- Construction of a raw water impoundment -- $25 million.

The methods of construction for the majority of the added features for mitigation are almost identical to the other methods of mitigation that were included in the VE study. Since there were no VE proposals accepted as a result of the VE study, it was determined that no additional value engineering study was required at that time. Value Engineering proposals which would result in cost savings to the project will continue to be considered through the design and construction of the project, as USACE guidance requires the project features to the re-evaluated during the design phase prior to construction.

Value Engineering Proposals which would result in cost savings to the project will continue to be considered throughout the design and construction of this project.

11 Plan Comparison

The P&G requires that the NED plan be identified and described in detail. The NED plan is the plan which maximizes net benefits and; therefore, makes the greatest contribution to the federal objective. USACE policy allows deviation from the NED plan when there is a preference for a plan that is less costly than the NED plan. Deviations from the NED plan may also be more costly than the NED plan, but the non-Federal partner must bear all project costs greater than the costs of the NED plan. The more costly plan must also provide benefits which are equal to or greater than the NED plan.

This chapter describes the plan selection process, which is based on impacts to the four accounts: National Economic Development (NED), National Ecosystem Restoration (NER), Regional Economic Development (RED), and Other Social Effects (OSE). A system of accounts analysis was used to identify and compare the impacts of no action and of each alternative plan.

11.1 Net Benefits of Alternative Plans

The alternative plan net benefits presented in Table 11-1 are calculated as the difference between the total annual average equivalent (AAEQ) costs and benefits of each alternative. The incremental net benefits of the alternative plans are decreasing with successive plan increments, but remain positive overall, which indicates that the incremental benefits of each successive alternative are greater than the incremental costs.

Table 11-1: Economic Analysis of Alternative Deepening Plans (FY 2011)

Alternative Plan Depth	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Incremental Net Benefits	Benefits/ Costs
-44	$29,372,000	$100,335,000	$ 70,963,000		3.4
-45	$31,636,000	$136,238,000	$104,602,000	$33,639,000	4.3
-46	$33,747,000	$154,247,000	$120,500,000	$15,898,000	4.6
-47	$35,799,000	$159,472,000	$123,673,000	$3,173,000	4.5
-48	$37,817,000	$159,953,000	$122,136,000	- $1,537,000	4.2

Average annual benefits based on 4.125%, 50 years, and FY 2011 prices
Note: Benefits are updated to 2012 values in Section 14 Selected Plan for the Selected Plan

Table 11-1 includes the AAEQ costs and AAEQ benefits of the Meeting Area alternatives dredged to the plan depth, which are presented in Table 11-2. Meeting areas were assessed as separable elements of the alternative deepening plans. The net benefits of combining the Long Island Meeting Area and the Oglethorpe Meeting Area are greater than the net benefits of either meeting area alone at each of the alternative depths (Table 11-2). The combination of meeting areas provides the greatest net benefits to the alternative deepening plans.

Table 11-2: Meeting Area Average Annual Equivalent Net Benefits

	Benefits	Costs	Net Benefits
Long Island Meeting Area			
44 foot Project Depth	$400,000	$135,000	$265,000
45 foot Project Depth	$401,000	$143,000	$258,000
46 foot Project Depth	$407,000	$148,000	$259,000
47 foot Project Depth	$450,000	$158,000	$292,000
48 foot Project Depth	$424,000	$169,000	$255,000
Oglethorpe Meeting Area			
	Benefits	**Costs**	**Net Benefits**
44 foot Project Depth	$385,000	$189,000	$196,000
45 foot Project Depth	$387,000	$195,000	$192,000
46 foot Project Depth	$393,000	$197,000	$196,000
47 foot Project Depth	$387,000	$206,000	$181,000
48 foot Project Depth	$373,000	$214,000	$159,000
Long Island and Oglethorpe Meeting Areas			
	Benefits	**Costs**	**Net Benefits**
44 foot Project Depth	$717,000	$324,000	$393,000
45 foot Project Depth	$722,000	$337,000	$385,000
46 foot Project Depth	$731,000	$345,000	$386,000
47 foot Project Depth	$730,000	$364,000	$366,000
48 foot Project Depth	$723,000	$383,000	$340,000

Average annual benefits based on 4.125%, 50 years, and FY2011 prices
Note: Benefits are updated to 2012 values in Section 14 Selected Plan

11.2 NED Plan Identification

The Principles and Guidelines require that the plan which maximizes net benefits, the NED plan, be identified. The -47-foot plan maximizes net benefits at an average annual equivalent of $174 million. At the next increment (-48-foot plan), there is a decrease in net benefits, which indicates that a plan deeper than the -47-foot plan does not provide greater benefits. Therefore, the -47-foot plan is identified as the NED plan.

