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Section 107 Navigation Improvement Project  
Detailed Project Report and  
Environmental Assessment

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**DRAFT**

# Great Chebeague Island

## Chebeague Island, Maine



US ARMY CORPS  
OF ENGINEERS  
New England District



Town of  
Chebeague Island

**January 2021**

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**GREAT CHEBEAGUE ISLAND  
CHEBEAGUE ISLAND  
CUMBERLAND COUNTY, MAINE**

**NAVIGATION IMPROVEMENT PROJECT**

**DETAILED PROJECT REPORT  
AND  
ENVIRONMENTAL ASSESSMENT**



**JANUARY 2021**

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## EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Town of Chebeague Island, Maine (Town), undertook this feasibility study to evaluate the existing navigation conditions at the public landing for Great Chebeague Island at the Stone Wharf. The study was conducted to determine the feasibility of Federal involvement to adopt and implement a Federal Navigation Project (FNP) for the benefit of public ferry and cargo barge services and commercial fishing vessels. This study was conducted under the authority and guidance of Section 107 of the 1960 River and Harbor Act, as amended, which provides for improvements to navigation. The study concludes that adoption of a FNP consisting of a deepened channel to the town landing with a turning basin to access the barge ramp would improve navigational efficiency and increase safety for the island's public ferry service, commercial barge services and the commercial fishing fleet.

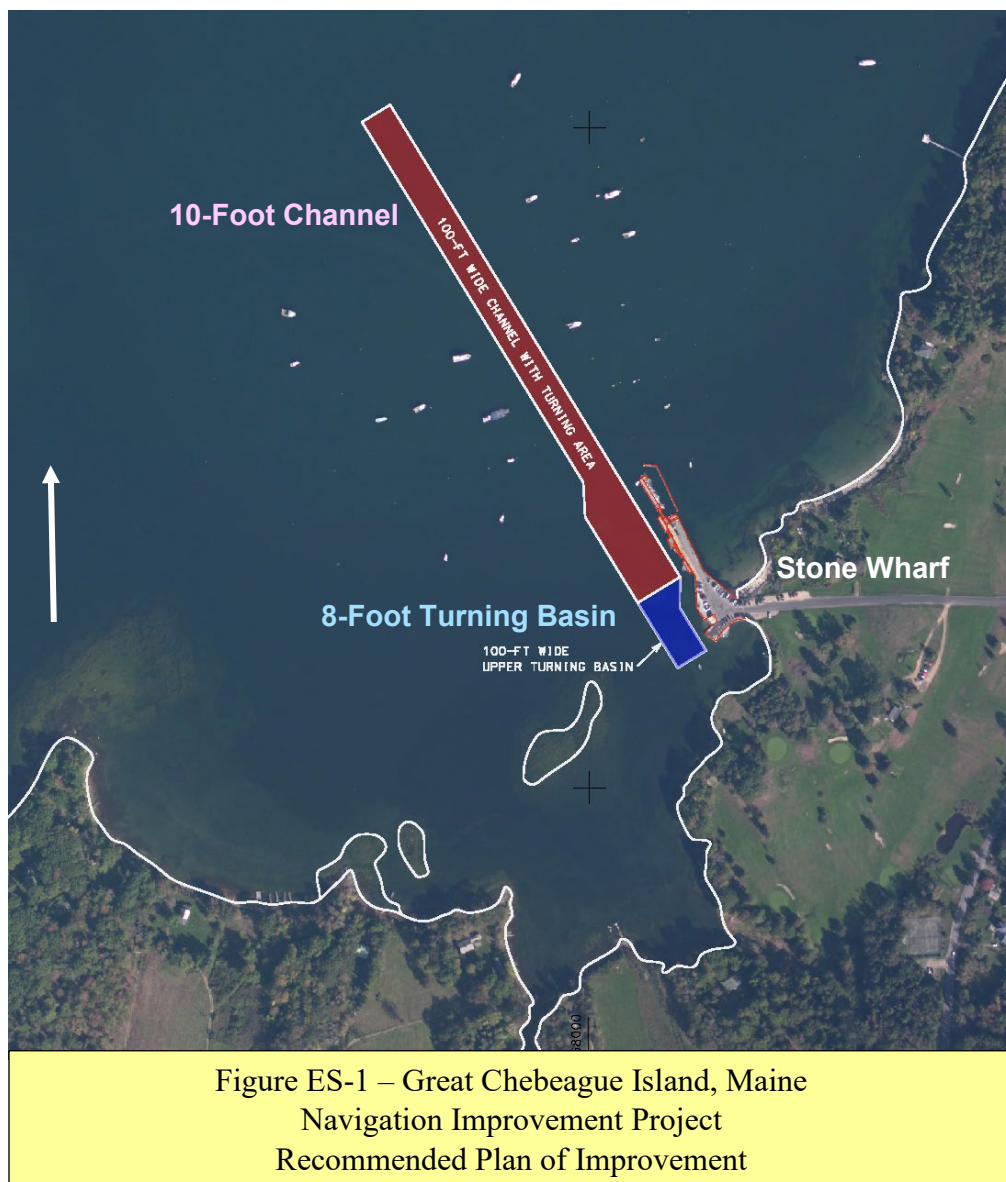
There is no existing Federal Navigation Project for Great Chebeague Island. A prior study in 1973 recommended adoption of a project consisting of a channel to the town landing with two adjoining anchorage areas. At that time the islands comprising today's Town of Chebeague Island were a part of the Town of Cumberland, and the larger town declined to participate financially in the recommended project. The Town of Chebeague Island separated from Cumberland and was incorporated as Maine's newest municipality in 2007. By letter dated October 9, 2009, the Town of Chebeague Island requested that the USACE revisit the feasibility and Federal interest in the improvements proposed in 1973 for improving the navigation conditions at Stone Wharf landing. An initial appraisal and Federal Interest Determination (FID) was completed April 30, 2014 and recommended proceeding with this cost-shared feasibility study. After reviewing the 2015 FID the Town requested that the scope of the feasibility study be reduced to only the assessment of navigational channel improvements and to drop the consideration of anchorage areas. A Feasibility Cost-Sharing Agreement was executed between the Town of Chebeague Island and the USACE on July 1, 2016.

The principal navigation issue at Great Chebeague Island is the existing channel to the Stone Wharf does not accommodate safe and efficient vessel movement into or from the landing. This wharf is the Island's primary location for year-round ferry and cargo barge service, emergency rescue operations, and commercial fishing. The ferry operation carries school children, commuters, residents, and services to and from the mainland. Controlling depth in the channel is currently less than 5 feet at MLLW, which is inadequate for ferries, barges, and other vessels currently using the wharf and adjacent cargo ramp. As the primary docking location for the commercial fishing fleet and barge operations, as well as passenger ferry operations, reliable access to the Stone Wharf is central to the town's economy. Barges and fishing vessels can now access the Stone Wharf for only a few hours either side of high tide to load supplies and off load their catch.

Deepening of the channel to the wharf and cargo ramp, with adequate width and maneuvering/turning areas for vessels, is necessary to ensure safe and efficient navigation access. For improving navigation conditions, USACE has tentatively selected a plan that recommends creating a federal navigation channel approaching the landing at Stone Wharf, widened along the wharf for maneuvering of ferries, and a turning basin of lesser depth

accessing the cargo ramp at the shore end of the wharf. A range of channel and turning basin depths between 6 feet and 12 feet below MLLW were evaluated to aid in determination of the USACE optimal plan. The barges and other vessels that use the ramp were determined to require about two feet less in depth than the ferries that use the other areas of the wharf.

The recommended plan (shown in the figure below) consists of a channel 10 feet deep at MLLW by 100 feet wide from deep water in Casco Bay to the Stone Wharf, widened to 150 feet alongside the wharf, with a turning basin at its head 8 feet deep at MLLW narrowing to 100 feet wide off the cargo ramp. Dredging would require the removal of about 33,600 cubic yards (CY) of mixed sand, silt and gravel by a barge-mounted mechanical bucket dredge or excavator with the material placed in scows and towed to the disposal site. The Town would continue to maintain the wharf and cargo ramp, and the depth of the berths alongside the wharf as it currently does.



The nearest ocean placement site in Federal waters (seaward of the territorial sea) is the Portland Disposal Site, located offshore of Casco Bay about 14 to 15 miles south of Great Chebeague Island. The Portland site is an EPA designated ocean disposal site under the Marine Protection Research and Sanctuaries Act (MPRSA). Portland is the most active dredged material placement site in Maine and is the site used for other FNPs in Casco Bay such as Portland Harbor and the nearby Royal River. A suitability determination for placement of the dredged materials at the Portland site was prepared based on sediment chemistry, toxicity testing, bioaccumulation testing, and evaluation of human health risk, and was concurred in by the USACE and EPA.

Benefits from the projects result from elimination of tidal delays and other wharf accessibility inefficiencies for the ferries, cargo services and fishing fleet, as well as the residents and other customers they serve. Without a dredged channel and turning basin of adequate depth these delays would continue to occur and would worsen over time, resulting in disruption of ferry and barge service, and increasing the operating costs of for all users of the landing. As the Town's lifeline to the mainland the landing's accessibility is critical to the Island's residents, their safety, and the Island's economy.

Future maintenance dredging of the completed improvements by the Federal government would be done when needed contingent upon the availability of maintenance funds, the continued economic justification of the project, and the environmental acceptability of maintenance activities.

An analysis of climate change focused on anticipated sea level rise rates and their impact on the feasibility of proposed navigation improvements through accessibility of the Stone Wharf. Three levels of sea level rise, historic, intermediate and high were evaluated with respect to mean higher high water and highest annual tide levels for the 50-year project economic life and the 100-year planning horizon. The analysis determined that the level of risk was not assumed to impact project feasibility.

The total estimated cost of design and construction for the recommended plan, based on price levels as updated to October 2020 (FY21) price levels, would be \$1,897,000. Benefit-cost analysis was used to compare and optimize alternatives and select the recommended plan. Annual benefits would be \$655,400 as compared to annual costs of \$98,100 resulting in a benefit to cost ratio 6.7 to 1, and net annual benefits of \$557,300. Benefit cost analysis used the FY21 interest rate of 2.5%.

Escalating the design and implementation cost to FY2022 (December 2021) price levels gives a fully funded cost of \$1,964,000. The non-Federal Sponsor would be required to provide ten percent of the cost of design and construction (\$196,400) up-front upon execution of a Project Partnership Agreement before project design can be completed, and a second ten percent (\$196,400) upon completion of construction. The total non-Federal share of project implementation is \$392,800. The total Federal share, 90 percent up-front, is \$1,767,600. Estimated costs and cost-sharing for the recommended plan are shown in the table below.



<b>Table ES-1</b> <b>Great Chebeague Island, Maine</b> <b>Section 107 Navigation Improvement Project Summary</b> <b>Projected Costs and Cost-Sharing for the Recommended Plan</b>	
Improvement Dredging - Cubic Yards	33,600 CY
Project First Costs (FY 2021 Price Levels)	
Construction Costs and Contingencies (Oct 2020)	\$1,184,000
Planning, Engineering and Design	\$303,000
Construction Management	\$69,000
Eelgrass Mitigation Costs	\$341,000
Total Project Costs	\$1,897,000
Total Investment Cost (with IDC)	\$1,899,000
Cost-Benefit Analysis (Updated FY 2021 Price Levels)	
Annual Cost	\$98,100
Annual Benefits	\$655,400
Annual Net Benefits	\$557,300
Benefit Cost Ratio	6.7
Cost-Sharing – Design & Implementation (FY22 Fully-Funded Price Levels)	
Fully Funded Project Cost (December 2021)	\$1,964,000
Federal Cost – 90%	\$1,767,600
Non-Federal Cost – Up-Front – 10%	\$196,400
Non-Federal Additional Contribution Post Construction	\$196,400
Total Non-Federal Cost Share	\$392,800

In conclusion, the USACE recommends that a Federal navigation project be adopted for Great Chebeague Island, Maine, under the authority of Section 107 of the River and Harbor Act of 1960, as amended, in accordance with the Recommended Plan identified in this Detailed Project Report, with such further modifications thereto as in the discretion of the Chief of Engineers may be advisable.

The recommendations contained in this report reflect the information available at this time and current USACE 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 authorized for implementation funding.



**Great Chebeague Island, Maine  
Navigation Improvement Project  
Detailed Project Report**

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## **Environmental Assessment**

Finding of No Significant Impact

Clean Water Act Section 404(b)(1) Evaluation

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# **Great Chebeague Island, Chebeague Island, Maine**

