from project excavation requirements. Restoration of wetlands on this site would provide the required 138 wetland credits (28.8 acres using Savannah District Regulatory SOP) of in-kind mitigation for the impacts of the project. The additional 11.5 acres of wetland restoration would be used by the Corps for any additional wetland mitigation needs of the SHEP or mitigation needs associated with the operation and maintenance of the Savannah Harbor Navigation Project.

As discussed in the previous paragraphs, indirect impacts associated with the proposed deepening would result in a vegetative shift in 223 acres of tidal freshwater marsh to brackish marsh with implementation of the selected plan (47-foot channel depth alternative) even with the flow routing. Approximately 740 acres of saltmarsh may also shift to more brackish species as a result of the flow rerouting to provide more freshwater in Little Back and Middle Rivers. As previously discussed, the Corps used the EFDC model to evaluate both existing stream salinity levels and salinity levels that would occur with the various channel deepening alternatives in place. However, the EFDC model does not directly predict marsh salinity. Consequently, determining the existing wetland species composition in the estuary, as well as predicting how these species would change with the various channel deepening alternatives, was accomplished using a method where riverine surface salinity levels are extrapolated across the adjacent marshes. This method creates contours that divide the marsh into 5 salinity categories: 0-0.5 ppt, which is considered freshwater, 0.6-1.0 ppt, 1.1-2.0 ppt, 2.1-4.0 ppt, and >4.0 ppt. In turn, distinctions between marsh types and acreage were defined based on the following salinity ranges: (0-0.5 ppt) Freshwater Marsh, (0.5-4 ppt) Brackish Marsh, and (>4ppt) Saltmarsh.

The results of the functional assessment concluded that the differentiation between salt marsh and brackish marsh recommended by the Wetland Interagency Coordination Team and used in the DEIS was somewhat constrained. The salinity range used in the SHEP to differentiate between brackish marsh (0.6-4 ppt) and salt marsh (> 4ppt) was restrictive, given that brackish marsh salinities have been reported with a range from 0.5-10 ppt (NOAA, 2010) and in other estuarine systems from 0.5-17 ppt (Judd and Lonard, 2004). An earlier assessment of wetland vegetation coinciding with the salinity range reported for brackish marsh systems (i.e., 5-10 ppt) which occur within the area of potential effect, also supports those findings. The EFDC value for saltmarsh (> 4.0 ppt) is approximately 2.5 times less than that reported by NOAA (2010). Additionally, the NOAA (2010) range for brackish marsh includes areas determined by the EFDC model to be saltmarsh. When considering values reported in the literature, the acreage of saltmarsh conversion (740 acres) which was calculated using the EFDC model is a very inclusive value and includes existing vegetative areas that would not transition to brackish marsh flowing deepening because these areas currently exist within the salinity range of a brackish marsh (0.5-10 ppt). Thus, the salinity range used to quantify salt marsh in the area of potential effect (i.e., > 4 ppt) likely over-estimated the amount of saltmarsh in the system and under-estimated the amount of brackish marsh. As such, the described conversion of salt marsh to brackish marsh, which was calculated to occur as a result of harbor deepening, would likely be much less if one takes into account vegetative characteristics for wetland environments with associated salinities that are more commonly associated with a brackish marsh (i.e., range between 0.5 and 10 ppt).

Given the wide range of salinity reported in literature for brackish marsh systems, the inherent variability in salinity that exists for all estuarine systems, and the modeling results that report post-deepening salinity concentrations consistent with the aforementioned range, Savannah District concludes that the 740-acre calculated conversion of saltmarsh to brackish marsh if the harbor is deepened to 47-feet is

conservative, with actual vegetative shifts unlikely to be identifiable *in situ* in Savannah. That said, the District was inclusive in its assessment of the potential for project-related effects and elected to include the saltmarsh and brackish marsh conversion in its calculation of minor impacts.

The conversion of 223 acres of freshwater wetland to brackish marsh represents the only significant wetland conversion that is likely to be noticeable if the harbor is deepened to 47 feet as proposed. It is important to note that the ecological values of the impacted 223 acres of freshwater wetlands would not be completely lost. Instead, those acres would be converted to brackish marsh. The Corps' calculation of the number of acres of freshwater wetland that have the potential to be converted to brackish marsh is based on a shift in the location of 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater marsh and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation (from freshwater marsh to brackish marsh) in this estuary does not occur until salinity concentrations approach 2.5 ppt (Latham et al., 1994). Even at oligohaline marsh sites with average salinity concentration of 2.1 ppt, a discriminant function (DF) analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification (Latham et al., 1994).

Deepening the harbor to a 47-foot depth would result in a conversion of the dominant vegetative species typically observed in approximately 223 acres of freshwater marsh (freshwater to brackish marsh scenario). It is important to note that many of the emergent plant species associated with freshwater marsh systems would still be readily observed in environments that have been defined as brackish marsh (Latham et. al., 1994). Likewise, the 47-foot depth would result in a conversion of the dominant vegetative species typically observed in 740 acres of saltmarsh (saltmarsh to brackish marsh scenario), and dominant saltmarsh species like *Spartina alterniflora* would still be observed in areas which have salinities that define a brackish marsh. However, the overall basic wetland functions typically associated with these systems would not change. A comparison of potential changes in elements of wetland function for both conversion scenarios is provided in the following table.

Table 7. Change in Wetland Function as a Result of Wetland Conversion

Elements of Wetland Function	Freshwater to Brackish Marsh (Approximately 223 acres)	Saltmarsh to Brackish Marsh (Approximately 740 acres)
Water Purification	Negligible	Negligible
Flood Protection	Negligible	Negligible
Shoreline Stabilization	Negligible	Negligible
Groundwater Recharge	Negligible	Negligible
Streamflow Maintenance	Negligible	Negligible
Retention of Particles	Negligible	Negligible
Surface Water Storage	Negligible	Negligible
Subsurface Storage	Negligible	Negligible
Nutrient Cycling	Negligible	Negligible
Values to Society	Negligible	Negligible
Fish and Wildlife Habitat	Minor Adverse	Negligible

Negligible Effect – the effect on the resource would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resource.

Minor Effect – the effect on the resource is measurable or perceptible, but it is slight.

Adverse Effect: the action is contrary to the interest or welfare of the resource; a harmful or unfavorable result

As illustrated in the table above, the only indirect effect the 47-foot project would have on the function of these wetlands systems would be associated with fish and wildlife habitat. All other elements of wetland function associated with predicted shifts in wetlands classification would be negligible as a result of the anticipated increase in salinity. It should be noted that areas of Savannah Harbor identified as saltmarsh or brackish marsh support similar fish and wildlife species (Jennings and Weyers, 2003). Any anticipated conversion of saltmarsh to a brackish marsh system would have a negligible impact on the overall function of the wetland system. USACE recognizes that a comparison of fish and wildlife habitat between freshwater and brackish marsh systems yields fewer similarities. However, the conversion in fish and wildlife habitat will still be minor when considering the total function of the wetland and continued existence of some freshwater vegetation after deepening in wetland areas that would be classified as brackish marsh. For additional information pertaining to the functional assessment, please see Section VII Consideration of Final Compensatory Mitigation Rule.

Since there would be a minor adverse effect to the fish and wildlife habitat function in 223 acres of tidal freshwater wetlands if the selected plan is implemented, an assessment was conducted to determine how to best mitigate for that impact. Once the extent of the impacts to wetlands was known, the Corps consulted natural resource agencies, the Stakeholders Evaluation Group, and other NGOs. No sites could be identified where

tidal freshwater restoration or creation was feasible. Consequently, the acquisition and preservation of lands that would be ecologically significant to the Savannah National Wildlife Refuge was determined to be appropriate mitigation.

The Corps has completed its initial assessment of properties in the SNWR's Acquisition Plan to determine potential properties that could meet the wetland mitigation needs of the SHEP. This assessment (Consideration of 2008 USEPA/USACE Mitigation Rule) is in Appendix C. The lands proposed for preservation consist of bottomland hardwoods, maritime forest and uplands dominated by deciduous forest and regrowth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure wildlife habitat is protected in perpetuity. Moreover, the additional lands would buffer the SNWR from future threats of development such that changes in land use would not occur immediately adjacent to existing areas of the Refuge that do contain estuarine emergent wetland characteristics. Thus, the acquisition and preservation of 2,245 acres of wetland and upland buffer would provide a functional replacement for the minor conversion of the only wetland function (i.e., fish and wildlife habitat) that would be expected as a result of the 223 acre freshwater to brackish marsh conversion.

The effects of the proposed work are described in detail in Section 5.0 of the Environmental Consequences of the DEIS. The Mitigation Plan can be found in Appendix C of the DEIS.

5.0 OTHER AREAS OF ENVIRONMENTAL CONCERN

Some of the major environmental concerns associated with the SHEP have been previously addressed in this document. Other environmental concerns include the dredging and disposal of sediments with high concentrations of cadmium, beach erosion, possible impacts to the Floridan aquifer, and impacts to Threatened and Endangered Species. These impacts are discussed in detail in Section 5.0, Environmental Consequences, of the EIS and the Mitigation Plan in Appendix C.

5.1 Contaminated Sediments

Three rounds of sediment sampling and analysis were performed for the Savannah Harbor Expansion Project. Each round built upon the results of the previous work. The second round of sampling was performed in 2005 and the analysis was completed in 2006. The conclusions from that evaluation were that the only sediment contaminant of concern for this project is naturally-occurring cadmium found in Miocene clays that would be dredged and/or exposed during construction. The highest concentrations of cadmium (average 21.45 mg/kg) are found between Stations 16+000 and 45+000 (River Mile 3.0 to 8.5) and medium concentrations (average 6.67 mg/kg) are found between Stations 45and000 to 94+000 (River Mile 8.5 to 17.8).

Additional studies were conducted in 2007 to assess the potential pathways by which cadmium could enter the environment during the dredging and disposal process. The additional studies included the following activities:

- Sediment Profile Imaging to locate/verify exposed Miocene clays and assess the potential existence of benthic communities in the clay;
- Side scan sonar survey to identify and map bottom characteristics in the channel;
- Benthic community assessment;
- Sediment sample collection (vibracoring 6 ft into Miocene clay at four locations in the navigation channel, reference sediment sampling, and upland reference soil sampling);
- Collecting dredging water from one location in the Federal navigation channel and one receiving water location in Fields Cut;
- Compositing and processing sediment cores to create "high cadmium" and "low cadmium" composite samples for further testing;
- Analytical testing of bulk sediment, standard elutriates, effluent elutriates, dredging water, and receiving water samples;
- Analytical testing of porewater and SLRP samples at the high cadmium locations only;
- Aquatic bioaccumulation studies and plant uptake studies using high and low cadmium composites; and
- Risk evaluation and report preparation.

Based on the results of the above studies, the following conclusions were reached relative to the dredging and disposal of cadmium enriched sediments associated with the SHEP:

A. The existing bottom habitats within the Savannah Harbor Navigation Channel support benthic communities that are diverse and provide an available food resource.

B. Although substantial benthic communities reside in the clay/sand veneer substrates which have naturally occurring high levels of cadmium, studies indicate that the cadmium is not freely soluble or readily bioavailable to organisms.

C. High cadmium composite samples (average concentration of 30 mg/km) and low cadmium composite samples (average of 15 mg/kg) were created from bottom sediments and used for physical and chemical analyses, standard and effluent elutriate creation, simplified laboratory procedure (SLRP), aquatic bioaccumulation testing, and plant uptake studies.

D. Sequential Extraction Procedures (SEP) were used to determine the amount of metal bound in different fractions of the sediment or soil. SEP results can be used to predict the metal concentrations that would most likely be available to aquatic organisms, plants, and wildlife. Results of the SEP for both the high cadmium and the low cadmium composite samples indicated that no cadmium was detected in the exchangeable fraction, and that about 98 percent of the cadmium in the Miocene layer was bound in relatively

insoluble forms. These results suggest that the majority of the cadmium is not freely soluble or readily bioavailable.

E. Analysis of site (dredging) water, receiving water, standard elutriate, and effluent elutriate results included both the total and dissolved fractions and comparisons of detected chemical constituents to Federal and state (South Carolina) saltwater acute and chronic water criteria for the protection of aquatic life. In the dredging and receiving water, nutrient and metal concentrations in both the total and dissolved fractions were low, and generally below the USEPA/South Carolina saltwater criteria for the protection of aquatic life. Cadmium was not detected in either the total or dissolved fraction of the dredging water sample or the receiving water sample.

