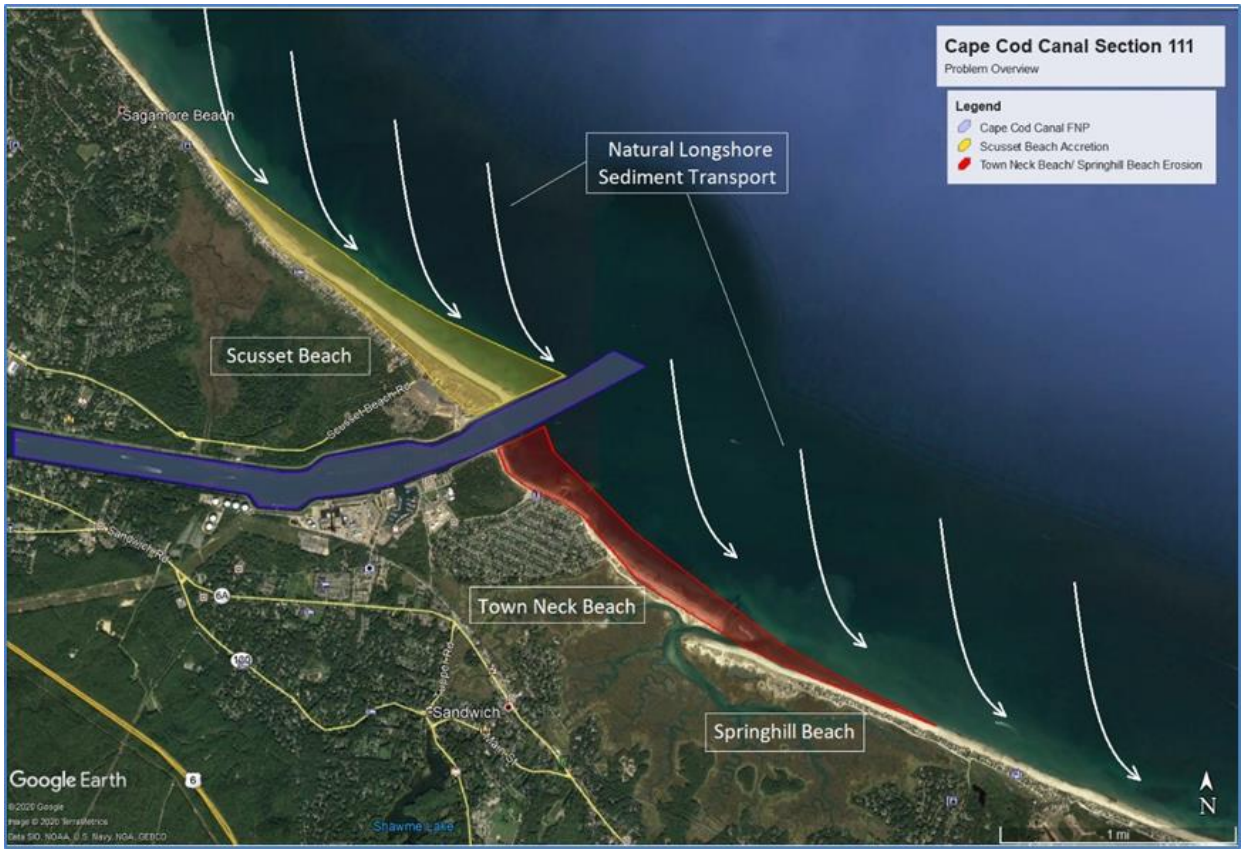
Section 111 Shore Damage Mitigation Study
Draft Decision Document & Final Environmental Assessment
Including Finding of No Significant Impact
and Section 404(b)(1) Evaluation

Cape Cod Canal & Sandwich Beaches
Sandwich, Massachusetts



US Army Corps
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New England District

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Cape Cod Canal and Sandwich Beaches
Section 111 Shore Damage Mitigation Study
Executive Summary

Introduction

In 1928 the U.S. Army Corps of Engineers (USACE) was given authority to purchase, operate and maintain, and improve the Cape Cod Canal (Canal) as a Federal Navigation Project (FNP). The Canal is a 17.5-mile navigational channel in southeastern Massachusetts that connects Cape Cod Bay (to the northeast) with Buzzards Bay (to the southwest). It provides a shorter, more protected route to mariners who would otherwise travel an additional 135 miles around Cape Cod and the Islands of Martha's Vineyard and Nantucket. The alternative route would leave mariners fully exposed to the open ocean and its associated navigational hazards, which was particularly dangerous in 1909 when construction of the Canal first began.