## **Navigation Improvement Project**

### **Detailed Project Report**

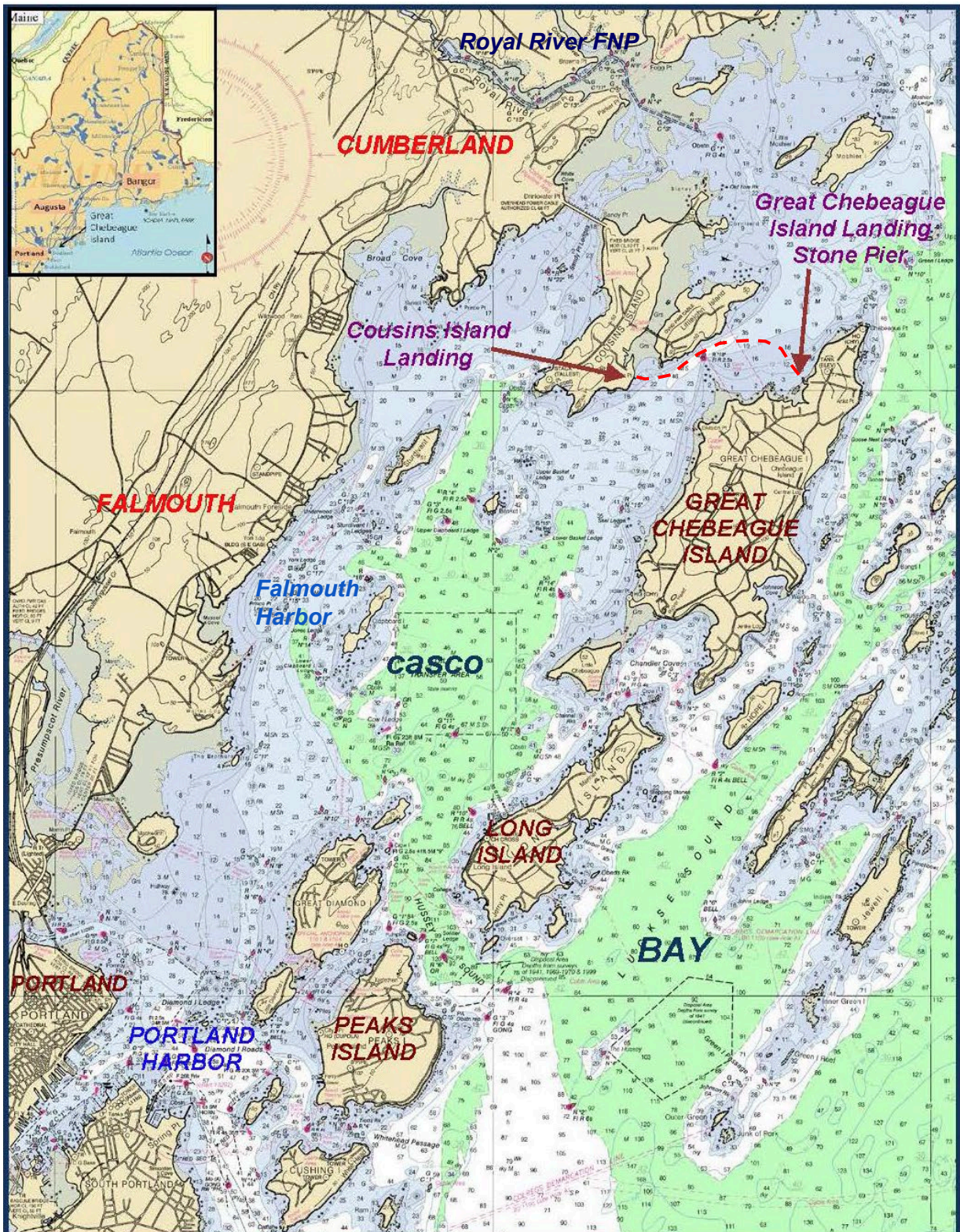
## **1 INTRODUCTION**

This study evaluates the justification for the U.S. Army Corps of Engineers (USACE) to participate in improving the existing navigation conditions at Great Chebeague Island in the town of Chebeague Island, Maine, to determine the feasibility of constructing a Federal Navigation Project (FNP). This study is being conducted under the authority and guidance of Section 107 of the 1960 River and Harbor Act, as amended, which provides for improvements to navigation, including dredging channels, widening turning basins, and construction of jetties and navigations aids. This Detailed Project Report (DPR) is the result of an engineering, economic, and environmental feasibility study of navigation improvements at Great Chebeague Island, Maine.

The Town of Chebeague Island is a municipality consisting of 17 islands in upper Casco Bay, in Cumberland County, Maine, about 10 miles north of Portland. Two of the Town's islands are inhabited, of which Great Chebeague Island is the largest. The Town is isolated, with no bridge access to the mainland. Figure 1 shows the island and its location in the bay. The municipally chartered Chebeague Transportation Company (CTC) provides year-round barge and ferry service for passengers and cargo from nearby Cumberland. The principal town landing is at the Stone Wharf on the northwest shore of the island. Other private services operate seasonally from Portland. Vehicles, fuel, trash, seafood, utility service, and building materials are carried by barge. About 421 people (2018) live year-round on the island with another approximately 1,600 summer residents. The principal commercial activity is fishing, with about 44 vessels licensed primarily for lobstering, and another 20 vessels used for freight and passenger transportation.

As the Island's principal landing, the Stone Wharf, located on its northwest shore, is critical to the island economy. Stone Wharf is the island's only full service landing, handling passengers, much of the local fishing fleet, light and heavy cargos, vehicles, and recreational craft. The Stone Wharf provides access for all island services and public safety, which all depend on adequate access to the mainland over the wharf and the boat ramp. Town officials reported that shallow water hinders operation of the many activities that rely on the landing at the Stone Wharf, including fishing, barge services (which use the boat ramp), and ferry operations. While depths alongside the pier on the mainland (Cousins Island) end are naturally deep, shallow water at the Stone Wharf on the island end limits access to higher stages of the tide and causes damage to vessels using the wharf and boat ramp during lower tide stages. Deepening of the channel to the pier, with adequate maneuvering and turning areas for vessels, is necessary to ensure safe navigation access.





**FIGURE 1**  
**GREAT CHEBEAGUE ISLAND, MAINE**  
**NAVIGATION IMPROVEMENT STUDY – PROJECT LOCATION**



A 1973 USACE DPR concluded that navigation improvements to Stone Wharf were in the Federal interest, but local financing prevented implementation at that time. By letter dated October 9, 2009, the Town of Chebeague Island requested that the USACE revisit the feasibility and Federal interest in the improvements proposed in 1973 for improving the navigation conditions at Stone Wharf. An initial appraisal and Federal Interest Determination (FID) was completed April 30, 2014 and recommended proceeding with this cost-shared feasibility study. The principal Federal interests at Stone Wharf are improving the safety and efficiency of commercial navigation for vessels accessing the wharf and landing.

## 1.1 Study Authority

This report is prepared and submitted under the authority and provisions of Section 107 of the River and Harbor Act of 1960, as amended. Section 107 provides authority for the USACE to improve navigation including dredging of channels, anchorage areas, and turning basins and construction of breakwaters, jetties and groins, and other general navigation features in partnership with non-Federal government sponsors such as cities, counties, special chartered authorities or units of state or tribal government.

## 1.2 Project Study Costs

The feasibility study was cost-shared 50/50 between the Sponsor and the USACE, except for the first \$100,000 in study costs which was funded 100 percent by the Federal government. The feasibility study examined reasonable alternatives for the problems and needs and determined the best solution consistent with Federal policy. The solution must pass the following criteria: engineering feasibility, economic justification, environmental impact, and it must have local partnership. The steps in the process are:

1. **Feasibility Study** - The Corps has conducted a Feasibility Study that is 100 percent federally funded up to \$100,000. Costs over \$100,000 are being shared with the non-federal sponsor on a 50/50 basis (up to one-half of the non-federal share can be in the form of in-kind services).
2. **Final Project Design and Preparation of Plans and Specifications** - Detailed final project design, and preparation of plans and specifications and bid solicitation documents, are treated as part of total project costs for purposes of cost sharing and the non-federal cost share for these activities is collected with the construction cost share.
3. **Project Construction** - Project design and construction for navigation projects with a design depth of 20 feet or less is initially 90 percent Federal and 10 percent non-Federal. The Sponsor is also responsible for an additional 10 percent contribution payable after construction is completed, which may be paid over a period of up to 30-years.
4. **Future Project Maintenance** - The U.S. Army Corps of Engineers is responsible for future maintenance of commercial navigation projects upon completion for project with design depths of 50 feet or less, subject to available funding. Funding for shallow draft project maintenance has been constrained in recent years. Maintenance of projects



constructed for recreational navigation purposes is a 100 percent non-Federal responsibility. Cost-sharing for maintenance of projects justified on the basis of both commercial and recreational navigation is apportioned according to the economic benefit produced for each purpose.

### **1.3 Study Location**

Great Chebeague Island is the largest of 17 islands which make up the Town of Chebeague Island located in Casco Bay, approximately eight miles northeast of Portland, Maine. It is the largest island in Casco Bay not connected to the mainland by bridge. The island is about four miles in a north-south direction and about 1.4 miles in an east-west direction. Cousins Island and Littlejohn Island lie between the mainland and Great Chebeague Island. Vehicular bridges connect Littlejohn to Cousins and Cousins to the mainland. Year-round ferry service connects Great Chebeague Island to the mainland via a wharf on Cousins Island.

Chebeague Island has two principle harbors, one on the northwest side adjacent to Stone Wharf and the other, Chandler Cove, at the southern end of the island. Chandler Cove is exposed to southerly seas and is used by a portion of the fishing fleet, recreational boats in the summer, and by the Casco Bay Lines ferry service from Portland. The Stone Wharf area is protected from easterly and south-easterly storms by the island itself and from prevailing southwesterly winds during the summer by the mainland and by Bar and Division Points on the west side of the island. The mean and spring tide ranges are 9.1 feet and 10.4 feet, respectively. The locality is shown on U.S. Coast and Geodetic Survey Chart #13290.

The area of Great Chebeague Island in the vicinity of Stone Pier is relatively flat with maximum elevations approaching 50 feet above mean sea level. The shoreline is rocky in nature, similar to other islands in Casco Bay. There is a hotel and nine-hole golf course in the immediate vicinity of Stone Wharf.

### **1.4 Scope of Study**

This DPR summarizes the investigation of alternatives for providing navigation improvements at Great Chebeague Island, for the benefit of the area's commercial fishing fleet. The study reviews all available access points to Great Chebeague Island, and narrows to the locale of Stone Wharf, since this wharf is the major portal for navigation and transportation on and off of the island. The FID had explored both navigation channel improvements and anchorage area improvements to the area in the vicinity to Stone Wharf, and had recommended pursuing a plan that included both a channel and anchorage areas. After reviewing the 2015 FID, by letter to the Corps dated April 10, 2015, the Town requested that the scope of the feasibility study be reduced to only the assessment of navigational channel improvements and to drop the consideration of anchorage areas. Therefore, the scope of this DPR is limited to assessment of navigation channel measures at Great Chebeague Island.

The steps in the study included a comprehensive inventory of applicable and available information, performance of topographic and hydrographic surveys, environmental testing and sampling, and preparation of base plans. Public officials have been contacted to provide information and seek input in the study process. Based on these efforts along with planning objectives and constraints, identification and assessment of various measures, and compilation of a set of alternatives formulated. These plans were developed and evaluated in coordination with state authorities and the final alternative plans were selected for detailed study.

This report provides for the following:

- Identifying existing conditions and historical trends within the study area;
- Determining the navigational problems and needs of the area;
- Determining the most probable future condition without Federal improvements;
- Developing alternative improvement plans;
- Evaluating and comparing the engineering, economic, environmental, and social impacts of the alternative plans, with respect to the future condition; and
- Recommending improvements that are implementable, economically feasible, environmentally and financially acceptable, and socially beneficial.

The geographic scope includes:

- The current navigational corridor on the south-west side of Stone Wharf
- Areas of possible impacts beyond the immediate vicinity of Stone Wharf, include the dredged material disposal site and the areas from which resources are harvested by the commercial fleet.

## **1.5 Prior Studies and Improvements**

No Federal Navigation Project exists at Great Chebeague Island. One previous USACE navigation improvement study of the town landing at Stone Wharf was completed in 1973. The report found that insufficient depths limited full use of the wharf by existing and prospective commercial and recreational vessels. A plan for dredging a 14-acre anchorage and a 100-foot wide channel to a depth 6 feet below mean low water was found to be economically justifiable. However, a Non-Federal Sponsor could not be identified at that time to contribute the necessary cost shared funds. The town of Cumberland, of which the Chebeague Islands were then a part, voted not to pursue the recommended improvements.

The Town of Cumberland applied for and received a permit to perform limited work at Stone Wharf in 2003, shortly before Chebeague Island seceded to form its own town. The work involved the dredging of the ferry berth and high shoal spots in an area approximately 300 feet by 150 feet adjacent to the wharf to a depth of -8 feet MLLW. This material was dredged mechanically and placed at the Portland Disposal Site. The work temporarily relieved issues with ferry access to the wharf but was insufficient to address the long-term problems with inadequate access to the island.

## **1.6 Study Participants and Coordination**

The preparation of this report required the cooperation of Federal and state agencies, elected officials of the state and local governments, the municipal ferry service and harbormaster, local commercial fishermen, and interested individuals. Appendix A contains a record of public involvement, agency coordination, and project correspondence.

## **1.7 Project Sponsor**

The project sponsor is the Town of Chebeague Island, Maine. The town is an incorporated municipality (2007) in Cumberland County. The town's 17 islands have a total land area of about 3.6 square miles. By letter dated October 9, 2009, the Town of Chebeague Island requested that the USACE investigate improving the navigation conditions at the landing at Stone Wharf. A FID was completed April 30, 2014 and approved by the North Atlantic Division on July 22, 2014. The Section 107 Fact Sheet was approved by the Assistant Secretary of the Army for Civil Works (ASA-CW) on June 3, 2015. A Feasibility Cost-Sharing Agreement was executed between the Town of Chebeague Island and the USACE on July 1, 2016.

## **1.8 Environmental Operating Principles**

The USACE has reaffirmed its commitment to the environment in a set of "Environmental Operating Principles". These principles foster unity of purpose on environmental issues and reflect a positive tone and direction for dialogue on environmental matters. By implementing these principles within the framework of USACE regulations, the USACE continues its efforts to evaluate the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions in partnership with stakeholders.

The seven "Environmental Operating Principles" are as follows:

1. Foster sustainability as a way of life throughout the organization.
2. Proactively consider environmental consequences of all USACE activities and act accordingly.
3. Create mutually supporting economic and environmentally sustainable solutions.
4. Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the USACE, which may impact human and natural environments.
5. Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
6. Leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.
7. Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

## 1.9 USACE Campaign Plan

The U.S. Army Corps of Engineers Campaign Plan guides USACE policy decisions on how we organize, train, and equip our personnel; how we plan, prioritize, and allocate resources; and how we respond to emerging requirements and challenges and meet national priorities. The Campaign Plan is regularly updated and the current version of the plan covers the period of FY2018 to FY2022.

The USACE strategic plan effort towards improvement began in August 2006 with the “12 Actions for Change” and has evolved to four goals and associated objectives. Although the effort originally developed with a focus on missions that seek to manage risk associated with flooding and storm damage, the Campaign Plan Goals and Objectives are applied to all aspects of the USACE service to the nation including its civil works mission. USACE Campaign Plan Goals and Objectives are derived, in part, from the Commander’s Intent, the Army Campaign Plan, and Office of Management and Budget guidance. The four goals are (1) Support National Security, (2) Deliver Integrated Water Resource Solutions, (3) Reduce Disaster Risk, and (4) Prepare for Tomorrow.

The goal and associated objectives most closely related to the study and recommendation of a navigation improvement project at Stone Wharf, Great Chebeague Island is:

### **Goal 2: Deliver Integrated Water Resource Solutions**

#### Objective 2a – Deliver Quality Water Resources Solutions and Services

The Recommended Plan for navigation improvements at Stone Wharf, Great Chebeague Island meets this objective by delivering a project which, within the limits of Federal participation established by Congress, meets to the extent practicable the expectations of our partners and stakeholders in providing safe and efficient navigation for the commercial fleet operating from the Stone Wharf, Great Chebeague Island.

#### Objective 2c – Develop the Civil Works Program to Meet the Future Needs of the Nation

The Recommended Plan for navigation improvements at Stone Wharf, Great Chebeague Island meets this objective by delivering a project which, within the limits of Federal participation established by Congress, provides sustainable system of channel improvements. The study and recommendation were conducted with stakeholder engagement and the public provided an opportunity to review and comment on the study and its recommendations through the NEPA process.

