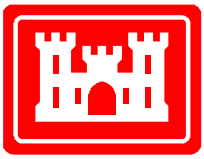

US Army Corps

of Engineers

Baltimore District

FINAL SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

DORCHESTER COUNTY, MARYLAND

MID-CHESAPEAKE BAY ISLANDS ECOSYSTEM RESTORATION PROJECT: BARREN ISLAND BORROW AREA

DECEMBER 2023

Prepared by: U.S. Army Corps of Engineers, Baltimore District

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ACRONYMS

ac	Acres
ACS	American Community Survey
ACJV	Atlantic Coast Joint Venture
ADCIRC	Advanced Circulation model
APHIS	Animal and Plant Health Inspection Service
ARI	Annual reccurence interval
CDC	Centers for Disease Control
CBRA	Coastal Barrier Resources Act
CMS	Coastal Modeling System
CMS-Wave	Coastal Modeling System Wave model
CSD	Cutter Suction Dredge
CSTORM	Coastal Storm Modeling System
CZMP	Coastal Zone Management Program
cy	Cubic yards
DLQ	Diurnal low water inequality
DHQ	Diurnal high water inequality
E2EM	Estuarine, intertidal, emergent wetland
E2FO	Estuarine, intertidal, forested wetland
E2SS	Estuarine, intertidal, scrub-shrub wetland
EIS	Environmental Impact Statement
ERDC	Engineering Research and Development Center
ESA	Endangered Species Act
EUS	Estuarine, unconsolidated shore
ft	Feet
FR/EIS	Feasibility Report and Environmental Impact Statement
FY	Fiscal Year
GT	Great diurnal range
HAPC	Habitat Areas of Particular Concern
IPaC	Information for Planning and Consultation
lf	Linear feet
LIDAR	Light Detection and Ranging
LOD	Limit of disturbance
m	Meter
MBTA	Migratory Bird Treaty Act
MCY	Million cubic yards
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDTL	Mean diurnal tide level
MHW	Mean high water
MLLW	Mean lower low water

MHT	Maryland Historic Trust
MN	Mean range of tide
MPA	Maryland Port Administration
NAAQS	National Ambient Air Quality Standards
NACCS	North Atlantic Coastal Comprehensive Study
NAVD88	North Atlantic Vertical Data 1988
NCDC	NOAA National Climatic Data Center
NEPA	National Environmental Policy Act
NOB	Natural Oyster Bar
OPA	Otherwise Protected Area (Coastal Barriers Resources Act)
PAR	Planning Aid Report
PED	Preconstruction, Engineering, and Design
PEM	Palustrine emergent wetland
SAV	Submerged aquatic vegetation
sEA	Supplemental Environmental Assessment
SHARP	Saltmarsh Habitat and Avian Research Program
SL	Source Level
SPL	Sound Pressure Level
STWAVE	Steady State Wave Model
T&E	Threatened and Endangered
TOYR	Time of Year Restriction
USCS	Unified Soil Classification System
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

1 INTRODUCTION

The U.S. Army Corps of Engineers, Baltimore District, (USACE) in partnership with the Maryland Port Administration (MPA), the non-federal sponsor, has prepared this supplemental Environmental Assessment (sEA) in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended, for the Mid-Chesapeake Bay Island Ecosystem Restoration Project (Mid-Bay Island Project) at Barren Island (Figure 1). The Mid-Bay Island Project is an environmental restoration/beneficial dredge use project in the Chesapeake Bay. The Mid-Bay Island Project recommends remote island restoration at James Island and Barren Island, both on the Eastern Shore of Maryland and in Dorchester County, Maryland, through the beneficial use of dredged material from the Upper Chesapeake Bay Approach Channels that service the Port of Baltimore (James Island) and small federal channels within Chesapeake Bay (Barren Island). The Mid-Bay Island Project is focused on restoring and expanding remote island habitat to provide over 2000 acres of wetland and terrestrial habitat for fish, shellfish, reptiles, amphibians, birds, and mammals through the beneficial use of dredged material.

The Mid-Bay Island Project is an integral component of the Federal Dredged Material Management Plan (*DMMP*), which is the long-term regional plan for managing sediments dredged from the Chesapeake Bay Federal navigation channels. The significance of the fish and wildlife resources of the Chesapeake Bay is widely recognized by resource agencies, the public, and academic institutions. For more than 20 years, extensive efforts have been expended to support natural resources management and restoration plans in the Chesapeake Bay region. The restoration projects at James and Barren Island will contribute to the goals of the Chesapeake Bay Program watershed partnership as established in the 2014 Chesapeake Bay Agreement. Both James and Barren Islands will contribute to the goals to restore 85,000 ac of tidal and non-tidal wetlands. In addition, the protection of 1,325 ac of SAV habitat adjacent to Barren Island will contribute to the goal to protect and restore 185,000 ac of SAV and to develop strategies to address water clarity in areas of critical importance for SAV. The Barren Island project is intended to improve water clarity by the protection of SAV and the reduction in shoreline erosion.

This Barren Island sEA will serve as a complement to the *Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)*, hereafter, Mid-Bay Feasibility Report, dated April 2009 (USACE, April 2009), and a sEA completed in March 2022. Given the time that elapsed since the Feasibility Report was completed, USACE prepared a sEA in March 2022 to update the NEPA documentation for the design of the Barren Island component of the project during the Preconstruction Engineering and Design (PED) Phase (USACE 2022). In the March 2022 sEA, USACE evaluated all aspects of the project except the use of a borrow area from which to dredged material for use in various components of the project's construction at Barren Island (USACE 2022). The NEPA evaluation presented here is solely focused on the proposed action of borrowing material from sub-aqueous areas in the vicinity of Barren Island for foundation replacement for sills, development of bird islands, and containment (geosynthetic tubes) associated with the wetland cells as part of the Barren Island restoration

project. This sEA evaluates a no action alternative, alternative dredging sites, and a non-dredging alternative, as well as impacts and benefits associated with the alternatives. The James Island component of the project is being addressed through the development of a separate supplemental Environmental Impact Statement.

1.1 Study Authority

The Mid-Bay Island Project is authorized to restore remote island habitat at James Island and Barren Island, in Dorchester County on the Eastern Shore of Maryland, through the beneficial use of dredged material. Section 7002 of the Water Resources Reform and Development Act of 2014 authorized the Mid-Bay Island Project, as described in the Chief's Report (USACE, August 2009) dated August 24, 2009, and the Mid-Bay Feasibility Report, dated April 2009 (USACE, April 2009). The record of decision was signed in July 2019 initiating the PED phase of the study. The project is being completed in partnership with a nonfederal sponsor, MPA.

1.2 Project Location and Setting

The Barren Island component of the Mid-Bay Island Project is located at Barren Island in Dorchester County, Maryland along the eastern shore of the Chesapeake Bay (Figure 1). Barren Island is a small island located approximately 1 mile west of Upper Hoopers Island that has now eroded into two smaller, separate land masses.

The island was acquired in 1993 by the United States Fish and Wildlife Service (USFWS) and is managed as a satellite refuge of the Chesapeake Marshlands National Wildlife Refuge Complex. A small portion of the island on the northwest was restored by USACE-Baltimore District Operations and Navigation Division in 2003 using dredged material taken from the adjacent Honga River channel. The Tar Bay Wildlife Management Area (WMA), a small section of Barren Island, is owned by Maryland's Department of Natural Resources (MDNR) and managed by the Wildlife and Heritage Service to conserve and enhance wildlife and their habitats and provide recreational use of the wildlife resources (MDNR Tar Bay WMA 2020). Tar Bay WMA was created in the 1980s by placement of dredged material from the Honga River channel off the northeast shoreline of Barren Island. At the time of its creation, Tar Bay WMA was a separate island from Barren Island. However, erosion and sediment transport has now connected the mainland of Barren Island and the Tar Bay WMA. Dredged material from local federally maintained navigation channels will serve as a portion of the material to stabilize Barren Island, restore wetlands, and thereby, provide for the continued protection of submerged aquatic vegetation (SAV) habitat east of Barren Island.

The focus of this sEA is the evaluation of borrow sources for material acquisition. Potential borrow areas include the shallow waters adjacent to Barren Island, the Honga River Navigation Channel, and a land-based source such as a quarry.

Figure 1. Project Area

1.3 Scope of Action

The scope of action for this sEA is acquiring approximately 300,000 cy of material for use in restoration efforts at Barren Island as part of the Mid-Bay Island Project. The first phase of the Barren Island restoration consists of modification and creation of several thousand feet of stone structures. Future phases of the Barren Island restoration will include new stone structures, foundation removal and replacement in areas of poor foundation of the new structures, creation of bird islands adjacent to the proposed breakwater, and placement of dredged material for wetland restoration. A source of material is needed for 1) replacement of poor foundation material in limited areas, 2) containment of dredged material for wetlands restoration, and 3) the creation of two bird islands. Containment of dredged material for wetlands restoration is planned to be accomplished by the use of material-filled geosynthetic tubes.

The Mid-Bay Island Project, including the restoration of Barren Island, will restore remote island habitat, a scarce and rapidly vanishing ecosystem component within the Chesapeake Bay region. Loss of remote island habitat within the middle eastern Chesapeake Bay has been estimated at approximately 10,500 acres (ac) in the last 150 years, a trend that will continue due to erosive forces and sea level rise. Remote islands in the Chesapeake Bay serve as an important stop-over point for migratory avian species, providing forage and protected resting habitat during spring and fall migration along the Atlantic Flyway. Additionally, the remote island habitat restored at James and Barren Islands will provide valuable wetlands and a vital connection between open-water and mainland terrestrial habitats within the region as well as valuable nesting habitat for a variety of colonial nesting and wading bird species.