The NED Plan consists of the:

- -47-foot deepening alternative, which includes channel bend wideners, and expansion of the Kings Island Turning Basin;
- Long Island Meeting Area at -47 feet; and
- Oglethorpe Meeting Area at -47 feet.

11.3 Summary of Accounts and Plan Comparison

Plan formulation has been conducted for this study with a focus on contributing to NED with consideration of all effects, beneficial or adverse, to each of the four evaluation accounts identified in the Principles and Guidelines (1983).

Plan selection is based on a weighting of the projected effects of each alternative on the four evaluation accounts. The Project Delivery Team reviewed qualitative and quantitative information for major project effects and for major potential effect categories. The alternatives were also compared and contrasted according to their achievement of the additional criteria of (a) effectiveness; (b) completeness; (c) acceptability, and (d) efficiency according to applicable Corps guidelines.

In addition to these four traditional accounts, information on potential risks, uncertainties, and consequences, is also presented in System of Accounts format, for comparison at the same level of scrutiny of the information presented in other accounts. The comparison of final alternatives includes future without-project conditions and future with-project conditions for each alternative plan (Table 11-3). Data presented for comparison of final alternatives includes:

- Costs;
- Benefits;
- Impacts to public facilities;
- Impacts to natural resources;
- Impacts to biological resources;
- Impacts to air quality;
- Impacts to water quality;
- Impacts to cultural resources;
- Impacts to health and safety;
- Contributions to planning objectives;
- Responses to planning constraints;

- Implementation responsibility; and
- Risk and vulnerabilities.

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
A. National Ecosystem Restoration (NER)						
1. Tidal Marsh	Existing freshwater marsh acreage = 4,072 acres; existing brackish marsh acreage = 2,253, existing salt marsh acreage = 2,506	Freshwater Marsh: Indirect impact resulting in increase of 322 acres (8.1%) due to conversion; Salt Marsh: Indirect impact resulting in decrease of 808 acres due to conversion; Brackish marsh: Indirect impact resulting in increase of 488 acres due to conversion. Direct impact resulting in loss of 15.68 acres of brackish marsh through excavation mitigated by restoration of 28.8 acres of brackish marsh. Restoration of an additional 11.5 acres may be performed as advance mitigation.	Freshwater Marsh: Indirect impact resulting in decrease of 32 acres (0.1%) due to conversion; Salt Marsh: Indirect impact resulting in decrease of 828 acres due to conversion; Brackish Marsh: Indirect impact resulting in increase of 861 acres due to conversion, mitigated through acquisition and preservation of 1,643 acres of bottomland hardwoods. Direct impact resulting in loss of 15.68 acres of brackish marsh through excavation mitigated by restoration of 28.8 acres of brackish marsh. Restoration of an additional 11.5 acres may be performed as advance mitigation.	Freshwater Marsh: Indirect impact resulting in decrease of 201 acres (5.2%) due to conversion; Salt Marsh: Indirect impact resulting in decrease of 757 acres due to conversion; Brackish Marsh: Indirect impact resulting in increase of 959 acres due to conversion, mitigated through acquisition and preservation of 2,188 acres of bottomland hardwoods. Direct impact resulting in loss of 15.68 acres of brackish marsh through excavation mitigated by restoration of 28.8 acres of brackish marsh. Restoration of an additional 11.5 acres may be performed as advance mitigation.	Freshwater Marsh: Indirect impact resulting in decrease of 223 acres (5.5%) due to conversion; Salt Marsh: Indirect impact resulting in decrease of 740 acres due to conversion; Brackish Marsh: Indirect impact resulting in increase of 964 acres due to conversion, mitigated through acquisition and preservation of 2,245 acres of bottomland hardwoods. Direct impact resulting in loss of 15.68 acres of brackish marsh through excavation mitigated by restoration of 28.8 acres of brackish marsh. Restoration of an additional 11.5 acres may be performed as advance mitigation.	Freshwater Marsh: Indirect impact resulting in decrease of 337 acres (8.3%) due to conversion; Salt Marsh: Indirect impact resulting in decrease of 730 acres due to conversion; Brackish Marsh: Indirect impact resulting in increase of 1,068 acres due to conversion, mitigated through acquisition and preservation of 2,683 acres of bottomland hardwoods. Direct impact resulting in loss of 15.68 acres of brackish marsh through excavation mitigated by restoration of 28.8 acres of brackish marsh. Restoration of an additional 11.5 acres may be performed as advance mitigation.

