Brunswick Harbor Modifications Study, Glynn County, GA

Draft Integrated Feasibility Report and Environmental Assessment and Draft FONSI

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Executive Summary

In this Integrated Feasibility Report and Environment Assessment (IFR/EA), the U.S. Army Corps of Engineers, Savannah District (the Corps) investigates the feasibility of reducing transportation cost inefficiencies associated with the Federal deep draft navigation channel at Brunswick Harbor. The study is authorized by Section 1201 of WRDA 2016. The Corps is undertaking this action in partnership with the Georgia Ports Authority (GPA), the study's non-Federal sponsor. This IFR/EA describes the recommended plan for reducing transportation cost inefficiencies and how it is economically justified and promotes National Economic Development (NED) while protecting the Nation's environment.

The Port of Brunswick, located at Brunswick Harbor, consists of three terminals. Of these, the Colonel's Island Terminal handles all the Roll-on/Roll-off (RO/RO) traffic and is the second busiest port in the U.S. for total RO/RO cargo and busiest for RO/RO imports. The Brunswick Harbor Pilots have guidelines and restrictions for vessel operations depending on RO/RO vessel dimensions and draft, and these result in cost inefficiencies for the largest RO/RO ship-type calling on Brunswick Harbor. These larger vessels experience navigation and maneuverability issues primarily due to the channel width at specific locations between St. Simons Sound and the Colonel's Island Terminal including a channel bend near the Cedar Hammock Range and a turning basin near Colonel's Island Terminal. The purpose of the proposed Federal action is to reduce transportation cost inefficiencies experienced by the largest ship type utilizing Brunswick Harbor.

The table below summarizes costs and benefits for the study's eight action alternatives and No Action alternative. Proposed modifications include widening the channel bend near the Cedar Hammock Range (Alt 2), expanding the turning basin (Alt 3), widening the channel west of the Sidney Lanier Bridge (Alt 4), widening the channel at St. Simons Sound (Alt 5), and combinations of these alternatives (Alt 6 through Alt 9). Alternative 8, a combination of Alt 2, Alt 3, and Alt 5 provides the highest average annual equivalent (AAEQ) net benefits among the alternatives and is the NED Plan and the Tentatively Selected Plan (TSP). This action generates $79,075,000 in economic benefits over the 50-year period of analysis and has a Benefit-Cost Ratio (BCR) of 4.1. The non-Federal sponsor supports the TSP, Alternative 8, and has no Locally Preferred Plan.

Comparison of Alternatives:

Alternative	Project First Costs	AAEQ Costs	AAEQ Benefits	AAEQ Net Benefits	BCR
Alt 1 – No Action	N/A	N/A	N/A	N/A	N/A
Alt 2 – BW	$9,445,000	$362,000	$1,016,000	$654,000	2.8
Alt 3 – TB	$8,462,000	$447,000	$1,249,000	$802,000	2.8
Alt 4 – MA1	$20,569,000	$762,000	$281,000	- $481,000	0.4
Alt 5 – MA2	$899,000	$33,000	$94,000	$61,000	2.8
Alt 6 – BW + TB	$14,368,000	$678,000	$2,833,000	$2,155,000	4.2
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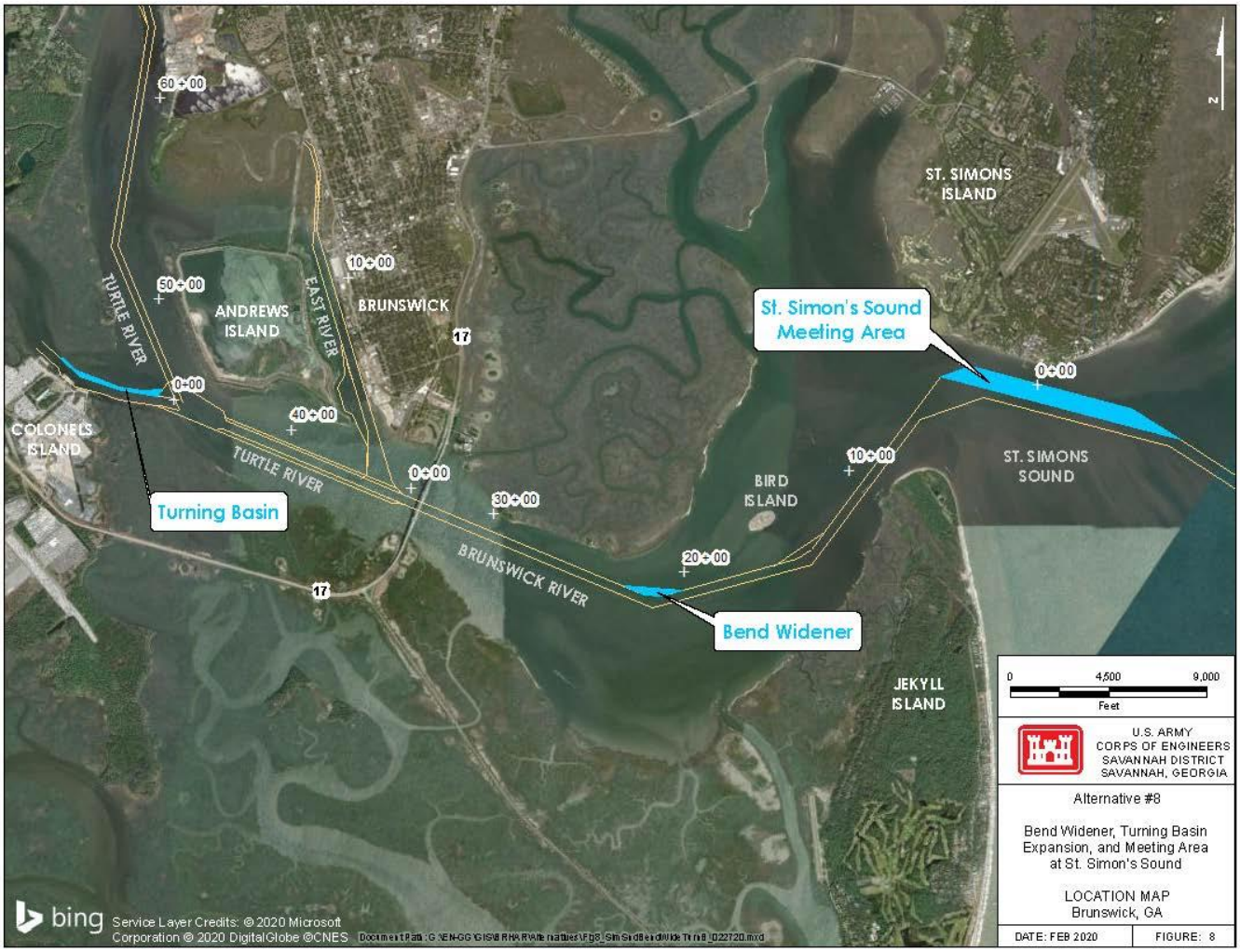
Alternative	Project First Costs	AAEQ Costs	AAEQ Benefits	AAEQ Net Benefits	BCR
Alt 7 – BW+TB+MA_1	$31,930,000	$1,329,000	$2,937,000	$1,608,000	2.2
***Alt 8 – BW+TB+MA_2**	**$15,312,000**	**$713,000**	**$2,929,000**	**$2,216,000**	**4.1**
Alt 9 – BW+TB+MA_1+MA_2	$32,027,000	$1,332,000	$3,033,000	$1,701,000	2.3

TB – Turning Basin Expansion; BW – Bend Widener; MA_1 – Meeting Area at Sidney Lanier Bridge; MA_2 – Meeting Area at St Simons Sound; *Denotes Tentatively Selected Plan



Alternative 8 - Bend widener, turning basin expansion, and meeting area at St. Simons Sound. Existing Federal navigation channel denoted by yellow lines with areas of proposed channel widening highlighted in blue.

With implementation of the recommended plan, there would be no significant environmental impacts to water quality, existing wetlands, threatened and endangered species, essential fish habitat, terrestrial resources and habitat, aquatic resources and habitat, and other protected resources within the study area. In order to minimize adverse impacts, the Corps will follow best management practices in its design and operations.

TABLE OF CONTENTS

This report includes an Environmental Assessment integrated into the Main Report that complies with requirements of the USACE and the Council of Environmental Quality (CEQ), and reduces duplication and paperwork. An **asterisk (*)** in the table of contents and headings notes paragraphs that are required for National Environmental Policy Act (NEPA) compliance.

LIST OF TABLES

LIST OF FIGURES

APPENDICES

DRAFT FINDING OF NO SIGNIFICANT IMPACT (FONSI)/NEPA

ACRONYMS

Acronyms	Definition
AAEQ	Average Annual Equivalent
ACHP	Advisory Council on Historic Preservation
AIWW	Atlantic Intercoastal Waterway
APE	Area of Potential Effects
BCR	Benefit-to-Cost Ratio
BMP	Best Management Practices
CAA	Clean Air Act
CAGR	Compound Average Growth Rate
CEQ	Council of Environmental Quality
CEU	Car-Equivalent Units
CFR	Code of Federal Regulations
CHL	Coastal Hydraulics Lab
CIMC	Cleanups in My Community
CMPA	Coastal Marsh Protection Act
CO	Carbon monoxide
CWA	Clean Water Act
DMCA	Dredged Material Containment Area
DO	Dissolved Oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
EPB	Environmental Protection Barrier
EPD	Georgia Department of Natural Resources Environmental Protection Division
EQ	Environmental Quality
ER	Engineering Regulation
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCSA	Feasibility Cost Share Agreement
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
FWOP	Future Without Project Condition Alternative
GACRD	Georgia Department of Natural Resources Coastal Resources Division
GADNR	Georgia Department of Natural Resources
GADOT	Georgia Department of Transportation
GADPH	Georgia Department of Public Health
GNAHRGIS	Georgia’s Natural, Archaeological and Historic Resources GIS
GPA	Georgia Ports Authority
HAPC	Habitat Area of Particular Concern
HDD	Horizontal Directional Drilling

HERO	High Efficiency Roll-on/Roll-off
HTRW	Hazardous, Toxic, and Radioactive Waste
IFR	Integrated Feasibility Report
IPAC	Information, Planning, and Conservation System
IWR	Institute for Water Resources (USACE)
LCTC	Large car and truck carriers
LER	Lands, easements, and rights-of way
LERRD	Lands, easements, rights-of-way, relocations and disposal areas
MHHW	Mean higher high water
MISLE	Marine Information for Safety and Law Enforcement (USCG)
MLLW	Mean lower low water
MLW	Mean Low Water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NMFS	U.S. Department of Commerce National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Telemetry Units
NWI	National Wetlands Inventory
OSE	Other Social Effects
PA	Programmatic Agreement
PAL	Planning Aid Letter
PAR	Planning Aid Report
PCTC	Pure car and truck carriers
PED	Preconstruction, Engineering, and Design
PPP	Previous Post-Panamax
RED	Regional Economic Development
ROM	Rough Order of Magnitude
RO/RO	Roll-on/Roll-off
SAFMC	South Atlantic Fishery Management Council
SERIM	United States Fish and Wildlife Service
SLC	Sea level change
SLR	Sea level rise
TRI	Toxics Release Inventory
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WQC	Water quality certification

Brunswick Harbor Modifications Study, Glynn County, GA

1.0 Introduction

The U.S. Army Corps of Engineers, Savannah District (the Corps) is investigating the feasibility of navigation channel improvements in Brunswick Harbor from St. Simons Sound to the Colonel's Island Terminal. The study focus is to examine harbor modifications to reduce transportation cost inefficiencies experienced by the largest ship type utilizing Brunswick Harbor. This report documents the planning process for navigation improvements to demonstrate consistency with Corps planning policy and to meet the implementation regulations for the National Environmental Policy Act (NEPA). The following sections provide background information regarding the basis for this study. The sections required for NEPA compliance are denoted with an asterisk (*).

1.1 Study Purpose and Scope*

This deep draft navigation feasibility study will analyze alternatives for navigation improvements to Brunswick Harbor. This feasibility report will identify and evaluate a full range of reasonable action alternatives in comparison to the No Action Alternative/Future Without Project condition alternative (NAA/FWOP).

1.2 Study Authority and Non-Federal Sponsor*

The study authority is Section 1201 of WRDA 2016, which reads:

> "The Secretary is authorized to conduct a feasibility study for the following projects for water resources development and conservation and other purposes, as identified in the reports titled ''Report to Congress on Future Water Resources Development'' submitted to Congress on January 29, 2015, and January 29, 2016, respectively, pursuant to section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d) or otherwise reviewed by Congress:
>
> (12) BRUNSWICK HARBOR, GEORGIA.—Project for navigation, Brunswick Harbor, Georgia."

Georgia Ports Authority (GPA) is the Non-Federal Sponsor (NFS). As the NFS, GPA contributes 50 percent of the total feasibility study costs in the form of cash or in-kind contributions. A feasibility cost share agreement was executed on April 11, 2019.

1.3 Location and Description of the Study Area*

Brunswick Harbor is located in the southeastern section of Glynn County, Georgia, adjacent to the City of Brunswick and includes the inner channels through St. Simons Sound, the Brunswick River, the Turtle River, and the East River to the Colonel's Island Terminal (Figure 1, Figure 2). The inner channels are at a depth of -36 feet mean lower

low water (MLLW) and at a width of 400 feet (ft). Brunswick Harbor consists of three terminals: Colonel's Island, Mayor's Point, and East River (Figure 3). The inner channels are at a depth of -36 feet mean lower low water (MLLW) and at a width of 400 feet (ft). Brunswick Harbor consists of three terminals: Colonel's Island, Mayor's Point, and East River (Figure 3).

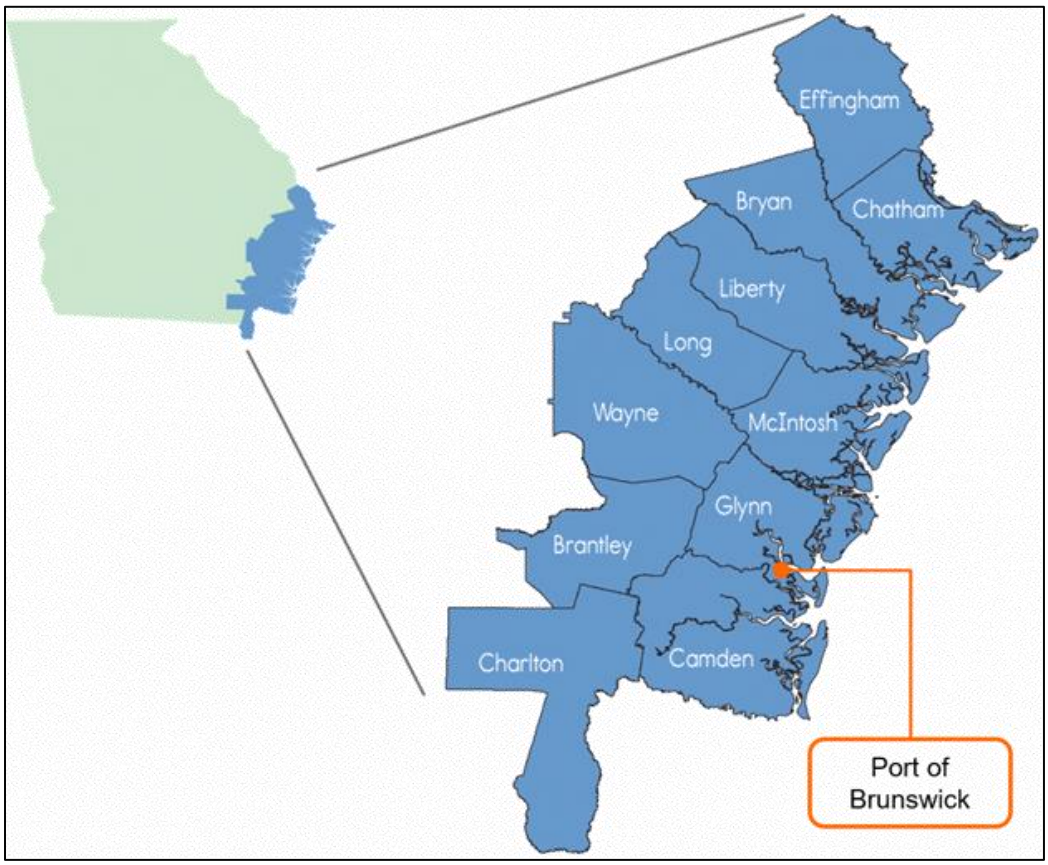


Figure 1. Port of Brunswick location

Figure 2. Brunswick Harbor with the navigation channel identified in yellow

Figure 3. Brunswick Harbor Terminals

The Mayor's Point Terminal and East River Terminal are located along the East River close to downtown Brunswick. The East River terminal is used for dry and liquid bulk shipping. Wood pellets are the main commodity shipped from the East River Terminal. Commodities received at the East River Terminal include fertilizers, salt from the Bahamas, perlite, kitty-litter, and bulk liquids. Mayor's point terminal specializes in paper and pulp products. Smaller vessels (less than 40,000 dead weight tons) service these two terminals.

Colonel's Island Terminal, as a dedicated "Roll-on/Roll-off" (RO/RO) facility, provides the central focus of this feasibility study. As the largest terminal in Brunswick Harbor and the largest automobile port in the Nation, with 610 acres of paved open storage and an additional 478 acres permitted for development, the Colonel's Island terminal, owned and operated by the GPA, is the second busiest port in the U.S. for total RO/RO cargo and busiest for RO/RO imports. It handles all of Brunswick Harbor's RO/RO traffic, which is wheeled non-containerized freight, such as automobiles and construction equipment.

1.3.1 Port Vicinity

As the westernmost port on the U.S. Eastern seaboard, the Port of Brunswick is a natural gateway to move cargo to the large population centers in the Southeast (Figure 4). The Colonel's Island Terminal is within 2.5 miles of Interstate 95 (I-95) and is also served by two Class 1 railroads.

Figure 4. Port of Brunswick Railroad Connections

1.4 Project Area Overview

Brunswick Harbor is a nationally significant port and a critical regional and national gateway. This feasibility study focuses on commodities that transit through the Colonel's Island Terminal. In Fiscal Year 2018, over 629,000 combined auto/machinery units moved through the Colonel's Island Terminal RO/RO terminal for receipt or shipment (GPA, 2019). This translates into almost one million metric tons of vehicles and parts moved. Colonel's Island Terminal has an annual throughput capacity of over 800,000 Car-Equivalent Units (CEUs). Ongoing expansion projects at Colonel's Island Terminal are expected to add to this capacity with an additional dock and landside infrastructure improvements which are projected to be completed in 2020. Given forecasted vehicle growth during the study period, the Port of Brunswick is not expected to exceed future capacity estimates of approximately 1.5 million CEUs by the end of the 50-year period of analysis.

Currently, Colonel's Island Terminal offers three RO/RO berths with an overall length of 3,355 feet at a depth of 36 feet (Figure 5) and is served by nine steamship lines. The port services more than 60 automobile and heavy equipment manufacturers. Three on-terminal auto processors, seven automobile manufacturers, and two marine terminal operators reside on Colonel's Island Terminal.

Figure 5. Colonel's Island Terminal looking southwest. Source: Georgia Ports Authority

1.4.1 Colonel's Island Terminal Expansion

The current capacity at Colonel's Island Terminal is 90,000 automobile parking spaces. Full build-out will provide 1,102 acres for automobile processing, an additional rail yard on the south side of the terminal, and a fourth RO/RO berth, for an annual capacity of approximately 1.5 million vehicles.

1.5 Prior Reports and Studies

USACE, Final Environmental Impact Statement, Brunswick Harbor Deepening Project, Brunswick, Georgia, March 1998

This Environmental Impact Statement (EIS) is the decision document for the previous Brunswick Harbor Deepening Project. The EIS described the formulation of alternatives and selection of the 6-foot deepening plan, which created an authorized depth of -36 feet MLLW in the inner harbor and -38 feet MLLW across the bar channel. The project described in this EIS was constructed between 2004 and 2008, and this authorized depth continues to be maintained.

USACE, Letter Report for Small Navigation Projects CAP Section 107, Brunswick Harbor Improvements, July 21, 2011.

This letter report documented problems identified by the Harbor pilots within two areas of Brunswick Harbor. At these locations, pilots expressed concern with navigating the largest RO/RO vessels due to channel width. Preliminary cost estimates identified a project that exceeded construction cost limits of the USACE Continuing Authorities Program. Therefore, the non-Federal sponsor pursued a specific authorization per WRRDA 2014, Section 7001.

1.6 Overview of Integrated Report

This document is a draft Integrated Feasibility Report/Environmental Assessment (IFR/EA). The purpose of the feasibility report is to identify the plan that reasonably maximizes the NED net benefits, is technically feasible, and environmentally sustainable. The purpose of the EA portions of the report is to comply with NEPA requirements to identify and analyze environmental effects of the alternatives, incorporate environmental concerns into the decision-making process, and to determine whether any environmental impacts are significant and warrant the preparation of an EIS.

2.0 Existing and Future Conditions*

This Section provides an overview of the existing project area conditions used for the analyses conducted for this study. The description of existing conditions contained in this section are the most relevant to the evaluation of project alternatives. Impacts of the alternatives being evaluated can be found in Section 4.0.

Existing conditions represent the current conditions within the project area, as well as those future conditions without implementation of those alternatives being evaluated. The following sections describe those general existing conditions.

2.1 Planning Horizon

The planning horizon encompasses the study period, construction period, period of analysis, and project life. The study began on April 11, 2019 and is estimated to be completed by March 11, 2022. The design is estimated to begin on November 1, 2022 and be completed by October 31, 2023. The construction period is estimated to begin on November 1, 2024 and be completed by October 31, 2025. The period of analysis for each alternative was 50 years, from 2026 to 2075.

2.2 Navigation and Economic Conditions

Historic and Existing Commerce

The Port of Brunswick, GA is the largest automobile port by area in the U.S. In fiscal year 2018, over 629,000 combined auto/machinery units moved through the port for import or export (GPA, 2019). This translated into almost 1 million metric tons of vehicles and parts moved. Figure 6 shows the total tonnage by major commodity between 2013 and 2017.

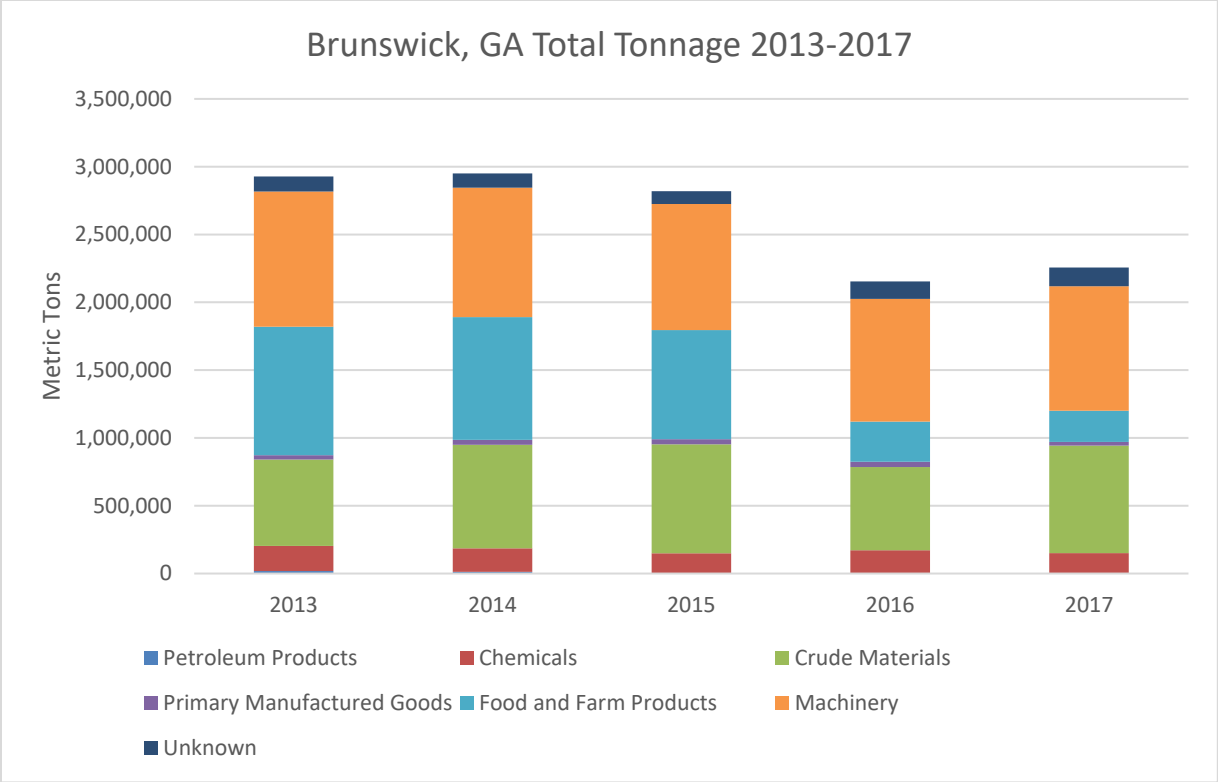


Figure 6. Brunswick Total Tonnage 2013-2017 (Source: Waterborne Commerce Statistics Center, 2019)

Port tonnage has decreased since 2014, mainly due to decreases in bulk grain tonnage through the port. The trades in bulk soybeans and corn have been traditionally very cyclical through Brunswick. Since 2013, the customers moving these goods have experienced issues with weather, vessel crews, railroad scheduling, and prices. These issues led to the gradual decline in bulk agricultural volumes. Therefore, most of the grain now is exported via the Mississippi River. This led to the closure of the grain loading facility at Colonel's Island Terminal after it was damaged by a storm in 2018. This facility is in the process of being developed into more parking for vehicles and for high and heavy cargo used in RO/RO trades. On average, 2.3 million metric tons have moved annually between 2007 and 2017.

There has been an almost even split of the tonnage between imports and exports. Imports have averaged around 1million metric tons per year since 2013, and exports have averaged around 1.4 million metric tons per year. As shown in Figure 7, vehicles make up about 60 percent of the total tonnage imported into Brunswick since 2013.

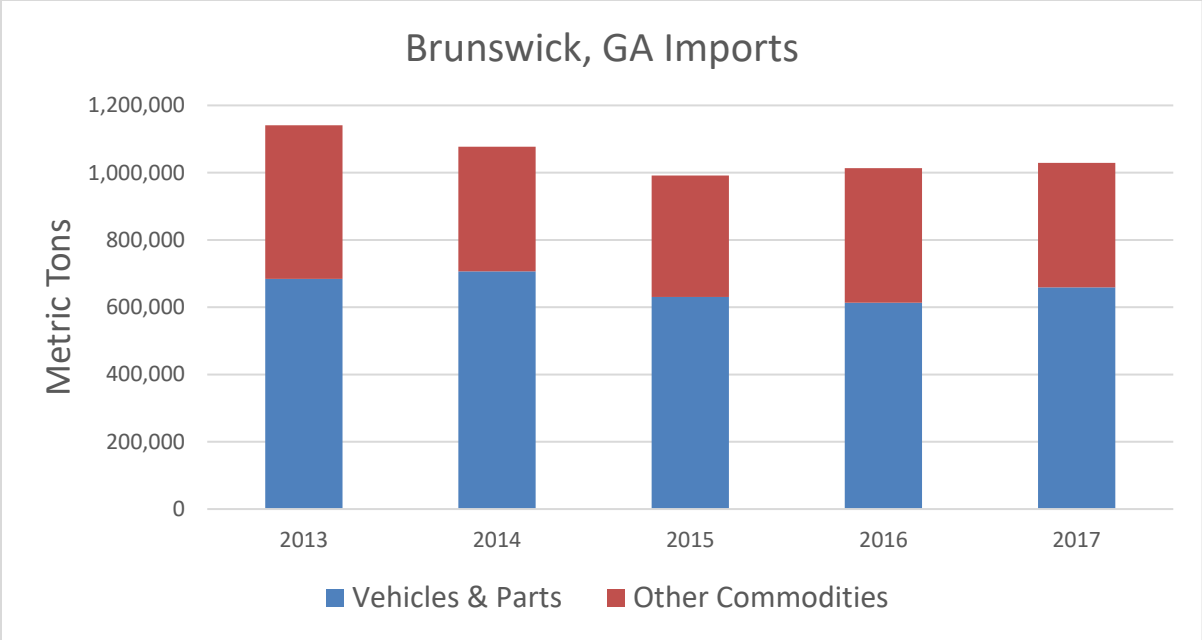


Figure 7. Brunswick, GA Import Tonnage 2013-2017 (Source: Waterborne Commerce Statistics Center, 2019)

Existing Vessel Traffic

The authorized Federal channel in Brunswick Harbor Channel was designed in the 1990s for a RO/RO design vessel with dimensions of 660 feet long and 106 feet wide. Today, longer and wider vessels use the channel. Vessels up to 870 feet long or 134 feet wide have called on the Colonel's Island Terminal to move vehicles. The current fleet of RO/RO vessels are broken up into five different classes.

- **Pure car and truck carriers (PCTC)** are the oldest and most prolific class of RO/RO, having been used at least since 1995. They are approximately 660 feet in length and have a CEU capacity of 6,600. They provide flexible and efficient operations. This class was the previous study's design vessel.

- **Large car and truck carriers (LCTC)** are longer than a PCTC at around 750 feet long. These are a slightly newer class that entered use around 2000. They also have a higher loading ramp and deck capacity, expanding the range of cargo that can be transported. They have a CEU capacity of up to 7,900.

- **The Mk IV/Mk V classes** are heavy RO/RO vessels with extreme ramp and deck capacity—up to 500 tons. These were designed more specifically for the carriage of heavy equipment and breakbulk cargo while retaining significant car capacity (5,500-6,000 CEU). Mk IV's entered use around 2000, while Mk V's around 2010. They can be between 800-870 feet long and 106 feet wide.

- **High Efficiency RO/RO (HERO)** carriers are the newest, most advanced RO/RO vessel, combining elements of all other vessel types. It is between 655-656 feet

long, has the capacity of an LCTC (7,600 – 8,000 CEU) and capability similar to an Mk IV, all in a highly efficient design. Its width is designed for the expanded locks of the Panama Canal, and can be 114-134 feet wide. This class entered use in 2015.

Table 1 shows typical vessel characteristics of the five classes of RO/RO vessels that currently utilize the channel. The bottom three rows display how often each of the five classes of RO/RO vessels called on the port from 2015-2018.

Table 1. Brunswick Harbor Vessel Characteristics and Port Calls (Source: National Navigation Operation & Management Performance Evaluation & Assessment System, 2017)

Class	PCTC	LCTC	Mk IV	Mk V	HERO
Length overall	650-671 ft	747-763 ft	789-803 ft	868-870 ft	655-656 ft
Beam	77-107 ft	105-107 ft	105-106 ft	105-107 ft	114-134 ft
2015 calls	393	65	5	1	2
2016 calls	315	69	4	9	35
2017 calls	299	60	1	5	39
2018 calls	325	68	0	0	53

PCTC are still the predominant class used in Brunswick, accounting for an average of 77 percent of RO/RO vessel calls between 2015 and 2018, but the number of HERO vessels is on the rise, accounting for an average of seven percent of RO/RO calls within the same time period and 12 percent in 2018.

Vehicle shippers employ a variety of routes to move goods around the world, and through Brunswick. Table 2 illustrates a single vessel voyage and shows the list of different ports a vessel may visit before and after their calls to Brunswick.