As determined by the June 2009 Mid-Bay Feasibility Report, the Barren Island Project component was formulated to provide minor dredged material placement capacity, protect the existing island resources, reduce erosion of the existing shoreline at Barren, create wetlands, and protect areas of SAV from high wave energy. The feasibility design was updated during PED (USACE 2022) and depicted in Figure 2 to include:

- 13,023 linear ft (lf) of sill,
    - modification of 4,300 lf of current sill
    - creation of 8,723 lf of new sill
- 4,620 lf of breakwater,
- 2 bird islands (8.5 ac total) including 3,392 lf of stone perimeter and a detached 300-foot-long stone reef off the cove of each island, and
- Approximately 83 ac of high and low marsh and intertidal mudflats.

The updated design includes two bird islands attached to the South breakwater alignment. Nesting habitat for birds free of predators is becoming scarce in the Chesapeake Bay. This habitat would support nesting for common tern (*Sterna hirundo*), royal tern (*Thalasseus maximus*), black skimmers (*Rynchops niger*), and other colonial waterbirds.

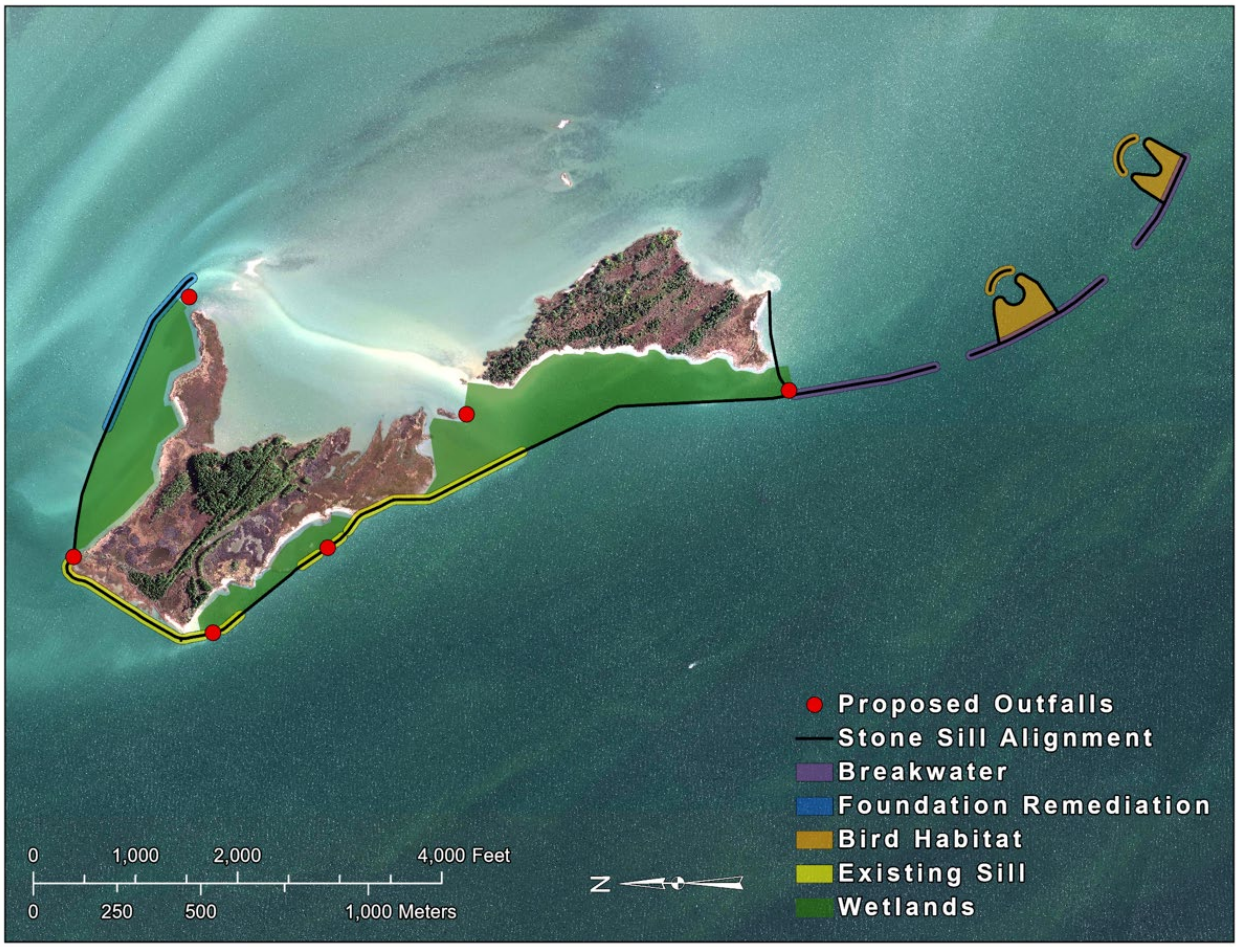

Figure 2. Barren Island Restoration Plan

2 PURPOSE, NEED, AND OBJECTIVES

2.1 Purpose

The Mid-Bay Island Study built upon the Federal and State's DMMP planning efforts to identify beneficial use sites to meet dredged material capacity needs and habitat restoration goals. The prior study determined the technical, economic, and environmental feasibility of protecting, restoring, and creating aquatic, intertidal wetland, and upland habitat for fish and wildlife within the Mid-Bay Island Project study area using clean dredged material from the Upper Chesapeake Bay Approach Channels. The purpose of the Barren Island project is to beneficially use dredged material to restore remote Chesapeake Bay Island habitat. The purpose of this evaluation is to acquire suitable material, in the necessary quantities, to replace unsuitable sill foundation material, construct wetland cell containment, and construct two bird habitat islands. This sEA evaluates the alternatives proposed for use as a source of material for construction of portions the Barren Island component of the Mid-Bay Island Project.

2.2 Need

Completing the Barren Island restoration project requires suitable material for construction of various project components to restore wetlands and bird nesting habitat. For these applications, material with less than 20% fines content is needed for proper construction. This sEA will evaluate alternatives for acquiring the necessary quantities of material for: 1) foundation replacement where soft bottom exists under the northeast sill footprint, 2) the construction of internal containment structures to develop wetland habitat, and 3) the development of bird nesting islands behind the southern breakwater. The location of foundation replacement and bird islands are depicted in Figure 2. The containment plan is presented in Figure 3. Table 1 provides the quantities of material needed in total and for each separate component. Suitable material is needed for the next phase of the project (Phase 2). Phase I, constructing the stone sills and breakwater began in March 2023.

Table 1. Material Quantity Estimate

	Containment	Ac-Ft Needed	Foundation Replacement	Ac-Ft Needed	Bird Island Fill	Ac-Ft Needed
Northwest	11,000	7	----	----	----	----
Northeast	15,000	9	37,000	23	----	----
South	23,000	14	----	----	----	----
Bird Island A	----	----	----	----	131,000	81
Bird Island M	----	----	----	----	80,000	50
SUBTOTAL	*49,000*	30	*37,000*	23	*211,000*	131
TOTAL QUANTITY	*300,000*	*184*				

Measures have been incorporated into the design to minimize the quantity of sand needed for the project. As documented in the Barren Island sEA (USACE 2022), 1) the northeast sill was reduced in length to minimize the portion that would need foundation replacement, 2) the align south sill was realigned to avoid the need for foundation replacement, and 3) geosynthetic tubes were selected for containment rather than sand dikes because they require less sand to construct.

The broader need for the Barren Island portion of the Mid-Bay Island Project is the preservation and restoration of Chesapeake Bay remote island habitat that is quickly being lost due to climate change (sea level rise, storm surge, etc.). Barren Island provides critically needed remote island habitat in the Chesapeake Bay and is one of the last remaining uninhabited islands in the Chesapeake Bay but is being lost to erosion at a rate of 3 to 4 ft per year. The project is needed to stabilize the island remnants, restore habitat that has been lost, add resiliency to address sea level rise and coastal storm risk, and reducing risking existing SAV by maintaining suitable conditions for SAV in the waters east of the island. In the nearly 20 years since the studies for the

feasibility phase was conducted, Barren Island has lost approximately 42 acres. Barren Island has continued to experience shoreline erosion while facing increased risks from coastal storms and sea level rise. Erosion has been greatest along the north shore of the Tar Bay WMA, centrally between what is now the north and south remnant, and along the western shoreline of the South remnant. As the island has eroded, the existing SAV beds have expanded into the historical remnant boundaries of Barren Island.

