OCEAN CITY HARBOR AND INLET & SINEPUXENT BAY PROJECT WORCESTER COUNTY, MARYLAND

INLET NAVIGATION IMPROVEMENTS

DRAFT

ENVIRONMENTAL ASSESSMENT

MAY 2022

Prepared by the
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Executive Summary

The U.S. Army Corps of Engineers, Baltimore District (USACE), in partnership with the Maryland Department of Natural Resources (MD DNR) and Worcester County, is proposing to construct navigation improvements to the Ocean City Inlet Channel. The U.S. Department of Interior (DOI), National Park Service (NPS), is a cooperating agency with USACE in preparation of this Environmental Assessment (EA) for the proposed action in accordance with National Environmental Policy Act (NEPA) requirements, with USACE serving as the lead agency. The Ocean City Harbor and Inlet & Sinepuxent Bay Project provides for navigation between the Atlantic Ocean and Maryland's Coastal Bays. USACE completed initial construction of the project in 1935. USACE has actively maintained and modified the project since that time.

The USACE 1998 *Ocean City, Maryland, and Vicinity, Water Resources Study, Feasibility Report and Integrated Environmental Impact Statement* (EIS) recommended numerous projects, including long-term sand management for the northern portion (ocean surf zone) of Assateague Island, ecosystem restoration projects in the coastal bays, and navigation improvements. The recommended navigation improvements were not constructed because of nationwide shortfalls in CAP funds and then more recently because of the unavailability of local sponsor funds. The USACE Long-Term Sand Management (LTSM) Project for Assateague Island, cost-shared with the NPS, was implemented in 2004. The project dredges sand from multiple sources, including the Ocean City Inlet, to compensate for sediment starvation at Assateague Island caused by USACE jetties at the inlet. The project is anticipated to continue through the year 2029.

Navigation and physical environment conditions have changed since the recommendations included in the 1998 EIS. This necessitated revising the recommended plan. From 2019 to 2021, USACE investigated physical environmental conditions, conducted extensive public and agency coordination, formulated alternatives, and modeled effects of these alternatives using state-of-the art sediment and hydrologic computer models. Based on these investigations and findings of economic, engineering, and environmental analyses, USACE is proposing to realign approximately 3,360 feet of the Ocean City Inlet navigation channel to immediately south of its current position where most water is already at the authorized 10 foot depth. However, dredging of inlet bottom sand would be required locally to realign the channel. In order to reduce shoaling in the federal channel, the plan would connect two 300-foot gaps in the existing breakwaters at the north end of Assateague Island (600 feet total) and would construct an additional 150-foot jetty extending to the northwest out into Sinepuxent Bay. The 1998 EIS did not evaluate modification of the inlet rock structures at northern Assateague Island. The proposed inlet navigation improvements would make beneficial use of sand dredged material from channel realignment, and maintenance-dredged sand from the Sinepuxent Bay federal channel to establish proper foundation conditions for the proposed rock structures. Dredging would be conducted mechanically.

Because the proposed plan has changed, and more than two decades have elapsed since the 1998 EIS, USACE is preparing a supplemental EA to update findings for the inlet navigation improvements portion of the 1998 EIS. This EA compiled new pertinent environmental information and reassessed conditions. This EA evaluated environmental effects of proposed project alternatives. The proposed action would have a variety of environmental consequences. A temporary degradation of water quality (via increased turbidity) and destruction of benthos

would occur in the realigned channel inlet area to be dredged. Previous USACE documents have assessed impacts of maintenance dredging, and this EA does not assess the impacts of future channel maintenance dredging, but does evaluate alternatives that would reduce the frequency of inlet maintenance dredging. If the proposed action is implemented recreational boating and commercial and recreational fishing access to inlet waters would be temporarily unavailable in the dredging and construction areas during construction. The project would cause a permanent conversion of open water to rock structure in the jetty footprint. Recreational boating/beach access opportunities at the center of the northern Assateague inlet shoreline would be permanently lost as that beach would be converted to rock structure. Dredging would be conducted following any MD DNR and National Marine Fisheries Service (NMFS) time-of-year (TOY) constraints determined to be needed to minimize impacts to commercial and recreational boating activity, as well as sensitive aquatic life. Construction on Assateague would be conducted in accordance with any TOY restrictions determined to be necessary to protect endangered species by US Fish and Wildlife Service (USFWS) and NPS. Construction activities would disturb approximately 7.5 acres of Assateague Island National Seashore, but be limited to within 200 ft south of the inlet rock structures to minimize impacts to park resources, including endangered species and public recreation. However, it is anticipated that several light trucks (suburban utility vehicles or pick-ups) per week would drive between the construction site and Route 611 along the ocean beach to transport crews and minor supplies. These vehicles would follow NPS policies for vehicle traffic to minimize environmental impacts.

The proposed action would improve navigational reliability of the inlet channel. However, as dredging of the inlet channel has in recent years been largely accomplished under the auspices of the LTSM project, that project would instead shift dredging activities to obtain sand for Assateague Island elsewhere in the inlet vicinity. Overall USACE dredging efforts in the inlet vicinity will show minimal change through the remaining life of the LTSM project. Following the finalization of that project, USACE dredging efforts in the inlet vicinity would be reduced.

In compliance with NEPA, USACE has prepared this EA and evaluated potential effects on the natural and human environment. Resource agency and public input was incorporated into the recommended alternative. The project would not result in significant effects warranting preparation of a supplemental EIS. A separate engineering design report in preparation will serve as the USACE decision document for the project.

The Coast Guard stated that they would perform a navigational safety assessment of the proposed jetty work during public review of this draft EA. In the event the US Coast Guard determines that the proposed alternative jetty length presents a safety hazard to navigation, it is anticipated that a shorter length jetty alternative may become the recommended plan.

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Appendices

1 Introduction

1.1 Project Background

The Ocean City Harbor and Inlet and Sinepuxent Bay Project is located in Maryland's Atlantic coastal bays in Worcester County. The Ocean City Inlet separates two barrier islands, Fenwick Island (Ocean City) to the north and Assateague Island to the south and extends from the Atlantic Ocean into Isle of Wight Bay and Sinepuxent Bay (Figure 1-1). These islands were historically connected but became separated when a hurricane in 1933 formed the Ocean City Inlet. The U.S. Army Corps of Engineers (USACE) stabilized the inlet by the construction of two jetties between 1934 and 1935 and dredged the federal channels shortly thereafter. The project provides a navigation channel 10 feet deep at mean lower low water (MLLW) (plus 2 feet of allowable over-depth) by 200 feet wide.

Assateague Island, south of the inlet, is undeveloped and is preserved as open space under the administration of NPS, USFWS, and the State of Maryland.

Fenwick Island, north of the inlet, is fully developed as a tourist resort and contains the town of Ocean City. The two islands serve to enclose and protect the coastal bays. Commercial and recreational vessels regularly use the Ocean City Inlet and Harbor channels, contributing significantly to the local economy.

Since construction of the jetties in 1934 and 1935, USACE has conducted maintenance dredging of the Ocean City Inlet and Harbor Project to maintain the federally authorized dimensions. Dredging of the Inlet Channel at the mouth of the harbor is necessary multiple times a year due to rapid sediment build-up (shoaling) in the channel. Maintenance dredging in recent years has been inadequate to ensure reliable navigation.

1.2 Authority

The authority for this project is Section 107 of the River and Harbor Act of 1960, as amended, which provides authority for the U.S. Army Corps of Engineers (USACE) to develop and construct small navigation projects, such as dredging of channels, construction of breakwaters and jetties for harbor protection, and widening of turning basins. The maximum federal cost for project development and construction of any one Section 107 project is $10 million and each project must be economically justified, environmentally sound, and technically feasible.

Figure 1-1. Project area including inlet and harbor location and federal channels.

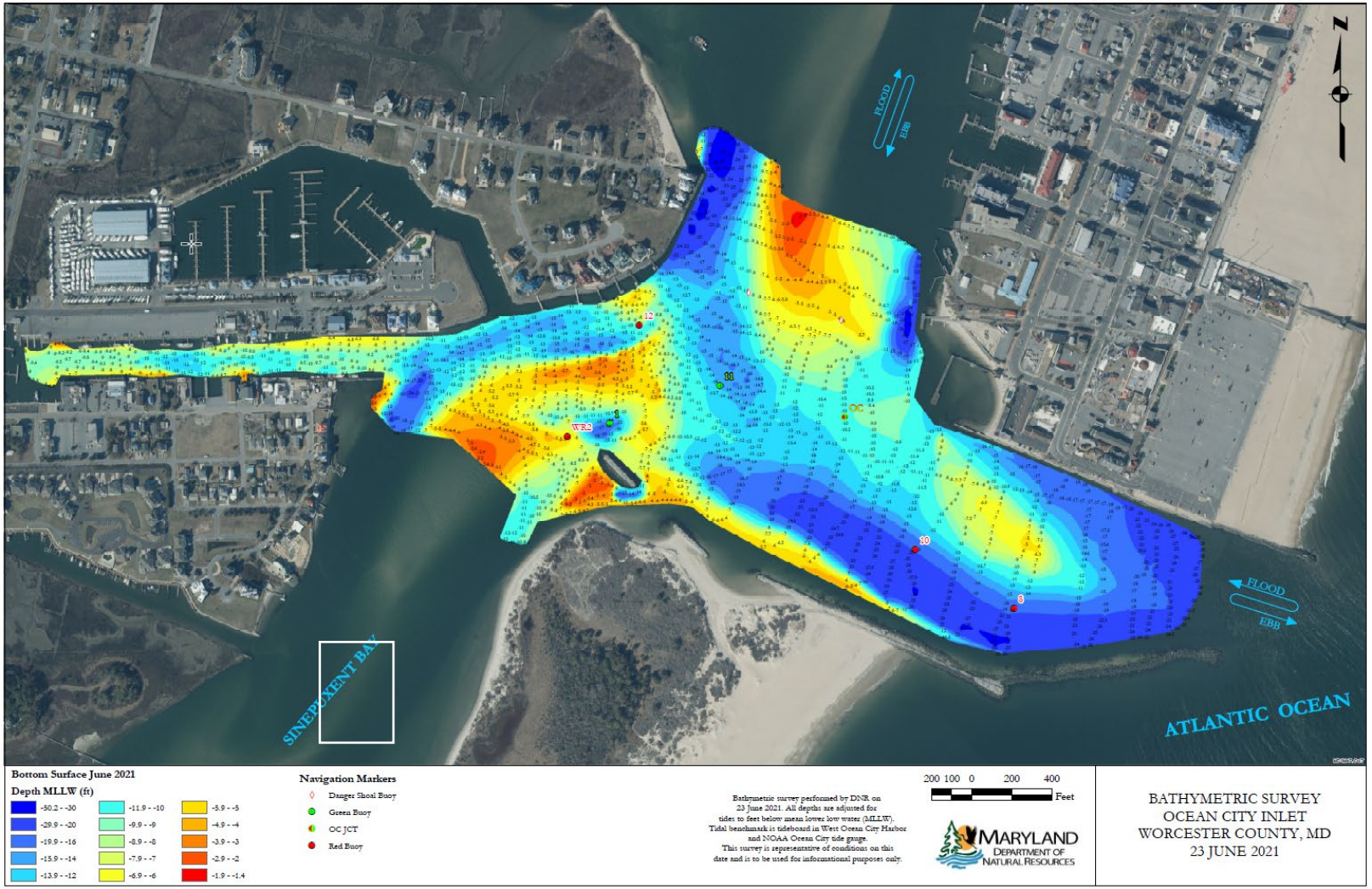
1.3 Purpose and Need

Shoaling in the federal channels within the Ocean City inlet occurs at a rate that exceeds USACE's ability to remove by dredging under present practices and maintain authorized channel navigation conditions. Shoaling creates navigation restrictions and hazards for the local commercial fishing fleets, primarily between buoys 11 and 12, resulting in vessel damages, delays, and increased maintenance (Figure 1-2). Periodically, larger commercial and recreational fishing boats run aground within the inlet resulting in damages and lost time. Consistent with the recommendations of the USACE 1998 *Ocean City, Maryland, and Vicinity Water Resources* (OCWR) Study findings, the purpose of the proposed action is to improve navigable conditions within the Ocean City Inlet channel.

The 1998 OCWR Study evaluated numerous projects, including long-term sand management for the northern portion (surf zone) of Assateague Island, ecosystem restoration in the coastal bays, and navigation improvements. With respect to the inlet and harbor portion of the navigation component of the OCWR study, objectives included: establishing a safe navigation channel, reducing damages being incurred by commercial vessels, and reducing the waiting time for vessels to navigate the channel. A recommendation of the OCWR Study report was to dredge the Ocean City harbor channel to a depth of 14 feet MLLW and the inlet channel to a depth of 16 feet MLLW. Deepening of the inlet and harbor channels was to be implemented through the Continuing Authorities Program, as authorized by Section 107 of the River and Harbor Act of 1960, as amended. However, the project was inactive for an extended period following Fiscal Year (FY) 2004 due to nation-wide funding shortfalls in the Section 107 program. Subsequently, the lack of non-federal sponsor funds impeded pursuing the project for an extended period.

In May 2015, and again in November 2017, USACE received a joint letter of request from the Maryland Department of Natural Resources (MD DNR), Worcester County, MD, and Town of Ocean City, MD, to restart the study relative to the recommended deepening of the Ocean City harbor and inlet as per the June 1998 OCWR report. In February 2018, USACE signed a Project Partnership Agreement with MD DNR and Worcester County to implement a project to manage shoaling in the Ocean City Inlet.

Inlet channel shoaling at the harbor mouth affects the efficient operation of the navigation channel and impacts boating operations by increasing the occurrence of vessel damages, maintenance costs, tide-waiting delays, and fuel costs, as controlling depths in the channel become shallower in between maintenance dredging cycles. Due to constrained funding, priority for USACE maintenance dredging is given to harbors with higher ship traffic (freight tonnage) elsewhere. Many coastal inlets exposed to the Atlantic Ocean experience frequent and less-predictable shoaling as a result of environmental conditions. These ocean inlets, such as Ocean City, MD, typically require multiple dredge visits each year to maintain the authorized depth. The Inlet Channel has been dredged to provide sand for the the Assateague Island long-term sand management project since 2012, thereby contributing to the navigability of the inlet, though funding and dredge vessel availability in recent years have consequently reduced the amount of material removed from the project area.



Note: Principal navigation problem area between buoys 11 and 12 (white box).

Figure 1-2. Inlet vicinity bathymetry.

There are multiple interrelated USACE projects within the area of interest (Section 1.4) that have been evaluated in previous NEPA documents. This environmental assessment evaluates alternatives to reduce shoaling within the inlet and associated environmental impacts that have not been previously evaluated.

The 1998 OCWR Study Environmental Impact Statement (EIS) evaluated harbor and inlet navigation improvements. This EA incorporates the 1998 EIS by reference. However, more than two decades have elapsed since the 1998 EIS was prepared, conditions have changed somewhat since that time, and the detailed recommended plan described in this EA is a modification of the plan evaluated in the 1998 EIS. The Council on Environmental Quality generally considers NEPA documents to be out-of-date after 5 years. USACE is preparing this EA to update findings of the 1998 EIS and to meet NEPA requirements. Modification of the recommended plan for navigation improvements from the 1998 EIS does not meet any USACE NEPA categorical exclusions, but the scope of the alternatives under consideration are not sufficient in magnitude to warrant preparation of an EIS.

1.4 Existing Projects in the Study Area

1.4.1 USACE Projects

USACE has multiple existing projects under several mission areas in the inlet vicinity (Table 1-1, Figure 1-3). These projects exert substantial control on environmental conditions, strongly affecting currents, waves, sand supply and sand movement. USACE has prepared numerous civil works and environmental documents for these projects. Additional information on these projects is provided in Appendix D.

Table 1-1. USACE projects in the inlet vicinity

Project Name	Description	Status	Mission
Atlantic Coast of MD	Ocean City beach nourishment. Approximately 1,000,000 yd3 of sand from offshore sources placed every 4 years.	Active	Coastal Storm Risk Management
Assateague Long-Term Sand Management (LTSM)	Mobile bypass target of 189,000 yd3 of sand annually to Assateague Island from inlet vicinity to compensate for jetty-induced starvation. Dredging/placement occurs in two periods per year.	Active, but Anticipated to Cease in 2029 (Unless reauthorized)	Ecosystem Restoration/Navigation
Assateague Short-Term Restoration	1,800,000 yd3 of sand placed from offshore sources to compensate for jetty-induced starvation (prior to LTSM).	Completed in 2002	Ecosystem Restoration/Navigation
Delaware Coast Fenwick Island	Southernmost Delaware beach nourishment.	Active	Coastal Storm Risk Management

Project Name	Description	Status	Mission
Ocean City Harbor[1] and Inlet and Sinepuxent Channel	Dredging to maintain federal channels to authorized depths and widths. (Note: includes Isle of Wight Channel.) Inlet Channel to 10 ft depth, Sinepuxent Bay Channel to 6 ft depth, Isle of Wight Channel to 6 ft depth MLLW**. Multiple placement sites utilized for dredged material. Maintenance of north and south jetties.	Active	Navigation
Ocean City Seawall Repair	1,000 ft of seawall along north side of inlet (southern side of Ocean City)	Completed in 2015	Navigation
Ocean City, Isle of Wight Bay, Shoreline Stabilization	Between 2nd and 4th Streets.	Completed in 1990	Emergency Streambank and Shoreline Protection

*Target volume not often met in recent years because of funding shortfalls and limited shallow-water hopper dredge vessel availability

**Plus 2 ft overdepth

In addition to the existing projects in Table 1-1 above, USACE is currently performing a feasibility study to investigate potential measures to manage a scour hole off the coast of Homer Gudelsky Park in southernmost Isle of Wight Bay that threatens recent shoreline residential developments. Dredged material from the inlet channel, Sinepuxent Channel, and Isle of Wight Channel is being considered as a source of material to fill the scour hole, which is approximately 50 ft deep. Note that much of the modeling performed for this Section 107 Navigation Project was conducted in conjunction with modeling performed for the scour hole feasibility study (Section 204). It is anticipated that MD DNR would be a cost-sharing partner with USACE if scour hole management is undertaken. Information for the scour hole study can be found at the USACE website "Projects in Ocean City, Maryland" (https://www.nab.usace.army.mil/OceanCity/).

[1] Note: harbor is located in west Ocean City, not within municipal limits of Town of Ocean City.

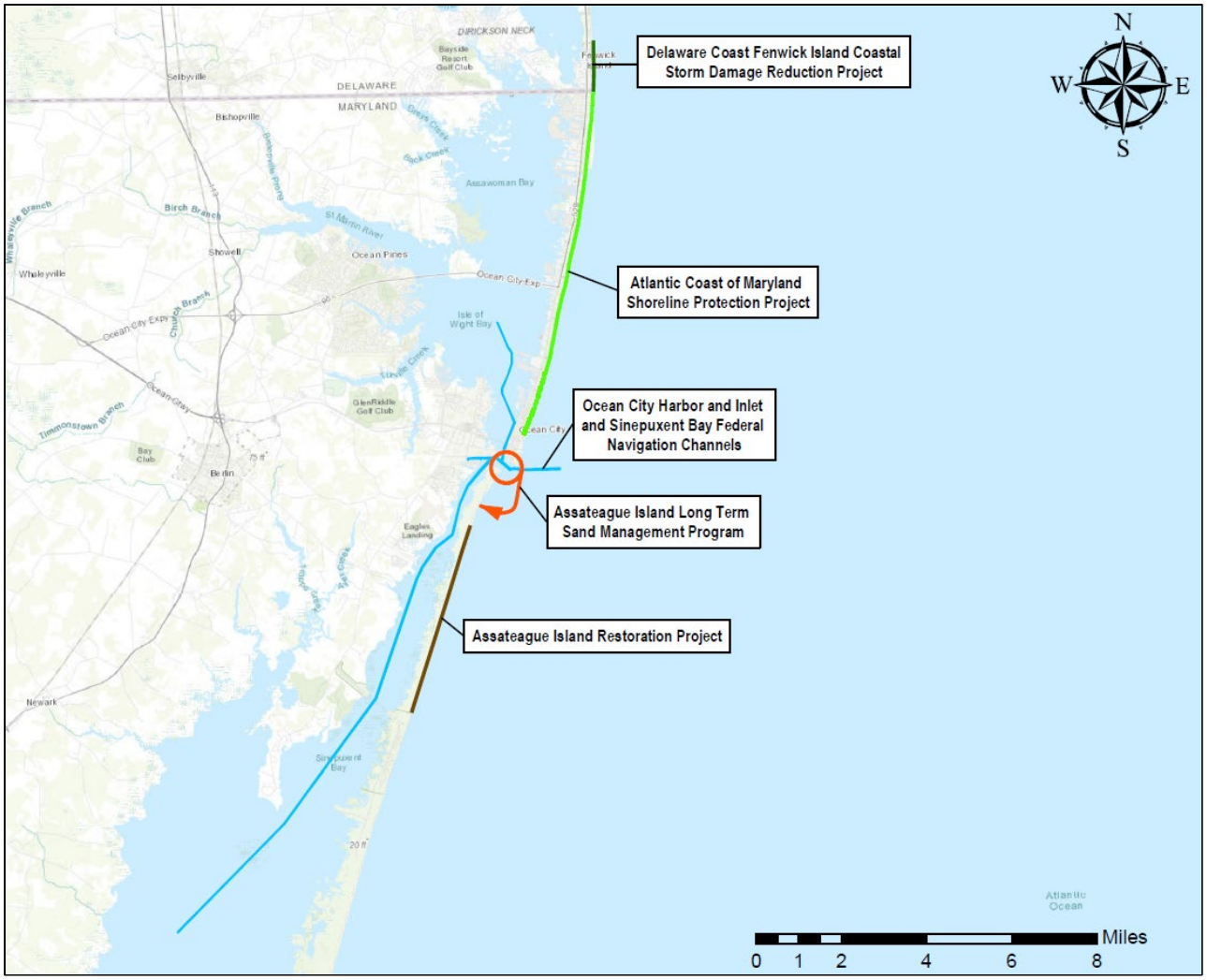


Figure 1-3. USACE projects in the study area.