In order to maintain safe navigation into and out of the Canal, jetties were constructed at the east entrance to reduce wave energy and prevent shoaling of the channel itself. Unfortunately, as successful as the project has been for navigational safety purposes, the jetties at the east entrance interrupt natural longshore sediment transport through the littoral system, which have long been suspect as the cause of significant erosion along the downdrift shoreline in Sandwich, Massachusetts; specifically along Town Neck Beach and Springhill Beach. Due to the presumed cause-and-effect relationship between the jetties and erosion along the Sandwich shoreline, the USACE was requested by the town of Sandwich to investigate the problem under Section 111 of the Continuing Authorities Program (CAP) and recommend a plan for mitigating damages directly attributable to the Canal FNP. This report presents the findings of that investigation.

Study Authority

This report was prepared under authority of Section 111 of the River and Harbor Act of 1968 (Public Law 90-483), as amended. Section 111 of the CAP program authorizes the USACE to study, plan and implement structural and/or non-structural measures to prevent or mitigate damage to public and privately-owned shorelines to the extent that such damages can be directly attributed to the FNP. The Federal expenditure limit for a project implemented under Section 111 authority is $12,500,000, as last increased by the Water Resources Development Act (WRDA) of 2018. Additionally, the costs of studying the problems and implementing solutions must be shared in the same proportion as the cost sharing provisions applicable to the project causing the damage. When the USACE took over ownership and final construction of the Canal, it was 100% federally funded. Therefore, this study and any resulting project would also be 100% Federally funded. It should also be noted that because Federal

participation is limited to only those damages directly attributable to the FNP, if there are multiple causes for the damages, the non-Federal sponsor would be responsible for all costs associated with correcting shore damages not attributed to the FNP.

Study Area

The study area is located on the north shore of Cape Cod, in the town of Sandwich, Massachusetts, approximately 50 miles southeast of Boston and 18 miles south of Plymouth (Figure ES-1). The study area is the approximately 2.5 miles of directly impacted shoreline, including Scusset Beach, the east entrance to the Canal, Town Neck Beach, Old Harbor Inlet and Springhill Beach. The study area also includes the neighboring areas of Great Marsh, Route 6A and downtown Sandwich, which have not yet been directly impacted by the problem but can reasonably be expected to be impacted if the problem is left unaddressed. The study was primarily focused on the Canal jetties, accretion of material along the updrift shoreline at Scusset Beach and erosion along the downdrift shoreline at Town Neck Beach and Springhill Beach (Figures ES-2 and ES-3).