Table 2. Example RO/RO Vessel Route through Brunswick

PORT	DAY	ACTIVITY
Panama Canal	1	Transit
Manzanillo, PAN	2	Discharge & Load
Brunswick, GA	6	Discharge & Load
Savannah, GA	7	Discharge & Load
Newport News, VA	9	Discharge
Baltimore, MD	10	Discharge & Load
Philadelphia, PA	12	Discharge
New York, NY	13	Discharge & Load
Zeebrugge, BEL	23	Discharge
Bremerhaven, GER	25	Discharge & Load
Zeebrugge, BEL	26	Load & Discharge
Southampton, UK	27	Discharge & Load
Bristol, UK	29	Load & Discharge
Savannah, GA	39	Discharge & Load
Manzanillo, PAN	43	Discharge & Load
Panama Canal	44	Transit
Port Hueneme, CA	52	Discharge & Load
Tacoma, WA	56	Discharge & Load
Yokohama, JPN	69	Discharge
Tianjin, CHN	73	Discharge

As a result of this large network of pickups and deliveries, shippers rarely load or unload their full vehicle capacity at Brunswick. While many vessels have capacity for 6,000-8,000 CEUs, the maximum shipment seen in Brunswick in one time may be 2,000-2,500 CEUs. Offloading crews can move over 200 units an hour from the vessels to the parking areas, leading typical port calls to last between 4-8 hours.

Numerous vehicle services call on Brunswick Harbor which are operated by several carriers and have trade routes which originate in Asia, Europe, or Latin America. See Section 2.3.2 of the Economic Appendix for carriers and trade lanes included in this analysis. The nine services originating in Asia or Oceana which access the U.S. East Coast and Gulf Coast via the Panama Canal were combined into a single route group, “Trans-Pacific” (TP). The route group “Trans-Atlantic” (TA) represents eight different services which call Brunswick and other U.S. East Coast ports. These services connect to Europe, Africa, and the Middle East. The route group “Short Sea” (SS) represents a four different services which call Brunswick and other U.S. ports on either side of the Panama Canal. These services also connect Central and South America to other global ports.

Distances associated with each route group were not used as part of this analysis, since widening alternatives are being evaluated. There are no origin-to-destination benefits, so at-sea savings were not measured. Only efficiencies gained inside the port are measured due to widening alternatives, and no routes were considered.

Harbor Pilot Rules

A Harbor Pilot guides ships through the harbor and are expert ship handlers with extensive knowledge of local waterways. The Brunswick Harbor Pilots have guidelines for vessel operations depending on RO/RO vessel length and draft. Since the channel is 400' wide, traffic is one-way inside the channels. However, there are locations at the turning basin by Colonel's Island Terminal and St. Simons Sound that vessels can wait for oncoming traffic to pass, if needed. Large tides and resulting strong currents can cause navigation issues for larger vessels transiting to and from Colonel's Island Terminal. Vessels greater than 768 feet long that are destined for Colonel's Island Terminal will have a tide and current restriction. They can only be inbound at slack water on a high tide. All RO/RO vessels are susceptible to the wind due to their tall sail area. Therefore, any RO/RO vessel heading to or from Colonel's Island Terminal may face delays when sustained winds are greater than 20 knots. While the pilots do not have a hard rule on maximum draft, due to fluctuating maintenance dredging requirements, vessels that exceed 32 feet of draft may experience delays due to waiting on high tide before beginning their transits.

Future Commerce

Using the commodity forecast for receipts and shipments and the average weight per CEU derived from historical CEU volumes provided by the GPA, a CEU forecast was developed. The long-term trade forecasted rates for the Brunswick Harbor study combined data obtained from IHS Global, Inc., USACE waterborne commerce databases and the Georgia Ports Authority. Volumes for the near-term (2019-2020) were held constant, based on industry and global economic dynamics. From 2021-2046, volumes were estimated to grow per the IHS rates. Commodity growth is held constant after 20 years following the base year (2026) due to the uncertainty surrounding such long-term forecasts. However, benefit levels remain constant through the remaining period of analysis as well. More detail on the commodity forecast can be found in the economic appendix. Receipt CEU's are made up of primarily passenger vehicles, while shipment CEU's are primarily high and heavy cargo, like construction equipment; hence, the heavier weight per shipment CEU. Table 3 provides the receipt and shipment CEU forecast, along with the weight per CEU for the three route groups.

Table 3. Brunswick CEU Forecast – Receipt and Shipment

Route Group	Weight per Receipt CEU	2026	2036	2046
TP	1.5	188,331	255,569	336,384
TA	1.5	323,871	387,601	457,356
SS	1.5	29,428	39,934	52,562
Total Receipts		**541,629**	**683,104**	**846,302**
Route Group	**Weight per Shipment CEU**	**2026**	**2036**	**2046**
TP	2.3	76,563	109,032	149,878
TA	2.3	84,560	98,493	113,022
SS	2.3	13,137	18,893	26,200
Total Shipments		**174,261**	**226,418**	**289,100**

The total number of CEUs, by receipt and shipment, and route group are shown in **Table 4**. Receipt CEUs are forecasted to grow from 500,000 in 2026 to 850,000 in 2046. Shipment CEUs are forecasted to grow from 170,000 in 2026 to 290,000 in 2046, an increase of 70 percent. The Compound Average Growth Rate (CAGR) for each route represents the geometric average growth of receipts and shipments, which accounts for the effect of compounding over time. For the Trans-Atlantic route, for example, receipts are projected to grow from 324,000 to 457,000 over the 20-year period at a CAGR of 1.7 percent per year.

Table 4. Brunswick Total CEU Forecast by Route for Receipts and Shipments

Total CEUs - Receipts	2026	2036	2046	CAGR
TP	188,331	255,569	336,384	2.9%
TA	323,871	387,601	457,356	1.7%
SS	29,428	39,934	52,562	2.9%
Total	**541,629**	**683,104**	**846,302**	**2.2%**
Total CEUs - Shipments	**2026**	**2036**	**2046**	**CAGR**
TP	76,563	109,032	149,878	3.4%
TA	84,560	98,493	113,022	1.5%
SS	13,137	18,893	26,200	3.3%
Total	**174,261**	**226,418**	**289,100**	**2.5%**
Total Overall CEUs	**2026**	**2036**	**2046**	**CAGR**
TP	264,894	364,600	486,262	3.0%
TA	408,431	486,094	570,378	1.7%
SS	42,565	58,827	78,762	3.0%
Total	**715,890**	**909,522**	**1,135,402**	**2.3%**

As seen in Table 4, the forecasted CEU trade is not expected to exceed port capacity of 1.5 million CEUs over the forecast period.

RO/RO Vessels Calling at Port of Brunswick

The study team began to develop a Brunswick-specific fleet forecast using an internal analysis of Port of Brunswick historical calls and the world RO/RO fleet snapshot in 2017. Table 5 shows the historical calls at Brunswick by class. Note that in 2018, Brunswick received 53 HERO calls, despite there being 15 HERO vessels currently in service. This means that all HERO vessels currently in service called on Brunswick multiple times over the year. The same is true for LCTC's. Examination of the pilot's logs from Brunswick confirm this to be true.

Table 5. Historical Vessel Calls at Port of Brunswick by Class, 2015-2018

Class	PCTC	LCTC	Mk IV	Mk V	HERO
2015 calls	393	65	5	1	2
2016 calls	315	69	4	9	35
2017 calls	299	60	1	5	39
2018 calls	325	68	0	0	53

The study team then used the historical fleet utilization as a baseline for forecasting the future fleet. Table 6 displays the percent cargo share by each vessel class for years 2015 to 2018.

Table 6. Percent Cargo by Vessel Class, 2015-2018

	2015	2016	2017	2018
Receipt				
PCTC	86%	57.5%	58.9%	64%
LCTC	12%	23%	20%	16%
Mk IV	1.8%	0.5%	0.1%	0%
Mk V	0.01%	3%	1%	0%
HERO	0%	16%	20%	20%
Shipment				
PCTC	95%	80%	73.9%	72%
LCTC	5%	13%	13%	12%
Mk IV	0.2%	0%	0%	0%
Mk V	0%	0.9%	0.1%	0%
HERO	0%	6%	13%	16%
Total				
PCTC	90%	63%	64%	66%
LCTC	9%	19%	17%	15%
Mk IV	1%	0.3%	0%	0%
Mk V	0.01%	2.3%	0.6%	0%
HERO	0%	15%	18%	18%

Total cargo movements on Previous Post-Panamax (PPP) (LCTC or larger) RO/RO's grew from 10 percent in 2015 to 33 percent in 2018, a significant trend.

Based on inputs from shippers and car manufacturers, shipping capacity will have stabilized to match reduced vehicle production by around 2023. At that point, shipbuilding is expected to rebound by the base year of 2026, based on the anticipated cycle of automotive production growth. During the last shipbuilding increase from 2012-2015, an average of 20 vehicle carriers were built per year, and 10 were scrapped. Given their higher average age (27 years), it is assumed that PCTC's are expected to be scrapped during this time. Given their emissions and capacity advantages, HERO's are expected to be added to the fleet. These new HERO's will continue the trend of more fuel efficient design, and incorporate new low-emissions technologies such as exhaust gas scrubbers, engines designed for lower-sulfur fuel, or even LNG-powered engines[1].

It is assumed that HEROs will continue to be the high end of the spectrum of large PPP vehicle carriers over the forecast period. HEROs are the most fuel efficient and cost effective option to ship vehicles in the fleet. Shipper feedback has been very positive on

[1] "NYK to introduce world's largest PCTC powered by LNG," *Automotive Logistics*, September 25, 2019. www.Automotivelogistics.media.

the performance of the HERO class over the last 2 years, citing better than expected performance in carrying capacity and fuel economy. Consistent with economic production theory, shipping firms will seek to maximize profits by lowering costs. Therefore, shifting cargo share to HERO vessels is consistent with that rationale. With an additional 10-20 HERO vessels in the world fleet by 2026, HEROs would be poised to take a larger share of the cargo moving at Brunswick. As Table 7 shows, HERO cargo share is about 18 percent already. With this projected fleet shift, a cargo share of 25 percent is likely by 2026, and an ultimate share of 30 percent is likely by the end of the forecast period, 2046, as shown in Table 7 and Figure 8 below.

Table 7. Historical and Forecasted Cargo Share by Class at Brunswick

	2015	2016	2017	2026	2036	2046
Receipt						
PCTC	86.00%	57.50%	58.90%	58.00%	53.00%	53.00%
LCTC	12.00%	23.00%	20.00%	17.00%	17.00%	17.00%
Mk IV	1.80%	0.50%	0.10%	0.00%	0.00%	0.00%
Mk V	0.01%	3.00%	1.00%	0.00%	0.00%	0.00%
HERO	0.00%	16.00%	20.00%	25.00%	30.00%	30.00%
Shipment						
PCTC	95.00%	80.00%	73.90%	63.00%	58.00%	58.00%
LCTC	5.00%	13.00%	13.00%	12.00%	12.00%	12.00%
Mk IV	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%
Mk V	0.00%	0.90%	0.10%	0.00%	0.00%	0.00%
HERO	0.00%	6.00%	13.00%	25.00%	30.00%	30.00%
Total						
PCTC	90.00%	63.00%	64.00%	60.00%	55.00%	55.00%
LCTC	9.00%	19.00%	17.00%	15.00%	15.00%	15.00%
Mk IV	1.00%	0.30%	0.00%	0.00%	0.00%	0.00%
Mk V	0.01%	2.30%	0.60%	0.00%	0.00%	0.00%
HERO	0.00%	15.00%	18.00%	25.00%	30.00%	30.00%

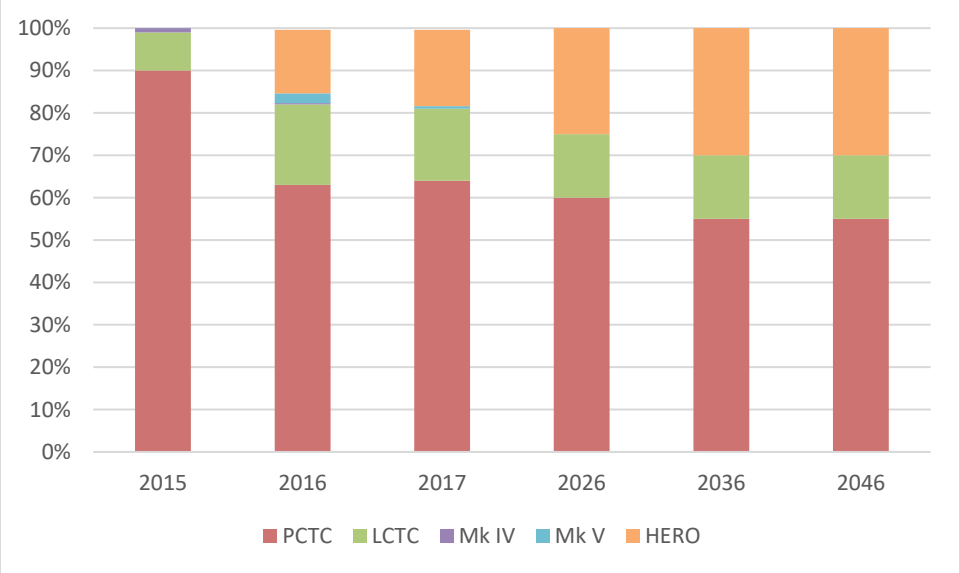


Figure 8. Historical and Forecasted Cargo Share by Class at Brunswick

This increase in cargo share, given today's loading practices, would result in substantial increases in calls from HERO vessels in Brunswick. As mentioned before, all PPP RO/RO vessels (LCTC and HERO) in the world fleet would call on Brunswick multiple times each year. The projected number of vessel calls through 2019, based on partial year's data from GPA, and the initial forecast of RO/RO vessels through the year 2046 is depicted in Table 8. PPP RO/RO vessels will make up about 50 percent of the vessel calls through 2046. Since pilot restrictions only apply to LCTC and HERO vessels, there would be a larger potential for increased delays in the future without-project condition than in the future with-project condition.

Table 8. Historic and Baseline Vessel Call Forecast for Port of Brunswick by Year (Source: GPA, 2019)

Vessel Class	2018	2019 (Projected)	2026	2036	2046
PCTC	318	285	301	353	444
LCTC	67	87	78	99	125
HERO	52	60	143	219	277
Total	**437**	**432**	**522**	**671**	**845**

2.3 Hydrology and Floodplains

Brunswick Harbor is located on the Turtle, East, and Brunswick Rivers in the Satilla River Basin. The Satilla River Basin is approximately 3,940 square miles of coastal plain composed primarily of the Satilla River, Little Satilla River, and Turtle River. The Satilla River Basin flows from the headwaters in Ben Hill County, Georgia to the Atlantic Ocean in Brunswick, Georgia. Figure 9 shows the location of Brunswick Harbor within the Satilla River Basin.

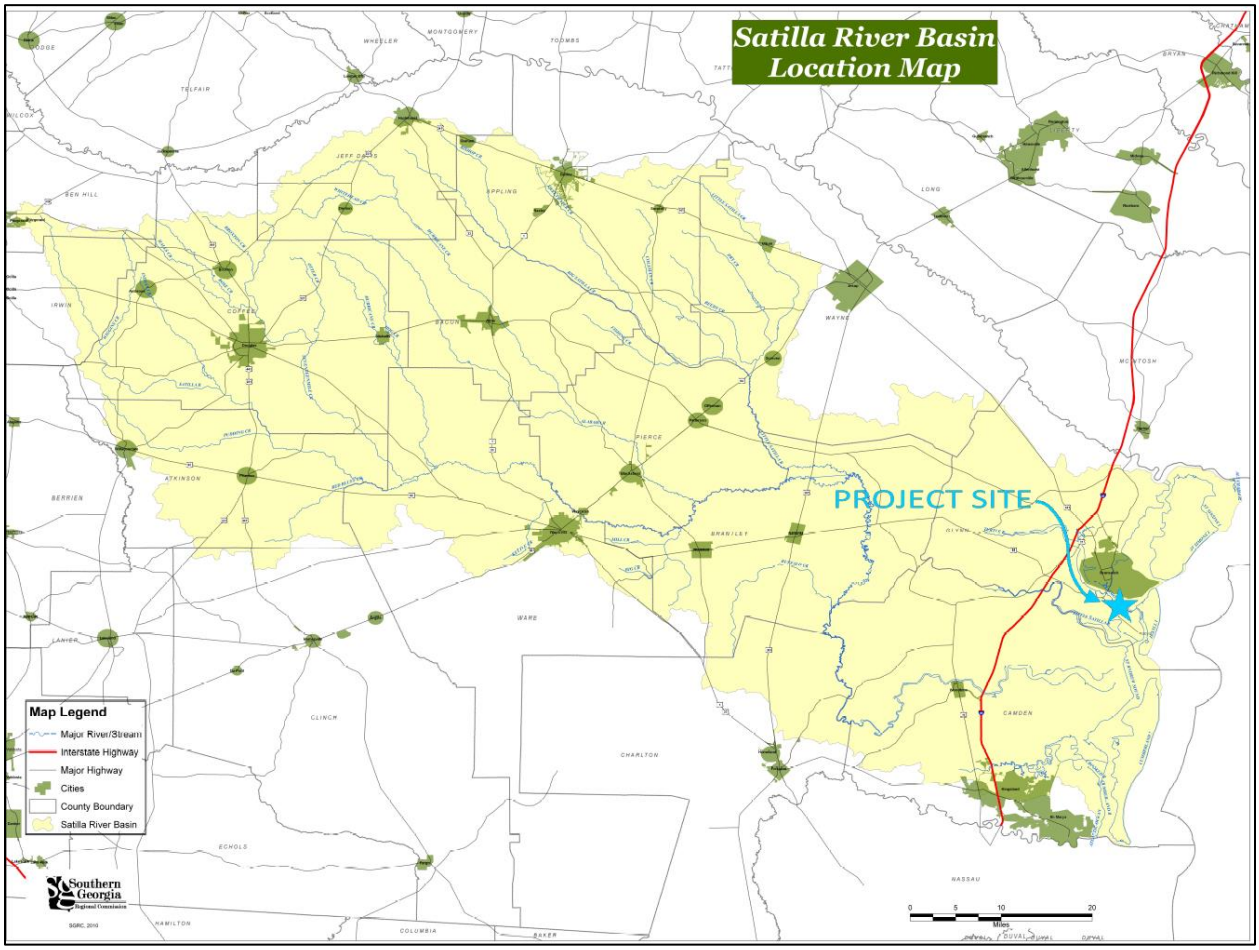


Figure 9. Location of Brunswick Harbor Within Satilla River Watershed (Source: Satilla Riverkeeper, 2019)

The major drainage in the project vicinity includes Turtle River and South Brunswick River. Both rivers flow from the west, merge just east of Colonel's Island Terminal, and flow through Brunswick Harbor to the St. Simons Sound. East River is oriented in a roughly north/south direction, passing along the east side of Andrews Island before discharging into Brunswick River just upstream of the Sidney Lanier Bridge (US Highway 17). In addition to these main streams, a complex network of small streams, creeks, and tidal sloughs dissects the entire estuarine complex *(Brunswick EIS, 1998)*. Tides in the project area are semidiurnal (two equally proportioned high and low tides every lunar day). The mean tide range in Brunswick Harbor is approximately 6.5 feet

near the St. Simons Sound and 7.3 feet in East River. Maximum ebb velocities usually range from 1.5 to 3.0 feet per second during mean tide conditions.

The climate of Brunswick is generally pleasant with short mild winters and hot, humid summers. The temperate to subtropical climate of the coastal ocean from North Carolina to Florida is influenced by the location of the Azores high-pressure system. High pressure is located offshore at its southern extent during winter months resulting in contact between polar and tropical air masses. The result is strong winter storms with gusty winds. Rainfall in the Brunswick area is typically 50 inches per year with the highest rainfall normally in August and September. Other precipitation types are rare. Hurricane season generally extends from late May to late October with the coastal region of Georgia ranked as a moderately high risk zone.

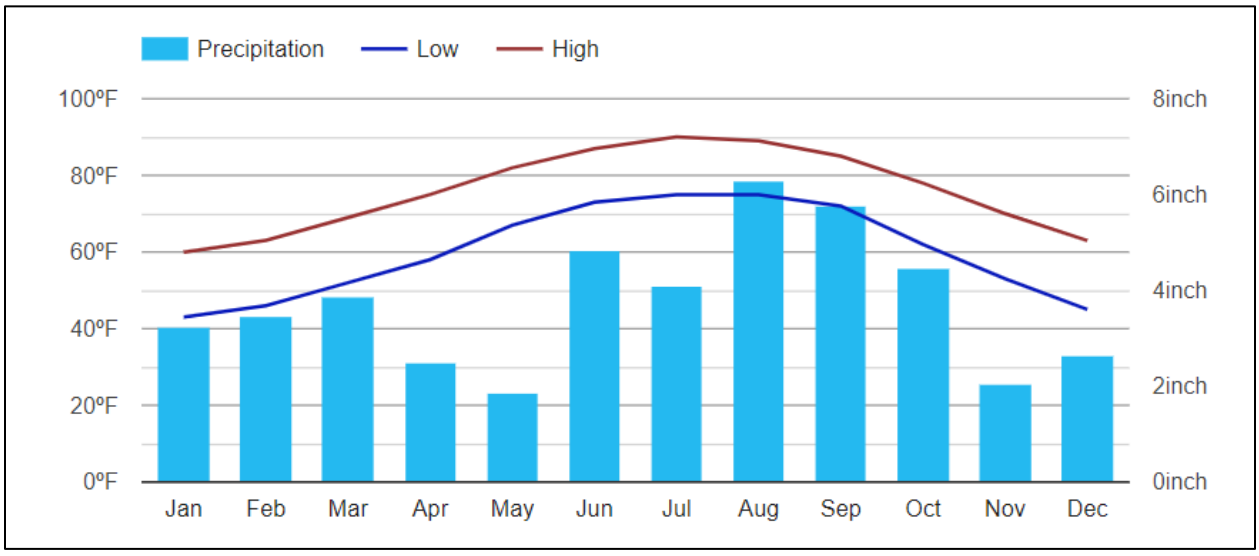


Figure 10. Average Annual Rainfall and Temperatures for Brunswick, GA (US Climate Data, 2020)

2.4 Aquatic Resources and Habitat and Substrate

The project area within the lower Brunswick River, which includes the inner channels through St. Simons Sound, Brunswick River, South Brunswick River, and Turtle River, supports an abundant and diverse fish and invertebrate community. Habitats within the project site consist of submerged unconsolidated estuarine bottom, intertidal flats, and estuarine emergent marsh. Most of the project area is open water that receives semi-diurnal tidal flushing from St. Simons Sound. As a result, the salinity levels tend to be approximately 25 parts per thousand (ppt), depending on tide stage. The St. Simons Sound tide range is approximately 6.5 feet, and the water in the harbor is well-mixed with a relatively uniform salinity (GPA 2015).

Common fish species include American shad and striped mullet. Other species found within the study area include diadromous fish (those fish that spend portions of their life cycles partially in fresh water and partially in saltwater) such as striped bass, blueback herring and shortnose and Atlantic sturgeon. Other important recreational fish include

southern kingfish, spot, red drum, black drum, tarpon, and flounder. Sharks also frequent the subtidal and intertidal zones between Brunswick, St. Simons Island, and Jekyll Island. Common shark species include bonnet head, bull shark, Atlantic black tip, sandbar, tiger, nurse, and lemon.

The existing scientific literature on offshore benthic assemblages along the east coast of the United States and Gulf of Mexico continental shelf was reviewed by Brooks et al. (2006). Benthic assemblages are an important foraging resource for fish species inhabiting the marine subtidal zone. Polychaetes were most often cited as the principal infaunal taxa present in studies from both the Gulf of Mexico and Atlantic coasts of the United States. The polychaetes, *Prionospio cristata, Nephtys incisa, N. picta,* and *Spiophanes bombyx*, were the only dominant taxa found in both the Gulf of Mexico and the east coast of the United States (Brooks et al. 2006). Polychaetes of the Family Spionidae are tube-building surface deposit feeders while polychaetes of the Family Nephtyidae are free-living predators consuming mollusks, crustaceans and other polychaetes (Fauchald and Jumars 1979).

Macrobenthic invertebrate species that could be in the study area range from shrimp, crabs, oysters, and clams, to other species such as polychaetes, mollusks, and other less well known, but valuable, species which make up the remainder of the food chain. Open water areas are populated by a variety of species of phytoplankton and zooplankton (USACE, 1998).

Other aquatic species that could be in or nearby the project area include North Atlantic right whale, humpback whale, fin whale, West Indian manatee, loggerhead sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle and green sea turtle.

The introduction of non-native or invasive species can have detrimental effects on an ecosystem. As defined by Executive Order (EO) 13112 (February 3, 1999), an invasive species is an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. EO 13112 charges the Federal government with duties to not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere (GANSMP). The Georgia Invasive Species Advisory Committee has identified 20 exotic plant species that are a serious problem in Georgia and 8 exotic plant species that pose a serious threat to becoming a problem in Georgia. No invasive plant species have been identified within the Federal project footprint.

The Georgia Invasive Species Advisory Committee has identified 110 nuisance species that currently exist in Georgia or have a high probability of being introduced. This list includes 77 animal species (mollusks, amphibians, mammals, reptiles, fish, birds, and crustaceans) and 33 disease causing organisms. There are also 99 insects listed as nuisance species.

Several invasive species have been documented within the lower Brunswick River area. These include the green mussel (*Perna viridis)* and the Giant tiger prawn (*Penaeus*

monondon). The green mussel is a native of the Indo-Pacific region. It is believed the mussel was introduced to Georgia from boats and equipment being transferred between coasts without adequate cleaning of attached organisms and draining of bilge water. The Giant tiger prawn is a non-native species introduced through accidental release from aquaculture facilities and have been documented from Georgia to Texas (Species List).

Macrobenthic invertebrate species are highly dependent on the quality and composition of substrata. The below figures represent the physical characteristics from which "Macrobenthos" rely on, each serving as estimates of what type of sediment can be expected to be found in the bend widener, turning basin, and the meeting area west of the Sidney Lanier Bridge. The data was referenced from previous sediment borings taken during the last deepening project from areas adjacent to the channel locations proposed to be modified in this study. Additional borings and sediment data will be collected from the areas to be modified as part of the feasibility-level engineering design of this study and will be included in the final report.

Bend Widener:
The previous adjacent sediment sampling borings suggest that the material proposed to be removed to modify (widen) the bend widener (Figure 11) consists of poorly graded sands, silty sands, and highly weathered limestone. The geological cross section represents an interpretation of the subsurface based on available boring data as well as professional judgment in consideration of coastal geologic processes.

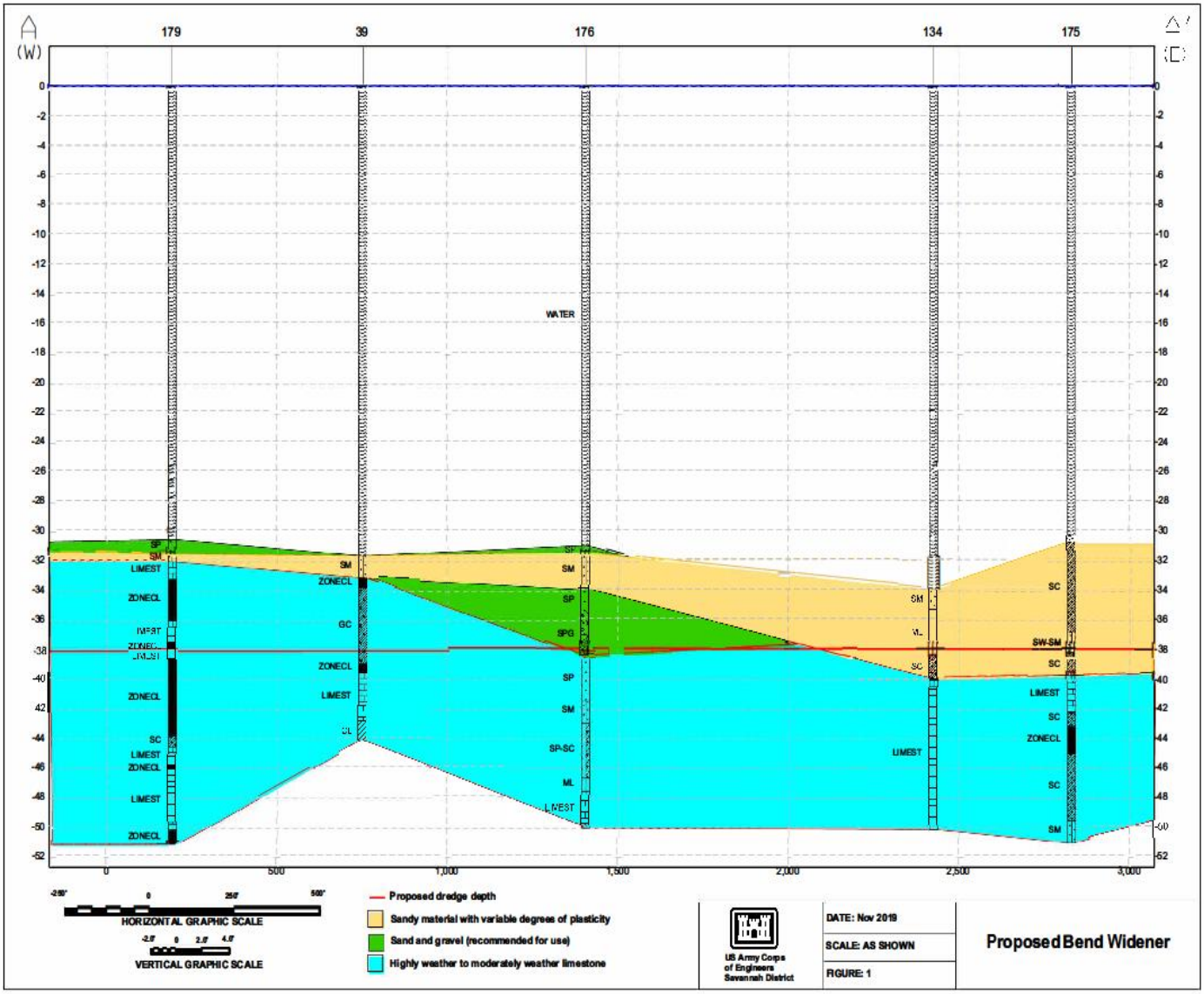


Figure 11. Sediment Sampling Borings- Bend Widener

Turning Basin:
Based on the historical boring logs in this vicinity, the material proposed to be dredged is expected to consist of poorly graded sands, clayey sands, sandy clays, highly weathered limestone and highly plastic clays (Figure 12).