F. Porewater analysis of two core samples collected from high cadmium locations indicate that concentrations of dissolved cadmium in the porewater were low and below the laboratory reporting limit and applicable water quality criteria.

G. For both the standard and the effluent elutriates, the concentrations of metals detected in the total fraction of the standard elutriates created using the high and low cadmium composite samples were high, exceeding South Carolina water quality criteria for the protection of aquatic life. However, cadmium concentrations did not exceed USEPA chronic saltwater criteria in the dissolved fraction of both the standard and the effluent elutriate samples. Therefore, the cadmium detected in the total fraction is most likely bound to the fine grained particles.

H. Aquatic bioaccumulation studies conducted were designed to evaluate the potential of benthic organisms to bioaccumulate contaminants of concern from the dredged material. These tests used *Nereis virens* (sand worm) and *Macoma nasuta* (blunt-nose clam) After 28 days of exposure using the high and low cadmium composite sample and a reference sediment sample from New River, none of the test sediments had significantly lower survival than the reference sediment. After the bioaccumulation testing, the organism tissues were analyzed. In the worm tissue, cadmium concentrations statistically exceeded the reference site tissue concentrations for tissue exposed to sediment from both the high and low cadmium composite samples. In the clam tissue, cadmium tissue concentrations from the high and low cadmium composite samples were not statistically different from the reference.

I. Plant uptake studies (45-day) were conducted using *Cyperus esculentus* (yellow nutsedge), the high and low cadmium composite samples and reference soil collected from a dike in one of the CDFs. Plant tissues were exposed to the prepared soils from the navigation channel. The mean concentration of cadmium in plant tissue exposed to the samples taken from the navigation channel statistically exceeded concentrations in reference tissue for both the high and low cadmium composite samples indicating that uptake from the soil to the plants occurred for each of these concentrations.

A risk assessment was conducted to identify the potential for impacts on human health or the environment from elevated cadmium concentrations in new work sediments that would be dredged. The risk assessment evaluated potential exposures and impacts of cadmium on aquatic and benthic organisms, wildlife, and fishermen in the Savannah River and on plants, aquatic and benthic organisms, and wildlife in the CDFs. The risk assessment reached the following conclusions:

A. Cadmium in new work sediments is not likely to cause adverse impacts to aquatic and benthic organisms in the Savannah River. This determination was based on the various tests that indicate that cadmium is bound to the sediments and not readily soluble and bioavailable to aquatic organisms.

B. While cadmium concentrations are likely to be elevated in sediment and water during and after dredging in Savannah Harbor, the limited bioavailability and bioaccumulation potential of cadmium results in relatively low doses to wildlife and no potential for adverse effects. This determination was based on risk analysis studies using food web ingestion models which were used to quantify exposures to evaluate potential adverse impacts to wildlife from cadmium in new work sediments that would be placed in the CDFs.

C. The predicted concentration in gamefish was below that protective of human health, indicating there are no adverse impacts to humans. This determination was based on model projections of concentration in flounder which were compared to fish tissue benchmarks protective of human consumption.

D. Cadmium concentrations in dredged material held in the CDFs in a wet condition and in effluent, runoff, and sediment discharged from the CDF are not likely to cause adverse impacts to plants in drainage areas and wetlands. This determination was based on the fact that while total concentrations of cadmium in sediment and water were elevated, the bioavailable concentrations in sediment and the dissolved concentrations of cadmium in effluent elutriates were below benchmarks protective of plants. Cadmium concentrations in the overlying water from the bioaccumulation tests were also below benchmarks.

E. Cadmium in sediments placed in the CDFs is not likely to cause adverse impacts to aquatic and benthic organisms in drainage areas impoundments, and wetland areas of the CDF. This determination is based on the fact that while total concentrations of cadmium in sediment and water were elevated above benchmarks, the bioavailability of cadmium is limited and unlikely to cause adverse impacts. Dissolved concentrations of cadmium in porewater, effluent elutriates, and overlying water from bioaccumulation tests were lower than benchmark concentrations protective of aquatic and benthic organisms. SEP analysis of the sediments demonstrated that more than 98 percent of the cadmium sediments are not likely to be bioavailable to aquatic and benthic organisms. Bioaccumulation tests indicate that test tissue concentrations of cadmium were either similar to reference concentrations or below no-effects residue benchmarks. The tests

also indicate that estimated tissue concentrations for higher trophic level fish were below no-effects residue benchmarks.

F. There is a strong indication that cadmium is not likely to cause adverse effects to wildlife using drainage areas, impoundments, and wetlands at the CDF. This determination is based on analyses using food web ingestion models to quantify exposures. The assessment evaluated exposures for birds and mammals that consume plants, fish, and benthic organisms, and modeled doses were compared to no-effects and lowest observable effects benchmarks. Great blue heron, spotted sandpiper, osprey, Canada goose, muskrat, and river otter were used as representative or surrogate receptor species.

G. Evidence from measurement endpoints indicates that there is a limited potential for adverse impacts to plant growth from cadmium in new work sediments placed in the CDFs. This determination is based on plant growth observed in the bioassays. Bioaccumulation test results indicated that plant tissue concentrations for high and low cadmium composites were higher than reference concentration, but the plant tissue concentrations were below tissue residue benchmarks. Plant growth in the bioassays was statistically significantly lower for plants grown on high in high and low cadmium composites than for control and reference treatments. This reduced plant growth may be related to cadmium concentrations and/or the fine grain size of the dredged material.

H. Cadmium concentrations in about 3 million cubic yards of dredged material to be discharged into the CDFs may cause adverse effects to wildlife using uplands. Approximately 7 million cubic yards of dredged material that would be removed from the inner harbor is cadmium-laden. About 4 million cubic yards of this material is expected to average 6.9 mg/kg cadmium which is below both no-effects and lowest observable effects limiting dose benchmarks. Approximately 3 million cubic yards of this material is expected to average 21.4 mg/kg cadmium which exceeds no-effects and lowest observable effects limiting dose benchmarks for soil. Risks to wildlife from cadmium in upland habitats were evaluated using food web ingestion models to quantify exposures. Models included site-specific bioavailability factors developed based on SEP analyses of the sediments and site-specific bioaccumulation factors developed based on sediment bioassays using plants. Modeled doses were compared to no-effects and lowest observable effects benchmarks. The assessment evaluated impacts for birds and mammals that consume plants, invertebrates, anode small mammals which included the song sparrow, marsh wren, red-tailed hawk, meadow vole short-tailed shrew and red fox. When modeled based on concentrations in sediment composites and effluent or runoff, modeled doses for song sparrow, marsh wren, and shrew for both low and high cadmium scenarios exceeded both no-effects and low-effects benchmarks. This indicates that there is a potential for adverse effects to these receptors.

Based on the findings of the various studies relating to the dredging and disposal of cadmium-laden sediments, a disposal and monitoring plan was developed for the Savannah Harbor Expansion Project. All of the cadmium-laden sediments that would be dredged would be deposited into existing CDFs 14A and/or 14B. These sediments would

be kept in a wet environment until a covering layer could placed on the material and sediment samples taken from that cover indicate that cadmium concentrations in the surface sediments are less than 4 mg/kg. Studies indicate that allowing the sediments in the CDF to dry changed the behavior of the cadmium in the sediments. Sequential extraction procedures on washed and dried sediment showed that cadmium becomes more available in the dried sediment. Plant uptake studies showed that plants can accumulate cadmium from dried sediments. An exposure model found that both birds and mammals exposed to the dried cadmium sediments are likely to accumulate cadmium at levels shown to have impacts. Following placement of cadmium-laden sediments, eighty-six (86) grab samples would be collected from a depth of 15 cm to characterize the cadmium levels of surface sediments. The sediments would then be covered with at least two feet of sediments that are expected to have cadmium concentrations of 4 mg/kg or less. After this cover has been applied, sediment samples would be obtained and analyzed. Eighty-six (86) grab samples would be taken from a depth of 30 cm and analyzed for cadmium. If cadmium levels in the cap are less than 4 mg/kg, the sampling would be considered complete. If cadmium levels in the cover are equal to or exceed 4 mg/kg in a cumulative area of 25 acres or greater, an additional cover of sediments from operation and maintenance dredging would be applied as soon as possible. Sediment sampling would then be conducted as previously performed. This process would be repeated until the concentration of cadmium in the samples was less than 4 mg/kg. The cadmium-laden sediments would remain in CDFs 14A and/or 14B and not used for other purposes (dike construction, etc.).

Monitoring would also include evaluation of the inflow and the effluent discharged from the disposal areas. Samples would be taken from the head section of the discharge pipe from the dredge and analyzed for cadmium. Samples of the effluent leaving the disposal area would be taken and analyzed to ensure that state water quality standards are being met. The Section 401 Water Quality Certification issued by the Georgia DNR-EPD requires cadmium concentrations to be monitored on a weekly basis at the point of discharge from the CDFs where cadmium-laden sediments are placed. Monitoring shall continue at these CDFs for as long as the discharge of effluent is present, and until all dredged sediments have been dewatered, stabilized and covered. Following the installation of a stable, clean cover, cadmium must be monitored for one year.

If analytical results indicate standards are not being met, corrective actions include reducing the pumping rate of the dredge and/or boarding up the weir to decrease the amount of effluent being discharged from the CDF.

Other monitoring efforts associated with cadmium-laden sediments include wildlife use surveys in CDFs 14A and 14B, vegetation sampling and removal (if required), and biological monitoring (bird tissue analysis)

The Corps would perform monthly wildlife surveys of the CDFs. These one-day surveys would record all birds and other major vertebrates seen within CDFs 14A and 14B. Monitoring would be performed during sediment placement and for 3 years after the placement is complete. If there is a concern about the number of birds or other animals

or a particular species using the CDFs, some type of hazing may be appropriate (with concurrence of the USFWS).

If analyses of the sediment samples from the cover show that concentrations of cadmium equal or exceed 4 mg/kg, vegetation sampling would be required. This sampling would be conducted on a quarterly basis in "hot spots" to determine cadmium uptake by plants. Samples collected from the CDFs would be compared to control samples taken from other, areas with low cadmium content found in adjacent CDFs. If vegetation samples have significantly elevated cadmium concentrations, efforts would be initiated to eradicate vegetation and/or place additional, low-cadmium sediments over the covering layer. These contingency measures would eliminate wildlife exposure should vectors for cadmium uptake be identified. Vegetation sampling would be considered complete once sustained cadmium concentrations in the surface sediments of the cap are less than 4 mg/kg.

Blood samples would be taken from birds and analyzed for cadmium prior to sediment placement in the CDFs (to obtain baseline data), during placement of cadmium-laden sediments and the cover and for 3 years afterward. The tissue monitoring protocols take into account the hydrologic conditions of the CDF (wet/ dry) and the season, since these factors greatly influence which birds are using the CDFs at a given time. Tissue (liver) samples would also be taken should the results of the samples taken during and after sediment placement show significantly higher cadmium levels than the baseline samples.

At the end of construction, sediment samples would be taken from the exposed channel bottom sediment surface and analyzed for grain size and metals (aluminum, iron, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver and zinc.) Analysis of the river bottom would provide an assessment of anticipated cadmium concentrations in sediments at the sediment/water interface.

The Georgia Section 401 Water Quality Certification also requires monitoring of maintenance dredging activities that would occur in areas of the channel with known high cadmium concentrations. Sediments to be dredged would require testing for cadmium from two locations that are representative of average sediment accumulation in that reach. This protocol would remain in effect for at least two maintenance dredging cycles and would continue if the sampling indicates cadmium levels of concern.

Details of cadmium monitoring are fully discussed in Appendix M.

5.2 Beach Erosion

It has been long surmised that construction and maintenance of the Savannah Harbor Navigation Project, particularly the entrance channel, plays a major role in beach erosion on Tybee Island. A study completed in 2008, Impact of Savannah Harbor Deep Draft Navigation Channel on Tybee Island Shelf and Shoreline" confirmed that construction and maintenance of the entrance channel and the construction of two large jetties near the mouth of the harbor have disrupted sediment pathways across the entrance channel. The major impacts of this disruption are loss of sand from the Tybee shelf which would be

available to move towards Tybee Island and erosion of the north end of the Tybee Island beach. The estimated combined shelf and shoreline impact at Tybee Island was calculated to be 78.5 percent. This means that an estimated 78.5 percent of the reduction in sand volume on the Tybee shelf and shoreline is due to the project. The remainder of the erosion is attributed to natural processes.