1.4.2 Projects by Others

Skimmer Island Conservation Partnership

The Ocean City Fishing Center, MD DNR, and Maryland's Coastal Bays Program (MCBP) engaged in a joint effort to maintain Skimmer Island, located just north of the Route 50 Bridge in Isle of Wight Bay. Sand dredged from the Fishing Center's approach channel was pumped onto Skimmer Island to improve nesting habitat conditions for state-endangered bird species that nest there (skimmers and terns), as well as maintain the island for horseshoe crabs (*Limulus polyphemus*). Dredging volumes placed ranged from approximately 630 to 1300 cubic yards per year between 2011 to 2015 (MD DNR, No Date). However, in recent years, the marina entrance has not needed dredging and Skimmer Island has not received beneficial placement of dredged material.

US 50 Bridge

MD State Highway Administration (MDSHA) undertook repairs of the Harry Kelly Memorial Bridge (Route 50), completed in 2021. Crews performed concrete and steel repairs designed to extend the expected service life of the bridge by 30 years (MDSHA, 2020).

In 1986–1987, the MDSHA placed rock on the bottom under the Route 50 bridge for scour protection. This indirectly affected the shoals north and south of the bridge, which increased in size and migrated to the northeast and southwest respectively (USACE, 1994).

Aids to Navigation (Channel Markings)

Federal navigation aids, channel markers and buoys, are maintained by the US Coast Guard and are found in areas and channels maintained by the federal government. The US Coast Guard routinely moves navigation aids to mark best water. There are additional navigation aids maintained by the state and private interests, with formal aids requiring Coast Guard permits.

2 Alternatives and Proposed Action

Alternatives formulation focused on solutions to shoaling problems in the Inlet Channel occurring just east of the harbor mouth (Section 1.3). Because of the complexity of tidal currents, commercial and recreational navigation, and environmental conditions for which navigation improvements could potentially produce positive as well as negative consequences, alternatives were formulated and evaluated over a multi-year period from 2019-2021.

The need for Ocean City Harbor deepening was also evaluated. This potential action was removed from consideration based on public input indicating that navigation problems related to shoaling have not been experienced in the harbor.

2.1 Conceptual Alternatives

Input to alternatives formulation was received from multiple sources: problems identified in a vessel survey, USACE staff with knowledge and experience of the inlet, citizens with knowledge and experience navigating and living in the area, USACE Engineer Research and Development Center (ERDC) staff who conducted extensive investigations and modeling of the inlet area, and staff from environmental resource agencies and organizations. Alternatives formulation included consideration of non-structural alternatives (dredging or sand-placement only) and some alternatives that could maintain natural and nature-based shoreline habitats. Alternatives formulation also considered managing the scour hole off Homer Gudelsky Park being evaluated in the separate CAP Section 204 *Beneficial Reuse of Dredged Material, Ocean City Scour Hole* USACE Feasibility Study. All the alternatives were first screened conceptually based on engineering best-professional judgment (Table 2-1). Those alternatives that passed this best-professional judgment screening were then given further consideration.

Table 2-1. Conceptual alternatives screening and findings.

Alternative	Engineering Purpose	Principal Considerations	Retain?
Inlet channel: Realign to follow deeper water	Alleviate need for maintenance dredging within authorized channel close to the inlet mouth.	Would not alleviate shoaling problem east of harbor in inlet channel	Yes. Could be implemented in conjunction with a structural alternative.

Alternative	Engineering Purpose	Principal Considerations	Retain?
Inlet Channel: Deepen to 14 or 16 feet	Accommodate deeper draft vessels Reduce frequency of needed maintenance dredging	Consistent with OCWR 1998 Study recommendation Would be more inconsistent with harbor and Sinepuxent Channel depths than existing conditions, potentially causing problem at connection points. Would fill-in without maintenance Extra depth not needed by vessels currently using harbor and inlet.	No
North Assateague: Connect and extend breakwaters into Sinepuxent Bay and or add a training structure into the Inlet Channel	Constrict Inlet and Sinepuxent Channels to enhance self-scour.	Need to consider encroachment into navigable waters, acceptability to NPS (habitat and recreational boating access impacts).	Yes Could be implemented in conjunction with non-structural alternatives
North Assateague: Extend breakwaters into Sinepuxent Bay and narrow the opening between the breakwater and north Assateague Island	Constrict channel to enhance self-scour.	Need to consider structure encroachment into navigable waters, acceptability to NPS (habitat and recreational boating access impacts). Filling into public waters to narrow gap between island and breakwater disfavored by MDE and NMFS unless engineeringly needed (train navigation channel or for breakwater stability)	Yes Could be implemented in conjunction with non-structural alternatives
North Assateague: Extend breakwater southward along bayside shoreline	Protect north end of Assateague from back flow erosion	Would not narrow the Sinepuxent channel. Would likely have significant impacts to park resources (recreational use of Assateague bay shoreline, disrupt natural processes), unacceptable to NPS	No

Alternative	Engineering Purpose	Principal Considerations	Retain?
North Assateague: Add material to build up land to historic shoreline condition	Narrow the channel and promote scour	Would restore natural bay shoreline. However, would usurp public water and bottom, and likely be unstable (without structures). Filling into public waters disfavored by MDE and NMFS unless engineeringly needed (train navigation channel or for breakwater stability)	No
South end of Fenwick Island: Construct training structure(s) extending into Inlet Channel	Narrow the channel and promote scour in the center of the inlet rather than nearer shore	Could allow for maintenance of some nature-based shoreline along inlet between/along training structures. Impacts on navigation safety and sediment transport/flow through the inlet	No
South end of Fenwick Island: Add fill along entire island to narrow inlet (extend island further south)	Narrow the channel and promote scour	Cost prohibitive and would usurp public water and bottom	No
Ocean City Harbor: Construct structure on southside of harbor entrance (historic bulkhead location)	Provide erosion protection for properties/structures, Affect circulation patterns that might reduce shoaling	Would not reduce transportation inefficiencies or improve safe navigation in the inlet channel	No

Non-structural alternatives of dredging alone or placing sand on Assateague bayside shoreline (without shoreline structures) to train the channel (Table 2-1) were determined to be infeasible because they would be unstable. These alternatives would only improve navigation temporarily after initial construction. Currents and waves would then rapidly alter conditions, undermining attempts to improve navigation.

2.2 Alternatives Evaluated in Detail

USACE preferred potential actions that would produce only localized affects versus actions that could produce substantial changes in tidal current patterns or velocities. Detrimental impacts to channels and shorelines over a large area in the inlet vicinity could potentially occur with substantial tidal current changes.

Alternatives that would only realign or deepen the channel would not produce a long-term solution to channel shoaling and dredging needs. However, these alternatives combined with the two structural alternatives that passed the initial evaluation summarized in Table 2-1 could provide for long-term improved navigation and reduced need for dredging. Accordingly, these

combined alternatives, plus the No Action alternative, were modeled in detail by USACE ERDC and evaluated by USACE and the project partners to consider potential effects on storm surge and erosion/shoaling.

ERDC utilized the Coastal Storm Modeling System (CSTORM-MS) to evaluate the potential impacts of six synthetic tropical storms events to represent the 10%, 5%, 2%, 1%, 0.5%, and 0.2% annual chance storm surge water levels for this area. Over that range of storm annual percent chance recurrence for the no action and two structural alternatives, storm surge would range from approximately 5 to 12 feet above normal levels. ERDC prepared a separate report (ERDC/CHL LR-21-6) documenting modeling efforts and findings. Section 3.1.1 provides additional information on those extreme water levels.

ERDC conducted two-dimensional computer-modeling of existing conditions and the two proposed alternative conditions to predict where scour and shoaling would occur. The computer effort modeled tides and winds to model sediment transport utilizing an adaptive hydraulics hydrodynamic and sediment model. Modeling was conducted to evaluate inlet vicinity conditions one year into the future after project construction completion. Based on ERDC experience, modeling for a longer period of time was not conducted as it was not anticipated that substantial further environmental changes would occur following year 1. Additionally, the modeling is an expensive undertaking and even one more year of data was well outside the scope and timeframe of the study. ERDC also modeled shoaling and scour conditions in the inlet vicinity under conditions of a 1.5 foot higher sea level scenario at the rock structures. Based on the present rate of sea-level rise (including ongoing acceleration in rate of rise), this scenario would accommodate 0.2 feet of structure settlement plus anticipated sea level rise expected approximately 50 years into the future (in approximately the year 2075). A base year of 2018 was utilized because the USACE data set for that year is comprehensive and well-suited for modeling. (Note though that incoming sediment from the ocean was not included over the time period modeled.) ERDC prepared a separate report (ERDC/TRxx xx) documenting 2D modeling efforts and findings.

Coordination with the public, local sponsors, stakeholder workgroup, jet ski facilities, and Coast Guard was undertaken to determine whether the structure extending into Sinepuxent Bay would pose navigation hazards. None of the interests coordinated with expressed concerns over potential safety impacts. Resource agencies (NMFS and MD DNR) preferred that openings be left between breakwaters if there were no demonstrated engineering reasons to close these gaps for navigation or structural integrity of the breakwaters.

USACE prepared separate cost-benefit analyses of the no action and two structural alternatives evaluated in this section. Both alternatives had favorable benefit-cost ratios[2].

2.2.1 No Action

Without a solution to reduce shoaling in the Ocean City Harbor and Inlet, navigation related hazards will persist. Dredging to keep the inlet accessible is currently needed several times a year

[2](The economic analyses are contained in the separate "Ocean City of Maryland Navigation Project Feasibility Study Economic Analysis," available at the USACE website "Projects in Ocean City, Maryland" website https://www.nab.usace.army.mil/OceanCity/). .

and maintenance dredging will continue sporadically depending on funding. With no action, commercial boaters will continue to incur damages and lose revenue due to groundings, and increased fuel and maintenance costs from tide-waiting delays, as controlling depths in the channel become shallower in the years following the maintenance dredging. Commercial boaters may choose not to operate in the area due to navigation related restrictions.

2.2.2 Alternative – Channel Realignment and Dredging, Plus Structures with Gap

For this alternative, the authorized location of the federal channel would be realigned (relocated) to coincide with deeper water that modeling predicts would occur immediately south of the marked channel after the structural solution is constructed. Dredging would be conducted where shallower waters occur to produce the authorized depth (10 feet MLLW plus 2 feet overdredge), primarily in the vicinity of the confluence of the Inlet Channel and Isle of Wight Channel.

A new approximately 150-ft long jetty would be constructed off the northwestern tip of Assateague Island extending out into Sinepuxent Bay to constrict flow and cause tidal currents to scour the realigned channel (Figure 2-1). This would serve to reduce shoaling in the most problematic channel area in the vicinity of buoys 11 and 12 (Figure 1-2) such that future maintenance dredging is predicted to be needed once approximately every 5-years. One approximately 300-ft gap between the existing breakwaters at the western end of the Assateague Island inlet shoreline would be closed with a rock structure. The easternmost gap in the breakwater along the Assateague Island inlet shoreline would be left open.

(Note. The inlet vicinity would continue to be dredged under the auspices of the LTSM project to compensate for interruption to longshore transport caused by the Ocean City jetties. This dredging would likely shift from inlet shoals to instead make greater use of the ebb shoal, as well as likely shoaled areas of the USACE Sinepuxent and Isle of Wight federal channels near their confluence with the inlet channel.)

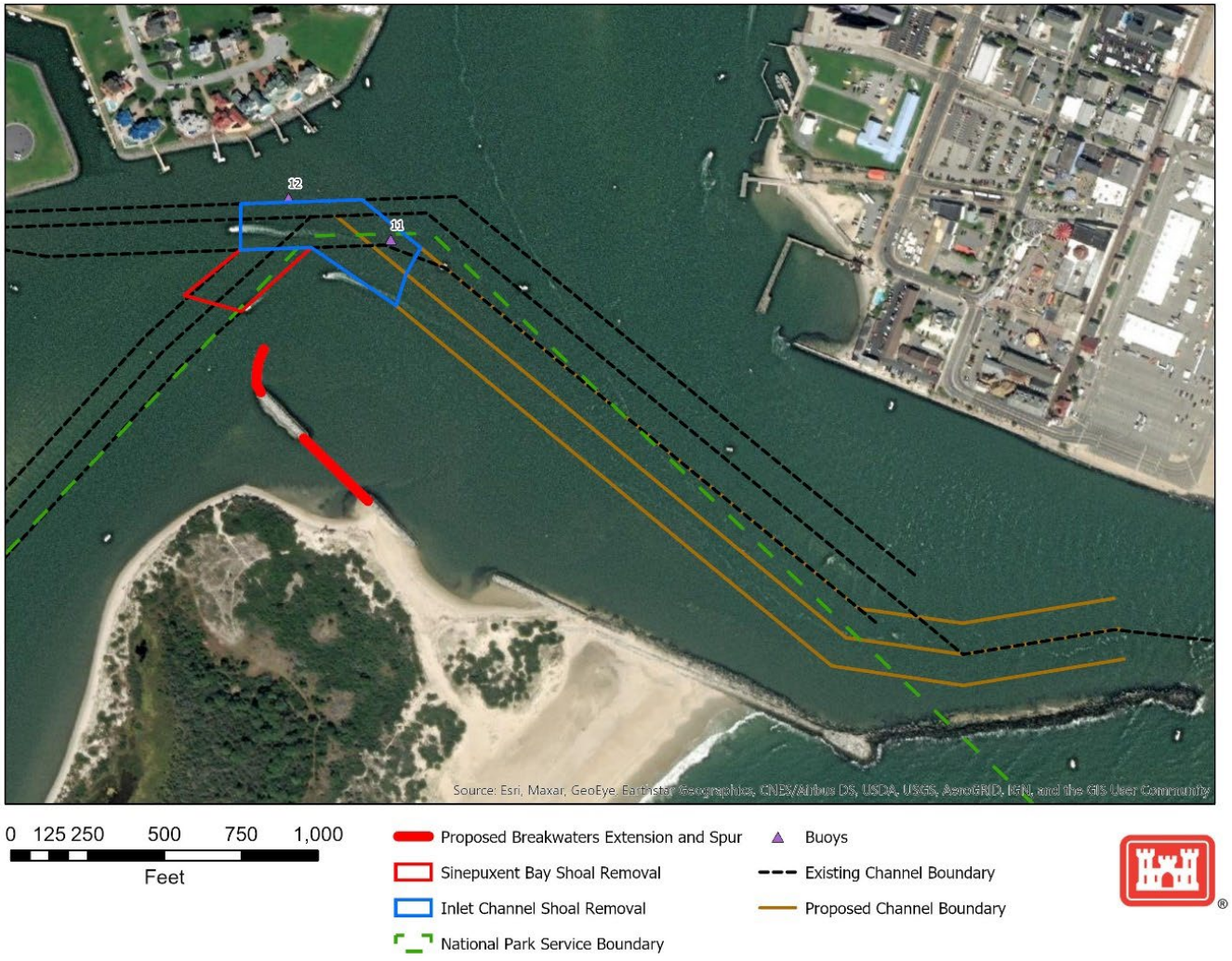


Figure 2-1. Alternative with gap left in breakwaters/jetty.

2.2.3 Alternative - Channel Realignment, Dredging and Structure with No Gap

For this alternative, the authorized location of the federal channel would be realigned (relocated) to coincide with deeper water that modeling predicts would occur immediately south of the marked channel after the structural solution is constructed, with dredging conducted as needed in the vicinity of the confluence of the Inlet Channel and Isle of Wight Channel to produce the authorized depth (10 feet MLLW plus 2 feet overdredge).

The alternative would close two approximately 300-ft gaps between the existing breakwaters at the north end of Assateague Island with rock structures and construct an approximately 150-foot jetty addition onto the breakwater extending to the northwest into Sinepuxent Bay. This would produce a continuous rock structure on the north tip of Assateague Island, which would extend toward the Sinepuxent Bay federal channel (Figure 2-2). The rock structures would constrict flow and cause tidal currents to scour the realigned channel. This alternative would also reduce the rate and volume of shoaling, decreasing the predicted need for maintenance dredging to maintain the inlet channel to approximately once every 5-years.

(Note. The inlet vicinity would continue to be dredged under the auspices of the LTSM project to compensate for interruption to longshore transport caused by the Ocean City jetties. This dredging would likely shift from inlet shoals to instead make greater use of the ebb shoal, as well as likely shoaled areas of the USACE Sinepuxent and Isle of Wight federal channels near their confluence with the inlet channel.)

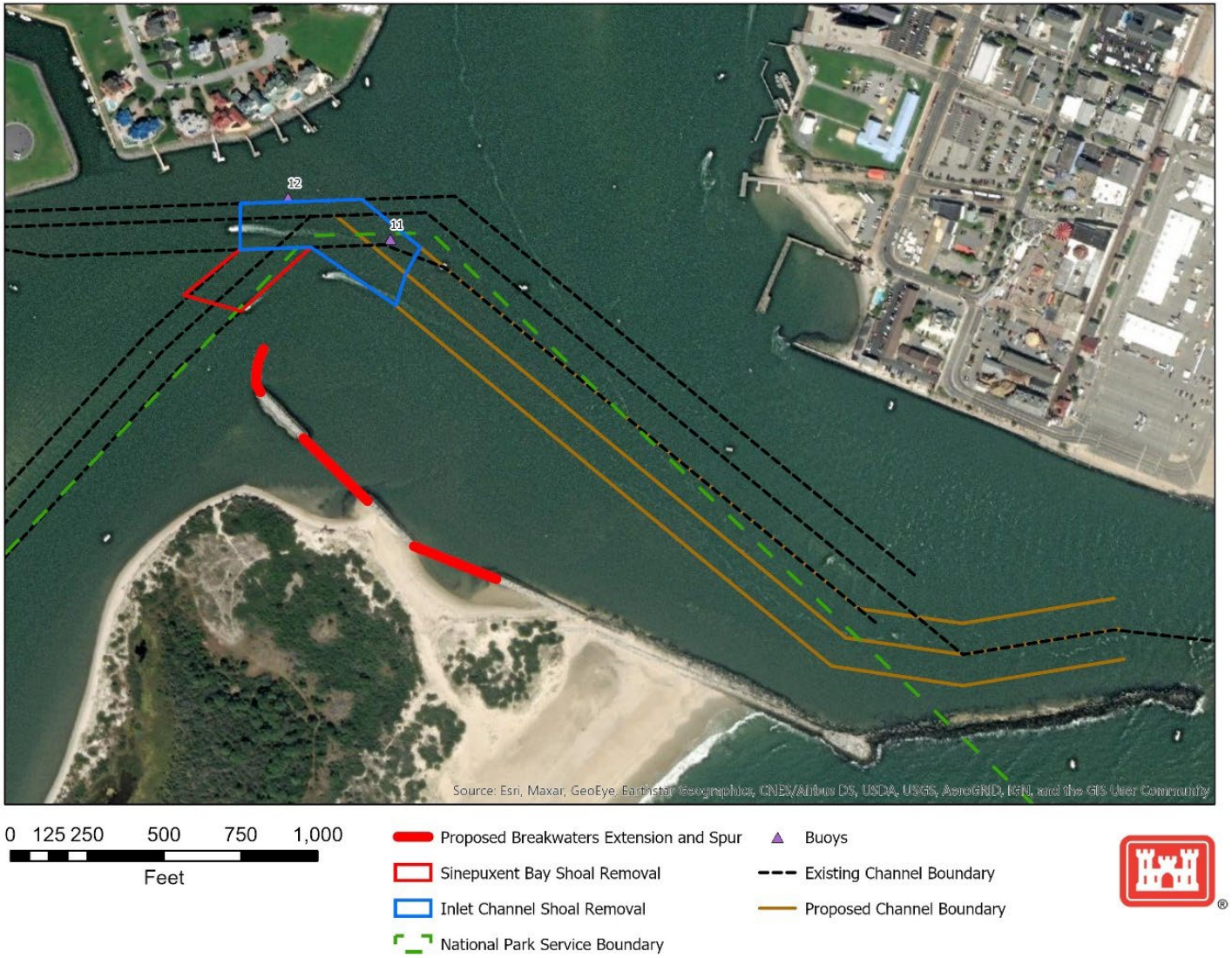
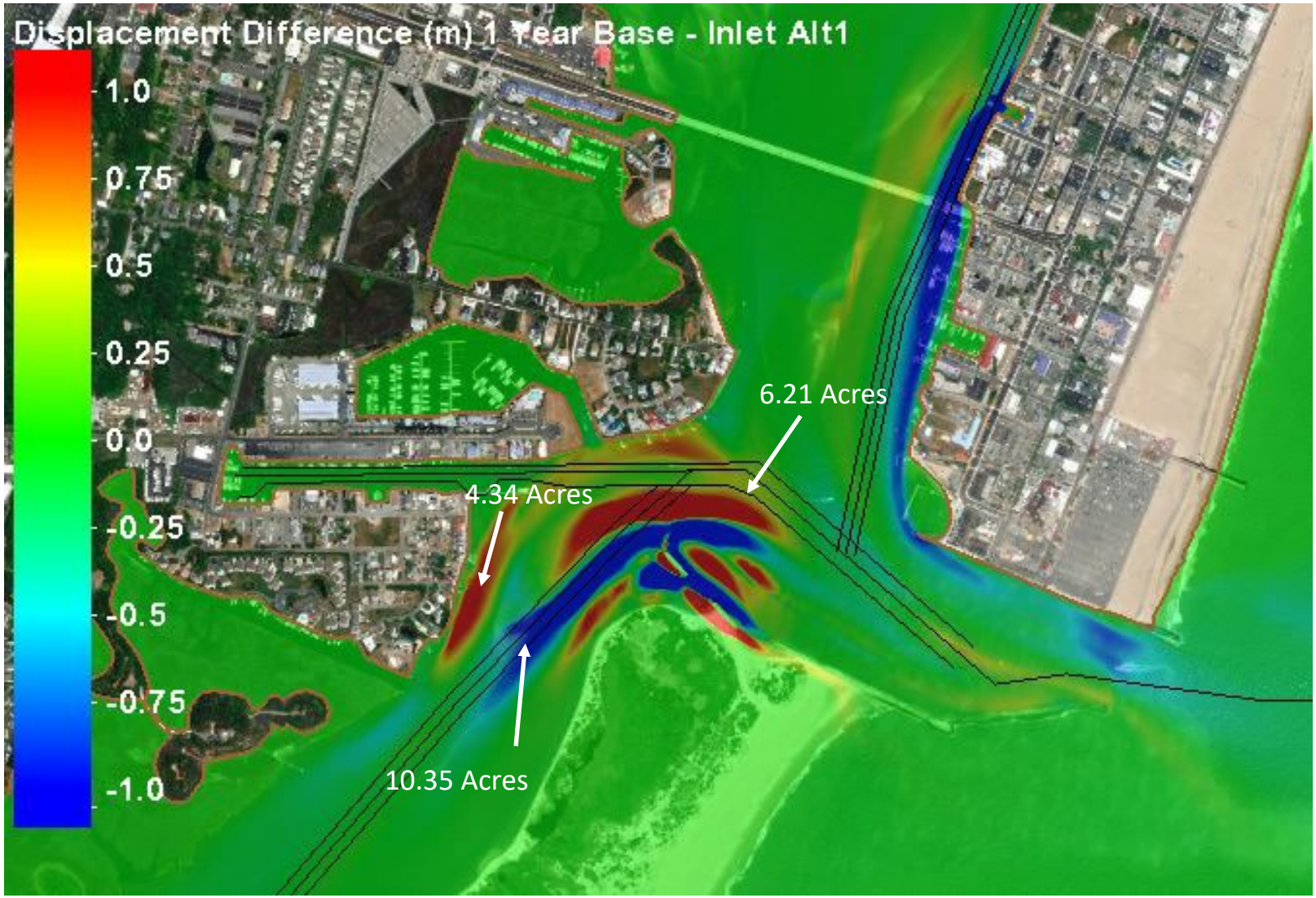