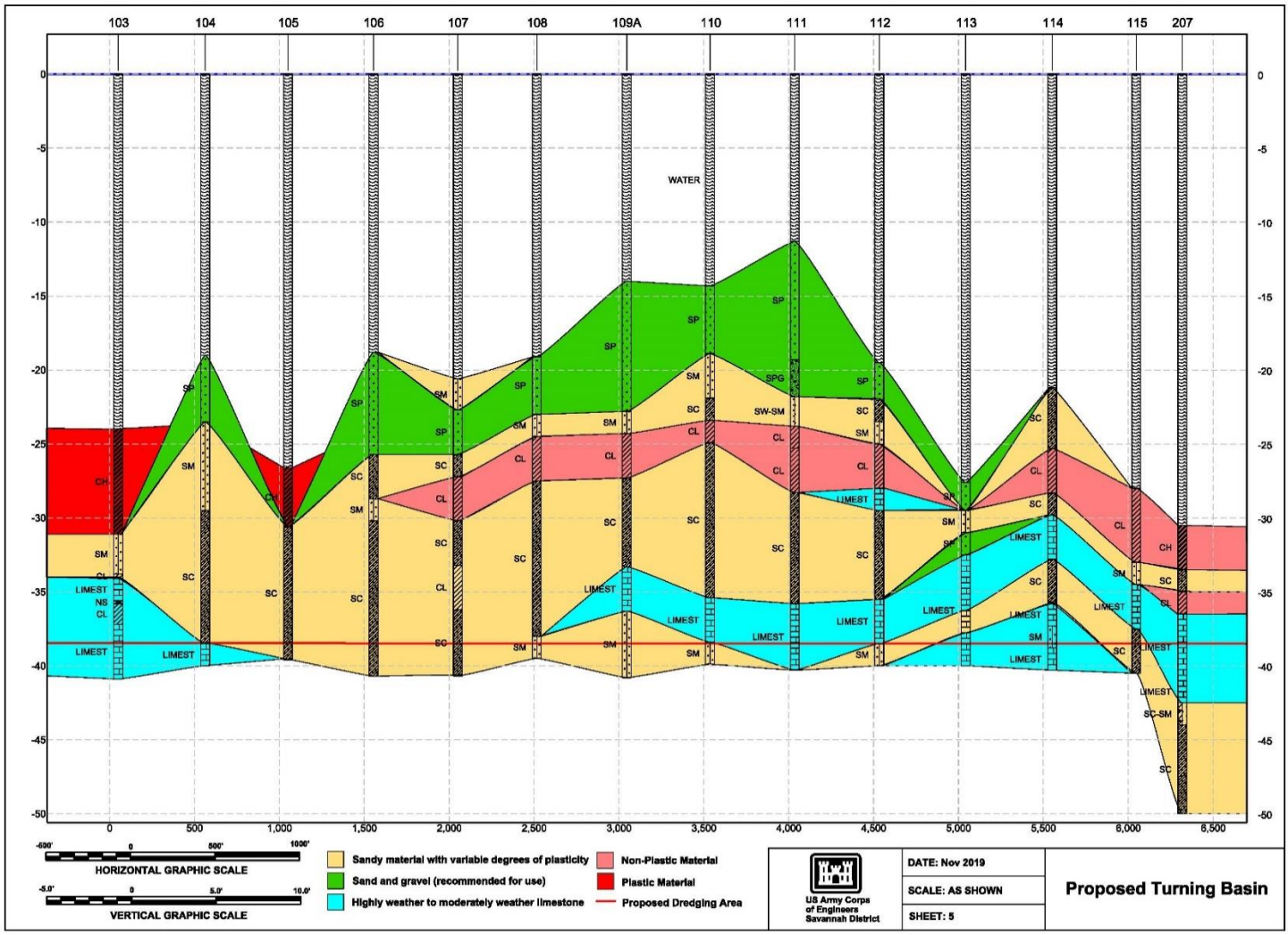


Figure 12. Sediment Sampling Borings- Turning Basin

Meeting area west of the Sidney Lanier Bridge:
Based on the historical boring logs for this area (Figure 13), it is expected that the material proposed to be removed during construction of this feature consists of highly plastic clays and silts to moderately-highly weathered limestone with intermittent sandy clay and clayey sand deposits.

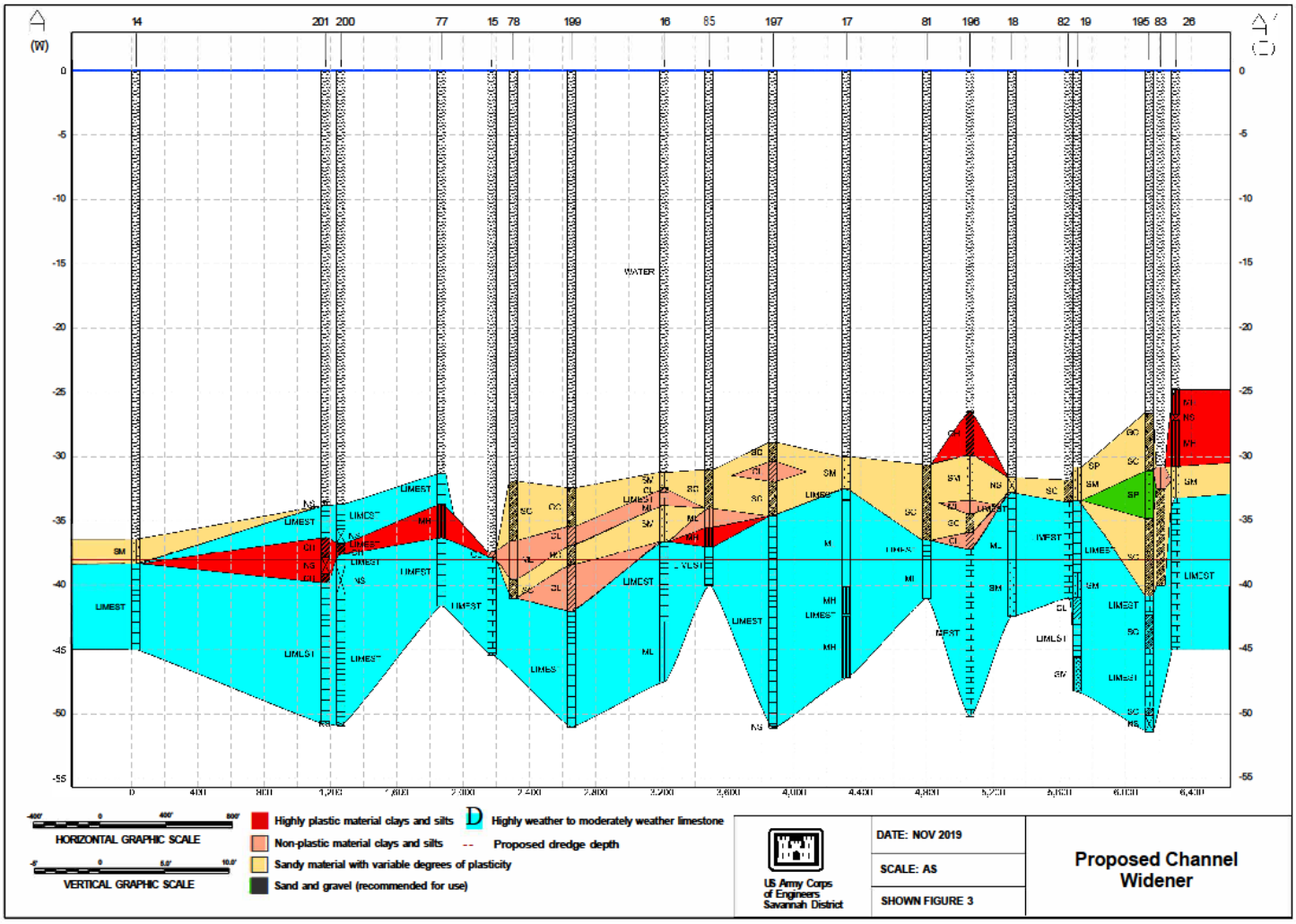


Figure 13. Sediment Sampling Borings- Channel Widener

2.5 Essential Fish Habitat

Essential fish habitat (EFH) is defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1802(10)) of 1996 as those waters and substrate necessary for fish spawning, breeding, feeding or growth to maturity. The MSA is the primary law responsible for governing marine fisheries management in U.S. federal waters and aims to promote conservation, reduce bycatch, and rebuild overfished industries. The South Atlantic Fishery Management Council (SAFMC) manages the following species occurring in the Lower Brunswick River area: shrimp (brown, white, and pink), gag grouper, gray snapper, black sea bass, Spanish mackerel, summer flounder, and several shark species.

High priorities for EFH conservation are called Habitat Areas of Particular Concern (HAPC) and merit special attention from the National Oceanic and Atmospheric Administration (NOAA) Fisheries. An EFH is considered a HAPC if it serves major ecological functions, is sensitive to declines, is stressed from development, and is rare habitat. The oyster reef and coastal inlet that are in or adjacent to the project area are also considered an EFH-HAPC. Specifically, coastal inlets are EFH-HAPC under the fishery management plans for shrimp complex (Figure 14) and the snapper grouper complex (NOAA EFH) (Figure 15). For grouper, the post larval and juvenile stages of this fish will typically be found within the Coastal Inlet EFH while the adult, egg, and larval stage remain out to sea. For shrimp species, the post larval, juvenile, and sub-adult juveniles can be found throughout this EFH while the adult, egg, nauplius, and protozoa stages remain out to sea (saltmarshguides.org).

Table 9 depicts the EFH occurring in the project area or immediate vicinity. More information on the designation of these habitats can be found in "*Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council*" (SAFMC).

Specifically, the following EFH habitat occurs in each of the proposed impact areas:

- Proposed Bend Widener: Coastal inlets
- Proposed Turning Basin: Unconsolidated bottom and Tidal creeks
- Proposed Channel Widener/St. Simons Meeting Area: Coastal inlets
- Proposed Channel Widener/Meeting Area West of Sidney Lanier Bridge: Unconsolidated bottom and Tidal creeks

Table 9. Essential Fish Habitat

Essential Fish Habitat	Potential Presence	
	In/Near Project Vicinity	Potential Project Effect
Estuarine Emergent Wetlands	Yes	No
Estuarine Scrub/ Shrub Mangroves	No	No
Submerged Aquatic Vegetation	No	No
Oyster Reefs & Shell Banks	Yes	No
Subtidal/Intertidal Non-vegetated Flats	No	No
Palustrine Emergent & Forested Wetlands	No	No
Aquatic Beds	No	No
Unconsolidated Bottom	Yes	Yes
Estuarine Water Column	Yes	Yes
Coastal Inlets	Yes	Yes
Live/Hard Bottoms	No	No
Coral & Coral Reefs	No	No
Artificial/ Manmade Reefs	No	No
Sargassum	No	No
Tidal Creeks	Yes	Yes
Marine Water Column	Yes	Yes
Coastal Inlets	Yes	Yes
Council designated Artificial Reef Special Management Areas	No	No
Hermatypic Coral Habitats & Reefs	No	No
Hoyt Hills	No	No
Sargassum Habitat	No	No
State Designated Areas of Importance of Managed Species	No	No
Submerged Aquatic Vegetation	No	No
Gray's Reef	No	No

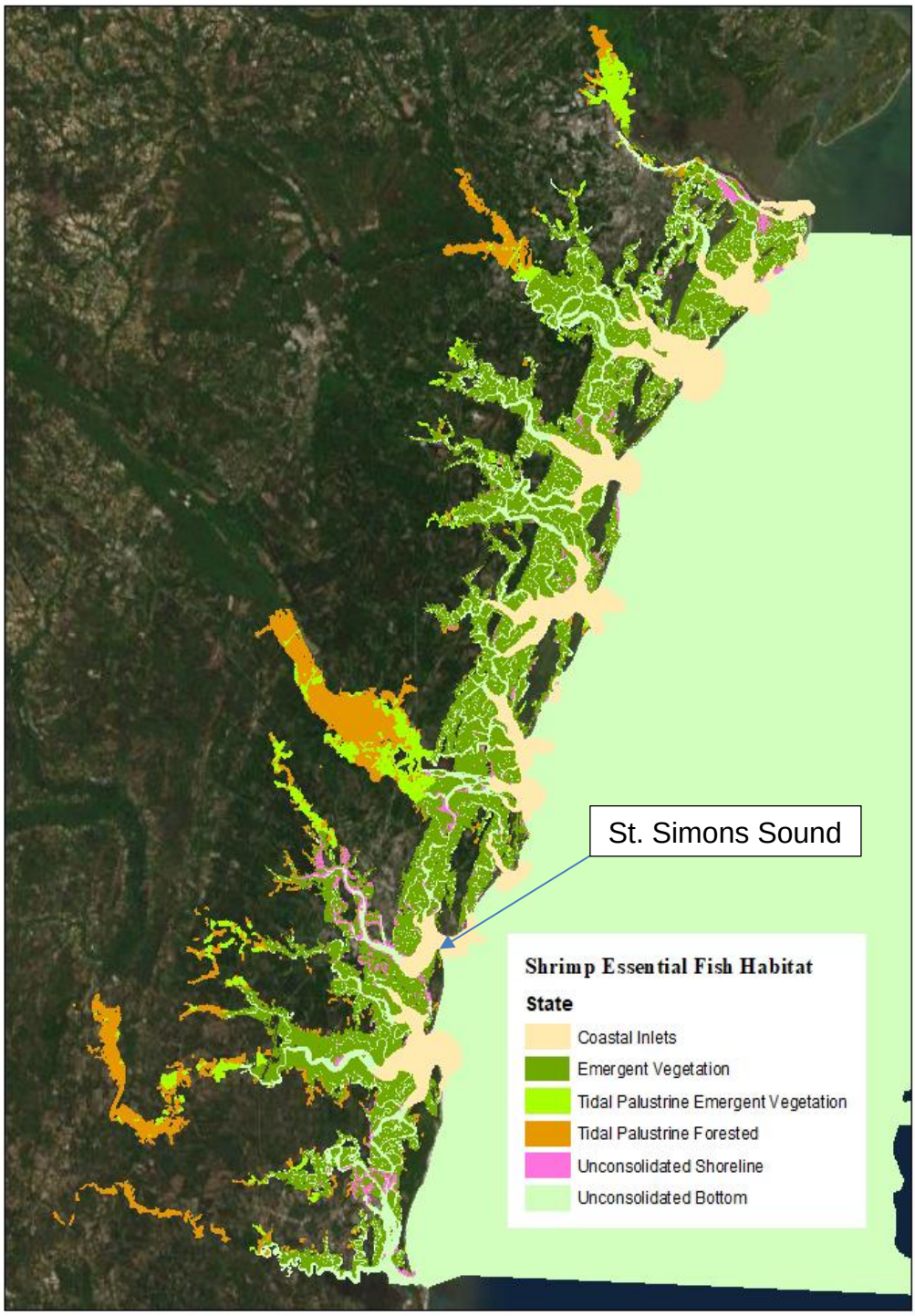


Figure 14. EFH-HAPC under fishery management plans for shrimp complex

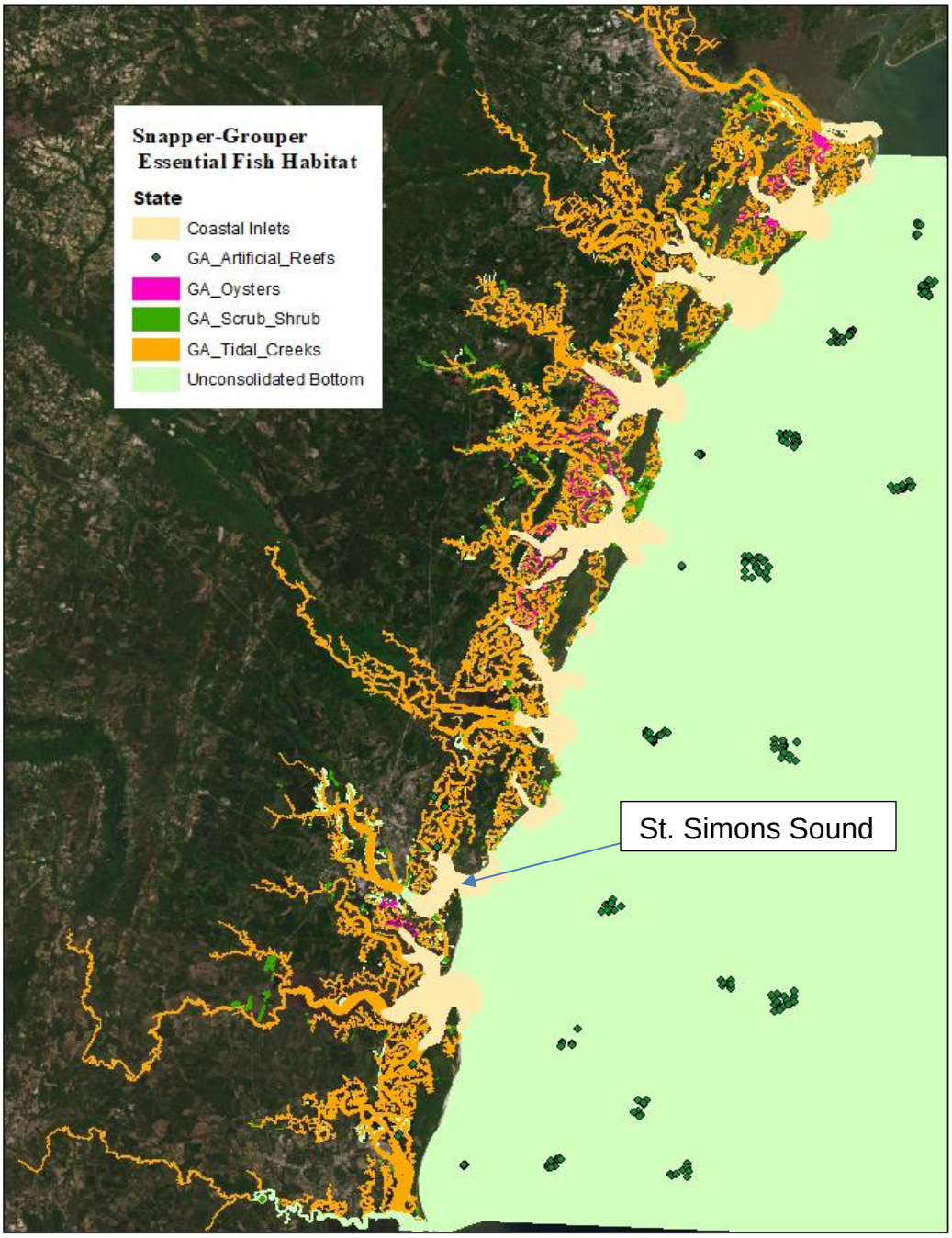


Figure 15. EFH-HAPC under fishery management plans for Snapper-Grouper complex

2.6 Wetlands

The project area is located in the lower Atlantic Coastal Plain of Georgia. The mainland of Glynn County is separated from the Atlantic Ocean by marsh, as well as barrier and sea islands. The islands are separated by tidal creeks and inlets. The majority of the habitat within the project site consist of submerged unconsolidated estuarine bottom and intertidal flats.

Diverse wetland communities occur throughout the general area and include 74,000 acres of saltwater and brackish marsh, 4,700 acres of freshwater marsh, 4,700 acres of tidal swamps, and 29,500 acres of open water. The lower East River area is industrialized. The eastern shore is nearly entirely developed, primarily with docks serving marine shippers or commercial fisherman. Wetlands are located along a narrow band on the western shoreline, between the river and a dike, which defines a portion of the Andrews Island Confined Disposal Facility. The salt marshes in the general area are of varying salinity and are vegetated in the lower elevations by smooth cordgrass (Spartina alterniflora). Higher marsh elevations are dominated by less abundant species, such as saltmeadow cordgrass, glassworts, black needlerush, salt grass and sea ox-eye. Wetlands located adjacent to East River are primarily Spartina alterniflora marshes existing along the river.

Wetland Mapping

A recent National Wetlands Inventory (NWI) Map for the project area confirms the classes of wetland and open water throughout the project area as described above (Figure 16).

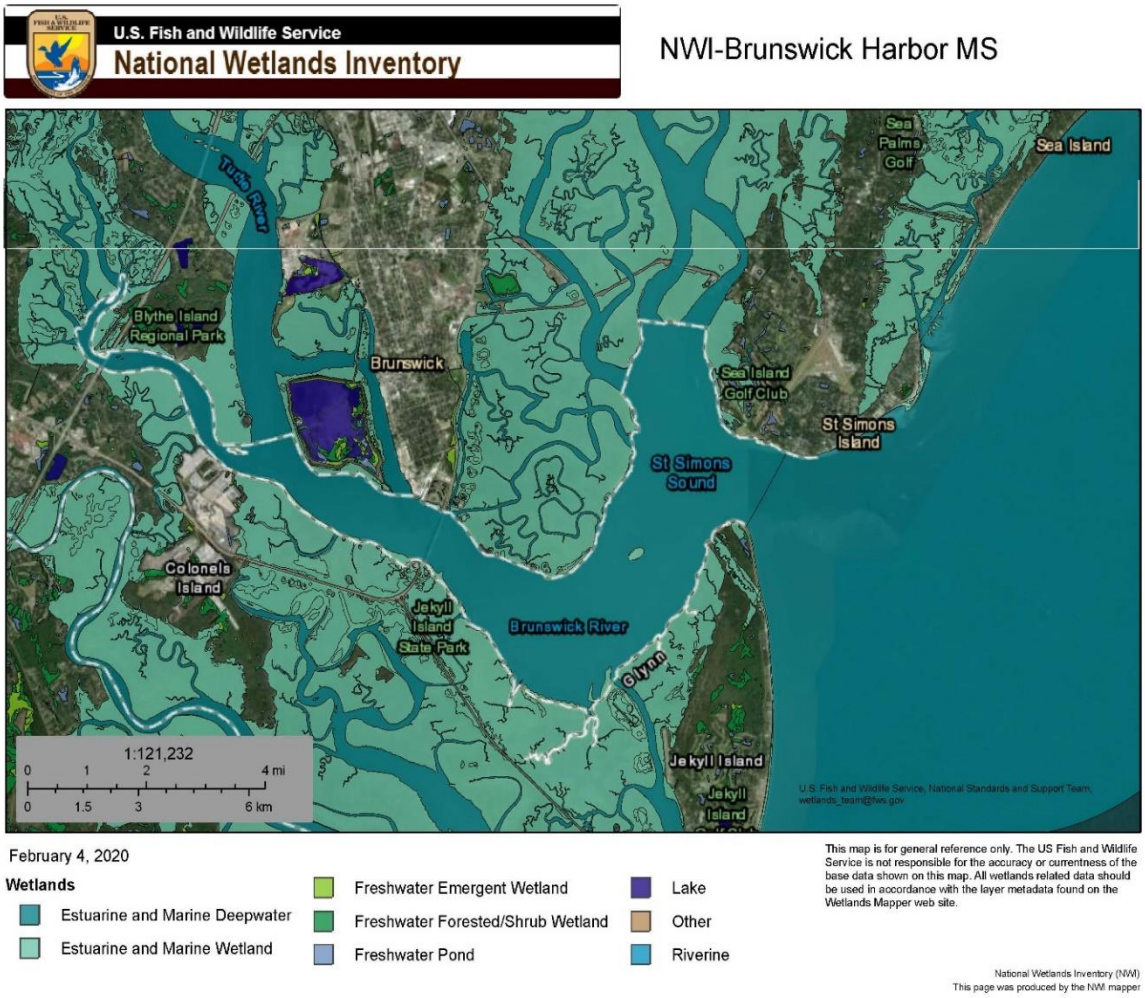


Figure 16. **National Wetlands Inventory for Brunswick Harbor**
(https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/)

2.7 Threatened and Endangered Species

Regulations for Threatened and Endangered Species

ESA
The Endangered Species Act (ESA) of 1973 (16 USC 1531-1543) regulates activities affecting plants and animals Federally classified as endangered or threatened, as well as the designated critical habitat of such species.

MBTA/ BGEPA
The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712; Ch. 128; July 3, 1918; 40 Stat. 755) prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service. The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. 668-668c) prohibits anyone from "taking" bald eagles, including their parts, nests or eggs without a permit issued by the Secretary of the Interior. Under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, 51 species of birds have been identified under the IPAC that are protected within the study area, including the American bald eagle.

MMPA
The Marine Mammal Protection Act (MMPA) of 1972 established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. It must be noted that all marine mammals are protected under the MMPA and some additionally are protected under the ESA. Three federal entities share responsibility for implementing the MMPA:

- **NOAA Fisheries**—responsible for the protection of whales, dolphins, porpoises, seals, and sea lions.
- **U.S. Fish and Wildlife Service**—responsible for the protection of walrus, manatees, sea otters, and polar bears.
- **Marine Mammal Commission**—provides independent, science-based oversight of domestic and international policies and actions of federal agencies addressing human impacts on marine mammals and their ecosystems (NOAA MMPA).

The 2020 U.S. Department of Commerce National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (2020 SARBO) lists species of concern for the project area, including North Atlantic right whale, fin whale, loggerhead sea turtle, green sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, hawksbill sea turtle, shortnose sturgeon, and Atlantic sturgeon.

As required by the MMPA, in the event of an encounter from a protected marine mammals species, contractors will observe the Best Management Practices (BMP's) and will remain informed of the civil and criminal penalties for harming, harassing or killing of marine mammals protected under the MMPA and in some cases, both the

MMPA as well as the ESA. The permittee and the permittee's contractor(s) (contractor) will be held responsible for any marine mammals harmed, harassed or killed as a result of construction activities.

Table 10 identifies the species that have been listed by the USFWS and the NMFS as occurring or possibly occurring within Glynn County, as well as species that may be listed within the project area or within the proximity to the project area.

Table 10. Listed species per USFWS and NMFS

U.S. Fish and Wildlife Service Jurisdiction		
Common Name	**Scientific Name**	**Status**
West Indian manatee	*Trichechus manatus*	Threatened
Piping plover*	*Charadrius melodus*	Threatened
Red Knot	*Calidris canutus rufa*	Threatened
Wood stork	*Mycteria americana*	Threatened
Eastern Indigo snake	*Drymarshon corais couperi*	Threatened
Gopher tortoise	*Gopherus polyphemus*	Candidate
Loggerhead sea turtle+	*Caretta caretta*	Threatened
Leatherback sea turtle+	*Dermochelys coriacea*	Endangered
Green sea turtle+	*Chelonia mydas*	Threatened
Altamaha Spinymussel	*Elliptio spinosa*	Endangered
Hairy Rattleweed	*Baptisia arachnifera*	Endangered
National Marine Fisheries Service Jurisdiction		
North Atlantic Right whale*	*Eubalaena glacialis*	Endangered
Sei whale	*Balenoptera borealis*	Endangered
Blue whale	*Balaenoptera musculus*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Endangered
Giant Manta ray	*Manta birostris*	Threatened
Oceanic Whitetip shark	*Carcharhinus longimanus*	Threatened

*Critical Habitat for this species found within Glynn county or adjacent coastal waters.

+ Species also under the National Marine Fisheries Service Jurisdiction

NOTE: List developed by the USFWS, Information for Planning and Consultation (IPaC) Website, June 2019 and the NOAA Fisheries Southeast Region Protected Resources Division, Threatened and Endangered Species Directory for Georgia, Southeast U.S.

FWCA

The Fish and Wildlife Coordination Act (FWCA) of 1934 (16 USC 661-666c) ensures fish and wildlife resources receive equal consideration to other features of water resource development projects. The FWCA requires Federal agencies involved with such projects to first consult with the USFWS and the respective state fish and wildlife agencies regarding the potential impacts of the project on fish and wildlife resources. Whenever the waters or channel of a body of water are modified by a Federal agency, or by any other entity where a Federal permit is required, adequate consideration must be made for the conservation, maintenance, and management of wildlife resources and habitat. The use of the waters, land, or interests for wildlife conservation must be in accordance with plans approved jointly by: the head of the department or agency exercising primary administration; the Secretary; the head of the state agency exercising administration of the wildlife resources.

Table 11 identifies the species that have been state listed by the Georgia Department of Natural Resources (GADNR) as occurring or possibly occurring within Glynn County (GADNR-georgiabiodiversity).

Table 11. Georgia's State Listed Species (Glynn County)

Animal/ Plant	Common Name	Scientific Name	State Listing	Habitat	US Listing
Animal	American Oystercatcher	Haematopus palliatus	Rare	Sandy beaches; tidal flats; salt marshes, shell rakes, sand bars	No US federal protection
Animal	Atlantic Sturgeon	Acipenser oxyrinchus oxyrinchus	Endangered	Estuaries; lower end of large rivers in deep pools with soft substrates; spawn as far inland as Macon, GA on the Ocmulgee	Listed Endangered
Animal	Bald Eagle	Haliaeetus leucocephalus	Threatened (GA)	Edges of lakes and large rivers; seacoasts	Bald and Golden Eagle Protection Act/the Migratory Bird Treaty Act
Animal	Black Skimmer	Rynchops niger	Rare	Tidal creeks and tidal ponds; sandy beaches, spits and dredge islands	No US federal protection
Animal	Diamondback Terrapin	Malaclemys terrapin	Unusal	Entire coast, estuarine and marine edge; All saltmarsh, beaches	No US federal protection
Animal	Eastern Indigo Snake	Drymarchon couperi	Threatened	Sandhills; pine flatwoods; dry hammocks; summer habitat includes wetlands	Listed Threatened
Animal	Gopher Tortoise	Gopherus polyphemus	Threatened	Sandhills; dry hammocks; longleaf pine-turkey oak woods; old fields	Candidate
Animal	Green Sea Turtle	Chelonia mydas	Threatened	Open ocean; sounds; coastal rivers; beaches	Listed Threatened
Animal	Gull-billed Tern	Gelochelidon nilotica	Threatened	Salt marshes; fields; sandy beaches, interdune, dredge islands	No US federal protection
Animal	Henslow's Sparrow	Ammodramus henslowii	Rare	Grassy areas, especially wet grasslands, pitcher plant bogs, pine flatwoods, power line corridors in CP. Requires open veg at ground level with grass canopy above	No US federal protection

Animal/ Plant	Common Name	Scientific Name	State Listing	Habitat	US Listing
Animal	Kemp's Ridley	Lepidochelys kempii	Endangered	Open ocean; sounds; coastal rivers; beaches	Listed Endangered
Animal	Least Tern	Sternula antillarum	Rare	Sandy beaches; sandbars, dredge islands	No US federal protection
Animal	Leatherback Sea Turtle	Dermochelys coriacea	Endangered	Open ocean; sounds; coastal beaches	Listed Endangered
Animal	Loggerhead Sea Turtle	Caretta caretta	Endangered	Open ocean; sounds; coastal rivers; beaches	Listed Threatened
Animal	Northern Atlantic Right Whale	Eubalaena glacialis	Endangered	Inshore and offshore ocean waters	Listed Endangered
Animal	Piping Plover	Charadrius melodus	Threatened	Sandy beaches; tidal flats, inlets	Listed Threatened
Animal	Rafinesque's Big-eared Bat	Corynorhinus rafinesquii	Rare	Pine forests; hardwood forests; caves; abandoned buildings; bridges; bottomland hardwood forests and cypress-gum swamps	No US federal protection
Animal	Red Knot	Calidris canutus	Threatened	Beaches and exposed mudflats	Listed Threatened
Animal	Shortnose Sturgeon	Acipenser brevirostrum	Endangered	Estuaries; lower end of large rivers in deep pools with soft substrates	Listed Endangered
Animal	Spotted Turtle	Clemmys guttata	Unusal	Heavily vegetated swamps, marshes, bogs, small ponds, and tidally influence freshwater wetlands; nest and possibly hibernate in surrounding uplands	No US federal protection
Animal	Swallow-tailed Kite	Elanoides forficatus	Rare	River swamps; marshes, open pine and bottomland forest with super canopy pines.	No US federal protection
Animal	West Indian Manatee	Trichechus manatus	Endangered	Estuaries; tidal rivers, nearshore ocean waters	Listed Threatened

Animal/ Plant	Common Name	Scientific Name	State Listing	Habitat	US Listing
Animal	Wilson's Plover	Charadrius wilsonia	Threatened	Sandy beaches; tidal flats	No US federal protection
Animal	Wood Stork	Mycteria americana	Endangered	Cypress/gum ponds; impounded wetlands with islands or emergent cypress; marshes; river swamps; bays	Listed Threatened
Plant	Ciliate-leaf Tickseed	Coreopsis integrifolia	Threatened	Floodplain forests, streambanks	No US federal protection
Plant	Climbing Buckthorn	Sageretia minutiflora	Threatened	Calcareous bluff forests; maritime forests over shell mounds	No US federal protection
Plant	Corkwood	Leitneria floridana	Threatened	Swamps; sawgrass-cabbage palmetto marshes	No US federal protection
Plant	Florida Wild Privet	Forestiera segregata	Rare	Shell mounds on barrier islands in scrub or maritime forests	No US federal protection
Plant	Greenfly Orchid	Epidendrum magnoliae	Unusal	Epiphytic on limbs of evergreen hardwoods; also in crevices of Altamaha Grit outcrops	No US federal protection
Plant	Hooded Pitcherplant	Sarracenia minor var. minor	Unusal	Wet savannas, pitcherplant bogs	No US federal protection
Plant	Pond Spice	Litsea aestivalis	Rare	Cypress ponds; swamp margins	No US federal protection
Plant	Rosemary	Ceratiola ericoides	Threatened	Ohoopee Dunes; deep sandridges	No US federal protection
Plant	Soapberry	Sapindus marginatus	Rare	Coastal shell mounds	No US federal protection

Species

The West Indian manatee (manatee) was listed as an endangered species throughout its range in 1967 (32 FR 4061) and received federal protection with the passage of the ESA in 1973. Between October and April, manatees appear to concentrate in areas of warmer water. During the remainder of the year, manatees appear to choose areas with an adequate food supply and water depth, often in close proximity to a source of fresh water. Manatees primarily consume submergent, emergent, and floating vegetation.