#### Objective 2d – Manage the Life-Cycle of Water Resources Infrastructure Systems to Consistently Deliver Reliable and Sustainable Performance

The project has been formulated with the complete life-cycle in mind, with a consideration of the costs and impacts of both initial construction and future operations and maintenance, to determine the most cost-effective alternative solution to address problems and opportunities with navigation at Stone Wharf, Great Chebeague Island.

## 2 PROBLEM IDENTIFICATION

This section discusses the project area and the reasons requiring navigational improvements. It establishes the planning objectives and constraints that direct subsequent planning tasks.

### 2.1 Problems and Needs

The principal navigation issue at Great Chebeague Island is the existing channel to the Stone Wharf does not accommodate safe and efficient vessel movement to the landing. This wharf is the primary location for year-round ferry and barge service, emergency rescue operations, and commercial fishing. The ferry operations carry school children, commuters, and residents to and from the mainland. Controlling depth in the channel is currently less than five feet at MLLW, which is inadequate for ferries, barges, and other vessels currently using the wharf. These ferries have less than 1-foot underkeel clearance at mean low tide, which is unsafe and places the ferries at risk of damage, particularly on minus tides. Ferries are unable to access the wharf during some lower tidal stages. Some minor and localized dredging was conducted by the Town in the past to remove high spots to attempt to keep the wharf accessible for ferries at least in higher tidal stages. Emergency situations that occur during mid to low tide periods will severely limit or make unavailable access under current conditions, and these limitations are a serious concern for the Island's public safety.

As the primary docking location for the commercial fishing fleet and barge operations, as well as passenger ferry operations, reliable access to the Stone Wharf is central to the town's economy. Fishing vessels can now access the Stone Wharf only a few hours either side of high tide to load supplies and off load their catch. These limitations have led to conflicts among fishermen as there are very limited time and space to load and unload their traps. Deeper draft lobster vessels have run aground approaching the pier when transporting their catch, and the fishing fleet is trending to using larger vessels as older boats are replaced, thus exasperating the navigational problems.

In summary, deepening of the channel to the wharf, with adequate maneuvering/turning areas for vessels, is necessary to ensure safe and efficient navigation access. For improving navigation conditions, USACE has tentatively selected a plan that recommends creating a federal navigation channel approaching the landing at Stone Wharf and a turning basin. This study analyzes the alternatives for channel improvement and the benefits that each alternative provides to the existing fleet.

### 2.2 Existing Conditions

**General Description** – The town of Chebeague Island is a municipality consisting of 17 islands in upper Casco Bay, Cumberland County, Maine, about 10 miles north of Portland. Only two of the islands are inhabited year-round, Great Chebeague and Hope Islands, all of the islands are isolated with no bridges to the mainland, and only Chebeague has town infrastructure and services. Bates, Ministerial, and Stave islands are privately owned and occupied only in the summer (Town comprehensive plan). Great Chebeague Island is the largest island, approximately four miles long and 1.4 miles wide at its widest point. The town

is 24.6 square miles of which 21.0 square miles is water (Census Bureau/Wikipedia). The coastline is rocky with some sandy areas, typical of Casco Bay islands. The mean tidal range is 9.1 feet with minimum and maximum ranges 3.5 feet less or greater. As of the 2018 American Community Survey 421 people live on Chebeague year-round with an additional approximately 1,600 summer residents. Great Chebeague Island and its navigation facilities are shown in Figure 2.

The municipally chartered Chebeague Transportation Company (CTC) has two ferries that provide year-round barge and ferry service for passengers and cargo to and from Cousins Island, which is connected by bridge to the mainland. The ferry transports residents, including commuting school children, teachers, emergency personnel, and visitors. In 2011 the company transported 157,000 passengers. The ferry runs 10-12 trips per day, seven days per week, weather permitting. CTC personnel are on call at all times for emergency operations to connect police and ambulance service to the island. Casco Bay Lines offers ferry service between Portland and Chandler's Cove on the southern end of the island year-round. The ferry stops at 4 other islands and takes approximately 1.5 hours to get to Chebeague. Casco Bay Lines also uses the Stone Wharf landing on occasion. Chebeague Island Boat Yard, located on the east side of the Island, is open year-round with a small dock used by small vessels.

All supplies, including vehicles, fuel, food, utility service, and building materials are brought to the island by boat or barge and all trash and municipal waste must be brought off island by barge. A barge and push boat transport vehicles and commercial freight from April 1<sup>st</sup> to November 30<sup>th</sup> every year. Barging from Chebeague to Cousins Island or Portland Harbor from the Stone Wharf is severely restricted by the tide due to shoals and shallow water.

**Land Uses & Facilities** – The dominant land use on the island is residential, with a significant amount of open space/forested areas and protected green space. There are approximately 525 (2010 census) dwelling units on the island of which a little over one third are occupied year-round (Chebeague Island Comprehensive Plan). The town has a market, library, elementary school, recreation center, assisted living facility, day care, community hall, cafe, and two gift shops, as well as the Chebeague Island Inn and a golf course which are open in the summer months (Town website and Chebeague Island Inn website).

At the Stone Wharf there is parking available as well as a floating dock and boat/barge ramp. The boat/barge ramp is located at the end of Stone Wharf Road and is only usable at high tide. The floating docks are utilized by larger lobster vessels as the area along the wharf is too shallow during mid to low tide periods. CTC ferry parking can be found off Route 1 on Cousin's Island, which has daily parking fees. A complimentary shuttle takes passengers to the wharf as well as a private parking area at the Cousin's Island wharf. This is where island visitors and residents can keep their cars on the mainland while on the Chebeague Islands.

Besides the Stone Wharf there is also a boat yard on the east side of the island where vessels can undergo repairs or be hauled out for off-season storage. Chandler Cove at the south end of the island has a wooden state pier used by the Casco Bay Lines ferry and part of the fishing fleet, and by recreational vessels during the warmer months.





**Recreation/Tourism** – Tourism is a major industry on Chebeague. The summer residents and visitors that come to the Island during the summer help sustain businesses. Many businesses, such as the Chebeague Inn and the gift shops, are only open in the summer. While other businesses, like the market and café, do much more business when the summer residents are present. The town population increases nearly fivefold in the summer and approximately 63% of the houses on Chebeague are owned by non-year-round residents. Many of these summer families have been coming to the island for generations (Town



comprehensive plan). Summer residents are essential to the Chebeague economy, as well as the visitors who come to stay at the Inn and vacation on the island.

**Economic Conditions** – Appendix D contains the Economic Assessment of the proposed Federal Action. In 2018, Chebeague had a year-round population of 421, with an additional ~1,600 people arriving in the summer. In 2010 there were ~525 housing units, 171 of which were occupied year-round and another 334 of which were for summer use. In 2000, the median family income was \$32,188 (2000 Census, as reported in the Town comprehensive report). Between 2013 and 2017, the median family income was \$61,250 compared to Maine’s overall household income of \$53,024 (based on the 2013-2017 American Community Survey 5-year estimates, from the Census Bureau Website).

**Vessel and Fleet Presence** – The location of Chebeague Island provides excellent access to the waters of Casco Bay. There are 44 commercial vessels registered on Chebeague Island. There are 18 smaller draft fishing vessels, 18 mid-range vessels with drafts of 4.5-6.5 feet and eight larger fishing vessels with drafts in excess of 6.5 feet. Along with the two CTC ferries (drafts of 7.0 feet) and the Casco Bay lines ferries, there are also three freight barges, a fuel barge, four water taxis, three utility service vessels and charter boats. Table 1 shows the composition of the Island’s fleet. In 2000 the Town of Chebeague Island as a whole had 54 lobster licenses and 45 lobster boats utilizing ~35,000 traps (Town comprehensive plan). The two Casco Bay Lines ferries use the state pier at the south end of the island, leaving 64 vessels using the landing at the Stone Wharf.

<b>TABLE 1</b> <b>Great Chebeague Island, Maine</b> <b>Navigation Improvement Project – Fleet Data Summary</b>				
<b>Vessel Types and Dimensions (Feet)</b>	<b>Draft Range</b>	<b># of Vessels</b>	<b>Average Length</b>	<b>Average Beam</b>
<b><i>Commercial Fishing Boats</i></b>				
Smaller Draft Fishing Vessels	<4.5	20	40.1	13.9
Middle-Range Draft Fishing Vessels	4.5 to 6.5	13	44.5	15.4
Larger-Draft Fishing Vessels	>6.5	14	43.9	14.8
<b><i>Commercial Ferries and Cargo Transports</i></b>				
Chebeague Transportation Co. Ferries	6.5 to 7.0	2	52-56	16-18.3
Freight Barges	4.0 to 5.0	3	40-80	14-24
Fuel Barge	5.0	1	36	12
Casco Bay Lines Ferries	8.0	2	100-110	-
Inter-Island Ferries	6.0	2	87-150	28-48
Barge Push Boats	5.0	1	25.2	14
<b><i>Municipal Craft</i></b>				
Harbormaster and Water Taxi	4.0 to 5.5	3	28-34	10-12
<b><i>Commercial - Utility Service and Other Non-Fishing Boats</i></b>				
Utility Service Vessels	3.0 to 5.5	3	28 to 42	11 to 14
Boat Yard Service	5.5	1	26	10
Charter Vessel	5	1	42	12

**Port Operations** – The CTC ferries, commercial fishing fleet, barges and recreational vessels all use the Stone Wharf at Chebeague Landing year-round. Shallow waters approaching the wharf makes navigation very challenging for the ferries, which now have less than one foot under keel clearance. Fishing vessels can only use the wharf at high tides, leading to competition for space to load supplies and unload catch. Some larger vessels have had grounding damage due to the shallow waters approaching the pier. The Casco Bay Lines ferry, some barges carrying light cargo, and fishing boats also use the pier at Chandler Cove, as do a number of recreational vessels during the summer months.

### 2.3 Without Project Condition

The “*Without Project Condition*” is the expected condition if the Federal government takes no action to improve the navigation access for Great Chebeague Island. The most likely future condition with navigation at Great Chebeague Island is a continuation of the existing conditions, which have constrained operations and threatened public safety for decades. Without the project, the delays, severe limitations, and damages to ferries, barges, and fishing vessels accessing the island would continue. The ferry schedule will remain unreliable with expected delays at low tide periods, continuing to negatively impact fishing operations, commuting school children, and residents who work off-island. A reliable year-round ferry service is essential to maintaining the viability of a year-round population on Great Chebeague Island. Additionally, as conditions continue to worsen with continuing sedimentation in the approach to the wharf, the ferry might not be able reach the pier in an emergency situation, threatening the public safety of Chebeague Island residents.

If the current conditions continue, the challenges faced by commercial fishing fleet (the restriction of tidal access to the wharf and the possibility of grounding damages to their vessels) will remain unabated. Lobstering as a profitable occupation is already under strain. The number of lobstermen on Chebeague under age 50 was only 26% in 2010 (from town comprehensive plan). Still, lobstering is a vital part of the Chebeague economy. If lobstering cannot be sustained on Chebeague the entire community would be adversely affected. Improving access to the stone wharf would help to alleviate some of the issues Chebeague Island’s lobstermen face.

There are currently no plans by the Town or any other interests to dredge the approach to the pier at the Chebeague Island Landing at Stone Wharf. The Town of Chebeague Island is quite new, having only existed as a separate town from the Town of Cumberland since 2007, has a limited population, and limited resources to deal with major infrastructure needs. The town is about to undertake necessary and overdue repairs to the Stone Pier itself. The Town of Chebeague Island does not currently have the means to construct general navigation improvements on their own and without Federal support it is unlikely that a channel will be constructed.

## 2.4 Planning Objectives and Constraints

**Planning Objectives** are the desired results of the planning process that will solve the identified problems and typically result in the desired changes between the without and with project conditions. Planning Objectives serve to eliminate from consideration alternatives and considerations that will not solve the identified problem.

State and local objectives for the project area include ensuring continued access of the CTC ferries to the wharf and Chebeague Landing and the continued use of Great Chebeague Island as a base for successful lobster fishing in Casco Bay. The Federal objective of water and related land resources project planning is to contribute to National Economic Development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes (National Environmental Policy Act), applicable executive orders, and other Federal planning requirements. This requirement involves:

- Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.
- Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

Planning objectives that have been identified to specifically address the navigation problems and needs of Great Chebeague Island are:

- Ensure continued year-round access for the CTC ferries to Great Chebeague Island at all tidal stages, protecting public safety
- Provide year-round all-tide access to the island for the other island services requiring pier and ramp access
- Contribute to safer more efficient conditions for the commercial fishing/shell fishing fleet

**Planning Constraints** are the parameters that limit the implementation of a proposed plan or plans to allow for improvement of the navigation conditions in support of the commercial and recreational industries at Great Chebeague Island.

- The major or primary constraint at Great Chebeague Island is the natural conditions. The island lacks a protected year-round natural harbor. The area near Stone Wharf is already very shallow, has a large tidal range (10-feet plus), and it continues to shoal.
- The island access will continue to rely on marine transportation since bridge or tunnel access is not being considered due to extremely high costs for construction and difficult environmental conditions.
- The island and town's resources are limited, given the low population and limited fiscal resources available to the municipality. Recommended improvements will need to take the town's fiscal resource limits into account.
- Casco Bay is a large estuary with significant natural resources, including the fish and shellfish resources that the local economy depends on. Any improvements must take

those resources, especially the large extent of submerged aquatic vegetation on the western (lee) side of the island, into account.

### **3 FORMULATION OF PLANS**

The formulation of alternatives for navigation improvement at Great Chebeague Island are compiled by combining various measures that the study team considered to address the problems and opportunities and planning objectives of the study. An alternative must be considered reasonable and designed to achieve the planning objectives and is developed with regard to the planning constraints previously identified (Section 2.3, Planning Objectives and Constraints). State and local sponsor objectives are essential considerations in the evaluation of alternative plans.

#### **3.1 Plan Formulation Rationale**

The formulation of alternative plans is based on a standard set of criteria. Each of the alternative plans must:

- be complete so that it provides and accounts for necessary investments or other actions to ensure the realization of the planned effects;
- be effective in alleviating the specified problems, and realizing the specified opportunities;
- be efficient, demonstrating a cost-effective means of alleviating the specified problems and realizing the specified opportunities;
- be acceptable by state and local entities and the public;
- be compatible with existing laws, regulations, and public policies.

Each alternative is considered on the basis of its effective contribution to the planning objectives, and the selection of a specific plan is based on technical, economic, and environmental criteria that allows for a fair and objective appraisal of the impacts and feasibility of alternative solutions.