Figure ES-1: Study Location

Figure ES-2: Study Area

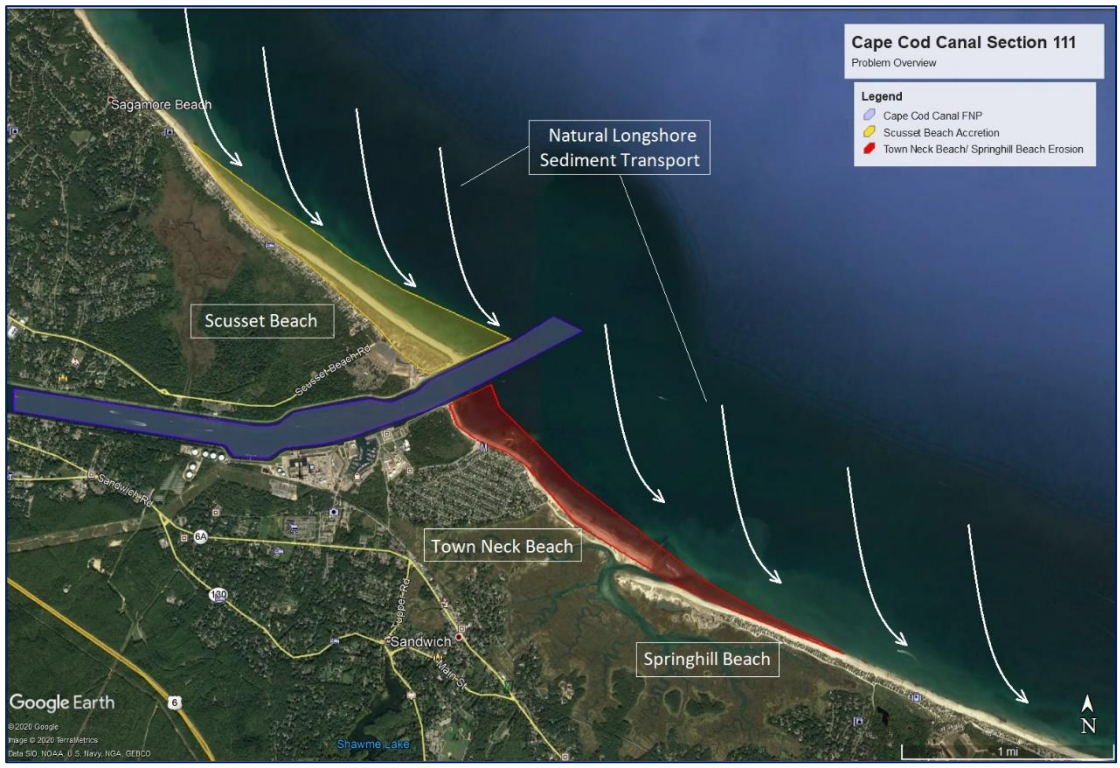

Figure ES-3: Problem Overview

Evaluation Process and Study Findings

The primary problem within the study area is erosion of the shoreline immediately downdrift of the FNP jetties at the east entrance of the Canal. The jetties are effective in maintaining the east entrance to the Canal by reducing wave energy and preventing sediment from filling in the channel, but the interruption to natural longshore sediment transport created by the jetties has starved the downdrift littoral system of sediment that would otherwise maintain a robust beach profile. Sediment starvation of the downdrift littoral system has resulted in extensive and worsening erosion of the existing beach, which has subsequently and significantly compromised public and private property and infrastructure in the town of Sandwich. Significant loss of the beach and damage to shorefront structures has already occurred in recent years, and if the conditions are left unaddressed, those impacts to the community would increase demonstrably. Increased impacts would include catastrophic failure of the barrier dune, additional losses of shorefront structures, catastrophic damage to 600+ acres of salt marsh habitat and in increase in storm related damages to downtown Sandwich, including but not limited to, local public safety facilities (police and fire stations), local commercial infrastructure, registered historic buildings and Route 6A (a primary evacuation route for the north shore of Cape Cod).

The feasibility study was broken into two general phases. The first phase of the study was aimed at confirming and quantifying the extent to which sediment starvation and erosion can be directly attributed to the Canal FNP. This cause-and-effect relationship was critical in determining the extent to which the USACE can participate in addressing the problem. The second phase of the study was aimed at developing and evaluating solutions that could be implemented through Section 111 of the CAP program.

Analysis conducted during the first phase of the study indicated that the jetties located at the east entrance to the Canal interrupt natural longshore sediment transport and starve the downdrift littoral system of sediment needed to maintain a stable shoreline. The analysis further indicated that although interruption to longshore sediment transport caused by the jetties is not the only cause of erosion in the area, it significantly exacerbates erosion along the downdrift shoreline and is the primary cause of the ongoing threat that such erosion poses to the shoreline and surrounding coastal community.

After delineating the extent of erosion impacts directly attributable to the Canal FNP, measures and alternatives for mitigating those impacts were developed and evaluated during the second phase of the study. Measures and alternatives considered during this study included but were not limited to, no Federal action, property buy-outs, beach nourishment, jetty modifications, groin modifications, stone revetments and nearshore breakwaters.

Pursuant to Section 111, a benefit to cost ratio was not required to justify the recommend plan. Rather, the recommended plan is the least cost alternative that effectively accomplishes the project purpose. Ultimately, beach nourishment, was identified as the least cost alternative. The recommended plan includes the construction of an engineered beach at Town Neck Beach using approximately 388,000 cubic yards of beach compatible material that would be dredged, pumped from a nearshore borrow site off neighboring Scusset Beach. This alternative would restore a more robust beach and dune system and it would reintroduce a substantial amount of material to the impacted littoral system.

Projects constructed through Section 111 authority cannot exceed a total project cost of $12.5 million. This constraint significantly influenced the alternatives analysis and the resulting recommended plan. Specific to this study area, there is a perpetual problem in that as long as the Canal exists, in its current form, the erosion along the downdrift shoreline will continue. Consequently, no permanent solution was identified that was also implementable through this authority. This study recommends a plan that would maximize the mitigation achievable through the Section 111 authority and also recommends that additional efforts be made by the USACE towards developing a long-term sediment management strategy for the east entrance to the Canal. The goal of these efforts would be to more sustainably maintain the Sandwich shoreline.