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
2. Bottomland Hardwoods	Existing bottomland hardwoods on private land subject to loss through development and harvest	No effect	Acquire and preserve 1,643 acres of bottomland hardwoods.	Acquire and preserve 2,188 acres of bottomland hardwoods.	Acquire and preserve 2,245 acres of bottomland hardwoods.	Acquire and preserve 2,683 acres of bottomland hardwoods.
3. Fisheries						
a. Striped Bass	Georgia DNR continues to operate striped bass stocking program at a 50-year annualized cost of $504,000	Lump sum payment equivalent to 17% increase in striped bass hatchery budget for 50 years compensate for cumulative (multi-life stage) habitat loss of 17.0%	Lump sum payment equivalent to 2.9% increase in striped bass hatchery budget for 50 years to compensate for cumulative (multi-life stage) habitat loss of 2.9%	Lump sum payment equivalent to 5.0% increase in striped bass hatchery budget for 50 years to compensate for cumulative (multi-life stage) habitat loss of 5.0%	Lump sum payment equivalent to 26.9% increase in striped bass hatchery budget for 50 years to compensate for cumulative (multi-life stage) habitat loss of 26.9%	Lump sum payment equivalent to 27.8% increase in striped bass hatchery budget for 50 years to compensate for cumulative (multi-life stage) habitat loss of 27.8%

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Southern Flounder	Existing southern flounder habitat limited by low dissolved oxygen levels	Increase habitat by 74.1%	Increase habitat by 54.2%	Increase habitat by 57.3%	Increase habitat by 57.3%	Increase habitat by 52.9%
c. American Shad	Continue existing population levels and trends	Negligible (less than 0.3 %) loss of habitat in some life stages	Negligible (less than 0.3 %) loss of habitat in some life stages	Negligible (less than 0.3 %) loss of habitat in some life stages	Negligible (less than 0.3 %) loss of habitat in some life stages	Negligible (less than 0.3 %) loss of habitat in some life stages
4. Endangered Species						
a. Sturgeon	No Sturgeon upstream passage to historic spawning area above New Savannah Bluff Lock and Dam, Continue existing population levels and trends	Adult winter habitat loss of 3.9% and juvenile winter habitat loss of 6.7%; gain of 19.0% for adult summer habitat restoration of access to historic spawning area	Adult winter habitat loss of 4.6% and juvenile winter habitat loss of 7.0%; gain of 9.8% of adult summer habitat restoration of access to historic spawning area	Adult winter habitat loss of 6.2%, and juvenile winter habitat loss of 7.3%; gain of 7.3% of adult summer habitat restoration of access to historic spawning area	Adult winter habitat loss of 6.9%, and juvenile winter habitat loss of 7.6%; gain of 6.5% of adult summer habitat restoration of access to historic spawning area	Adult winter habitat loss of 8.4%, and juvenile winter habitat loss of 11.5%; gain of 2.8% of adult summer habitat restoration of access to historic spawning area

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Sea Turtles	Continue existing population levels and trends	May affect but is not likely to adversely affect leatherback, green, and hawksbill sea turtles. Will adversely affect loggerhead and Kemp's Ridley sea turtles. Population protected by implementation of NMFS Reasonable and Prudent Measures and Terms and Conditions of BO	May affect but is not likely to adversely affect leatherback, green, and hawksbill sea turtles. Will adversely affect loggerhead and Kemp's Ridley sea turtles. Population protected by implementation of NMFS Reasonable and Prudent Measures and Terms and Conditions of BO	May affect but is not likely to adversely affect leatherback, green, and hawksbill sea turtles. Will adversely affect loggerhead and Kemp's Ridley sea turtles. Population protected by implementation of NMFS Reasonable and Prudent Measures and Terms and Conditions of BO	May affect but is not likely to adversely affect leatherback, green, and hawksbill sea turtles. Will adversely affect loggerhead and Kemp's Ridley sea turtles. Population protected by implementation of NMFS Reasonable and Prudent Measures and Terms and Conditions of BO	May affect but is not likely to adversely affect leatherback, green, and hawksbill sea turtles. Will adversely affect loggerhead and Kemp's Ridley sea turtles. Population protected by implementation of NMFS Reasonable and Prudent Measures and Terms and Conditions of BO
c. Other	Continue existing population levels and trends	Right whales, manatee, and piping plover may be affected but are not likely to be adversely affected	Right whales, manatee, and piping plover may be affected but are not likely to be adversely affected	Right whales, manatee, and piping plover may be affected but are not likely to be adversely affected	Right whales, manatee, and piping plover may be affected but are not likely to be adversely affected	Right whales, manatee, and piping plover may be affected but are not likely to be adversely affected