Technical criteria require that the plan have the dimensions necessary to accommodate the expected vessel use, sufficient navigation area to provide for maneuvering of boats, and allow for development or continued use of shore facilities. All plans must contribute to navigational efficiency and be complete within themselves.

Economic criteria require that the benefits of the navigation improvement exceed the economic costs and that the scope of the project is such to provide maximum net benefits.

Environmental criteria require that the tentatively selected plan address the environmental quality of the project area. This includes the identification of impacts to the natural environment and social resources. It also includes the assessment of impacts that are incurred during the construction of the proposed navigation improvements and those activities attracted to the area after plan implementation.

### 3.2 Management Measures

Management measures can be identified and evaluated as the basis for formulating alternative plans to solve the navigation problems at Great Chebeague Island. These management measures are categorized as either structural or non-structural.

Structural measures are those that involve the construction of features that would, to varying degrees, meet the planning objectives developed for Great Chebeague Island. These include constructing a new Federal general navigation features at the town landing at Stone Wharf. These features would reduce or eliminate tidal delays and the risk of grounding for the fishing fleet, ferry service, and other critical island services.

Nonstructural measures involve those that would achieve the same planning objectives, but without resorting to structural improvements. An example of a nonstructural measure applicable to small fishing harbors involves the transfer of commercial fishing vessels to neighboring off-island ports having capacity to sufficiently accommodate additional vessels at existing facilities. Fishermen would become ‘commuters’ or would also relocate their homes and families as well to be nearer their new business locations. These are discussed more in the general consideration of alternatives below.

Given the limited nature of the improvements under consideration for this Section 107 CAP small navigation project, more costly solutions such as the following were considered impractical.

(1) Extending the Stone Wharf more than 1,100 feet to deep water to avoid the need to dredge. A wharf extension of that length would cost several million dollars. The 10-foot contour is about 900 feet seaward of the end of the existing Stone Wharf. Additional length would be needed for berthing the ferries and other craft that use the wharf.

Extending the wharf would not address the need for heavy duty ramp access and building a new wharf to support that traffic would be even more costly.

(2) Construction of a bridge to the mainland would eliminate the immediate need for dredging to the Stone Wharf as that facility would no longer need to support the ferry and barge services. The fishing fleet and other smaller users of the wharf would still require some dredging to support their continued safe use. The distance between Great Chebeague at Bar Point and Littlejohn Islands is about 3,200 feet at its narrowest at MHW. The distance from Division Point to the Cousins Island ferry wharf is about 4,100 feet. A bridge high enough above this passage to allow navigation traffic from Chebeague Island and other towns to the north up the bay and remain open during storm surges would likely need to be about 4,000 to 5,000 feet long and would cost many times that of any channel dredging project.

Navigation improvement measures were developed and analyzed during the early stages of the planning study. These measures included both nonstructural measures, including the possibility of transferring vessels to neighboring ports, and structural measures (various dredging options).

### **3.2.1 Non-Structural Measures**

Fleet Transfer: This would include transfer of some of the larger fishing vessels to nearby harbors on the mainland such as Royal River in Yarmouth or Falmouth Harbor (See Figure 1). As lobstering is a key component of the Chebeague Island economy, so transferring the fleet to another port would also make sustaining the island community very difficult. Transfer of the ferry to other seasonal landing areas on the island (see Figure 2) would reduce this service to a seasonal operation. Without the ferry to provide year-round transportation to and from the island, maintaining a year-round population on Great Chebeague Island would be impossible. Children beyond K-5 are now educated on the mainland, relying on the ferry for daily access. Emergency services that rely on the ferry would also be compromised in colder months. Transfer of services and uses at the town landing at Stone Wharf to either of these other two areas on the island with making significant structural improvements needed for safe year-round navigation would not meet the island's needs or the planning objectives. These measures were therefore eliminated from further consideration.

Tidal Navigation: Tidal navigation is presently practiced by most of the fishing fleet at Great Chebeague Island. Larger fishing boats in particular must pay close attention to the tides which vary throughout the day, month, and year. New England experiences a semidiurnal tide; in general, there are two high tides and two low tides every 24 hours and 50 minutes. The highs and lows (and therefore range of the tide) can vary considerably from one tidal cycle to the next. Extreme low water is as much as one foot below MLLW. Experienced fishermen understand the tides in the areas they operate and pay attention to the tide charts. Even so, the effects of storms, waves, swells, surges, currents, winds and other factors all contribute to uncertainties in navigating shallow coastal waters and harbors. Groundings can occur when deeper draft boats are operated without sufficient underkeel clearance to account for the conditions mentioned above.

Tidal navigation results in delays accessing shore facilities when leaving and entering the harbor. The ferries leave both Great Chebeague and Cousins Island with passengers and freight. Fishing boats leave the harbor loaded down with provisions, fuel, and bait, and return to the harbor loaded down with catch. When loaded draft, plus a reasonable underkeel clearance for sea and channel conditions, exceeds the available controlling depth in the channel, then groundings occur. The only solution short of dredging is to delay the channel transit, which costs the fishing boats time, and if inbound fuel and labor. Tidal navigation would delay the ferries and make maintaining a regular service schedule very difficult.

At Great Chebeague Island, the Sponsor requested the USACE to examine constructing a Federal navigation channel to alleviate tidal delays and groundings. Further reliance on tidal navigation would fail to address the problems experienced by the fleet. Problems with access would only continue to worsen as shoaling of the channel and along the pier continues.

### **3.2.2 Structural Measures**

Structural measures for navigation improvements were analyzed in this study that could help meet the planning objectives. Navigation improvements can improve access to existing shore

facilities or involve construction of new measures that would create better protection for development of new shore facilities. Access improvements include dredging of channels, turning basins, and anchorage areas to address inadequate depths for safe navigation and improvement access. Other structural improvements such as breakwaters can create new protected harbors at sites that would otherwise be unsuitable for year-round access.

Stone Wharf: At Great Chebeague Island navigation safety and access at the existing town landing at Stone Wharf could be improved by dredging new access features. Elsewhere on the island either of the two alternative landing areas discussed under the non-structural fleet transfer above could be made into year-round access sites through construction of breakwaters and new heavy-duty access facilities.

Improvements at the town landing at the Stone Wharf would involve dredging of a channel and turning basin to improve access to the wharf, and additional dredging of anchorage areas to allow the fleet to anchor closer to the wharf. Consultation with the Town and State agencies led to the development of two combinations. The first would be limited to dredging a channel and turning basin to improve access to the wharf and ramp at the landing to provide safe all-tide access to the landing for the ferry, barge services, and commercial fishing fleet. The second would add dredging of two anchorage areas similar to those recommended in the 1973 report to allow the fleet better access to the landing and room to expand in the future.

Former Central Landing Site: Construction of a new public landing at the old central landing site would require public acquisition of property and extensive infrastructure improvements including, roads and parking, a new breakwater to shelter the site, constructing a new heavy-duty wharf and ramp, and dredging a channel and turning basin to provide access.

Chandlers Cove: Similarly, development of the site at Chandlers Cove on the southeast end of the island may require extensive improvements. These could include a shorter breakwater to shelter the cove from southerly seas and winds in the winter, replacement of the existing timber dock with a more heavy-duty landing to accommodate greater barge service, and potentially dredging improvements to make those facilities accessible at all tides.

The combination of these different structural measures into the initial alternatives outlined above, and the practicability of each are discussed in the following sections.

### **3.3 Development and Analysis of Initial Alternatives**

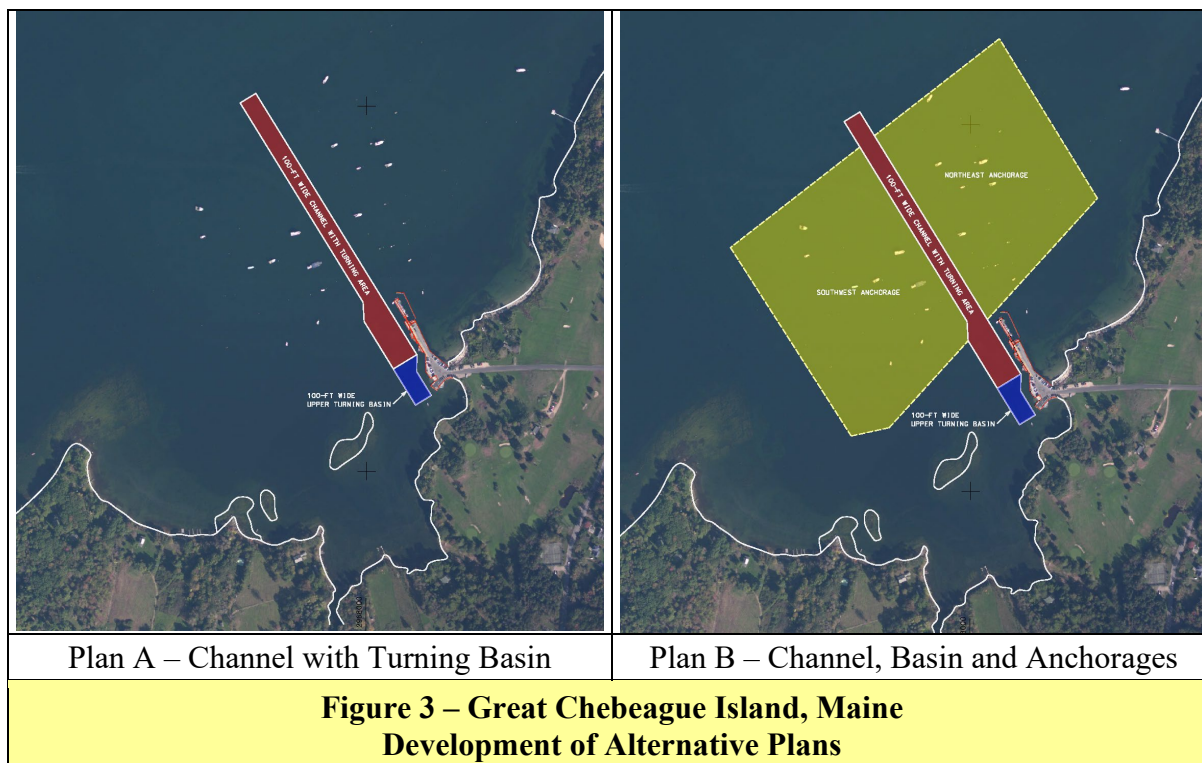
As discussed above, management measures for improving safe year-round navigation for Great Chebeague Island were combined into initial alternatives. The alternatives were screened to determine the extent to which each contributed to achieving the planning objectives with consideration of the identified planning constraints. Those alternatives which survived this initial screening were then carried forward for more detailed development and evaluation as detailed plans, including specific analysis of detailed costs, impacts, and benefits.



The first two of these initial alternatives address the Town’s desire for improvements at the town landing at Stone Wharf. Two additional alternatives for more extensive harbor improvements at other areas on the island were also evaluated.

### 3.3.1 Alternatives Considered and Carried Forward for Further Analysis

The first two alternative investigated involved constructing a channel and turning basin to access and utilize the existing town landing at Stone Wharf at Great Chebeague Island (Plan A), and the addition of dredged anchorage areas to the plan for a channel and turning basin (Plan B). These plans are shown in Figure 3.



Plan A involves constructing a new federal navigation channel 100 feet wide from deep water in Casco Bay southeasterly approximately 1,600 feet to Great Chebeague Island public landing at the Stone Wharf, widened to 150 feet alongside the pier to accommodate turning of the ferry. An upper turning basin between the channel and the boat/barge ramp about 230 feet long would also be constructed to accommodate maneuvering of barges and the servicing and launching of fishing boats and other craft. Based on the size of the fishing vessels, barges, and ferries, the channel width of 100-150 feet was chosen. For this measure a large range of channel and turning basin depths were considered. The design depths initially considered for the channel and turning basin range from 6 feet to 12 feet below MLLW. These alternative depths address the varying abilities of vessels to maneuver during the range of tidal conditions encountered.

The town landing at Stone Wharf is the closest landing on the island to the mainland terminal on Cousins Island, a distance of about 1.7 miles by vessel. This site is also the only landing located on the island's sheltered (lee side) western shoreline, making this a reliable year-round access point for all island services. Stone Wharf also has the island's only heavy-duty wharf and its only paved ramp.

Plan B was examined in some detail in the FID. That plan would have added dredged anchorage areas both north and south of the channel and wharf and were included in the project recommended in the 1973 DPR. Plan B, with its far larger dredge area carries a much higher cost than Plan A with only the channel and turning basin. The anchorage areas are also significant eelgrass habitat, which would be removed by any dredging. The town decided during review of the FID to eliminate further consideration of anchorage areas in the remaining feasibility investigation. The town believes that a draft-focused mooring plan together with the channel and turning basin improvements of Plan A would provide the fishing fleet and other open-moored small craft with adequate all-tide access to the shore facilities they depend on. Furthermore, not dredging anchorages would avoid the impacts to eelgrass beds which are important to the long-term health of the Bay's environment and the fishery resources the island's economy and its commercial fleet depends on.

### **3.3.2 Alternatives Considered and Eliminated from Further Analysis**

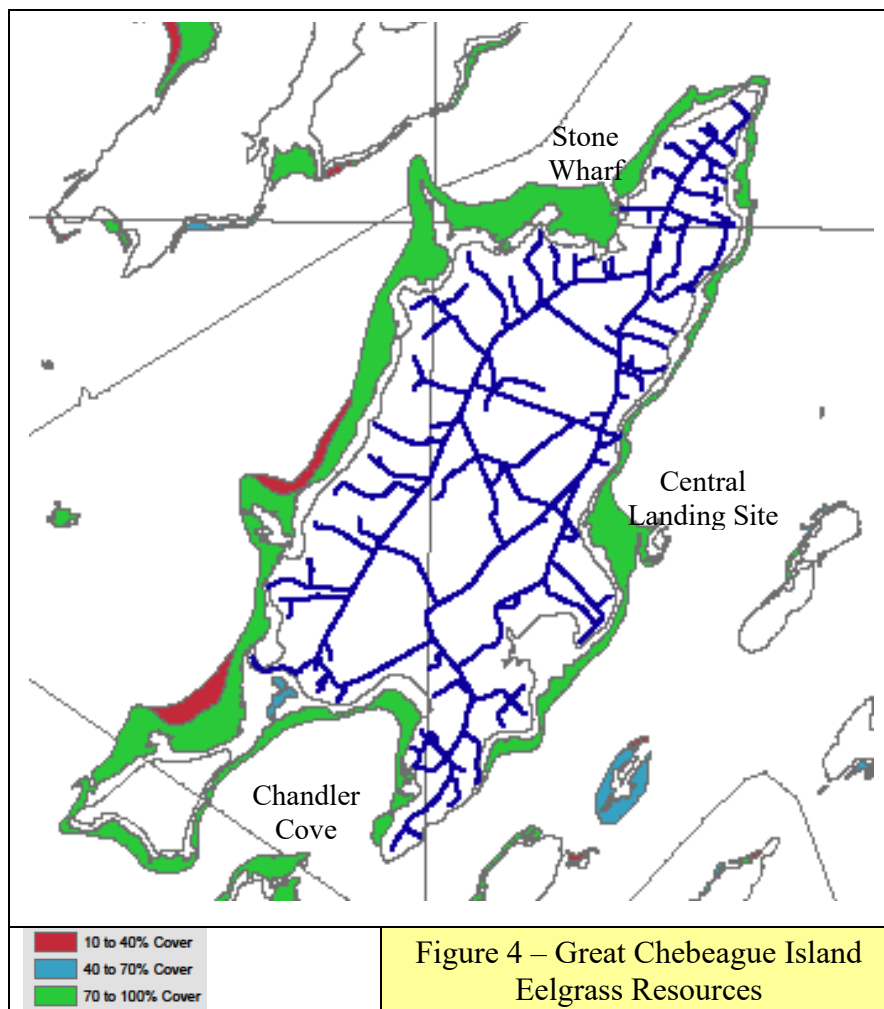
Two other measures were initially evaluated to improve navigation within the project area but rejected from further analysis. These measures involved channel improvements and new shore facilities at two different existing seasonal docking areas on Great Chebeague Island (see Figure 2).