Figure 2-2. Alternative with no gaps left in breakwater system.

2.3 Detailed Analysis of Alternatives

Under the No Action alternative, the channel would remain at its existing location and depth. Rapid shoaling that limits the ingress and egress of boats into the Ocean City Harbor would continue, and watermen would continue to incur vessel damages and increased maintenance costs. Under the No Action alternative, navigation-impeding shoals would re-form in the channel 3 to 6 months following dredging. In recent years, special-purpose hopper dredge availability has been a limiting factor for dredging the shoals in a timely manner to prevent impacts to waterway users. This alternative would not address the purpose and need of the project. Therefore, the no action alternative was rejected.

The alternative with a gap left in the breakwater system (2.2.2) would reduce the need for maintenance dredging and improve navigation more cost-effectively than the alternative with no gaps (2.2.3) because leaving the gap open would reduce construction costs. However, in the first year following construction as inlet sedimentary processes adjust to changed tidal currents, it would induce up to approximately 1 meter (3 feet) of excess erosion or sedimentation in other areas in the inlet vicinity based on ERDC modeling. After the first year, ERDC expected that minimal (much less than 3 feet) additional induced erosion or sedimentation would occur. USACE presented this alternative to stakeholders at a public meeting in August 2021. Because of concerns over sedimentation impacts to marinas on the bayside of Ocean City, as well as potential erosion impacts to properties south of the harbor, this alternative was disfavored by the Ocean City Inlet Workgroup and public (Figure 2-3 versus Figure 2-4).



(Red = Scour due to alternative; Blue = Shoaling due to alternative. The most intense red and blue ends of scale represent 1 m of change from existing conditions.)

Figure 2-3. Alternative with gap left in breakwater system, induced erosion and shoaling.

(Red = Scour due to alternative; Blue = Shoaling due to alternative. The most intense red and blue ends of scale represent 1 m of change from existing conditions.)

Figure 2-4. Alternative with no gaps left in breakwater system, induced shoaling and erosion.

The alternative with no gaps (2.2.3) would reduce dredging needs while producing substantially less risk of excess erosion or sedimentation in areas of concern. Accordingly, the alternative with the two gaps closed was selected as the proposed action.

2.4 Recommended Plan

2.4.1 Physical Description

The realigned navigation channel would be approximately 3,360 feet long, occupying approximately 15.4 acres of bottom area. Most of the realigned channel length/area is already at the authorized depth. However, dredging would be required over a 2.7-acre area in the vicinity of buoys 11 and 12 (Figure 1-2). Additional minor local dredging may be required elsewhere, depending on conditions at the time of dredging.

The proposed project would close two approximately 300-foot gaps in the existing breakwaters at the north tip of Assateague Island with new rock structures (600 feet total) and would construct an approximately 150-foot jetty extending to the northwest into Sinepuxent Bay/Inlet waters. The proposed new rock structures would be underlain by a rock-filled marine mattress. The shape of the proposed new rock structures would match the height and width of the existing structures where they join. The breakwaters would be approximately 12 ft wide at the top. The jetty would crest at a height of +6 ft MLLW. The footprint width of the new rock structures would vary from 60 ft to 150 ft. The footprint of the new structures would be approximately 58,000 square feet, or 1.3 acres (Figures 2-5 through 2-9).

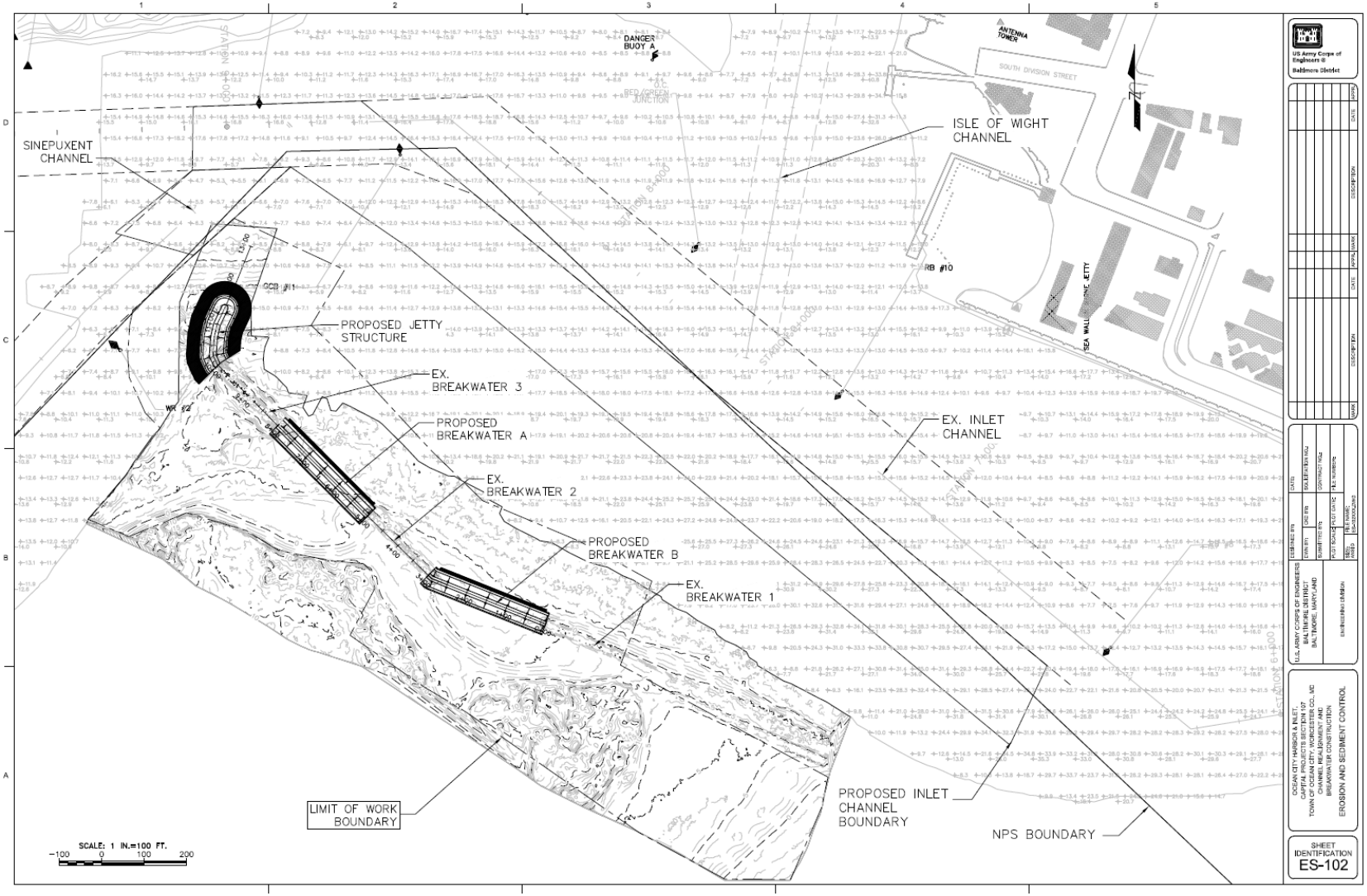


Figure 2-5: Map view of proposed navigation improvements (recommended plan).

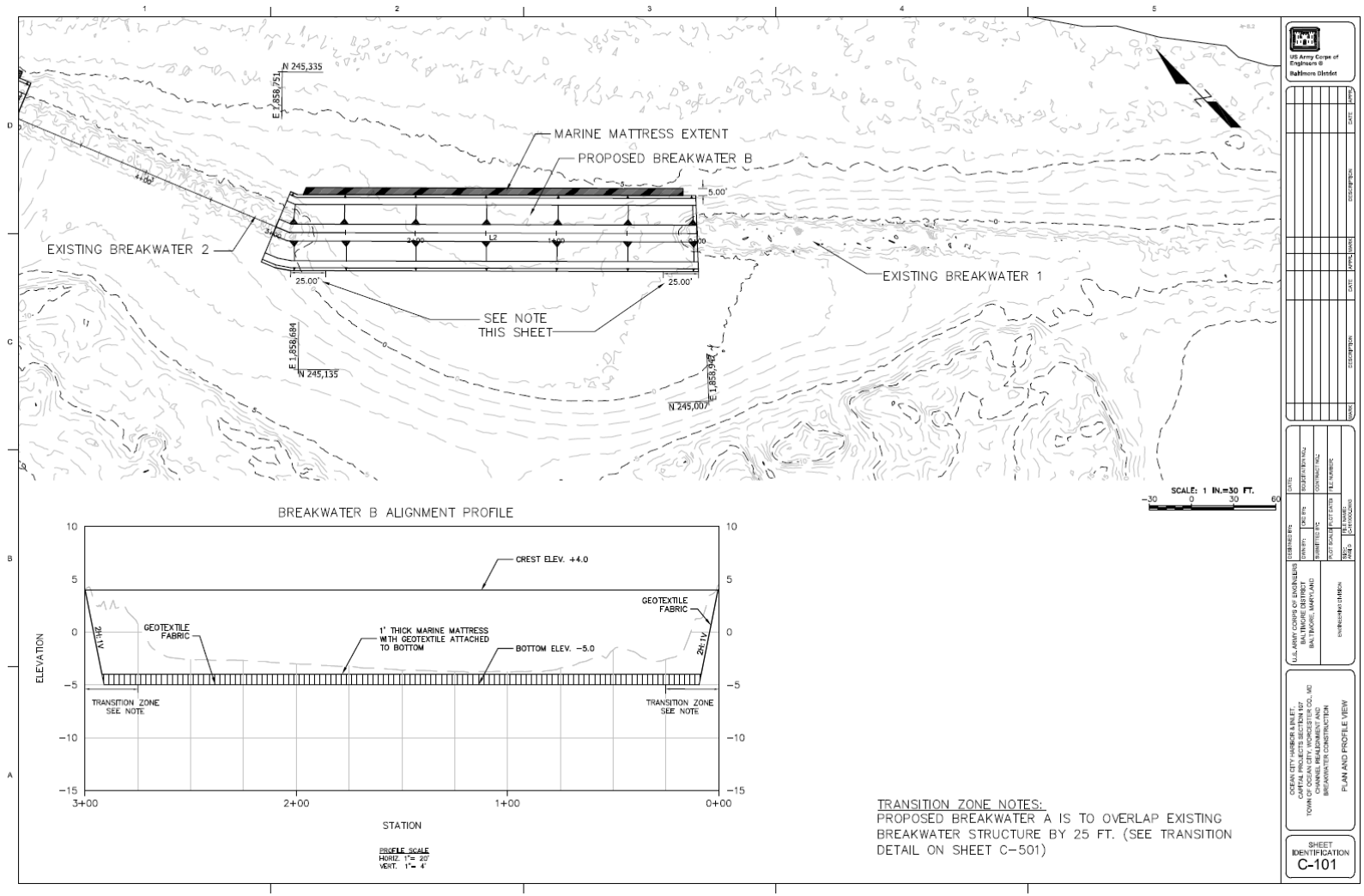


Figure 2-6: Map view and profile of proposed new breakwater (recommended plan).

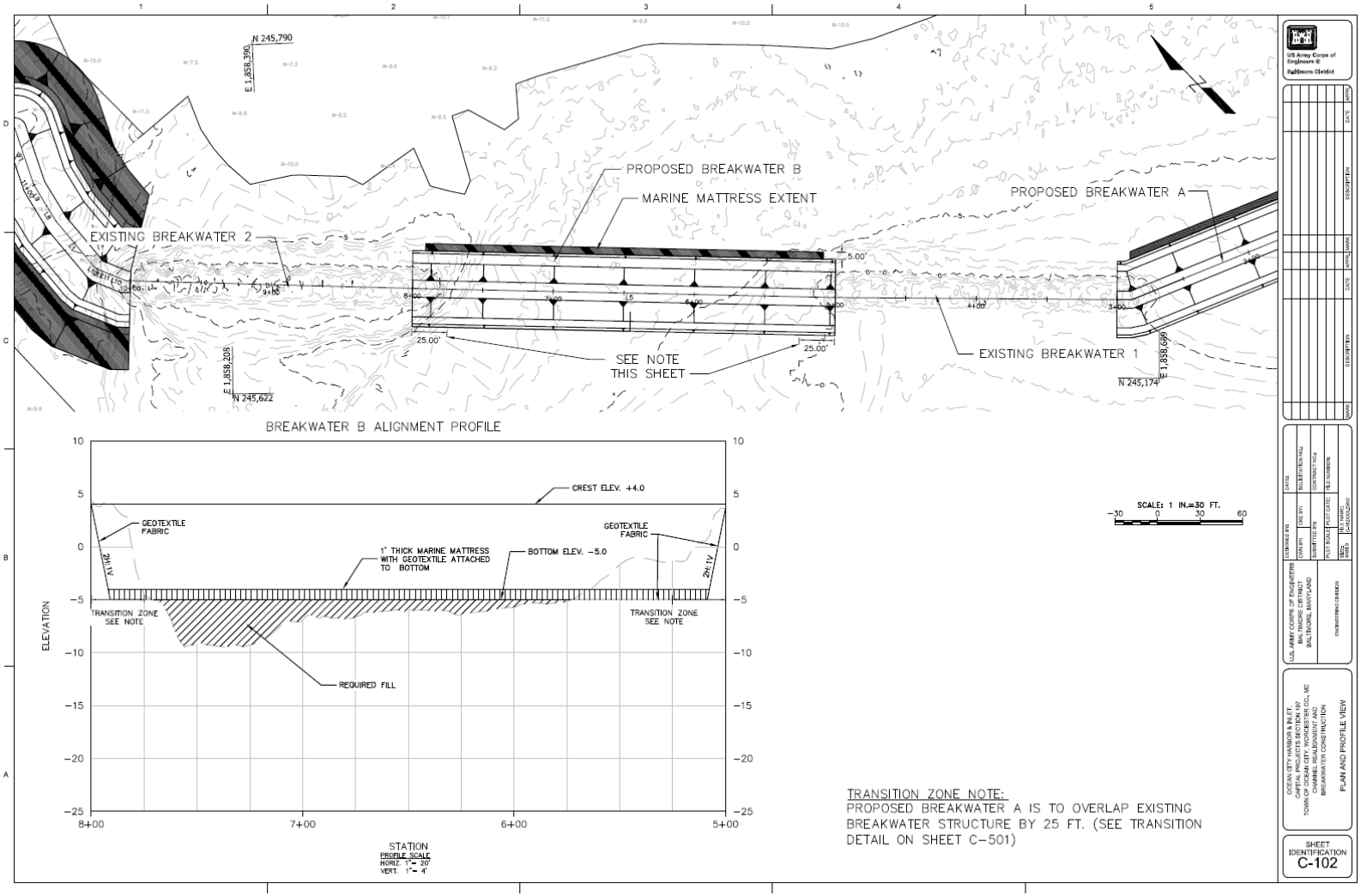


Figure 2-7: Map view and profile of proposed new breakwater (recommended plan).

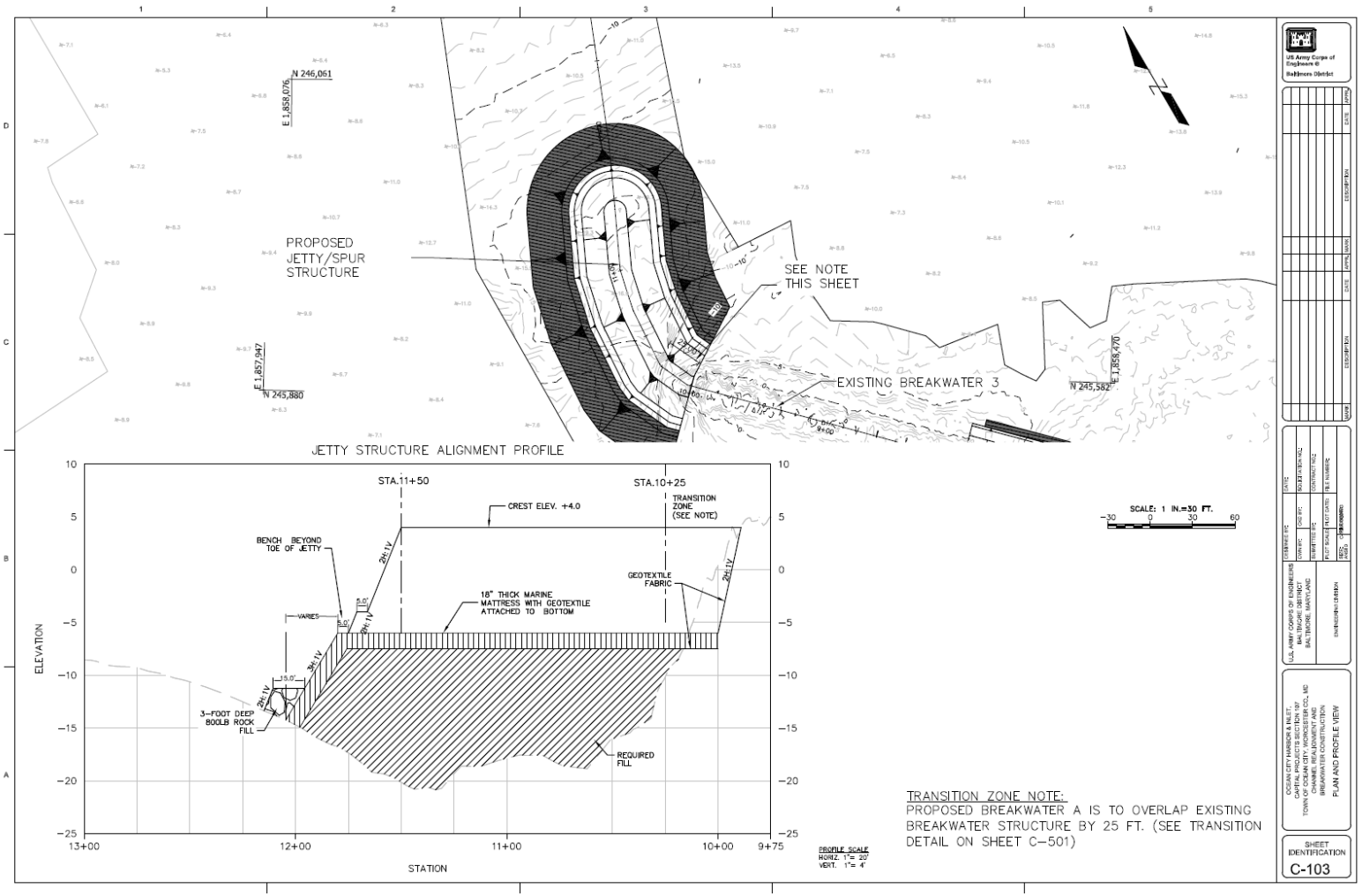


Figure 2-8: Map view and profile of proposed jetty extension (recommended plan).