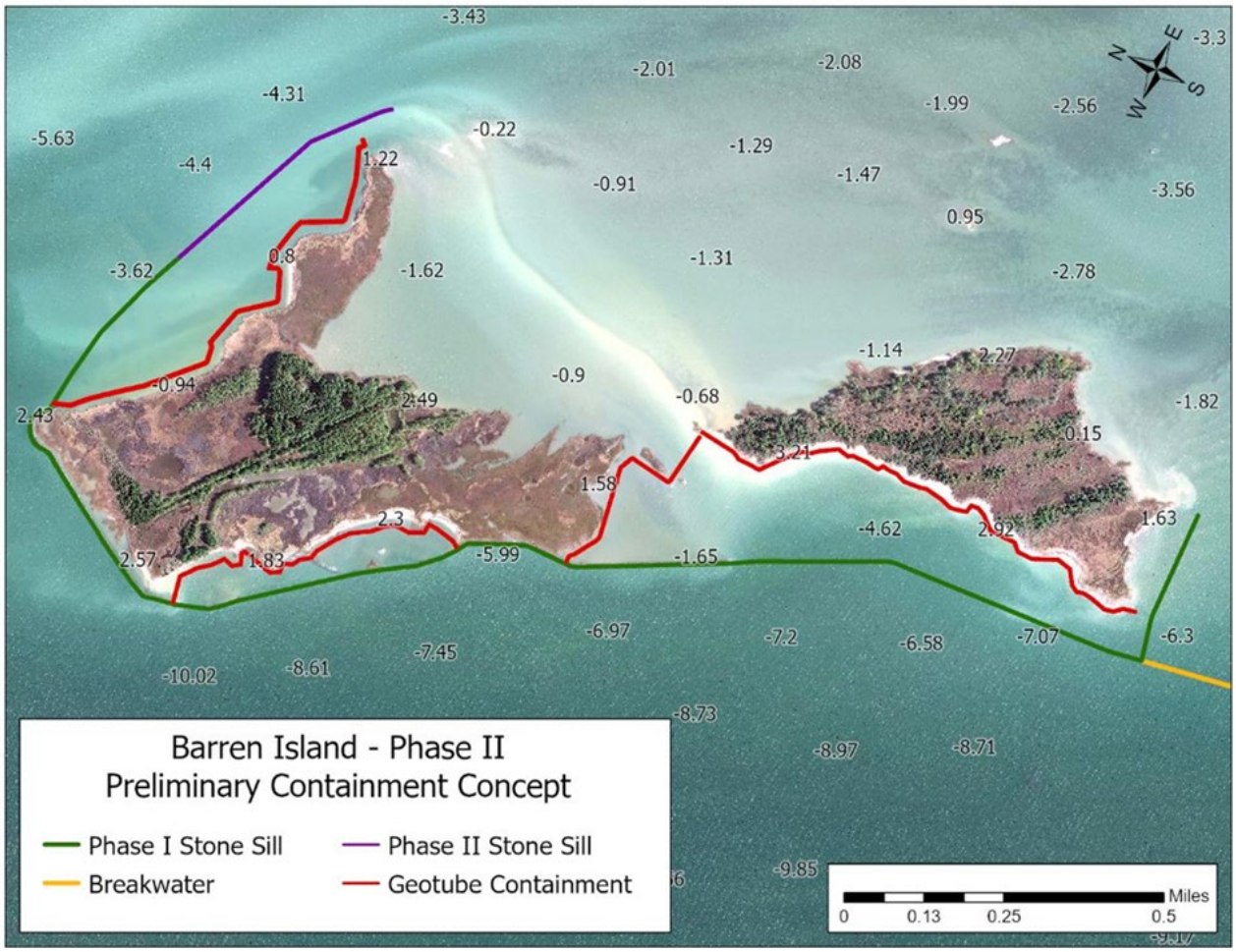

Figure 3. Barren Island Containment Plan

2.3 Objectives

The objective of this effort is to identify a source of material to use for construction of the Barren Island restoration project. The goal is to ensure all materials needed to complete the Barren Island portion of the Mid-Bay Island Project are available to restore and protect valuable but threatened Chesapeake Bay remote island ecosystems.

3 ALTERNATIVES

3.1 Alternatives Considered

Five alternatives plus the No Action alternative were identified. The sites identified below are depicted in Figure 4. Potential borrow areas were identified within a 3-mile distance of Barren Island. Three miles is the limit for effectively pumping material via pipe from a dredged site to a placement site. With the exception of the Northern Borrow Area, SAV and oyster habitats, as well as protective 500-yard buffers around these habitats were eliminated as potential borrow areas. The Northern Borrow Area was considered even though it contained some SAV habitat because the watermen's community requested its inclusion.

- Alternative 1 is the 'No Action' or base condition that represents existing conditions and would not develop a source of material for use in the project.
- Alternative 2 is the Northern Borrow Area.
- Alternative 3 is the Southern Borrow Area.
- Alternative 4 is using the Honga River Channel as a source of material.
- Alternative 5 is using a quarried material (land-based material source).
- Alternative 6 is a combination of the Northern and Southern Borrow Area.

3.1.1 Alternative 1

The No Action Alternative would involve no further actions to acquire material for the project. This alternative does not meet the purpose and need of the project.

3.1.2 Alternative 2

Alternative 2 is dredging the required material from the Northern Borrow Area. The Northern Borrow Area was identified as a potential alternative through stakeholder outreach. The area is immediately north of the Honga River Channel, a federally maintained channel. The Northern Borrow Area is recognized by local waterway users as an area that experiences shoaling and could be a source of material. An approximately 123 ac site was identified in the identified location that avoided the federal channel and spoil areas from past dredging activities. At its closet point, the Northern Borrow Area is 1,485 ft from the planned Barren Island restoration project.

3.1.3 Alternative 3

Alternative 3 is dredging the required material from the Southern Borrow Area. The Southern Borrow Area was identified as a potential source of material based on the results of geotechnical surveys acquired during the feasibility study. The Southern Borrow Area encompasses approximately 342 acres to the west of Barren Island in open Bay waters. Although distances vary depending on end points selected, the Southern Borrow Area is approximately 4,700 ft from the planned Barren Island restoration project.

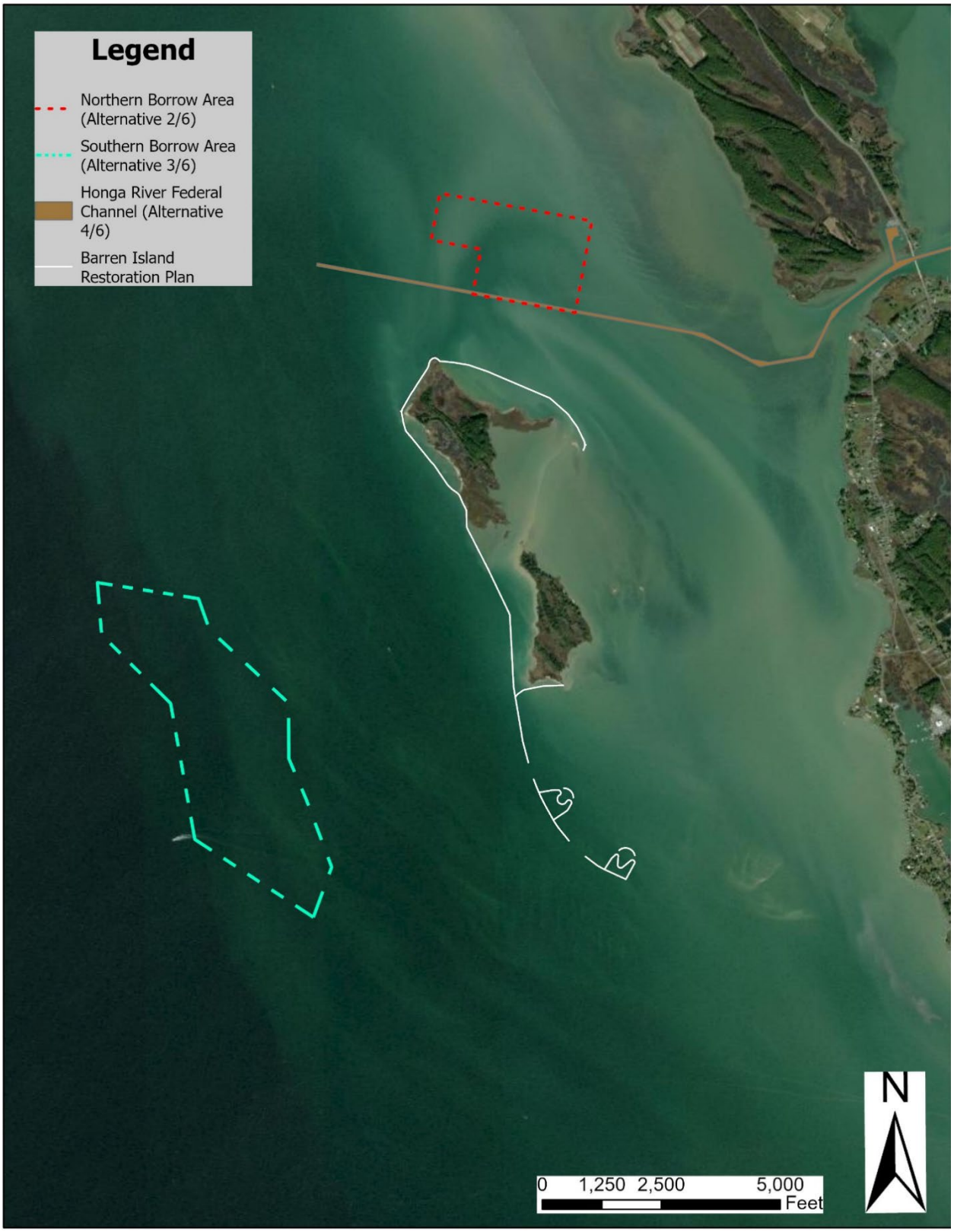

Figure 4. Alternatives

3.1.4 Alternative 4

Alternative 4 is dredging the required material from the federally maintained Honga River Channel, and using remaining quantities for wetlands restoration at Barren Island. The channel is authorized to a width of 60 feet and a depth of 7 feet and runs from the 7-foot depth contour in the Chesapeake Bay through Tar Bay and Fishing Creek to the Honga River. The Honga River channel is the main water access for local watermen on Hooper's Island to access the Chesapeake Bay. Currently, the channel has shoaled, and depths are too low to enable passage, even at high tide. Nearly 12,000 ft (2.27 mi) of the channel span the waters of the Tar Bay and are included in Alternative 4. Material from the Honga River Channel is the focus for this alternative due to the availability of Congressional funding to conduct maintenance dredging of the Honga River Channel, as well as proximity to Barren Island. Other local navigation channels such as Duck Point Cove and Muddy Hook Cove are further than 3-miles from Barren Island, limiting their ability to be beneficially used at Barren Island.

3.1.5 Alternative 5

Alternative 5 is acquiring the needed material from a land-based source, likely a quarry. For this alternative, material would need to be transported to the project site either via the Bay on a barge or via land by a truck and then barged. A specific land-based material source has not been located as part of this evaluation. This alternative is not depicted on Figure 4.