Economic Analysis

Typical civil works projects require an economic analysis that uses a comparison of project benefits to their respective costs in order to establish a Federal Interest in the project and to identify an alternative that optimizes net benefits relative to the National Economic Development (NED) or National Environmental Restoration (NER) interests. Section 111 of the CAP program, however, does not require such an economic analysis. Rather, Section 111 requires that the recommended plan be the least costly alternative for mitigating the damages. Consequently, an economic analysis was not conducted for this study.

Federal and Non-Federal Project Cost-Sharing

The costs of implementing a project through Section 111 of the CAP program must be shared in the same proportion as the cost sharing provisions applicable to the project causing the shore damage. In this case, the Canal FNP is the project causing the shore damage, which is entirely federally funded. Therefore, the cost sharing responsibilities of implementing the recommended plan would be 100% Federal and 0% non-Federal.

Recommended Plan

Alternative 1A was identified as the Recommended Plan, which includes the one-time construction of a 388,000 cubic yard engineered dune and berm beach along Town Neck Beach, using material dredged from the nearshore area at Scusset Beach. The Recommended Plan is depicted in Figure ES-4. This report also recommends the consideration and development of a long-term sediment management strategy for the area. Approximately 90,000 cubic yards of beach compatible material are dredged from the east end of the Canal, approximately once every seven years, as part of routine operations and maintenance. That material is typically disposed of offshore at the Cape Cod Canal Disposal Site (the current Federal Base Plan for disposal) but could substantially reduce coastal storm risk to the Sandwich community if it were beneficially reused at Town Neck Beach and Springhill Beach instead.