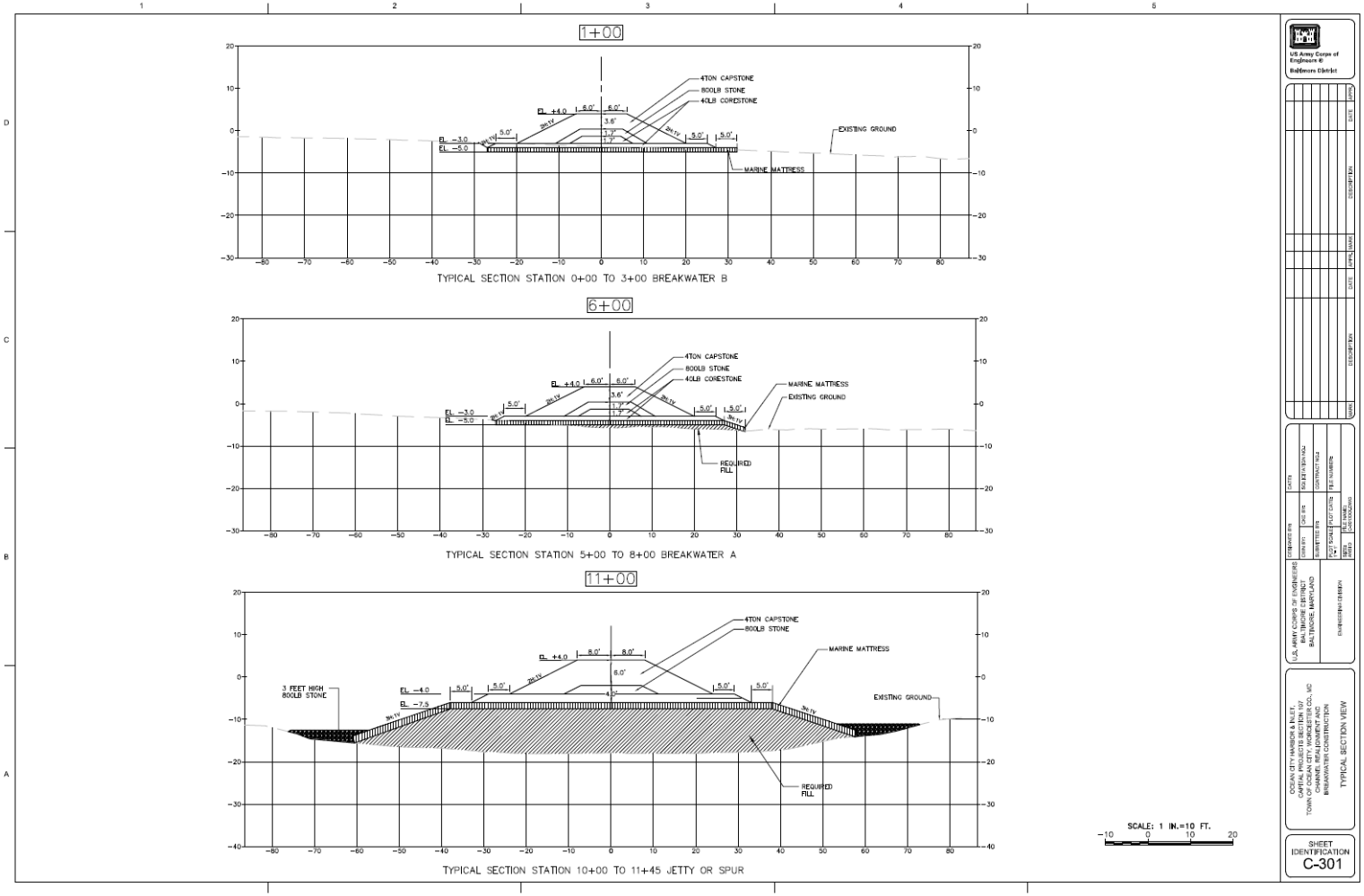


Figure 2-9: Typical sections of proposed rock structures.

The Coast Guard stated that they would perform a navigational safety assessment of the proposed project during public review of this draft EA. In the event the US Coast Guard determines that the proposed jetty presents a safety hazard to boaters because it extends into heavily used waters, then it is anticipated that the length of the spur into Sinepuxent Bay would be shortened(by perhaps a maximum of 50 feet). ERDC conducted modeling to evaluate this possible alternative.

2.4.2 Description of Dredging and Construction Method

This description was prepared based on the Cost Engineering Appendix (available separately by request) and internal coordination among engineering, navigation, and planning project delivery team members.

Channel Realignment

Based on a 2018 hydrographic survey, approximately 3,000 cubic yards from the Inlet Channel and 1,000 cubic yards of shoals from the Sinepuxent Bay Channel would be mechanically dredged to realign the Inlet Channel. Dredged material would consist of predominantly sand, and dredging work would likely continue 24 hours a day, 7 days per week until the job is complete. USACE would coordinate with the Coast Guard to move navigation buoys as the channel is realigned.

It is anticipated that a backhoe on a barge would be used for mechanical dredging, with anchors or spuds to hold the barge in place on the water. Sand would be excavated from the seabed and placed on a barge, and then the barge would be transported to the jetty construction site and the sand dredged material would be beneficially placed as needed in the jetty footprint to improve foundation conditions (see "Jetty/Breakwater Construction" subsection).

TOY restrictions have not been determined for the proposed mechanical dredging. While it is not anticipated that mechanical dredging would pose a notable risk to sensitive aquatic life, it is likely that dredging would avoid warm weather months when heavy boat traffic would make dredging and material transport difficult. Dredging and placement of material would honor any TOY restrictions determined to be necessary by MD DNR and NMFS to protect substantial recreational boating and fishing activity as well as aquatic life[3].

Jetty/Breakwater Construction

Construction of the rock structures would be conducted from the water (Sinepuxent Bay and the inlet), as well as from land on northern Assateague Island. Barges would travel to northern Assateague and be positioned in waters adjacent to the construction area within approximately 200 feet of the island. Barges would convey equipment (backhoe and heavy cranes) that would be utilized, as well as rock.

[3] When USACE most recently dredged Sinepuxent Channel, TOY restrictions were applied for dredged material placement to protect horseshoe crabs and summer flounder, as well as substantial recreational boating and fishing activity. Dredging and dredged material placement activities were restricted to the period December 15 through March 31.

It would be necessary to have the jetty extend downwards a substantial distance below the bottom into the substrate to have the structure be stable under extreme storm scour conditions. Based on data available in January 2022, the lowest elevation of the jetty foundation would be -18.5 ft NAVD88 feet, and the lowest elevation of the breakwater foundation would be approximately -7 ft NAVD88. Excavation depth would depend on water depth and structures design at any given location. Maximum excavation into the bottom could potentially be 10 to 15 feet in shallow water off the northwest tip of Assateague Island. The breakwater foundation would match foundations of inlet rock structures already present. It is anticipated that removal of material from the jetty footprint would be conducted by mechanical backhoe dredging from a barge. Sand excavated from the breakwater footprint may be conducted from barge or land. Sands excavated from the footprint during construction would be re-used locally as needed for construction.

It is anticipated that coarse fill material (sand and gravel) would need to be placed locally within the jetty footprint and immediately adjacent areas within Sinepuxent Bay to establish proper foundation elevations and conditions. It is anticipated that sand from mechanical backhoe dredging for new rock structure work (as described above) as well as from mechanical dredging undertaken to realign the Inlet Channel, or from maintenance dredging of the Sinepuxent Bay Channel, would be beneficially used for jetty construction (particularly to fill deeper water in the jetty footprint).

The marine mattress would be assembled (filled with stone, stitched together) on a barge or on land. The work area would likely include stone stockpile and a filling platform. After mattresses are filled and closed, they can be stacked prior to placement by crane. Due to the anticipated amount of mattresses needed it is likely the contractor would assemble and fill these within the designated work area on Assateague.

The construction contractors would probably construct a temporary offload facility on north Assateague, which generally consists of several pieces of heavy equipment, office trailers, and/or trucks to transport equipment and material needed for the project. The contractor would barge in all of their equipment and stone for staging to locations on northern Assateague Island. Work area, stockpile and laydown areas will be field identified in consultation with NPS personnel in order to minimize resource impacts. It is anticipated that the stockpile and laydown area(s) on northern Assateague Island would be within approximately 200 feet of the rock structure work. (No construction work equipment nor work activities would occur beyond approximately 200 feet south of the existing structures line). The type of land-based equipment that would be used on northern Assateague Island would likely include a large track-mounted crane and front-end loaders. Crew work hours for stonework would be assumed to work 8 hrs per day, 5 days/week. If a temporary haul road is needed within the work limits, the road would be constructed with a combination of geotextile and temporary ground protection mats (construction mats). The contractor would be required to remove the road materials as well as the offload facility after completion of the work. The contractor will be required to restore all site conditions as per NPS standards within the construction area after the completion of work.

At this time, adequate water depths are available along northern Assateague Island for barges to reach the proposed rock structure area, but light loading would likely occur to transport in stone. Because the area is dynamic and shoaling could occur in waters along northern Assateague, it is

possible minor mechanical dredging would be needed to facilitate barge access to the rock structure construction areas in the immediate vicinity of the structure footprints. In that event, sand would likely be reutilized in breakwater construction.

USACE anticipates that all construction equipment would access the north end of Assateague Island for rock work by barge. No construction equipment would be driven up the beach from the nearest access point from land (Route 611). However, it is anticipated that USACE quality assurance representatives would access the site up to several times per week by vehicle (pickup truck or suburban utility vehicle) from Route 611. Vehicles would drive on the beach in accordance with NPS policies between the low and high tide lines. It is anticipated that several vehicles per week would access the northern Assateague construction site by driving on the beach to/from Route 611. USACE would notify NPS in the event that such driving was needed and follow NPS procedures for driving official vehicles on the beach.

2.4.3 Project Monitoring and Performance

USACE, NPS, and others monitor or have previously monitored numerous environmental variables in the proposed project vicinity. NPS routinely monitors the ocean shoreline position of Assateague Island (NPS, 2022), but does not monitor bay shoreline position. Topography of Assateague Island (including the northernmost end) has occasionally been determined by other government agencies (USGS, NOAA, NASA), particularly following storm events. However, there is no standard scheduled topographic data collection program for northern Assateague Island in the inlet vicinity. USACE and MD DNR routinely monitor water depths in the federal Inlet channel and Isle of Wight and Sinepuxent federal channels at their confluence with the inlet channel. USACE and NPS monitor ocean bathymetry offshore of the inlet under the auspices of the Assateague LTSM Project.

USACE has compiled pre-project topographic and bathymetric survey data to facilitate project design and would conduct an as-built survey once construction is completed. USACE would then conduct post-construction topographic surveys of the rock structures .

NPS is requesting that additional monitoring be conducted following project construction based upon ERDC model results that show the potential for excess scour occurring immediately south of the south jetty. USACE and NPS are negotiating details of additional monitoring that may be conducted following construction of the proposed project[4].

NPS would like bayside shoreline position monitoring to extend to approximately 1 km south of the inlet. NPS could undertake this bayside shoreline position work, but would need to be provided funds to do so. NPS would like topography within approximately 75 yards perpendicular to the proposed rock structures to be monitored. Topography of the area is occasionally determined using LIDAR by other agencies (USGS, NOAA, NASA), particularly following storm events. However, there is no standard scheduled topographic data collection program.

[4] Following previous jetty rehabilitation in 1985, USACE monitored multiple parameters in the inlet vicinity to track changes in physical environment conditions (USACE, 1994).

The existing project is an authorized USACE Civil Works project for which operations and maintenance (O&M) of the jetties is justified. In the event of future severe scour or breaching at the jetties on northern Assateague, USACE could request O&M funding to repair or rehabilitate the structure.

3 Existing Conditions

3.1 Physical Environment

3.1.1 Climate

Worcester County has a humid continental climate modified by the Atlantic Ocean, Chesapeake Bay, and Gulf Stream. Average annual precipitation at Ocean City is 49-inches, with about 10-inches of snow occurring annually. Heavy precipitation occurs mostly in the warmer portion of the year from thunderstorm activity. Droughts can occur throughout the year but are most likely during the summer months. Prevailing winds are from the west to northwest, except during the summer months, when they are southerly. Onshore winds from the northeast, east, and southeast occur approximately one-fifth of the time. Direct onshore winds can elevate nearshore waves and coastal water levels during storm events, increasing storm damages. Winds from the east and northeast tend to be of the highest magnitude. The average annual temperature at Ocean City is 57°F (USACE, 2008).

Most coastal storms causing erosion and other damage in the study area are nor'easters. These storms can produce damaging storm waves for a duration of up to several days, occurring most frequently between December and April. Hurricanes and tropical storms also impact the study area, although less frequently. The winds and waves during the 1933 hurricane were estimated at 100 mph and 20-ft, respectively. The 1962 nor'easter caused the greatest storm damage to Ocean City: water covered Fenwick Island for two days at depths of up to 8-ft (USACE, 2008). Table 3-1 presents storm surge water levels predicted to occur in association with severe infrequent storms by ERDC (details in separate report ERDC/CHL LR-21-6).

Table 3-1: Severe storm modelled mean water levels.

Storm Annual % Chance of Occurrence	Recurrence Frequency (Once per __ Years)	Mean Water Level (ft MSL 1992)
10.0%	10	5.4
5.0%	20	5.9
2.0%	50	6.7
1.0%	100	7.7
0.5%	200	8.7
0.2%	500	10.0

3.1.2 Air Quality

Worcester County, MD, lacks large stationary sources of air pollutants. Instead, on and off-road mobile sources and small stationary sources of air pollutants are sources of air pollutants originating in Worcester County. Mobile sources in the county include motor vehicles and boats; small stationary sources include dry cleaners and gasoline stations. The USEPA "Green Book"

lists Worcester County, MD, as being in attainment for all criteria air pollutants over the period 1992 - 2022. Air quality in the county is generally healthy for people and the environment.

3.1.3 Geology and Soils

This subsection covers geologic materials, geographic features formed of geologic materials, and movement of geologic materials. The study area lies within the Coastal Plain physiographic province. The Coastal Plain is a relatively flat, low-lying region along the Atlantic Coast underlain by sediments. Natural geologic materials of the study area consist of layers of sediments (gravel, sand, mud, and plant remains) approximately 7,700 feet thick. (Below that, bedrock occurs [US Geological Survey, 1991]).

Ocean City Inlet vicinity contains several prominent geographic features: flood-tidal shoals, an ebb-tidal shoal, and the inlet channel itself. These features formed naturally, but their current form is strongly affected by coastal engineering measures in the inlet vicinity. USACE projects exert major influence on inlet character, adding sand to the system at Ocean City, maintaining the navigation channel by removing sand and placing it at Assateague Island, managing the ebb shoal by removing sand and placing it on Assateague Island, and holding the channel in place with rock structures along the north and south shorelines of the inlet. Figure 3-1 shows borrow (dredging) locations for the Assateague LTSM project. It was not determined whether the proposed inlet channel realignment area was ever previously dredged by USACE, but that could have occurred historically in the 20th century if the inlet channel was previously located in this area, or in the 21st century to obtain sand for the LTSM Project.

Within the inlet and adjacent constricted waterways (north into Isle of Wight Bay and south into Sinepuxent Bay), tidal currents are principal factors controlling erosion and deposition of sediment. Further north into Isle of Wight and south into Sinepuxent Bays where bay waters widen, tidal currents become weak, and waves are principal factors controlling erosion and deposition of sediment. In the coastal bays where tidal current velocities lessen, substantial deposition of sediment conveyed in from the ocean is deposited.

Studies conducted by ERDC during preparation of this EA evaluating effects of proposed navigation improvements determined that the coastal bays gain approximately 40,000 cubic yards (yd^3) of sand per year transported through the inlet. These sediments deposit within the inlet itself locally, but predominantly accumulate at the southern end of Isle of Wight Bay and at the northern end of Sinepuxent Bay. Accumulating sand forms flood-tidal shoals or deltas that are predominantly below water, but also form low islands above water in southernmost Isle of Wight Bay, including Skimmer Island.

USACE stabilization of the inlet in the 1930s largely cut off the flow of sand to Assateague Island for decades, and induced formation of the large ebb shoal outside the inlet in the ocean. Beginning in the 1970s, some natural transport of sand to the island was re-established to Assateague Island through development of sand bars connecting the ebb shoal to the island (Buttolph et al., 2006). USACE has monitored the ebb shoal since the 1990s in association with Assateague Island restoration and LTSM efforts. The ebb shoal has been continuously growing over this time period (USACE, 2016). Assateague Island retreated a full island width following inlet stabilization, occupying what had been open waters of Sinepuxent Bay. Subsequently in the late 1990s, the

bayside shoreline of northernmost Assateague (formed by island retreat over Sinepuxent Bay) itself collapsed and converted back to open water[5].

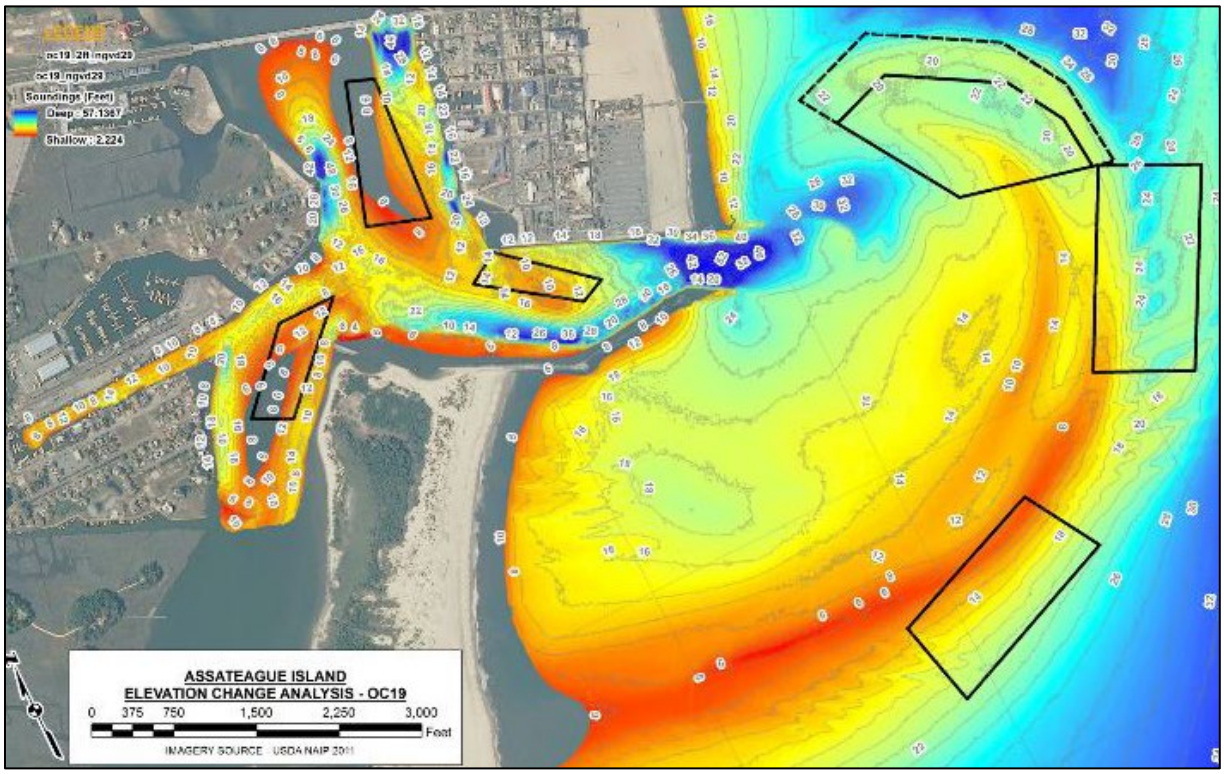


Figure 2-1. Borrow locations for Assateague LTSM project. (Black polygons). Ebb shoal is shallow area extending oceanward from Assateague Island.

Bottom sediment in open waters of Sinepuxent and Isle of Wight Bays in the Ocean City Inlet vicinity consists of sand (MGS, 2003). USACE borings to approximately 8 feet below the bottom in the inlet vicinity completed in 2002 recovered predominantly sand with some gravel and shell. A maximum of approximately 5 percent of that recovered bottom material consisted of muds (silts and clays). Previous MGS investigations (2003) indicate that comparable geologic materials occur to approximately 20 feet below the bottom surface. ERDC investigations conducted for this proposed action found that generally the upper three feet of bottom material consists of nearly pure sand, but that muddy sand occurs in the subsurface below approximately 3 feet below the bottom. Non-erodable geologic materials occur approximately 50 feet below sea level.