3.1.6 Alternative 6

Alternative 6 is dredging the needed material from a combination of the Northern and Southern Borrow areas, and the Honga River Channel. This alternative is included to investigate whether an option exists that could efficiently use suitable material between the sites to minimize or avoid impacts and maximize access to suitable material. Site combinations considered include using both the Northern and Southern Borrow Areas, the Northern Borrow Area with the Honga River channel, the Southern Borrow Area with the Honga River channel, and a combination of all 3 sites. This alternative was developed as a way to minimize the quantity of sand that would be needed from the southern borrow area. The western portion of the northern borrow area outside SAV habitat could be utilized in combination with material from the Honga River and the southern borrow area. The impacts could be shifted from the southern borrow area to these locations for the quantities that area recoverable from those areas. This would reduce the area to be impacted at the southern borrow area and subsequent impacts to the commercial fishing industry, shift some impacts to the northern borrow area which is any area preferred by the commercial fishing industry, and is adjacent to previously dredged bottom. Further, it would avoid SAV impacts associated with using the northern borrow area only (Alternative 2). The impact of dredging previously non-dredged bottom at the southern borrow area could be reduced by utilizing all borrow options. If this option is determined to be viable, material acquired from the Honga River Channel could be placed within the bird islands to fill bottom depths prior to placement of sand at top depths. Sand is needed at surficial depths to promote

drainage and minimize vegetation growth, and subsequent operations and management measures.

3.2 Alternative Evaluation and Comparison

The following screening criteria were evaluated and used to compare alternatives:

- Suitability of the material for construction

Material suitable for use must have a low fines content. Fines content is the percentage of material by weight with particle size finer than 0.075 mm (#200 sieve). The ideal borrow material for use as backfill for foundation removal and replacement would be material with less than approximately 20% fines. Material with less than 20% fines can be easily placed with mechanical or hydraulic placement. The low fines content allows for rapid decanting of water during placement and for achieving an adequate relative density with minimal to no compactive efforts. A low fines content is especially important in underwater placement or hydraulic placement where compaction is not possible. Material with greater than 20% fines is more difficult to place for foundation replacement, resulting in insufficient relative densities and strengths.

Whereas the ideal foundation replacement material is less than 20% fines, a fines content up to 30% could be used for bird island construction. At 30% fines, the material can still decant easily but could potentially settle over time and exhibit a lower relative density and strength. Neither of these issues are critical for bird island construction because the material will be contained by stone structures and the material does not need to support any loads. A material source with less than 30% fines could be (1) a silty or clayey sand with less than 30% fines or (2) an area of material with small lenses of fine-grained material that when blended contains less than 30% fines.

In addition to the composition, potential substrate sites need to provide a homogeneous source. The ideal source would consist of a large, homogeneous area of sand, free of lenses of silts and clays. It is important to find a homogenous area when evaluating potential borrow sites because sampling collects a very small amount of material to represent a potentially large area. Homogeneity provides additional confidence that the samples accurately represent the material available at the borrow site. Variability in material properties among grab samples is a strong indication that borrow source material is also variable. Grab samples do not give an indication of material composition below the surface, but a large homogenous area of suitable material at the surface justifies further geotechnical investigations at depth. A homogeneous source could be identified at an in-water site or from a land location (quarry).

To minimize the amount of material needed to construct containment structures, geotextile tubes are being planned for containment. The geotextile tubes will be approximately forty feet in circumference and fifty feet in length. To fill the geosynthetic tubes, material would be pumped from a dredge to several fill ports along the length of each tube. The geotextile tubes will be pumped to a maximum height of approximately 8 feet. To prevent excessive settlement of the material within the geotextile tubes, the material used to fill the tubes should have the least

amount of fine material as possible. It is possible to fill tubes with fine-grained material, but the tubes will take months if not years to dewater. As the tubes dewater, they will get shorter and not provide the desired containment height. At Barren Island, the approximate eight-foot height requirement is at the practical limit of maximum height for a geotextile tube. The tubes will need to remain in-place for several years.

- Quantity of suitable material available

The source of material identified needs to be able to provide approximately 300,000 cy of suitable material for use in constructing the Barren Island project as presented in Table 1. Approximately 37,000 cy is needed for foundation replacement. 49,000 cy is needed for wetland containment, and 211,000 cy is needed for bird island restoration. Of the quantity needed for containment, 15,000 cy is the estimate for containment in the northeast wetland cell, 11,000 cy in the northwest cell, and 23,000 cy for the south wetland cell. The following approaches have been included in the project's design to minimize the quantity of borrow material needed to construct the project: use of geosynthetic tubes rather than sand dikes; locating containment at the shallowest depth possible, which is 3 ft NAVD88 for the northwest and northeast to provide a tidal channel that serves existing wetlands, but at mean high water for the south cell since this shoreline is elevated; and reduction of the northeast sill length where foundation replacement is required.

- Impacts to commercial fisheries and waterway users

Commercial watermen have pound nets in the area being considered for the Southern Borrow Area. Surveys have identified intensive crab harvesting using crab pots and trotlines in the waters adjacent to Barren Island. Further, there are commercial and recreational boaters in the project area. Alternatives will be evaluated for their ability to avoid and/or minimize impacts to other waterway users.

- Impacts to cultural resources

The areas have been evaluated for potential impacts to cultural resources. Alternatives will be evaluated for their ability to avoid and/or minimize impacts to any identified resources.

- Impact to sensitive habitats – SAV, oysters, and shallow-water habitat

The areas have been evaluated for potential impacts to SAV, oysters, and shallow-water adjacent resources. Alternatives will be evaluated for their ability to avoid and/or minimize impacts to any identified resources.

- Impacts to aquatic species – fish, benthic invertebrates

The areas have been evaluated for potential impacts to fish and benthic invertebrates. Alternatives will be evaluated for their ability to avoid and/or minimize impacts to any identified resources.

- Size of Area impacted

The size of the area that would be impacted in acquiring the targeted quantity of material will be considered. Alternatives will be evaluated for their ability to minimize the area impacted.

- Feasibility

The feasibility of implementing an alternative will be considered. Challenges and risks of implementation will be discussed as well as factors that would be expected to affect the time needed to complete the project.

- Cost

The cost to acquire the targeted quantity of material will be considered.

3.2.1 Alternative 1: No Action

Under this scenario, no material would be obtained for use in the project. The Barren Island Restoration Project would not be able to be completed. Only the initial restoration effort to construct stone sills and breakwaters would be accomplished. This would leave the existing refuge protected by offshore sills and breakwaters, but would not achieve any additional habitat restoration, including wetlands and remote bird nesting islands. The No Action Alternative would have no impacts to commercial fisheries, waterway users, cultural resources, sensitive habitats, or aquatic species.

3.2.2 Alternative 2: Northern Borrow Area

The area north of the Honga River Channel was suggested as a potential material source by stakeholders familiar with the area. If suitable, approximately 30 days would be needed to dredge the needed quantities of material from the Northern Borrow Area. An area for investigation was delineated from the nautical chart that avoided spoil areas from past channel dredging efforts because previous spoil areas are likely to contain fine sediments and not the sand desired. Two sampling efforts were completed to characterize the composition of bottom sediments. The initial effort focused on obtaining samples to characterize the composition of the substrate within the area (Figure 5). Fifteen (15) grab samples (1 quart of material) were collected within the potential Northern Borrow Area (Honga River Channel sampling will be discussed in Section 3.2.4.). Sieve analysis was performed for each sample and Atterberg limit testing was completed to classify the fine-grained samples.

Table 2 provides the classifications and fine contents for each sample in the Northern Borrow Area resulting from the analysis (SM=silty sand, SP-SM=poorly graded sand with silt, ML=silt, CL=lean clay, and SC=clayey sand):

Table 2. Grab Sampling Results for the Northern Borrow Area

Northern Borrow Area		
Sample Number	USCS Classification	Fines Content (%)
NB-1	SM	15
NB-2	CL	51
NB-3	SM	17
NB-4	SM	14
NB-5	SM	28
NB-6	SM	33
NB-7	SC	45
NB-8	SC	37
NB-9	ML	69
NB-10	SP-SM	8
NB-11	SC	27
NB-12	SM	32
NB-13	ML	58
NB-14	ML	57
NB-15	ML	51

The results were evaluated for fines content and homogeneity to determine the suitability of the site for use as a material source and indicate the material in the Northern Borrow Area is highly variable, containing both silty sands, silts, lean clays, and clayey sands. Based on the results, it is unlikely that a large area of material containing less than 20% fines exists in the Northern Borrow Area.