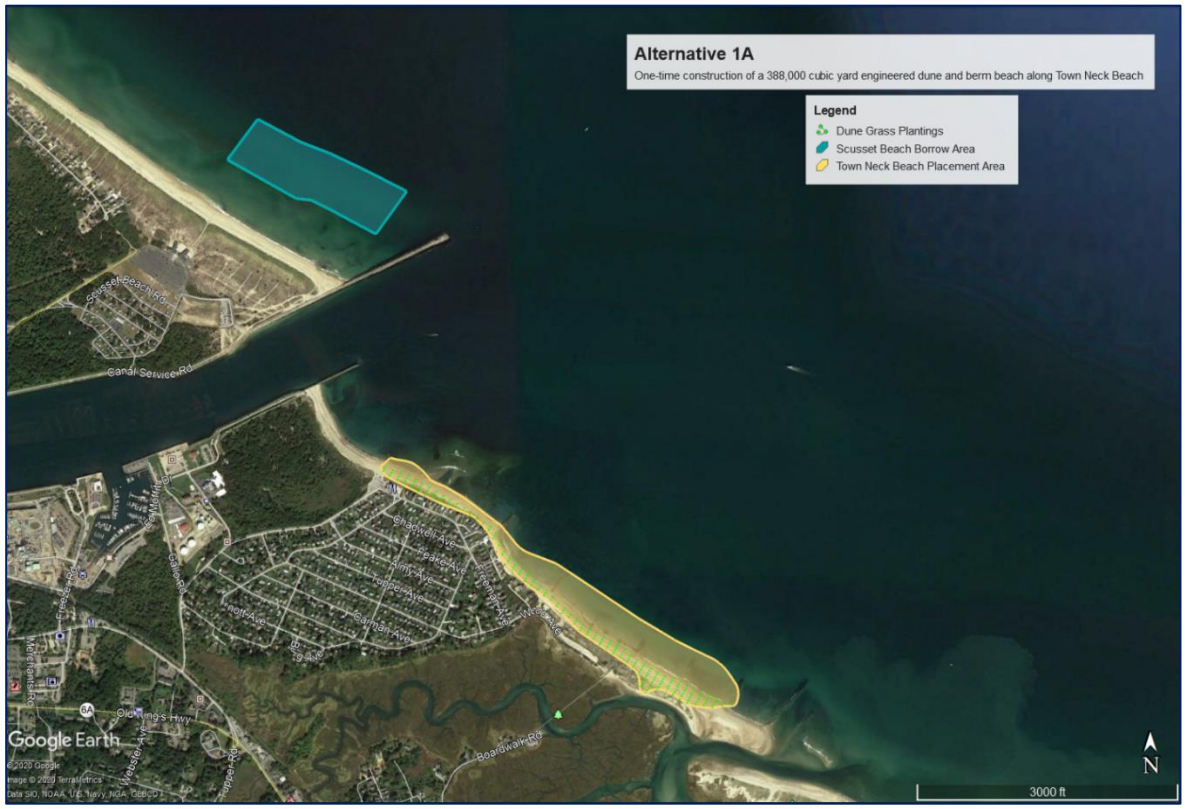

Figure ES-4: Overview of the Recommended Plan

Project Costs

Total Project Costs (First Cost): **$12,251,000**

The initial construction costs account for all design and implementation costs associated with construction the initial beach profile. The initial construction costs were estimated to be $11,636,000 and the feasibility study costs are estimated at $615,000, bringing the total project costs (First Cost) to $12,251,000.

Operations and Maintenance (Future Renourishment Costs): **$0**

The recommended plan includes the construction of an engineered beach profile along Town Neck Beach but does not include future renourishment. Although long-term renourishment will be needed for the engineered beach profile to continue performing as intended, such renourishment efforts cannot be fully achieved through Section 111 due to the $12.5 million federal expenditure limit for this authority. The recommended plan is limited to a one-time placement of material with no future renourishment, accordingly. However, it should be noted, if the design and implementation of the project ultimately costs less than the federal expenditure limit, as the current estimate suggests, then any remaining funding can be applied to future renourishment efforts. Any renourishment costs above the federal limit would be borne by the non-Federal sponsor. The non-Federal sponsor cannot commit to such efforts at this time; thus, it is unreasonable to assume that they would ultimately take place. Consequently, for the purpose of this document it is assumed that no renourishment will take place and that there will be no operations and maintenance costs.

Table ES-1
Cape Cod Canal and Sandwich Beaches
Section 111 Shore Damage Mitigation Study Summary
Projected Costs and Cost-Sharing for the Recommended Plan

Beach Nourishment	388,000 Cubic Yards
Project First Costs (Fiscal Year 2021 Price Levels)	
Construction Costs and Contingencies	$ 11,065,000
Planning, Engineering and Design	$ 305,000
Construction Management	$ 266,00
Total Project Costs	$ 12,251,000
Cost Sharing (Fiscal Year 2022 Fully Funded Price Levels)	
Fully Funded Project Cost (October 2022)	$ 12,251,000
Federal Cost Share – 100%	$ 12,251,000
Non-Federal Cost Share – 0%	$ 0

Real Estate Requirements

The recommended plan includes the construction of an engineered beach profile with a footprint of approximately 41 acres. Approximately 40 acres of the 41-acre beach nourishment placement area are located on land currently owned by the town of Sandwich. Construction easements within this section of the project area must be provided by the Town in order to facilitate initial construction and any potential future maintenance and/or repair work. A small portion of the project footprint will extend onto seven privately owned parcels. Construction easements will be required from those property owners in order to construct and maintain the proposed project. Non-standard easements must be provided by those property owners. Due to the mitigative nature of the Section 111 authority, as well as, the incidental nature of material being placed on those properties, easements for those properties would not require public access for all uses, as would typically be required for a traditional Coastal Storm Risk Mitigation project per USACE Planning guidance (ER 1160-2-100).

The project will be 100% federally funded 100%, per Section 111 policy requirements. As such, the District will be responsible for obtaining and certifying acquisition of all Lands, Easements, and Rights of Way (LERs) required for the construction, operation and maintenance of the project. The non-federal sponsor will not be responsible for obtaining and certifying LERs acquisition but has indicated a willingness to informally assist the District in its efforts to acquire LERs associated with this project.

No real estate acquisition will be required for the procurement of sediment from the proposed borrow area as it is subtidal and will be accessed by waterborne dredging equipment.

Public Use and Access

This project will not negatively impact existing public access or usage of the area. Conversely, the project will significantly improve overall access and usage of the area by increasing the public beach by 40 acres. Approximately one acre of the project footprint will be located on privately owned residential property. Access and usage of this section would remain private as is currently the case, but that would not limit or otherwise negatively impact public access to or usage of the public areas of the proposed project.

Final Recommendation

In conclusion, the USACE recommends that a shore damage mitigation project be adopted and implemented for Cape Cod Canal and the Sandwich beaches, in Sandwich, Massachusetts under the authority of Section 111 of the River and Harbor of 1968 (Public Law 90-483), 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 study also recommends the consideration and development of a long-term sediment management strategy for the area that would capitalize on recurring O&M dredging of the canal and thereby include beneficial reuse of material dredged from the Canal.

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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