Shorelines on the bayside of Ocean City in the inlet vicinity are largely bulkheaded. The mainland shoreline of Worcester County in the inlet vicinity is stabilized with riprap and bulkheads. The Virginia Institute of Marine Science (VIMS) conducted a survey of shoreline conditions in 2004 (VIMS, 2004). Since that time, shoreline stabilization works have increased, particularly in

[5] Two separate USACE engineering documents available by request provide additional information on area geology: 1) Design Documentation Report, and 2) ERDC report "A Comprehensive Observational Analysis of Scour and Sedimentation Issues in the Vicinity of Ocean City, Maryland: CAP 204, Regional Hydrodynamics and Morphology Change."

association with construction of new houses and the Sunset Marina along the shoreline north of the Ocean City harbor.

Soils are geologic materials modified by living organisms, that are capable of supporting the growth of plants. Where intense wave energy and currents occur in the inlet vicinity, rooted plants are not capable of growing on the intertidal shoreline. Soils of the study area differ in that those of Fenwick and Assateague Islands have formed in association with the coastal barriers, which are dynamic features that over time have been moving westward as the sea has risen. The mainland soils include soils that have formed in place over long periods of time, as well as soils formed in recent deposits along the shoreline.

Natural Resources Conservation Service (NRCS) Soil Mapper was consulted to obtain information on soils of the study area. Soils of the study area are gently sloped, with slopes generally less than 5 percent. Soils on Fenwick Island consist of a variety of urban land soils. Urban soil types are characteristic of urban areas with long histories of cut and fill, wherein the soils include substantial human artifacts. Soils on northern Assateague Island consist predominantly of sand. Peats occur on the bayside where tidal salt marsh deposits have accumulated. Northern Assateague Island retreated its full width following inlet stabilization, so sands and peats have all accumulated since that time by overwash, wind transport, and plant growth. Soils of the mainland in West Ocean City include a variety of urban soils that occur where substantial cut and fill activities have occurred, typically in association with development, with large parcels occurring on either side of the Ocean City Harbor. Peats occur in areas of tidal wetlands along the mainland shoreline.

3.1.4 Land Use and Land Cover

Ocean City is a completely developed urban area. Conversely, the Maryland portion of Assateague Island consists of largely undeveloped parkland managed by the State of Maryland and NPS. The Worcester County, MD, master plan depicts land use in West Ocean City in the inlet vicinity as existing developed and commercial land.

Land cover along the immediate south side of the inlet jetty on northern Assateague Island is bare sand/sparse vegetation. Further south along the bayside and middle of the island, natural dune fields, dune grasses, shrubs and extensive saltmarshes occur.

3.1.5 Bathymetry and Elevations

NOAA periodically surveys bathymetry of the ocean and coastal bays in the study area. These conditions are presented in NOAA Nautical Chart "Fenwick Island to Chincoteague Inlet" (No.12211) (Figure 3-2). NOAA nautical charts present depths in reference to mean low water (MLW). NOAA nautical charts may not depict up-to-date detailed information on USACE navigation channels or the harbor. USACE, with its partner MD DNR, conducts hydrographic surveys of the USACE channels in the inlet vicinity, as well as the flood and ebb tidal shoals of the inlet. The USACE inlet channel (including southernmost Isle of Wight Channel and northernmost Sinepuxent Bay Channel) is surveyed about every 6 months. USACE hydrographic surveys of federal navigation channels are catalogued on the publicly accessible eHydro program, which provides a standardized archive of available hydro surveys from across the country on one

website. Ebb shoal bathymetry is surveyed about once per year. USACE projects directly and indirectly effect inlet vicinity bathymetry.

Water depths at the confluence of the inlet, Sinepuxent Bay, Ocean City Harbor, and Isle of Wight Bay are dynamic. Water depths adjacent to northern Assateague Island on the bayside and inlet (including discontinuous breakwater and jetty) are less than -6 ft MLW. Water depths in the inlet at the ocean entrance reach maximum depths of greater than 50 ft, but a shoal occurs on the immediate northside of the Inlet Channel between Ocean City and Assateague Island. Within Sinepuxent Bay, a shoal occurs parallel to shore southeast of the shoreline, south of the Ocean City Harbor. An additional shoal extends from the mainland shoreline, southeast from the area of the former railroad bridge into open water of southernmost Isle of Wight Bay. Water depths deeper than 6-ft occur along the bayside of Fenwick Island, and deeper waters occur along the Ocean City jetty. The inlet's ebb shoal in the ocean is attached to northern Assateague Island about 0.7 miles south of the inlet, and then arks out eastward into the ocean, forming an area of waters less than 10 ft in depth almost 3 square miles in area.

While the inlet position has been stable overall since stabilized by jetty construction, water depths within the inlet and vicinity, and the northern Assateague Island landmass itself, have been dynamic. Bottom scour from currents in narrow waterways near the inlet is strong. During the 1937–1995 period, the inlet throat deepened from 15 feet to more than 40 feet coincident with a substantial increase in cross-sectional area as the inlet accessed an increasingly large bay tidal prism (USACE, 1998).

Elevations on Assateague in the island interior on dunes exceed 5 ft elevation (NAVD 88[6]), with maximum elevations on northern Assateague Island locally exceeding 10 ft (NAVD 88). Elevations along the mainland shoreline in the study area are generally less than 5 ft NAVD 88, except where fill has been placed to increase elevation. Proceeding landward, the land gradually slopes upward, with ground reaching elevations exceeding 5 ft NAVD 88 about ¼ mile in from the Isle of Wight and Sinepuxent Bays shorelines. Elevations on Ocean City are less than 5 ft NAVD 88 along much of the Fenwick Island bayshore. Highest elevations in Ocean City in the study area occur on the constructed dunes along the ocean, where elevations locally exceed 10 ft NAVD 88 (USGS, 2016).

[6] North American Vertical Datum

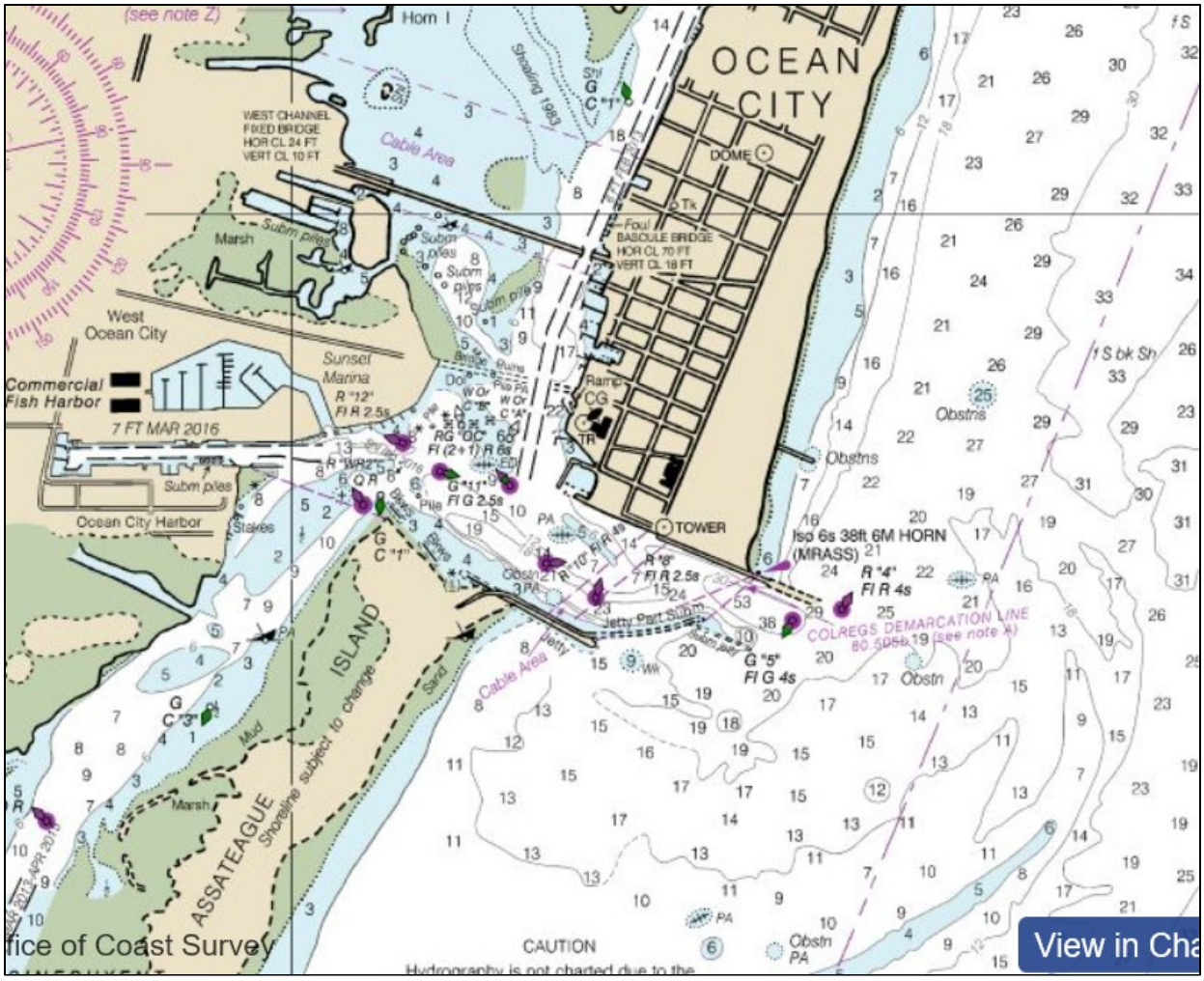


Figure 3-2. Bathymetry in the vicinity of the Ocean City inlet.
Source NOAA chart: http://www.charts.noaa.gov/ChartCatalog/MidAtlantic.html

3.1.6 Hydrology

Tidal range near the Ocean City Inlet is more than 3.4 ft. NOAA National Ocean Service operates a water level and weather monitoring station at Ocean City Inlet at the US Coast Guard Station (National Buoy Data Center [NDBC] Station OCIM2; NOAA Tides & Currents Station ID: 8570283). The tidal range becomes less in the coastal bays proceeding away from the inlet, reaching minimums of approximately 0.4 ft in the middle of the Chincoteague Bay and 1.5 ft in Assawoman Bay (MDE, 2014)

The engineered inlet has strong currents and dynamic substrate and depth conditions. The engineered inlet induces much greater flow of water into/out of the coastal bays than would a natural inlet. The majority of tidal waters flowing into/out of the coastal bays from/to the ocean travels into Isle of Wight Bay. Modeling conducted by ERDC for this study estimated volumes of water moving through the Ocean City Inlet during the tidal cycle in 2018. On average, 80% of incoming tidal flow splits northward into Isle of Wight Bay while 20% splits southward

flowing into Sinepuxent Bay. Maximum flow in during flood tide is approximately 502,000 gallons/second. Maximum flow out during ebb tide is approximately 364,000 gallons/second.

Tide records demonstrate that sea-level is rising at Ocean City (NOAA, 2017). The rate of sea-level rise at Ocean City as of 2006 was 0.0145 feet/year (4.4 mm/yr) (USACE, 2019). The rate of sea-level rise appears to be accelerating (IPCC, 2021). USACE utilizes a sea-level change tool for forecasting future sea levels under low, medium and high scenarios, and utilizes tool outputs as a basis for planning and engineering. The medium scenario appears to match present acceleration rates in the study area.

3.1.7 Water Quality

Water temperatures are measured at the Ocean City Inlet station (Station 8570283) at 12.1 ft below Mean Lower Low Water (MLLW). Because of strong ocean tidal flushing, temperatures at this station largely reflect ocean water temperatures. Strong circulation in the vicinity of the station likely serves to blend bottom and surface waters. Temperatures vary seasonally, as well as from year to year. February typically has the coldest monthly average water temperature. August typically has the warmest average monthly water temperature (Table 3-2) (NOAA, 2020). Water temperatures are a major factor controlling when various aquatic organisms are present in the inlet vicinity, with endangered sea turtles being of particular interest.

Table 3-2. Range of average monthly water temperatures (°F) at Ocean City Inlet.

Month	Minimum	Maximum
January	36	45
February	34	44
March	37	48
April	49	53
May	58	62
June	68	70
July	72	76
August	73	76
September	73	77
October	64	69
November	54	58
December	46	53

From NOAA, January 2015 through September 2020

Water quality in the inlet vicinity of the coastal bays is similar to that of the adjacent Atlantic Ocean because of strong tidal flushing. MD DNR maintains water quality monitoring stations in the coastal bays. The closest station to northern Assateague Island lies approximately 2 miles north of the inlet in southern Isle of Wight Bay in approximately 14 feet of water (Station XDN 2438). Over the period of record, water at the station has an average salinity of 30 parts per thousand (ppt), ranging from a minimum of 21 ppt to a maximum of 33 ppt. (Salinity in coastal ocean waters typically average 32 to 33 ppt [USACE, 2020]). Dissolved oxygen at the southern Isle of Wight Bay station ranged from a minimum of 5.4 to a maximum of 12 milligrams per liter

(mg/l) over the period of record (MD DNR, 2020). Dissolved oxygen is necessary for higher forms of aquatic life. Levels above about 5 mg/l are considered healthy.

Water quality in the Atlantic Ocean is generally thought of as good. However, offshore sampling cruises in the nearshore Atlantic Ocean in 2012 found areas of elevated nitrogen, phosphorus, and chlorophyll, as well as some harmful algae species. Elevated nutrients may originate from Delaware Bay outflow, ocean water upwelling, and/ or emanating from the offshore discharge of the Ocean City sewage treatment plant in the summer tourist season (Dennison and others, 2012).

Surface waters in the proposed project area are assigned to Use Class II by Maryland Department of the Environment (MDE), and designated for "Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting." Maryland Department of the Environment (MDE) has identified the waters of the Maryland Coastal Bays on the Integrated Report of Surface Water Quality in Maryland (Integrated Report) as impaired by excess nutrients. Total Maximum Daily Loads (TMDLs) for nitrogen and phosphorus have been established by the USEPA and MDE for the Maryland Coastal Bays (MDE, 2014).

3.1.8 Noise

The inlet vicinity is typically noisy during tourist season daylight and early evening hours with various manmade noises. Boats and jet skis in the water, and automobiles, trucks, amusements, and people recreating along the shoreline all contribute to manmade noise. In close proximity to the ocean, ambient noise from ocean waves contributes to the noise environment.

Underwater noises are produced by movement of water via tides and waves, as well as by vessels operating in the inlet vicinity. Dredge vessels have been measured to produce greatest noise during transit, rather than during dredging itself.

3.2 Habitats and Biological Resources

3.2.1 Aquatic and Terrestrial Habitats

Assateague Island National Seashore is one of the largest and last surviving Mid-Atlantic barrier islands possessing a continuum of intact coastal habitats where the full range of natural processes occur with little or no human influence. These dynamic physical processes create a diverse barrier island landscape that provides unique habitat for a multitude of specialized plant and animal species, many of which are rare, threatened or endangered. The extensive marine and estuarine waters within the seashore also provide a protected vestige of high-quality aquatic habitat ranging from open ocean to shallow estuarine bays where submerged grass beds, fish, shellfish and other invertebrates utilize expansive salt marshes and a mosaic of sandy shallows and intertidal flats.

Habitats in the coastal bays include natural habitats and habitats intentionally or unintentionally created/maintained by people that are natural in character ("nature-based"). These natural and nature-based habitats support numerous aquatic species of plants and animals. Among these habitats, those of recognized environmental importance include submerged aquatic vegetation (SAV) beds, salt marsh, and waterbird island nesting sites.

The coastal bays and inlet are designated as essential fish habitat (EFH) for 15 fish species that are managed under the Magnuson Stevens Fishery Conservation and Management Act (MSA). Table 3-3 and Appendix B provides information on these species and applicable life history stages for the project area. The MSA seeks to ensure that fisheries for these species remain viable.

Table 3-3. EFH designation summary

EFH Species	Number
Mollusc species	1
Ray and shark species	7
Bony fish species	7

Natural shoreline is considered an indicator of ecological health of the coastal bays by the MCBP. Shorelines that are natural in character provide spawning habitat for horseshoe crab, including several sites in the inlet vicinity, which are surveyed by the MCBP (northern Assateague Island, Skimmer Island, Oceanic Motel [southern end of Ocean City], and Homer Gudelsky Park historically known locally as Stinky Beach) (MD Coastal Bays Program, 2014). Natural shorelines provide foraging habitat for numerous species of birds. The bayside of Assateague Island is comprised of natural shoreline area in the inlet vicinity. Parcels of nature-based shoreline occur along the inlet on northern Assateague Island along the inlet between jetty segments.

Substantial area of stabilized shorelines occurs in the inlet vicinity. Assateague Island northern shoreline fronting the inlet is partially stabilized with discontinuous breakwaters , but has a long continuous jetty from the center of the island ocean-ward along the inlet. The shoreline of West Ocean City is largely stabilized with revetment and bulkhead from Route 50 to south of the Ocean City Harbor. Ocean City's shoreline is entirely stabilized, although it contains local bayside beach within protection works.

Manmade habitats in the Coastal Bays include intertidal shoreline structures fouled by oysters and islands created/maintained by dredged material. The inlet vicinity in-water habitat conditions (depths, substrate conditions, current velocities) are substantially controlled by coastal engineering, whether directly or indirectly. Coastal engineering creates/maintains deeper waters with strong current in the inlet vicinity that would otherwise be naturally lacking in the coastal bays.

Natural and manmade islands isolated from terrestrial predators and human disturbance support a variety of nesting bird species. Skimmer Island just north of the Route 50 Bridge was formerly a regionally significant nesting site for several waterbird species, including state-rare species. Although only a short distance from land, strong currents dissuade terrestrial predators. The island has diminished in size and no longer supports nesting rare birds. Northern Assateague Island, particularly 0.5 to 6 miles south of the inlet, provides regionally significant nesting habitat for numerous waterbird species, including federally rare and state rare species. (Also see “Fish and Wildlife,” “Endangered Species,” and Appendices C and D).

3.2.2 Plant Communities

The coastal bays contain regionally significant beds of submerged aquatic vegetation (SAV). SAV varies annually in response to variations in water clarity and temperature. SAV is limited in Isle of Wight Bay in the inlet vicinity by strong currents and continuously shifting substrates. Shoreline stabilization serves to promote scour of shallow water adjacent to the structures, increasing water depth and decreasing suitability of bottom for SAV.

VIMS SAV annual surveys map no SAV in coastal bays in the immediate vicinity of the inlet, harbor, or Homer Gudelsky Park over the period from 1971-2018. South of the inlet, SAV beds consistently occurred on the bayside of Assateague Island southward of approximately 1,400 yards south of the inlet. Adjacent to the mainland, SAV beds occurred frequently southward of approximately 1,000 yards of the inlet. North of the inlet from 1971-2018, SAV beds have occasionally occurred on the bayside of Ocean City and the mainland northward from approximately 4,300 yards north of the inlet. The beach and shallows in the inlet vicinity are too high energy and unstable (shifting sands) to be suitable for establishment of SAV.

Prior to extensive development on Fenwick Island, shoreline salt marsh occurred along the majority of the bayside of what is today Ocean City, as well as the bayside of the mainland. Salt marsh habitats were substantially filled and ditched for development on the bayside of Fenwick Island and in the inlet vicinity of the mainland prior to protection of wetlands under the Clean Water Act (USACE, 1998). Wetlands are mapped by the National Wetlands Inventory (NWI). The NWI maps salt marsh in the inlet vicinity as "estuarine emergent wetlands." Salt marshes occur in undeveloped parcels along the mainland shoreline in the inlet vicinity, and on small islands at the southern end of Isle of Wight Bay. Substantial salt marsh is present on the bayside of Assateague Island. Salt marsh occurs commonly on Assateague Island about 0.1 miles south of the southern jetty and thence occurs further southward. On the mainland, salt marsh occurs just north of Homer Gudelsky Park, about 0.3 miles north of the inlet vicinity (USFWS, 2020).

Natural dune vegetation, consisting of American beach grass (*Ammophila breviligulata*), panic grass (*Panicum amarum*), and seaside goldenrod (*Solidago sempervirens*), dominates northern Assateague Island. In sheltered areas of the island interior, shrubs such as bayberry (*Myrica pennsylvanica*), wax myrtle (*Myrica cerifera*), blackberry (*Rubus argutus*), and poison ivy (*Toxicodendron radicans*) occur (NPS, 2021). Natural dune vegetation occurs locally in small natural character shoreline areas of West Ocean City. Constructed dunes with plantings occur in Ocean City. Vegetation on the mainland and on Ocean City in the inlet vicinity is landscaped consistent with land use (residential or commercial). Residential areas typically contain mowed lawns and plantings. Commercial areas have plantings on building and parking lot margins, including plantings undertaken to manage quality of stormwater runoff.

3.2.3 Fish and Wildlife

A wide variety of bottom-dwelling (benthic) organisms occur in the MD coastal bays, with species occurrence being largely a function of bottom habitat conditions (substrate grain size and whether vegetated). Organisms present include worms, clams, and crustaceans. Hard clam densities in the coastal bays are mapped periodically by MD DNR as part of efforts to manage the fishery. Highest mapped clam densities in the coastal ba ys occur several miles south of the

inlet in Sinepuxent Bay and several miles north of the inlet in Isle of Wight Bay. Historically, the coastal bays open waters supported substantial oyster beds. However, these failed in the decades following inlet stabilization due to increasing prevalence of a variety of oyster predators and parasites associated with increased salinities (Dennison and others, 2009; Tarnowski, 2011). Although large beds were lost, oysters persisted naturally in intertidal settings where they still occur.