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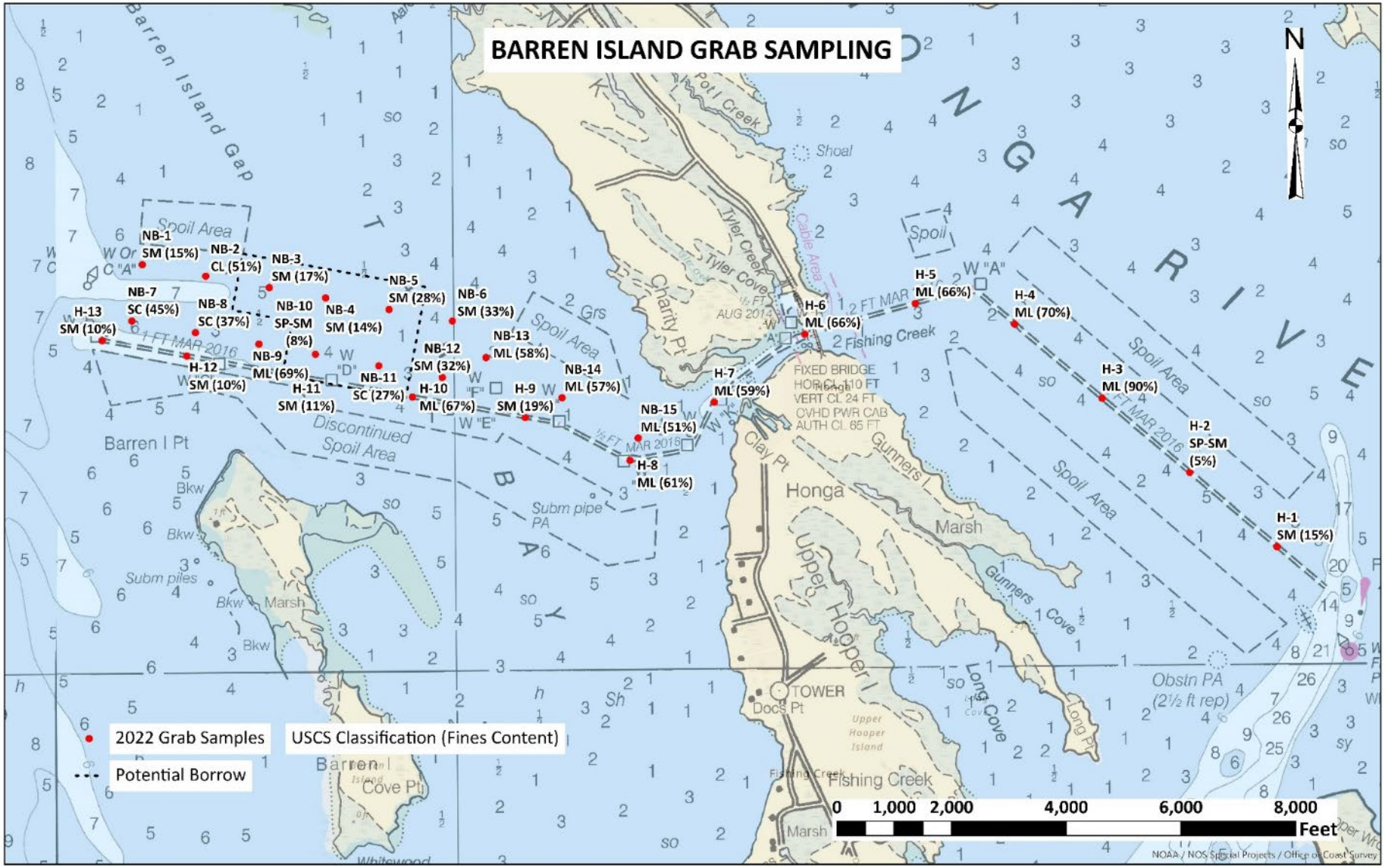

Figure 5. Initial Geotechnical Investigation for Northern Borrow Area

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The grab sampling identified an area (characterized by NB-3, NB-5, NB-10, and NB-11) with < 30% fines that could serve as material for bird island development with additional exploration. In November 2022, thirty-one (31) borings were acquired from the Northern Borrow Area to determine if this portion of the Northern Borrow Area could provide material for bird island development (Figure 6). The borings were conducted to a depth of approximately 15 feet. Continuous samples were collected with either direct push sampling or split spoon sampling. Laboratory testing was performed to verify field classifications and determine the gradations and plasticity limits of selected samples.

Results indicate that the depth of surficial sand varies throughout the borrow area between no sand (at many boreholes) and 15 ft of sand (at N-7). Table 3 presents a summary of the surficial sand depths. Fine grained materials were encountered in all but two borings and classified primarily as either ML, CL, or CL-ML according to the Unified Soil Classification System (USCS). Layers of fine-grained materials were found at the surface and between layers of sand. The borings indicate large differences in material between adjacent borings. A sub-area within the Northern Borrow Area containing a sizeable volume of sand could not be identified.

The geotechnical investigations determined that the material present in the Northern Borrow Area is not suitable for use in the project where sand is needed. There are no large areas of sand present, layers of fine-grained material are more extensive than layers of sand, and the site does not contain areas that could be blended to produce a suitable material with less than 30% fines content. Due to its high variability and high fines content, material from the Northern Borrow Area is not suitable for foundation removal and replacement. The site is also not recommended for filling geotextile tubes because of the high likelihood that the material within the tubes could settle (because of high fines content) causing an unacceptable reduction of height. Finally, the composition of the material is not suitable for the entirety of bird island development. Material with high fines content could be placed at depth in the bird islands.

Figure 6. Boring Locations Investigated in the Second Geotechnical Investigation of the Northern Borrow Area

Table 3. Depth of Surficial Sand (ft) in the Northern Borrow Area

Boring	Surficial Sand Depth (ft)	Boring	Surficial Sand Depth (ft)
N-1	4.7	N-17	0*
N-2	-	N-18	4.2
N-3	9.7	N-19	2.2
N-4	8.4	N-20	0
N-5	14.3*	N-21	0
N-6	0	N-22	2
N-7	15*	N-23	0*
N-8	9.2*	N-24	2
N-9	8.3	N-25	10.8
N-10	0	N-26	10
N-11	0	N-27	0*
N-12	0*	N-28	5
N-13	0	N-29	0
N-14	0	N-30	0*
N-15	0	N-31	2
N-16	4.0		

* = Sand depth is presumed (due to poor recovery in top sample)

- = Designates insufficient recovery to quantify

Use of the Northern Borrow Area would impact shallow water habitat with depths that range from approximately -4.2 to -8.1 ft NAVD88, with an average depth of -6.0 ft. Further, the eastern half is situated in SAV habitat (Figure 7). Approximately, 51 acres of potential SAV habitat would be negatively impacted by dredging the eastern half of the Northern Borrow Area (See Figure 7). Water depths would be deepened likely past the suitable extent for SAV. The area would be expected to be unsuitable for SAV habitat for a period of years until the area shoals into suitable depths. Based on existing shoaling patterns, it can be expected that the borrow area would experience shoaling to reduce water depths, but it is not guaranteed so this impact could be long-term. No direct negative impacts to oyster habitat would be expected (See Figure 12, Section 4.3.1). The closest oyster bars to the site are Legal Natural Oyster Bar (NOB) 23-2 and Great Bay Bar (Maryland Historic Bar). Legal NOB 23-2 is at least 3,500 ft west of the proposed Northern Borrow Area and would not be expected to be indirectly impacted. Great Bay Bar is approximately 1,200 ft south of the proposed

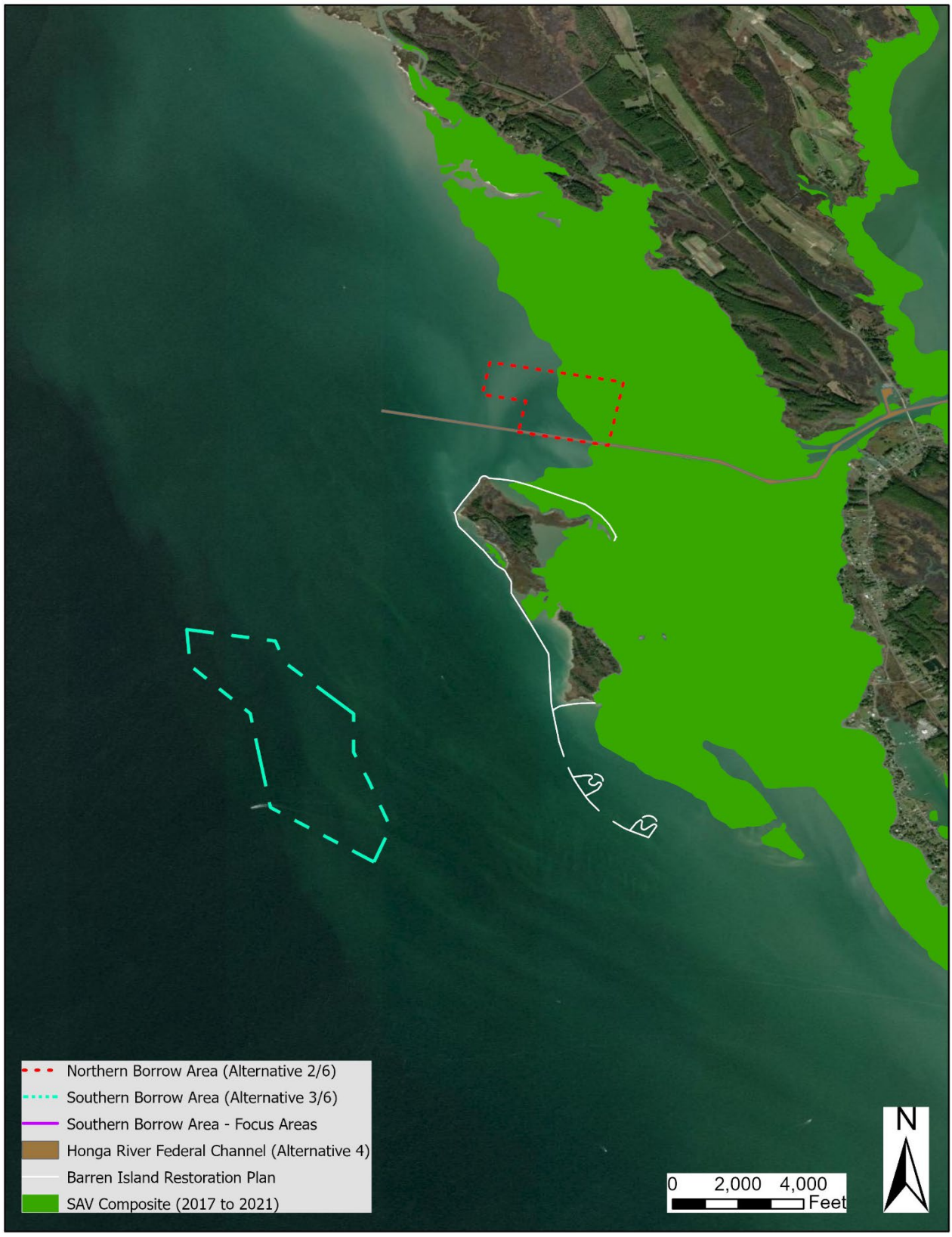

Figure 7. Submerged Aquatic Vegetation – Five Year Composite (2016 – 2020)

Northern Borrow Area and is within a distance where indirect impacts could occur. A time of year restriction could be implemented for dredging within 1,500 ft of Great Bay Bar to minimize and avoid negative impacts. Crab harvesting using trotlines is known to occur within Tar Bay. Using the Northern Borrow Area as a source of material would temporarily displace crabbers if dredging occurred during harvest season (April to October). Additionally, it would be expected that the use of the borrow area for crab harvesting may be altered as a result of dredging for a short-term period. Dredging of this area could temporarily impact boaters as it is adjacent to the federal channel. Boaters would need to navigate around the dredging operation and may experience longer routes and delays.