Plan C – Chandler Cove Landing: The first additional docking area considered was at Chandler Cove on the southeast end of the island, which has a timber and plank state pier and is used by the Casco Bay Line interisland ferry (four to six calls a day), some fishing boats, and seasonally by recreational craft. This cove is exposed to southerly winds and storms from the Atlantic during the late fall to early spring seasons. The timber pier at the cove does support landing small vehicles but is insufficient for use for heavy freight. There is limited barge landing of smaller commercial vehicles over the beach at Bennett's Cove to the south of Chandler Cove using planks in lieu of a ramp (observed during site visit). For this site to be developed as a year-round landing, a new heavier-duty pier and paved boat/barge ramp would be required to accommodate greater barge service. Expanded parking facilities would be needed, as well as some form of storm protection (a short breakwater or wave attenuation structure extending west from the southeastern point), and dredging improvements to make those facilities accessible at all tides. Additionally, Chandler Cove is farther from the Cousins Island wharf (about 5.8 miles, more than three times the distance of Stone Wharf), and so the ferry ride would be longer.

Plan D – Former Central Landing Site: The second alternative landing area considered was the former central landing area on the east side of the island. The Central Landing site was abandoned after World War II. This site has been privately owned with no public access since about the 1950s. The Chebeague Island Boatyard is located a half mile south of the old

landing area and has a dock and floats for small recreation vessels. This area has never been dredged and is completely exposed to the southeasterly weather coming from the Atlantic and the Bay. A year-round public landing facility at this site for the ferry, fishing fleet, and freight barges would require public acquisition of sufficient property, road and parking area improvements, a new offshore breakwater to shelter the site, construction of a new heavy-duty wharf and ramp to accommodate the need for a ferry terminal and paved barge ramp, and dredging a channel and turning basin to provide access those shore facilities. Additionally, it would require traveling all the way around Great Chebeague Island to get to the Cousins Island ferry dock, about 5.1 miles by vessel, three times the distance of Stone Wharf.

Both of these alternative locations (Chandler Cove and Central Landing) were deemed impracticable for the needs of the project due principally to the extent of shore facility modifications that would need to be made, the increased distance to the island's mainland access terminal at Cousins Island, and the need for wave and storm protection structures to make the sites usable year-round, and were therefore eliminated from further consideration. Dredging and breakwater construction would have significant impacts on the extensive eelgrass resources in both these areas, though more so at the central landing site (Figure 4).



### 3.4 Dredged Material Management Measures

Several measures for suitable placement of the dredged material were considered. Parameters such as material suitability, environmental impact, cost, and engineering feasibility were considered in the analysis. Variables that were addressed included haul method and distance, special handling of the dredged material, the method of dredging required by the placement method, and the need for any containment or treatment of the dredged material. The material to be dredged at Great Chebeague Island is a mixture of sand, silt and gravel, based on sampling and testing performed in 2019 by the USACE (see Appendix F). Additionally, experience has shown that improvement dredging in Maine coastal waters often requires boulder removal, typically handled by a boulder and debris line item in the dredging contract, and through risk analysis and contingencies developed for the cost estimate. These factors would limit dredging methods to a mechanical bucket dredge or excavator.

There are a number of historic open water disposal areas in state waters in Casco Bay that were last used several decades ago. State and Federal resource agencies, local lobstermen, and the sponsor raised significant concerns with re-opening these areas, principally the impact of fisheries and shellfish resources in these inshore areas, and the need for extensive surveys and site evaluations to support a return to use as active dredged material placement sites. Given the nearshore impacts, and the difficulty and expense of reactivating one of these historic sites, in-bay disposal measures were dropped from further consideration.

The nearest ocean placement site in Federal waters is the Portland Disposal Site, located offshore of Casco Bay about 14 miles south of Great Chebeague Island. The Portland site is an EPA designated ocean disposal site under the Marine Protection Research and Sanctuaries Act (MPRSA). Portland is the most active dredged material placement site in Maine and is the site used for other FNPs in Casco Bay such as Portland Harbor and the Royal River. The majority of the site, including those areas currently used for dredged material placement, is located seaward of the three mile limit. A suitability determination for placement of the Great Chebeague Island dredged materials at the Portland site was prepared based on sediment chemistry, toxicity testing, bioaccumulation testing, and evaluation of human health risk. This suitability determination was concurred in by the USACE and EPA (See Appendix H).

Measures that would beneficially use the dredged material were also considered. Potential beneficial-use measures include placement on or nearshore to shorelines for beach nourishment and thin layer placement on tidal marshes. Core logging and geotechnical test results revealed interlayered silts, sands, and gravels. The nature of the material to be dredged is not compatible with either nearshore bar placement or direct beach placement. No locations were identified near the project area for marsh restoration to utilize the material for thin layer nourishment. Therefore, beneficial use was not further considered in this feasibility study.

Upland placement of the dredged materials would require extensive re-handling of the material, which would have to be dredged from the harbor, transferred ashore, dewatered in an area adjacent to the harbor, and then loaded onto trucks and taken to an upland disposal area. Dewatering would require construction of a diked containment to hold the dredged

material and dewatering of the material would take several months and potentially up to one year. The town was consulted during the study on opportunities for upland placement and beneficial use of the dredged material. There is no appropriate dewatering area near the Town Landing at Stone Wharf. The area around the pier for more than 1,000 feet in all shoreward directions is a municipal golf course and private residences. The former town landfill and current recycling and transfer station is located a little more than two miles from the Stone Wharf. Marine sediment placed upland may impact the island's aquifer, the source of all potable water on the island. If the material is not needed on the island, or cannot be permanently placed onshore, then it would have to be moved by scow to the mainland. Given the excessive amount of re-handling, lack of available area for dewatering, and issues with placement of marine sediment upland, this dredged material placement option is not being considered as an alternative.

The town is investigating the feasibility of repairing and expanding sections of the Stone Wharf in the near future and is looking at sources of solid fill to facilitate such repairs. This work will not impact the feasibility and justification of the proposed channel and turning basin improvements. Some of the dredged material from the channel and turning basin improvements may be suitable for such use as structural fill. However, the ability of the town to complete plans and secure the necessary state and Federal permits for such a project in time to receive the dredged materials is unknown and perhaps unlikely given the regulatory hurdles with permitting solid fill structures. While this use could be re-examined during the design phase of the navigation dredging project, at this time the concept seems tenuous at best, and is not sufficiently developed to consider for purposes of this analysis and report.

The study team concluded that placement of the dredge material at the Portland Disposal Site (PDS) was the only viable measure for dredge material management at this time, and will be carried forward as the most practicable and permissible placement measure for the dredged material from Great Chebeague Island.

### **3.5 Results of Initial Screening and Identification of Alternatives**

Of the four initial alternatives for providing safe year-round navigation access to Great Chebeague Island only the two plans for improvements to access to the town landing at the Stone Wharf were determined to be practicable. Both alternatives (Plans A and B) included dredging a channel and turning basin at the Stone Wharf and placing the dredged material in Federally regulated ocean waters at the Portland Disposal Site. Additionally, Plan B would provide anchorage areas on both sides of the channel to allow the existing commercial and recreational fleets to anchor closer in-shore to the landing.

Both Plans A and B address the planning objectives for this study. Both improve navigation safety and reduce tidal delays and groundings by providing improved channel and turning basin dimensions. Plan B includes the components of Plan A and adds anchorage areas for the commercial and recreational fleet. Both plans include mitigation for impacts to submerged aquatic vegetation (eelgrass). While provision of additional improved anchorage area would be beneficial to the town, providing year-round anchorage for recreational vessels

is not a priority. Town expressed a preference for Plan A, given the lower cost and the greatly-reduced impacts to submerged aquatic vegetation important to the Bay's fisheries. Table 2 summarized the results of the initial screening of alternatives.

<b>TABLE 2</b> <b>Results of Initial Screening of Alternatives</b>				
Alternative	Completeness	Effective	Efficient	Acceptable
Plan A – Channel with Turning Basin at Stone Wharf	Dredging with Ocean Disposal and Limited SAV Mitigation	NED Benefits. Provide Safe Year-Round Access	Meets Objectives at Limited Cost.	Disposal found Suitable. SAV Mitigation is Limited
Plan B – Plan A plus Anchorage Areas	Dredging with Ocean Disposal and Greater SAV Mitigation	NED Benefits but much Higher Cost. Provide Safe Year-Round Access plus Fleet Expansion	Meets Objectives at Limited Cost, but Impacts Larger Area	Disposal found Suitable. SAV Mitigation is Significant. Cost Higher
Plan C – New Harbor at Central Landing Site	Dredging with Ocean Disposal, but Requires New Landing Facility and Breakwater	Provide Safe Year -Round Access. Navigation Benefits Offset by Longer Transit	3 Times More Distant from Mainland Terminal	Significantly Higher Cost. New Structures would have Greater Impacts.
Plan D – Improvements at Chandler Cove	Dredging with Ocean Disposal, but Requires Expanded Heavy-Duty Landing Facility	Provide Safe Year-Round Access. Navigation Benefits Offset by Longer Transit	3.5 Times More Distant from Mainland Terminal	Significantly Higher Cost. New Structures would have Greater Impacts. SAV Mitigation is Significant.

Both Plans A and B are complete within themselves and no additional work is required beyond dredging and eelgrass mitigation for either plan to meet the planning objectives and generate its anticipated benefits when compared to the without-project condition.

Plans A and B are effective in that they meet the planning objectives while also yielding net economic benefits for the Town. Both plans provide for improved safe year-round access to Great Chebeague Island for the ferry and barge services and for the commercial fishing fleet.

Plans A and B are efficient in that they address the problems and opportunities at the least expense relative to the other two alternatives. Incremental depth optimization to determine the depths that result in the maximum net benefit will be evaluated later.



Plans A and B are acceptable to the Sponsor, local community, and some harbor users from engineering design and economic viewpoints. However, the much larger impact of Plan B on eelgrass resources is a significant concern to Federal and State resource agencies, area fishermen, and town officials. The Plans differ in their compatibility with existing laws, regulations, and public policies, due to the different level of SAV impact. The Town expressed a preference for Plan A, given their needs and the lower cost.

### **3.5.1 System of Accounts**

The Principals and Guidelines for Water and Related Land Resource Implementation Studies (P&G) require all studies to consider the impact of various alternatives with respect to four accounts, National Economic Development, Environmental Quality, Regional Economic Development and Other Social Effects.

National Economic Development (NED): Plans A and B produce net NED benefits (benefits greater than the costs of the improvements) by contributing to improvement in the safety and efficiency of navigation. Plans C and D would both require significantly greater investment in new harbor development and shore facilities to relocate year-round access for the island. Plans C and D would base fleet operations farther from the existing mainland terminal and would result in higher operational costs for services.

Environmental Quality (EQ): All plans involve dredging to improve navigation access and would dispose of the dredge material at the Portland Disposal Site in Federal waters. Dredging results in disturbance to the harbor bottom and a temporary loss of benthic biota and other minor impacts. Plan B would impact a much greater extent of SAV than Plan A and would require significantly greater mitigation for that loss. Placement of the dredged material will bury benthic biota in the offshore disposal site. All of these impacts will be temporary and are not considered significant. Constriction of new structures in Plans C and D would permanently impact greater areas of the bay bottom.

Regional Economic Development (RED): The benefits of harbor deepening and navigation improvements typically extend beyond the NED benefits which are measured on the vessel and at the dock in terms of operational efficiencies (crew time, fuel, repairs, etc.), costs of transporting cargo and passengers, and changes in vessel value of catch landed. More economic activity on the water generally means more activity shore side for provisioning ships, servicing ships, offloading and processing, marketing, buying and transporting catch, operating and maintain shore facilities, operating the port, and other activities. These are examples of the RED benefits that could be expected to accrue to the region from harbor improvements under any of the four initial alternatives.

Other Social Effects (OSE): Other Social Effects include those that extend beyond economic development and environmental quality to include impacts to the community, human health and safety, energy conservation, and cultural resources impacts. Those working in the fishing fleet and for the ferry and barge services, those who provision and service the boats and shore facilities, and those who process, transport and distribute their passengers, goods, and catch are members of the community to which their employment contributes. Navigation



improvements that improve the ease-of-use and efficiency of port operations and navigation safety will have a positive effect on the community as a whole. Improving safety for vessels and port operations and helping to ensure timely delivery and freshness of catch contribute to human health and safety. Improving navigational efficiency would contribute to energy conservation by saving the fishing fleet at sea time and fuel if improvements were made at the existing landing at Stone Wharf. Development of other harbors more distant from the mainland as in Plans C and D would require greater expenditures of time, labor and fuel. Delivery of emergency services and transport of passengers, including commuting school children, would all take longer under Plans C and D.

The results of cultural resource investigations and coordination with state and tribal cultural resource officials have concluded that dredging and dredged material disposal under Plan A and B would have no significant impact on historic or archaeological resources.

## **4 COMPARISON AND EVALUATION OF DETAILED PLANS**

### **4.1 Development of Detailed Plans**

Screening of alternatives eliminated those which involved development of a new island ferry terminals and harbor facilities at sites other than the existing town landing at Stone Wharf. Consultation with the town and resource agencies also resulted in elimination of plans including anchorage areas at the town landing due to SAV resource concerns. The only plan carried forward for detailed development and analysis is Plan A for a channel with a turning basin at the Stone Wharf and boat ramp at the existing year-round town landing nearest the mainland ferry terminal on Cousins Island.