The Oyster Recovery Partnership's "Marylanders Grow Oysters Program" works with waterfront homeowners in the Coastal Bays to raise oysters. Hard clam aquaculture has been considered in MD coastal bays, but only one hard clam facility is in operation in the coastal bays, and it is not in close proximity to the inlet. The MD Aquaculture Siting Tool depicts no aquaculture activities in the proposed projects' vicinity.

Water temperature is a very important factor controlling when various organisms are likely/unlikely to be present. Numerous highly mobile aquatic species migrate into the coastal bays during warm water months but migrate offshore and or southerly during cooler weather months.

Horseshoe crab spawn on sandy shorelines that are natural in character in the coastal bays close to the high tide line. Spawning in the coastal bays occurs predominantly from May through July, peaking in June (MD Coastal Bays Program, 2014). In the inlet though, strong currents impinge large numbers of horseshoe crabs on shoreline rocks in the vicinity of the Coast Guard Station from which they are unable to escape.

USACE Operations Division Navigation Branch contracted for a study of juvenile summer flounder and other fishes in the inlet vicinity that was completed in 2016 by Grothues and Able. Sampling collected a number of species living on the bottom, including several species of crabs, American eel (*Anguilla rostrata*), spotted hake (*Urophycis regia*), smallmouth flounder (*Etropus microstomus*), winter flounder (*Pseudoplueronectes americanus*), and summer flounder (*Paralicthys dentatus*). Winter flounder appearance in the spring suggests that they spawn within the coastal bays, and is consistent with previous similar studies conducted in 2012 and 2008..

Researchers (Love and May, 2007), using data collected over the period 1996 - 1999, found that weakfish (*Cynoscion regalis*), Atlantic croaker (*Micropogonias undulates*), bay anchovy (*Anchoa mitchilli*), spot (*Leiostomus xanthurus*), Atlantic menhaden (*Brevoortia tyrannus*), silver perch (*Bairdiella chrysoura*), blueback herring (*Alosa aestivalis*), summer flounder, (*Paralichthys dentatus*) striped anchovy (*Anchoa hepsetus*), Atlantic herring (*Clupea harengus*), and Atlantic silverside (*Menidia menidia*) were the most abundant fish sampled. The Maryland Coastal Bays Trawl and Seine Survey conducted by MD DNR since 1972 provides a long-term record of finfish for the coastal bays. MD DNR trawl sampling conducted between 1989-2015 found Sinepuxent Bay to have the highest index of diversity of fish species (Shannon Index) of the coastal bays (although not the highest number of species). Seventy-three species of fish were recorded over that time period. One trawl site, T008, is located at the north end of Sinepuxent Bay off the northern tip of Assateague Island in close proximity to the inlet (Doctor, 2016).

Several species of reptiles occur in shoreline habitats in brackish water. Several species of turtles can be found in and on the edge of tidal marshes, including diamondback terrapin (*Malaclemys terrapin*), snapping turtle (*Chelydra serpentina*), and mud turtle (*Kinosternon subrubrum*). Water snake (*Nerodia sipedon*) (non-venomous) can also occur in brackish waters. Several species of sea turtle occur occasionally in area waters; all are listed as either federally threatened or endangered (see Section 3.2.4).

Numerous species of birds occur as transients or residents in the coastal bays. Numerous transients occur because Assateague Island and the coastal bays lie along the Atlantic Flyway used by numerous bird species migrating south in fall and north in spring. The inlet vicinity contains regionally significant nesting habitat for waterbirds on islands of Sinepuxent Bay Wildlife Management Area (WMA), as well as on northern Assateague Island (Dennison et al., 2009).

Several marine mammals occur commonly in the study area seasonally. Bottlenose dolphin (*Tursiops truncatus*) typically are present from May through October. Harbor porpoise (*Phocoena phocoena*) occur in study waters in late winter to early spring (Dennison and others, 2009). Harbor seal (*Phoca vitulina*) are a seasonal visitor from December to May, and loaf on rocks along the inlet as well as sandy habitats in the inlet vicinity. The National Aquarium compiles records of seal sightings and strandings; seals routinely inhabit Skimmer Island and adjacent small islands during winter months. The National Aquarium has several records over the period 2001-2021 of seals loafing on the south jetty and northern tip of Assateague Island.

3.2.4 Rare, Threatened, and Endangered Species

Federally listed (endangered or threatened) species occur regularly on Assateague Island and as transients in ocean, inlet, and coastal bay waters. Species protected under the Endangered Species Act are protected as trust resources of the USFWS and/or NMFS. Federally listed terrestrial organisms, as well as the terrestrial portions of aquatic organisms' life histories, are trust resources of the USFWS. Those federally listed aquatic species that are in tidal waters are generally regulated by NMFS.

NMFS, by letter on April 2, 2018, listed four sea turtles and one fish (Atlantic sturgeon) that may be present in the project area. Subsequently, NMFS "Section 7 Mapper" was consulted in July 2019, covering an impact area of lower Isle of Wight Bay, upper Sinepuxent Bay, the inlet, and adjacent ocean waters. This online tool identified the same list of sea turtle species and Atlantic sturgeon as the NMFS 2018 letter. However, the list generated by "Section 7 Mapper" also identified an additional fish (shortnose sturgeon), and two whale species (north Atlantic right whale and fin whale) (Table 3-4). "Section 7 Mapper" lists no critical habitat for federally listed species that are NMFS trust resources. The whales would most likely be in ocean waters, rather than the inlet or coastal bays. The sturgeon would not likely be present in the inlet area, or only be briefly present as transients. The sea turtles could be present in area waters seasonally, with loggerhead and Kemp's ridley sea turtles being the species most likely to be present (Appendix C).

Table 3-4. Endangered and threatened species under NMFS jurisdiction.

Common Name	***Scientific Name***	**Federal Status**	**Life History Stage Potentially Present**	**Behavior**
Atlantic sturgeon fish	*Acipenser oxyrhynchus*	E	Adult and subadult, All year	Migrating & foraging
Shortnose sturgeon fish	*Acipenser brevirostrum*	E	Adult, April through November	Migrating & foraging
Loggerhead sea turtle	*Caretta caretta*	T	Adults and juveniles, May through November	Migrating & foraging
Kemp's ridley sea turtle	*Lepidochelys kempi*	E	Adults and juveniles, May through November	Migrating & foraging
Green sea turtle	*Chelonia mydas*	E	Adults and juveniles, May through November	Migrating & foraging
Leatherback sea turtle	*Dermochelys coriacea*	E	Adults and juveniles, May through November	Migrating & foraging
North Atlantic right whale	*Eubalaena glacialis*	E	Adult and juveniles, All year	Migrating
Fin whale	*Balaenoptera physalus*	E	Adult and juveniles, All year	Migrating

E = Endangered, T = Threatened

The USFWS (Appendix C, Planning Aid Report) identifies two federally-threatened species as occurring in the proposed project area on northern Assateague Island: the bird Piping Plover (*Charadrius melodus*) and the plant seabeach amaranth (*Amaranthus pumilus*). No critical habitats for either species occur within the proposed project area. The NPS monitors location and success of these species on Assateague Island, and manages visitor use to protect these species. Piping Plover nest on northern Assateague Island from approximately 0.25 to 5 miles south of the inlet. Seabeach amaranth generally occurs in the same vicinity in years when it is present. Loggerhead sea turtle infrequently nest on Assateague Island, with the nearest nesting occurring about 0.6 miles south of the inlet.

In addition to federally-listed species, several state-listed endangered and threatened species occur on northern Assateague Island. These include the state-endangered Black Skimmer (*Rynchops niger*), Common tern (*Sternula hirundo*), Least Tern (*Sternula antillarum*), and white tiger beetle (*Cicindela dorsalis media*). The state-listed bird species nest in about the same area utilized by Piping Plover. The state-listed tiger beetle occurs on the ocean beach from the jetties southward, but with highest populations occurring substantially south of the jetty vicinity. Intense recreational beach use, such as occurs along the bayside shoreline of northern Assateague, is generally incompatible with tiger beetle because larvae can't survive with other than minor human pedestrian traffic (Knisley, 2018).

Skimmer Island when it was a larger size formerly supported nesting populations of state-endangered Black Skimmer, Common Tern, and Royal Tern (*Thalasseus maximus*) in the 1990s and early 2000s (Brinker and Jesien, Annual Reports).

3.3 Community Setting

An Economic Appendix of the Engineering Documentation Report prepared for the proposed project provides additional information on many aspects of community setting. That document is available by request.

3.3.1 Population and Demographics

The Town of Ocean City had an estimated year-round population of 6,927 in 2018, with the town having decreased in population by 2.5% since 2010, according to the US Census Bureau. The town population typically swells to more than 70,000 on off-season weekends, and up to 300,000 on summer weekends (Worcester County, 2017 draft).

The West Ocean City Census Designated Place had a population of 3,311 in 2010, as presented in the 2017 Draft Worcester County Plan. Table 3-5 presents information on the Ocean City population.

Table 3-5. Population characteristics (percent) of Town of Ocean City and United States.

Characteristic	Ocean City	United States Nationally
Age 65 and older	33	16
White	95	77
Black	2	13
Hispanic/Latino	4	18
Two or More Races	2	3
Owner-Occupied Housing Rate	75	64
Bachelor's degree or higher	32	31
Persons in Poverty	7	12

Source: US Census Bureau 2019

3.3.2 Environmental Justice

Minority refers to people who classified themselves as American Indian or Alaskan Native; Asian or Pacific Islander; African Americans or Black, not of Hispanic origin; or Hispanic. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population (CEQ, 1997). The Census Bureau defines a "poverty area" as a Census tract with 20 percent or more of its residents below the poverty threshold (Census Bureau, 2016).

USEPA EJSCREEN was consulted for information on environmental justice pertaining to the project vicinity. The southern part of the Town of Ocean City in the inlet vicinity generally has a minority population of less than 8.5 percent. However, along the bayside of Ocean City and the bayside of the west Ocean City mainland the population is 8.5 to 22 percent minority. The southern end of Ocean City has 10.5 to 16 percent of the population below poverty, while the mainland in the west Ocean City vicinity has 6 to 10.5 percent of the population below poverty.

Accordingly, the proposed project vicinity does not constitute a minority nor impoverished population (USEPA EJSCREEN, 2019).

3.3.3 Parks and Recreation

The Ocean City inlet is bounded to the south by Assateague Island National Seashore. National Park Service federal boundaries extend into the adjacent coastal bays approximately 0.5 miles out from the barrier island shoreline or up to the federal navigation channel. National Park Service staff monitor and manage park lands and waters for the dual explicit purposes of providing high-quality resource-compatible recreation experiences and preserving the coastal resources of Assateague Island. The natural resources of the National Seashore provide visitors with a wide variety of active and passive recreational and educational opportunities. Expansive seascapes of ocean and bay, panoramic views, natural sounds and clean waters provide an ideal setting for an exceptional visitor experience. More than two million people visit the Seashore annually and take part in a variety of activities.

Maryland's coastal bays are included in the U.S. EPA's network of National Estuary Programs and are the focus of the MCBP. MCBP has prepared conservation management plans to restore and protect the coastal bays. The plans provide for multiple use of the coastal bays while improving the bays' environmental health.

Several islands within Isle of Wight Bay and Sinepuxent Bay, to the north and south of the inlet, respectively, are contained within MD DNR Sinepuxent Bay WMA. Skimmer Island at the Route 50 bridge is part of the Ocean City Inlet flood-tidal delta, created and maintained by sand flowing in through the inlet, but also by human sand-placement. These islands are important nesting habitat for water birds, and MD DNR restricts public access during those time periods. During other times of the year, the islands are heavily used for recreational purposes.

Homer Gudelsky Park is operated by Worcester County Department of Recreation & Parks and lies off Old Bridge Road on the mainland shoreline about 0.15 miles north of the inlet. The park provides shoreline access for swimming, walking, and fishing. An ongoing beach nourishment program provides sand to the park from dredging at the Shantytown Channel annually (Worcester County, 2017 draft).

Inlet Park, operated by the Town of Ocean City, located at South 2nd Street on the southern-most end of Ocean City, has a boardwalk with viewing binoculars and interpretive signs overlooking Assateague Island. In downtown Ocean City, Sunset Park also operated by the Town of Ocean City, is located about 0.1 miles north of the north jetty on the bayside of the island on South Division Street west of South Philadelphia Avenue in the heart of downtown. This park has a stage for concerts and gatherings and provides fishing and crabbing opportunities.

Recreational boating and jet skiing are popular in area waters. The bayside shoreline along northern Assateague Island National Seashore along Sinepuxent Bay and inlet beach is a popular destination for recreational boaters and jet skiers. Recreational fishing from boat and shore is a popular activity. Additionally, commercial nature/ecotourism boats traverse area waters and regularly visit northern Assateague Island.

There are multiple jet-ski rental and servicing businesses on Fenwick Island (Ocean City). Many of these direct their customers to jet ski in waters of Sinepuxent Bay, and jet ski tour groups utilize the bay shoreline of northern Assateague.

Recreational boats typically come ashore or anchor near shore where there are beaches in combination with water depths that permit safe access. Thus, the parks of the area that have shorelines with beaches (rather than riprap or other structural stabilization) are focal points for boaters. The bayside and inlet beaches of northern Assateague, as well as shorelines of Sinepuxent Bay WMA islands, receive heavy recreational use during the summer months. The northernmost 0.5 miles of Assateague's bay shoreline has deep water in close proximity to the shore, facilitating safe boat access to the island. Along the inlet shoreline of Assateague Island, the eastern gap between breakwaters is popular with recreational boaters and provides approximately 140 yards of beach fronting protected water between the breakwaters. Further south along Assateague Island's bay shoreline, shallower water depths limit boats with deeper drafts to anchoring further offshore.

According to NPS special regulations (formalized within the Code of Federal Regulations [36 CFR Part 7]), all Seashore waters in MD are closed to personal watercraft (jet ski) use, except for a landing area located at the north tip of Assateague Island between the existing breakwaters of the inlet shoreline. The Assateague Island National Seashore General Management Plan finalized in 2021 (NPS, 2021) recognizes that the popular boat-in beach area extending 0.5 miles south from the Ocean City inlet (known locally as "the wedge") is important for recreational boaters and will remain available for that purpose. However, the General Management Plan also identifies the need to improve the future management of this boat-in beach area in order to limit resource impacts in this vicinity. Potential future management options include installation of low-impact comfort station facilities and implementation of a new permit system.

Numerous popular sport fish occur in Maryland’s coastal bays, including multiple species of flatfish (flounder), bluefish, rockfish, and black sea bass (MD Coastal Bays Program website) (also see Section 6.2.3).

3.3.4 Landscape Aesthetics and Visual Characteristics

The inlet vicinity waters engineered shorelines give the inlet an urban waterway appearance, other than for the bayside shoreline of Assateague Island which is natural. The mainland and Ocean City are developed and urban in character. USACE dredging vessels are regularly present in Inlet Channel waters for two periods of time each year to bypass sand for the LTSM Project. Substantial recreational and commercial boat traffic characterizes inlet area waters. Southward of the inlet jetty, Assateague Island presents a natural barrier island vista.

3.3.5 Fisheries

The inlet area provides recreational fishing opportunities for a variety of fish species attracted to the abundance of rock structure (engineered shorelines), as well as deep habitat that occurs in channels and scour hole areas. Anglers catch numerous species while fishing from the rock

structures or in boats in adjacent waters. Fish species caught include rockfish, bluefish, flounder, croakers, shad, sheepshead, tautog, sea trout, and sharks (Unkart, 2021).

Flounder party boats fish the inlet area daily. There are party boats and charter boats that use the inlet area almost daily in the summer. In addition to flounder, they fish this area for striped bass, bluefish, sheephead, tautog, Atlantic croaker, and weakfish when available. The Route 50 Bridge area is fished daily and nightly from spring to fall for summer flounder, striped bass, bluefish, tog, shad, sheephead, and red and black drum (Willey DNR, personal communication, July 8, 2021).

Party boats fish along rocks along the inlet south jetty extensively in the fall for tautog and sheephead, and in the spring and summer for striped bass. Party boats sometimes fish just on the edge of the channel where boats turn to head toward the Rt. 50 Bridge near the white buoys. Snapper bluefish can be caught there. Sharks are occasionally caught in that vicinity as well. There are times when shad can be caught (and released) near the Oceanic Motel (Willey DNR, personal communication, July 8, 2021).

Striped bass commercial gill netting occurs along coastal waters offshore from Assateague Island, but all commercial fishing is prohibited within the National Seashore boundary. The ebb shoal is occasionally fished for trigger fish and sheepshead but not often. Commercial trawling is prohibited within 1 mile (Willey DNR, personal communication, July 8, 2021).

3.3.6 Navigation, Transport, and Infrastructure

The inlet is the navigational thoroughfare for vessels from the Ocean City area to enter/exit the MD Coastal Bays from/to the Atlantic Ocean. Users of the inlet include commercial, recreational, and government vessels. The economics analysis section of the Engineering Documentation Report for this project includes additional detailed information on vessels and navigation.

In the inlet vicinity, the bayside of Ocean City and the mainland shoreline have numerous individual docks and piers, as well as multiple marinas (Table 3-6).

Table 3-6.Marinas in the inlet vicinity (Google Maps).

Marina	Location	Services
White Marlin	Ocean City, Somerset St. Approximately 1/4 mile north of the inlet (just south of the Route 50 bridge)	Slip rentals, Fuel, Long & deep draft vessels.
Ocean City Fishing Center	West Ocean City, Approximately 0.3 miles north of the inlet (immediately south of US Route 50)	Slip rentals, Fuel, Sport fishing charter boat fleet.
Sunset Marina	West Ocean City (immediately north of Ocean City commercial harbor)	Slip rentals, Fuel, Boatel, Sport Fishing Charter Boat fleet
Ocean City Fisherman's	Ocean City Harbor	Deep water dockage, long vessel dockage, Charter boats

The flood tidal shoals in the coastal bays and the ebb shoal in the Atlantic Ocean pose a navigation hazard for vessels entering/exiting the inlet. While these features are produced by waves and currents, coastal engineering measures (stabilization work, dredging, sand placement) substantially affect navigation conditions (patterns and stability of erosion and deposition).

Major roads in the study area include US Route 50, which has its eastern terminus in Ocean City. The bridge crosses southernmost Isle of Wight Bay and has a drawbridge over the Isle of Wight navigation channel. MD SHA currently has a study underway looking into making improvements to the Route 50 Bridge. Vessels navigating into/out of Isle of Wight Bay to the south contend with strong tidal currents under the bridge. The bridge itself has features to protect it from scour. Other bridges over the coastal bays to Assateague and Fenwick Island lie miles from the inlet area (Route 611 Bridge 6.5 miles south; Route 90 bridge 4 miles north).

The NOAA nautical chart depicts cables as being present within the inlet itself, crossing from Ocean City to northern Assateague Island. However, for this EA in 2021, Town of Ocean City engineering staff and NPS reviewed their files and couldn't locate any information on these mapped cables. It is presumed that these cables no longer exist, although perhaps cables were historically present or intended to be installed before Assateague Island National Seashore was established. Additionally, the nautical chart depicts a single line in the same color as cables are depicted between the mainland and northwest Assateague Island. Neither the Town of Ocean City nor NPS have any information indicating that a cable is present at that location.

Ocean City Municipal Airport is located on the mainland approximately 1.5 miles south of the inlet (based on measurement in Google Earth 2017 imagery).

3.3.7 Cultural and Historic Resources

NOAA nautical charts depict multiple obstructions, including shipwrecks, in the inlet vicinity. Historic infrastructure plays a role in controlling navigation channel position and character. Two bridges were historically present in southernmost Isle of Wight Bay that no longer span the bay. From the late 1800s until 1933, a railroad bridge spanned the bay entering Ocean City at Division Street that provided passenger rail service to points west. This bridge was destroyed in the hurricane that created the Ocean City Inlet, and not rebuilt. From 1916 to 1942, one block north of the railroad bridge, an automobile bridge spanned the bay from what is today Route 707, Old Bridge Road on the mainland, and entered Ocean City at Worcester Street. The auto bridge was damaged in the 1933 hurricane but repaired and continued in use until completion of the Route 50 bridge (the Harry Kelley Memorial Bridge) (Dispatch, 2016).

The Maryland Historical Trust (MHT)'s online cultural resources geographical information system, Medusa, was utilized to identify previously mapped cultural resources within 0.5 miles of the project area. No cultural resources have been identified within the area of potential effect (APE), although a submerged "old railroad bridge" (Quad File OCEANC-QF03) is located within half-a-mile. Additionally, a review of the NOAA's Automated Wreck and Obstruction Information System indicated that no wrecks have been identified within the APE.

3.3.8 Hazardous, Toxic, and Radioactive Waste

A search of the Ocean City Inlet vicinity using USEPA Environmental Mapper tool identified no hazardous or contaminated sites on Fenwick Island, Assateague Island, or the mainland (USEPA, 2019). Homefacts (2019) depicts the closest Superfund site to the inlet as the historic West Ocean City landfill, located approximately 5 miles southwest of the inlet on the mainland. Homefacts depicts no brownfields in the inlet vicinity. Homefacts depicts minor numerous leaking tank and spill sites in the Ocean City Inlet vicinity, both on the mainland and on Fenwick Island.