Alternative 2 cannot provide material to satisfy all project needs. Utilizing a portion of the Northern Borrow Area as a source of the material needs for initial bird island development was also considered but will not be pursued due to the impacts that use of the Northern Borrow Area would have on SAV habitat. This alternative would also require another area to be dredged and impacted to acquire the remaining quantity of suitable material needed. Due to these reasons, Alternative 2 is screened out from further consideration, and it will not be considered as a partial option in Alternative 6. Given its elimination, no cultural resources investigations were undertaken in the Northern Borrow Area.

3.2.3 Alternative 3: Southern Borrow Area

The Southern Borrow Area was identified as a source of material from subsurface investigations made during the feasibility phase of the study in 2001 and 2004. At the time, this area was being screened as a potential location for a large island restoration project. Subsurface exploration identified a large source of sand between Barren Island and the pilot area indicated on National Oceanic and Atmospheric Administration (NOAA) Chart 12264. A portion of this delineated area is now identified as the Southern Borrow Area. The Southern Borrow Area lies approximately 1.5 miles to the west of Barren Island and just east of deeper water of approximately 14 to 16 feet and the deep draft navigation channel. The outer limit of the Southern Borrow Area represents the bounds of borings that showed deep deposits of sandy material in the prior subsurface explorations.

In 2022, subsurface investigations were conducted to investigate the material composition of the area (Figure 8). The investigation focused on the northern half of the potential Southern Borrow Area, based on input from commercial fishing stakeholders, to minimize impacts to their use of the area. The investigation involved collection of twenty-five (25) borings to an approximate depth of fifteen (15) feet. Continuous samples were taken. Select sub-samples were tested for grain size analysis and plasticity limits.

A custom computer program was developed to compute composite gradations from the laboratory data. Details of this analysis are available in Appendix A4 (Geotechnical Appendix, Section 5.2). The output was a composite gradation curve and the percentage of gravel, sand,

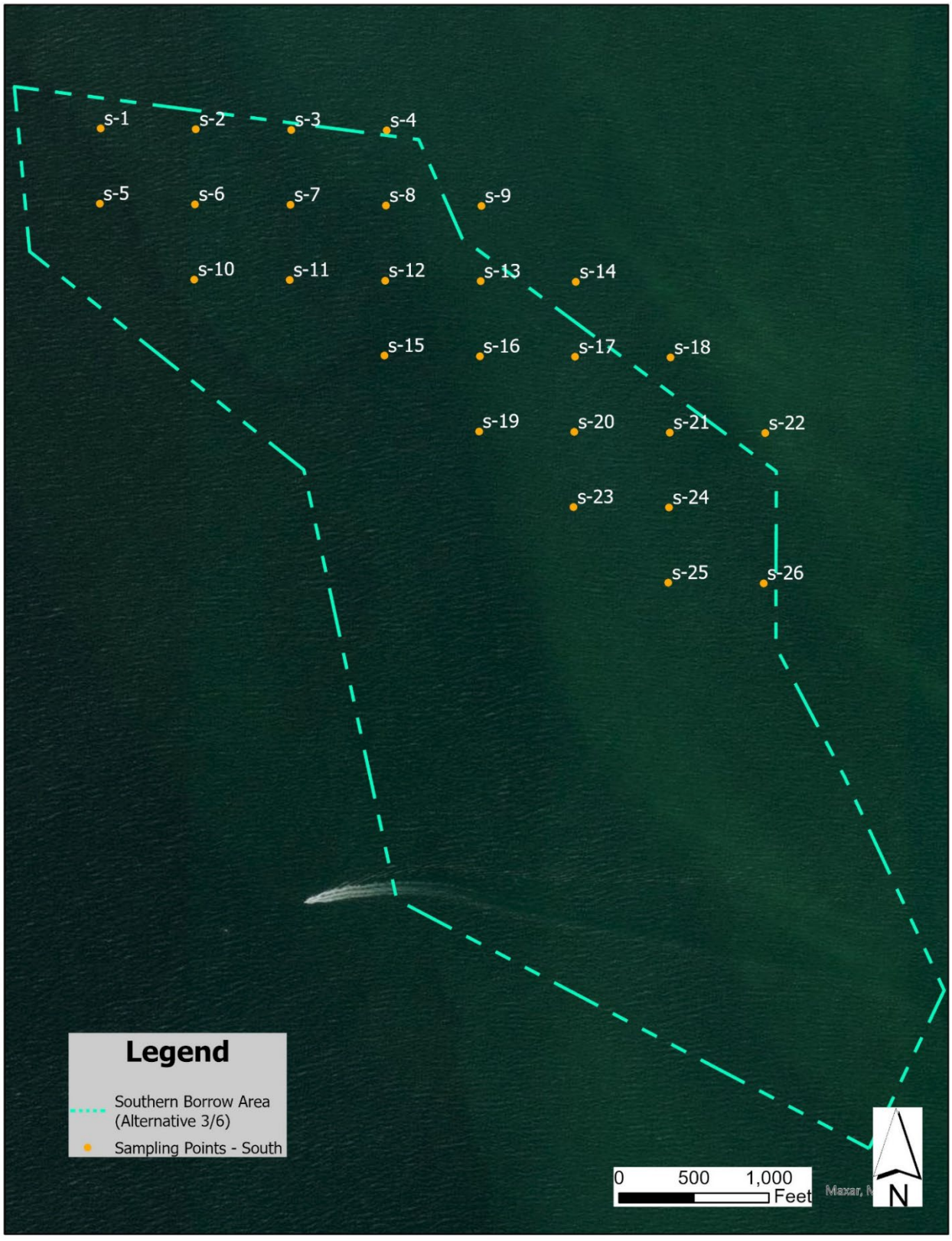

Figure 8. Boring Locations Investigated in the Southern Borrow Area

and fines for the curve. The output is included in Appendix A4 (Attachment O). The results are summarized in Tables 4 and 5.

Table 4. Southern Borrow Area: Area A Material Properties

Elevation Range (NAVD88, ft)	% Gravel	% Sand	% Fines	D_{50} (mm)
0 to -20	0	80.5	19.5	0.12
-20 to -25	0	78.1	21.9	0.12
-25 to -30	1.4	75.3	23.3	0.13
-30 to -35	4.5	73.5	22.0	0.20
Estimate of Composite from 0 to -35	0.9	77.5	21.7	0.13

Table 5. Southern Borrow Area, Area B Material Properties

Elevation Range (NAVD88, ft)	% Gravel	% Sand	% Fines	D_{50} (mm)
0 to -20	0	82.6	17.4	0.17
-20 to -25	0	84.9	15.1	0.19
-25 to -30	0.3	87.7	12.0	0.22
-30 to -35	1.6	92.8	5.6	0.29
Estimate of Composite from 0 to -35	0.1	84.7	15.2	0.20

Most borings contained silty sand to the full depth of the boring. Some borings, such as S-8 and S-13 contained limited extents of surficial sand (3.3 ft and 6 ft, respectively). For this reason, as well as input from local watermen on a preferred area, the entire area is not considered acceptable for material borrow and has been reduced in size. The Southern Borrow Area was further divided into two areas to avoid silts and clays – Area A and Area B. Area A is 44.4 acres and Area B is 40.2 acres in size (See Figure 9).

The quantity of material needed for the replacement of unsuitable foundation material, wetland containment, and the creation of two bird islands is approximately 300,000 CY. Both Area A and Area B within the Southern Borrow Area can provide a suitable substrate in the desired quantities.

Alternative 3 has enough suitable material available to meet the project needs. Approximately 30 days would be needed to dredge the required quantities from the Southern Borrow Area. SAV habitat would not be affected by this alternative. It is also unlikely that oyster habitat would be affected by Alternative 3. The only oyster bar in the vicinity is Legal NOB 23-2 which sits just outside, 1,500 feet, from site A and is at least 2,800 feet from site B. [1,500 feet is the recognized