Manatees are found in Georgia mainly during warmer months of the year. Records in Georgia are primarily random sightings and carcass finds and are not the result of systematic research. The Georgia population is primarily migratory in nature and therefore fluctuates with season. Manatees are most frequently sighted in Georgia waters from April through October in the waters of Camden, Glynn, and McIntosh counties.

North Atlantic right whales typically inhabit offshore waters along coastal Georgia each winter. According to the NOAA species directory website, each fall, some right whales travel more than 1,000 miles from north Atlantic feeding grounds to the shallow, coastal waters of South Carolina, Georgia, and northeastern Florida. These waters in the southern U.S. are the only known calving area for the species. These whales typically remain in an area where females regularly give birth during the entire winter. While this is the typical pattern, migration patterns can vary. This offshore location near the project area is considered critical habitat for calving. Although critical habitat is near the project area, there are no known confirmed sightings of a right whale in St. Simons Sound. The project action area, which is limited to areas in the South Brunswick River and Turtle River and St. Simons Sound, does not include North Atlantic right whale habitat. The proposed project will not increase cargo vessel traffic, and therefore, the project action area does not include shipping lanes or the Federal navigation project extending offshore in the Atlantic Ocean. As a result, the proposed project will have no effect on North Atlantic right whales.

Blue, Fin and Sei whales, typically reside offshore in deep waters and more frequently observed in North Atlantic waters. They are not anticipated to be present in the project area. The blue, fin and sei whales are also not discussed in detail in this assessment as they are unlikely to be within the vicinity of the coastal action area since they are typically offshore species, residing in deep water, and the activities proposed by the Corps are coastal in nature. As a result, the proposed project will have no effect on these species.

The piping plover is a small, stocky shorebird that resembles a sandpiper. The piping plover was listed by the USFWS as threatened and endangered on December 11, 1985. The Great Lakes population is listed as endangered, whereas the Atlantic Coast and Great Plains populations are listed as threatened. Preferred habitats for the species are sandy beaches along the ocean and inland lakes, bare areas in dredge disposal sites,

and natural alluvial islands in rivers. Shorelines with little vegetation are preferred for both nesting and feeding. These plovers feed primarily on fly larvae, beetles, crustaceans, mollusks, and other invertebrates that they pluck from the sand (Bent, 1929). Breeding grounds along the Atlantic Coast range from Newfoundland to North Carolina. Wintering areas on the Atlantic Coast are from North Carolina southward through Florida and in the Bahamas and West Indies. Designated critical habitats are located on the south ends of Jekyll Island and St. Simons Island.

The red knot is a migratory shorebird endemic to North America. In the Western Hemisphere the red knot breeds in the mid to high arctic tundra of Alaska, Canada, and Greenland. Most breeding habitats are near coastal areas, often on islands. Nest sites are generally on dry, sunny, and slightly elevated areas of tundra, frequently on open gravel ridges or slopes. During migration this species switches to coastal beaches usually at or near the mouth of bays, estuaries, or tidal inlets. Staging sites are associated with high wave-energy coastal areas. Wintering sites are generally intertidal habitats such as beaches with significant wave action or currents. Red knots can be found on any Georgia barrier beach within the winter spring events. Red knots have been seen on Little Tybee, Wassaw, St. Catherines, Blackbeard, Sapelo, Little St. Simons, and Cumberland Islands, as well as St. Catherines Island Bar most often during those timeframes, while Wolf Island, Little Egg Island Bar, and Little St. Simons Island at the mouth of the Altamaha River support the only known late summer and fall staging site on the east coast of the U.S., attracting as many as 12,000 knots at one time (BATES USACE 2019).

Sea turtles are present in the area of St. Simons Sound, immediately north and south of St. Simons Sound. Female loggerhead sea turtles regularly nest along the beaches of St. Simons Island and Jekyll Island from April/May through August. There are fewer occurrences of green sea turtles nesting in the area and even less occurrences of Kemp's ridley sea turtles. As such, female loggerheads are most common in the project area during this nesting period. Loggerhead turtles are a focus for conservation efforts due to their relative abundance and are a focus of GACRD conservation efforts.

Very few adult greens or Kemps are found in Georgia. Adult loggerheads are common in and around the ship channel from Cedar Hammock Range to the ocean. Juvenile loggerheads, greens, and Kemp's ridley are common throughout the estuary year-round, but are more abundant March through November. The abundance of juveniles is several orders of magnitude higher than adults. The 2019 sea turtle nesting data indicated that for St. Simons Island, there were six loggerhead nests and for Jekyll Island, there were 199 loggerhead nests (GADNR Sea Turtle Conservation Program).

Atlantic sturgeon adults are typically observed traveling during the spawning season from August to December and juvenile/sub-adults are observed year round. For the shortnose sturgeon, sub-adult to adult stages may be observed from late winter to early spring (Post- SCDNR). According to the NOAA species directory website, unlike Atlantic sturgeon, shortnose sturgeon tend to spend relatively little time in the ocean. When they do enter marine waters, they generally stay close to shore. In the spring,

adults move far upstream and away from saltwater, to spawn. Other species like the oceanic white tip shark and the giant manta ray generally remain offshore in the open ocean, with the manta ray occasionally frequenting productive coastlines. Neither species are expected to be found in the project area.

2.8 Air Quality

The Clean Air Act (CAA), which was last significantly amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of national ambient air quality standards-primary and secondary. Primary standards are levels established by the EPA to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are levels established to protect the public welfare, including protection from decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has set six NAAQS that regulate six pollutants: carbon monoxide (CO), lead (Pb), nitrogen oxide (NO_x), ozone (O_3), sulfur dioxide (SO_2), and particulate matter ($PM_{2.5}$ and PM_{10}). Geographic areas have been officially designated by EPA as being in attainment or non-attainment for air quality based on an area's compliance with the NAAQS. Glynn County, Georgia is currently in attainment for the NAAQS for all criteria pollutants. Therefore, the project area is under no Federal or State restrictions for the purpose of improving air quality to meet any air quality standards.

2.9 Water Quality

According the Georgia Department of Public Health website, there are no known pollution sources other than storm water discharges and non-point source pollutants in the general vicinity of the Brunswick River and St. Simons Sound. St. Simons Island and Jekyll Island waters are tested by GACRD personnel for enterococcus bacteria once a week from several locations. If bacteria levels exceed state criteria, then a beach advisory or closing is issued until levels fall below threshold values. Permanent advisories are in place for two Glynn county beaches in the Coastal Health District. They are:

- Clam Creek Beach on Jekyll Island – this area is on the back side of the island at the end of Clam Creek Road.
- St. Andrews Beach on Jekyll Island – this area is also on the back side of the island, around the St. Andrews Picnic area.

On January 14, 2020, beach advisories were issued after routine water quality tests showed a high level of enterococci bacteria on St. Simons Island: Fifth Street Crossover Beach (Cedar Street to 9th Street) and Jekyll Island: Driftwood Beach (Beach KM Marker 1 to Tallu Fish Lane). This bacteria can increase the risk of gastrointestinal illness in swimmers. Subsequent water samples showed that the bacteria levels had

dropped below EPA's recommended limits. Therefore, the advisories have been lifted (GA Beach bacteria report). Enterococcus bacteria is found in warm blooded animals including humans but also birds, raccoons, deer, dolphins and other wildlife. It is difficult to determine exactly where the bacteria came from but some sources could include animal waste, storm water runoff, or boating waste.

The State of Georgia classifies all waters into categories which have different standards depending on the designated use of the water body. These uses include: (a) Drinking Water Supplies; (b) Recreation; (c) Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life; (d) Wild River; (e) Scenic River; and (f) Coastal Fishing. Recreation designation is assigned if the water supports general recreational activities such as water skiing, boating, or swimming. The littoral waters of St. Simons Island and Jekyll Island are considered Recreational.

Turbidity, expressed in Nephelometric Turbidity Units (NTU), quantitatively measures the light scattering properties of the water. Turbidity levels at the project area are influenced by the East River and Turtle River to the west, the Brunswick River to the southwest and St. Simons Sound, and by waves and tidal action.

However, the properties of the material suspended in the water column that create turbid conditions are not reflected when measuring turbidity. The two reported major sources of turbidity in coastal areas are very fine organic particulate matter, and sand-sized sediments that are re-suspended around the seabed by local waves and currents (Dompe and Haynes 1993). Higher turbidity levels are typically expected around inlet areas, and particularly in estuarine areas, due to high nutrient and entrained sediment levels. Although some colloidal materials remain suspended in the water column upon disturbance, high turbidity episodes usually return to background conditions within several days to several weeks, depending on the duration of the disturbance (storm event, dredging, etc. or other) and on the amount of suspended fines.

Rule 391-3-6-.03(5)(d) states that all waters shall be free from turbidity which results in a substantial visual contrast in a water body due to a man-made activity. The upstream appearance of a body of water shall be as observed at a point immediately upstream of a turbidity-causing man-made activity. That upstream appearance shall be compared to a point which is located sufficiently downstream from the activity so as to provide an appropriate mixing zone.

2.10 Cultural Resources

The management of cultural resources is regulated under Federal laws such as the National Historic Preservation Act (NHPA) of 1966, the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archeological Resource Protection Act of 1979, NEPA, and the Native American Graves Protection and Repatriation Act of 1990.

Cultural resources considered in this section are those defined by the NHPA as properties listed, or eligible for listing, on the National Register of Historic Places (NRHP) and are referred to as historic properties. Historic properties include buildings, structures, sites, districts, objects, cultural items, Indian sacred sites, archaeological artifact collections, and archaeological resources (36 CFR 800.16(l)(1)). Cultural resources also include resources with unknown NRHP eligibility status.

Archaeological and Historic Setting

The archival research presented here is taken from an earlier Panamerican Consultants, Inc., investigation of the same area (Tuttle and James 1999) and from a report prepared by LG2 Environmental Services, Inc., and Tidewater Atlantic Research in 2017 for survey work conducted of portions of the Little Satilla River in Camden County, Georgia (Watts et al. 2017). The previous archival research was conducted in several Brunswick area repositories, such as the Museum of Coastal History and the Coastal Georgia Historical Society, both on St. Simons Island, and the collections at the Brunswick Glynn County library. Records examined included Annual Chief of Engineers Reports of the U.S. Army Corps of Engineers, and previous archaeological studies of the Brunswick Harbor area and of other harbors of similar context were also reviewed and synthesized as part of this research. The archival research identified numerous vessel losses in and around Brunswick. These data enable the researcher to determine the types of resources lost within the project area, allowing a more accurate interpretation of any that might be encountered.

PaleoIndian Period (10,000- 8,000 BCE/12,000-10,000 BP)

The Paleoindian period is usually associated with the earliest securely documented period of human occupation in the New World. Exactly when the first humans arrived is uncertain, although most archaeologists believe it was sometime between 20,000 and 14,000 years ago in the last stages of the Pleistocene glaciation. Much of what is known of this period is based on findings from adjacent states and other parts of the continent. The climate was probably cooler and wetter than present. This was a time of rapid environmental change and rising sea levels. By around 7000 BCE, the sea level was probably near its present elevation, and homogeneous oak hickory forests had replaced boreal spruce and pine forests that had prevailed during the late Pleistocene (Delcourt and Delcourt 1985)

In Georgia, the Paleoindian period is typically divided into three broad temporal stages, Early (10,000–9000 BCE), Middle (9000–8500 BCE and Late (8500–8000 BCE), based on the occurrence of specific point types. The Clovis point stands as the best-known item in the early Paleoindian toolkit (dating 9800–9000 BCE) and is generally recognized as the earliest tool form in North America.

Archaic Period (ca. 8000–1000 BCE/10,000-3000 BP)

During the Archaic Period, new settlement and subsistence patterns emerged, and regional technological innovations were developed. Archaeologists have traditionally

divided the Archaic into three subperiods that are characterized by a set of projectile point types and other tool forms. These include the Early (8000–6000 BCE), Middle (6000–3000 BCE), and Late (3000–1000 BCE) Archaic periods. Overall, the Archaic Period was the longest period of prehistoric cultural development in Georgia, with major cultural differences separating the early subperiod from the late. Most research in Georgia has centered on the central Savannah River valley, where much has been learned, especially regarding the Late Archaic.

Woodland Period (ca. 1000 BCE–1000 CE/3000-1000 BP)

The Woodland Period in Georgia is divided into three sub periods: Early Woodland (1000-300 BCE), Middle Woodland (300 BCE-600 CE), and Late Woodland (600-1000 CE). In general, the Woodland Period is characterized by a greater emphasis on horticulture, sedentism, and the manufacture and use of pottery. It should be emphasized that while these sub periods are based on changes in ceramic types, lithic technologies, subsistence patterns, and social development, change during Woodland Period involved a gradual process of intensification as well as continuity with previous Late Archaic subsistence and settlement patterns. At this time, the modern Holocene forest first emerged in the United States which contributed to population growth, regional differentiation, and increased technological specializations (Delcourt and Delcourt 1981).

In Georgia, distinct changes in ceramic technology differentiate Woodland Period assemblages from those associated with Late Archaic occupations. The earliest pottery types found in Georgia and the oldest known in North America is known as Stallings, This pottery type dates to at least 2500 B.C. and is named for its location on Stallings Island Site on the Savannah River (Griffin 1943; Sassaman 1993). Other common ceramic types for the Woodland period include Refuge, Deptford, Swift Creek Complicated Stamped, Wilmington and St. Catherines Series.

While ceramic manufacture, food storage, and increased sedentism are traits mark the beginning of the Early Woodland Period, it is perhaps the full emergence of the Eastern Agricultural Complex that best characterizes the Woodland Period.

Mississippian Period (ca. 1000-1500 CE/1000-500 BP)

The Mississippian Period in Georgia is divided into three subperiods: Early Mississippian (1000 - 1200 CE), Middle Mississippian (1200 - 1350 CE), and Late Mississippian (1350 - 1550 CE). This period is characterized by the emergence of chiefdom-level societies in the southeastern United States that occurred approximately eleven hundred years ago. Mississippian culture is recognized in the archaeological record through the presence of a series of traits, including but not limited to, intensive maize cultivation, settlement in the floodplains of major rivers, shell-tempered pottery, rectangular wall-trench structures, pyramidal earthen mounds, and the long-distance exchange of well-crafted prestige objects.

Historic Period

European Contact and Mission Period (1500-1700 CE)

Spanish explorers arrived along the Georgia coast in the late 1500s and traded extensively with the Native American groups they encountered. Jesuit missions were constructed and became the primary means for the indigenous populations' integration into the Spanish colonial system. They were established at prominent Native American towns with the goal of consolidating the populations to make it easier to control indigenous activities and convert them to the Christian faith. This allowed missionaries to negotiate a ready supply of Native laborers rather than requiring the effort and risk of raids to acquire forced labor through enslavement.

After a brief effort among the coastal Guale, the first successful mission in Georgia was San Pedro de Mocama established among the Timucua-speaking Mocama and located at the southern end of present-day Cumberland Island.

History of Brunswick

The town of Brunswick was established on 383 acres of land purchased from Mark Carr. The purchase of the land was carried out in 1771 by the legislative assembly of the Royal Provence of Georgia. Glynn County, named for John Glynn, British parliamentarian who supported American Independence and a man considered to be a special friend to the people of Georgia, was founded in 1777 as one of the original eight counties of the State of Georgia.

The American Revolution was the next political conflict to impact the region. Loyalists evacuated the area, taking as much wealth as they could carry. After the war, in 1787, the General Assembly of Georgia made Brunswick a port of entry, however, growth was slow until a canal and railroad were initiated in the region in the 1830s. As a result the Governor of Georgia appointed a commission to examine the potential of developing Brunswick Harbor. With the advancement of many capital improvements, numerous individuals moved into the region and growth continued until the outbreak of the Civil War.

The growth of Brunswick resumed during the years following the Civil War and numerous railroads connected the city with other interior regions of the state as well as Florida. These facilities helped with growth of the port and local industry. More banks were chartered, and public services such as telegraph, telephone, water, light, and sewerage were installed before the turn of the century. Port facilities were built up, and in 1876 the U.S. Army Engineers proposed the construction of a jetty to aid in maintaining the port, which was completed by 1883 (U.S. Army 1876, 1883). Also, at this time the U.S. Army Engineers sponsored dredging to establish and maintain a channel at 15 feet (U.S. Army 1880).

By the turn of the twentieth century Brunswick had a population of 9,081. The port facilities had grown, and commercial activity had grown almost 450% in less than 10 years. The dollar value of trade from the port in 1893 was $5,960,000; by 1901 the total

value was $26,404,083. Compared to other Atlantic ports in the south, Brunswick ranked high in many products exported, such as first in lumber, second in naval stores, third in cotton, and fifth in phosphate.

During World War I, six shipbuilding companies worked on the city waterfront and the population of the city more than doubled during World War II. During World War II shipping was halted through the port, although many vessels were produced for the war effort. Besides shipping and industry, both wars stimulated the fisheries industry, especially shrimping (Childs 1966:89-90,118-119). During the Second World War the dock facilities fell into disuse, but following the conflict plans were made for harbor improvement.

Inventory of Resources in the Study Area

A review of Georgia's Natural, Archaeological and Historic Resources GIS (GNAHRGIS) database shows that investigations within the Federal navigation project are limited to the existing channel, associated features, and Bird Island, and that there are no recorded historic properties in the Area of Potential Effects (APE). The APE is defined as the areas that will be widened, including the sideslopes of the channel (300 foot buffer), within the Federal Navigation Project. The APE also includes areas for dredged material disposal. Staging areas and access roads for construction would also be within the APE. These areas have yet to be identified.

Surveys of the existing navigation channel conducted prior to 1997 resulted in the identification of anomalies in the channel, wideners, and bends that were attributed to modern debris and no further investigations of the anomalies were recommended. A survey of the South River turning basin (existing turning basin) conducted in 1997 located two anomalies that had signatures indicative of submerged cultural resources. These were recommended for diver investigation, but no further work was conducted. In 2002, Gordon Watts located 17 anomalies in the area where the Bird Island would be created. Diver investigations determined that none of the identified anomalies in the area of the Bird Island were significant cultural resources. A detailed discussion and inventory of previous investigations in the federal channel and vicinity is found in the enclosure (Brunswick Harbor Modifications Study Glynn County, Georgia, Section 106 Determination of Effects) that was sent to the Georgia State Historic Preservation Officer and the Tribal Historic Preservation Officers initiating Section 106 that is included in Appendix G.

Recorded Cultural Resources Outside of APE

A review of GNAHRGIS showed that there are several cultural resources recorded within a 1 km radius of the study area. These resources are not within the APE but are indicative of the resources that may be found within the APE during the remote sensing surveys.

Site Type	NRHP Status	Comments	In APE?
Mound and village	Unknown	excavated by Holder 1937/38	No
Prehistoric	Unknown		
Early Woodland - Historic Contact/ Historic occupation 1810-1850	Eligible	mitigated	No
Shell Midden/Late Archaic/Mississippian	Unknown		No
Oyster Middens	Unknown		No
Shell Scatter w/intact subsurface midden	Unknown	Additional testing recommended	No
Shell Scatter w/intact subsurface midden	Unknown	Additional testing recommended	No
late 18th-20th Century	Unknown	Razed	No
18th century British fort	Eligible		No
Archaeological site	Unknown		No
J.A. Jones Construction Company Brunswick Shipyard	Eligible District	Historic Resources Report prepared due to future development near district	No

The Brunswick Old Town Historic District is located in downtown Brunswick, and while not in the study area or the APE is mentioned as part of the analysis. This historic district encompasses the site of the colonial British town of Brunswick and is listed on the National Register of Historic Places. The city was named after the family of King George III of England, and is one of two deep water ports on the coast of Georgia, the other being in Savannah. The town was laid out in 1771 and retains its original plan known as 'Old Town'--a grid plan similar to that of Savannah, Georgia's. Brunswick contains an outstanding collection of late 19th century residential and public buildings. Among the best examples are the Hazelhurst-Taylor House (Hanover Square), the Mahoney-McGarvey House (Reynolds Street) and the Old City Hall. The town also retains many of its original sidewalks paved with unusual hexagonal stone tiles.

Potential for Unidentified Cultural Resources

The potential for encountering sunken watercraft in the APE during remote sensing surveys is high due to the use of the area by European inhabitants for over two hundred years. Research conducted for previous surveys of the channel and in the vicinity has compiled lists documenting the losses of vessels in the Brunswick area that date back to the colonial era. Garrison (1980) notes that 40 vessels were lost in the Brunswick area. The majority of losses are in the East River Channel, Disposal Area K, and the Brunswick River Channel. Garrison notes that there should be archaeological surveys conducted in the regions of St. Simons and Jekyll Islands if future construction is planned.

An Espy, Huston & Associates, Inc. (1991) report contains the names of 32 vessels with their dates of loss along with 12 unidentified vessels. A majority of the unidentified vessels are considered to have been lost during the struggles of Empire between Great Britain and Spain. Nine of the 12 unidentified vessels date to the Battle of Bloody Marsh in 1742.

Panamerican Consultants created a list of potential wreck sites when they conducted a survey that included the turning basin in the East River (James 2007, draft). The list was derived from the personal research conducted by Judy Wood, former Savannah District archaeologist (Wood n.d.), Garrison and Evans (1980), the NOAA charts, and an 1888 navigation chart. Tidewater Atlantic Research (TAR 1992) lists 35 named vessels, two unnamed vessels, and a less definite number of vessels from the Battle of Bloody Marsh era.

Name	Type	Date Lost	Comments
Annie	schooner	1906	15 tons, stranded
Dixie	gas screw	8/21/1918	built 1906, burned
Dorthy	side-wheeler	12/15/1915	built 1891, 74 tons, foundered
Dragoon	gas screw	9/30/1907	none
Green Ocean	diesel screw	12/1/1961	built 1938, fishing vessel, foundered
Joseph W	gas screw	9/20/1948	built 1918, fishing vessel, foundered
Lelia E. Rowley	sloop	1/1/1907	none
MaryH.	schooner	9/23/1913	built 1909, 21 tons, foundered
Massosit	gas screw	8/25/1919	fishing vessel, burned
May Garner	steam screw	7/10/1921	built 1893, 101 tons, burned
Messenger	gas screw	11/11/1910	built 1909, 13 tons, burned
Pope Catlin	side-wheeler	8/28/1899	built 1853, burned and removed
R.LMabey	side-wheeler	2/3/1897	built 1854, 82 tons, burned
Redwing	steamer	10/3/1908	19 tons, burned
Roamer	gas-yawl	12/1/1930	built 1902, burned
Samuel Winpenny	steamer	4/3/1889	none

Tee Cee 0	diesel screw	3/23/1975	built 1956, fishing vessel, burned
Unknown	dredge	8/27/1881	none

Field surveys for the identification and evaluation of cultural resources for the Selected Plan will be conducted during the Preconstruction, Engineering, and Design (PED) phase of this project, if the plan is approved and funded. Due to the lack of detailed project designs during the current feasibility stage, it will not be possible to conduct fieldwork to identify and evaluate cultural resources or to determine the effects of the selected plan on historic properties. Pursuant to 54 U.S.C. 306108 and 36 CFR§ 800.4(b)(2), the Corps is deferring final identification and evaluation of historic properties until PED. A Programmatic Agreement will be executed that will outline a compliance strategy (Appendix G). This agreement would include Phase I investigations to identify archaeological sites and shipwrecks in previously unsurveyed areas where dredging will occur, including a buffer for mooring and anchoring and sideslopes. The survey would be followed by evaluation of resources for the National Register. Resources that are eligible for the NRHP that could not be avoided would require mitigation. Previously recorded historic properties that would be impacted would be mitigated if avoidance is not possible. Surveys would be conducted to relocate the two anomalies in the turning basin as well as diver investigations of the anomalies to determine if they are significant cultural resources.

2.11 Recreation

Recreational boaters access the ocean via the Brunswick River and St. Simons Sound from marinas upriver. Most of the waterway is accessible to recreational boaters therefore they can access the ocean without impeding the navigation channel. Boats also use the Atlantic Intracoastal Waterway (AIWW), which crosses the Brunswick River after St. Simons Sound. Also, the Mayor's Point terminal in downtown Brunswick hosts a small cruise ship line that docks monthly during the summer.

2.12 Aesthetics

The lower part of the basin within the study area is characterized by a meandering course with several joining tributaries and confluences. The natural beauty of the Lower Brunswick River has been preserved by a number of factors. Among these are: (1) the preserved Spartina saltmarshes are generally intact, (they have not been exploited extensively per the Coastal Marsh Protection Act (CMPA) of 1970); (2) the major uses of the area, that of recreation (hunting, fishing, and boating), have had little permanent effect on the natural environment; and (3) commerce via the Brunswick River area is largely confined to designated areas to avoid impacts to adjacent marsh and land areas. Currently, the project area consists of estuarine open water habitat abutted by estuarine emergent marsh and is located adjacent to the Colonel's Island Terminal as well as the City of Brunswick.

There are no parks, national or historical monuments, national seashores, wilderness areas, research sites or preserves within the project site or in the vicinity of the project area.

2.13 Environmental Justice

EJSCREEN is an environmental justice mapping and screening tool that is used by the EPA to obtain and display demographic and environmental information for a given area. Glynn County is considered the geographic area of interest for this project and was the input to the EJSCREEN tool. Figure 17 displays the results for Glynn County in terms of six demographic indicators and a demographic index. The demographic indicators shown on the graph are: Low-income (the percent of an area's population in households where the household income is less than or equal to twice the federal poverty level), minority population (the percent of individuals in an area who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino), less than high school education (percent of people age 25 or older in an area whose education is short of a high school diploma), linguistic isolation (percent of people in households in which all members age 14 years and over speak a non-English language and also speak English less than "very well"), individuals under age 5, and individuals over age 64.

As shown in the figure, Glynn County's minority population is at the 43rd percentile in the state, meaning that the region's percentage of minority population is equal to or higher than 43 percent of the state. When compared with the U.S., the County is at the 56th percentile. The county is in the 56th percentile in the state in terms of low income population (65th in the national percentile); it is in the 65th percentile in the state in terms of linguistically isolated population (57th in the national percentile); it is in the 52nd percentile in terms of population with less than a high school education (59th in the national percentile); 51st in population under the age of five (53rd in the national percentile); and 81st in population over age 64 (71st in the national percentile). The demographic index, which is based on the average of two demographic indicators: percent low-income and percent minority, shows that county is in the 49th percentile when compared to the state and 60th percentile in the nation.

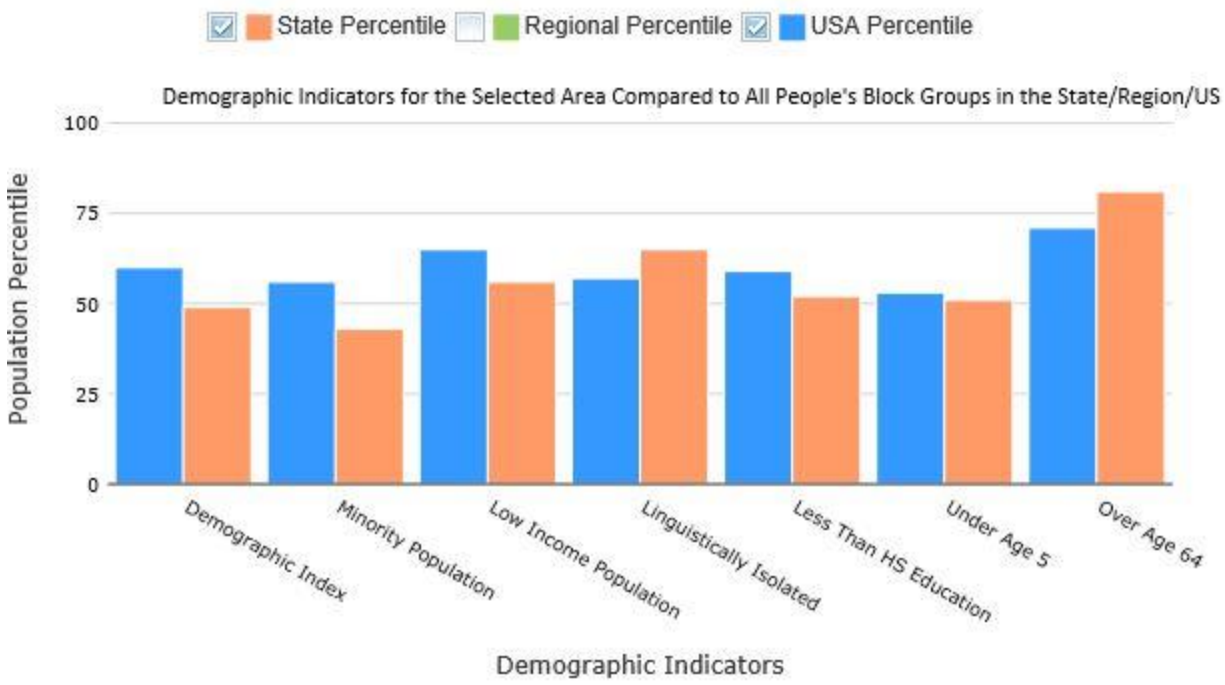


Figure 17. Environmental Justice Demographic Indicators for Glynn County

2.14 Noise

For purposes of regulation, noise is measured in A-weighted decibels (dBA). This unit uses a logarithmic scale to weigh sound frequencies. Table 12 shows typical noise levels and corresponding impressions. Ambient noise levels in Glynn County are quiet to moderate and are typical of recreational environments. The major noise producers the Lower Brunswick River include recreational boating/maritime activities, beach goers, adjacent commercial and residential areas, boat and nearby vehicular traffic. The project area within the Lower Brunswick River is not densely populated or heavily industrialized, though watershed noises associated with minor industrial, maritime activities from large vessels, and airport activities are the predominant sources of noise in the project area. Naturally occurring noises (bird calls, etc.) are also common within the project areas.

Table 12. Typical Noise Levels and Impressions

Typical Noise Levels and Impressions		
Source	**Decibel Level**	**Subjective Impression**
Normal breathing	10	Threshold of hearing
Soft whisper	30	---
Library	40	Quiet
Normal conversation	60	---
Television audio	70	Moderately loud
Ringing telephone	80	---

Snowmobile	100	Very loud
Shouting in ear	110	---
Thunder	120	Pain threshold

2.15 Hazardous, Toxic, and Radioactive Waste (HTRW)

The following is a summary of the cumulative knowledge about HTRW in the project area.