Channel sediments from the inlet, northern Sinepuxent Bay, and southern Isle of Wight Bay channels are reliably coarse sand and "clean." Accordingly, USACE does not conduct chemical testing of those channel areas in planning O&M dredging. USACE does conduct chemical testing of Ocean City Harbor sediments when planning dredging. Sediments from the interior area of the harbor do contain low concentrations of contaminants. However, those results would not be applicable to conditions of the open waters of the inlet vicinity.

3.3.9 Public Safety

US Coast Guard Station Ocean City is located on Philadelphia Avenue immediately north of the inlet on the bayside of Fenwick Island. The station has docking facilities for Coast Guard vessels. Ocean City Fire Department has its headquarters approximately 1.4 miles north of the inlet on Philadelphia Avenue. The fire department has multiple stations, with the closet (Volunteer Fire Company Station Number 2) being located approximately 0.3 miles north of the inlet. The closest major hospital, Atlantic General Hospital, lies approximately 7 miles west of the inlet.

4 Environmental Consequences

This section identifies and evaluates the anticipated environmental consequences associated with the Proposed Action, and uses the terms "impact" and "effect" interchangeably. Impacts are described as positive, neutral, adverse, or minor with respect to the resource. The EA describes an impact as minor when the action would cause an impact but would not permanently and/or substantially change the resource. The EA describes an impact as substantial if it would permanently and/or substantially change the resource. Significant impacts would occur if a resource would be impacted in a manner that would violate existing laws or policies or would occur over a large area or affect a large portion of an organisms' population. Impacts are also described as short- and long-term, which are not associated with rigid time frames, but relative timeframes with respect to the resource. A general description of likely construction activities is provided in Section 2.4.

Without the proposed action, the inlet channel would continue to shoal locally in the vicinity of buoys 11 and 12 and maintenance dredging would be required to occur multiple times per year as was described in Sections 1.4 and 2.2. Resources considered in this EA would continue in their current condition as described in Section 3.

Effects of proposed beneficial placement on the oceanside of Assateague Island within the LTSM Project area (from approximately 1.5 to 4.5 miles south of the inlet) and effects of maintenance dredging of the Sinepuxent Channel have been evaluated in previous NEPA documents. Findings of those previously evaluations are still valid, and consequently those effects are not evaluated in this EA.

4.1 Physical Environment

4.1.1 Climate

Greenhouse gases produced by dredging and construction activities would constitute a negligible human greenhouse gas contribution overall. Indirect impacts associated with sea-level rise are addressed below in Section 4.1.3 (Geology and Soils) and 4.1.6 (Hydrology).

4.1.2 Air Quality

Operation of dredges and other land-based construction equipment would release air pollutants into the project area where equipment is operated. Construction occurring during any period of time when winds are light may cause relatively high air pollutant concentrations temporarily in localized areas. Effects would not undermine regional efforts to improve air quality as captured in the State Implementation Plan. Because Worcester County air quality is in attainment with National Ambient Air Quality Standards for criteria pollutants, no General Conformity Determination is required for the proposed action. Accordingly, no mitigation measures that would reduce or minimize impacts of air pollution are required.

4.1.3 Geology and Soils

Approximately 15,500 cubic yards of sands and gravels would be dredged from the inlet over approximately 2.7 acres in the vicinity of Buoys 11 and 12, as well as locally elsewhere in the realigned channel if needed based on depth conditions. The bottom of the newly dredged relocated inlet channel would consist of sands and gravels comparable to bottom materials elsewhere in the inlet. The abandoned channel sections would be expected to partially fill in with sands and gravels transported by tidal currents comparable to those that are removed. Accordingly, bottom sediment character is not anticipated to change.

Dredged material from inlet channel realignment placed on the bottom of Sinepuxent Bay or the inlet for breakwater construction would be similar in character to existing sandy bottom. No change in bottom geologic material would be expected.

Existing sand sediments in Sinepuxent Bay and northern Assateague Island underlying the new rock structures would be excavated over the 1.1 acre footprint of the new structures to establish proper structural foundation conditions, and then replaced with rock (Figures 2-5 and 2-6). Rock would be comparable to that of existing manmade inlet structures. There would be an increase in hardened inlet shoreline by 600 feet (not including the new jetty).

ERDC modelling undertaken to aid plan formulation identified that new jetty construction would induce altered shoaling and scouring locally in the inlet vicinity concentrated off the NW tip of Assateague Island (Figure 2-4). Over the first year following completion of project construction, ERDC modeling results indicate up to approximately 3 feet (1 m) of shoaling or deposition would occur locally (Figure 2-4). The most notable erosion would be concentrated in and adjacent to the Inlet and Sinepuxent Bay Channels, as was the intent of the project's design to improve navigability. Up to approximately 3 feet of erosion and deposition could occur immediately adjacent to the rock structures on northern Assateague Island over approximately a 2.6 acre area. However, because of limitations in model capability to forecast erosion and deposition immediately adjacent to structures and tendency to overpredict at those locations, it is anticipated that changes would generally be less than indicated on northern Assateague Island. After the first year, it is anticipated that minimal shoaling or erosion induced by the project would occur in subsequent years.

Bottom sands excavated from the Sinepuxent Bay bottom and sandy soils excavated on Assateague Island in the breakwater footprint would be used locally as needed for rock structure foundation improvements. No change in soil character is anticipated from placement of excavated sands.

Because shorelines of Isle of Wight and Sinepuxent Bays in the inlet vicinity are largely armored and because the project is not anticipated to induce shoaling or erosion along shorelines (Figure 2-4), negligible impacts to shorelines on the mainland or backside of Ocean City are expected.

With 1.5 feet of predicted sea-level rise (see Section 2.2) whether or not the proposed navigation improvements are made, ERDC modeling shows that Assateague Island would be vulnerable to

erosion immediately south of the rock structures on the south side of the inlet. Additionally, the island would be vulnerable to erosion approximately 2.5 miles south of the inlet opposite Snug Harbor. These are both areas that have been vulnerable to erosion and breaching. The USACE/NPS Assateague LTSM Project regularly places sand on the oceanside of the island opposite Snug Harbor to mitigate these impacts. With 1.5 of sea-level rise but ignoring counter-acting effects of incoming sand from the ocean, southernmost Isle of Wight Bay would generally show increased bottom scour in the vicinity of the Isle of Wight Channel outside of the channel itself. Conversely, where Isle of Wight Bay widens proceeding northwards, increased shoaling would generally be expected in the channel vicinity.

USACE, in cooperation with NPS, would agree to a defined set of triggers that may require follow-on measures to take place after construction (see Section 2.4.3). Specifically, in the event shoreline erosion is exacerbated at Assateague following the construction of the proposed action, USACE and NPS would evaluate the conditions, determine the likely cause(s), and work together to address the situation.

4.1.4 Land Use and Land Cover

Land use on northern-most Assateague within an approximately 7.5-acre area (within approximately 200 feet of the rock structures) would be converted temporarily to a construction zone (Figures 2-5 and 2-6). Following completion of construction, the area would be restored as per NPS standards and revert to previous national seashore land use.

In the construction area on northern Assateague, approximately 6.65 acres of bare sand/sparse vegetation occurs that would be temporarily impacted by construction activities and equipment. Approximately 0.85 acres of the proposed construction zone is vegetated with dune grasses and shrubs. This vegetation would be vulnerable to disturbance or destruction during construction. Details of construction that would determine size and location of the disturbed area would be developed in further coordination with NPS. As much of this area is now bare sand and is likely to remain bare sand, changes to land cover would be minor. Following construction, all disturbed areas would be restored as per NPS standards.

4.1.5 Bathymetry and Elevations

Water depths in the relocated inlet channel would increase from current depths to the depth of the new inlet channel. Water depths would be maintained in the future by increased scour, as well as maintenance dredging where needed. Increase in water depths would be greatest in the vicinity of Buoys 11 and 12 (Figure 1-2), where depths would increase from approximately 5 feet to 10 feet. Based on ERDC modeling, it is anticipated that deposition or scour of up to approximately 1 m of bottom material would occur outside the channels locally in the inlet vicinity in the first year following project construction (Figure 2-4), with minimal change anticipated to occur in subsequent years. These changes would be within the range of depths occurring in the inlet vicinity, but with deeper and shallow areas shifted in location with respect to the realigned channel (Figure 4-1).

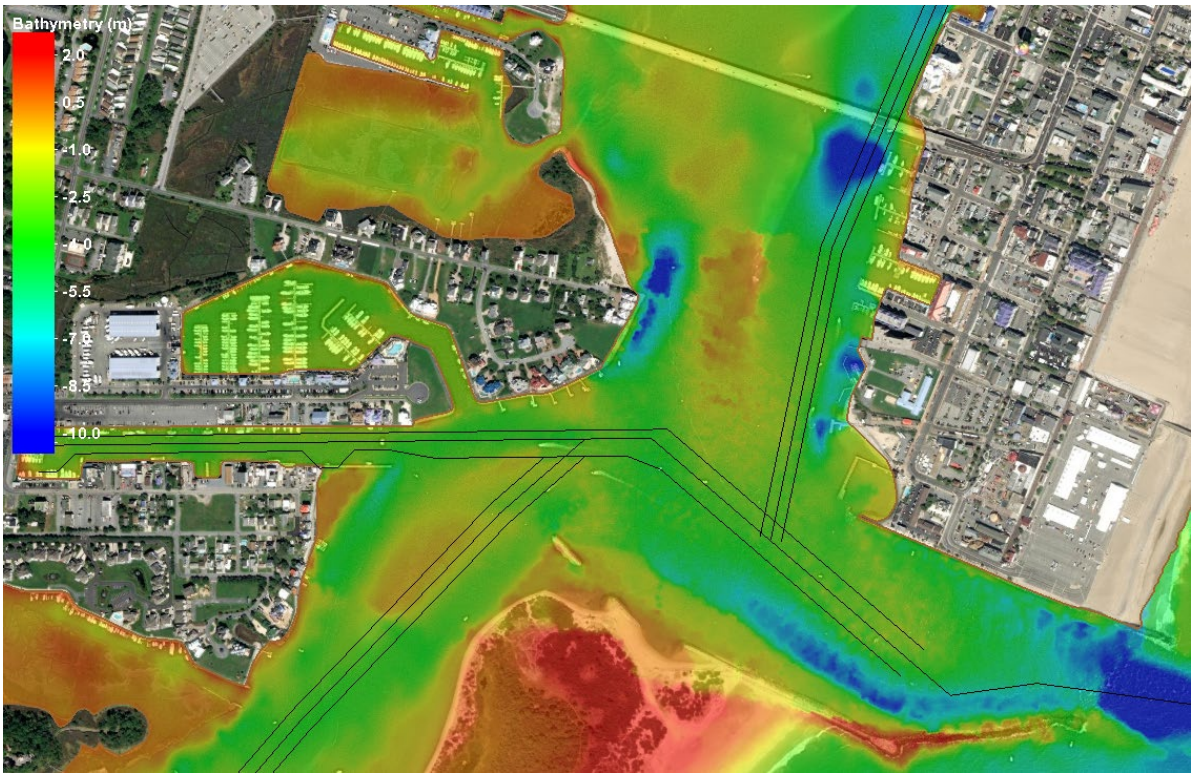


Figure 4-1. Modeled resultant bathymetry in meters. Existing (pre-project) channels displayed.

Where the jetty and breakwaters are constructed, water depths would change from open water to the contours of the structure (Figure 2-5). The rock structures would crest at supratidal elevations (+6 ft MLLW).

4.1.6 Hydrology

Proposed jetty construction off north Assateague Island and dredging/adjustment of the inlet channel would shift flow patterns at the north end of Assateague Island into and out of Sinepuxent Bay, with increased flow in the realigned channel. Increased velocities would occur behind the jetty and rock structures on northern Assateague Island during ebb tide, as water no longer has an outlet through the structure with both breakwaters closed (Figure 4-2). ERDC modeling results determined that presence of the new structures would direct ingoing/outgoing tidal currents toward the Sinepuxent Bay navigation channel, increasing velocities by a maximum of 25 to 30 percent, with the maximum increasing from about 2.6 feet/sec (0.8 m/sec) to approximately 4.1 ft/sec (1.25 m/sec). Increased velocities caused by the structures and dredging of the inlet channel and adjustment in its position would increase the volume of water flowing into and out of Sinepuxent Bay by about 5 percent, and the tidal water volume going into/out of Isle of Wight Bay by approximately 3 percent.

Figure 4-2 : Modeled velocity magnitude difference – base ebb tide.

ERDC storm surge modeling showed that the with-project alternatives do not significantly change water surface elevations. During severe storm surges when water levels would range from approximately 5 to 11 feet above normal, the average maximum difference in maximum water levels between existing and with-project conditions in the project area would be less than half a foot, which is the approximate uncertainty of the modeling effort. Accordingly, no induced increase in storm surge is anticipated from the proposed navigation improvements.

ERDC adaptive hydraulics hydrodynamic and sediment models showed that for a sea level rise of 1.5 feet, the proposed navigation improvements would induce minimal effect in comparison to those associated with the rising sea itself. Under conditions of 1.5 foot increase in sea level, velocities in the inlet and channels would increase by as much as 50% in association with greater water depths. Flood tide velocity would increase as much as 3 feet per second in the inlet.

4.1.7 Water Quality

Proposed jetty construction and dredging activities would produce temporary, local, and minor increases in turbidity in the vicinity of the project sites in the inlet, Sinepuxent, and Isle of Wight Bays. Water quality certification (WQC) for the proposed work would need to be acquired from MDE (see Section 5.1), and work would be conducted in accordance with the WQC to minimize impacts to water quality. Because the flow volume through the inlet and into Isle of Wight Bay and Sinepuxent Bay is large with strong currents (particularly at flood and ebb tide), effects of turbidity generated during construction would be rapidly dissipated. Additionally, because bottom materials to be dredged are predominantly sand, it is anticipated that suspended material would remain only briefly in the water column. However, turbidity could be substantial locally for temporary periods when muddy sands which occur at greater depth below the bottom are encountered and dredged.

Following completion of navigation improvements, although current patterns and strength would be locally altered, the area would remain a dynamic environment with strong circulation and water quality largely controlled by oceanic conditions. The increased volume exchange of about 5 percent into and out of Sinepuxent Bay and 3 percent into and out of Isle of Wight Bay would promote slightly greater flushing of the southern and northern coastal bays with ocean water. This would tend to reduce salinity variation in the bays, making them somewhat saltier in the coastal bays in the inlet vicinity in winter, but perhaps reducing salinity in Sinepuxent Bay slightly in summer, as poor circulation in Chincoteague Bay can make bay water slightly greater than marine salinity. Increased flushing with ocean water would be expected during warmer water months to slightly increase dissolved oxygen (DO) levels and reduce turbidity in both the northern and the southern bays. Ocean waters are better oxygenated and less turbid than bay waters during warmer water months.

An erosion and sediment control plan would be developed to meet requirements of NPS and Worcester County Soil Conservation District. The plan would include measures to ensure protection of water quality.

4.1.8 Noise

Noise would be produced during dredging and construction by the dredge and associated vessels and on-water construction equipment. Noise below the water surface would be audible to in-water aquatic life. Noise above the surface could be audible to people and wildlife.

In-water noise would be produced during dredging, movement of vessels, excavation from land or barge-based equipment, and any placement below MHW. It is expected that the loudest sounds produced by dredges would occur during transiting, whether full or empty, rather than during dredging activities. While these various activities would increase underwater noise in the inlet vicinity, the area is already an area of concentrated human activity and associated underwater noise. It is anticipated that noise produced during dredging would not cause any mortality to marine life. However, manmade project underwater noises may alter the behavior of fish in the borrow area during dredging. Fish may alter swim speed and or direction, and fish

communication could be affected. Overall noise impacts to in-water life are expected to be negligible to minor.

On-land noise would cause a minor temporary detrimental impact to marine and terrestrial wildlife. It is anticipated that wildlife that is noise sensitive would temporarily relocate to other areas. The proposed construction activities on northern Assateague Island are a substantial distance from concentrated sensitive bird nesting areas and would not be anticipated to impact those sensitive wildlife species.

4.2 Habitats and Biological Resources

4.2.1 Aquatic and Terrestrial Habitats

The proposed action would have direct effects on approximately 2.7 acres of aquatic habitat by dredging presumably never dredged bottom to realign the channel. Following project completion, it is anticipated that future Inlet Channel dredging in the problem area would occur less frequently, at approximately once every 5 years. Whether the inlet channel and adjacent habitats are less disturbed in the future by dredging would depend on dredging conducted under the auspices of the LTSM Project. It is anticipated that dredging for the LTSM Project would still occur in any shoaled navigation channel areas of the northern Sinepuxent or southern Isle of Wight Bays navigation channels. It is anticipated that some additional dredging of the ebb shoal (which is net accretional) may occur instead. Thus, overall bottom impacts from the combination of USACE dredging for the navigation channels and LTSM Project would likely remain within the typical range of acreage dredged annually. These habitats are all high energy with strong tidal currents and or waves, and consequently continuously shifting sandy substrates.

Approximately 1.3 acres of bottom habitat in the inlet and northernmost Sinepuxent Bay would be disturbed by excavation to construct the breakwaters and be converted to rock structures. Although not natural to the region, rock structures provide habitat for numerous species of fouling organisms (algae and barnacles affixed to the rocks) and provide habitat for fish that orient to structures.

Open water column habitat (not the rock structures nor the bottom) in the inlet vicinity would overall remain comparable to pre-project conditions, with many areas of strong current during flood and ebb tide. Maximum tidal current velocities would increase within the realigned channel habitat. However, tidal current velocities would be reduced and create protected areas locally in the lee of the jetty extending into Sinepuxent Bay. Based on increased flows, the project would induce a slight increase in salinity in the inlet vicinity, but the area is already marine in character, limiting potential ecological effects that could occur (see Section 4.1.7).

Impacts to EFH are addressed in detail in Appendix B. The proposed action would temporarily adversely impact EFH in the Ocean City Inlet vicinity during dredging and construction. At northern Assateague Island, the proposed action would cause a long-term loss of unconsolidated bottom habitat where rock structures replace it. Habitat impacts are not anticipated to reduce the

carrying capacity of the projected area for managed fish species. The proposed action would have no effect on Habitat Areas of Particular Concern (HPAC).

4.2.2 Plant Communities

The proposed action would be expected to have no effect on SAV or vegetated wetlands because none is present in the proposed project areas. No SAV nor vegetated wetlands would be expected to become established on northern Assateague after construction because frequent natural and human disturbance would continue and likely preclude these from developing.

Up to approximately 0.85 acres of dune grasses and shrubs could possibly be disturbed by construction activities on northern Assateague Island. Construction details would be planned further in coordination with NPS to minimize impacts to plant communities overall. As island vegetation is dynamic, with disturbances naturally occurring from storms, this temporary impact from construction to island vegetation would be minor and temporary.

4.2.3 Fish and Wildlife

Dredging would destroy relatively non-mobile benthos occurring in the realigned Inlet Channel and Sinepuxent Channel. Minimal capture or destruction of mobile aquatic life would be expected. No impacts to the overall population of any fish or wildlife species are anticipated. Dredged areas of the realigned inlet channel and Sinepuxent Channel would have sand substrate and would be recolonized by organisms similar to those that lived at the sites prior to dredging that are capable of living on or in the strong currents and shifting substrate.

Excavation of substrate in the jetty footprint, placement of sand fill, and placement of rock would bury and/or destroy any non-mobile benthos at those sites. However, mobile organisms would be anticipated to leave and be unharmed.

There would be a temporary disturbance to wildlife in the inlet vicinity from dredging and construction activity, which could include birds and seals, depending on the time of year. It is anticipated that these animals would temporarily relocate to other areas to avoid injury or disturbance. If loafing seals are in the work area, USACE would coordinate with NMFS on how to safely induce the animals to relocate elsewhere. Following completion of construction, fish and wildlife use of the area would return to pre-project levels.

Following construction, there would be greater rock structure in the inlet vicinity than pre-project, further favoring structure-oriented organisms. Substrate conversion (sand to rock) would change availability of forage organisms at the jetty extension area to organisms associated with hard structure, and favor fish and wildlife that orient to structure.

Although Ocean City Inlet is highly altered from the conditions of a natural inlet of this region, aquatic life thrive in the coastal bays, indicating that aquatic life continues to pass successfully through the inlet and coastal bays. Under existing conditions, organisms have to travel approximately 2,900 feet along the inlet south shoreline to reach Sinepuxent Bay. (Although an inlet beach along northern 2,400 feet inward from the ocean along the north Assateague Island

shoreline provides a 300 foot stretch of natural habitat along the inlet south shoreline.) With the proposed contiguous increased-length structure, organisms would have to travel approximately 3,600 feet along the northern Assateague Inlet shoreline to reach Sinepuxent Bay. The proposed action induced changes in current velocities, water circulation, and depths from existing conditions would not be expected to change aquatic life ability to traverse the inlet between the coastal bays and ocean habitats.