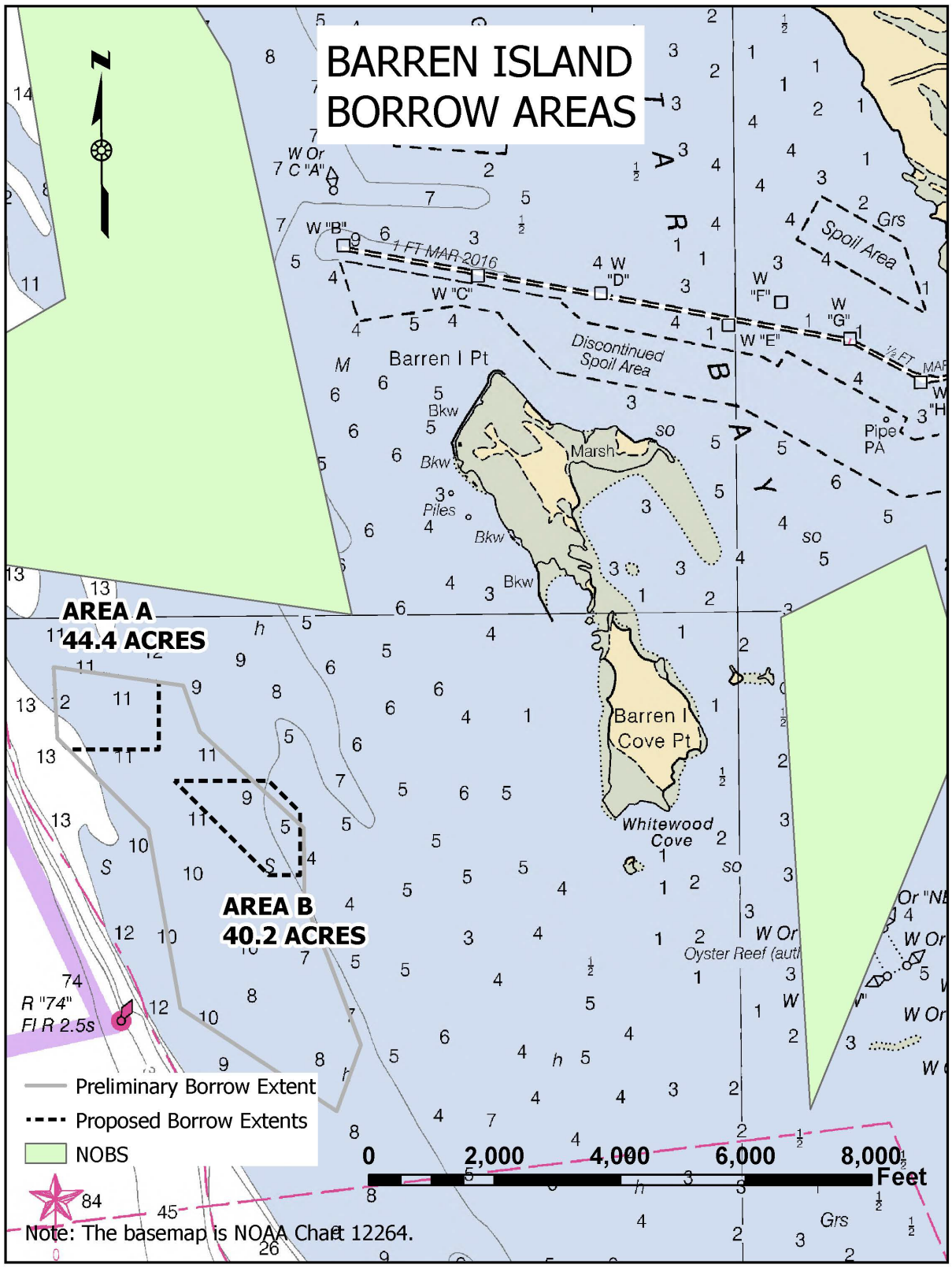

Figure 9. Southern Borrow Area – Focus Areas A and B

distance of disturbance for protection of oyster habitat by DNR.] Crab harvesting using crab pots is known to occur in the waters within and adjacent to the proposed Southern Borrow Area.

There are registered pound nets to the north and west of Area A and southeast of Area B, but as of March 2023 none are shown as active in the DNR Chesapeake Bay Pound Net database. Using the Southern Borrow Area as a source of material would temporarily displace crabbers if dredging occurred during harvest season. Additionally, it would be expected that the use of the borrow area for crab harvesting may be altered as a result of dredging for at least a short-term period. Dredging of this area could temporarily impact boaters transiting the water. Boaters would need to navigate around the dredging operation and may experience slightly longer routes and delays.

3.2.4 Alternative 4: Honga River Channel

The Honga River Channel was suggested as a potential material source by stakeholders familiar with the area. The Honga River Channel has been appropriated funding by Congress for maintenance dredging. If suitable for the project, approximately 30 days would be needed to dredge the required quantities of material from the Honga River Channel. As the channel has been impacted in modern times by periodic dredging, impacts from this alternative would be to a prior impacted area and prevent impacts to other untouched bottom habitats. A geotechnical investigation was undertaken to characterize the composition of bottom sediments in the Honga River Channel. Samples were obtained to characterize the composition of the substrate within the area (Figure 5). Thirteen (13) grab samples (1 quart of material each) were collected within the Honga River Channel. Sieve analysis was performed for each sample and Atterberg limit testing was completed to classify the fine-grained samples.

Table 6 provides the classifications and fine contents for each sample in the Northern Borrow Area resulting from the analysis (SM=silty sand, SP-SM=poorly graded sand with silt, ML=silt, CL=lean clay, and SC=clayey sand):

Table 6. Grab Sampling Results for the Honga River Channel

	USCS Classification	Fines Content (%)
H-1	SM	15
H-2	SP-SM	5
H-3	ML	90
H-4	ML	70
H-5	ML	66
H-6	ML	66
H-7	ML	59
H-8	ML	61
H-9	SM	19
H-10	ML	67
H-11	SM	11
H-12	SM	10
H-13	SM	10

The geotechnical investigations determined that the material present in the Honga River Channel is not suitable for use in the project where material with <20% fines is needed. There are no large areas of sand present, layers of fine-grained material are extensive, and the site does not contain areas that could be blended to produce a suitable material with less than 30% fines content. Due to the high variability, the Honga River Channel is not suitable for use as backfill for foundation removal and replacement. The site is also not recommended for filling geotextile tubes because of the high likelihood that the material within the tubes could settle (as a result of high fines content) causing an unacceptable reduction of height. Finally, the composition of the material is not suitable for the development of the bird island surface which requires <30% fines to provide proper consolidation and drainage. The heterogeneous composition of the Honga River material would make placing the material at the thickness needed (> 14 ft) challenging and would reduce the quantity of material available to restore wetlands habitat. Therefore, Alternative 4 is screened out as a sole source of material, but inclusion of dredging material from the Honga River Channel will be considered as part of Alternative 6 to supply material for the base of the bird islands.

3.2.5 Alternative 5: Quarried Source

A source from a land-based quarry could be acquired to meet desired specifications for grain size composition. Alternative 5 would be able to provide the quantities needed for the project and would have no impacts on the benthic environment or the use of the bottom for crab harvesting and fishing. The most likely source of land-based material is a quarry in Havre de Grace, MD. Transporting the needed quantities to the project site would require approximately 100 trips (2 barges per trip) from Havre de Grace at the head of the Bay to Barren Island. If two barges are brought to the site each day, it would take over 3 months for all the material to reach Barren Island. The depths surrounding the bird islands would require barges to be light-loaded resulting in the high number of barges and trips. These trips would moderately add to traffic in shipping channels and result in greenhouse gas emissions comparable to those produced from dredging the material from a borrow area (Appendix C4). The challenges posed by this alternative are largely associated with cost and implementation. A preliminary cost estimate was completed for the Phase 2 work. The cost to quarry, ship, and place material from a land-based source at Barren Island is estimated to be 13 times more than dredging the material from the Southern Borrow Area. With respect to implementation, material from a land source would need to be handled multiple times to create the surface for the bird islands. Once on site, additional equipment would be needed to mix the material with water to create a slurry for geosynthetic tube construction. The material for filling the bird islands would need to be moved off the barges and into the footprint of the bird island. This would be accomplished using an excavator with a clam shell. The barges would need to be brought to the Bay-side of the breakwater and then the material would be moved one bucket at a time into the bird islands footprint on the other side of the breakwater. This effort would take a lengthy amount of time. Once the waterline was broken, equipment would be needed within the bird island to position the material within the bird island (that effort would also likely be necessary for placement of dredged material). The

alternative could be accomplished but would require a much larger investment of time and money, and is therefore screened out from further consideration.

3.2.6 Alternative 6: Site Combination

Alternative 6 was developed to provide flexibility to make efficient use of materials available, balance stakeholder interests, minimize impacts, and maximize material availability. Site combinations considered include using both the Northern and Southern Borrow Areas, the Northern Borrow Area with the Honga River channel, the Southern Borrow Area with the Honga River channel, and a combination of all 3 sites. If suitable, approximately 30 days would be needed to dredge the required quantities of material. While the Northern Borrow Area was preferred by local stakeholders (watermen), the unsuitable results of the geotechnical surveys and concerns with negative SAV impacts, the Northern Borrow Area has been eliminated from further consideration. With the exclusion of the Northern Borrow Area, this Alternative 6 could still provide for a combination of the Southern Borrow Area and the Honga River Channel. As the Honga River Channel is planned for dredging in 2025 (anticipated), dredged material could be used to offset some portion of the quantity of material needed to be dredged from the Southern Borrow Area and minimize impacts to benthic habitat and commercial fishing activity in the Southern Borrow Area. Dredged material could not be used for the surface of the bird islands due to drainage concerns but could be suitable for placement at lower depths. Sandy material would still be required for the top elevations of the bird islands. This alternative would use material dredged from the Honga River Channel placed at depths for initial fill of the bird islands while reducing dredging for material in the Southern Borrow Area to the needs for containment, foundation replacement, and the top elevations of the bird islands. Utilizing Honga River Channel material in the bird islands is projected to reduce the impact area at the Southern Borrow Area to 25 to 30 ac.

After a thorough engineering review, it was decided that although it is technically feasible to place Honga River material in lower depths of the bird islands to offset material needs, this method of island creation would take considerably more time to dewater the dredged material due to its high fines content adding uncertainty to the construction timeline. Further, placing sand on top of fine-grained dredged material poses the risk of creating mud waves during placement and presents challenges to dewater and stabilize the surface. As a result of these risks, fine-grained dredged material is not recommended to be utilized for bird island development. As documented in the Barren Island sEA completed previously, the Honga River Channel dredged material will be used only for wetland development at Barren Island. Therefore, Alternative 6 is screened out from further consideration.