Spills

U.S. Coast Guard Marine Information for Safety and Law Enforcement (MISLE) System: the Corps requested data on spills that could have impacted entrance channel sediments in the vicinity of Brunswick Harbor from the MISLE System. That database records information on spills determined to be significant in nature or 100 gallons or more. MISLE is used by the U.S. Coast Guard (USCG) to schedule and record operational activities such as vessel boardings, marine casualty investigations, and law enforcement and pollution response actions. MISLE is only available to authorized Coast Guard personnel via the Coast Guard intranet but information may be requested by other federal and state agencies. Table 13 lists incidents since the last reported spills in the 2016 Tier III Sediment Evaluation (report submitted to EPA August 2016, concurrence on findings received September 2016).

Table 13. Spills in the Vicinity of Brunswick Harbor

Incident Date	Source	Location	Type of Discharge	Amount Discharged (gallons)	Response
02 October 2017	Storage Tank	Terry Creek	Sodium Hypochlorite (Diluted)	430	A vacuum truck collected spilled product and soil was remediated
27 November 2018	Fishing Vessel	Brunswick River	Diesel	50	Contractor contained and removed product
09 January 2019	Fishing Vessel	Darien River	Diesel	100	Discharge collected contained and removed

The U.S. Coast Guard reported that all appropriate safety procedures were followed after each spill (deployment of containment booms and skimmers, recovery of fuel/oil from leaking containers, monitoring of sheens on waterways, etc.). Since these contaminants tend to remain on the water surface, no significant impacts to entrance channel sediments are expected to have occurred from these incidences.

U.S. Coast Guard National Response Center Database:
A U.S. Coast Guard National Response Center (http://nrc.uscg.mil) query for incidents in the Brunswick Harbor was conducted. This query revealed approximately 13 incidents that were reported to the National Response Center since the 2016 Tier III

sediment testing event. Of these, only one incident involved a release over 100 gallons. This event occurred in 2018 and involved a release of ~500 gallons of sewage into the Altamaha Canal. The release was contained. The others were 10 gallons or less. The incident summaries indicate that the primary chemicals that were released consisted mostly of diesel fuel, hydraulic oil, and lubricating oils. Since these contaminants tend to remain on the water surface, and due to the distance the events occurred from the mouth of the entrance channel, no significant impacts to entrance channel sediments are expected to have occurred.

Cleanup Sites

U.S. Environmental Protection Agency EnviroFacts Database: Several queries were made on the EPA EnviroFacts database (EnviroFacts). A search of the Cleanups in My Community (CIMC) database found 44 sites listed in Glynn County (Figure 18).

The CIMC database lists sites that have the following characteristics: "*Accidents, spills, leaks, and past improper disposal and handling of hazardous materials and wastes … that have contaminated our land, water (groundwater and surface water), and air (indoor and outdoor). These contaminated sites can threaten human health as well as the environment*". Of the 44 sites in Glynn County, 32 were Brownfields Sites and five had links to responses. All the incidents were prior to 2016 or past and/or ongoing investigations of 6 superfund sites. There were no new releases listed since the 2016 Tier III testing that could have adversely impacted Brunswick Harbor entrance channel sediments.

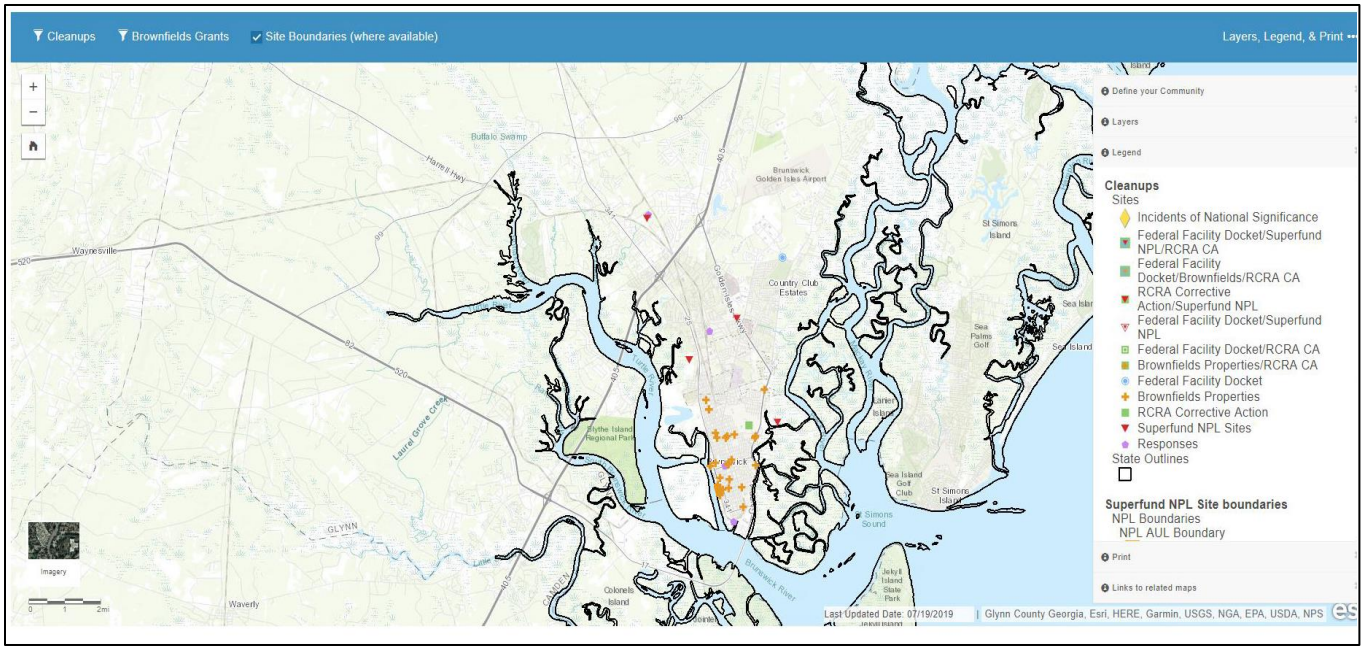


Figure 18. CIMC Listing for Brunswick County

A search of the Toxics Release Inventory (TRI) in that database found 8 sites in the general vicinity of Brunswick Harbor (Figure 19). The TRI database lists sites that have the following characteristics: "*The Toxics Release Inventory (TRI) contains information about more than 650 toxic chemicals that are being used, manufactured, treated, transported, or released into the environment. Manufacturers of these chemicals are required to report the locations and quantities of chemicals stored on-site to state and local governments. EPA compiles this data in an on-line, publicly accessible national computerized database … which tabulate air emissions, surface water discharges, releases to land, underground injections, and transfers to off-site locations.*" None of the sites listed in this database were considered to have significant adverse effects to Brunswick Harbor or the entrance channel.

Figure 19. TRI Facilities in and around Brunswick Harbor

Other Databases

The National Institute of Health's TOXMAP database (*http://toxmap-classic.nlm.nih.gov/toxmap/home/welcome.do*) was also searched; however, no new sites or releases were identified beyond those contained in EPA's EnviroFacts database.

Changes Since Last Testing

No significant changes have been made in Brunswick Harbor since the last sediment evaluation that would impact entrance channel sediments. No new berths or terminals have been added. The majority of changes in the harbor have been minor to moderate improvements to existing docks, infrastructure, and parking facilities.

Results of Previous New Work Sediment Testing

The last new work sediment analyses were conducted for the 1998 Brunswick Harbor Deepening Environmental Impact Statement. Although sediment testing indicated varied results both above and below federal limits per the Clean Water Act, the results appeared to be localized and although present within Brunswick Harbor, were found in in the East River, not the Brunswick River in which the project footprint lies.

Results of Previous O&M Sediment Testing

Brunswick Harbor Entrance Channel sediments were tested for suitability for ocean disposal in 2016. The testing results reviewed for this evaluation are contained in the August 2016 *MPRSA Section 103 Sediment Evaluation for Brunswick Harbor Navigation Project, Brunswick, GA*., *ANAMAR Environmental Consulting, Inc*. This work was performed in accordance with the EPA /USACE joint publication, *Evaluation of Dredged Material Proposed for Ocean Disposal - (Testing Manual)*, dated February 1991, referred to as the 1991 “Green Book” and the *Southeast Regional Implementation Manual (SERIM)*, dated August 2008. A portion of this testing included Cedar Hammock Range which is located inside the inner harbor and most represents sediment suitability for surrounding inner harbor O&M sediments. Sediment Chemistry for metals, TOC, total solids, ammonia, organotins, pesticides, PAHs and PCBs varied, but sediments in the Cedar Hammock Range, as well as those in the entrance channel were found suitable for ocean disposal.

HRTW- The Golden Ray

At around 1:45 am local time on September 8, 2019, the MV Golden Ray listed to port and ran aground while transiting the St. Simons Sound outbound from Brunswick, Georgia. The vessel remains grounded on the southside of the sound between St. Simons Island and Jekyll Island (Figure 20). The Golden Ray’s approximate location is 31° 07.68 N, 081° 24.23 W at the entrance to St. Simons Sound and near the Federal navigation channel. The vessel’s current heading is 146.9°, and she has 100.16° heel to port, with 0.36° trim by the stern (Siri Marine, 2020).

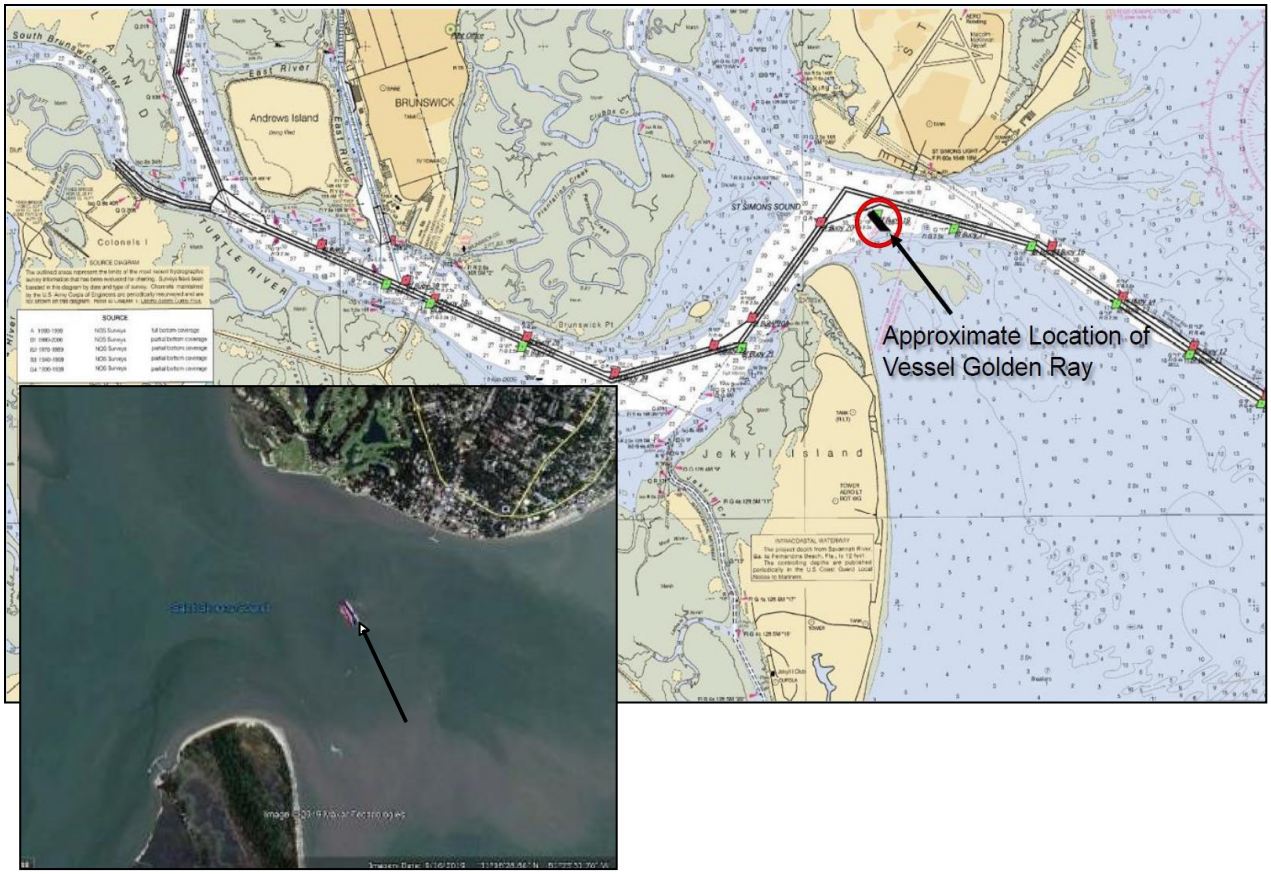


Figure 20. Location of MV Golden Ray (St. Simons Sound, Brunswick Harbor)

2.16 Climate Change

The main climate change assessment is the potential of impacts from future Sea Level Change (SLC). The SLC in Brunswick Harbor is forecasted to be a Sea Level Rise (SLR). Inland hydrology is not expected to affect Brunswick Harbor, because it is the outlet of the drainage area. The assessment of the watershed vulnerability assessment did not categorize any navigation lines in HUC 0307 as vulnerable. There is strong agreement from the literature review that temperatures in the Southeast will increase over the next century. Projections for precipitation events and hydrology are less certain than temperature projections for the Southeast Region.

Sea levels around Brunswick Harbor are expected to rise, depending on the projected rates of rise for low, intermediate, and high scenarios. The estimated relative SLC from 1935 to 2128 was calculated with the USACE SLC Curve Calculator at two NOAA tide gauges: Fernandino Beach, Florida, located 30 miles South of Brunswick Harbor and Fort Pulaski, Georgia located 60 miles to the north of Brunswick Harbor. The SLR projections for the three scenarios for both tide gauges are shown below for the 100-year project life cycle.

Table 14. Sea Level Rise projections for low, intermediate, and high scenarios

USACE SLC Curve Calculator Scenario	Fernandino Beach, FL (NOAA Gauge 8720030)	Fort Pulaski, GA (NOAA Gauge 8670870)
Low	0.39 FT	1.12 FT
Intermediate	2.08 FT	2.81 FT
High	7.45 FT	8.18 FT

Figure 21 below is from the NOAA SLR viewer. The water levels and inundation shown are preliminary, higher resolution is required for further analysis. The bottom figure shows the existing water level at mean higher high water (MHHW). The top figure shows the Port and Disposal Area at MHHW plus three feet of SLR (NOAA, 2020). The MHHW plus three feet of SLR, represents the intermediate SLC scenario at the Fort Pulaski NOAA tide gauge. Water depth is shown in blue, with darker blue representing deeper water and lighter blue shallower water. Green areas are identified as low-lying areas that are not flooded, but are at risk for flooding.

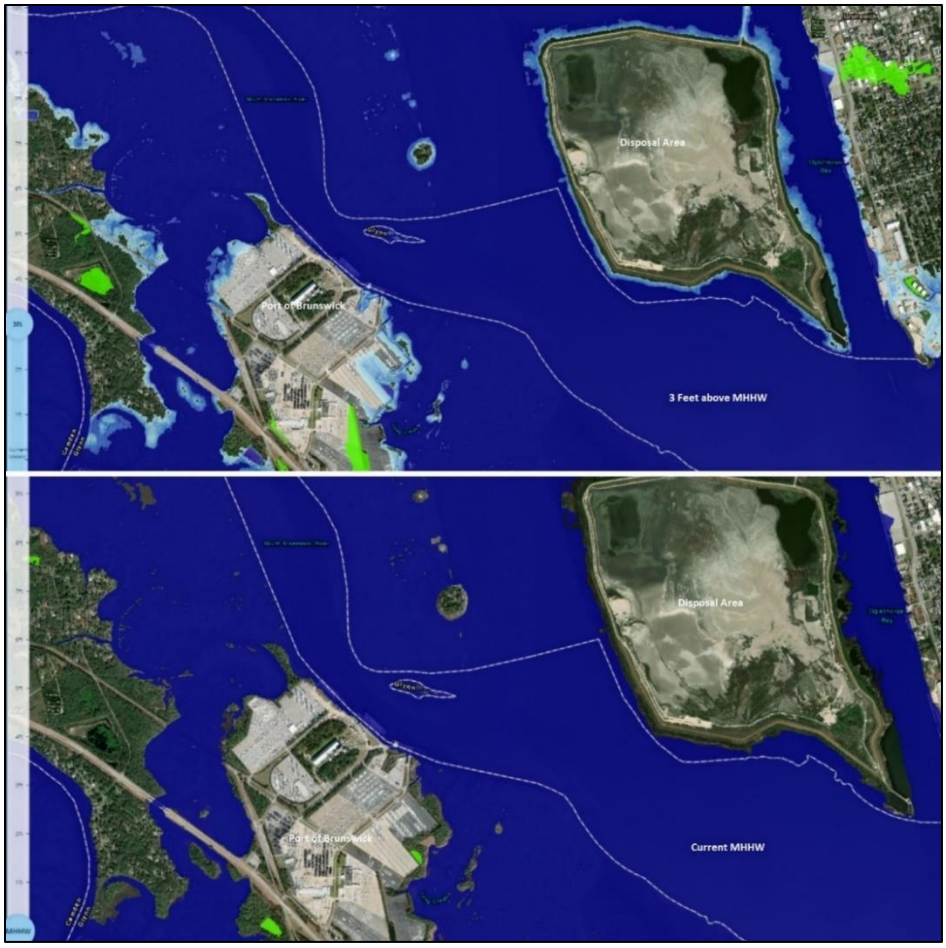


Figure 21. Sea Level Rise Viewer of Brunswick Harbor and Andrews Island Disposal Area (NOAA, 2020)

Modifications as part of normal Operations and Maintenance (O&M) will need to be assessed as sea levels rise. As part of normal maintenance of disposal areas, erosion and toe protection would be evaluated as needed. It is expected that more tidal alerts would occur with higher sea level changes.

The air draft under the Sidney Lanier Bridge will need to be assessed with rising sea levels. Currently there is 185 feet of clearance at MHW. Currently the tallest vessels are around 150 feet. In addition, the tidal range of the Brunswick Harbor is larger than three feet, therefore with the addition of three feet of SLR, the vessels could choose to sail at a lower tide level.

3.0 Formulation of Alternative Plans

The guidance for conducting civil works planning studies, Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook, requires the systemic formulation of alternative plans that contribute to the Federal objective. To ensure sound decisions are made with respect to development of alternatives and; ultimately, with respect to plan selection, the plan formulation process requires a systematic and repeatable approach.

3.1 Problems and Opportunities*

Newer RO/RO vessels have increased in length and width since the last design of the Brunswick Harbor Federal navigation channel. Several locations within the Federal channel present maneuverability challenges and restrictions to large RO/RO vessels. Self-imposed transportation safety restrictions are in-place such as waiting for suitable weather (including favorable tides); one-way traffic for most of the harbor; and using tug boat assistance earlier in the berthing process. Larger RO/RO vessels are experiencing transportation cost inefficiencies due to these restrictions at targeted areas within the existing federal channel. As PPP LCTC and HERO vessels call more frequently over the 50-year period of analysis, there would be an increase in the number of calls delayed.

Opportunities to address problems for this study include the following:

- Increase the efficiency and reliability of RO/RO traffic at Brunswick Harbor.
- Reduce the cost of vehicle shipping into and out of Brunswick Harbor.
- Reduce the risk of vessel grounding and environmental damage.
- Provide beneficial use of dredged material.

3.2 Purpose and Need*

The purpose of the study is to examine harbor modifications to reduce transportation cost inefficiencies experienced by the largest RO/RO ship type calling on Brunswick Harbor. There is a need to study modifications to the Federal channel at locations where ships have historical navigation and maneuverability issues due to the channel width.

3.3 Objectives and Constraints*

The primary objective is to improve the efficiency of the Brunswick Harbor deep-draft navigation system and contribute to National Economic Development by reducing the transportation cost of existing and anticipated future cargo volumes to and from Brunswick Harbor in an environmentally acceptable and sustainable manner during the 50-year period of analysis, from 2026 to 2075.

Constraints include avoiding significant environmental effects to endangered species (such as sea turtles and right whales) within Brunswick Harbor and avoiding impacts to

the existing bridge alignment and clearance of the Sidney Lanier Bridge (vertical clearance of 185 feet Mean High Water).

3.4 Management Measures and Screening

Management measures are features or activities that can be implemented at a specific geographic location to address one or more planning objectives and avoid constraints. A preliminary list of structural and non-structural management measures and how they apply to Brunswick Harbor is included below:

Structural Measures

- Channel deepening – Harbor pilots report that most RO/RO vessels are not limited by depth at Brunswick Harbor. The current federal navigation channel is maintained to a depth of -36 feet MLLW.
- Channel widening – At four locations harbor pilots report issues with the length and width of the largest RO/RO vessels. Two areas in particular, a bend widener at Buoy 24 near the Cedar Hammock Range and a turning basin at Colonel's Island Terminal, are problematic areas. Furthermore, Brunswick Harbor is limited to one-way RO/RO traffic. Hence, two meeting areas, where two vessels pass each other going opposite directions in transit, would be considered for widening.
- Turning basins – The harbor pilots must turn RO/RO vessels 180° in order to "back" them into the berths at Colonel's Island Terminal. They conduct this maneuver in the existing turning basin.
- Anchorages – There are adequate locations within the harbor for vessels to wait for correct conditions.
- Breakwaters and Jetties – Breakwaters and jetties assist in controlling wave action. The harbor pilots have indicated that waves are not an issue for RO/RO vessels navigating the channel. They have greater concern and awareness of the changing tides in the area.
- Disposal areas – The most likely disposal area is the Andrews Island Dredged Material Management Facility where material from routine O&M activities is placed. Andrews Island has sufficient capacity to accommodate material from potential new work.
- Construction methods – Standard construction methods would be used.
- Port expansion – Georgia Ports Authority is currently in the process of expanding facilities at Colonel's Island Terminal. In 2019, they received a USACE regulatory permit for construction of a new RO/RO berth.

Non-structural Measures

- Use of tide – For the largest vessels, the harbor pilots wait for favorable tides to bring vessels into and out of the port most often waiting for "slack" water at high tide for favorable currents.

- Light-loading – Due to the nature of RO/RO vessel routes and deliveries, the vessels are rarely full. In addition, channel depth is not an issue for the current fleet.
- Lightering – Channel depth is not an issue for RO/RO vessels at Brunswick Harbor.
- Traffic management – The harbor pilots have self-imposed travel restrictions related to travel management such as use of tugs, using tugs earlier in the berthing process, and one-way harbor traffic.
- Tug assists – Provides towing services during the berthing process.

Screening

Screening is the process of eliminating, based on planning criteria, those measures that will not to be carried forward for further analysis. Criteria are derived for the specific planning study based on the planning objectives and constraints of the study and project area. Criteria used to screen measures as well as qualitative metrics associated with each criterion include the following:

- Is the measure already being carried out by a non-federal entity? (Yes/No); measure is screened out from further analysis if response is “Yes”.
- Does the measure meet the primary planning objective? “Improve the efficiency of the Brunswick Harbor deep-draft navigation system.” (Yes/No); measure is screened out from further analysis if response is “No”).
- Can the measure be designed to avoid or minimize the impacts outlined in the planning constraints? (Yes/No); measure is screened out from further analysis if response is “No” or compensatory mitigation may be necessary.
- Based on site-specific conditions, is the measure technically feasible or applicable as a navigation improvement measure? (Yes/No); measure is screened out from further analysis if response is “No”.

Table 15. Measures Screened Out from Further Analysis and Cause for Screening

Measures Screened Out from Further Analysis				
Measures	Already carried out by non-Federal entity?	Meets primary planning objective?	Avoid planning constraints?	Technically feasible?
Structural				
Channel Deepening	No	No	Yes	Yes
Channel Widening	No	Yes	Yes	Yes
Turning Basin	No	Yes	Yes	Yes
Anchorages	No	No	Yes	No
Breakwaters	No	No	Yes	No
Jetties	No	No	Yes	No
Port Expansion	Yes	No	Yes	No
Non-Structural				
Use of tide	Yes	Yes	Yes	No
Light-loading	No	No	Yes	No
Lightering	No	No	Yes	No
Traffic Management	Yes	Yes	Yes	No
Tug assists	Yes	Yes	Yes	No

Based on the screening summarized above, port expansion, use of tide, traffic management, and tug assists were screened out from further analysis because they are already being carried out by a non-Federal entity and would not achieve significant transportation cost savings to meet the primary planning objective. Channel deepening, anchorages, breakwaters, and jetties were screened out from further analysis since they would not meet the primary planning objectives. Light-loading and lightering were also screened out from further analysis for that reason.

Therefore, the following measures were carried forward for additional analysis:

- Channel widening
- Turning basin expansion

All the measures carried forward for additional analysis meet the primary planning objective of the study, can be designed to avoid or minimize impacts outlined in the planning constraints, are not being implemented by a non-Federal entity, and are considered technically feasible.

3.5 Formulation of the Initial Array of Action Alternatives

Alternatives are a set of one or more management measures functioning together to address one or more planning objectives. An initial array of alternative plans was formulated based on information provided by the harbor pilots combined with engineering and operations judgment provided by the Savannah District. Several assumptions were made in the development of the initial alternatives and are described in the section below.

3.5.1 Design Vessel Assumptions

Identification of a design vessel assists the study team by informing design parameters for alternatives. For deep draft navigation projects, the design vessel was selected based on economic studies of the types and sizes of the vessel fleet expected to use the proposed channel over the project life. The design vessel is chosen as the maximum or near maximum size ship in the forecasted fleet. The current federal channel was deepened in the 1990s for a RO/RO design vessel with dimensions of 660 feet long and 106 feet wide. Since then, RO/ROs have increased in length or width. There are five distinct classes of RO/RO vessels that use Brunswick Harbor. The classes are grouped by ship length and ship width.

The economics and coastal hydraulics team recommend a HERO vehicle carrier as the design vessels. This vessel class entered into use in 2015. The typical HERO is about 660 feet long and ranges from 114 to 134 feet wide. They are the widest ships to call on Brunswick. They have an average capacity of approximately 7,600 – 8,000 CEU. These vessels have increased in use at Brunswick Harbor and the call frequency for Colonel's Island Terminal is expected to increase during the period of analysis. The HERO class is the primary design vessel for the Brunswick Harbor Modifications Study.

3.5.2 Channel Width Assumptions

Proposed channel widths for each alternative have been determined based on existing bathymetry, expert elicitation from harbor pilots, feasibility-level ship simulation, and in conjunction with guidance from EM 1110-2-1613 (Hydraulic Design of Deep-Draft Navigation Projects). Channel widths range from approximately 100 feet (additional turning basin width) to 1200 feet (meeting area in St. Simon's Sound) within the alternatives.

3.5.3 Disposal Assumptions

Both upland disposal and beneficial use options were evaluated. For the upland disposal option, dredged material would be disposed of at Andrews Island Dredged Material Containment Area (DMCA), which is typically used for placement of sediments removed during maintenance of Brunswick Harbor. The capacity of Andrews Island was over 15 million cubic yards after the last maintenance dredging cycle in November 2019, and it is assumed that all dredged material from this project could be disposed there. Beneficial use of dredged material is currently being evaluated at a number of locations. Additional discussion of dredging and dredged material management can be found in Section 5.2 of this report.f

3.5.4 Local Facility Assumptions

Local facilities include terminals, docks, berthing areas, and local access routes. The Colonel's Island Terminal has gone through port improvements over the last couple of years. Specifically, 610 acres have been developed for vehicle processing and a further 478 remain permitted for future development. According to GPA, there are now 26 dockside acres that have been redeveloped for RO/RO use. A fourth RO/RO berth received permitting for Colonel's Island Terminal in 2019, and there are currently upgrades underway to allow Berth 2 to accommodate larger post-Panamax vessels. Other recent upgrades include: increase in parking spots for automobiles from 60,000 to 90,000 units, upgraded road construction to handle increase in vehicle traffic, and funds approved for design of future rail expansion. A new berth was recently permitted by the Corps Regulatory Division and design is currently underway.

3.6 Evaluation of Alternatives

Addition of Alternatives in Response to Golden Ray

In response to the Golden Ray event, the Brunswick Harbor pilots requested that the study team investigate the addition of a vessel meeting area at St. Simons Sound. This area consists of naturally deep water (deeper than -38 feet MLLW) and would be used for vessels meeting prior to entering the inner harbor. For clarification, vessel meeting is defined as two vessels transiting past one another in opposite directions. This maneuver is different from passing, which is when one vessel overtakes a second vessel transiting in the same direction.

Feasibility-Level Ship Simulation

Feasibility-level ship simulation was completed for each alternative at the ERDC Coastal Hydraulics Lab (CHL) in Vicksburg, MS from December 2-6, 2019. Two Brunswick Harbor pilots completed 44 simulated runs under a variety of environmental conditions (including extreme conditions), with data collected on transit time, run difficulty, and run safety. Results from ship simulation were used to optimize the design of the various alternatives. Appendix B includes a detailed description of ship simulation.

Economic Benefits
Economic benefits were calculated using the USACE Institute for Water Resources (IWR) HarborSym Model. IWR developed HarborSym as a planning level, general-purpose model to analyze the transportation costs of various waterway modifications within a harbor. HarborSym is a Monte Carlo simulation model of vessel movements at a port for use in economic analyses.

Channel improvement modifications (i.e. channel widening and turning basin expansion) in Brunswick result in reduced transportation cost by creating fewer delays and less congestion when traversing the port. Furthermore, the creation of a meeting area reduces wait times within the harbor. A detailed description of the economic model, economic analyses, and benefits is located in Appendix A.

3.7 Final Array of Alternatives

Alternative 1: No Action Alternative

The NAA/FWOP is analyzed for comparison with the action alternatives. Taking no action would mean continuing current operations and restrictions at Brunswick Harbor with no improvements to the Federal navigation channel. All physical conditions at the time of this analysis are assumed to remain. The new berth at Colonel's Island Terminal and terminal expansion are included in the NAA/FWOP. The NAA/FWOP assumes one-way RO/RO traffic within Brunswick Harbor; however, vessels do occasionally meet in two locations: (1) the St. Simons Sound and (2) the Colonel's Island Terminal Turning Basin. Vessels rarely meet in the turning basin as conditions must be ideal for the maneuver to take place and both pilots must agree to it. Meetings in the St. Simons Sound occur outside of the Federal channel on a regular basis. The NAA/FWOP also assumes O&M dredging would occur within the Federal navigation channel at authorized depths (-36 feet MLLW + 2 feet allowable over-depth). The NAA/FWOP is the base condition to measure action alternatives.

Figure 22. Alternative 1 – No Action/ Future Without Project Condition

Alternative 2: Bend Widener

Alternative 2 would expand the Cedar Hammock Range bend widener located between stations 20+300 to 23+300. The bend widener would be expanded by a maximum of 321 feet on the north side and at a length of approximately 2,700 feet. The bend widener would be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable over-depth). Approximately 205,000 cubic yards of material would need to be dredged to expand the bend widener. Dredged material from this location would first be considered for beneficial use on Bird Island located approximately 1 mile to the northeast. Otherwise, the material would be placed in the Andrews Island DMCA. The AAEQ benefit is $1,016,000, AAEQ cost is $362,000, and annual net benefit is $654,000. The BCR is 2.8. Alternative 2 is eliminated because the net benefits are substantially less than the NED plan.