The Stone Wharf at Great Chebeague Island's town landing already has parking facilities, a boat/barge ramp, and docking space for vessels. The town landing at Stone Wharf is located on the northwest side of the Island and is protected from prevailing winds and storms of the Atlantic and is closest to the ferry pier at Cousin's Island and that island's bridge to the mainland. The Town would continue to maintain the berths between the channel and the wharf/floats and the area between the base of the barge ramp and the turning basin. This measure supports the Town of Chebeague Island and protects the public safety of the island's residents. This measure provides the dimensions necessary to accommodate the expected vessel use at the Great Chebeague Island landing and the Stone Wharf, allows for sufficient area for maneuvering boats, and accommodates the need for continued use of shore facilities.

Hydrographic surveys and other investigations were performed to determine the best channel alignments, avoid ledge areas, and determine the volumes and types of dredged material requiring removal. Dredging projects with design depths of less than 15 feet typically include a one-foot allowable overdepth pay increment to account for dredging efficiencies. Quantity estimates for the various depths evaluated for the channel and turning basin are shown below in Table 3. Quantity estimates for the anchorage areas are provided for informational purposes only as these plans were not carried forward for detailed analysis.

<b>TABLE 3 – Dredging Volume and Area Estimates</b>				
Design Depth (MLLW)	Required Dredging CY	Allowable Overdepth CY	Total Cubic Yards Dredged	Area Dredged (SF)
<b>Channel</b>				
8 Feet	8,700	3,600	12,300	91,100
9 Feet	12,300	4,300	16,600	110,560
10 Feet	16,600	5,000	21,600	122,690
11 Feet	21,600	6,000	27,600	130,300
<b>Turning Basin</b>				
6 Feet	7,500	1,400	8,900	39,700
7 Feet	8,900	1,500	10,400	41,670
8 Feet	10,400	1,600	12,000	43,710
9 Feet	12,000	1,700	13,700	45,800
10 Feet	13,700	1,700	15,400	47,940
<b>Northeast Anchorage – 13 Acres</b>				
6 Feet	2,300	4,100	6,400	153,310
7 Feet	6,400	6,900	13,300	241,570
8 Feet	13,300	10,500	23,800	331,000
9 Feet	23,800	13,700	37,500	402,190
<b>Southwest Anchorage – 13 Acres</b>				
6 Feet	34,700	18,400	53,100	572,800
7 Feet	53,100	23,500	76,600	706,120
8 Feet	76,600	28,500	105,100	823,020
9 Feet	105,100	32,100	137,200	896,270
Note: All estimates include a 1:3 side slope. Allowable overdepth is 1 foot.				

## 4.2 General Comparison

The alternatives to improve navigation at Great Chebeague Island consist of several channel and turning basin depths to provide access from deep water in Casco Bay to the public landing at Stone Wharf. The depths evaluated for Plan A consist of depths between -8 feet and -11 feet at MLLW, with depths in the turning basin at two feet less than those in the channel due to the difference in drafts of the vessels using the wharf v. those using the boat/barge ramp. Table 4 summarizes the alternative project depths and the expected results from implementation with respect to the project purpose and need. The channel widths of 100 feet between the bay and the wharf and 150 feet alongside the wharf were considered the minimum needed for safe navigation for the sizes of vessels using the wharf. The configuration of the turning basin was determined to provide adequate maneuvering area for the barge traffic while avoiding areas of ledge to the south of the ramp. Each incremental alternative differs in benefits, costs, and the amount of material dredged. Figure 3 shows the location of the proposed alternatives.

Subsurface analysis indicates that the removal of rock or ledge is not required for any plan evaluated. The material to be dredged for Plan A and Plan B is mixed sand, gravel, and silt and is deemed suitable for disposal at the offshore Portland Disposal Site which has been used before to dispose of dredge material from projects in southern Maine, including the Casco Bay area.

A range of channel and turning basin depths between six feet and 12 feet below MLLW were evaluated to aid in determination of the USACE optimal plan. The shallowest channel depths of -6 and -7-foot deep MLLW, were eliminated due to continued significant tidal restrictions to the ferry and barges. The deepest channel depth of 12 feet below MLLW was also eliminated as a measure because none of the vessels currently using the site need a 12-foot channel to navigate and maneuver, even at lower tides. The 10, 11, and 12-foot turning basin depths were also eliminated because the ferry and most other vessels can maneuver successfully in the 150-foot wide dredged channel along the wharf, and the barge services and other boats using the ramp only require eight to nine feet of depth to maneuver safely in that location. The barges generally have drafts two feet less than those of the ferries (see Table 1). The fishing fleet uses both the pier and the boat ramp for access and service. Therefore, the range of depth optimization measures involved four separate increments as follows, and will be measured according to their ability to reduce tidal delays and the potential for vessel groundings:

- Plan A-1 - 8-foot channel with 6-foot turning basin
- Plan A-2 - 9-foot channel with 7-foot turning basin
- Plan A-3 - 10-foot channel with 8-foot turning basin
- Plan A-4 - 11-foot channel with 9-foot turning basin

Table 4 below shows the quantity estimates for the four combined depth increments.

<b>Table 4</b> <b>Navigation Improvement Plan Description - Plan A Details</b> <b>Great Chebeague Island, Maine</b>			
Depth Increment	Required Dredging (CY)	Allowable Overdepth (CY)	Total Dredge Volume
8-Foot Channel with 6-Foot Turning Basin	16,200	5,000	21,200
9-Foot Channel with 7-Foot Turning Basin	21,200	5,800	27,000
10-Foot Channel with 8-Foot Turning Basin	27,000	6,600	33,600
11-Foot Channel with 9-Foot Turning Basin	33,600	7,700	41,300

Incremental analysis of the several depth options was carried out to determine the optimal depth that would yield the greatest net economic benefits. This analysis is summarized here and described in greater detail in Appendix D – Economic Assessment. Cost estimates and development of project benefits for incremental optimization of Plan A were prepared at both FY20 and FY21 price levels. Cost estimates for each depth increment were updated in September of 2020 for Fiscal Year 2021 (October 2020) Price Levels and are presented later. Economic benefits of the project were also updated to FY21 price levels, and incrementalized for each depth. Both costs and benefits were annualized at their present worth and the annual costs of each increment were compared to the annual benefits using FY2020 interest rates (2-7/5% over the 50-year period of analysis).

### 4.3 Project Cost Estimates

Several assumptions were made to evaluate the projected costs as follows:

- Acquisition Strategy – Based on the limited size of the project, limited complexity, and previous work of this type on the Maine coast, it was assumed that the project would be advertised as a small business set-aside solicitation for a mechanical dredging with ocean placement.
- Mobilization and Demobilization were estimated based on a distance of 200 miles which would attract small dredging contractors in northern New England.
- Planning, Engineering, and Design (PED) as well as Supervision and Administration (S&A) amounts were developed by District Cost Engineering and resource provider elements and include contingencies.
- Abbreviated Risk Analysis utilized in the project development stage resulted in contingencies of 20% to 39% for construction line items, 12% for PED, and 23% for S&A.
- Based on experience with other similar work in the area dredging and disposal would be limited to a period of roughly October to March, though specific resource impacts may restrict the work further.
- Mitigation of eelgrass impacts would be accomplished by contribution to the Maine in-lieu fee program at a rate related to the total area of impact.
- Cost would include post-construction monitoring of adjacent eelgrass beds and any recolonization of eelgrass within the dredged area.
- Estimates are based on a 10 cubic yard bucket dredge or excavator, two or more scows of about 1500 CY, and a tug to tow the scows to the disposal site. Small survey and workboats would also be used.

Project first costs and annual charges are directly related to the volume of material to be removed, increasing as the dredging depth increases. Construction costs are from the 8 September 2020 updated cost estimate and will be reviewed and certified by the USACE Cost Engineering Center of Expertise. Table 5 compares the construction costs and annual costs associated with each of the incremental depths analyzed for Plan A for FY21 price levels.

Planning, Engineering and Design Costs: Each of the plans evaluated consists of the same project features and are small in scope to the point that Planning, Engineering, and Design (PED) costs are the same for all plans. Surveys and other site investigations would cover the same project area regardless of depth increment. Whether alone or combined all work would fit on a single drawing, have a single dredging line item, and result in no difference in the cost of design investigation or bid document preparation.

Construction Management Costs: Similarly the minor nature of the improvements and the short on-site construction duration (4 to 6 weeks) result in Construction Management (CM) costs that are nearly the same for the two plans, and so will be expressed as a percentage of the construction cost. Construction Management includes the costs of contract administration, supervision and inspection. The cost of CM activities from award through mobilization to arrival at the project site, and post-construction will likely be greater than actual inspection costs during dredging. The resulting total first cost of design and implementation is the amount cost-shared with the non-Federal Sponsor.

Aids to Navigation: No new USCG or local aids to navigation would be required. Along the ferry route the shoal between Great Chebeague and Littlejohn Islands is already marked by a lighted red buoy. The ferry landings at both terminals are well lighted and are marked with private aids placed and maintained by the ferry company.

Eelgrass Impact Mitigation: Dredging of the channel, and to a lesser extent the turning basin, would remove a small portion of the harbor's eelgrass beds and would require mitigation. This will be discussed in more detail in Section 4.6.3. Mitigation for eelgrass impacts in Maine has focused on direct in-kind mitigation through planting of new eelgrass in areas identified for restoration, or by payment into the State's in lieu fee program. Direct in-kind mitigation is the preferred method, and the costs provided in the estimates are for that method.

Appendix C, Cost Engineering, provides a more detailed cost breakdown including total project cost summary and contingency risk analysis.

Annual Costs: Annual costs include interest and amortization of the implementation cost plus the annualized cost of future project operation and maintenance. Implementation cost is the first cost plus a factor applied for interest during construction (IDC) based on the construction duration. Interest and amortization (I&A) is based on the interest rate for the current Federal fiscal year, 2-1/2 percent amortized over 50 years in the case of navigation projects, or a factor 0.03526. Construction of the project, given its limited scope and straightforward method is estimated to take about 4 to 6 weeks, increased to two months to cover mobilization and demobilization.

Annual Maintenance: The frequency of USACE navigation project maintenance of the channel and turning basin is expected to be minimal due to the strong tidal flushing in Casco Bay and comparison with similar projects along the Maine coast. The town landing at Stone Wharf is located on the island's protected lee shore and erosion on the adjacent rocky shoreline is minimal. There are no rivers entering the vicinity of the landing or any large rivers entering that area of the bay. Other non-riverine harbors on the Maine coast such as Bass Harbor and Bucks Harbor did not require maintenance for more than 40 to 50 years after

their initial construction. The limited dredging to remove high shoal spots at the Stone Wharf was done 17 year ago by the Town of Cumberland in 2003. Maintenance of the proposed channel and turning basin would be required when shoaling has compromised the underkeel clearance needed for all-tide operation, for a shoal volume of about 40% of the initial improvement volume. Regardless of depth, maintenance would likely be on at least a 20-year frequency, or about twice during the 50-year project life. To be conservative in terms of benefit-cost analysis, future maintenance dredging will be expressed as about two percent of the first cost (without mitigation).

<b>Table 5</b> <b>Great Chebeague Island – Costs of Detailed Plans</b> <b>(Costs at October 2020 Price Levels – FY21)</b>				
Cost will be MDX Certified	A-1	A-2	A-3	A-4
Channel Depth	8-Feet	9-Feet	10-Feet	11-Feet
Turning Basin Depth	6-Feet	7-Feet	8-Feet	9-Feet
Total Cubic Yards	21,200	27,000	33,600	41,300
Mobilization/Demobilization	\$512,000	\$512,000	\$518,000	\$524,000
Dredging and Disposal	<u>268,000</u>	<u>330,000</u>	<u>411,000</u>	<u>519,000</u>
Subtotal	\$780,000	\$842,000	\$929,000	\$1,043,000
Contingencies	<u>\$200,000</u>	<u>\$223,000</u>	<u>\$256,000</u>	<u>\$297,000</u>
Subtotal	\$980,000	\$1,065,000	\$1,184,000	\$1,340,000
Planning, Engineering and	303,000	303,000	303,000	303,000
Construction Management	69,000	69,000	69,000	69,000
SAV Mitigation and Monitoring	<u>307,000</u>	<u>324,000</u>	<u>341,000</u>	<u>360,000</u>
Total First Costs	\$1,659,000	\$1,761,000	\$1,897,000	\$2,072,000
Construction Timeline (months)	2	2	2	2
Interest During Construction	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>
Total Investment Cost	\$1,661,000	\$1,763,000	\$1,899,000	\$2,074,000
ANNUAL COSTS				
Interest & Amortization 2-1/2% - 50 Years (0.03526)	\$58,600	\$62,200	\$67,000	\$73,100
Maintenance Dredging	<u>27,000</u>	<u>28,700</u>	<u>31,100</u>	<u>34,200</u>
Total Annual Charges	\$85,600	\$90,900	\$98,100	\$107,300
Annual Shoaling (CY)	400	500	700	800
20-Year Shoal Volume	8,000	10,000	14,000	16,000
15-Year Shoal Volume	6,000	7,500	10,500	12,000



## 4.4 Project Benefits

This section summarizes the benefits of deepening the channel and turning basin to the combined incremental depths. Table 6 summarizes the breakdown of annual project benefits for the depth increments using FY20 price levels and also as updated to October 2020 (FY21) price levels. Project benefits are benefits to commercial navigation; the ferry and barge services and the commercial fishing fleet. Commercial navigation benefits were derived from reductions in waterway congestion and tidal delays, vessel grounding damage cost, lost labor cost, increased fuel consumption cost and increased ordinary maintenance costs. The benefits of the proposed improvement have been based on the following assumptions (see Appendix D for a discussion of project benefits in greater detail).

Commercial Navigation Benefits: Commercial benefits are calculated using information provided by the Harbormaster, town administrator, and the Chebeague Transportation Company. The Harbormaster identified 64 commercial vessels that regularly use the proposed improvement area. These 64 vessels include 44 commercial fishing vessels, six passenger ferries, three freight barges and one push boat. Based on information collected from port officials and in discussion with the Harbormaster, the commercial fishing vessels make an average of 180 trips per year and generally have a crew of two to three, depending on the size of the vessel.