Further studies were conducted during the SHEP to evaluate the potential impacts of deepening of the inner harbor channel to -48 feet MLW and the entrance channel to -50 feet MLW on beach erosion at Tybee Island. These studies included a bathymetry and volume change analysis to obtain the historical perspective of the Savannah nearshore evolution, numerical modeling of circulation, waves, and sediment transport to compare pre-and post-deepening of the channel impacts on coastal processes. Based on this work, the following determinations were made:

1. Modeling results indicate that deepening of the entrance channel would result in only minor changes in nearshore wave patterns. Consequently, the proposed deepening project would be expected to have very little impact on the Tybee Island shoreline.

2. The circulation and wave modeling indicate very small changes associated with the proposed deepening project. The proposed deepening project would not change the general overall pattern of sediment transport in the region. The most noticeable changes were computed in the channel. Channel deepening would have only a negligible effect on the Tybee Island Shelf.

3. The current navigation channel appears to be nearly a complete sink for any sediment from moving north to south along the shelf. Placement of dredged material back into the nearshore zone of Tybee Island would be a means restoring this supply of sand to the Tybee Island beach system.

Based on the results of the studies conducted during the SHEP, much of the loss of sand from the Tybee Island shelf and the erosion of the north end of Tybee Island Beach can be attributed to the existing project. Consequently, this impact is an operation and maintenance issue.

Deepening of the Savannah Harbor project would have little impact on the Tybee Island shoreline or the Tybee Shelf.

The studies that were conducted (wave refraction, sediment budget, etc.) did not identify any substantial impacts to South Carolina beaches or nearshore areas.

5.3 Groundwater

Concern was raised during SHEP studies that deepening of the navigation channel could adversely affect the principal drinking water aquifer in the coastal area-the upper Floridan aquifer. The concern is that excavation of material required to deepen the harbor would allow saltwater to enter the freshwater aquifer, thereby degrading its quality and rendering it unacceptable for drinking purposes. Three potential pathways were identified whereby deepening of the navigation channel could possibly increase saltwater intrusion into the aquifer:

1. Deepening of the channel would require the removal of some of the top portion of the aquifer's protective layer (Miocene cap) which could result in saltwater intrusion into the aquifer.

2. Removal of sediments from paleochannels (former Pleistocene-age stream channels that have eroded into the Miocene cap) would increase the potential for intrusion into the aquifer.

3. Water with increased salinity levels could enter could enter aquifer via fractures or joints in the Miocene cap.

Various studies were conducted during the SHEP to address these issues. Based on the results of these studies, the following major conclusions were determined:

1. The primary cause of saltwater intrusion into the Floridan aquifer is long-term pumping from the aquifer to meet groundwater needs. The long-term pumping of water from the Upper Floridan aquifer and surrounding coastal counties has lowered ground water levels and reversed the seaward hydraulic gradient that existed before development. The increased withdrawal of water from the upper Floridan aquifer has resulted in a radial flow directed towards the center of pumping and a cone of depression beneath Savannah. Sustained pumping of water from the aquifer has also resulted in a downward hydraulic gradient and induced significant head differences between the surficial aquifer and the confined Upper Floridan aquifer. This effect has resulted in the downward intrusion of water through the Miocene layer into the aquifer.

2. Improvements (deepening) and maintenance of the Savannah Harbor Navigation Project have also had some impact on the downward migration of water through Miocene layer into the aquifer. Channel dredging has removed portions of the Pleistocene sands and Miocene clays that reside above the upper Floridan aquifer. GIS analysis conducted during the SHEP indicates that about 5 feet of the confining layer that protects the aquifer has been removed. Significant exposure of the Miocene layer appears to be a relatively recent event. GIS studies conducted during the SHEP also indicate that exposures of large stretches of the Miocene along the Bight Channel (Elba Island) and near the Kings Island Turning Basin appeared to have occurred between 1992 and 1998. Completion of the 42-foot project in 1994 may at least partially explain this observation. Although deepening of the navigation channel has removed some of the Miocene cap, GIS analysis

and groundwater model studies indicate that historical dredging has probably had minimal influence on the rate of saltwater intrusion into the aquifer.

3. Underneath the navigation channel, the overall thickness of the confining unit ranges from about 30 feet thick near the Tybee high to over 150 feet thick near downtown Savannah. Model studies indicate that the expected increase in the downward flow of saline water from the area underlying the navigation channel due to channel deepening would be very low. The area that would have to be dredged to deepen the channel to 48 feet MLW accounts for a total downward flow between 50 and 250 gallons per minute. Deepening the navigation channel increases the downward flow between 2 and 7 gallons per minute which translates to a 3-4 percent increase. This contribution is negligible when compared to groundwater production in the Savannah area from the aquifer which is about 80 million gallons per day (55,555 gallons per minute).

4. SHEP studies identified eight significant paleochannels that have incised deeply into the Miocene confining layer between Stations 30+000 and -30+000B. Groundwater model study results indicate that the impacts of dredging sediments within the paleochannels would be small when compared to the impacts of dredging elsewhere in the channel where the Miocene unit is impacted. The bottom of the paleochannels represents the areas of minimum thickness of the Miocene confining layer in the harbor. Dredging to these depths would not be required.

5. Analysis conducted during SHEP studies indicates that the Savannah Harbor Project area is not likely characterized by joints or fractures which could serve as pathways for enhanced downward flow of water into the aquifer. This is evidenced by the absence of observable vertical joints in Miocene-aged surface exposures and the lack of evidence of joints or fractures in sub-surface cores of the Miocene. Also, there is no historical evidence (springs, etc.) of joints or fractures in the area.

5.4 Threatened and Endangered Species

A Biological Assessment of Threatened and Endangered Species (BATES) has been prepared for the SHEP. The BATES is included in the EIS as Appendix B. The BATES concludes that the proposed SHEP “may affect-is not likely to adversely affect” piping plover, wood stork, West Indian manatee, right whale and humpback whales, sea turtles, and Shortnose sturgeon. The BATES is subject to the review and approval of the US Fish and Wildlife Service and the National Marine Fisheries Service. The USFWS has issued a letter of concurrence with the findings of the BATES in regards to those species for which they have responsibility. Similarly, NOAA has issued a Biological Opinion which includes reasonable and prudent measures to protect Loggerhead and Kemp’s Ridley sea turtles and Shortnose and Atlantic sturgeon. The USFWS report and the BO are included in Appendix Z.

6.0 STATE ENFORCEABLE POLICIES

6.1 Introduction

The goals of the South Carolina Coastal Management Program are attained by enforcement of the policies of the State as codified within the South Carolina Code of Regulations. "Policy" or "policies" of the South Carolina Coastal Management Program means the enforceable provisions of present or future applicable statutes of the State of South Carolina or regulations promulgated duly there under (SC Code of Regulations Chapter 30). The statutes cited as policies of the Program were selected because they reflect the overall Program goals of developing and implementing a balanced program for the protection of the natural resources, as well as promoting sustainable economic development of the coastal area. Each section of the South Carolina coastal management laws are discussed separately in this section, in numerical order. These sections are then followed by a paragraph titled "Consistency" that explains the extent to which the proposed project is consistent with that enforceable provision.

6.2 Statement of Policy (SC CODE 30-1)

6.2.1 South Carolina Coastal Zone Management Act

The South Carolina Coastal Zone Management Act was passed by the 1977 General Assembly of South Carolina to provide for the protection and enhancement of the State's coastal resources. This legislation creates the South Carolina Coastal Council which is given the task of promoting the economic and social welfare of the citizens of this State while protecting the sensitive and fragile areas in the coastal counties and promoting sound development of coastal resources. The South Carolina Coastal Zone Management Act was amended by Act 181 of 1993, which merged South Carolina Coastal Council with the South Carolina Department of Health and Environmental Control. The South Carolina Coastal Council became the Office of Ocean and Coastal Resource Management (OCRM).

Through the efforts of an overall coastal zone management program and permitting process, the Department seeks to guide the wise preservation and utilization of coastal resources. These rules and regulations are intended to: (a) aid developers and others in taking advantage of state-of-the-art techniques in developing projects compatible with the natural environment; (h) insure consistent permit evaluations by the Department; and (c) serve as a stimulus for implementation of better and more consistent management efforts for the coastal zone.

These regulations are the Department statements of general public applicability that implement and prescribe policy and practice requirements of the Department. They are to be read as part of, and to be construed with, the policies set forth in the South Carolina Coastal Management Program.

6.2.2 The Value of Tidelands and Coastal Waters

The tidelands and coastal waters of the South Carolina coast are a very dynamic ecosystem and a valuable natural resource for the people of the State. The tides regularly ebb and flood through the coastal inlets, bays and marshes which constitute a fragile area, vulnerable to the impacts of many human activities. Tidelands and coastal waters are identified as "critical areas" over which the Department has direct permitting authority.

The saline marshes are highly productive components of the marine food web of coastal waters and estuaries. Decaying organic material, called detritus, serves as the basis of the food web and is the major biological contribution of the saline marshes. Many commercially and recreationally important fish and shellfish species depend on the marshlands and estuaries for all or part of their life cycle. In addition, many birds and other forms of wildlife utilize wetlands as habitat as well as a source of food. Tidelands and coastal waters also have become increasingly important in recent years for the purposes of aquaculture.

Among the important functions of the salt and brackish marshes is their role in protecting adjacent highlands from erosion and storm damage. Marsh vegetation absorbs and dissipates wave energy and establishes a root system which stabilizes the soils. Its effectiveness as a buffer depends on the surface area available which, combined with the composition of the underlying substrate, allows tidelands to act as "sponges," absorbing and releasing waters during storms or times of heavy riverine discharge.

Marshes also perform a valuable waste treatment function since the dense vegetation acts as a filter, trapping sediments and pollutants which enter as run-off from the upland areas. The trapping of sediments helps maintain water clarity, a factor important to clam, oyster, and phytoplankton productivity. The marshes also assimilate pollutants and recycle nutrients through various biochemical processes.

Coastal waters and the adjacent marshes are also significant as aesthetic, recreational and educational resources. Much of the expenditure for recreation and tourism in the South Carolina coastal zone is for purposes of enjoying outdoor activities and the aesthetic pleasures of undisturbed tideland areas. These natural areas lend themselves to meaningful and important academic pursuits such as bird-watching and wildlife population and nutrient recycling studies.

These same unique natural resource areas face increasing land development pressure and negative impacts from human activities in and around them. The marshes constitute a fragile ecosystem; consequently, indiscriminate dredging and filling, degradation of water quality or unsound building and development practices can have long-term detrimental effects. All development need not be prohibited; rather, the range of favorable and unfavorable results needs to be realized, and analysis made to determine priorities, evaluate alternatives, anticipate impacts, and suggest the best methods and

designs to carry out wise development of these resources.

6.2.3 The Value of Beaches and Dunes

In 1977, the South Carolina General Assembly enacted the Coastal Tidelands and Wetlands Act (Coastal Zone Management Act) to protect, preserve, restore and enhance the coastal resources of South Carolina. The Act created a new state agency, the South Carolina Coastal Council, and charged it with the responsibility of administering and enforcing the statute. This legislation, however, proved ineffective for managing the beach/dune system because regulatory authority over these areas given to the Coastal Council was not sufficient. From the State's beaches, the Coastal Council could regulate landward only to the primary oceanfront sand dune or to the highest uprush of the waves where no such dune existed.

Lacking adequate authority, the Coastal Council was unable to prevent structures from being sited unwisely close to the eroding shore, thus making them extremely vulnerable to the effects of storms and high tides. The owners of the structures, in most instances, quickly sought permits from the Coastal Council (herein referred to as the Department) to construct hard erosion control devices in order to protect their erosion threatened structures. Unfortunately, hard erosion control devices can sometimes result in increased erosion, a lowering of the beach profile (thereby reducing the beach/dune system's tourist and recreational value), and a decrease in the ability of the beach/dune system to protect upland property from storms and high tides.