Figure 23. Alternative 2 – Bend widener at buoy 24 in vicinity of Cedar Hammock Range

Alternative 3: Turning Basin Expansion

Four different turning basin expansion configurations were evaluated. Two initial turning basin configurations were developed during the Continuing Authorities Program (CAP) Section 107 study for Brunswick Harbor Improvements in 2011. Upon expert elicitation with Brunswick Harbor Pilots, these two turning basin configurations were screened due to concerns with lack of additional maneuvering space near or upstream of Berth 0. A third turning basin configuration was refined further during ship simulation to create turning basin option four. Turning basin option four incorporates less total width than turning basin option three, with widths between 100 feet and 170 feet versus up to 360 feet with turning basin option three, however option four provides nearly 1,000 feet of additional length upstream versus option three. Ultimately, turning basin option four provides additional maneuverability near Berth 0 and requires less dredging and therefore was carried forward as the selected turning basin option. Further discussion on turning basin design and development of configurations is available in the Appendix B.

Alternative 3 would include expanding the existing turning basin at the Colonel's Island Terminal along approximately 4,100 feet, increasing the width by a maximum of 395 feet along South Brunswick River from stations 0+900 to 5+300. The turning basin expansion would be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable over-depth). The turning basin expansion would require approximately 346,000 cubic yards of dredged material to be removed. It is expected that all dredged material would be placed in the Andrews Island DMCA. Beneficial use of dredged material would be considered; however, a suitable location has not been identified. The AAEQ benefit is $1,249,000, AAEQ cost is $447,000 and annual net benefit is $802,000. The BCR is estimated at 2.8. Alternative 3 is eliminated because the net benefits are substantially less than the NED plan.

Figure 24. Alternative 3 – Turning basin expansion near Colonel's Island Terminal

Alternative 4: Meeting Area West of Sidney Lanier Bridge

Alternative 4 would create a RO/RO vessel meeting area upstream of the Sidney Lanier Bridge to the turning basin at the Colonel's Island Terminal (a distance of approximately 8,700 feet). This part of the Federal navigation channel is currently 400 feet wide. The Federal channel would be expanded by approximately 200 feet on both the north and south side of the channel to create a new channel width of 800 feet from stations 34+200 to 43+200. The meeting area would be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable over-depth). The meeting area would require dredging of approximately 800,000 cubic yards of material. It is expected that all dredged material would be placed in the Andrews Island DMCA. Beneficial use of dredged material would be considered; however, a suitable location has not been identified. The AAEQ benefit is $281,000, AAEQ cost is $762,000, and the annual net benefit is -$481,000. The BCR is 0.4. Alternative 4 is eliminated because it has a negative net benefit.

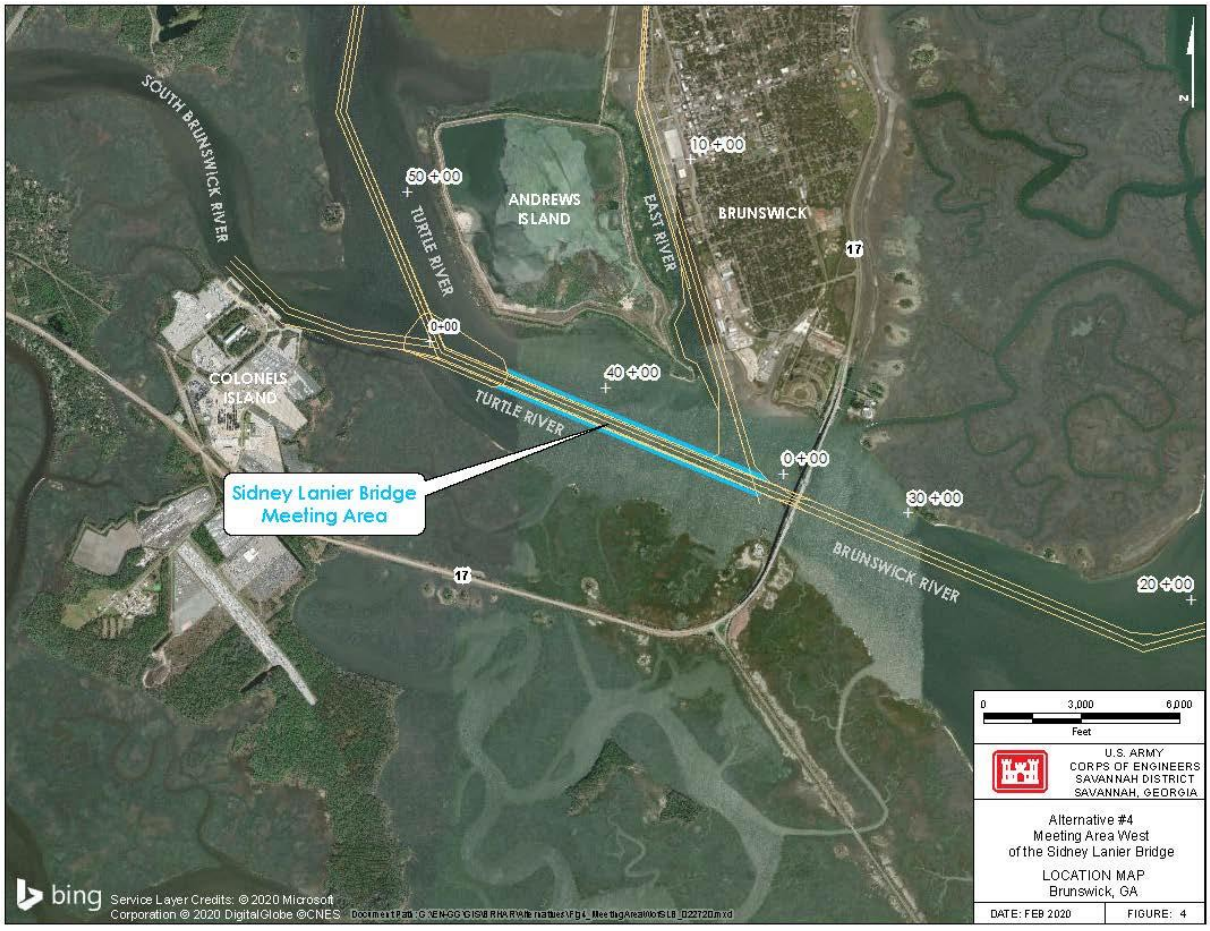


Figure 25. Alternative 4 – Meeting area west of the Sidney Lanier Bridge

Alternative 5: Meeting Area at St. Simons Sound

Alternative 5 would create a RO/RO vessel meeting area located at St. Simons Sound near the entrance channel to Brunswick Harbor. Since that area is naturally deep water, no dredging would be required. Creating a meeting area at St. Simons Sound would relocate the north toe of the existing channel approximately 800 feet to the north along a length of approximately 10,000 feet from stations -6+800 to 4+300. The existing channel centerline would not change. Cost drivers are associated with cultural resource preservation. The AAEQ benefit is $94,000, AAEQ cost is $33,000, and the annual net benefit is $61,000. The BCR is 2.8. Alternative 5 is eliminated because the net benefits are substantially less than the NED plan.

Figure 26. Alternative 5 – Meeting area at St. Simons Sound

Alternative 6: Bend Widener and Turning Basin Expansion

Alternative 6 is a combination of the bend widener (Alternative 2) and the turning basin expansion (Alternative 3). The AAEQ benefit is $2,833,000, AAEQ cost is $678,000, and annual net benefit is $2,155,000. The BCR is 4.1. All objectives are met by Alternative 6; however, it is eliminated because the net benefits are less than the NED plan.

Figure 27. Alternative 6 – Bend widener and turning basin expansion

Alternative 7: Bend Widener, Turning Basin Expansion, and Meeting Area West of Sidney Lanier Bridge.

Alternative 7 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area west of the Sidney Lanier Bridge (Alternative 4). The AAEQ benefit is $2,937,000, AAEQ cost is $1,329,000, and annual net benefit is $1,608,000. The BCR is 2.2. All objectives were met by Alternative 7; however, it is eliminated because the net benefits are less than the NED plan.

Figure 28. Alternative 7 – Bend widener, turning basin expansion, and meeting area west of Sidney Lanier Bridge

Alternative 8: Bend Widener, Turning Basin Expansion, and Meeting Area at St. Simons Sound.

Alternative 8 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area at St. Simons Sound (Alternative 5). The AAEQ benefit is $2,929,000, AAEQ cost is $713,000, and annual net benefit is $2,216,000. The BCR is 4.1. Alternative 8 is the NED Plan and the Tentatively Selected Plan (TSP). The non-Federal sponsor supports this plan and there is no Locally Preferred Plan.

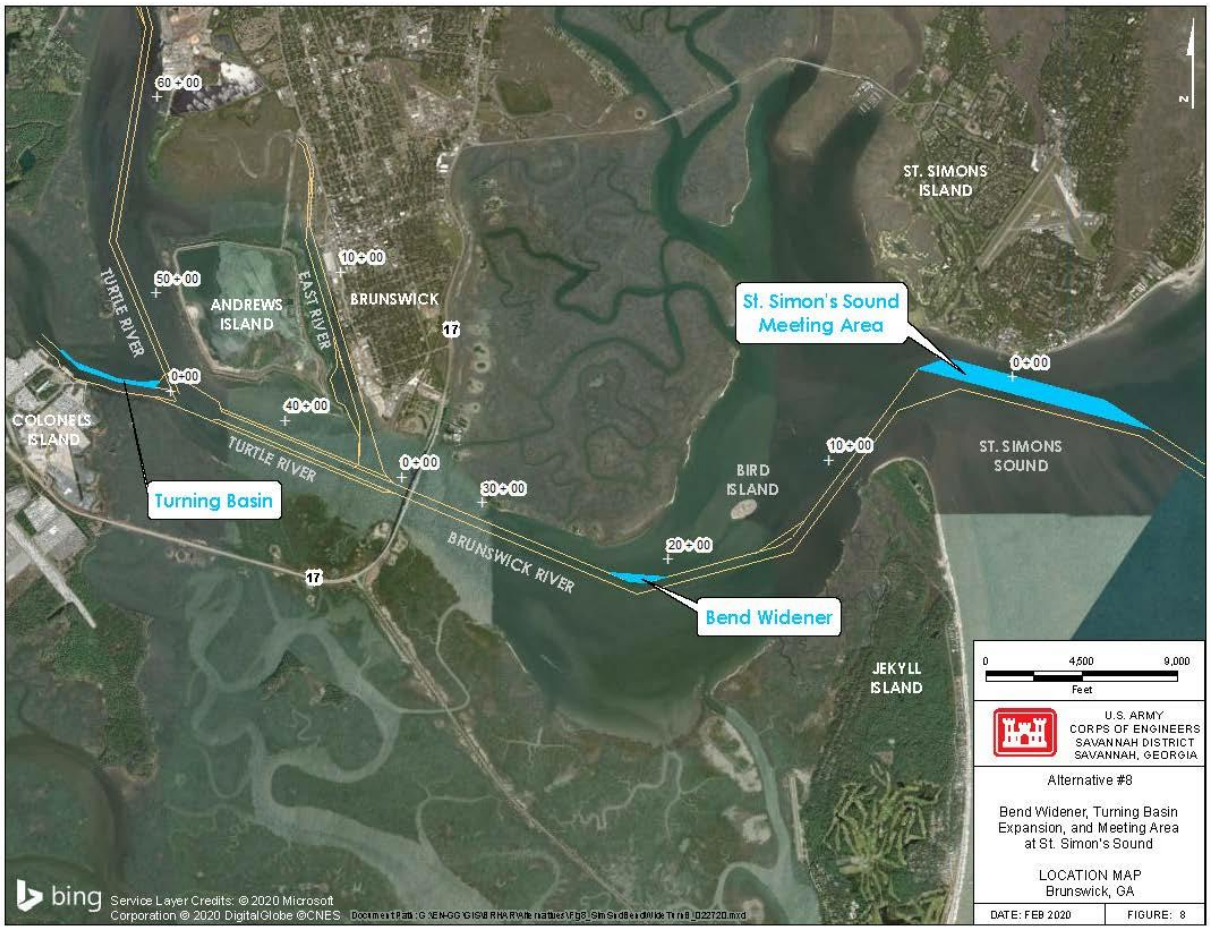


Figure 29. Alternative 8 – Bend widener, turning basin expansion, and meeting area at St. Simons Sound

Alternative 9: Bend Widener, Turning Basin Expansion, Meeting Area West of Sidney Lanier Bridge and Meeting Area at St. Simons Sound.

Alternative 9 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), meeting area west of the Sidney Lanier Bridge (Alternative 4), and meeting area at St. Simons Sound (Alternative 5). The AAEQ benefit is $3,033,000, AAEQ cost is $1,332,000, and annual net benefit is $1,701,000. The BCR is 2.3. All objectives were met by Alternative 9; however, it is eliminated because the net benefits are less than the NED plan.

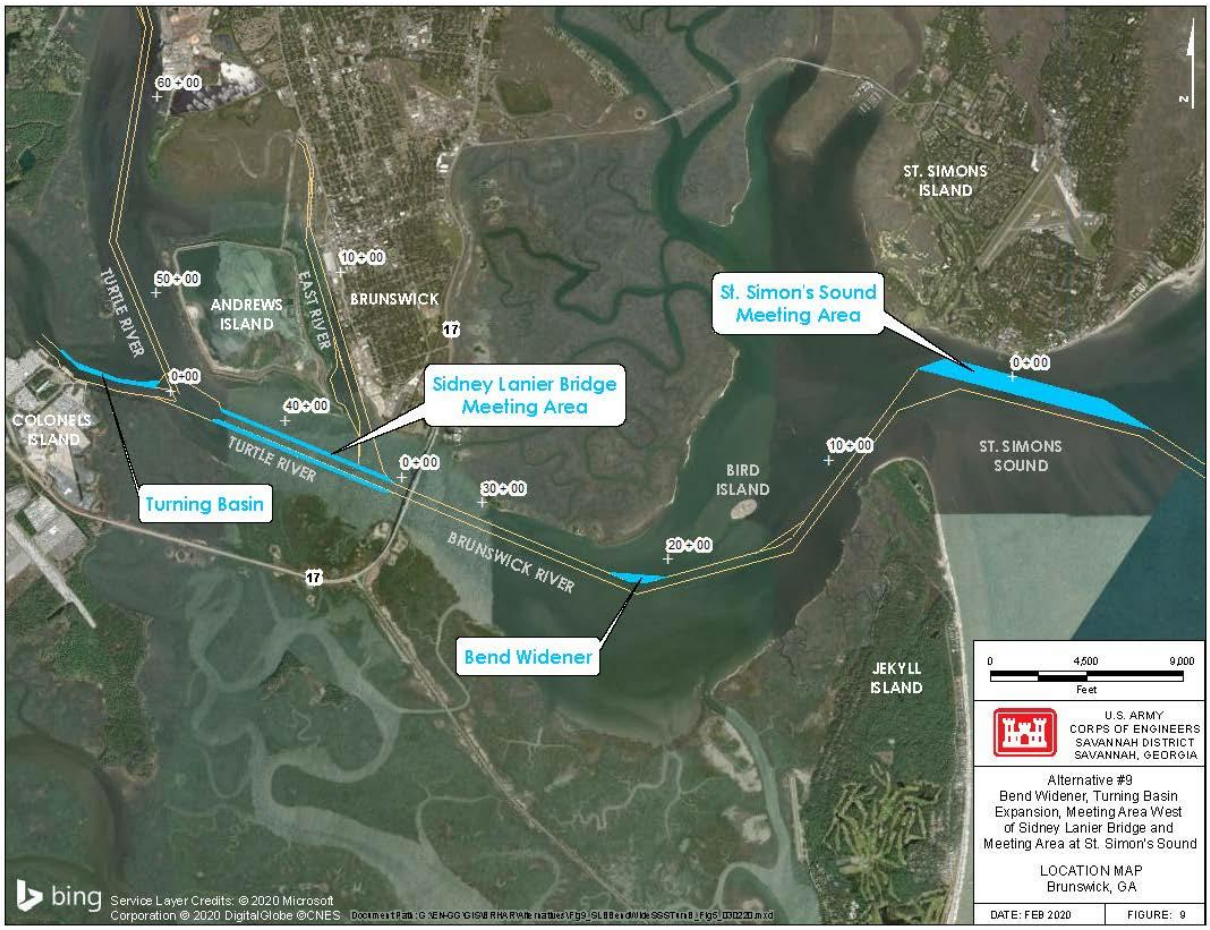


Figure 30. Alternative 9 – Bend widener, turning basin expansion, meeting area west of the Sidney Lanier Bridge, and meeting area at St. Simons Sound

3.8 Evaluation and Comparison of Final Array of Alternatives*

This section describes how the plans in the final array of alternatives compare in meeting the planning objectives and constraints. Also, this section identifies key tradeoffs among the alternatives.

All of the final array of alternatives, with the exception of the NAA/FWOP, meet the planning objectives and avoid the known constraints. However, some of the

alternatives are more complete, effective, efficient, and acceptable than others. Alternative 2 would increase transportation efficiency at the Cedar Hammock Range, but would not provide any benefit further upstream in the area around Colonel's Island Terminal. Similarly, Alternative 3 would increase transportation efficiency at Colonel's Island Terminal, but would not address difficulties navigating through Cedar Hammock Range. Alternatives 4 and 5 would allow vessels to meet, which would increase overall transportation efficiency, but would not address problems at either Cedar Hammock Range or Colonel's Island Terminal. Alternative 6 would address issues at Cedar Hammock Range and Colonel's Island Terminal, but without the added efficiency gains of including a meeting area. Alternative 7 includes a meeting area, but in a location that requires a larger construction cost when compared to Alternative 6, reducing the net benefit. Alternative 8 includes all benefits of Alternative 6, but with the addition of a meeting area in an area of naturally deep water, thus providing a greater net benefit than any other alternative. Although Alternative 6 provides a relatively similar level of net benefits, the incremental congestion relief benefits of Alternative 8 ($61,000) outweigh the minimal incremental costs ($35,000) above Alternative 6. Alternative 8 provides a meeting area for two-way traffic in the port, while incurring no additional dredging. Because of this, Alternative 8 has the greatest net benefit and is the NED plan. Alternative 9, which has both meeting area locations, has the highest cost and less net benefit than Alternative 8. In addition to the NED account, Alternative 8 was compared with the NAA/FWOP using the Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE) accounts as described in the Table 16 below.

Table 16. Comparison of No Action Alternative and NED Plan

	No Action Alternative	Alternative 8 (NED Plan)
I. PLAN DESCRIPTION	Future Without Project Condition	-Bend Widener -Turning Basin Expansion -Meeting Area At St. Simons Sound
II. IMPACT ASSESSMENT		
A. National Economic Development (NED)		
1. Total Investment Cost	$0	$ 15,733,000
2. Annual Cost	$0	$ 713,000
3. Total Annual Benefits	$0	$ 2,929,000
4. Annual Net Benefits	$0	$ 2,216,000
5. Benefit to Cost Ratio	N/A	4.1
B. Environmental Quality (EQ)		
1. Air Quality/Noise	No effect. Glynn County, Georgia is currently in attainment for the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants. The project area is under no Federal or State restrictions for the purpose of improving air quality to meet any air quality standards. Nothing changes under a NAA/FWOP. Ambient noise levels in Glynn County are quiet to moderate and are typical of	No effect. No additional restrictions are anticipated as this project area maintains no Federal or State restrictions for the purpose of improving air quality. No anticipated reduction in air quality beyond what is normally associated with periodic and/or annual dredge maintenance of the navigation channels are anticipated. Minor temporary increase in ambient noise associated with dredging activities but no more than the measurable ambient noise

	recreational environments. Watershed noises associated with minor industrial, maritime activities from large vessels and airport activities are the predominant sources of noise in the project area. Nothing changes under a NAA/FWOP.	associated with periodic and/or annual dredge maintenance of the navigation channels.
2. Water Quality/Hazardous, Toxic, and Radioactive Waste (HTRW)	No effect.	Minor, short term increase in turbidity (increased suspended solids in the water from dredge activity) which absorbs greater heat in the sunlight, thus raising water temperature, which in turn lowers dissolved oxygen levels (DO). However, because the project area is mostly open water that receives semi-diurnal tidal flushing from St. Simons Sound, the proposed project will have a minor, short term increase in turbidity during initial dredging but no long term increase from routine maintenance dredging. For HRTW, no anticipated impacts or releases of HRTW within project area for the duration of the project.
3. Wetlands	No effect.	No effect.

4. Threatened and Endangered (T&E) Species	O&M dredging is covered under the existing 2020 SARBO.	Initial and O&M dredging is covered under the existing 2020 SARBO.
5. Essential Fish Habitat (EFH)	No adverse effect.	No adverse effect.
6. Cultural Resources & Historic Properties	No potential to effect.	Pending. Dredging in undisturbed deposits has the potential to cause direct adverse impacts to submerged cultural resources such as shipwreck remains and prehistoric archaeological sites. Field investigations and impacts will be addressed through a PA with the GAHPD, pursuant to Section 106 of the NHPA.
C. Regional Economic Development (RED)	No effect.	Construction of an expanded harbor project and increased O&M expenditures would likely result in short-term increases in local spending, tax revenue, economic output, and full-time employment positions.
D. Other Social Effects (OSE)	No effect.	No effect. Increased throughput is not projected. Therefore, channel improvements would not induce additional traffic, noise, or lighting compared to the future without-

		project condition. As such, the improvement of the channel would not have a disproportionately high and adverse effects on minority, juvenile, elderly, and low-income individuals and is not anticipated to have any measurable impact on the OSE account.
1. Life, Health, and Safety	No effect.	The NED plan would contribute to safer vessel operations by adding width to the channel in various locations. This may reduce the risk of vessel grounding in those areas and the resultant environmental damage from an incident.
2. Community Cohesion (displacement of people & businesses)	No effect.	No effect.
3. Recreation	No effect.	No effect.
III. PLAN EVALUATION		
A. Contribution to Planning Objectives		
1. Reduce Inefficiencies	None.	$2,236,000 Net Benefits.
2. Environmental Acceptability	Acceptable.	Acceptable.
B. Response to Planning Constraints		
1. Financial Capability of Sponsor	N/A	Sponsor capable of meeting their portion of the cost share.
2. Institutional Acceptability	Inefficiencies are not acceptable and do not meet planning criteria.	Increased efficiencies are fully acceptable and meet planning criteria.
3. Public Acceptability	Not Fully Acceptable This plan is the least satisfactory plan to the local maritime community.	Fully Acceptable

IV. REAL ESTATE	No effect.	Minimal Lands, Easements, Rights of Entry, Relocations, and Disposal/Borrow Areas (LERRD) required for beneficial placement at the Bird Island and/or disposal of material at Andrews Island. Interagency agreement required with GADNR for beneficial placement and/or Georgia Department of Transportation (GDOT) for the disposal site.

Key Assumptions. This section identifies key assumptions that underlie the analysis. Those assumption include hydrologic, environmental, and economic assumptions key to the formulation and recommendation, including those related to analytic models used in the study.

- Tonnage in Brunswick Harbor will increase according to economic forecasts over the 50 year planning horizon.
- No environmental mitigation will be required.
- The total volume of dredging for the NED plan (Alternative 8) is approximately 551,000 CY.
- All dredged material is capable of being removed using a hydraulic cutterhead dredge and no blasting is required.
- No dredging (new work or O&M) is required in the proposed meeting area at St. Simons Sound.
- The average shoaling rate for the future turning basin and bend widener is approximately 14,900 CY per year and 2,000 CY per year, respectively.

3.9 Summary of the National Economic Development Plan

Feasibility-level cost estimates were developed at the October 2019 price level. A detailed "Basis of Cost Estimate" that outlines cost assumptions appears in the Cost Engineering Appendix. Potential risk events were evaluated and incorporated into a risk model to determine appropriate contingency levels.

Table 17 summarizes the cost information for the NED plan which were used in the economic evaluation. Construction first costs were estimated at $15,312,000. Interest during construction was computed on the construction first cost using a 12-month construction duration and the current discount rate of 2.75 percent. There were no service facility costs to capture the widening benefits. The total investment cost is the sum of the construction first cost and interest during construction.

Table 17. NED Economic Costs (October 2019 prices)

Cost	***NED Plan***
Project First Cost	$15,312,000
IDC (12 months @ 2.75 percent)	$421,000
Aids to Navigation	Unknown, at this time
Total Investment Cost	$15,733,000
AAEQ Cost	$563,000
AAEQ OMRR&R	$150,000
Total AAEQ Cost	$713,000
Note: Transportation costs are based on FY17 vessel operating costs updated from EGM 17-04.	

Net Benefits and Benefit-Cost Ratio (BCR)

Table 18 displays the updated costs, benefits and net benefits for the NED plan at the October 2019 price level and 2.75 percent discount rate. The NED plan maximizes net benefits at $2,216,000 and a BCR of 4.1.

Table 18. Summary of NED Plan (October 2019 prices)

Alternative	Total AAEQ Benefits[1]	Total AAEQ Costs	Total Net Benefits	Incremental Net Benefits	Benefit/Cost Ratio (BCR)
Alternative 8	$2,929,000	$713,000	$2,216,000	--	4.1
Transportation cost savings benefits are based on FY17 vessel operating costs updated from EGM 17- 04.					

Table 19 provides a summary of the costs and benefits of the NED. O&M dredging expenses have been estimated to occur every year at $150,000 per dredge cycle at the October 2019 price level. AAEQ cost is estimated at $713,000, which includes an AAEQ cost for O&M of $150,000. AAEQ benefits include origin-to-destination transportation cost savings of approximately $2,929,000, resulting in total net benefits of $2,216,000 (AAEQ benefits minus AAEQ costs) and a 4.1 BCR. First costs for authorization are estimated at $15,312,000 (October 2019 price level).

Table 19. Average Annual Equivalent (AAEQ) Benefits and Costs of the Brunswick Harbor NED Plan

	Cost and Benefit Summary of the NED Plan (October 2019 price level)
Interest Rate (Fiscal Year 2020)	2.75%
Interest Rate, Monthly	0.23%
Construction Period, Months	12
Period of Analysis, Years	50
Construction First Costs	$15,312,000
Interest During Construction (First Costs only)	$421,000
Estimated Local Service Facilities	$0
Estimated Aids to Navigation	$0
Estimated Economic Investment Costs	***$15,733,000***
AAEQ Costs	
Amortized Cost	$564,000
OMRR&R	$150,000
Total AAEQ Costs	***$713,000***
AAEQ Benefits	
Origin-to-Destination Transportation Cost Savings[1]	$2,929,000
Total AAEQ Benefits	***$2,929,000***
AAEQ Net Benefits (AAEQ Benefits – AAEQ Costs)	**$2,216,000**
Benefit-to-Cost Ratio (computed at 2.75%)	**4.1**
[1]Transportation costs and cost savings benefits are based on FY17 vessel operating costs updated from EGM 17-04.	

4.0 Environmental Consequences of Alternatives*

Section 4.0 examines and describes the direct and indirect physical effects and potential impacts of implementing the final array of alternatives on the existing conditions described in section 2.0 of the IFR/EA. This section evaluates the final array of alternatives while ensuring the final alternative proposal is engineeringly feasible, environmentally acceptable, and is cost effective, while maintaining the Congressional intent in the WRDA 2016, NEPA, other environmental requirements, and stakeholder and sponsor needs.

For the purposes of this analysis, the original design is used for comparison of alternatives and as the NAA during formulation. The current and future conditions, described in this document and used as the base of comparison for the effects analysis, assumes that no part of the selected plan has been implemented. It is assumed that vessel navigation outside of the existing Federally authorized channel is unsafe in all locations.

The final array of alternatives consists of 9 different alternatives. The analysis of environmental impacts for this proposed project involves the discussion of each stand-alone alternative as well as a combination of them. It must be noted that the analysis involves actions and activities both during the construction phase and for periodic and routine maintenance dredging after construction has been completed. O&M dredging should occur regularly.

On April 9, 2020, the USACE vertical team approved the PDT's recommendation of Alternative 8 as the tentatively selected plan. Alternative 8 is a combination of the bend widener, turning basin expansion, and meeting area at St. Simons Sound. Alternative 8 includes dredging 205,000 cubic yards of material at the bend widener, 346,000 cubic yards at the turning basin expansion, and 0 cubic yards at the meeting area at St. Simons Sound for a total of approximately 551,000 cubic yards of dredged material. Based on this evaluation and review by the Corps staff, it is the Corps' determination that the TSP may affect, but not likely adversely affect threatened and endangered species and would not cause adverse effects on the quality of water quality, aquatic resources, EFH, and the human environment. Table 20. Summary of Environmental Consequences provides a summary of the environmental consequences for each alternative.

Table 20. Summary of Environmental Consequences

Alternatives / Resources	1. NAA/FWOP	2. Bend Widener	3. Turning Basin Expansion	4. Meeting area west of Sidney Lanier Bridge	5. St. Simons Sound Meeting Area	6. Bend Widener + Turning Basin Expansion	7. Bend Widener + Turning Basin Expansion + Meeting Area West of Bridge	8. Bend Widener + Turning Basin Expansion + St. Simons Meeting Area	9. Bend Widener + Turning Basin Expansion + Meeting Area West of Bridge + St. Simons Sound Meeting Area	Report Section
Hydrology and Floodplains	No impacts expected									4.1
Aquatic Resources and Habitat	No change	Minor and short-term impacts expected			No change	Minor and short-term impacts expected				4.2
Essential Fish Habitat	No effect	No adverse effect	Habitat conversion, but no adverse effects		No effect	Habitat conversion, but no adverse effects				4.3
Wetlands	No impacts expected									4.4
T&E Species	No effect	May affect but not likely to adversely affect the following species: Kemp's ridley sea turtle, Hawksbill sea turtle, Green sea turtle, Loggerhead sea turtle, Leatherback see turtle, Shortnose sturgeon, Atlantic sturgeon, Giant Manta Ray								4.5
Air Quality	No change	Minor and short-term impacts expected			No change	Minor and short-term impacts expected				4.6
Water Quality	No change	Minor temporary adverse effects during the one-year construction period			No change	Minor temporary adverse effects during the one-year construction period				4.7
Cultural Resources	No impacts to cultural resources or historic properties	Potential for negative impacts to cultural resources			No impacts to cultural resources or historic properties	Potential for negative impacts to cultural resources				4.8
Recreation	No impacts expected									4.9
Aesthetics	No impacts expected									4.10
Noise	No effects	Minor impacts during the one-year construction period								4.11
HTRW	No effects	No increased risk of disturbance or increase risk of spills								4.12
Climate Change	No change in water levels from existing conditions									4.13
Environmental Justice	No adverse effects expected									4.15

4.1 Hydrology and Floodplains

Future Condition with No Action and Future Conditions with Alternatives 2 through 9

With implementation of the NAA and with Alternatives 2 through 9, no changes in hydrology and floodplains are anticipated.

4.2 Aquatic Resources and Aquatic Habitat

Future Conditions with a No Action Alternative and Alternative 5

With the implementation of either the NAA or Alternative 5, there will be no changes to aquatic resources or habitat in the project area. Alternative 5 would create a RO/RO vessel meeting area located at St. Simons Sound near the entrance channel to Brunswick Harbor. Since this area is naturally deep water (deeper than -38 feet MLLW), no dredging would be required. Creating a meeting area at St. Simons Sound would re-locate the north toe of the existing channel approximately 800 feet to the north from stations -6+800 to 4+300. The existing navigational channel centerline would not change. With implementation of Alternative 5, Aquatic Resources and Aquatic Habitat will remain as they are. No impacts to Aquatic Resources and Aquatic Habitat are anticipated beyond normally scheduled annual maintenance dredging. This Alternative, as with the No Action Alternative, also assumes O&M dredging would occur within the Federal navigation channel at authorized depths (-36 feet MLLW + 2 feet allowable over-depth) as normally scheduled on an annual basis to continue to accommodate open channels for vessel navigation. Andrews Island will continue to remain as the primary location for the dredge material storage.