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
5. Air Quality	Region to continue in current Attainment status	Minor improvements due to reduced vessel traffic; short-term emissions increases during construction	Minor improvements due to reduced vessel traffic; short-term emissions increases during construction	Minor improvements due to reduced vessel traffic; short-term emissions increases during construction	Minor improvements due to reduced vessel traffic; short-term emissions increases during construction	Minor improvements due to reduced vessel traffic; short-term emissions increases during construction
6. Water Quality						
a. Turbidity	Continue temporary increases in turbidity during periodic harbor maintenance dredging	Temporary increase in turbidity during construction	Temporary increase in turbidity during construction	Temporary increase in turbidity during construction	Temporary increase in turbidity during construction	Temporary increase in turbidity during construction
b. Dissolved Oxygen	Continued low dissolved oxygen levels (below state standards) during Summer months (May - Sept.)	Due to increased salinity and depth, pre-mitigation DO decreases; mitigation fully offsets decrease with incidental improvement	Due to increased salinity and depth, pre-mitigation DO decreases; mitigation fully offsets decrease with incidental improvement	Due to increased salinity and depth, pre-mitigation DO decreases; mitigation fully offsets decrease with incidental improvement	Due to increased salinity and depth, pre-mitigation DO decreases; mitigation fully offsets decrease with incidental improvement	Due to increased salinity and depth, pre-mitigation DO decreases; mitigation fully offsets decrease with incidental improvement

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
c. Salinity	Surface-water salinity threshold (0.5 ppt) upstream to river mile 21.00	Surface-water salinity threshold (0.5 ppt) upstream to river mile 21.59 with impacts to fisheries and dissolved oxygen	Surface-water salinity threshold (0.5 ppt) upstream to river mile 21.78 with impacts to wetlands, fisheries and dissolved oxygen	Surface-water salinity threshold (0.5 ppt) upstream to river mile 21.89 with impacts to wetlands, fisheries and dissolved oxygen	Surface-water salinity threshold (0.5 ppt) upstream to river mile 21.96 with impacts to wetlands, fisheries and dissolved oxygen	Surface-water salinity threshold (0.5 ppt) upstream to river mile 22.26 with impacts to wetlands, fisheries and dissolved oxygen
7. Cultural Resources						
a. CSS Georgia	CSS Georgia preservation as funds become available (currently not scheduled);	Archeological data recovery: excavating, conserving, and curating	Archeological data recovery: excavating, conserving, and curating	Archeological data recovery: excavating, conserving, and curating	Archeological data recovery: excavating, conserving, and curating	Archeological data recovery: excavating, conserving, and curating

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Old Fort Jackson	Shoreline hardened in 2004; no bank erosion expected	No effect	No effect	No effect	No effect	No effect
c. Fort Pulaski	Continued bank erosion at unprotected areas	Negligible increase in bank erosion	Negligible increase in bank erosion	Negligible increase in bank erosion	Negligible increase in bank erosion	Negligible increase in bank erosion

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
8. Total Quality of the Environment	The existing 4,072 freshwater marsh acres within the study area are scarce and highly valued habitat, most of which is within the Savannah National Wildlife Refuge. Expected future conversion of freshwater marsh due to sea-level rise; Continued low dissolved oxygen levels (below state standards) during Summer months (May - Sept.); Continued low population levels and trends for Short nose Sturgeon and Striped Bass.	No significant environmental impacts after mitigation. 332 acre increase (8.1%) in freshwater marsh acreage; SN Sturgeon lifecycle habitat impacts are offset by restoration of access to historic spawning areas; Striped bass lifecycle habitat impacts are offset by increase annual stocking; Incidental improvements to dissolved oxygen	No significant environmental impacts after mitigation. 32 acre freshwater marsh conversion (0.1%) mitigated through acquisition and preservation of 1,643 acres of bottomland hardwoods. SN Sturgeon lifecycle habitat impacts are offset by restoration of access to historic spawning areas; Striped bass lifecycle habitat impacts are offset by increase annual stocking; Incidental improvements to dissolved oxygen	No significant environmental impacts after mitigation. 201 acre freshwater marsh conversion (5.2%) mitigated through acquisition and preservation of 2,188 acres of bottomland hardwoods. SN Sturgeon lifecycle habitat impacts are offset by restoration of access to historic spawning areas; Striped bass lifecycle habitat impacts are offset by increase annual stocking; Incidental improvements to dissolved oxygen	No significant environmental impacts after mitigation. 223 acre freshwater marsh conversion (5.5%) mitigated through acquisition and preservation of 2,245 acres of bottomland hardwoods. SN Sturgeon lifecycle habitat impacts are offset by restoration of access to historic spawning areas; Striped bass lifecycle habitat impacts are offset by increase annual stocking; Incidental improvements to dissolved oxygen	No significant environmental impacts after mitigation. 337 acre freshwater marsh conversion (8.3%) mitigated through acquisition and preservation of 2,683 acres of bottomland hardwoods. SN Sturgeon lifecycle habitat impacts are offset by restoration of access to historic spawning areas; Striped bass lifecycle habitat impacts are offset by increase annual stocking; Incidental improvements to dissolved oxygen

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
B. Regional Economic Development (RED)						
a. Impact on Gross Regional Product	No change	NA			$794,610,000	NA
b. Impact on Income					$511,074,000	
c. Impact on Employment					11,555 job equivalents	
NOTE: The project's potential effect on Regional Economic Development were only examined for the No Action Alternative and the Selected Plan (47-foot depth alternative)						
C. Other Social Effects (OSE)						
a. Health and Safety	Continue existing levels and trends	Meeting areas increase margins of safety during channel transit.	Meeting areas increase margins of safety during channel transit.	Meeting areas increase margins of safety during channel transit.	Meeting areas increase margins of safety during channel transit.	Meeting areas increase margins of safety during channel transit.