In 1986, the Blue Ribbon Committee on Beachfront Management was formed in response to the growing recognition that existing law was inadequate to protect the fragile beach/dune resource. The Committee determined that the beach/dune system of the State was in a state of crisis. The report concluded that "over fifty-seven miles of our beaches are critically eroding. This erosion is threatening the continued existence of our beach/dune system and thereby threatening life, property, the tourist industry, vital State and local revenue, marine habitat, and a national treasure". The 1988 Beachfront Management Act was enacted by the South Carolina General Assembly in response to the concerns presented in this report.

It has been clearly demonstrated that the erosion problems of this State are caused by a persistent rise in sea level, a lack of comprehensive beach management planning, and poorly planned oceanfront development, including construction of hard erosion control structures, which encroach upon the beach/dune system. Sea level rise in this century is a scientifically documented fact. The South Carolina shoreline is suffering from its effects today. It must be accepted that regardless of attempts to forestall the process, the Atlantic Ocean, as a result of sea level rise and periodic storms, is ultimately going to force those who have built too near the beachfront to retreat.

There are three basic approaches to beachfront management: (a) armor the beach with hard erosion control devices; (b) renourish the beach with sand; and (c) retreat from the beach.

The 1977 Coastal Zone Management Act, as amended, rejects construction of new erosion control devices and adopts retreat and renourishment as the basic state policy towards preserving and restoring the beaches of our state. The Department, as steward of the State's coastal resources, has the responsibility under the new statute to implement the forty-year retreat policy by designating a baseline and setback line on all oceanfront properties of the State, developing a long-range comprehensive State plan for management of the beach/dune resource, and supporting the efforts of local governments in developing local long-range beach management plans. In addition, the Department shall require property owners to move new construction and reconstruction as far landward as possible, to limit the size of structures within the constraints of the Act, and to seek innovative ways to ameliorate the effects of beach erosion.

In the final analysis, the long-range public good is the same as the long-range private good. If the dry sand beaches of this State disappear because of the failure of its people and governmental natural resource managers to protect the beach/dune system, future generations will never have the opportunity to use and enjoy this valuable resource.

6.2.4 Consistency

The proposed SHEP would affect coastal waters and tidelands which are considered critical areas. Dredging would be conducted in the Savannah Harbor entrance channel (a portion of which is located within the State of South Carolina). Material would be removed from the inner harbor channel and placed in the existing CDFs along Savannah Harbor. Seven of these CDFS 12A, 12B, 13A, 13B, 14A, 14B and Jones/Oysterbed Island) are located in Jasper County, South Carolina. Effluent discharged from these CDFs would enter Wright River, Savannah River, Back River, or the Intracoastal Waterway. Other areas in the coastal zone of the State of South Carolina would be impacted by implementation of the mitigation plan for the project, which includes construction of a submerged berm across Back River at the mouth of the Sediment Basin, placement of about 2.1 million cubic yards of dredged sediment behind the berm, removal of the Tidegate end walls, and placement of some of the concrete from Tidegate demolition along the banks of Back River and other appropriate locations for fish habitat. Removal of the Tidegate end walls on the South Carolina side would result in the excavation of 0.85 acres of brackish marsh. Implementation of the mitigation plan for the 45, 46, 47 and 48-foot channels would also require dredging in Little Back River to increase the flow of freshwater into that stream. A flow diversion structure would be constructed in McCoys Cut to increase the flow of freshwater into Little Back River. The lower portion (western arm) of McCoys Cut would be closed to maintain the additional flow of freshwater into Little Back River.

As previously discussed in this Consistency Determination, the major impacts to South Carolina coastal waters and tidelands would be an increase in upstream salinity levels that would impact fishery habitat of several species and the loss of 0.85 acres of brackish marsh resulting from the removal of the Tidegate structure end wall in South Carolina. As discussed above and in more detail in the paragraphs below, the SHEP avoids and minimizes adverse impacts to resources in the coastal waters and tidelands to the

maximum extent possible. The SHEP mitigation plan provides compensation for any impacts that cannot be avoided.

The South Carolina DHEC-OCRM must evaluate projects to determine the extent to which the project would further its major objectives which are to “protect and where possible, to restore and enhance the resources of the State’s coastal zone for this and succeeding generations”. While implementation of the SHEP would not restore or enhance resources in the State’s coastal zone, the project’s mitigation and adaptive management features provide protection for those resources by providing adequate mitigation where adverse impacts cannot be avoided. Consequently, the SHEP is fully consistent with this provision of the State of South Carolina’s Coastal Zone Management Program.

While, the SHEP would impact coastal waters and tidelands, the proposed SHEP would not affect any beaches or dunes in the State of South Carolina.

7.0 CRITICAL AREA BOUNDARIES (SC CODE 30-10)

7.1.1 Coastal Waters and Tidelands

The Department has permit authority over the coastal waters and tidelands critical areas defined in Section 48-39-10 as follows:

a. "Coastal waters" means the navigable waters of the United States subject to the ebb and flood of the tide and which are saline waters, shoreward to their mean high-water mark. Provided, however, that the Department may designate boundaries which approximate the mean extent of saline waters until such time as the mean extent of saline waters can be determined scientifically.

b. "Tidelands" means all areas which are at or below mean high tide arid coastal wetlands, mudflats, and similar areas that are contiguous or adjacent to coastal waters and are an integral part of the estuarine systems involved. Coastal wetlands include marshes, mudflats, and shallows and mean those areas periodically inundated by saline waters whether or not the saline waters reach the area naturally or through artificial water courses and those areas that are normally characterized by the prevalence of saline water vegetation capable of growth and reproduction. Provided, however, nothing in this definition shall apply to wetland areas that are not an integral part of an estuarine system. Further, until such time as the exact geographic extent of this definition can be scientifically determined, the Department shall have the authority to designate its approximate geographic extent.

c. Using biological field surveys and aerial photography, the Department has found the point on the upper reaches of the estuarine systems where tideland vegetation changes from predominately brackish to predominately fresh and has established a boundary using the nearest recognizable physical features within this area. This boundary has been posted on an official map in SC DHEC-OCRM'S

principal offices of business and is available for public review. An approximate description of this boundary is as follows: NOTE: The remainder of this section has been deleted from this Consistency Determination. The deleted section describes an approximate boundary where tideland vegetation changes from predominantly brackish to predominately fresh.

d. All coastal waters and tidelands seaward from this boundary to the State jurisdictional limit are included within the critical areas.

7.1.2 Beaches and Beach/Dune System

The Department has permitting authority over beaches and the beach/dune system. In determining the boundaries of this critical area, the Department will be guided by Section 48-39-270, Section 48-39-280 and Section 48-39-360.

7.1.3 Consistency

Section 30-10 defines the critical areas covered by the SC Coastal Management Plan. The proposed SHEP would not impact any upland beaches or dunes. The proposed SHEP would impact South Carolina coastal waters and tidelands as previously described. This Consistency Determination has been prepared to ensure that the SHEP complies with the South Carolina Coastal Management Program in regards to impacts to coastal waters and tidelands.

7. 2.1 General Guidelines for all Critical Areas (SC CODE 30-11)

The critical areas are of vital importance to the State, and there is strong and growing pressure for the development of these areas. The Department has established these rules and regulations for permit applications in an effort to reduce the irreversible loss of productive tidelands, coastal waters, beaches, and dunes while meeting long-range State development needs.

7.2.2 General Considerations

In assessing the potential impacts of projects in critical areas, the Department will be guided by the policy statements in Sections 48-39-20 and 48-39-30 and the following ten considerations in Section 48-39-150:

a. The extent to which the activity requires a waterfront location or is economically enhanced by its proximity to the water;

b. The extent to which the activity would harmfully obstruct the natural flow of navigable water. If the proposed project is in one or more of the State's harbors, or in a waterway used for commercial navigation and shipping, or in an area set aside for port development in an approved management plan, then a certificate from the South Carolina State Ports Authority declaring that the proposed project or activity would not unreasonably interfere with commercial navigation and shipping must be obtained by the

Department prior to issuing a permit;

c. The extent to which the applicant's completed project would affect the production of fish, shrimp, oysters, crabs, or clams or any marine life or wildlife, or other natural resources in a particular area, including but not limited to water and oxygen supply;

d. The extent to which the activity could cause erosion, shoaling of channels or creation of stagnant water;

e. The extent to which the development could affect existing public access to tidal and submerged lands, navigable waters and beaches, or other recreational coastal resources;

f. The extent to which the development could affect the habitats for rare and endangered species of wildlife or irreplaceable historic and archeological sites of South Carolina's coastal zone;

g. The extent of the economic benefits as compared with the benefits from preservation of an area in its unaltered state;

h. The extent of any adverse environmental impact which cannot be avoided by reasonable safeguards;

i. The extent to which all feasible safeguards are taken to avoid adverse environmental impact resulting from a project;

j. The extent to which the proposed use could affect the value and enjoyment of adjacent owners.

7.2.3 Further Guidelines

In the fulfilling of its responsibility under Section 48-39-150, t**he** Department must in part base its decisions regarding permit applications on the policies specified in Sections 48-39-20 and 48-3930, and thus, be guided by the following:

a. The extent to which long-range, cumulative effects of the project may result within the context of other possible development and the general character of the area.

b. Where applicable, the extent to which the overall plans and designs of a project can be submitted together and evaluated as a whole, rather than submitted piecemeal and in a fragmented fashion which limits comprehensive evaluation.

c. The extent and significance of negative impacts on Geographic Areas of Particular Concern (GAPC). The determination of negative impacts will be made by the Department in each case with reference to the priorities of use for the particular GAPC.

The priorities of use are found in Chapter IV of the Coastal Management Program.

7.2.4 General Guidelines for Beaches and the Beach/Dune System

These guidelines are not included in this Consistency Determination because the SHEP would not affect any beaches or dunes in South Carolina.

7.2.5 Consistency.

Consideration One. The extent to which the activity requires a waterfront location or is economically enhanced by its proximity to the water.

As previously addressed in this document, deepening of the Savannah Harbor Navigation Channel is the only viable alternative to address the navigation inefficiencies associated with the current controlling depth of -42 feet MLLW. Other alternatives, including non-structural alternatives, were considered early in the study process as documented in Appendix O of the EIS. Consequently, there are no known alternatives that could be implemented to avoid construction work in the aquatic and marine environment.

Consideration Two. The extent to which the activity would harmfully obstruct the natural flow of navigable water. If the proposed project is in one or more of the State's harbors, or in a waterway used for commercial navigation or shipping, or in an area set aside for port development in an approved management plan, then a certificate from the South Carolina State Ports Authority declaring that the proposed project or activity would not unreasonably interfere with commercial navigation or shipping must be obtained by the Department prior to issuing a permit.

The proposed SHEP would improve navigation by remedying navigation restraints in an existing Federal deep-draft navigation project (Savannah Harbor) used for commercial navigation and shipping.

Various features of the SHEP mitigation plan would alter but not harmfully obstruct the natural flow of navigable water in the estuary. Flows from Front River into Back River will be reduced by constructing the submerged berm in Back River. This berm is part of the project's mitigation plan and is designed to reduce the amount of salt water from Front River moving up Back River to brackish and freshwater marsh areas. The flow diversion structure to be constructed at McCoys Cut would allow more freshwater from the Savannah River to flow into Middle River and Little Back River. The closure structure in the western arm of McCoys Cut would help maintain this increased flow of freshwater into Middle River and Little Back River. Although this closure structure would remove a "short cut" between Front River and McCoys Cut, it would not prevent access for recreational boaters to any waterway in the area. None of these streams (McCoys Cut, Middle River, Little Back River) are used for commercial navigation or shipping.

Construction of these flow diversion structures is critical to the success of the project's mitigation plan. The diversion of additional freshwater into these streams would help to

offset the expected upstream increases in salinity resulting from construction of the project. In turn, this increase in freshwater into these areas would maintain a dependable source of freshwater for the SNWR and minimize adverse (salinity) impacts to tidal freshwater marshes, and Striped bass and Shortnose sturgeon habitat in the area.

Consideration Three. The extent to which the applicant's completed project would affect the production of fish, shrimp, oysters, crabs, clams or any marine life or wildlife, or other natural resources in a particular area, including but not limited to water and oxygen supply.