Future Conditions with Alternatives 2, 3, 4, 6, 7, 8 & 9

Alternatives 2, 3, 4 are considered stand-alone projects while 6, 7, 8 and 9 are combinations of the above stated “stand-alone” alternatives. Therefore, impacts to Aquatic Resources and Aquatic Habitat would be the same for all of these alternatives.

Habitats within the project site consist of coastal inlets, intertidal and sub-tidal non-vegetated flats, tidal creeks, estuarine water columns, and unconsolidated bottom. Most of the project area is open water that receives semi-diurnal tidal flushing from St. Simons Sound. For macrobenthic invertebrates species that could be in the study area, including shrimp, crabs, oysters, and clams, to other species such as polychaetes, mollusks, and other less well known, but valuable, species which make up the remainder of the food chain, removal of the bottom substrate within the dredging areas would eliminate most benthic resources in those locations. Those sites would be available for recolonization and use by benthic organisms once the dredging event ceases, so no irreversible loss of resources would occur. The loss of habitat would be short term and through primary succession, followed by secondary succession, the populations that ultimately reestablish should be similar to those eliminated, since the species are substrate dependent and the sediments that create shoals in the channel and adjacent areas now will continue to do so after the proposed dredging. The proposed dredging will not limit the density and diversity of the benthic community that

becomes reestablished any more so than existing maintenance activities. However, benthic populations in the navigation channel are in a state of flux due to the continual sedimentation and shoaling that creates the need for maintenance dredging (SHEP-EIS 2012). Cumulative effects on phytoplankton and zooplankton species living in the water column should not be affected any more so than the existing maintenance activities. For diadromous fish such as striped bass, blueback herring, and shortnose and Atlantic sturgeon, although the fish species present actively use the entire water column within the project area for both traveling upstream and downstream and feeding, no impacts are anticipated since most of the fish species present have the ability to freely avoid any dredge activity. In addition, feeding during any dredge activity will likely temporarily decrease in the project area due to a temporary loss of macro benthic invertebrates, as well as a reduced ability for fish feeding via sight due to the temporary increase of turbidity in the water column.

Regarding invasive species, the alternatives being evaluated as part of this study are not expected to cause an increase or decrease in proliferation or recruitment for these species increase.

4.3 Essential Fish Habitat

Future Conditions with No Action
With implementation of the NAA, EFH will not be adversely affected as no changes are proposed.

Future Conditions with Alternative 5
With implementation of the Alternative 5, Coastal Inlet EFH will remain as they are. No impacts to Coastal Inlet EFH are anticipated beyond normally scheduled annual maintenance dredging. This Alternative, as with the No Action Alternative, also assumes O&M dredging would occur within the Federal navigation channel at authorized depths (-36 feet MLLW + 2 feet allowable over-depth) as normally scheduled on an annual basis to continue to accommodate open channels for vessel navigation.

Future Conditions with Alternatives 2, 3, 4, 6, 7, 8 & 9
With the implementation of Alternatives 2, 6, 7, 8, and 9, beneficial use is under consideration, specifically for dredged material from the bend widener location. For the purposes of this IFR/EA, the material would be placed in the Andrews Island Dredged Material Containment Area. Currently, this use, as well as other proposals are being evaluated for feasibility. Alternatives 2, 3, 4, 6, 7, 8, and 9 are comprised of both stand-alone proposals or in various combinations. The impacts from dredge activity for each alternative on EFH are discussed below.

Coastal Inlets - With the implementation of Alternatives 2, 4, 6, 7, 8, and 9, all alternatives involve impacts to EFH through dredging the bend widener, be it as a stand-alone alternative or as part of a combination of alternatives. The substrata in the area proposed for dredging is of similar composition as the adjacent federally maintained channel. Any loss of habitat would be short term and through primary

succession, followed by secondary succession, and the populations that ultimately reestablish should be similar to those eliminated. The proposed dredging will not limit the density and diversity of the benthic community that becomes reestablished any more so than existing maintenance activities. Any proposed impacts to the bend widener area would be temporary and minimal. Therefore, no adverse effects are expected to EFH from these alternatives.

Tidal creeks and unconsolidated bottom- The implementation of Alternatives 3, 4, 6, 7, 8, or 9, (or various combinations) involves impacting EFH through dredging at the turning basin and/or the meeting area West of Sidney Lanier Bridge. Initial ship simulations resulted in a smaller dredge footprint, which subsequently minimized the EFH area required to be dredged. The reduced footprint includes dredging of a small section of tidal creeks/ unconsolidated bottom EFH at each location. The substrata in the area being dredged is of similar composition as the adjacent federally maintained channel. The impacts would be temporary and minor and through primary succession, followed by secondary succession, and the populations that ultimately reestablish should be similar to those initially removed. The proposed dredging will not limit the density and diversity of the benthic community that becomes reestablished any more so than existing maintenance activities. Surviving populations of fish and macroinvertebrates specifically adapted to the shallower areas will relocate to abundant similar habitat just outside the project scope that will remain preserved. The newly converted habitat may additionally attract more fish, macro invertebrates and prey species associated with this EFH, as well as create greater resting and foraging habitat for T&E species such as sturgeon. The conversion of habitat will be permanent as this is part of the proposed dredge activity and continuing annual dredge maintenance, however, given the abundance of EFH surrounding the immediate area, the conversion into deeper EFH of equal/similar diversity and quality does not eliminate, diminish or appreciably disrupt EFH in the project area. Therefore, no adverse effects are expected to EFH from these alternatives.

4.4 Wetlands

Future Conditions with No Action and with Alternatives 2 through 9
No impacts to wetlands are proposed and no indirect impacts are anticipated for any of the alternatives.

4.5 Threatened, Endangered and Protected Species

Future Conditions with No Action and with Alternatives 2 through 9
With implementation of the NAA or any of the action alternatives being evaluated, the Corps has concluded that the proposed actions may affect but are not likely to adversely affect some and no effect to other Federally listed species under NMFS and USFWS jurisdiction. These impacts would be covered by the analysis and Project Design Criteria in the 2020 SARBO as well as the ESA.

The Corps has initiated consultation with NMFS to get concurrence on our may affect but is not likely to adversely affect determinations for: loggerhead sea turtle (Caretta

caretta), green sea turtle (Chelonia mydas), leatherback sea turtle (Dermochelys coriacea), Kemp's ridley sea turtle (Lepidochelys kempii), hawksbill sea turtle (Eretmochelys imbricate), shortnose sturgeon (Acipenser brevirostrum), Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus), and giant manta ray (Manta birostris). The Corps has made a no effect determination for all other listed species under the purview of the NMFS and described in Appendix H. There is no designated critical habitat within the project location.

The Corps is also consulting with the USFWS on our may affect not likely to adversely affect determination for the West Indian manatee (Trichechus manatus). The Corps has made a no effect determination for the piping plover (Charadrius melodus) and red knot (Calidris canutus). Piping plovers and red knot do not nest in the proposed project area, and the area does not possess their preferred feeding or resting habitats.

Although manatees are found in Georgia, as required by the ESA, in the event of an encounter from a manatee, contractors will observe BMPs and will remain informed of the civil and criminal penalties for harming, harassing or killing of manatees protected under the ESA and in some cases, both the ESA as well as the MMPA. The permittee and the permittee's contractor(s) (contractor) will be held responsible for any marine mammals harmed, harassed or killed as a result of construction activities. Therefore, the proposed project may affect but is not likely to adversely affect the manatee.

The Corps will follow all relevant Project Design Criteria in the 2020 SARBO.

4.6 Air Quality

Future Conditions with No Action and Alternative 5

With implementation of the NAA and Alternative 5, air quality will remain unchanged as no dredging above existing O&M would occur. With respect to air quality and vessel traffic, through implementation of the NAA and with Alternatives 2-9, no changes in Air Quality are anticipated as no additional vessel traffic would occur with this project.

Future Conditions with Alternatives 2, 3, 4, 6, 7, 8 & 9

With implementation of the above alternatives, minor temporary adverse impacts to air quality will occur during the approximately one-year construction period. The project area is currently an air quality attainment area and the project would not change this.

4.7 Water Quality

Future Conditions with No Action and Alternative 5

With implementation of the NAA, water quality will remain unchanged as no dredging above existing O&M would occur. With respect to water quality and vessel traffic, through implementation of the NAA and with Alternatives 2-9, no changes in Water Quality are anticipated as no additional vessel traffic would occur with this project.

Future Conditions with Alternatives 2, 3, 4, 6, 7, 8 & 9

Alternatives 2, 3, 4, 6, 7, 8, and 9 are comprised of both stand-alone proposals and in combination. With implementation of the above alternatives, minor temporary adverse

impacts to water quality will occur during the approximately one-year construction period.

The project proposes to use the cutterhead dredge, minimizing turbidity by piping away the sediments without having to bring them up through the water column in a bucket or transport them to an offshore location. In addition, most of the project area is open water that receives semi-diurnal tidal flushing from St. Simons Sound. As a result, the water in the harbor is well-mixed with a relatively uniform salinity, DO, and other important water quality parameters. This tidal flush in turn enables the water quality to return to normal levels relatively quick. Any limited impacts to Water Quality would be temporary and minimal, and project impacts are considered discountable and insignificant. The Corps has prepared a 404(b)(1) analysis for the proposed modifications to the Brunswick Harbor federal navigational channel. Based on the determination made in the Section 404(b)(1) evaluation found in Appendix F the finding is that the proposed action complies with the Section 404(b)(1) guidelines.

Andrews Island upland disposal site: If Andrews Island is utilized, effluent from the site would be discharged into the Turtle River in accordance with Section 401 and Section 303 of the Clean Water Act water quality certification and monitoring rules (EPD 1998). The Corps water quality monitoring protocol is detailed in the 1996 Savannah Harbor Long Term Management Strategy, adopted for Brunswick Harbor. The effluent could contain sediments that in turn could be released into the Turtle River and subsequently deposited in habitat located downstream. However, once the dredged material is placed, the sediments can settle out before the effluent is discharged into the river. As a result, most of the sediment remains within the DMCA and would not be discharged with the effluent or enter the water column. In addition, the Turtle River is a traditionally navigable water. The amount of effluent that would be discharged into the Turtle River would be minute compared to the volume of water currently within the river. Any suspended solids within the effluent would be diluted in the water column (GPA 2015). Based upon the project design and the minimal short-term impacts associated with the dredging, there would be no impacts to water quality.

4.8 Cultural Resources

Future Conditions with No Action With implementation of this alternative there would be no impacts to cultural resources or historic properties. Standard operations currently in place would continue and no ground disturbing activities would occur. O&M dredging that would occur would be carried out within the navigation channel in previously disturbed areas. No new disposal areas would be required for the dredged material. The existing Andrews Island upland disposal area would be used.

Future Conditions with Alternative 2
Implementation of Alternative 2 has the potential to cause negative impacts to cultural resources. Dredging impacts on submerged cultural resources can be classified as direct and indirect. Direct impacts are associated with damage caused by the dredging equipment itself. While the most destructive impacts would be related to cutterhead damage, submerged cultural resources could also be negatively impacted by the

mooring and anchoring of the dredge. Dredging in undisturbed deposits in the area around the bend widener would have the potential to cause direct negative impacts to submerged cultural resources such as shipwreck remains and prehistoric archaeological sites. Indirect impacts would be associated with exposure or burial of submerged cultural resources. Burial from sedimentation on top of the resource could have both positive/beneficial and negative impacts.

Section 2.10 contains a list of shipwrecks that have been identified as lost in the Brunswick area that date back to the colonial era. As the exact locations of these wrecks are unknown there is high potential that unrecorded resources exist in the APE. Remote sensing surveys (side scan sonar and magnetometer) of the proposed areas will be conducted in accordance with the PA executed between the Corps and the GA SHPO. The agreement also contains mitigation strategies that would be carried out if any NRHP-eligible resources are located that cannot be avoided through design modification or refinement. Execution of the PA would ensure that impacts to cultural resources would have minor effects.

Dredged material would be disposed of in an upland disposal area or in an alternate location, if material would be used for beneficial use. Placement of dredged material has the potential to bury cultural resources. Burial from sedimentation could have both positive/beneficial and negative impacts. Sediments placed on top of archaeological sites could result in preservation in place of the resource. Negative impacts would occur as the resource would no longer be easily accessible for scientific research or investigation.

Upland disposal would consist of material being pumped into Andrews Island, an existing disposal area typically used for placement of sediments removed during maintenance dredging of Brunswick Harbor. Andrews Island has been used for dredged material disposal since 1961. No cultural resources investigations would be required for use of this area. Use of this area would have no impacts to cultural resources as there are none that would be affected.

Areas that would be used for beneficial use have yet to be fully determined. Areas that are under consideration include the existing Bird Island in St. Simons Sound and placement nearshore or onshore at Jekyll Island. Placement on Bird Island would restore the existing bird island to as-built volumes, and create up to four new shorebird nesting islands between St. Simons and St. Andrews Sounds, and possibly marsh thin layer placement. Bird Island was surveyed for cultural resources by Tidewater Atlantic Research (TAR) in 2002 and no significant cultural resources were located. Beneficial use to restore Bird Island would have no impacts on cultural resources. Cultural resources investigations, including background research to identify previously recorded cultural resources, would be necessary for other areas as they are fully identified. The work would be conducted in accordance with the programmatic agreement that would be executed between the Corps and the GA SHPO. Impacts to cultural resources would be minor as the PA includes identification of cultural resources, avoidance, minimization and mitigation strategies.

The Non-federal sponsor owns the parcel proposed for the staging area and no cultural resources investigations would be required to use the parcel as it has been used previously. There would be no impacts to cultural resources associated with the use. Should other staging areas be identified through design and alternative refinement, cultural resources background research and investigations would be carried out in accordance with the PA during PED if the area had not been used previously.

Future Conditions with Alternative 3

Implementation of Alternative 3 would result in the same types of impacts from dredging as described in Alternative 2. Two anomalies with signatures indicative of cultural resources were located in 1997 by Panamercian Consultants Inc. (Tuttle and James 1999) in an area adjacent to the existing turning basin. Surveys to relocate and assess these anomalies, including diver investigation, would be carried out in accordance with the PA to be executed between the Corps and the GA SHPO. Surveys would also be conducted of the areas that would be dredged, including a buffer area for mooring and anchoring. National Register eligible resources would be avoided, if possible, or mitigated in accordance with the PA.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 as the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Future Conditions with Alternative 4

Implementation of Alternative 4 would result in the same types of impacts from dredging as described in Alternative 2. Remote sensing surveys would be conducted of the areas that would be dredged, including a buffer area for mooring and anchoring. National Register eligible resources would be avoided, if possible, or mitigated in accordance with the PA.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 as the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Future Conditions with Alternative 5

Implementation of this alternative would have no impact on cultural resources. No dredging would be required or conducted as this area is in naturally deep water and there is sufficient depth for vessels to navigate.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 as the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Future Conditions with Alternative 6

Implementation of Alternative 6 would result in the same types of impacts from dredging as described in Alternative 2. Remote sensing surveys to relocate and assess these anomalies, including diver investigation, would be carried out in accordance with the PA that would be executed between the Corps and the GA SHPO. Remote sensing surveys would be conducted of the areas that would be dredged, including a buffer area for mooring and anchoring. National Register eligible resources would be avoided, if possible, or mitigated in accordance with the PA.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 as the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Future Conditions with Alternative 7

Implementation of this alternative would have the same impacts as described in Alternatives 2, 3 and 4 for dredging, placement of dredged material and staging areas. Cultural resources investigations, avoidance, minimization and mitigation would be conducted as detailed in Alternatives 2, 3 and 4 in accordance with the PA.

Future Conditions with Alternative 8

Implementation of this alternative would have the same impacts as described in Alternatives 2, 3, and 5 for dredging, placement of dredged material and staging areas. Cultural resources investigations, avoidance, minimization and mitigation would be conducted in accordance with the PA as detailed in Alternatives 2, 3, and 5.

Future Conditions with Alternative 9

Implementation of this alternative would have the same impacts on cultural resources as described in Alternatives 2, 3, 4 and 5 for dredging, placement of dredged material and staging areas. Cultural resources investigations, avoidance, minimization and mitigation would be conducted in accordance with the PA as detailed in Alternatives 2, 3, 4, and 5.

4.9 Recreation

None of the alternatives would have negative impacts on the recreational vessels that use the Brunswick Harbor, St. Simons Sound, or the AIWW. The project alternatives are proposing dredging in areas that can be easily avoided by recreational vessels during their transits to and from the ocean. They are not impacting areas that are known to be popular for recreational vessels to loiter. Most of the river and sound are navigable for recreational vessels, so transits may only be minimally impeded during

project construction. Therefore, none of the alternatives would affect navigability of the AIWW, or vessels' ability to access it.

4.10 Aesthetics

Future Conditions with No Action and with Alternatives 2 through 9
With implementation of the NAA and with Alternatives 2 through 9, aesthetics will remain as they are. Therefore, the project would have no effect on this factor.

4.11 Noise

Future Conditions with No Action and with Alternatives 2 through 9
Implementation of a NAA or Alternatives 2-9 would result in short-term negative impacts from noise during the approximately one year construction period**.** The project area is currently an air quality attainment area and the project would not change this. Equipment used during construction will temporarily raise the noise level in the areas where dredging construction will occur. Construction equipment would be properly maintained to minimize these effects in compliance with local laws. Noise from vessel traffic will not change with the Implementation of a NAA or Alternatives 2-9.

4.12 Hazardous, Toxic, and Radioactive Waste (HTRW)

Future Conditions with No Action and with Alternatives 2 through 9
With implementation of the NAA or any of the action alternatives, HTRW will remain as they are. Regarding spills and cleanup sites, none of the alternatives will impact or increase the chances of any spills or releases of HTRW, nor will it increase the chances of any HTRW releases from local cleanup sites.

Changes Since Last Testing

No significant changes have been made in Brunswick Harbor since the last sediment evaluation that would impact channel sediments. No new berths or terminals have been added; however, a permit has been issued to GPA for construction of a new berth at the existing Colonel's Island Terminal. The majority of recent changes in the harbor have been minor to moderate improvements to existing docks, infrastructure and parking facilities.

Upon coordination with EPA, it was agreed that a new Tier I sediment analysis would be conducted during the PED phase of the project. The Tier I analysis will include a compilation and analysis of information pertaining to potential sources and/or changes in sources of contaminants which may have been introduced to the sediments proposed to be dredged just prior to construction.

The Golden Ray

On February 4, 2020, The Corps issued both a 408 (impacts to a Federal project) and CWA 404/10 (Nationwide Permit 22) permit to remove the wrecked M/V Golden Ray Vessel (Golden Ray) in St. Simon's Sound, near Brunswick, GA. This aligns with the Emergency Order from the State of Georgia from November 1, 2019 through December 31, 2021. The proposed work within the navigational channel will consist of barge movements into navigation channel however, they will be temporary in nature and coordinated with cooperating agencies so as not to disrupt vessel traffic coming into and leaving St. Simons Sound. The project is anticipated to be complete prior to project construction and no adverse impacts to the sediments in the project area is expected.

4.13 Climate Change

Climate change assessments are required for all phases of the project life cycle including feasibility and PED, for both existing and proposed projects. Because climate science is continuing to evolve, additional climate assessments may be performed during future project phases, which may include quantitative climate assessments on sea-level change (SLC) and/or updated hydrology.

The proposed channel modifications were measured in a 2D Adaptive Hydraulic modeling system (AdH) and no increase in water levels throughout the channel were observed. Therefore, it is assumed that the channel modifications will not change water levels from the existing water level and therefore, SLR will have the same effect on the NAA as compared to the other alternatives. Comparison of water levels between alternative depths to future without project conditions, using the low, intermediate and high sea level rates, showed no difference due to the project.

4.14 Cumulative Impacts

The CEQ regulations (40 CFR 150.7) requires an analysis of the cumulative impacts resulting from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these other actions. Cumulative effects are not caused by a single project but include the effects of a particular project in conjunction with other projects (past, present and future) on the particular resource. Cumulative effects are studied to enable the public, decision-makers and project proponents to consider the "big picture" effects of a given project on the community and the environment. In a broad sense, all impacts on affected resources are probably cumulative; however, the role of the analysis is to narrow the focus of the cumulative effects analysis to important issues of national, regional and local significance (CEQ, 1997). This section addresses the cumulative effects arising from the alternatives being evaluated as part of this study when combined with other ongoing or proposed actions within and near the Brunswick Harbor project area.

Brunswick Harbor is deep-draft navigation harbor that serves three distinct commercial facilities. To maintain viable commercial navigation at the Port of Brunswick, dredging

efforts, channel improvements and other navigation works completed by the GPA as well as by the Corps are common occurrences. It is expected that in the future, additional dredging projects will occur as well as routine O&M dredging. The previous dredging efforts have not had any long term adverse environmental impacts and future dredging efforts are expected to be very similar in nature. The future dredging for both new work and O&M efforts, in conjunction with the alternatives being evaluated as part of this study are not expected to have any adverse cumulative impacts within the study area.

In addition to new work and maintenance dredging within Brunswick Harbor, the GPA has constructed a new pile-supported RO/RO berth which not only consisted of impacting approximately twelve acres of waters of the U.S. as part of the construction effort but also involved dredging. The GPA worked with Corps Regulatory Division as well as State and Federal resource agencies to ensure the proper mitigation and monitoring plans were developed to minimize impacts to resources such as rare, threatened, and protected species, wetlands, EFH, air quality, water quality, etc. As a result, the construction and dredging efforts associated with future new berths, in conjunction with the alternatives being evaluated as part of this study are not expected to have any adverse cumulative impacts within the study area from a watershed and system perspective.

Within the Brunswick Harbor study area, there are also ongoing efforts associated with the carrier vessel, the MV Golden Ray. The vessel remains grounded on the southside of the sound between St. Simons Island and Jekyll Island. It is anticipated that all removal efforts would be accomplished on or before December 31, 2021. It is not expected that any of this removal effort will impact the Federal navigation channel and that the vessel would be removed before dredging and construction efforts associated with this study would be started. The cumulative impacts associated with the removal efforts would possibly have temporary minor adverse effects, however these would be considerably less than the NAA, and the long-term effects are expected to be beneficial. Protective measures in the form of air, species, and pollution monitoring activities will be implemented in a proactive manner to avoid, minimize or mitigate adverse effects resulting from the vessel removal. The adaptive management plan would be integral to adjusting mitigation measures on-site and in real-time for fish, turtles, and marine mammals. Specific mitigation and monitoring measures would be implemented to address entanglement or entrapment risks during project implementation and adaptively managed through to completion.

Future Conditions with No Action Alternative and Alternative 5

With implementation of the NAA, standard O&M dredging operations at Brunswick Harbor would continue with no modifications to the federal navigation channel and there would be no additional adverse cumulative impacts to aquatic resources, EFH, wetland habitat, water quality, air quality, and noise within the study area. Additionally, the Corps will continue to comply with the relevant Project Design Criteria in the 2020 SARBO to protect ESA listed species. Further with implementation of the NAA, there would be no adverse cumulative impacts to cultural resources or historic properties.

O&M dredging that would occur would be carried out within the navigation channel in previously disturbed areas and therefore impacts to cultural resources would remain low as well as the risk of encountering new HTRW material.

No other significant cumulative impacts associated with the No Action Alternative and other past, present, and foreseeable actions have been identified during this assessment.

Future Conditions with Alternatives 2, 3, 4, 6, 7, 8 (TSP) & 9

Alternatives 2, 3, 4, 6, 7, 8 (TSP), and 9 would all involve some type of modification to the existing Brunswick Harbor Federal navigational channel such as expansion of the existing bend wideners, expansion of the existing turning basin, and the creation of meeting areas. With implementation of these alternatives, including the TSP, there would minor and temporary impacts to air quality, water quality, noise, and aquatic resources within the immediate study area as a result of the dredging and construction efforts. It is expected that with implementation of appropriate time of year restrictions on when the construction would occur as well as the use of best management practices during construction, that the river system within the study area would recover very shortly after dredging and construction is completed.

Regardless of the alternative selected, the Corps will comply with the relevant Project Design Criteria in the 2020 SARBO to protect ESA listed species.

Additionally, it is anticipated that the cumulative impacts associated with EFH for the alternatives being evaluated are not adverse in nature. Within the study area, there are large areas of similar, shallow water habitat immediately adjacent to the proposed areas where dredging will occur. When considering the local species community as a whole, this change in EFH will not have adverse effects on that community and may be beneficial to some other aquatic resources in the study area long term. In addition, there is a wide variety of depths within the immediate project area so the conversion of such as small area from one type of EFH to another is not expected to have adverse cumulative impacts and there will be other areas within the turning basin that will remain undisturbed.

With implementation of alternatives 2, 3, 4, 6, 7, 8 (TSP), and 9, there is the potential to cause adverse effects to historic properties. Dredging in undisturbed deposits has the potential to cause direct adverse impacts to submerged cultural resources such as shipwreck remains and prehistoric archaeological sites. Surveys of the proposed areas will be conducted in accordance with the PA to be executed between the Corps and the GASHPO. National Register eligible resources would be avoided, if possible, or mitigated in accordance with the PA.

No other significant cumulative impacts associated with the alternatives 2, 3, 4, 6, 7, 8 (TSP), and 9, and other past, present, and foreseeable actions have been identified during this assessment. These alternatives were developed and evaluated using a systems and watershed context, and it is anticipated that implementation of these

alternatives, including the recommend plan, will not cause any long-term impacts to the Brunswick Harbor system/watershed. Coordination with the appropriate state and federal resource agencies will continue to ensure future actions do not result in direct or indirect impacts to natural resources in the vicinity of the project area where the channel modification to the Brunswick Harbor are planned to occur.

4.15 Environmental Justice

Executive Order (E.O.) 12898 directs federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. As none of the alternatives estimate any adverse human health or environmental effects, there would also be no adverse effects on minority or low-income populations. A breakdown of those potential populations is shown in Section 2.1.3.

5.0 Recommended Plan

5.1 Description of the Recommended Plan

This section identifies the selected plan and its features, and describes the rationale supporting the selection.

Alternative 8 is a combination of the bend widener, turning basin expansion, and meeting area at St. Simons Sound. Alternative 8 includes dredging 205,000 cubic yards of material at the bend widener, 346,000 cubic yards at the turning basin expansion, and 0 cubic yards at the meeting area at St. Simons Sound for a total of approximately 551,000 cubic yards of dredged material. Dredging will occur to a depth equal to the existing Federal channel (-36 feet MLLW + 2 feet allowable over-depth). The AAEQ benefit is $2,929,000, AAEQ cost is $713,000, and annual net benefit is $2,216,000. The benefit-to-cost ratio is 4.1. Alternative 8 is the NED Plan and the TSP. The non-Federal sponsor supports this plan and there is no Locally Preferred Plan.

5.2 Dredging and Dredged Material Management

Material will be removed using a hydraulic pipeline cutterhead dredge. This is a conventional dredging method that is routinely used for deep draft navigation projects throughout the county. The dredge works using a rotating cutter apparatus surrounding the intake of a suction pipe to cut and remove material. A detailed description of this type of dredge and its operation can be found in EM 1110-2-5025 (USACE, 2015). Dredged material will be either disposed of in an upland disposal area or in an alternate location for beneficial use. It is the Corps of Engineers policy to accomplish the disposal of dredged material associated with the construction or maintenance dredging of navigation projects in the least costly manner. Disposal is to be consistent with sound engineering practice and meet all Federal environmental standards including the environmental standards established in Section 404 of the Clean Water Act of 1972 or Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended. This constitutes the base disposal plan for the navigation purpose. The current Dredge Material Management Plan (DMMP) was developed during the previous harbor deepening in 1998 (USACE – SAS, May 1998).

5.2.1 Upland Disposal

Upland disposal will consist of material being pumped into Andrews Island, an existing disposal area typically used for placement of sediments removed during maintenance dredging of Brunswick Harbor. The area is completely diked and covers about 770 acres. There are five existing weirs in the disposal area. The main weir consists of three 48-inch weirs side-by-side which are connected to one 60-inch HDPE outfall pipe which discharges to East River. The other two 48-inch weirs are currently not in use for maintenance dredging but are available after ditching is performed to allow water to flow to them. In 2009, the Andrews Island dikes were raised to elevation +44 feet Mean Low Water (MLW) to restore capacities lost during the last deepening project. The dike improvement is expected to extend the remaining useful life of the site to about 50 years

with two future dike raisings planned. The most recent estimated capacity of Andrews Island is approximately 15,500,000 CY, which is enough to accommodate the proposed 551,000 CY of dredged material from the selected alternative.

5.2.2. Beneficial Use

Dredged material from this project has the potential for numerous beneficial uses. Coordination between the Corps and resource agencies is ongoing, and to date the following opportunities have been identified:

- GACRD proposed adding material to repair erosion along the northern and northeastern edge of the existing Bird Island in St. Simons Sound. It was estimated that this placement would include less than 25,000 CY of material, whereas the proposed bend widener located nearby would consist of approximately 205,000 CY of dredged material.

- USFWS proposed several options including placement nearshore or onshore at Jekyll Island, restoration of the existing Bird Island to as-built volumes, creation of up to four new shorebird nesting islands between St. Simons and St. Andrews Sounds, and possibly marsh thin layer placement. USFWS acknowledged that the proposed areas would require additional coordination with NMFS for EFH impacts, the Federal Aviation Administration (FAA) due to the position of the existing Bird Island along the flight line approach to St. Simons Island airport, and GADNR at a minimum.

For a beneficial use opportunity to be feasible in the context of this study, it must be a part of the “base plan”, also known as the Federal Standard. The base plan for navigation purpose consists of disposal of dredged material using the least costly manner consistent with sound engineering practice and meeting all Federal environmental requirements. If the base plan (least cost disposal alternative) includes disposal of material in a manner benefiting the environment the costs for this disposal are included in total costs of the general navigation features and funded accordingly. Where the disposal of material in a manner that benefiting the environment is not part of the base plan for the navigation purpose, the base plan shall serve as a reference point for determining the incremental costs of the ecosystem restoration features that are attributable to the environmental purpose.

The Corps continues to evaluate the feasibility of beneficial use proposals in coordination with the recommending agency. Geotechnical borings will be collected as part of the feasibility-level engineering design and the physical and chemical characteristics of sediments will be used to estimate the volume of material suitable for beneficial use. In addition, Rough Order of Magnitude (ROM) costs are being determined for potential beneficial use options and will be incorporated into the base plan where applicable. Beneficial use options that exceed the base plan would need to be authorized under an authority separate from this study’s authority. Section 204 of the Water Resources Development Act of 1992, as amended is an authority under which

the Corps can implement beneficial use with participation of a willing non-Federal sponsor. Under section 204, the Corps typically funds the study and the design, while the non-Federal sponsor contributes 35 percent of the construction costs that exceed the base plan.

5.3 Real Estate Considerations

The GPA is the NFS for this feasibility study. All lands needed for construction of the Brunswick Harbor Modifications Study project are NFS owned. The project study consists of widening the channels in Brunswick Harbor to help reduce the difficulty in maneuvering and turning of larger shipping vessels. Excavation to widen the channels will be below mean high water. Excavated and dredged material will be disposed of on Bird Island and/or Andrews Island. Bird Island is owned by the State of Georgia as developed by the Corps of Engineers in 2007 with beneficial use of dredged material from Brunswick Harbor. Andrews Island is owned by the Georgia Department of Transportation (GADOT). Andrews Island has been and is currently used as a disposal area to support construction, operation, and maintenance of the Brunswick Post Navigational channels, turning basins, and other related transportation facilities. The NFS will need to acquire inter-agency agreements with the GADNR for beneficial use and the GADOT for disposal of dredged material from the harbor project. The GPA as the NFS will provide a staging area at the port facility during construction. There are no utility/facility relocations associated with this project. No further real estate is required for the project.