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Quality of life; Material well-being; economic development and standard of living; housing; built environment; natural environment; job security	Continue existing levels of recreation opportunities at Savannah National Wildlife Refuge (29,175 acres)	No change to existing levels of recreation opportunities at Savannah National Wildlife Refuge (29,175 acres)	Increase recreation opportunities at Savannah National Wildlife Refuge by increasing overall size by 1,643 acres (5.6%) and increasing buffer zone	Increase recreation opportunities at Savannah National Wildlife Refuge by increasing overall size by 2,188 acres (7.5%) and increasing buffer zone	Increase recreation opportunities at Savannah National Wildlife Refuge by increasing overall size by 2,245 acres (7.7%) and increasing buffer zone	Increase recreation opportunities at Savannah National Wildlife Refuge by increasing overall size by 2,683 acres (9.2%) and increasing buffer zone

Table 11-3: Savannah Harbor Expansion – System of Accounts						
Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.						
Item	**No Action**	**44 Foot Depth**	**45 Foot Depth**	**46 Foot Depth**	**47 Foot Depth**	**48 Foot Depth**
c. Effects on educational, cultural, and recreational opportunities	No Effect	CSS Georgia archeological data recovery; provide increased cultural and education opportunities; cumulative incidental benefits of increased dissolved oxygen; restored upstream fish passage; increased striped bass stocking; increased submerged structures (resulting from Tidegate removal) will improve recreational fishing opportunities	CSS Georgia archeological data recovery; provide increased cultural and education opportunities; cumulative incidental benefits of increased dissolved oxygen; restored upstream fish passage; increased striped bass stocking; increased submerged structures (resulting from Tidegate removal) will improve recreational fishing opportunities	CSS Georgia archeological data recovery; provide increased cultural and education opportunities; cumulative incidental benefits of increased dissolved oxygen; restored upstream fish passage; increased striped bass stocking; increased submerged structures (resulting from Tidegate removal) will improve recreational fishing opportunities	CSS Georgia archeological data recovery; provide increased cultural and education opportunities; cumulative incidental benefits of increased dissolved oxygen; restored upstream fish passage; increased striped bass stocking; increased submerged structures (resulting from Tidegate removal) will improve recreational fishing opportunities	CSS Georgia archeological data recovery; provide increased cultural and education opportunities; cumulative incidental benefits of increased dissolved oxygen; restored upstream fish passage; increased striped bass stocking; increased submerged structures (resulting from Tidegate removal) will improve recreational fishing opportunities

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
D. Plan Evaluation						
1. Contributions to Planning Objectives						
a. Reduce Navigation Transportation Costs	The No Action Alternative does not reduce transportation costs	Reduces transportation costs by an average annual equivalent of $100,335,000	Reduces transportation costs by an average annual equivalent of $136,238,000	Reduces transportation costs by an average annual equivalent of $154,247,000	Reduces transportation costs by an average annual equivalent of $159,472,000 (at 4.125%)	Reduces transportation costs by an average annual equivalent of $159,953,000
		NA	NA	NA	Reduces transportation costs by an average annual equivalent of $213,144,000 (at 4.0%)	NA

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Integrate / Complement other related programs including DMMP and environmental programs	Operations comply with DMMP and environmental programs as funding allows	Fish by-pass supports NOAA anadromous fish passage program; incidental improvement to dissolved oxygen levels compliments EPA's TMDL. New material placement integrates with existing DMMP.	Fish by-pass supports NOAA anadromous fish passage program; acquisition of 1,643 acres of bottomland hardwoods supports Refuge expansion plan; incidental improvement to dissolved oxygen levels complements EPA's TMDL. New material placement integrates with existing DMMP	Fish by-pass supports NOAA anadromous fish passage program; acquisition of 2,128 acres of bottomland hardwoods supports Refuge expansion plan; incidental improvement to dissolved oxygen levels complements EPA's TMDL. New material placement integrates with existing DMMP	Fish by-pass supports NOAA anadromous fish passage program; acquisition of 2,245 acres of bottomland hardwoods supports Refuge expansion plan; incidental improvement to dissolved oxygen levels complements EPA's TMDL. New material placement integrates with existing DMMP	Fish by-pass supports NOAA anadromous fish passage program; acquisition of 2,683 acres of bottomland hardwoods supports Refuge expansion plan; incidental improvement to dissolved oxygen levels complements EPA's TMDL. New material placement integrates with existing DMMP