Construction of the SHEP would not adversely affect the production of fish, shrimp, oysters, crabs, clams or other marine life. The dredging requirements for the SHEP in South Carolina would be confined to the existing channel (except in the area of one of the meeting areas and two of the channel bend wideners) in the inner harbor and the entrance channel, McCoys Cut, and the upper portion of Little Back River. Most of the dredged material would be discharged into the existing CDFs routinely used for Savannah Harbor.

Essential fish habitat (See Appendix S) in the project area includes estuarine emergent wetlands (includes palustrine, emergent, and forested wetlands), estuarine scrub/Shrub, submerged aquatic vegetation, oyster reefs and shell banks, intertidal flats, aquatic beds, estuarine water column (during construction) and estuarine water column (dissolved oxygen). Some dredged material (and clean fill material) would be placed in open water areas to construct the various mitigation features of the project. This dredged material does not contain contaminants at levels of concern. The dredged material used to construct the mitigation features of the project would not be discharged into any estuarine emergent wetlands. Adverse effects to other essential fish habitat (water column, etc.) would be avoided by not placing any dredged material into open water areas upstream of Station 63+000 during the Striped bass spawning season (April 1- May 15) and by not depositing dredged material into open water areas during periods of low dissolved oxygen levels in Savannah Harbor.

Hydrodynamic and water quality modeling conducted during SHEP studies predict that without mitigation, channel deepening would decrease upstream dissolved oxygen levels. Consequently, the project's mitigation plan includes injection of oxygen at three locations in the estuary to remedy this effect. Injection of oxygen into Savannah Harbor during periods of low dissolved oxygen (summer months) would remove the adverse incremental effects of the SHEP on the dissolved oxygen regime in Savannah Harbor. Due to the spacing of the systems, the dissolved oxygen regime would be improved in over 90 percent of the estuary when compared to existing conditions.

Modeling conducted during SHEP studies indicates that channel deepening would adversely affect Striped bass and Shortnose sturgeon habitat. These adverse effects are mainly related to predicted increases in upstream salinity levels. The flow modifications in McCoys Cut, Middle River, and Little Back River are designed to increase the amount of freshwater entering these waterways, while the sill in Back River is designed to decrease the amount of salty water entering Back River.

As shown in the preceding tables in this Consistency Determination, additional mitigation would be required for adverse impacts to Striped bass and Shortnose sturgeon habitat,

despite implementation of the flow diversion measures and oxygen injection. Additional mitigation to offset adverse impacts to Striped bass would consist of funding the Georgia DNR to stock fingerling Striped bass in the lower Savannah River. This would mitigate for the loss of Striped bass spawning, egg, and larvae habitat. The fingerlings would replace juvenile fish that might not reach the fingerling stage because of this loss of habitat. The Georgia Department of Natural Resources Wildlife Resources Division has stocked this species in the estuary in the past. The recent growth in the Striped bass population in the lower Savannah River indicates that stocking is effective in getting the species past those bottlenecks in its life cycle. Annual stocking of fingerling Striped bass would ensure that the Striped bass sport fishery in the lower Savannah River is protected and remains viable.

The SHEP mitigation plan provides for a sufficient post-construction monitoring period to ensure project features function as intended and impacts are within the range of those predicted. As part of that plan, the data collected from the field data collection efforts would be used in conjunction with the hydrodynamic and water quality models to assess the impacts of the SHEP on Striped bass habitat. This study would be conducted during years 2, 4 and 9 of the Post-Construction monitoring period. Additional funding could be provided for Striped bass stocking if the data indicates that is appropriate.

Additional mitigation for project impacts to Shortnose sturgeon habitat would be provided by constructing a fish bypass at the New Savannah Bluff Lock and Dam. This bypass would be designed to provide Shortnose sturgeon (as well as other species of anadromous fish) access to traditional spawning grounds above the dam. The mitigation for Shortnose sturgeon habitat is discussed in more detail below in the section addressing endangered species and in Appendix C of the EIS.

Consideration Four. The extent to which the activity could cause erosion, shoaling of channels or creation of stagnant water.

The proposed SHEP would not have any major impacts on existing shoaling rates, bank erosion nor would it create any areas of stagnant water.

Consideration Five. The extent to which the development could affect existing public access to tidal and submerged lands navigable waters and beaches, other recreational coastal resources.

The proposed SHEP would not block public access to tidal and submerged lands, navigable waters and beaches, or recreational coastal resources. Closures would occur at Rifle Cut (a man-made passage in Georgia) and the western end of McCoys Cut (South Carolina). Both of these areas are within the Savannah National Wildlife Refuge and are not used by commercial traffic. Closing Rifle Cut would lengthen the transit of recreational boaters using the existing boat ramp at the Houlihan Bridge who travel to Back River. The project would address those impacts by constructing a new boat ramp on Hutchinson Island to provide more direct access to Back River for recreational boaters. The Corps would give the ramp to Chatham County to operate the facility in perpetuity. The project does not include any closure structures on Little Back River.

Consideration Six. The extent to which the development could affect the habitats for

rare and endangered species of wildlife or irreplaceable historic and archaeological sites of South Carolina's coastal zone.

A Biological Assessment of Threatened and Species (BATES) was prepared to evaluate the potential impacts of the SHEP on threatened and endangered species (See EIS-Appendix B). The conclusion reached in the BATES is that the proposed SHEP may affect but is not likely to adversely affect piping plover, wood stork, West Indian manatee, right whale and humpback whale, sea turtles, and Shortnose sturgeon. The BATES was sent to the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) for their review and comment and/or Biological Opinion. The USFWS has concurred with the findings of the BATES in regards to the species for which they have responsibility: the Piping plover, Wood stork, West Indian Manatee, and nesting sea turtles. NOAA has issued a Biological Opinion for the species for which they are responsible. The BO includes reasonable and prudent measures to protect Loggerhead and Kemp's Ridley sea turtles and Shortnose and Atlantic sturgeon. The report prepared by the USFWS and the BO prepared by NOAA are included in Appendix Z.

As discussed in the previous section, additional mitigation would be required because of SHEP impacts on Shortnose sturgeon habitat. The SHEP mitigation plan includes construction of a fish bypass structure at the New Savannah Bluff Lock and Dam to provide Shortnose sturgeon access to traditional spawning grounds above the dam. Construction of the fish bypass to expand the spawning area of Shortnose sturgeon is appropriate mitigation for the remaining impacts to that species habitat. The adverse impacts of previous developments on the Savannah River on Shortnose sturgeon (i.e. dams that block access to traditional upstream spawning areas) is well documented. Successful fish passage of Shortnose sturgeon at the New Savannah Bluff Lock and Dam would also benefit other species of fish such as American Shad and Atlantic sturgeon. A horseshoe rock ramp design was proposed in the DEIS. However based on comments received during the review of the DEIS and a fish passage workshop held in April 2011. As a result of that workshop and subsequent coordination with NOAA Fisheries, the Corps has revised the design and now proposes an off-channel rock ramp at that site. The off-channel rock ramp design would capture substantially more of the river flow and provide a greater effectiveness in regards to fish passage than the horseshoe design. The success of fish passage at the New Savannah Bluff Lock and Dam would be monitored during the Post-Construction phase of the project.

It should be noted that the adverse impacts of the SHEP on Shortnose sturgeon habitat are mainly in the Savannah River within the State of Georgia. With the flow modifications and oxygen injection, there would be a slight increase in Shortnose sturgeon habitat in South Carolina in Little Back River in the vicinity of the SNWR.

Construction of the SHEP may affect significant archaeological, historic and submerged resources in South Carolina. Specifically, two anomalies are located in South Carolina waters between Stations 41+500 and 49+500, two Confederate crib obstructions are located between Stations 55+000 and 68+500, and the *CSS Georgia* is located in Back River. A Programmatic Agreement (PA) has been prepared in accordance with 36 CFR 800.14b(1)(ii) that outlines a strategy for conducting surveys, determinations of

significance and effect, and mitigation. The PA has been coordinated with and signed by the Georgia and South Carolina State Historic Preservation Offices, and the US Navy, the owner of the *CSS Georgia*. The PA has been coordinated with appropriate federally recognized tribes. The agreement is included at Appendix G in the final Environmental Impact Statement.

Consideration Seven. The extent of the economic benefits as compared to the benefits from preservation of an area in an unaltered state.

Navigation studies undertaken by the US Army Corps of Engineers evaluate the benefits of a proposed project from a national perspective and do not focus on an individual state or region when selecting the National Economic Development Plan. The proposed 47-foot depth alternative is expected to result in economic benefits to the Nation of $177 million per year. The economic benefits remaining after project costs (including environmental mitigation) are included would be $116 million per year. The economic benefits of the proposed project are substantial.

Consideration Eight. The extent of any adverse environmental impact which cannot be avoided by reasonable safeguards.

US Army Corps of Engineers procedures for evaluating project impacts and developing appropriate mitigation measures were followed in developing the various plans considered in the SHEP. Impacts have been avoided and minimized to the maximum extent practicable. Impacts that cannot be avoided include the loss of 15.68 acres of brackish marsh due to excavation requirements of the project, the conversion of up to 223 acres of tidal freshwater marsh to brackish marsh, the loss of Striped bass spawning, egg, and larvae habitat in the lower Savannah River, and the loss of Shortnose sturgeon habitat in the lower Savannah River. Since these impacts cannot be avoided, mitigation is included to compensate for these impacts.

As previously discussed, model studies indicate that the injection of oxygen would remove the incremental impacts of the SHEP on dissolved oxygen levels in Savannah Harbor. Because of the spacing of the systems, incidental improvements to dissolved oxygen levels would occur in over 90 percent of the estuary. The systems would be operated during the summer months when dissolved oxygen levels are traditionally low.

Approximately 15.68 acres of brackish marsh would be lost as result of the expansion of the Kings Island Turning Basin (3.0 acres-Georgia), removal of the Tidegate Structure end walls (7.63 acres in Georgia and 0.85 acres in South Carolina), and miscellaneous excavation requirements of the project (4.2 acres-Georgia). In-kind mitigation would be provided by grading down dredged material deposits (about 40.3 acres) in Disposal Area 1S located at the juncture of Front River and Middle River to allow the area to re-vegetate with indigenous marsh species. The area would be sprigged with *Spartina alterniflora*, if required. The marsh restoration site would be monitored to ensure that the marsh restoration is successful. Monitoring would include checking for invasive species and their removal if required. The restoration of 40.3 acres of marsh in Disposal Site 1S would provide the required compensation (28.8 acres) for SHEP impacts. The remaining 11.5 acres of restored marsh would be used for any additional mitigation needs of the SHEP and wetland mitigation needs associated with the operation and maintenance of the

Savannah Harbor Navigation Project.

All channel depths evaluated in the SHEP would affect some of the tidal freshwater marshes (via increased salinity levels) located in the estuary. This would be the case irrespective of the proposed mitigation features (flow rerouting). Adverse impacts to tidal freshwater marsh would occur in Georgia in areas mainly between Front and Middle Rivers from just below the Georgia Highway 25 crossing to just above Front River's juncture with the Steamboat River. With the flow diversion measures in place, the amount of tidal freshwater marsh in South Carolina should increase along the Little Back River in the vicinity of the SNWR.

The SHEP would not destroy tidal freshwater marsh. Instead, up to 223 acres (with the 47-foot project) is calculated to transition to a brackish marsh community. Many of the emergent plant species associated with the tidal freshwater marsh communities would still flourish after project implementation. Emergent plant species often associated with freshwater communities are readily observed in environments that have been defined as brackish marsh (Latham et. al., 1994).

Although the composition of tidal freshwater vegetation would change with brackish marsh species becoming more prevalent, the basic wetland functions associated with these plant communities would not be materially transformed. A comparison of potential changes in wetland function after conversion of freshwater wetlands to brackish wetlands reveals there are only negligible alteration to functions such as water purification, flood protection, shoreline stabilization, groundwater recharge, streamflow maintenance, retention of particles, surface water storage, subsurface storage, nutrient cycling, and values to society as shown in Table 7. There would be a minor effect on the fish and wildlife element, as a result of converting tidal freshwater marsh to brackish marsh.

As shown in Table 7, approximately 740 acres of saltmarsh is calculates to change through time to a brackish marsh. Dominant saltmarsh species like *Spartina alterniflora* would still be observed in areas which have salinities that define a brackish marsh. However, the overall basic wetland functions would not change. As shown in Table 7, the conversion of a saltmarsh to a brackish marsh system would have a negligible impact on the overall function of the wetland system. It should be noted that areas of the Savannah Harbor identified as saltmarsh or brackish marsh support similar fish and wildlife species.