The new channel and turning basin would reduce tide delays and related labor and fuel costs incurred while waiting for the tide to come up to access the floating dock, wharf, and boat/barge ramp. Delays due to inadequate landside off-loading capacity, including lack of space for lobster pods and fishing gear, would not be reduced by the proposed project. The deeper channel would provide all tide access to the Stone Wharf, preventing labor and fuel costs incurred during tide delays. The proposed turning basin would provide all tide access to the boat/barge ramp and prevent costly tide delays experience by the CTC barge and service vessels, as well as providing sufficient room for vessels to safely maneuver. The proposed channel and turning basin would also prevent potential increased maintenance costs incurred when the ferry or fishing vessels bump bottom due to insufficient depth.

Average tidal delays were calculated by vessel draft using a mean tide chart based on a 9.1-foot mean tidal range and an underkeel clearance requirement of two feet for fishing and commercial non-fishing vessels and three feet for ferries. Benefits to the proposed channel widening are calculated for the 64 vessel that regularly transit the area of the proposed channel, in the following categories:

- Elimination of tidal delays would result in decreased labor and fuel costs for harvest of the existing catch, and reduced operating costs for the ferry and barge services.
- Increasing the channel depth and length would reduce grounding damage and provide maneuverability and access to existing town landing facilities (wharf and ramp).

The benefits to the existing commercial fleet and the Town would occur immediately following the implementation of these improvements. The navigation improvements will not affect harvest rates or prices for the commercial fish market. The commercial fishing fleet benefits result in a reduction in harvesting costs for the existing level of catch.

Recreational Navigation Benefits: Recreational benefits accrue to users of the harbor from increased accessibility and improved safety once the channel and turning basin have been constructed. To estimate the value of improvement in the recreational quality with the project, the Unit Day Value method was used. Benefits were calculated for the 100 recreational vessels using the channel during the warmer season (as provided by the Harbormaster).

<b>Table 6</b>				
<b>Great Chebeague Island – Annual Tidal Delay Benefits of Detailed Plans</b>				
FY 2020 Price Levels	Plan A-1	Plan A-2	Plan A-3	Plan A-4
Channel Depth	8-Feet	9-Feet	10-Feet	11-Feet
Turning Basin Depth	6-Feet	7-Feet	8-Feet	9-Feet
Commercial Fishing Fleet				
Labor Cost Prevented	\$88,200	\$96,200	\$98,500	\$98,500
Fuel Cost Prevented	\$36,700	\$40,000	\$41,000	\$41,000
Commercial Non-Fishing Craft				
Labor Cost Prevented	\$72,800	\$72,800	\$72,800	\$72,800
Fuel Cost Prevented	\$16,500	\$16,500	\$16,500	\$16,500
Commercial Passenger Ferries				
Labor Cost Prevented	\$225,800	\$272,300	\$319,300	\$319,300
Fuel Cost Prevented	\$51,100	\$61,700	\$72,300	\$72,300
Total Annual Commercial Navigation Benefits	\$491,100	\$559,500	\$620,400	\$620,400
Recreational Navigation Benefits	\$16,400	\$16,400	\$16,400	\$16,400
Total Navigation Benefits	\$507,500	\$575,900	\$636,800	\$636,800
Project Benefits as Updated to FY 2021 Price Levels				
Total Annual Commercial Navigation Benefits	\$505,400	\$575,800	\$638,500	\$638,500
Recreational Navigation Benefits	\$16,900	\$16,900	\$16,900	\$16,900
Total Navigation Benefits	\$522,300	\$592,700	\$655,400	\$655,400

Details on recreational navigation benefits can be found in Appendix D – Economic Assessment. Recreational activities are evaluated based on five criteria that characterize the quality of the recreational experience. Point values for the existing without-project conditions are compared to the with-project condition. Total point values are converted to dollar values based on current Corps guidance as contained in EGM 19-03 Fiscal Year 2019. Additional recreational benefits of approximately \$16,900 would be realized if the channel and turning

basin are constructed. Since the recreational fleet is composed of smaller craft that will have full access with an 8-foot channel recreational benefits are the same for all four depth alternatives.

The number of recreational users will likely increase when the channel and basin are constructed. However as dredging to provide increased anchorage depth is not included in the project access benefits are only based on channel improvements. An increase in the recreational fleet was not included in this analysis. Total project benefits are summarized in the table below. Under USACE policy recreational benefits can be included in project justification provided they total no more than 50 percent of total project benefits, which is the case for this project.

#### 4.5 Benefit-Cost Comparison

Table 7 provides a summary of annual project benefits compared to annual project costs for the incremental depth options under Plan A. Appendix C – Economic Analysis provides greater detail on the cost-benefit analysis. A project or increment is economically justified based on a benefit-cost ratio greater than 1:1. Costs and benefits are based on a 50-year evaluation period, starting in 2022, and presented in annual terms updated to FY21 price levels and using the FY21 Federal interest rate for water resources projects of 2-1/2 percent.

<b>Table 7</b> <b>Plan A Project Depth Optimization - Benefit-Cost Analysis – FY21</b>				
Alternative and Depth Increment	Annual Costs	Annual Benefits	Net Annual Benefits	Benefit-Cost Ratio
Plan A-1 8-Foot Channel with 6-Foot Turning Basin	\$85,600	\$522,300	\$436,700	6.1
Plan A-2 9-Foot Channel with 7-Foot Turning Basin	\$90,900	\$592,700	\$501,800	6.5
Plan A-3 10-Foot Channel with 8-Foot Turning Basin	\$98,100	\$655,400	\$557,300	6.7
Plan A-4 11-Foot Channel with 9-Foot Turning Basin	\$107,300	\$655,400	\$548,100	6.1

The total annual benefits for each project alternative are weighed against the costs of each alternative to determine the benefit-cost ratio. The benefit-cost ratio of each alternative is determined by dividing its total annual benefits by its total annual costs. A project is

considered economically justified if it has a benefit to cost ratio of 1.0 or greater. Net annual benefits are determined by subtracting annual costs from annual benefits. The alternative that maximizes net annual benefits is the National Economic Development (NED) plan.

Based on depth optimization and benefit-cost analysis, constructing a new Federal Navigation Project at the Great Chebeague Island landing at Stone Wharf with a channel and turning basin at depths of -10 feet and -8 feet MLLW, respectively, provides the greatest net project benefits.

## **4.6 Environmental Impacts**

The proposed Federal action has been reviewed under the authorities of the National Environmental Policy Act and all applicable Federal environmental laws, regulations, Executive Orders and Executive Memorandums. The EA included with this report provides additional information on the projected impacts of construction including the expected impacts to habitats and environmental resources from dredging and at the disposal site. This section summarizes the expected environmental effects from dredging and disposal of dredged material.

### **4.6.1 Dredged Material Suitability**

The materials to be dredged have been sampled and tested for physical and chemical parameters and subjected to biological testing. All materials have been found to be clean mixed silt, sand, and gravel and suitable for placement at the Portland Disposal Site. There are no hazardous, toxic, or radioactive wastes (HTRW) associated with the project. A dredged material Suitability Determination was prepared covering the sampling and testing process and results and determining that the material was suitable for the intended disposal site (see Appendix H). The EPA and state have concurred in this determination.

### **4.6.2 General Environmental Effects of Dredging**

Dredging would result in the removal of sub-tidal benthic habitat and temporary increases in turbidity. The loss of non-motile benthic organisms from the project area during dredging is unavoidable, however, the area would likely be recolonized by similar species within a matter of months. Motile species such as lobsters, crabs and finfish should be able to avoid the area during dredging operations and are expected to return after the dredging is finished and so should not be significantly impacted by the project. Dredging will be scheduled between 1 October and 1 April, to avoid impacting marine resources. No significant shellfish beds are located in the area proposed to be dredged. Temporary short-term impacts to fish resources in the project area are anticipated but not considered significant. The small size of the project and use of a mechanical dredge minimizes the potential for turbidity impacts.

### **4.6.3 Eelgrass Impacts**

As discussed earlier extensive eelgrass beds surround most of Great Chebeague Island and neighboring areas of upper Casco Bay. Eelgrass beds are present around all of the island's

landing sites. At the Stone Wharf past dredging of shoals and the scouring action of ferries, barge tugs and other vessels has displaced eelgrass from most of the channel and basin area and along the wharf. Eelgrass does occupy the side slope areas along the western side of the channel and the northwestern corner of the turning basin area. These project features have been minimized to the extent practicable to avoid this impact while providing for safe navigation of the ferries and barges that must use these areas. The reaches of the channel seaward of the wharf have been narrowed to the minimum needed for safe navigation of the ferry and fishing boats. It is assumed that traffic in the channel would be one way during barge transits. Still some amount of eelgrass would be removed during dredging of the channel and mitigation for this loss would be required. The table below shows the extent of eelgrass impacts with each of the four incremental project depth alternatives and the costs for mitigation. Mitigation for eelgrass impact in Maine has focused on either direct in-kind mitigation through planting of new eelgrass beds in areas where the resource was formerly present, or by payment into the state's in lieu fee program based on a per square foot rate established by the program. While costs for both methods are shown below, the preferred method for in-kind mitigation has been selected. These costs have been included in the cost estimate and include a 10 percent contingency.

<b>Table 8 – Eelgrass Mitigation Costs (FY21)</b>			
Alternative Depth Increment	Eelgrass Impact (SF)	In-Kind Mitigation	Maine In-Lieu Fee
		Cost	Cost
8-Foot Channel with 6-Foot Turning Basin	44,880	\$307,000	\$382,000
9-Foot Channel with 7-Foot Turning Basin	47,196	\$324,000	\$403,000
10-Foot Channel with 8-Foot Turning Basin	49,516	\$341,000	\$424,000
11-Foot Channel with 9-Foot Turning Basin	51,826	\$360,000	\$445,000

#### **4.6.4 Summary of Expected Disposal Impacts**

Disposal would consist of loading the dredged material into scows and transporting it 14 to 15 miles to the EPA designated Portland Disposal Site. The dredged sediments are all suitable for ocean placement. Biological impacts in the disposal site will vary. Mobile finfish and crustaceans are expected to avoid the disposal area and would not be impacted by this activity but benthic organisms such as clams and tube worms will be buried. It is anticipated that the density of these organisms will return to normal levels within several months. USACE made the preliminary determination that the proposed project is not likely to adversely impact any

state or Federally listed threatened or endangered species. Several listed marine mammals may occur as transient species in the general area but are unlikely to occur within the shallow depths of the dredging or placement areas.

#### **4.6.5 Summary of the NEPA Evaluation - Finding of No Significant Impact**

A NEPA evaluation (EA and draft FONSI) was prepared for the proposed action. Based on the findings the District Engineer has determined that the environmental effects for the improvement dredging at Great Chebeague Island (as presented in the Environmental Assessment) is not a major Federal action significantly affecting the quality of the human environment. The FONSI will be finalized when signed by the District Engineer at the conclusion of the 30-day public review period, and after consideration of all comments received.

#### **4.7 Real Estate Requirements**

No real estate interests are required for the project. All work at the dredging and ocean disposal sites and at the proposed eelgrass mitigation site would be seaward of MHW, within the waters of the United States, and subject to the Federal government's navigation servitude (see Real Estate Planning Report – Appendix E). All construction equipment would be waterborne plant (dredge, scows, tug, survey and work boats). No onshore staging would be required. The contractor would be responsible for securing shore side access for personnel and fuel according to their specific needs and equipment types and would account for this in their bid.

#### **4.8 Climate Change Analysis**

Climate change most often impacts navigation projects with respect to sea level rise and its potential to affect operation of shoreline facility access through flooding and restricting allowable air draft for vessel passage beneath bridges. There are no bridges over the routes between Great Chebeague Island and the mainland ferry terminals, Portland Harbor, or the open waters of the bay and ocean fished by its fleet. The Stone Wharf, with a top elevation of about +13 feet at MLLW, is now overtopped by high water about once annually when large storm surges occur atop the highest annual tide levels.

Due to the uncertainty associated with future sea level change, USACE policy is to look at three scenarios of sea level change and investigate impacts to project feasibility. The three sea level change scenarios are the low (historic) rate of SLC at the project site, an intermediate rate, and a high rate of SLC and include the global (eustatic) sea level rise rate and vertical land movement. These rates were calculated using the USACE Sea Level Change Calculator (Version 2019.21), using the closest NOAA tide station (Portland) also located on Casco Bay for the historic trend, to develop approximate changes in sea level rise for Great Chebeague Island from 2022 to 2122. This time range includes both anticipated project economic life (50 years) and the planning horizon (100 years).



Sea level change is expected to impact access to the Stone Wharf over time. To assess the wharf's vulnerability projected changes in sea level were added to existing water levels to evaluate if sea level rise will impact landslide infrastructure on or access to the wharf. Future Mean Higher High Water (MHHW) and Highest Annual Tide (HAT) water levels for the years 2072 and 2172 are provided in Table 9 for each scenario.

<b>Table 9 – Climate Change Analysis</b>			
<b>USACE Sea Level Change Rates – Future Scenarios</b>			
<b>Year</b>	<b>Low RSLC (Feet)</b>	<b>Intermediate RSLC (Feet)</b>	<b>High RSLC (Feet)</b>
2072	0.49	1.06	2.87
2122	0.80	2.30	7.07
Note: Sea level change values are relative to the base year of 1992 which corresponds to the midpoint of the current National Tidal Datum Epoch of 1983-2001			
<b>Projected Water Surface Elevations – Future Scenarios</b>			
<b>Year</b>	<b>Scenario</b>	<b>MHHW (Feet, MLLW)</b>	<b>HAT (Feet, MLLW)</b>
2072 (50 Years)	Low	10.40	12.29
	Intermediate	11.97	12.86
	High	12.78	14.67
2122 (100 Years)	Low	10.71	12.60
	Intermediate	12.21	14.10
	High	16.98	18.87

A comparison of the wharf elevation to the projected tide levels shows that the wharf is not projected to be impacted by MHHW alone under the three sea level change scenarios nor HAT alone under the low and intermediate sea level change scenarios through 2072. Looking out to 2122, the wharf will not be exceeded by MHHW alone under the low and intermediate sea level change scenarios nor HAT alone under the low sea level change scenario. This level of risk was not assumed to impact project feasibility. However, any future actions by the Town to repair or modify the Stone Wharf should take this analysis into account and consider increasing the deck elevation of the wharf to mitigate the impact of climate change on sea level.

## 5 THE RECOMMENDED PLAN

### 5.1 Description of the Recommended Plan

The Recommended Plan for navigation improvements, shown in Figure 5, is Plan A-3. The Recommended Plan is based on consideration of economic efficiency, minimization of environmental impacts, navigational safety, as well as the needs of the project Sponsor, state government and local stakeholders. Plan A-3, as optimized for project design depths, results in the greatest net benefits, and is the preferred National Economic Development (NED) plan. This plan provides the most favorable method for meeting the project objective of reducing navigation hazards and delays.