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
2. Response to Planning Constraints						
Goal: Adhere to Maritime Safety Requirements	Vessels continue to operate under standard harbor safety guidelines	Plan complies with harbor safety guidelines. Meeting areas and turning basin modification increase margins of safety during channel transit.	Plan complies with harbor safety guidelines. Meeting areas and turning basin modification increase margins of safety during channel transit.	Plan complies with harbor safety guidelines. Meeting areas and turning basin modification increase margins of safety during channel transit.	Plan complies with harbor safety guidelines. Meeting areas and turning basin modification increase margins of safety during channel transit.	Plan complies with harbor safety guidelines. Meeting areas and turning basin modification increase margins of safety during channel transit.
Goal: No significant adverse impacts to the Upper Floridan Aquifer	Continued salinity increase due to withdrawals	No significant effect to aquifer or production wells	No significant effect to aquifer or production wells	No significant effect to aquifer or production wells	No significant effect to aquifer or production wells	No significant effect to aquifer or production wells

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
Goal: No significant adverse impacts to cultural resources	CSS Georgia preservation as funds become available (currently not scheduled); Old Fort Jackson Shoreline hardened in 2004 and no bank erosion expected; Fort Pulaski continued bank erosion at unprotected areas	CSS Georgia archeological data recovery including excavating, conserving, and curating; no significant adverse impacts to river bank at Fort Pulaski	CSS Georgia archeological data recovery including excavating, conserving, and curating; no significant adverse impacts to river bank at Fort Pulaski	CSS Georgia archeological data recovery including excavating, conserving, and curating; no significant adverse impacts to river bank at Fort Pulaski	CSS Georgia archeological data recovery including excavating, conserving, and curating; no significant adverse impacts to river bank at Fort Pulaski	CSS Georgia archeological data recovery including excavating, conserving, and curating; no significant adverse impacts to river bank at Fort Pulaski

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
Goal: Do not violate Environmental Restrictions on Dredging	The plan complies with environmental dredging restrictions.	Plan complies with environmental dredging restrictions.	Plan complies with environmental dredging restrictions.	Plan complies with environmental dredging restrictions.	Plan complies with environmental dredging restrictions.	Plan complies with environmental dredging restrictions.
Goal: Avoid adverse impacts to existing landside infrastructure along channel	No adverse impacts to existing landside infrastructure along channel	Plan avoids adverse impacts to landside infrastructure through channel design	Plan avoids adverse impacts to landside infrastructure through channel design	Plan avoids adverse impacts to landside infrastructure through channel design	Plan avoids adverse impacts to landside infrastructure through channel design	Plan avoids adverse impacts to landside infrastructure through channel design

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
Goal: No adverse impact to Georgia DNR Striped bass recovery program	GADNR continues to operate Striped bass recovery program	Plan maintains effectiveness of GADNR Striped bass recovery program by supplementing program budget to offset habitat loss.	Plan maintains effectiveness of GADNR Striped bass recovery program by supplementing program budget to offset habitat loss.	Plan maintains effectiveness of GADNR Striped bass recovery program by supplementing program budget to offset habitat loss.	Plan maintains effectiveness of GADNR Striped bass recovery program by supplementing program budget to offset habitat loss.	Plan maintains effectiveness of GADNR Striped bass recovery program by supplementing program budget to offset habitat loss.
Goal: No adverse impacts to Shortnose sturgeon	No Sturgeon upstream passage to historic spawning area above New Savannah Bluff Lock and Dam, Continue existing population levels and trends	Plan restores access to historic spawning area.	Plan restores access to historic spawning area.	Plan restores access to historic spawning area.	Plan restores access to historic spawning area.	Plan restores access to historic spawning area.
Goal: No net adverse effect on dissolved oxygen	Continued low dissolved oxygen levels during Summer months	Plan fully offsets decrease with incidental improvement	Plan fully offsets decrease with incidental improvement	Plan fully offsets decrease with incidental improvement	Plan fully offsets decrease with incidental improvement	Plan fully offsets decrease with incidental improvement

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
3. Response to Evaluation Criteria						
a. Acceptability	The no action plan would continue to be acceptable to state and local entities as compliant with existing laws, regulations, and policies. This plan is the least satisfactory plan to the local maritime community.	This plan would continue to be acceptable to state and local entities as compliant with existing laws, regulations, and policies. This plan provides minimal satisfaction to the local maritime community.	This plan would continue to be acceptable to state and local entities as compliant with existing laws, regulations, and policies. This plan provides moderate satisfaction to the local maritime community.	This plan would continue to be acceptable to state and local entities as compliant with existing laws, regulations, and policies. This plan provides somewhat more satisfaction to the local maritime community than the 45-foot plan.	This plan would continue to be acceptable to state and local entities as compliant with existing laws, regulations, and policies. This plan provides nearly the most satisfaction to the local maritime community.	This plan would continue to be acceptable to state and local entities as compliant with existing laws, regulations, and policies. This plan provides the most satisfaction to the local maritime community.