A comparison of fish and wildlife habitat between freshwater and brackish marsh yields fewer similarities. However, the conversion in fish and wildlife habitat would still be minor when considering the total function of the wetland and the continued existence of some freshwater vegetation after deepening in wetland areas that would be viewed as brackish marsh. Even though there would only be a minor change in fish and wildlife habitat where tidal freshwater marsh is converted to brackish marsh, a determination was made that mitigation for this conversion was warranted.

The Corps made use of a Wetland Interagency Coordination Team (ICT) consisting of technical expert representatives from USACE, and Federal and state natural resource agencies (including SC DHEC-OCRM) to identify acceptable mitigation for the proposed project. The Corps also consulted with the Stakeholder Evaluation Group, including its

Non-Governmental Organization members, to identify any suitable mitigation alternatives. At that time, the USFWS stated that mitigation actions must be performed within the basin for impacts to SNWR wetlands.

The Wetland Interagency Coordination Team concluded there were no opportunities either to restore or create substantial acreages of tidal freshwater marsh in the estuary. Consequently, preservation of lands that are ecologically valuable and add to the purposes of the SNWR was identified as appropriate mitigation for the remaining wetland impacts. These would be properties already identified in the SNWR Acquisition Plan. It was the consensus of the team that acquisition/preservation of these lands would serve as mitigation for reducing the only wetland function (fish and wildlife habitat value of freshwater marsh) materially changed by the SHEP.

The proposed preservation parcel (s) to mitigate for the above vegetative changes would consist of 2,245 acres of bottomland hardwoods, maritime forest and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are classified as palustrine, forested, broad-leaved deciduous systems that are both temporarily and seasonally flooded. Preserving these areas would ensure wildlife habitat is protected in perpetuity. Moreover, the additional lands would buffer the SNWR from future threats of development such that changes in land use would not occur immediately adjacent to existing areas of the Refuge that do contain emergent wetland characteristics. Thus, the acquisition and preservation of 2,245 acres of wetland and upland buffer would provide a functional replacement for the conversion of the only wetland function (fish and wildlife habitat) that would be expected as a result of the 223 acre freshwater to brackish marsh conversion. Thus, the functional assessment conducted for all wetland areas proposed for impact and mitigation satisfies the intent of the no-net loss criterion.

As shown in Table 5, approximately 167 acres (16.1%) of Striped bass spawning habitat, about 181 acres of Striped bass egg habitat (10.8%), and approximately 20 acres of Striped bass larvae habitat (3.5%) would be adversely affected by the SHEP even with flow diversion. As discussed above, this impact would be mitigated by funding the State of Georgia to stock fingerling Striped bass.

As shown in Table 5, approximately 266 acres (6.9%) of adult winter Shortnose sturgeon habitat and about 251 acres (7.6%) of juvenile winter Shortnose sturgeon habitat would be adversely affected by the SHEP even with flow diversion and oxygen injection. Approximately 89 acres (6.5%) of summer Shortnose sturgeon habitat would be beneficially affected by the SHEP. As previously discussed, a fish bypass would be constructed at the New Savannah Bluff Lock and Dam to provide Shortnose sturgeon (and other anadromous species of fish) access to traditional spawning grounds above the dam as mitigation for this loss of habitat.

The SHEP also features an adaptive management (See Appendix D) approach to the mitigation features. The effectiveness of all of the project's mitigation features would be monitored during the Post-Construction phase of the project to determine if any modifications to the mitigation measures are warranted. Funds are also included in the project to modify the mitigation features and/or provide additional mitigation if the monitoring demonstrates that such action is necessary.

Consideration Nine. The extent to which all feasible safeguards are taken to avoid adverse environmental impact resulting from a project.

As discussed in Consideration Eight, all adverse impacts resulting from implementation of the SHEP have been avoided or minimized to the maximum extent practicable. The project features an extensive monitoring plan (See Appendix D) that would be conducted during both the construction and post-construction phases. The monitoring plan has been designed to monitor the performance of the project and its mitigation features to ensure that impacts do not exceed those expected. Funds are also included in the project to modify the mitigation features and/or provide additional mitigation if the monitoring demonstrates that such action is necessary.

Consideration Ten. The extent to which the proposed use could affect the value and enjoyment of adjacent owners. The project involves deepening an existing Federal navigation channel which is used for commercial navigation. Consequently, implementation of the SHEP would be in consonance with most of the activities along the harbor which are industrial and commercial in nature. However, an evaluation was conducted of other types of properties along and adjacent to the harbor such as Fort Pulaski, Fort Jackson, the SNWR, etc. to determine if the SHEP would adversely affect these properties. The project would adversely affect some areas of the SNWR as previously described, but also benefit other areas of the Refuge. The engineering consultant to the Joint Project Office that is evaluating development of a container terminal in Jasper County recently indicated that deposition of the new work sediments from this project on the site they are considering for development would save the developers around $300 million in the cost of fill. Deepening the harbor past the site of that facility would also save its developers the cost of deepening the navigation channel to that site (which they have stated would be necessary to successfully operate that container terminal). The State of South Carolina is one of the two joint owners of that property and is one of the entities pursuing development of the site.

7.2.6 Further Guidelines. The OCRM must also consider the following in reviewing permit applications or Federal Consistency Determinations:

The extent to which long-range, cumulative effects of the project may result within the context of other possible development and the general character of the area.

The EIS includes a Cumulative Impact Analysis (Appendix L). This cumulative impact analysis evaluated past, present and known future actions on wetlands, fisheries, the dissolved oxygen regime in Savannah Harbor, groundwater, Shortnose sturgeon, and the Tybee Island Shelf and Beach. Cumulative impacts associated with the SHEP of most concern include the conversion of tidal freshwater marsh to brackish marsh, loss of 15.68 acre of brackish marsh associated with the excavation requirements for the project, adverse effects to Striped Bass habitat, impacts to the dissolved oxygen regime in Savannah Harbor, and adverse impacts to Shortnose sturgeon habitat in the lower Savannah River. Impacts to these resources resulting from implementation of the SHEP were avoided or minimized to the maximum extent practicable. The project would provide appropriate mitigation where impacts to these resources could not be avoided.

The only other known harbor development project that could result in similar concerns is

the proposed container terminal in Jasper County. The proposed terminal would be located in what are now Corps of Engineers' CDFs 14A and 14B at about River Mile 6. If the SHEP is constructed, it is assumed that entrance channel and inner harbor channel depth requirements would be similar for that container terminal. Consequently, very little additional dredging would be required for a Jasper County facility if the SHEP is constructed.

The main cumulative impacts of concern that would be associated with a proposed Jasper facility would be the direct impacts on wetland resources in the Savannah estuary. Construction of a container facility in CDFs 14A and 14B would require extensive construction through wetland areas to provide the required rail and road infrastructure. The Corps of Engineers maintains dredged material disposal easements in CDFs 14A and 14B. The Federal government would not release its easements until it was "made whole" in regards to the replacement of dredged material disposal capacity that would be lost in CDFs 14A and 14B. Replacing this loss of dredged material disposal capacity could result in substantial wetland impacts.

Where applicable, the extent to which the overall plans and designs of a project can be submitted together and evaluated as a whole, rather than submitted piecemeal and in a fragmented fashion which limits comprehensive evaluation.

The SC DHEC-OCRM has been provided all plans associated with the SHEP in the GRR and EIS.

The extent and significance of negative impacts on Geographic Areas of Particular Concern (GAPC). The determination of negative impacts will be made by the Department in each case with reference to the priorities of use for the particular GAPC. The priorities of use are found in Chapter IV of the Coastal Management Program.

Chapter 4 of the South Carolina Coastal Management Program was consulted to determine if the SHEP would impact any Geographic Areas of Particular Concern (GPAC). Based on that review, the following GPACs could be affected by the SHEP:

a. Areas of Unique Natural Resource Value.

Marshes. Construction of the SHEP would result in the loss of 0.85 acres of brackish marsh in the State of South Carolina where the end wall of the Tidegate Structure would be removed on the South Carolina side of the river. The project provides in-kind mitigation by restoring marsh in Disposal Site 1S.

Savannah National Wildlife Refuge. Adverse impacts in the SNWR resulting from construction of the SHEP include conversion of tidal freshwater marsh to brackish marsh, loss of three acres of brackish marsh due to the expansion of the Kings Island Turning Basin, and loss of Shortnose sturgeon habitat. The project includes mitigation for these unavoidable adverse impacts. These adverse impacts are located in the State of Georgia.

b. Wildlife and game management areas under ownership and/or management of the South Carolina Wildlife and Marine Resources Department.

Turtle Island is located in Jasper County, South Carolina. It is located just north of the navigation channel near the entrance of the inner harbor. The main potential threat to Turtle Island would be increased erosion. Turtle Island is protected from any erosion caused by vessels in the inner harbor since it is sheltered from the navigation channel by the entrance channel jetties and Jones/Oysterbed Island. Wave action and subsequent erosion on Turtle Island from vessels in the entrance channel is not a major problem because of its distance from the entrance channel. Also, ship wake and erosion studies conducted during SHEP studies indicate that harbor deepening would have very little impact on shoreline erosion rates in the vicinity of the project.

c. Groundwater Resources.

As previously discussed in this Consistency Determination, studies conducted during the SHEP indicate that harbor deepening would have very little impact on the movement of saltwater through the Miocene protective layer into the Floridan aquifer.

d. Threatened or Endangered Species Habitats.

As discussed previously in this Consistency Determination, Shortnose sturgeon habitat in Georgia would be adversely affected by harbor deepening. Those impacts (increase in upstream salinity levels) would be minimized as much as possible through the flow diversion plan. The flow diversion plan includes providing more freshwater into the upper reaches of Middle River and Little Back River, while reducing the flow of saltwater into the lower ends of those streams. Potential impacts to dissolved oxygen levels would be mitigated through injection of oxygen. Even with these project features, additional mitigation would be required to offset project impacts on Shortnose sturgeon habitat. Consequently, the project's mitigation plan includes the construction of a fish bypass at the New Savannah Bluff Lock and Dam to provide Shortnose sturgeon access to about 20 miles of former spawning habitat.

e. Navigation Channels.

The proposed SHEP would involve deepening an existing navigation channel to enable vessels to enter the harbor more fully loaded, as well as accommodate larger vessels expected to call in the future. Consequently, this project fully complies with the priority use of a navigation channel as specified in Chapter 4 of the South Carolina Coastal Management Program. All adverse impacts associated with the project have been identified and mitigation measures have been included to ameliorate those impacts.

f. Areas of Special Historic, Archeological or Cultural Significance.

The Area of Potential Effect (APE) for historic properties in South Carolina includes: the north side of the existing entrance channel, the north side of the inner harbor channel from the Savannah River mouth to the Back River entrance, the entrance channel bend widener, the eastern two-thirds of the proposed passing lane located in the vicinity of the mouth of Back River, and the fish and wildlife mitigation features located along the north sides of Back River and Little Back River. Archaeological remote sensing surveys and diver evaluation of anomalies and targets have been completed for all areas, except the

Fish and Wildlife mitigation features, which were identified late in project planning. These features will be surveyed and evaluated with avoidance of impacts as the preferred mitigation alternative. All completed archaeological survey and testing reports have been reviewed and approved by the South Carolina State Historic Preservation Officer.

Two significant historic properties have been identified within the South Carolina APE. These include the National Register listed CSS Georgia wreck site and the eroded remains of two Confederate crib obstructions located north of the wreck. The wreck would be impacted by channel deepening and the construction of the passing lane. The crib site would be impacted by the construction of the passing lane. The archaeological survey and testing reports have been reviewed and approved by the South Carolina SHPO. Both sites will be mitigated through archaeological data recovery. The wreck site is located in Georgia and South Carolina. In 2003, the South Carolina SHPO determined that, due to the vessel's association with the state of Georgia (designed, built, manned, operated, and scuttled by Georgians in Georgia) and that only a recent change to the state boundary moved most of the wreck site into South Carolina, the Georgia SHPO should assume lead SHPO responsibility for compliance with the National Historic Preservation Act for this resource.