This plan would adopt a new Federal Navigation Project for Great Chebeague Island to improve access to the town landing at Stone Wharf. The recommended plan consists of a channel 100 to 150 feet wide by -10 feet MLLW extending from deep water in Casco Bay southeasterly about 1,600 feet to the public landing, with a 0.5 acre turning basin at a depth of -8 feet MLLW at the head of the channel off the boat/barge ramp. Dredging the channel and turning basin to the recommended depths would require removal of about 33,600 cubic yards of material. The dredging would be by mechanical dredge and use scows that will be able to operate in shallow draft areas in the harbor. Disposal of the dredged material would be at the EPA designated Portland Disposal Site, located in Federal waters outside the three mile limit (territorial sea) and about 14 to 15 miles south of the project area.

Plan A-3 has been developed consistent the USACE Environmental Operating Principals and in a manner which meets the goals of the USACE Campaign Plan with respect to water resources infrastructure and the civil works program. Plan A-3 has been formulated to meet the planning objectives for this project by improving the safety and efficiency of commercial navigation including ferry and barge services, and fishing fleet operations at Great Chebeague Island. All dredged material would be placed at the Portland Disposal Site. Plan A-3 meets the plan formulation criteria of completeness, effectiveness, efficiency, and acceptability and are compatible with existing laws, regulations, and policies.

Plan A-3 will have an overall positive impact from the perspective of other social effects by efficiently maintaining access to this island community at the least cost. Plan A-3 also retains access through the closet public landing area to the mainland for commuters, school children and emergency responders and other necessary island services.

The Environmental Assessment that accompanies this report addresses in detail the expected impacts to the environmental resources in the project area that would be affected by dredging and disposal. Impacts to eelgrass resources located within the dredged areas would be mitigated by in-kind replacement though planting of new eelgrass beds in Maine waters within the Piscataqua River estuary. Payment to Maine's in-lieu fee program which funds environmental restoration and preservation project throughout the state was considered but was eliminated in favor of in-kind mitigation.

Cost estimates for the recommended plan were escalated to the assumed mid-point of construction in January 2022 (Fiscal Year 2022). These escalated costs are the fully-funded estimate for the project and provide the basis for determining the estimate for future cost-sharing purposes. Table 10 below shows the cost estimate for the recommended plan for both the FY2021 budget year and the FY2022 fully funded cost.

<b>Table 10</b> <b>Fully-Funded Cost Estimate for the Recommended Plan</b>		
Plan A-3 – 10-Foot Channel with 8-Foot Turning Basin	Budget Year FY 2021 – Q1 Costs	Fully-Funded FY 2022 – Q2 Costs
Mobilization/Demobilization	\$518,000	\$537,000
Dredging and Disposal	411,000	426,000
Contingencies (28%)	<u>256,000</u>	<u>264,000</u>
Subtotal	\$1,184,000	\$1,227,000
Planning, Engineering and Design	303,000	312,000
Construction Management	69,000	72,000
SAV Mitigation and Monitoring	<u>341,000</u>	<u>353,000</u>
Total First Costs	\$1,897,000	\$1,964,000

## 5.2 Implementation Responsibilities

### 5.2.1 Cost Apportionment

For Federal navigation improvements with a design depth of 20 feet or less, local interests are required to provide cost-sharing of ten percent of the cost of design and construction up-front upon execution of a Project Partnership Agreement (PPA). The remaining 90 percent up-front share of the first cost of design and construction is the Federal contribution. A further additional non-Federal contribution of ten percent of the cost of design and construction is payable at the conclusion of construction and can be paid over a period of up to 30-years. These cost sharing requirements are as specified in the Water Resources Development Act of 1986 (Public Law 99-662), as amended. Table 11 below provides the cost-sharing responsibilities for design and implementation of the Recommended Plan.

Costs are shown below at both the current year First Cost basis and the estimated fully funded level escalated to the mid-point of construction. Benefit-cost analysis is based on project First Cost. Fully funded costs are provided for the project sponsor to understand what cost and budget will be required to construct the project.

### 5.2.2 Other Federal Responsibilities

The Federal government will be responsible for preparation of plans and specifications, contract advertisement and award, and supervision and inspection of the work. The Federal government will be responsible for project compliance with Federal environmental laws and regulations, including the National Environmental Compliance Act (NEPA), consistency with the Coastal Zone Management Act (CZM), the Clean Water Act (CWA), and the National Historic Preservation Act. Federal responsibility includes only the improvement dredging and maintenance dredging of the designated Federal channels, with ocean disposal of the dredged

material, and does not include any berthing facilities, shoreline protection, or site work at upland disposal areas.

<b>Table 11</b> <b>Cost Apportionment for the Recommended Plan</b>			
FY 2021 – Q1 Costs	Total First Cost	Federal Share 90%	Non-Federal Share
First Cost of Design and Construction	\$1,897,000	\$1,707,300	\$189,700
Post-Construction 10% Additional Contribution	-----	-----	\$189,700
Total Cost Allocation	\$1,897,000	\$1,707,300	\$379,400
FY 2022 – Q2 Costs	Total Fully Funded Cost	Federal Share 90%	Non-Federal Share
First Cost of Design and Construction	\$1,964,000	\$1,767,600	\$196,400
Post-Construction 10% Additional Contribution	-----	-----	\$196,400
Total Cost Allocation	\$1,964,000	\$1,767,600	\$392,800

### 5.2.3 Other Non-Federal Responsibilities

The following is a list of some of the items of local cooperation required for projects authorized under Section 107. The non-Federal sponsor must provide assurance that they intend to meet these items prior to project authorization. The Project Partnership Agreement details these and other requirements of the Government and the Sponsor for implementation and future maintenance of the project.

1. Provide without cost to the United States, all necessary lands, easements, rights of way, relocations, and dredged material placement and borrow areas (LERRD) necessary for completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project. This project consists solely of dredged general navigation features and will be constructed using waterborne dredging plant and placement of the dredged materials will be in ocean waters. All work areas are seaward of mean high water and subject to the government's navigation servitude. Therefore, no LERRDs are required from the Sponsor for initial construction. At this time it is assumed that future operation and maintenance of the project will be accomplished in the same manner. However, should different construction methods be used for future O&M Sponsor provision of LERRDs may be required;
2. Hold and save the United States free from all damages arising from construction, operation, maintenance, repair, replacement, and rehabilitation of the project, except for damages due to the fault or negligence of the United States or its contractors;

3. Assume full responsibility for all non-Federal costs associated with the project. Current law requires that the non-Federal sponsor provide at least 10 percent of the first cost of design and construction of General Navigation Facilities not exceeding 20 feet in depth up-front, and provide an additional 10 percent after completion of initial construction of the project;
4. Agree to be responsible for total project costs in excess of the Federal cost limit of \$10 million in accordance with Section 107 of the River and Harbor Act, as amended.
5. Not use funds from other Federal programs, including any non-federal contribution required as a matching share therefore, to meet any of the non-Federal sponsor's obligations for the project unless the Federal agency providing the funds verifies in writing that such funds are authorized to be used to carry out the project;
6. Provide, maintain and operate without cost to the United States, an adequate public landing open and available to use for all on an equal basis. The town landing facilities at the Stone Wharf, including the boat ramp and public parking are adequate to satisfy this responsibility for the recommended improvement;
7. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;
8. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, (42 U.S.C. 1962d-5b) and Section 101(e) of the WRDA 86, Public Law 99-662, as amended, (33 U.S.C. 2211(e)) which provide that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;
9. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of three years after completion of the accounting for which such books, records, documents, and other evidence are required, to the extent and in such detail as will properly reflect total cost of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;
10. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal government determines to be necessary for the initial construction, operation and maintenance of the project;
11. Assume, as between the Federal government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous



substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way required for the initial construction, or operation and maintenance of the project;

12. Agree, as between the Federal government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability;
13. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4601-4655) and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way necessary for operation, and maintenance of the project including those necessary for relocations, the borrowing of material, or the placement of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;
14. Comply with all applicable Federal and state laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled “Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army”; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c));
15. Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project.

### **5.3 Risk Informed Decision-Making**

The Sponsor and the public must be informed of the risks associated with the formulation, evaluation and recommendation of a plan of improvement for Great Chebeague Island. While the USACE’s extensive experience with mechanical dredging and ocean disposal projects along the Maine coast for both improvement and maintenance of navigation allows reasoned evaluation of the proposed improvements, there will always be some level of risk, mainly dealing with project costs. The contingency risk analysis performed as part of the project cost estimate sought to capture these risks and their potential impacts on cost and implementability. The following are some of the risks captured in the contingency analysis.

- With construction limited to late fall to mid-winter for environmental resource impact reasons, severe weather can play a role in construction delays when tugs towing scows are delayed in their transit to the offshore disposal site.

- While sediment sampling and subsurface investigations have shown all material encountered to be clean mixed silt, sand, and gravel, the work is in an area influenced by glaciation and characterized by ground moraine and outwash plain deposits. It is possible that other materials such as gravel and boulders will be encountered. These materials can be removed by the mechanical bucket dredge plant that would be used to dredge the project features and can be placed in the offshore site, but may slow production somewhat if encountered.
- While subsurface investigations have not shown ledge within the proposed dredge area and depths it is possible that ledge could be encountered, particularly in the proposed turning basin. Project limits may need to be adjusted during construction if ledge is encountered, or mechanical rock removal means may need to be employed.
- Great Chebeague Island's public landing at Stone Wharf is a small active commercial fishing harbor and debris, such as discarded cables, containers, broken traps and other gear are sometimes encountered in dredging operations, though none were observed during site surveys. This material can also be readily removed by a bucket dredge and dredging specifications contain provisions specifying upland disposal of such materials. The risk is that when encountered in significant quantity such debris can slow production.
- The economic benefit of this project has been measured in improved efficiency of vessel operations – fuel and labor savings, reductions in vessel damages, etc. Great Chebeague Island's public landing at Stone Wharf is an active small harbor which has supported a stable year-round commercial fleet for many decades. Any risk that the projected benefits will not be achieved is low.
- Availability of competent responsive bidders can be an issue when funding for such small projects regionally results in more work being advertised than the dredging industry can accommodate. In past years some projects in New England have failed to attract any responsive bidders. Given the low level of funding in the past several years for small harbor projects a lack of responsive bidders is not expected to be an issue.
- Knowledge of potential environmental resource impacts from marine construction projects and the concern given species can change over time. If significant time passes between completion of the feasibility phase and project construction, then it is possible that changing resource concerns could change the work window for the project or make more costly mitigation of impacts necessary. New species could be listed as threatened or endangered, or additional habitat could be noted as critical for fisheries resources or climate change could result in a change in species in the project area. At this time only dredging impacts to eelgrass have been identified as requiring mitigation which would be met through in-kind planting of new eelgrass beds. Coordination with Federal and State resource agencies will continue through construction and any changes to eelgrass impacts will be monitored and required mitigation adjusted in needed.
- On rare occasions previously unknown cultural resources can be encountered during marine construction. In such cases coordination with state and tribal historic preservation officials is re-initiated. Documentation of any finds is a minimal requirement. Depending on the nature of the resource encountered work may be delayed at least in part while coordination is pursued. Research and coordination undertaken during this study indicate that the potential for such resources in the project area is low.

- The need for maintenance dredging is a function of controlling depth (shoaling) relative to vessel draft, underkeel clearance requirements, and variations in tidal range. Currently maintenance cost is calculated based on a 2% annual shoaling rate, like other similarly situated harbors on the Maine coast that lack significant sediment sources. That cost is about 31% of total annual costs for the recommended plan. Even if shoaling and maintenance costs were double that estimate, the benefit-cost ratio for the recommended plan would be reduced from 6.7 to 4.9. Variations in maintenance requirements would not impact the recommendation.
- Federal funding for small harbor maintenance has been difficult to budget in recent years. Though under current law maintenance of the Federal Navigation Projects is eligible for 100% Federal funding, the budget situation has delayed maintenance of these projects nationally. In recent years the State of Connecticut and municipalities in Massachusetts have contributed funds for the Federal maintenance of small harbors. While we cannot predict the situation with respect to future Federal budgets, the Sponsor should be aware that delays in Federal funding may delay necessary maintenance dredging.

## 6 CONCLUSIONS

USACE has evaluated the proposed Federal plan for improving navigation at Great Chebeague Island. USACE will review, evaluate, and consider the comments and views of interested agencies, stakeholders, and the concerned public regarding this recommendation. The potential consequences of the recommendation will be evaluated on the basis of engineering feasibility, environmental impact, and economic efficiency.

USACE finds substantial benefits are to be derived by providing the ferry, barge operators, and commercial fishermen with reliable and improved access to the Stone Wharf at Great Chebeague Landing. The proposed Federal action was considered individually and cumulatively under the provisions of the National Environmental Policy Act and the action was determined not to have significant effects on the quality of the human environment.

The proposed action also incorporates the provisions for protection of resources and mitigation of impacts, and ensures compliance with other Federal environmental laws, regulations, Executive Orders, and Executive Memorandum such as, the Endangered Species Act, the Fish and Wildlife Coordination Act, the National Historic Preservation Act, the Clean Water Act, etc. The USACE has concluded the proposed navigation improvements would cause a temporary disruption of the environmental resources present in and immediately adjacent to the construction area during dredging operations. While no significant long-term effects are anticipated the project includes mitigation for loss of eelgrass within the dredging limits and side slopes, by in-kind replacement through planting of new eelgrass beds in Maine waters within the Piscataqua River estuary. Due to the significant benefits attributable to the residents of Chebeague and commercial fishing industry, any other effects are considered to be offset by the improvement and the resulting overall economic benefit to the town and the region.

The Recommended Plan as optimized would result in the greatest economic net benefits and is therefore the NED Plan. The Recommended Plan proposes to construct a new Federal navigation channel 100 feet wide and -10 feet deep MLLW from deep water in Casco Bay southeasterly 1,600 feet to the Great Chebeague Island public landing at the Stone Wharf, widened to 150 feet alongside the pier, and with turning basin -8 feet MLLW between the head of the channel and the boat/barge ramp at the landward end of the Stone Wharf.

## 7 RECOMMENDATION

The USACE recommends that a Federal navigation project be adopted for Great Chebeague Island, Maine, under the authority of Section 107 of the River and Harbor Act of 1960, as amended, in accordance with the Recommended Plan identified in this Detailed Project Report, with such further modifications thereto as in the discretion of the Chief of Engineers may be advisable.

The recommendations contained in this report reflect the information available at this time and current USACE 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 authorized for implementation funding.

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Date

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John A. Atilano II  
Colonel, Corps of Engineers  
District Engineer