Should it later be determined that an additional real estate interest is required for the project, the NFS is responsible for providing the lands, easements, and rights-of-way (LER) required to implement the project. See Real Estate Appendix D.

5.4 Fish and Wildlife Coordination Act Considerations

The Corps initiated consultation with the USFWS during a kick-off Planning Charrette held for the state and federal resource agencies on May 17, 2019. Following multiple discussions with USFWS staff on the scope and preliminary selection of alternatives, a draft Fish and Wildlife Service Coordination Act evaluation for the project (Appendix F) was submitted to the Corps on February 18, 2020.

USFWS Recommendations

The draft report summarily stated that they had no opposition to any of the proposed alternatives as presented and did not expect significant impacts to fish and wildlife resources under their jurisdiction during project implementation. However, they did enumerate several potential opportunities for the project to mitigate or minimize the effects of storm surge and predicted sea level rise through beneficial use of dredged sediments for Bird Island creation and/or marsh restoration. Some of these included:

- Restore the existing Bird Island in St. Simons Sound;
- Restore the Satilla River Marsh Island Natural Area in the mouth of the Satilla River in St. Andrews Sound; and

- Create new bird islands in shallow protected areas in St. Simons, Jekyll, and/or St. Andrews Sounds (see Figure 31 below).

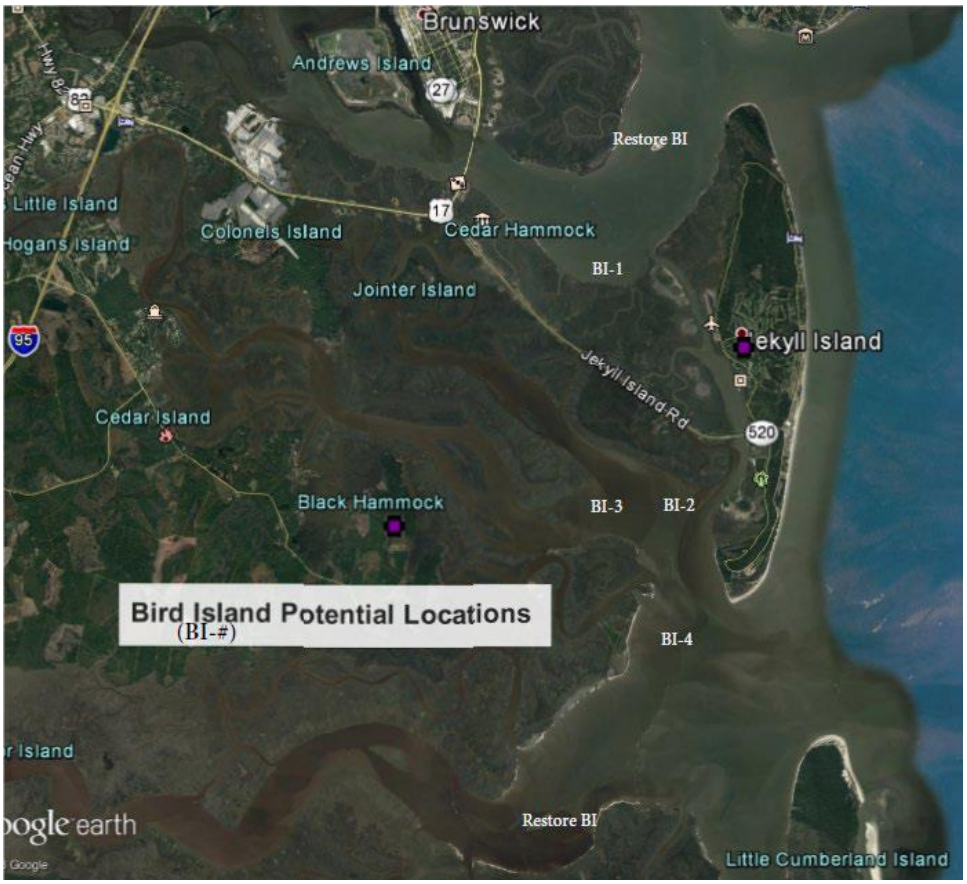


Figure 31. Agency Proposed Locations for Beneficial Use of Dredged Sediments

They also recommended placement of dredged sediment offshore that could serve as a source for sand migration onto nearby Jekyll beach, and temporary intertidal and/or supratidal berms to provide foraging/loafing and nesting habitat for shore and seabirds.

Finally, the USFWS suggested that the Corps reconsider how we determine the feasibility of beneficial use opportunities for projects. Rather than determining best disposal methods based on the least costly alternative, consistent with sound engineering practices while meeting all federal environmental requirements, they recommend the Corps also consider the societal value of a created feature (e.g., bird habitat, marsh restoration) and costs savings that a feature may produce in future channel maintenance or restorative projects (e.g., fewer beach renourishments needed as a result of naturally occurring onshore sand migration from constructed nearshore feeder berms).

Corps Response

We acknowledge that several stakeholders, including GADNR and USFWS have identified potential areas for beneficial use of dredged material. Coordination with these

potential non-Federal sponsors for beneficial use is ongoing. ROM costs are being determined for potential beneficial use options and will be incorporated into the base plan where applicable. These considerations may be carried into the PED phase of the project.

However, it should be noted that the base plan, or Federal Standard, consists of the disposal or placement costs that are assigned to the navigational purpose of the project. Costs for the base plan are shared with the NFS as outlined in the Feasibility Cost Share Agreement (FCSA). Beneficial use options that exceed the base plan would need to be authorized under a separate authority. For example, Section 204 of the Water Resources Development Act of 1992, as amended, is an authority under which the Corps can implement beneficial use with participation of a willing NFS. Under Section 204, the Corps typically funds the study and the design, while the NFS contributes 35 percent of the construction costs that exceed the base plan.

5.5 Summary of Environmental Consequences and Cumulative Effects of the Recommended Plan

With implementation of Alternative 8, there would be no significant environmental impacts to water quality, existing wetlands, threatened and endangered species, EFH, terrestrial resources and habitat, aquatic resources and habitat and other protected resources within the study area. In order to minimize adverse impacts, the Corps will follow BMPs in its design and operations. In addition, the proposed dredging activity will be accomplished through hydraulic cutterhead style dredging. The environmental consequences of conducting dredge activities through hydraulic cutterhead dredging are discussed below.

Brunswick Harbor Entrance Channel sediments were tested for suitability for ocean disposal in 2016. The testing results reviewed for this evaluation are contained in the August 2016 *MPRSA Section 103 Sediment Evaluation for Brunswick Harbor Navigation Project, Brunswick, GA*., *ANAMAR Environmental Consulting, Inc*. This work was performed in accordance with the EPA / U.S. Army Corps of Engineers (USACE) joint publication, *Evaluation of Dredged Material Proposed for Ocean Disposal* - (Testing Manual), dated February 1991, referred to as the 1991 “Green Book” and the *Southeast Regional Implementation Manual* (SERIM), dated August 2008. Sediment Chemistry for Metals, TOC, Total Solids, Ammonia, Organotins, Pesticides, PAHs and PCBs are varied.

Although sediment testing indicated varied results both above and below Federal limits per the Clean Water Act, the results appeared to be localized and although present within Brunswick Harbor, it is not likely to impact the proposed dredge locations. The project locations are nearby, not adjacent to the areas in question.

Through the recommended plan (Alternative 8), the use of cutterhead dredging on aquatic resources are expected to be limited to short term impacts. The cutterhead dredge minimizes turbidity by piping away the sediments without having to bring them

up through the water column in a bucket or transport them to an offshore location. The impacted areas would be available for recolonization and use by benthic organisms once the dredging event ceases, so no irreversible loss of resources would occur. The loss of habitat would also be short term and through primary succession, followed by secondary succession, the populations that ultimately reestablish should be similar to those eliminated, since the species are substrate dependent and the sediments that create shoals in the channel and adjacent areas now will continue to do so after the proposed dredging. The proposed dredging will not limit the density and diversity of the benthic community that becomes reestablished any more so than existing maintenance activities. However, benthic populations in the navigation channel are in a state of flux due to the continual sedimentation and shoaling that creates the need for maintenance dredging (SHEP-EIS 2012). Cumulative effects on Phytoplankton and zooplankton species living in the water column should not be affected any more so than the existing maintenance activities.

Environmental impacts to cultural resources will be assessed during the PED phase. As project designs are refined and optimized, impacts to cultural resources caused by dredging and other ground disturbing activities will continue to be minimized and avoided in some cases. Because the Corps cannot fully determine how the project may affect historic properties prior to finalization of this feasibility study, a PA will be used to ensure compliance with Section 106 of the NHPA. The PA will streamline Section 106 reviews by including a detailed process for identification, evaluation and mitigation of historic properties. Therefore, pursuant to 54 U.S.C. 306108, 36 CFR 800.4(b)(2), and 36 CFR 800.14(b)(1)(ii), the Corps is deferring final identification and evaluation of historic properties until after project approval, additional funding becomes available, and prior to construction by executing a PA. A draft of the PA is included as an appendix to this report and has been sent for review to the Georgia SHPO. Execution of the PA would ensure that impacts to cultural resources are less than significant.

5.6 Project Implementation

The approved feasibility report is scheduled to be transmitted to Headquarters USACE by August 2021, and a Chief of Engineer's Report is scheduled to be signed by March 2022. Following approval of the feasibility report, a Design Agreement will be executed with the non-Federal sponsor for the PED phase, at which point funds must be appropriated by Congress to complete the project design. Project construction would require Congressional authorization and appropriation of funds.

The total cost of the feasibility study is shared (50/50) with the non-Federal sponsor pursuant to the terms of the FCSA executed by the District Commander and the Georgia Ports Authority on April 11, 2019. The cost share for the PED phase and the construction phase will be included in the Design Agreement and Project Partnership Agreement, respectively. Estimated cost shares based on model agreements are included in Table 21 below. The AAEQ cost for OMRR&R is $150,000, which is a 100% Federal cost.

Table 21. Cost Sharing Summary

Federal/Non-Federal Cost Apportionment – NED Plan October 2019 Price Levels			
	Total Cost	**Fed Share**	**Non-Fed Share**
[1]Feasibility Phase *[50% Fed / 50% Non-Fed]*			
[1]Feasibility Study	**$3,000,000**	**$1,500,000**	**$1,500,000**
[2]General Navigation Features (GNF) *[75% Fed / 25% Non-Fed]*			
Dredging and Disposal	$11,327,000	$8,495,250	$2,831,750
Preconstruction, Engineering, & Design	$2,940,000	$2,205,000	$735,000
Construction Management	$1,106,000	$829,500	$276,500
Subtotal – Project First Costs (rounded)	**$15,400,000**	**$11,550,000**	**$3,850,000**
[3]Additional 10% of (NED) GNF	$0	-$1,540,000	$1,540,000
LERRs	$16,000	$0	$16,000
Subtotal – Additional 10% with credited LERRs	**$16,000**	**-$1,540,000**	**$1,524,000**
USCG Aids to Navigation [100% Fed]	[4]TBD	TBD	$0
Project Costs (rounded)	**$18,400,000**	**$11,500,000**	**$6,900,000**

[1]Cost share from FCSA executed on 11 April 2019.

[2]Cost share estimated based on model Design Agreement and Project Partnership Agreement. Project-specific Design Agreement will be developed following completion of the Final Feasibility Report. Project-specific Project Partnership Agreement will be developed during the PED phase.

[3]Non-Federal sponsors amount

[4]Coordination with the USCG is ongoing. Costs for Aids to Navigation will be added when available.

5.7 Risk and Uncertainty

Several risks and mitigation approaches to those risks were identified during evaluation of the alternatives. Many of those risks apply equally to all action alternatives and; therefore, while useful to consider, were not used for distinguishing between alternatives. For example, future tonnage forecast is uncertain and based on the U.S. economy. This risk applies equally to all alternatives and was mitigated by utilizing best available information when making economic forecasts and by performing a sensitivity analysis for low and high commodity growth scenarios. Another risk is that a cultural resources survey will be conducted during the PED phase of the project; therefore, actual impacts to historic properties and cultural resources would not be identified until PED and could potentially add time to the schedule if specific mitigation or design readjustment are required to minimize impacts. This risk would be mitigated by frequent coordination with the GASHPO and development of a PA to comply with Section 106 of the NHPA. Similarly, the exact character of materials in the proposed dredging areas is not currently known. Although the likelihood is low that there is material that cannot be dredged with a hydraulic cutterhead, the consequence is that costs would be higher than the current estimate. All material dredged during the previous Brunswick Harbor

Deepening was capable of being removed with a hydraulic cutterhead and no blasting was required. Additionally, this risk does not apply to the meeting area at St. Simons Sound, where no dredging is expected. This risk would be mitigated by collecting geotechnical borings at the proposed bend widener and turning basin expansion locations prior to release of the final report.

Another identified risk is that shoaling may increase as a result of project implementation. This risk was mitigated using a combination of historical O&M dredging data as well as by estimating shoaling rates based on conditional surveys. Future O&M quantities were estimated for each project feature using Brunswick Harbor O&M dredging records provided by the Corps' Operations Division. Dredging records from 2014 to 2020 were evaluated. For the bend widener analysis, a January 2018 survey was compared to the January 2020 survey using Autodesk Civil 3D software. No dredging had occurred in the Brunswick Point Cut Range and Cedar Hammock Range between the two surveys. From this analysis, shoaling rates were determined to be approximately 2,000 CY/year in the location of the bend widener. For the turning basin analysis, O&M dredging records were available and evaluated from 2015 to 2019 for the South Brunswick River near the existing turning basin. Dredging records show approximately 16,000 CY of material was dredged in FY15, 58,000 CY of material was dredged in FY16, and no material was dredged in FY17, FY18, or FY19 near the existing turning basin. The average shoaling rate for this five-year period is approximately 14,900 CY and will be assumed as the future annual shoaling rate for the turning basin until further hydrodynamic analysis is completed during the PED Phase.

For the Sidney Lanier Bridge Meeting Area, there has been no O&M dredging in the Turtle River Lower Range. Velocities are relatively high (>2.5 knots) in this location and shoaling is not expected to occur in the future. For the St. Simons Sound Meeting Area, there has been no O&M dredging in the Plantation Creek Range, which is the location for the St. Simons Sound Meeting Area. Velocities are also relatively high (>2.5 knots) in this location, depths range from 40–60 feet MLLW, and shoaling is not expected to occur in the future. These data were incorporated into the cost estimate for each alternative.

6.0 Environmental Compliance*

Compliance with the following environmental laws, and implementing regulations, and Executive Orders (Table 22) is required for all alternative channel deepening plans under consideration (Note: this is not necessarily an exhaustive list of all applicable environmental requirements).

Table 22. Relationship of the Proposed Action to Applicable Federal Laws and Policies

Public Laws		
Title of Public Law	**U.S. Code**	**Compliance Status***
Abandoned Shipwreck Act of 1987	43 U.S.C. §§2101-2106	Full Compliance
Anadromous Fish Conservation Act of 1965, as amended	16 U.S.C. §757a *et. seq.*	Full Compliance
Archaeological and Historic Preservation Act, as amended	P.L. 93-29	Partial Compliance
Archeological Resources Protection Act	P.L. 96-95	Full Compliance
Bald Eagle Act of 1972	16 U.S.C. §§668-668d	Full Compliance
Clean Air Act of 1972, as amended	42 U.S.C. Chapter 85	Full Compliance
Clean Water Act of 1971, as amended	33 U.S.C. §1251 *et. seq.*	Partial Compliance
Coastal Barrier Resources Act of 1982	16 U.S.C. §3501-3510	Full Compliance
Coastal Zone Management Act of 1972, as amended	16 U.S.C. §1451 *et seq.*	Partial Compliance
Deepwater Port Act of 1974, as amended	33 U.S.C. §1501 *et. seq.*	Full Compliance
Endangered Species Act of 1973	16 U.S.C. §1531 *et. seq.*	Partial Compliance
Estuary Program Act of 1968	16 U.S.C. §1221 *et. seq.*	Full Compliance
Federal Insecticide, Fungicide, and Rodenticide Act	7 U.S.C. §136 *et. seq.*	Full Compliance
Fish and Wildlife Coordination Act of 1958, as amended	16 U.S.C. §§661-665; 665a; 666; 666a-666c	Partial Compliance
Flood Control Act of 1944, as amended, Section 4	P.L. 78–534	Full Compliance
Magnuson-Stevens Fishery Conservation and Management Act	16 U.S.C. §1801 *et. seq.*	Full Compliance
Marine Mammal Protection Act of 1972, as amended	16 U.S.C. §1361 *et. seq.*	Full Compliance

Marine Protection, Research and Sanctuaries Act of 1972	33 U.S.C. §1401 *et. seq.*	Full Compliance
Migratory Bird Conservation Act of 1928, as Amended	16 U.S.C. §715	Full Compliance
Migratory Bird Treaty Act of 1918, as amended	16 U.S.C. §§703-712	Full Compliance
National Environmental Policy Act of 1969, as amended	42 U.S.C. §4321 *et. seq.*	Partial Compliance
National Historic Preservation Act of 1966, as amended	54 U.S.C. §300101 *et. seq.*	Partial Compliance
Native American Graves and Repatriation Act (NAGPRA)	25 U.S.C. §§3001 *et seq.*	Full Compliance
Noise Control Act of 1972, as amended	42 U.S.C. §4901 *et. seq.*	Full Compliance
River and Harbor Act of 1888, Sect 11 (as codified)	33 U.S.C. §608	Full Compliance
River and Harbor Act of 1899, Sections 9, 10, 13	33 U.S.C. §§401, 403, and 407	Full Compliance
River and Harbor and Flood Control Act of 1962, Section 207	PL 87-874	Full Compliance
River and Harbor and Flood Control Act of 1970, Sections 122, 209, and 216	PL 91-611; *see generally* 33 U.S.C. §701 *et. seq.*	Full Compliance
Safe Drinking Water Act	42 U.S.C. §§300f-300j	Full Compliance
Merchant Marine Act	46 U.S.C. §861 *et. seq.*	Full Compliance
Submerged Lands Act of 1953	43 U.S.C. §1301 *et. seq.*	Full Compliance
Executive Orders		
Title of Executive Order	**Executive Order Number**	**Compliance Status***
Protection and Enhancement of Environmental Quality	11514/11991	Full Compliance
Protection and Enhancement of the Cultural Environment	11593	Partial Compliance
Floodplain Management	11988	Full Compliance
Protection of Wetlands	11990	Full Compliance
Federal Compliance with Pollution Control Standards	12088	Full Compliance
Offshore Oil Spill Pollution	12123	Full Compliance

Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances	12843	NA
Federal Compliance with Right-To-Know Laws and Pollution Prevention	12856	Full Compliance
Federal Actions to Address Environmental Justice and Minority and Low-Income Populations	12898	Full Compliance
Federal Acquisition and Community Right-To-Know	12969	Full Compliance
Indian Sacred Sites	13007	Full Compliance
Protection of Children from Environmental Health Risks and Safety Risks	13045	NA
Invasive Species	13112	Full Compliance
Consultation and Coordination with Indian Tribal Governments	13175	Full Compliance
Responsibilities of Federal Agencies to Protect Migratory Birds	13186	Full Compliance
Executive Order Facilitation of Cooperative Conservation	13352	Full Compliance
*Compliance Status: *Full Compliance*: Having met all requirements of the statute, E.O., or other environmental requirements. *Partial Compliance*: Not having met some of the requirements at current stage of planning. Compliance with these requirements is ongoing. *Non-Compliance*: Violation of a requirement of the statute, E.O., or other environmental requirement. *Not Applicable*: No requirements for the statute, E.O, or other environmental requirement for the current stage of planning.		

Environmental compliance for the proposed action would be achieved upon completion of the following:

- Receipt of a Clean Water Act Section 401 Water Quality Certification from GADEPD;
- GACRD consistency review and concurrence that the proposed project is consistent with the Georgia Coastal Zone Management Program;
- NMFS confirmation that the proposed action in covered under the 2020 SARBO;
- A signed PA with GASHPO to comply with NHPA Section 106;
- Receipt and acceptance or resolution of all USFWS FWCA evaluation recommendations; and

- Coordination of this EA and draft Finding of No Significant Impact (FONSI) with appropriate agencies, organizations, and individuals for their review and comments.

The draft FONSI will not be finalized and signed until the proposed action achieves environmental compliance with applicable laws and regulations, as described above.

7.0 Public Involvement and Review*

7.1 Public Involvement Process

A draft of the IFR/EA will be released to the public for a 30-day review and comment period. The release is scheduled for June 9, 2020.

7.2 Agencies Consulted

A kick-off Planning Charrette for the study was held on 16-17 May 2019. Representatives from GADNR, EPA, USFWS, NMFS, GPA, GDOT, and the U.S. Coast Guard attended, either in person or via phone. Discussions were held on environmental topics such as beneficial use, environmental compliance issues, and preferred dredging methods. Subsequently, EPA, NMFS, USFWS, and GADNR were formally invited (emails dated May 23, 2019) to participate as cooperating agencies. GADNR and EPA officially accepted.

Under authority of the FWCA, the USFWS was requested to provide support in evaluating project goals, objectives, and management actions in the form of a Planning Aid Letter (PAL) or Planning Aid Report (PAR). A statement of work was provided, and a draft report was provided on February 18, 2020. The final report was received May 20, 2020.

Discussions with NMFS relating to compliance with Section 7 of the Endangered Species Act (ESA) were initiated in October 2019. Due to the routine and predicted effects (May Affect Not Likely to Adversely Affect - NLAA) anticipated from the location and prescribed construction of the project, an informal, expedited consultation was recommended. However, in the interim, the 2020 SARBO was published and ongoing consultation is taking place for affected species.

There has been ongoing coordination with EPA on the suitability for use or disposal of the sediments proposed for removal during project construction. EPA requested a summary of previous relevant sediment testing. That summary was provided on November 13, 2019. In an email dated January 27, 2020, EPA requested a Tier I sediment analysis be conducted to address potential sources of contaminants that may have occurred since the previous testing. Savannah District agreed to the request and responded that the evaluation will be conducted during PED. EPA concurred with that approach, email dated February 7, 2020.

The Corps initiated Section 106 of the NHPA coordination with the GA SHPO and 11 Tribal Historic Preservation Officers (THPOs) on November 4, 2019. In the correspondence to the SHPO and THPOs the Corps provided information regarding previous surveys, recorded cultural resources in the APE, nearby recorded cultural resources and the types of impacts this undertaking would potentially have on cultural resources and historic properties. The Corps recommended execution of a programmatic agreement as a way to fulfill its Section 106 compliance requirements.

The PA would allow for the completion of remote sensing surveys after the selected plan has been refined and optimized in the PED phase of the project. The PA will include a strategy for completing remote sensing surveys of areas that are part of the selected plan, as well as strategies for avoidance, minimization and mitigation of historic properties. The GA SHPO concurred with this approach and consultation is ongoing. None of the tribes expressed interest in being a consulting party for this undertaking or request concurring party status to the PA. The Catawba Indian Nation requested notification in the event of an inadvertent discovery. The Corps notified the Advisory Council on Historic Preservation (ACHP) of its intent to prepare a PA on January 29, 2020. The ACHP declined to participate in consultation as the criteria for participation had not been met. Appendix G contains correspondence with the agencies and THPOs.

8.0 Recommendations

The non-Federal sponsor, the Georgia Ports Authority, requested that the Corps study modifications to the Brunswick Harbor Federal channel at locations where the largest Roll-On/Roll-Off vessels have historically experienced navigation restrictions and maneuverability issues due to the channel width. The purpose of the study is to investigate harbor modifications to reduce transportation cost inefficiencies at Brunswick Harbor.

To achieve the project objectives, I recommend implementation of Alternative 8 for modifications to the Brunswick Harbor Federal channel. Alternative 8 would consist of the expansion of a turning basin near Colonel's Island Terminal, the addition of a bend widener at Buoy 24 near the Cedar Hammock Range, and the addition of a vessel meeting area at St. Simons Sound. Alternative 8 includes dredging of the turning basin expansion and the bend widener to a depth equal to the existing Federal channel (-36 feet MLLW plus 2 feet allowable over-depth) with an estimated dredged volume of 551,000 cubic yards. Material would be disposed at Andrews Island DMCA or a suitable beneficial use placement site to be determined. The meeting area at St. Simons Sound would take advantage of naturally deep water and would not require dredging.

Alternative 8 is the National Economic Development Plan. The average annual equivalent cost is $713,000 while the average annual equivalent benefit is $2,929,000. The recommended plan has $2,216,000 in net benefits and a benefit-to-cost ratio of 4.1.

The non-Federal sponsor supports this plan and there is no Locally Preferred Plan. It is anticipated that Georgia Ports Authority will be the non-Federal sponsor for the Preconstruction, Engineering, and Design phase, and for the Construction phase.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for project modification and/or implementation funding.

_____ _____

Date

Daniel H. Hibner, PMP
Colonel, U.S. Army
Commanding

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Brunswick Harbor Modifications Study, Glynn County, GA
Draft Integrated Feasibility Report and Environmental Assessment

The U.S. Army Corps of Engineers, Savannah District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The draft Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated June 9, 2020, for the Brunswick Harbor Modification Study, addresses opportunities and feasibility to reduce transportation cost inefficiencies in Brunswick Harbor, a deep draft navigation project, in Glynn County, Georgia. The final recommendation is contained in the report of the Chief of Engineers, dated XXXXXX.

The IFR/EA, incorporated herein by reference, includes a variety of alternatives that were evaluated to examine harbor modifications to reduce transportation cost inefficiencies experienced by the largest ship type utilizing Brunswick Harbor. The draft recommended plan is the National Economic Development (NED) Plan and includes:

- The draft recommended plan, Alternative 8, is a combination of the bend widener, turning basin expansion, and meeting area at St. Simon's Sound and includes dredging 205,000 cubic yards of material at the bend widener and 346,000 cubic yards at the turning basin expansion. The dredged material would be placed in the Andrews Island Dredged Material Management Facility.

In addition to the "no action" plan, which would mean continuing standard operations at Brunswick Harbor with no improvements to the Federal navigation channel, eight alternatives were evaluated. The final array of alternatives, described and compared in Section 3.7 of the report, included Alternative 2, which would expand the Cedar Hammock Range bend widener located between stations 20+300 to 23+300. Alternative 3 would include expanding the existing turning basin at the Colonel's Island Terminal along approximately 4,100 feet increasing the width by a maximum of 395 feet along South Brunswick River from stations 0+900 to 5+300. Alternative 4 would create a RO/RO vessel meeting area upstream of the Sidney Lanier Bridge to the turning basin at the Colonel's Island Terminal (a distance of approximately 8,700 feet). Alternative 5 would create a RO/RO vessel meeting area located at St. Simon's Sound near the entrance channel to Brunswick Harbor. Alternative 6 is a combination of the bend widener (Alternative 2) and the turning basin expansion (Alternative 3). Alternative 7 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area west of the Sidney Lanier Bridge (Alternative 4). Alternative 8 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area at St. Simons Sound (Alternative 5). Alternative 9 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), meeting area west of the Sidney Lanier Bridge (Alternative 4), and meeting area at St. Simons Sound (Alternative 5).

SUMMARY OF POTENTIAL EFFECTS:

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Draft Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☐	☒	☐
Other cultural resources	☒	☐	☐
Floodplains	☒	☐	☐
Hazardous, toxic & radioactive waste	☒	☐	☒
Hydrology	☒	☐	☐
Land use	☐	☐	☒
Navigation	☒	☐	☐
Noise levels	☒	☐	☐
Public infrastructure	☐	☐	☒
Socio-economics	☐	☐	☒
Environmental justice	☐	☐	☒
Soils	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☒	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. BMPs as detailed throughout the draft IFR/EA will be implemented, if appropriate, to minimize impacts. In addition, the Corps will adhere to the Project Design Criteria for the 2020 Nation Marine Fisheries Service South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO). In the event of an encounter from a protected marine mammal species, contractors will observe best management practices and will remain informed of the civil and criminal penalties for

harming, harassing, or killing species, which are protected under the Endangered Species Act of 1973 (ESA) and/or the Marine Mammal Protection Act of 1972.

COMPENSATORY MITIGATION:

No compensatory mitigation is required as part of the recommended plan.

Any potential mitigation associated with impacts to cultural resources will be mitigated as a part of the Programmatic Agreement (PA) to ensure compliance with Section 106 of the National Historic Preservation Act of 1996, as amended (NHPA). The PA will allow any mitigation to be completed if historic properties cannot be avoided.

Public review of the draft IFR/EA and FONSI is ongoing and all comments submitted during the public review period will be responded to in the Final IFR/EA and FONSI.

OTHER ENVIRONMENTAL AND CULTURAL COMPLIANCE REQUIREMENTS:

Pursuant to section 7 of the ESA of 1973, as amended, the Corps is consulting with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service on our effects determinations for the following species: manatee (*Trichechus manatus*), North Atlantic right whale (*Eubalaena glacialis*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (Chelonia mydas), Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (Eretmochelys imbricate), shortnose sturgeon (*Acipenser brevirostrum*), and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). There is no designated critical habitat in the project location.

Pursuant to the Fish and Wildlife Coordination (FWCA) Act of 1934, on February 18, 2020, the USFWS provided the Corps with a draft FWCA Evaluation Report. The final evaluation was provided on May 20, 2020, which has been incorporated into the draft IFR/EA. The Corps will concur with, and/or resolve all USFWS Coordination Act Evaluation recommendations and it is expected that with implementation of the recommended plan, there would be no impacts to non-listed species within the project area. The final FWCA Evaluation can be found in Appendix F.

Pursuant to Section 106 of the NHPA, environmental impacts to cultural resources will be assessed during the Preconstruction, Engineering, and Design (PED) phase. As project designs are refined and optimized, impacts to cultural resources caused by dredging and other ground disturbing activities will continue to be minimized and avoided in some cases. Because the Corps cannot fully determine how the project may affect historic properties prior to finalization of this draft IFR/EA, a Programmatic Agreement (PA) will be used to ensure compliance with Section 106 of the NHPA of 1966. The PA will allow the Corps to complete the necessary archaeological surveys during the PED phase of the project, and it will also allow any mitigation to be completed if historic properties cannot be avoided. The PA will streamline Section 106 reviews by including a detailed process for identification, evaluation and mitigation of historic properties. Therefore, pursuant to 54 U.S.C. 306108, 36 CFR 800.4(b)(2), and

36 CFR 800.14(b)(1)(ii), the Corps is deferring final identification and evaluation of historic properties until after project approval, additional funding becomes available, and prior to construction by executing a PA. A draft of the PA is included as an appendix to this report and has been sent for review to the Georgia State Historic Preservation Office. The draft Section 106 evaluation for the draft IFR/EA can be found in the Cultural Resources Appendix, Appendix G.

No discharge of dredge or fill material under Section 404 of the Clean Water Act is being proposed in waters of the U.S. as part of the recommended plan. Therefore, a Section 404(b)(1) evaluation is not required at this time.

The Corps will comply with the existing 401 Water Quality Certification in place for the Andrews Island Dredge Material Containment Area where effluent from the dredge events be discharged into the Turtle River.
A determination of consistency with the State of Georgia Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 will be obtained from Georgia Department of Natural Resources, Coastal Resources Division prior to construction. The Corps determination of consistency with the State of Georgia's Coastal Zone Management program, can be found in Appendix F of the draft IFR/EA. The determination states that the recommended plan appears to be consistent with state Coastal Zone Management plans, pending confirmation based on information to be developed during the pre-construction engineering and design phase. All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. This information can be found in Section 6.0 as well as 7.0 of the draft IFR/EA.

Technical, environmental, economic, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

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Date

Daniel H. Hibner, PMP
Colonel, U.S. Army
Commanding