A draft Programmatic Agreement outlining compliance procedures for Section 106 of the National Historic Preservation Act was coordinated with the South Carolina and Georgia SHPO's and Native American Tribes. All approved the draft document. The document was held for signature in order to incorporate changes to the project (e.g. passing lanes) and clarification of the Fish and Wildlife mitigation features. Minor modifications have been made to the document to address these features and to include the US Navy as a consulting party. The finalized document has been coordinated and signed by the SHPOs and the US Navy. The document has been coordinated with the appropriate Federally recognized tribes.

Cultural resources surveys were conducted to identify resources that could potentially be impacted by the project. Mitigation is included in the project for adverse impacts to remains of the CSS Georgia, which is located at the junction of Front River and Back River. Additional studies will be conducted prior to construction on lands that would be impacted by the proposed mitigation. For those resources located in South Carolina, the results of those investigations will be coordinated with the South Carolina SHPO. All work would be conducted in compliance with the Programmatic Agreement for this project that was signed by the South Carolina SHPO and the Corps.

g. Living Marine Resources.

Marine resources in the State of South Carolina that would be adversely affected by the SHEP would be mainly those benthic communities located in the navigation channel that would be removed by the dredging. To protect marine resources (mainly sea turtles), the use of hopper dredges in the bar channel would be restricted to the period December 1-March 31.

Adverse impacts associated with the proposed SHEP have been evaluated and minimized

as much as possible. In those cases where adverse impacts would be unavoidable, mitigation would be provided to offset those impacts.

Based on these determinations, the proposed SHEP complies with the General Guidelines for Critical Areas.

8.0 Specific Project Standards for Tidelands and Coastal Waters (SC CODE 30-12).

8.1.1 Docks and Piers. Section 30-12 provides standards for various types of private, commercial and community docks and piers.

8.1.2 Consistency. The SHEP would not include the construction of any docks and piers

8.2.1 Boat ramps. Section 30-12 provides standards for boat ramps.

8.2.2 Consistency. The SHEP would not include the construction of any boat ramps in South Carolina. A concrete boat ramp would be constructed on the Georgia side of Back River to replace fisherman access lost as a result of blocking Rifle Cut.

8.3.1 Bulkheads and Revetments (Rip-rap) (Other than ocean front, as covered under R.30-13(N). Section 30-12 provides standards for bulkheads and revetments (rip-rap) designed to mitigate environmental losses.

8.3.2 Consistency. Most of the use of stone, rip-rap, etc. is associated with construction of the mitigation features. These activities include construction of a diversion structure at McCoys Cut, closure of the western end of McCoys Cut, and the closure of Rifle Cut. These measures are designed to increase the flow of freshwater into Middle River and Back River and to decrease the amount of saline water that enters these streams. The placement of rip-rap in Back River would also be required on the Georgia side to stabilize the shoreline in the vicinity of the proposed boat ramp.

A submerged sill (stone) would be constructed in Back River across the mouth of the Sediment Basin. The purpose of this sill and berm would be to reduce salinity levels in Back River by reducing the amount of saltwater from Front River that enters Back River. At the request of the resource agencies, concrete obtained from the Tidegate would be placed along the shoreline in areas of Back River and other appropriate locations to provide fish habitat. No marsh would be filled with this material. Some of this concrete rubble maybe placed along the shoreline in areas of heavy erosion. This material would not be used to fill any wetlands.

Based on the intended uses (mitigation, fish habitat, and erosion control) of the above material and the commitment to avoid filling wetlands, this portion of the SHEP project is consistent with the standards in 30-12 regarding bulkheads and revetment..

8.4.1 Cable, Pipelines and Transmission Lines. Section 30-12 provides standards for the installation of cables, pipelines, and transmission lines to protect the environment, especially when they require construction in wetland areas.

8.4.2 Consistency. Construction of the oxygen injection systems (in Georgia) would require some pipes to be placed in the river. This would be done in a manner to avoid or minimize adverse impacts to wetlands in the vicinity of the oxygen injection systems.

8.5.1 Marina/Community Dock Location and Design. Section 30-12 provides detailed requirements for both the construction and operation of marinas.

8.5.2 Consistency. The SHEP would not involve the construction of any marina facilities.

8.6.1 Transportation. Section 30-12 provides guidance to prevent environmental degradation in the coastal zone relevant to the construction of various types of transportation projects including highways, airports, etc.

8.6.2 Consistency. The SHEP would not involve the construction of any highway or airport. Normal maintenance of roads in the CDFs is carried out in strict accordance with South Carolina Erosion Control Procedures. The SHEP is consistent with the provisions concerning transportation projects.

8.7.1 Dredging and Filling. Section 30-12 describes various requirements and standards designed to minimize environmental degradation caused by dredging and filling actions as follows:

Development of wetland areas often has been considered synonymous with dredging and filling activities. Dredging and filling in wetlands can always be expected to have adverse environmental consequences; therefore, the Department discourages dredging and filling. There are cases, however, where such unavoidable environmental effects are justified if legitimate public needs are to be met.

The specific standards are as follows:

a. The creation of commercial and residential lots strictly for private gain is not a legitimate justification for the filling of wetlands. Permit applications for the filling of wetlands and submerged lands for these purposes shall be denied, except for erosion control, see R.30-12(C), or boat ramps, see R.30-12(B). All other dredge and fill activities not in the public interest will be discouraged;

b. Dredging and filling in wetland areas should be undertaken only if that activity is water-dependent and there are no feasible alternatives;

c. To the maximum extent feasible, dredging and filling activities should be restricted in nursery areas and shellfish grounds and during periods of migration, spawning, and early development of important sport and commercial species;

d. Dredging and excavation shall not create stagnant water conditions, lethal fish entrapments, or deposit sumps or otherwise contribute to water quality degradation;

e. Designs for dredging and excavation projects shall, where feasible, include protective measures such as silt curtains, diapers, and weirs to protect water quality in adjacent areas during construction by preventing the dispersal of silt materials;

f. Dredged materials shall be deposited and contained in such a manner so as to prevent dispersal into adjacent wetland areas and, in all cases, new facilities must have permanent upland disposal sites. Existing facilities must have either permanent upland disposal sites or EPA approved ocean disposal sites;

g. Applications for dredging in submerged and wetland areas for purposes other than access, navigation, mining, or drainage shall be denied, unless an overriding public interest can be demonstrated. Dredging permits for mining will be issued only as specified in (2) (h) below. Drainage permits must be consistent with the provisions in R.30-12(L);

h. Applications for dredging for mining activities within the critical areas will be denied unless a significant portion of the resource is located in the critical area, extraction of the resource is clearly necessary, and benefits derived from extraction would outweigh resultant detrimental impacts on coastal ecosystems. For any permit issued to allow dredging for mining operations in the critical areas, a complete site reclamation plan shall be required;

i. Wetlands shall not be utilized as depositories for waste materials except as discussed in R.30-I 2(I and J);

j. In all cases, dredging activities shall not he approved until satisfactory disposal sites have been acquired.

k. Only hydraulic dredging is permitted unless the material is being placed in a hopper barge for offshore disposal or unless the applicant can show that hydraulic dredging is infeasible in a site-specific application.

1. Marinas will usually not be allowed in areas that require maintenance dredging more often than once every four years.

8.7.2 Consistency.

No dredged sediment from the SHEP would be used to create land to be used for development purposes.

Construction of the SHEP would involve dredging primarily in open water areas in South Carolina's coastal zone, although some excavation of wetlands would also occur. Dredging in South Carolina waters would include McCoys Cut, Little Back River, and a portion of the entrance channel. Approximately 0.85 acres of saltmarsh would be removed from the South Carolina side of the Tidegate abutment. Those impacts would be mitigated through the restoration of brackish marsh at Disposal Area 1S. Sediments

would be deposited into the Sediment Basin in Back River as part of the mitigation features of the project. Approximately 100,000 cubic yards of stone would be placed in Back River to construct a submerged sill across the mouth of the Sediment Basin. Approximately 2.1 million cubic yards of sediment would be placed upstream of the sill to construct a broad berm in the lower end of the Sediment Basin. This sill and berm would reduce the upstream flow of saltwater into Back River. This part of the mitigation plan is designed to reduce the impacts on tidal freshwater marsh and fishery habitat. Effluent from the CDFs located in South Carolina would be discharged into South Carolina waters.

No dredging and filling would occur in designated shellfish areas in the State of South Carolina. Construction of the SHEP would not create stagnant water conditions, lethal fish entrapments or deposit sumps. The project's mitigation plan includes injection of oxygen at strategic locations in Savannah Harbor to offset potential impacts to dissolved oxygen levels.

Sediment dredged from the inner harbor channel would be placed into existing CDFs along the harbor. The discharge of effluent from the weirs in the CDFs would be monitored for various parameters during construction including suspended solids. No sediment would be discharged into Back River to partially fill in the Sediment Basin until the sill is in place to ensure the sediment would not be washed downstream. Sediment that would be deposited in the basin has a high sand content, minimizing increases in suspended solids.

The proposed SHEP would not involve any mining activities.

No dredged sediment would be deposited in wetlands.

Construction of the SHEP would primarily involve the use of hydraulic pipeline dredges or hopper dredges. There could be a need to use other equipment such as mechanical dredges or clamshells, especially where there is s need to remove debris.

Based on these determinations, the SHEP is consistent with the dredging and filling requirements of Section 30-12.

8.8.1 Navigation Channels and Access Canals

Section 30-12 prescribes specific standards designed to minimize the adverse effects of the disposal of dredged material. Certain dredging activities involve the creation and maintenance of navigation channels and access canals. These activities have a potential for severe environmental impacts and should meet a demonstrated public need.

Where the Department determines that such activities are justified, the following standards will he applied:

a. Dredging for establishment of new canals which involves permanent alteration of wetland habitats will be prohibited unless no feasible alternative exists. Establishment of canals for purposes of creating waterfront lots from inland property will be prohibited unless it can be demonstrated that there will be no significant environmental impacts on critical areas;

b. To the extent feasible, project plans must utilize piers or catwalks, rather than channels or canals, to reach deeper water areas;

c. Access canals shall be designed to insure adequate flushing and shall not create dead-end or stagnant water pockets. Open-ended, U-shaped, or semicircular canals are generally preferred over dead-end canals, since they usually provide better water circulation;

d. Highland waterway construction that is slated to be tied into wetland areas shall be constructed in the dry, if feasible, so that sloping and stabilization of the banks can be completed before the plug is removed for the connection to open waters. Where dry construction is not possible, temporary plugs or silt curtains at the end of canals connected to waterways should be maintained until all sediment settles out;

e. The sides of navigation channels and access canals should he gently sloping rather than vertical to facilitate biological as well as physical stabilization of the canal banks;

f. When several landowners are to be served by a project, dredging for navigation channels and access canals should be well planned to prevent unnecessary excavation. Tributary canals in the highlands leading to a central navigation channel should be used rather than separate channels for each waterfront landowner;

g. The berm of access canals should be raised so that there is a gradual slope away from the canal edge. This will help prevent introduction of contaminants into adjacent wetland areas;

h. Alignment of channels and canals should make maximum use of natural or existing channels. Alignment of channels and canals should avoid shellfish beds, nursery areas, and spawning areas in wetlands.

8.8.2 Consistency

The SHEP would not involve the construction of any access canals. In general, the side slopes of the existing navigation channel would not be affected. The existing side slopes would generally be maintained, resulting in a narrower bottom of the channel when it is deepened.

Most of the dredging would be confined to the existing Savannah Harbor Navigation Project and the existing eight container vessel berths at the Garden City Terminal of the Georgia Ports Authority. Exceptions include the dredging in McCoys Cut, Middle River and Back River, which is designed to deepen the channels in these existing waterways to allow more freshwater to enter these streams. The other exception is the extension of the entrance channel 37,680 feet from Stations -60+000B to -97+680B.

Dredging outside of the existing navigation channel in the above areas would not impact any shellfish beds, nursery areas or spawning areas in wetlands. The channel improvements in Middle River would be near the upper end of the waterway, thereby avoiding the lower end which is important for Shortnose sturgeon.

The SHEP is consistent with the objectives regarding navigation channels outlined in Chapter 30-12.