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Completeness	The plan's effects will continue to be realized into the future based on the continuance of historical trends in the maritime industry.	The plan's effects are somewhat reliant on completion of the Panama Canal Expansion.	The plan's effects are moderately reliant on completion of the Panama Canal Expansion.	The plan's effects are strongly reliant on completion of the Panama Canal Expansion.	The plan's effects are strongly reliant on completion of the Panama Canal Expansion.	The plan's effects are strongly reliant on completion of the Panama Canal Expansion.
c. Effectiveness	The no action plan does not contribute to navigation-related planning objectives.	This plan minimally contributes to navigation-related planning objectives. The plan significantly contributes to the integration objective.	This plan moderately contributes to navigation-related planning objectives. The plan significantly contributes to the integration objective.	This plan substantially contributes to navigation-related planning objectives. The plan significantly contributes to the integration objective.	This plan strongly contributes to navigation-related planning objectives. The plan significantly contributes to the integration objective.	This plan makes the most significant contribution to all planning objectives.

Table 11-3: Savannah Harbor Expansion – System of Accounts

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Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
d. Efficiency	The no action plan is the least efficient plan because of the additional transportation cost burden it will impose on the nation.	Although this plan has the lowest financial cost of the alternatives, it is only minimally efficient because it does not fully meet navigation-related planning objectives.	This plan is only moderately efficient because there would remain a residual transportation cost burden to the nation.	This plan is somewhat efficient, but it does not reduce transportation costs as much as deeper alternatives.	This plan is the most efficient in that it meets all planning objectives in the least costly manner and provides the greatest net benefit.	This plan is highly efficient, and it provides the greatest total transportation cost savings, but it does not provide the greatest net benefit.
e. Reversibility	The no action plan may be reversed by reducing maintenance dredging.	The navigation-related components of this plan may be reversed by altering the maintenance dredging regime. Mitigation-related components of the plan are largely irreversible.	The navigation-related components of this plan may be reversed by altering the maintenance dredging regime. Mitigation-related components of the plan are largely irreversible.	The navigation-related components of this plan may be reversed by altering the maintenance dredging regime. Mitigation-related components of the plan are largely irreversible.	The navigation-related components of this plan may be reversed by altering the maintenance dredging regime. Mitigation-related components of the plan are largely irreversible.	The navigation-related components of this plan may be reversed by altering the maintenance dredging regime. Mitigation-related components of the plan are largely irreversible.

Table 11-3: Savannah Harbor Expansion – System of Accounts						
Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.						
Item	**No Action**	**44 Foot Depth**	**45 Foot Depth**	**46 Foot Depth**	**47 Foot Depth**	**48 Foot Depth**
a. Implementation Responsibility	Existing implementation responsibilities are expected to continue.	Implementation of this plan requires responsible actions by the federal government and the non-federal partner in a manner similar to existing conditions. There are no new roles or responsibilities for federal, state, or local agencies.	Implementation of this plan requires responsible actions by the federal government and the non-federal partner in a manner similar to existing conditions. There are no new roles or responsibilities for federal, state, or local agencies.	Implementation of this plan requires responsible actions by the federal government and the non-federal partner in a manner similar to existing conditions. There are no new roles or responsibilities for federal, state, or local agencies.	Implementation of this plan requires responsible actions by the federal government and the non-federal partner in a manner similar to existing conditions. There are no new roles or responsibilities for federal, state, or local agencies.	Implementation of this plan requires responsible actions by the federal government and the non-federal partner in a manner similar to existing conditions. There are no new roles or responsibilities for federal, state, or local agencies.
E. Risk Evaluation						
1. Risk and Vulnerabilities						
a. Investment Risk	Minimal risk to return on investment of maintenance funds since those expenses are periodically justified.	This plan includes the lowest risk to the return on construction funds investment because the existing fleet and existing trade levels would provide some level of return.	This plan includes a very low risk to the return on the investment of construction funds because the return is somewhat based on completion of the Panama Canal Expansion and a minor fleet shift.	This plan includes a low risk to the return on the investment of construction funds because the return is somewhat based on completion of the Panama Canal Expansion and a minor fleet shift.	This plan includes a low risk to the return on the investment of construction funds because the return is somewhat based on completion of the Panama Canal Expansion and a minor fleet shift.	This plan includes a low risk to the return on the investment of construction funds because the return is somewhat based on completion of the Panama Canal Expansion and a minor fleet shift.