4.2.4 Rare, Threatened, and Endangered Species

Dredging of the channels, excavation of the footprints for the breakwaters and the jetty, and placement of dredged material would be conducted using a mechanical dredge, which would not likely adversely affect (NLAA) sturgeon, sea turtles, or whales. These highly mobile animals would only be present as transients, and should be able to avoid direct physical effects. Rock placement work in water would pose negligible risk for sturgeon, sea turtles, or whales regardless of the time of year that the work occurs, as the animals would be transients and able to easily avoid being physically impacted. Accordingly, the proposed rock structure work would fit an NLAA determination. Following completion of construction, the project would have no effect on sturgeon, sea turtles, or whales. Dredging and placement of sand and rock fill for rock structure construction would be conducted in accordance with any TOY Restriction determined to be necessary by NMFS, USFWS, NPS, and MD DNR, as described in Section 2.4.2.

Construction activities on northern Assateague Island would be restricted to within 200 feet of the existing rock structure work. This area of the island does not typically support nesting Piping Plover nor nesting loggerhead sea turtle. Future nesting by either animal in the proposed project construction area is highly unlikely. USACE and NPS would coordinate to confirm absence of nesting sea turtle or Piping Plover at the time of construction. In the unlikely event that either of these species is nesting in the proposed construction area, USACE and NPS would coordinate with the USFWS to determine appropriate mitigation measures. Piping Plover or Red Knot could occur within the construction area as foraging transients during construction but would likely generally relocate foraging activities elsewhere. As the proposed project area is not of identified importance as a foraging area for either species, the anticipated shift of foraging activities would have no effect on either bird species. Abundant foraging habitat already readily used by these bird species is available elsewhere in the vicinity.

Seabeach amaranth is not anticipated to occur within the proposed construction area. Verification of its absence would be made by USACE and NPS. In the unlikely event seabeach amaranth is found to occur in the proposed project area during construction, USACE and NPS would coordinate with USFWS to determine appropriate mitigation measures, which would likely include erecting a temporary fence around the plant to avoid direct physical impacts.

Following project construction, the project would be anticipated to have no effect on federally-listed species as island and open water habitat conditions would revert generally to the range of pre-project conditions, except that additional rock structure would be present.

It is anticipated that no state-listed nor state-rare plant, insect, or bird species (that isn't also federally listed) other than possibly white tiger beetle would occur within the proposed

construction area during construction, other than as transients. White tiger beetle could possibly occur on the ocean beach and be destroyed during construction. However, numbers of individuals present would likely be few or none based on their preponderant occurrence further south. It is anticipated that following project construction completion, white tiger beetle would re-occupy the proposed project area to pre-project levels in years with favorable conditions. USACE and NPS would coordinate with MD DNR to determine appropriate mitigation measures in the event state-rare species are identified in the proposed project area during construction.

4.3 Community Setting

4.3.1 Population/Demographics

Dredging and construction workers would comprise a very small number of people compared to the regional population. If employees working on the project originate from elsewhere, they would likely only temporarily be in the Ocean City area during the time of construction. The proposed action would not be expected to induce changes in area demographics or population.

4.3.2 Environmental Justice

The proposed action would occur in open water and on park land where no people live or work regularly. The proposed action would neither disproportionately disadvantage nor benefit any minority nor low-income communities.

4.3.3 Parks and Recreation

The proposed action would include dredging activities within the heavily used recreational waters of the Inlet Channel and Sinepuxent Bay. Construction activity would occur on approximately 7.5 acres of park land on northern Assateague Island National Seashore. Potential effects of these activities are described extensively in this document by pertinent topic. No effects to other parkland are anticipated.

The proposed project would cause a minor adverse impact to recreation. During construction, recreational use of the construction area would be temporarily prohibited. During construction, nature/ecotourism access to northern Assateague Island would not be possible. Following construction, recreational use along the bayside (including ecotourism) would likely return to pre-project conditions. There would be a permanent adverse impact to recreation along the inlet. Recreational boat access would be lost to approximately 600 feet of the inlet shoreline with rock breakwaters preventing access from water to the beach. Approximately 140 yards of beach that now occurs in protected waters of the eastern gap between breakwaters would no longer be available for boat landings as it would be separated by new rock structure from inlet waters. The western gap to be filled with new rock structure would still allow potential for boat landings from Sinepuxent Bay. However, the shoreline is dynamic, and natural processes of scour and shoaling would alter its future condition, potentially increasing or decreasing future access to the shoreline. Following project construction, beach use and boat access opportunities would remain along the

bayside of Assateague Island, as long as conditions allow. New rock structure would support some increased public recreational fishing from the rock structures.

The proposed continuous rock structure on northern Assateague along the inlet would physically close and potentially eliminate access to the NPS-authorized landing area for personal watercraft (jet skis). The NPS would consider other shoreline areas along northern Assateague Island as appropriate landing areas for personal watercraft and would re-initiate the formal rule-making process. Thus, this would pose potentially a long-term adverse effect to personal watercraft recreation.

4.3.4 Landscape Aesthetics and Visual Characteristics

The inlet visual character of urban land and shoreline bounded by parkland would be temporarily affected by the temporary presence of construction equipment activities on northern Assateague Island. This change in aesthetics would be temporary and cease when construction is completed. USACE dredging activity in the inlet area occurs for two periods of time each year under the LTSM Project. Thus, the presence of the dredges for the proposed project would have only minor effect on views.

Following project completion, the extent of rock works would increase. Because Northern Assateague Island is already stabilized with rock structures along the inlet, the increase in length of rock structure would have only a minor visual effect. However, the additional rock structure would have no effect on island aesthetic character south of the inlet.

4.3.5 Fisheries

During construction, fishing would be restricted in the dredging and construction areas. It is anticipated that fishermen would relocate to other fishable areas in the vicinity and negligible impacts to fishing as an activity would occur. Following completion of construction, the project would have no effects on fisheries.

4.3.6 Navigation, Transportation, and Infrastructure

During dredging and construction, navigation along the northern Assateague Island bay and inlet shoreline would be temporarily interrupted by presence of construction vessels and equipment. The jetty extension would improve navigability of the Ocean City Inlet and Sinepuxent Bay Channels by inducing self-scour and reducing the need for maintenance dredging.

Following completion of construction, because the proposed action would close an existing navigable space between breakwater sections and extend the breakwater further into Sinepuxent Bay, future navigation along the northwestern tip of Assateague Island would relocate to the exterior (not island side) of the rock structures. This would serve to increase boat traffic within otherwise open waters of the inlet and Sinepuxent Bay.

With the construction of jetty extension to the northwest off northern Assateague Island the width of boatable waters would be reduced. The width of open boatable water between the northern

edge of the northernmost breakwater and mainland shoreline would be reduced from approximately 250 yards to approximately 200 yards. USACE solicited feedback from the Coast Guard and multiple stakeholders in 2020 to determine whether this represented a concern to navigation (including jet skis and vessels) but received no feedback that it would be a concern. USACE would utilize findings of a Coast Guard study to be conducted during public/agency review of the draft EA to determine whether or not the proposed narrowing represents a navigation safety hazard. In the event that the Coast Guard determines the proposed action to be a hazard, USACE would reduce the westernmost extension of the breakwater/jetty to maintain a greater width of navigable water in that vicinity.

The Coast Guard informed USACE during coordination in September 2020 that lights or beacons would need to be installed on the jetty for navigation safety. USACE would install a foundation or tower to support such structures and the Coast Guard would install lighting.

For work undertaken in water, a notice to mariners would be posted and typical safety practices as described in Section 2.4 would minimize risks to navigation.

4.3.7 Cultural and Historic Resources

In a letter dated October 15th, 2020, the MHT indicated that the proposed project would have no adverse effects on cultural resources.

4.3.8 Hazardous, Toxic, and Radioactive Waste

Because the proposed excavation, dredging, and placement of material (excavated and dredged) would involve sandy sediments deposited in areas of strong water circulation with the sediments being primarily or completely of marine origin, it is anticipated that negligible contaminants would be encountered or liberated during construction. No dredging, excavation, or placement of material would occur within Ocean City Harbor or other harbors or marinas within which contaminants accumulate.

4.3.9 Public Safety

USACE ERDC modeled water surface elevations and velocities in the area of interest under severe storm events to determine if the inlet navigation improvement (as well as scour hole management alternatives) individually or in combination would have an effect (see Section 3.1.1). The simulations and analyses performed show that the with-project alternatives do not significantly change the water surface elevations. The average maximum difference in maximum water levels between existing and with-project conditions in the project area is less than half a foot, which is within model error. In summary, the proposed alternative would not cause induced flooding problems.

Safety measures would be undertaken to ensure public safety during construction (measures for navigation are described in Section 4.3.6). On northern Assateague Island, it is anticipated that a Limit of Disturbance fence would be erected to prevent public access to the construction area to

minimize public risk from those activities. This fence would be removed post construction and all areas would be restored as per NPS standards.

5 Environmental Compliance, Coordination & Public Involvement

In compliance with the National Environmental Policy Act (NEPA), the proposed action has been coordinated with elected officials, applicable resource agencies, stakeholder groups, and the public to ensure that environmental and social factors were fairly considered. Annex A contains a summary of coordination efforts, summary of public and agency meetings, and copies of important correspondence with agencies and organizations. Coordination undertaken for the studies was substantial, in accordance with the economic importance of the Ocean City area and sensitive environmental resources present.

5.1 Environmental Compliance

The text below provides a summary of concerns relevant to major applicable environmental laws and policies. A summary of compliance of the proposed activity with multiple potentially applicable federal laws and executive orders is provided in Table 5-1.

Clean Water Act
To ensure compliance, USACE prepared a 404(b)(1) Analysis which is included in Appendix A. Additionally, as required by Section 401c of the Clean Water Act, the proposed inlet navigation improvements project will need to obtain Water Quality Certification (WQC) from the MD Department of the Environment. Worcester County (project sponsor) is applying for WQC for the proposed project concurrent with draft EA public/agency release and finalization.

Endangered Species Act
As the lead federal agency, USACE is responsible for determining the nature and extent of effects upon federally-listed species and for coordinating with USFWS and NMFS as appropriate. USACE and NPS informally consulted with USFWS and NMFS throughout the study to incorporate consideration of potential effects to endangered species into plan formulation. Because the recommended plan would involve work not in areas on Assateague Island important to seabeach amaranth individuals, nesting loggerhead sea turtle, or nesting Piping Plover, and because the proposed mechanical dredging would minimal risk to sea turtles and whales, concerns over impacts to federally-listed species are of minimal concern. The proposed work would be conducted in accordance with the terms and conditions of NMFS' 1998 Biological Opinion, as well as subsequent related NMFS/USACE coordination in 2013 and 2018. USACE concluded that the proposed action may affect individuals of these species but is not likely to adversely affect their populations. USACE anticipates completing informal consultation with USFWS and NMFS during public review of the EA. USACE would continue up to and during project construction to coordinate with NPS, USFWS, and NMFS to verify anticipated absence of federally-listed species in the proposed construction area on north Assateague.

Magnuson-Stevens Fishery Conservation and Management Act
As the lead federal agency, USACE is responsible for determining the nature and extent of effects upon federally-managed fishery species and for coordinating with NMFS as appropriate. USACE and NPS informally consulted with NMFS throughout the study to incorporate consideration of potential effects to managed fishery species into plan formulation. USACE prepared an EFH

impacts assessment (Appendix B) and anticipates completing informal consultation with NMFS during public release of the draft EA.

Coastal Barrier Resources Act (CBRA)
Assateague is an OPA (otherwise protected area) under the CBRA. The USFWS determined that the proposed navigation improvements are exempt from the CBRA because the proposed action meets the Group 1 exemption, "The maintenance or construction of improvements of existing federal navigation channels (including the Intracoastal Waterway) and related structures (such as jetties), including the disposal of dredge materials related to such maintenance or construction". A federal navigation channel or a related structure is an existing channel or structure, respectively, if it was authorized before the date on which the relevant System unit or portion of the System unit was included within the Coastal Barrier Resources System (CBRS)."

Coastal Zone Management Act
USACE has reviewed the proposed activity with respect to MD's laws and policies affecting the coastal zone. USACE has determined that the proposed activity is in conformity with MD's Coastal Zone Management Program (CZMP). USACE anticipates receiving a finding of concurrence from MD during public review of this EA.

Code of Federal Regulations. Parks, Forests, and Public Property. National Park Service
The activities proposed by USACE require a NPS Special Use Permit pursuant to 36 CFR 1.2(a)3 and 36 CFR 5.7. NPS is a cooperating agency in preparation of this EA and coordination between NPS and USACE has occurred regularly. USACE would seek this permit following public review of the draft EA and issuance of a FONSI.

Table 5-1: Compliance of the Proposed Action with Statutes.

Federal Statutes	Level of Compliance[1]	Concurrence or Permit
Anadromous Fish Conservation Act	Full	
Archeological and Historic Preservation Act	Full	
Clean Air Act	Full	
Clean Water Act	Partial	
Coastal Zone Management Act	Full	
Comprehensive Environmental Response, Compensation and Liability Act	NA	
Endangered Species Act	Full	
Estuary Protection Act	NA	
Federal Water Project Recreation Act	Full	
Fish and Wildlife Coordination Act	Full	
Magnuson-Stevens Fishery Conservation and Management Act	Full	
Marine Protection, Research and Sanctuaries Act	Full	
Marine Mammal Protection Act	Full	
Migratory Bird Treaty Act	Full	
National Environmental Policy Act	Full	

Federal Statutes	Level of Compliance[1]	Concurrence or Permit
National Historic Preservation Act	Full	
Rivers and Harbors Act	Full	
Submerged Land Act	Full	
Water Resources Planning Act	Full	
Watershed Protection and Flood Prevention Act	Full	

Table 5-2: Compliance of the Proposed Action with Executive Orders.

Executive Order (EO)	**Level of Compliance**
Protection and Enhancement of Environmental Quality (E.O. 11514)	Full
Protection and Enhancement of Cultural Environment (E.O. 11593)	Full
Floodplain Management (E.O. 11988)	Full
Recreational Fisheries (E.O. 12962)	Full
Environmental Justice (E.O. 12898)	Full
Recreational Fisheries (E.O. 12962)	Full
Indian Sacred Sites (E.O. 13007)	Full
Protection of Children from Environmental Health Risks and Safety Risks (E.O.13045)	Full
Migratory Bird (E.O. 13186)	Full
Stewardship of the Oceans, Our Coasts and the Great Lakes (E.O. 13547)	Full
Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (E.O. 13985)	Full
Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis (E.O. 13990)	Full
Tackling the Climate Crisis at Home and Abroad (E.O. 14008)	Full

1 Levels of Compliance

a. Full Compliance: having met all requirements of the statute, E.O., or other environmental requirements for the current stage of planning.

b. Partial Compliance: not having met some of the requirements. This results from certain pre-requisite tasks needing to be completed in the future, and consequent need for future coordination with agencies.

5.2 Agency and Public Coordination

USACE coordinated extensively with the public, organizations, resource agencies, and elected officials throughout the study. A brief summary of that effort is provided below. Appendix C contains a summary table of individual coordination records, as well as notable individual pieces of correspondence. Subsequent to USACE initial coordination for navigation improvements implementation, USACE also began public coordination for the separate Scour Hole Management Study (see Section 1.4.1). Coordination with the public, resource agencies, and elected officials

typically involved consideration of both potential actions. Accordingly, the text below also references the Scour Hole Management Study when applicable.

A survey inquiring about boating conditions in the inlet area was conducted independently of USACE in March 2019 by the legal firm AYRES, JENKINS, GORDY & ALMAND, P.A. This firm worked in coordination with local marinas, the Marlin Club, Worcester County, and known commercial boat owners. Approximately 900 boaters responded to a form survey. Feedback received provided information about channel depths, currents, and waves related to navigation, economic, and safety concerns. This information was provided to USACE and utilized in plan formulation.

USACE mailed out letters to resource agencies and a public notice to citizens, elected officials, and companies and organizations announcing initiation of harbor and inlet navigation improvements implementation investigations in May 2019. USACE will send out a public notice announcing availability of the draft EA for public and agency review.

USACE received responses to the study initiation letter and notice received from multiple federal and state agencies informing USACE of topics warranting consideration. By letter dated June 6, 2019, NPS agreed to be a NEPA cooperating agency for this CAP Section 107 Ocean City Harbor & Inlet navigation improvement project. USACE and NPS held multiple conference calls and virtual meetings with representatives of NMFS, USFWS, MD DNR, and MDE from 2019 through 2021 to review environmental topics. USACE coordinated with Coast Guard representatives in 2020 regarding navigation safety.

USACE held an in-person public meeting in May 2019, and a hybrid in-person/virtual public meeting in August 2021.

USACE held in-person and virtual public meetings with the Ocean City Working Group, which consisted of representatives of elected officials, state and local government agency representatives, and representatives of various navigation interests in September 2021, April 2021, and August 2020. Additionally, USACE study managers coordinated with the Ocean City Working Group as needed throughout the study.

USACE gave presentations regarding the Inlet Navigation Improvements and Scour Hole Management studies to the MD Coastal Bays Scientific and Technical Advisory Committee in June 2019 and June 2021.

USACE gave presentations regarding the Inlet Navigation Improvements and Scour Hole Management studies to the LTSM Project for Assateague Island Restoration in April 2020, April 2021, and April 2022.

USACE will distribute the draft EA electronically for public and agency review for a 30-day period. Following completion of review, USACE will address comments. Responses to nominal comments will be incorporated as revisions, if appropriate, in the final EA. Otherwise, nominal comments will be summarized and addressed in the appendix of the final EA. Substantial comments will be dealt by USACE coordinating with the person or entity making the comment

and seeking to come to a mutual resolution. USACE response to serious substantial concerns could include modifying proposed project design or construction methods. In the event that public and agency review determines that impacts of the proposed project are significant, USACE could then proceed to prepare an EIS, which would then stop the clock on proceeding with project construction until an EIS is completed.

6 Conclusions

The environmental and social consequences associated with the proposed action have been assessed by USACE. The alternative of taking no action was compared to the proposed action. USACE, as the lead agency, and NPS, as the cooperating agency, undertook substantial coordination with resource agencies and the public throughout plan formulation. Multiple complex topics were considered, including maintaining inlet physical stability, navigation, shoreline stability, public safety, and federally-listed species in the water and on northern Assateague Island. Modeling conducted by USACE ERDC was foundational in selecting among potential recommended plans.

The proposed action would improve navigational reliability of the inlet channel. Maintenance dredging of the inlet channel to maintain navigability under the proposed action would be reduced with the proposed action to approximately once every five years. Construction work would include dredging to realign the inlet channel, and rock structure construction work on northern Assateague Island from water and land. Environmental and recreational impacts of construction work would be minimized through TOY restrictions that limit construction to the months of October through March, inclusive. It is anticipated that coordination conducted during public and agency review and obtaining required permits and concurrence for the proposed action will arrive at the same conclusion, although details of BMPs may evolve from those required previously.

The proposed dredging of the Ocean City Inlet Federal Navigation Channel and rock structure construction on northern Assateague Island would be expected to have short-term minor adverse environmental impacts to water quality, benthos, fish and wildlife, EFH, and recreation. Additionally, minor short term adverse social effects would occur through air pollutant emissions, noise, and navigation interruption. Proposed rock structure work to train tidal currents would be permanent and increase the extent of armored shoreline in the inlet vicinity, which is already substantially armored.

While the proposed project would provide navigation improvements to the inlet channel, it would minimally or not reduce overall USACE dredging efforts in the inlet area from recent practices. The inlet vicinity would continue to be dredged under the auspices of the LTSM project through 2029 to provide the necessary sediment supply to Assateague Island to compensate for interruption to longshore transport caused by the historic construction of the Ocean City jetties. This dredging would likely differ from past LTSM project practices in that dredging would instead make greater use of the ebb shoal, as well as the USACE Sinepuxent and Isle of Wight federal channels near their confluence with the inlet channel. As less shoaling in the inlet channel would occur, that would become a less important sand source for the LTSM project. After 2029 when the LTSM project ceases, overall USACE dredging activity in the inlet vicinity would be reduced.

Assessment of the proposed project indicates that there would be no significant adverse effects to the natural or human environment and the Proposed Action would produce economic benefits and be engineeringly and environmentally acceptable. Based on this assessment, a draft FONSI has been prepared (Appendix E).

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8 Acronyms

ASIS	Assateague Island National Seashore
BMP	Best management practice
CBRS	Coastal Barrier Resources System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
CY	Cubic yard
dBA	A-Weighted Decibel
E2EM	Estuarine Intertidal Emergent
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
ERDC	Engineer Research and Development Center
FONSI	Finding of No Significant Impact
LTSM	Long-Term Sand Management Project
MCBP	Maryland Coastal Bays Program
MD	Maryland
MDE	Maryland Department of the Environment
MD DNR	Maryland Department of Natural Resources
MHT	Maryland Historic Trust
MLW	Mean Low Water
MOU	Memorandum of Understanding
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOB	Natural Oyster Bar
NOI	Notice of Intent
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
PFO	Palustrine Forest
ppt	Parts per Thousand
PSFA	Public shellfish fishing area
PSS	Palustrine Scrub Shrub
REC	Record of Environmental Consideration
SAV	Submerged Aquatic Vegetation
SHPO	State Historic Preservation Office

TMDL	Total Maximum Daily Load
TOY	Time of Year
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VIMS	Virginia Institute of Marine Science
WMA	Wildlife Management Area
WQC	Water Quality Certification