8.9.1 Deposition of Dredged Sediment

Section 30-12 provides standards to prevent and minimize impacts to the marine and aquatic environment resulting from the deposition of dredged material as follows:

a. Upland disposal of dredged material shall always be sought in preference to disposal in wetlands. Vegetated wetlands and mudflats shall not be utilized for disposal of dredged materials unless there are no feasible alternatives. Any other wetlands should not be utilized for disposal of dredged materials when other alternatives exist;

b. Open water and deep water disposal should be considered as an alternative if highland alternatives are not feasible. However, open and deep water disposal sites should be seriously considered only after careful consultation with the Department and other relevant State and Federal agencies;

c. Dredged materials containing hazardous levels of toxic material must be disposed of with extraordinary caution. These materials shall never be disposed of in wetland areas and only in highland areas which are lined and diked with impervious materials. These materials will only be disposed in open water ocean dumping sites when maximum safety has been demonstrated after thorough review by the Department and other appropriate state and federal agencies;

d. Dikes surrounding disposal areas should be shaped and vegetated immediately to minimize erosion, with outfalls positioned to empty into non-wetland areas;

e. Future disposal sites shall be reviewed on a case-by-case basis;

f. Wherever feasible, existing disposal areas shall be utilized to the fullest extent possible; this would include raising the height of the embankments to increase the holding capacity of the disposal area;

g. Consideration must be given to the temporal aspects of spoil deposition - for example, impacts on spawning, fish migrations, shellfish harvesting, waterfowl nesting and wintering areas, and mosquito control. Attention must be given to possible adverse impacts of various alternative sites on the public health and welfare as well as on critical fish and wildlife areas;

h. In all cases, dredging activities shall not be approved until satisfactory disposal sites have been acquired.

8.9.2 Consistency

Most of the dredged sediment from the inner harbor would be placed in the existing CDFs located along Savannah Harbor. Some of the better material (mostly sand) would be used to construct some components of the mitigation plan, such as the broad berm in the Sediment Basin.

All of the sediment containing elevated levels of cadmium would be placed in CDFs 14A and 14B. The dredged sediments containing the highest levels of cadmium would be placed in the CDFs first and then covered with sediments containing lower levels of cadmium. This cover could be followed by a cover of sediment obtained during maintenance dredging, if required, which would not have elevated cadmium levels. Monitoring would be conducted to ensure that effluent released from CDFs 14A and 14B complies with state water quality standards. The monitoring plan also includes sampling and analysis of the deposited sediments to ensure that the protective cover does not contain cadmium at unacceptable levels. The cadmium monitoring plan also includes wildlife and bird use monitoring in the CDFs, vegetation sampling and removal if required, and monitoring of cadmium levels I birds that use the CDFs.

All dikes in the CDFS would be raised and maintained in accordance with South Carolina erosion control requirements. The proposed SHEP would not result in the construction of any new CDFs or the expansion of existing ones into adjacent wetlands. After the initial construction of the deepening project, new work sediments that were placed in the CDFs would likely be used in the future to raise the height of those confining dikes.

Dredging and sediment placement operations for the SHEP would be carried out in accordance with the same environmental provisions used for maintenance dredging operations. These provisions include no dredging during the Striped bass spawning season (April 1-May 15), above Station 63, and various measures to protect nesting birds in the CDFs during the breeding season.

The BO submitted by the NMFS also stipulates that construction of the flow diversion structure at McCoys Cut be conducted during the period May 15-November 1 to avoid adverse impacts to sturgeon.

The SHEP is consistent with the objectives concerning dredged material deposition outlined in Section 30-12.

8.10.1 Waste Treatment Systems. This section of 30-12 provides standards applicable to the construction and operation of various types of waste treatment systems.

8.10.2 Consistency. The proposed SHEP would not involve the construction of any types of waste treatment systems.

8.11.1 Marsh Impoundments for Recreational and Commercial Activities. This section of 30-12 describes the review procedures and conditions for approval of proposals involving the impoundment of wetlands.

8.11.2 Consistency. The SHEP would not include the impoundment of any wetlands.

8.12.1 Drainage Canals or Ditches. This section of 30-12 describes under what conditions drainage canals and ditches are approved and the state standards for constructing these types of projects.

8.12.2 Consistency. The SHEP would not involve the construction of any drainage canals or ditches.

8.13.1 Non-water Dependent Structures. This section of 30-12 describes types of non-water dependent structures and the conditions under which they are considered for approval.

8.13.2 Consistency. The SHEP would not include the construction of any non-water dependent structures.

8.14.1 Access to Coastal Islands. This section of 30-12 provides guidance relative to the construction of bridges and docks as a means of gaining access to coastal islands.

8.14.2 Consistency. The SHEP would not involve the construction of any such structures.

8.15.1 Mariculture. This section of 30-12 describes the standards for the establishment of mariculture type activities which is the confined cultivation of aquatic species in the marine environment.

8.15.2 Consistency. The SHEP would not include the development of such operations,

8.16.1 Mooring Buoys. This section of 30-12 provides specifications for the placement of mooring buoys.

8.16.2 Consistency. Modification to the Navigation aids for Savannah Harbor would be required. The new/modified aids would be in strict accordance with U.S. Coast Guard requirements and specifications. The SHEP is consistent with these requirements.

9.0 LOCAL LAND USE PLANS

Much of the proposed action is located in Georgia. Activities in Jasper County, South Carolina include the placement of dredged sediment in the seven existing CDFs located in South Carolina, dredging in McCoys Cut and Little Back River, removal of the Tidegate on the South Carolina side of Back River, construction of a submerged sill across Back River at the mouth of the Sediment Basin, placement of concrete from demolition of the Tidegate in Back River and other suitable locations for fish habitat, and deepening of the entrance channel. None of these activities would result in long-term land use changes. Therefore, no impacts to local land use plans are expected.

10.0 DEMONSTRATION OF NO FEASIBLE ALTERNATIVES UNDER THE SCCMP

According to SC DHEC, the Corps is required to analyze feasible alternatives under the SCCMP and South Carolina water quality certification regulations. The following analysis demonstrates there are no feasible alternatives to the SHEP under either of these South Carolina authorities.

As part of the SHEP EIS, the Corps considered reasonable and practicable alternatives under the National Environmental Policy Act (NEPA) and the Clean Water Act (CWA). The SHEP NEPA alternatives analysis ranged from considering other potential options or sites for the project, including other South Atlantic ports, to evaluating potential specific locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel. The SHEP NEPA alternatives analysis is found in various places in the Environmental Impact Statement (EIS) and General Re-Evaluation Report (GRR), including EIS Section 2.0, Purpose and Need for Action; EIS Section 3.0, Alternatives; EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; various other sections in the GRR; GRR Appendix A, Economics; GRR Appendix A, Attachment 3 (Regional Port Analysis); GRR Appendix A, Attachment 5 (Multiport Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 3); (3) a Multiport Analysis (GRR, Appendix A, Attachment 5); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O; GRR Section 6 and Appendix D); (6) analysis of six different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O; GRR, various sections); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.01.1 and

Appendix O; GRR Section 6.12.1).

In addition, the Corps considered practicable alternatives under the Clean Water Act (CWA), as explained in EIS Appendix H, 404(b)(1) evaluation. The practicable alternatives analysis was largely co-extensive with the SHEP NEPA alternatives analysis.

The SHEP NEPA and CWA alternatives analysis demonstrates there is no feasible alternative to deepening Savannah Harbor under the SCCMP or South Carolina water quality certification regulations. In South Carolina, a feasible alternative must be reasonable, taking into account the likelihood that it will achieve the project purpose, the cost of the alternative, and other factors – and it must reduce adverse consequences on water quality. A proper feasible alternatives analysis includes analysis of alternative locations and sites, analysis of methods of design or construction, and analysis of the no-action alternative. The Corps's alternatives analysis for SHEP fully complied with these principles.

Originally, the local sponsor proposed the project with the purpose of improving navigation in Savannah Harbor. The Corps had a duty to take that project purpose into account. In addition, the US Congress then authorized the specific project (subject to further study and approval by other federal agencies). 1999 Water Resources Development Act, Pub. L. No. 106-53, sec. 101(b)(9). Despite the specific Congressional authorization, the Corps still undertook a wide-ranging, multi-level alternatives analysis as described.

The Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper County Marine Terminal in South Carolina. GRR, Appendix A, Attachment 3, Final Report, pp. 1-20, and Interim Reports. In addition, the information regarding a Jasper County Marine Terminal from the Regional Port Analysis was further analyzed in a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side). EIS Sec. 3.0 and Appendix O; GRR Section 6.8 and Appendix D.

The most pertinent conclusions relative to the wide range of alternatives studied for SHEP are: (1) there is no feasible alternative to improving Savannah Harbor because the major South Atlantic ports will experience so much cargo growth from 2005 to 2050 they will all need deepening or improvement as currently planned, (2) no one South Atlantic port has the ability to expand to accommodate all the growth in container volume expected in the region, (3) the proposed deepening of Savannah Harbor would not divert container traffic from other ports because the shipping cost efficiencies would not outweigh the additional landside transportation costs, and (4) the proposed Jasper Ocean Terminal is not presently a feasible alternative to improving Savannah Harbor for various reasons including the tremendous cost involved (at least $4 billion), the environmental impacts, and the timing (Jasper does not exist at present and cannot be constructed in

time to meet the growth in demand Savannah and other South Atlantic ports are currently facing).

South Carolina's Coastal Management Plan (SCCMP) specifically establishes a strong preference for developing ports in industrialized areas that have existing infrastructure. See SCCMP, Part III, Transportation Facilities, at III-19 – III-20. This preference plus the high cost associated with developing a Jasper Ocean Terminal and the approximately twenty years required to study, permit, and construct that project, weigh heavily against finding a Jasper Ocean Terminal alternative to be feasible to improving Savannah Harbor.

The SHEP and a Jasper Ocean Terminal are not viewed by the Jasper project office as alternatives. Rather, the project office believes both ports are needed. A March 11, 2011 "Update" from the Jasper Ocean Terminal project office contains numerous statements that SHEP is necessary and beneficial for the Jasper Ocean Terminal project ("The development of the Jasper site is predicated on the success of ports in Savannah and Charleston. A completed SHEP and the planned expansion of Charleston are the first steps . . . ."). The Update states that the Jasper Ocean Terminal will handle container volumes in excess of what an improved (deepened) Savannah Harbor or Charleston Harbor could handle. The Update also confirms that the Jasper Ocean Terminal will cost $4 billion (a more recent estimate by the SCSPA is $5 billion).

In light of the information provided in the Update, combined with the fact that Jasper Ocean Terminal would have its own environmental impacts requiring mitigation (Regional Port Analysis, GRR, Appendix C, Attachment 3, Final Report, at 14-20, and associated Interim Reports), Jasper Ocean Terminal is not presently a feasible alternative to SHEP. After extensive study, no other specific feasible alternative was identified or found.

The no-action or "without project" alternative was thoroughly considered in the GRR/EIS, as well, but was not selected because it would not fulfill the project purpose and need, which are to address navigation inefficiencies in Savannah Harbor. The no-action alternative would not allow deepening the harbor so that larger and/or more fully loaded vessels could use it. By not enabling more efficient navigation in the harbor, the no-action alternative would not realize approximately $177 million in net annual economic benefits that could be achieved with harbor deepening, some of which would accrue to South Carolina. And while it is true that with the no-action alternative there would be no new environmental impacts, the total project cost of SHEP does include a comprehensive mitigation plan, with monitoring and adaptive management, that would protect and in some ways, enhance, South Carolina coastal resources.

11.0 SOUTH CAROLINA WATER QUALITY CERTIFICATION

On November 15, 2011, SC DHEC issued South Carolina's Clean Water Act Section 401 water quality certification for the project, with conditions. The water quality certification constitutes a determination that the project as conditioned will not violate South Carolina

water quality standards, which constitutes additional evidence that the SHEP is fully consistent with the enforceable provisions of the SCCMP.

12.0 CONCLUSION

In accordance with the CZMA, 16 U.S.C. § 1456(c), as amended, Savannah District, US Corps of Engineers has determined that the proposed deepening of the Federal Navigation Project to 47-feet MLW would be carried out in a manner which is fully consistent with the enforceable policies of the South Carolina Coastal Management Plan. This determination applies to the selected alternative identified in the Environmental Impact Statement prepared for the project -- which is the 47-foot depth MLLW alternative -- and the effects of the that alternative on the land or water uses or natural resources of the coastal zone of South Carolina, as directed by 15 C.F.R. § 930.39.