Table 11-3: Savannah Harbor Expansion – System of Accounts

Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
b. Reliability	The no action plan requires continuance of existing periodic maintenance dredging to maintain reliability	This plan requires a negligible increase in existing maintenance dredging levels to maintain reliability	This plan requires a slight increase in existing maintenance dredging levels to maintain reliability	This plan requires a very small increase in existing maintenance dredging levels to maintain reliability	This plan requires a small increase in existing maintenance dredging levels to maintain reliability	This plan requires a minor increase in existing maintenance dredging levels to maintain reliability
c. Relative Sea-level rise	The no action plan may be modified in the future to account for effects of sea-level rise	The effects of a range of sea-level rise scenarios were included plan development	The effects of a range of sea-level rise scenarios were included plan development	The effects of a range of sea-level rise scenarios were included plan development	The effects of a range of sea-level rise scenarios were included plan development	The effects of a range of sea-level rise scenarios were included plan development
d. Risk of Ecosystem Damage	Existing conditions and trends are projected to continue	Post-construction monitoring will be conducted to verify predictions and assumptions for chlorides, aquifer impacts, and dissolved oxygen.	Post-construction monitoring will be conducted to verify predictions and assumptions for chlorides, aquifer impacts, and dissolved oxygen.	Post-construction monitoring will be conducted to verify predictions and assumptions for chlorides, aquifer impacts, and dissolved oxygen.	Post-construction monitoring will be conducted to verify predictions and assumptions for chlorides, aquifer impacts, and dissolved oxygen.	Post-construction monitoring will be conducted to verify predictions and assumptions for chlorides, aquifer impacts, and dissolved oxygen.

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Problem Statement: Container ship transportation at Savannah Harbor operates in an economically inefficient manner under existing and without project conditions.

Item	No Action	44 Foot Depth	45 Foot Depth	46 Foot Depth	47 Foot Depth	48 Foot Depth
e. Risk of Life and Safety	Existing levels of safety are projected to continue into the future.	Meeting areas and turning basin modification increase margins of safety during channel transit.	Meeting areas and turning basin modification increase margins of safety during channel transit.	Meeting areas and turning basin modification increase margins of safety during channel transit.	Meeting areas and turning basin modification increase margins of safety during channel transit.	Meeting areas and turning basin modification increase margins of safety during channel transit.

12 Uncertainty Considerations

Uncertainties are evaluated for economic benefits, costs, environmental impacts, mitigation effects, and sea-level change.

12.1 Economic Analysis Uncertainty

12.1.1 Jasper County Terminal Sensitivity Analysis

In this analysis of navigation improvements to Savannah Harbor, a proposed future Jasper County Terminal is not included as a without or with-project condition due to the high level of uncertainty concerning the proposed terminal (Section 5.2 US East Coast and Gulf Coast Port Configurations and Capacities). Nonetheless, a series of sensitivity analyses were conducted to identify the potential impact that a Jasper County terminal might have on the justification and recommendation of a proposed channel deepening to the Garden City Terminal.

Terminal Development Uncertainty

The JPO has estimated that Phase I of the terminal would become operational by 2025, with 3 berths, having a total capacity of 500,000 TEUs, turning basin, utility, road and rail access and supporting infrastructure on 1,500 acres in Jasper County, SC. Additional phases would be brought on line as needed to meet market demands. The terminal would eventually have 10 berths and a capacity of 7M TEUs. The estimated cost of the terminal and connecting land transportation corridors would be around $4B. However, there is a high degree of uncertainty regarding the development of a container terminal in Jasper County. There is some doubt about whether a terminal will be constructed, and if it is constructed, the timing of construction, the exact location where the terminal might be built and how it would operate. Although a draft Intergovernmental Agreement has been published and the states are continuing to work in a collaborative manner, numerous uncertainties still exist regarding the development of a new terminal at Jasper County. A terminal design has not been developed nor have permits been obtained or even sought for construction. Other unknowns include the terminal development costs, the number of ship berths that would be available, the amount of storage capacity, accessibility for rail and truck, and ultimate throughput capacity. In addition, impacts to Corps operations and maintenance of the existing Federal Savannah River channel are not known, nor are the impacts to the existing Dredged Material Management Plan for the harbor and the required environmental uses of these disposal areas. The areas serve not only as dredged material disposal sites but also as habitat for critical avian species.

In such situations of great uncertainty, Federal regulations at 40 C.F.R. 1502.22 call for an evaluation based what might be considered "reasonably foreseeable significant adverse environmental impacts." Because of the uncertainty surrounding virtually all aspects of a potential Jasper terminal, an evaluation at the reconnaissance level was