3.2.7 Alternative Comparison

The above sections discussed the evaluation of the screening criteria for each alternative as well as the feasibility of implementation. Table 7 compiles a summary of the alternative screening. The geotechnical investigation results (grain size and quantity) and habitat impacts feasibility

were the primary criteria used to compare the alternatives and select the preferred alternative. An alternative needed to be able to provide suitable material at the required quantity, either alone or in combination, for the project to meet the purpose and need. The geotechnical investigation results eliminated Alternatives 2 and 4 as they could not provide necessary quantities of suitable material. Feasibility concerns with regards to lengthened schedules and high costs eliminated Alternative 5. Feasibility concerns related to placing sand on dredged material, dewatering, and associated potential time needs to achieve suitable consolidation eliminated Alternative 6. Alternative 3 (Southern Borrow Area) is the only remaining actionable alternative capable of providing suitable material in the quantities needed without feasibility challenges that could delay or jeopardize achievement of project objectives. Selection of the No Action alternative would result in an incomplete project at Barren Island; therefore, the No Action alternative does not meet purpose and need.

The result of alternative evaluation and comparison is selection of Alternative 3 as the Preferred Alternative. Alternative 3 could provide all the required material, and avoid SAV and oyster habitat impacts, but would have a large impact to benthic habitat, approximately 40 ac within the 84.6 ac area of Focus Areas A and B, as well as disrupt commercial crab harvesting. [It is anticipated that only one of the Focus Areas would be needed, limiting the impact to ~40 ac.] For the impact analysis, an impact area of 40 to 50 ac is expected in the Southern Borrow Area.

Table 7. Comparison of Alternatives

	Alt 1: No Action	Alt 2: Northern Borrow Area	Alt 3: Southern Borrow Area	Alt 4: Honga River Channel	Alt 5: Land-based source	Alt 6: Site Combination
Material has suitable composition						
Foundation replacement	N	N	Y	N	Y	Y
Containment	N	N	Y	N	Y	Y
Bird Island Development	N	Y*	Y	Y*	Y	Y*
Quantity available meets needs	N	N	Y	N	Y	Y
Avoids/minimizes impacts to commercial fisheries						
Blue crabs	Y	N	N	Y	Y	N
Pound Nets	Y	Y	Y	Y	Y	Y
Oysters	Y	Y	Y	Y	Y	Y
Avoids/minimizes impacts to cultural resources	Y	NA	Y	Y	Y	Y
Avoids/minimizes impacts to habitats						
SAV	Y	N - direct	Y	N*	Y	Y
Oysters	Y	Y	Y	Y	Y	Y
Crabs - wintering habitat	Y	Y	Y	Y	Y	Y
Shallow-water habitat/benthics	Y	N	N	N*	Y	N
Maximum size of impact area	0	123 ac	40-50 ac	40 ac*	0	~25-30 ac
Feasibility/Constructability	-	No concern	No concern	Concerns	Concerns	Concerns
Cost	0	L	L	L	H	L

Y* = The site cannot provide material to the desired specification. Evaluation focused on whether dredged material could be placed at-depth in the bird islands.

N* = The Honga River channel has been repeatedly dredged in modern times. Therefore, impacts are to a previously impacted area and will occur regardless of the alternative selected when maintenance dredging occurs in 2025 (anticipated).
NA = Geotechnical investigations eliminated the Northern borrow area. Therefore, no cultural surveys were completed.
*40 ac = This impact will occur regardless of the alternative selected when maintenance dredging occurs in 2025 (anticipated).

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3.2.8 Preferred Alternative and Implementation

The Preferred Alternative would involve dredging approximately 300,000 cy of material from a the Southern Borrow Area within the bounds of Focus Area A and/or B. It is anticipated that Area B will be the preferred site and the impact area would be limited to approximately 40 ac, but the impact evaluation is completed for both areas A and B (85 ac). With input from resource agencies and commercial watermen, the Southern Borrow Area would be dredged to a depth of 5 feet (with +2 ft over depth) across approximately 40 acres to provide the needed material. Dredging would be conducted in a manner that provides a post-dredging bottom topography that mirrors the current topography to provide heterogeneity by removing an even depth across the existing bottom. Dredging of the borrow area is anticipated to occur in 2025 as part of the Barren Island Phase 2 construction. Material would be dredged for foundation replacement, bird island development, and the containment (geosynthetic tubes) associated with the wetland cells targeted for development. There is insufficient dredged material available from dredging the Honga River Federal channel to complete all wetland cell development (northeast, northwest, and south) with this dredging cycle. The south wetland cell will be developed first. Therefore, sand needed for northeast and northwest containment (geosynthetic tube development etc.) will not be dredged as part of Phase 2. The sand for those two wetland cells will be acquired at a future time, but are captured by the impact assessment in Section 4.

Based on feedback from local watermen, dredging is planned to occur in the fall/winter outside the primary crabbing season. The dredging plan for the initial dredging event calls for dredging of two 15-acre areas within Focus Area B to obtain sand for south cell containment, bird islands, and foundation replacement. USACE is proposing to leave a section (~300 ft wide, totaling ~ 10 acres) between the two dredged areas untouched by the first dredging event in 2024/2025. The first dredging event would acquire ~90% of the sand needed for the project from the two selected locations in Focus Area B. Depending on the consistency of the sand content of the dredged material and losses during construction, it is estimated that 20 to 30 acres would be impacted within these two areas during the first dredging event. Subsequent dredging at a future time would acquire sand from the central area that was not dredged during the initial event. At this time, this area would be in Focus Area B, but Focus Area A could be utilized based on future conditions and the preference of stakeholders/resource agencies. USACE will also continue to consider other means to acquire the remaining 10% of sand needed for the project at a future time, as compliant with the Mid-Bay NEPA assessments. It may not be cost-effective at that future time to dredge the quantity that remains to be needed. Other options that could be implemented are to source the sand from the borrow area within the James Island footprint (dredging impact accessed by the James Island sEIS) or reuse sand from prior containment efforts at Barren Island.

A monitoring plan to determine impacts and track the recovery of the benthic and fisheries communities post-dredging will be established and implemented. This plan will be developed through the Mid-Bay Monitoring Workgroup in partnership with resource agencies.

No time of year restrictions (TOYR) are applicable for dredging of the borrow area. Dredging is planned to occur between October and April to avoid prime commercial crabbing activity.

Sand from the southern borrow area will be hydraulically dredged and pumped through a high density polyethylene (HDPE) pipeline to the placement sites. The pipeline will be submerged, marked, and maintained in accordance with all U.S. Coast Guard requirements for navigational safety. It is expected that the pipeline will have a diameter between 12 and 24 inches. The pipeline will be removed as soon as practicable, upon completion of the dredging and placement activities. The pipeline needed for work associated with the northeast sill foundation replacement is expected to be the only pipeline route with portions that need to transit existing SAV beds. The dredging and use of the pipeline would occur in the fall and winter to avoid impacting SAV during its growing season, in alignment with the typical SAV TOYR which prohibits sediment/turbidity producing activities (dredging and material placement) in/near/within 500 yards of SAV bed from 15 April to 15 October. In the northeast, one pipeline will be needed to transport unsuitable fine-grained material dredged from the Northeast sill footprint to the southern wetland cell for placement. This pipeline would be expected to follow one of two pathways. The first would begin at the point of dredging and transit across Tar Bay and existing SAV beds, through the gap between the islands, and into the southern wetland cell. Alternatively, that route could be laid from the point of dredging, north around the island and down the western side of Barren Island to the southern wetland cell. A second pipeline would be needed to transport sand from the southern borrow area for foundation replacement and geosynthetic tube construction for the northeast sill. This pipeline would be expected to be laid from the borrow area, around the northern end of Barren Island, and through existing SAV habitat in Tar Bay until it reaches the northeast sill. The remaining pipelines for the northwest and southern wetland cells would be located fully in waters to the west of Barren Island to transport sand from the southern borrow area across shallow-water sand habitats to the respective cell to construct geosynthetic tubes. No portions of any pipeline will be laid on any parts of the existing Barren Island.

By letter dated December 5, 2023, MHT identified three areas within the southern borrow area that were not surveyed due to the presence of barges in the area during surveys. MHT recommended that these areas be excluded from dredging. USACE intends to comply with this recommendation. There were no exclusion areas identified in Focus Area B. However, if Focus Area A were to be used at a future time, there is an exclusion area within Focus Area A.

4 AFFECTED ENVIRONMENT AND IMPACTS EVALUATION OF PROPOSED ACTION (PREFERRED ALTERNATIVE)

The impact discussions for each of the resource topics below will focus on the maximum potential impacts, negative and positive, associated with utilizing the Southern Borrow Area (Alternative 3). Impacts analysis of the identified resources due to project placement operations was completed and presented in the previous Barren Island sEA completed in March 2022 well as the

2009 *Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & EIS* (FR/EIS) completed during feasibility (USACE, 2009).

4.1 Physical Environment

4.1.1 Climate

Barren Island and the proposed Southern Borrow Area exist within a temperate climate. Mild, windy winters and warm, muggy summers are characteristic of the weather in the Dorchester County region of Maryland. U.S. Climate Data shows that the average annual high temperature in Cambridge, Dorchester County, is 69 degrees Fahrenheit, while the average annual low temperature is 48 degrees Fahrenheit. Mean annual precipitation for Cambridge, Dorchester County is 46 inches, with August being the wettest month and February being the driest month (U.S. Climate Data, 2023).

Impacts: No impacts to climate are anticipated as a direct effect of the Project.

4.1.2 Substrate and Sedimentation

The proposed Southern Borrow Area is a broad, relatively flat area west of Barren Island and east of the mainstem Bay channel with water depths ranging between -8 and -16 ft NAVD88. Preliminary geotechnical investigations indicate that the borrow area consists of poorly graded fine sand with silt. Tables 4 and 5 in Section 3.2.3 describe the substrate material within the focus A&B areas. Focus Area B contains less fine material than Focus Area A. Currently, no new sediment modeling has been performed for the proposed borrow area, but during the Feasibility phase, modeling (Dinicola et al.2006) has shown that storms are the primary force behind appreciable sediment movement in the Barren Island area. Calculated bottom elevation change was negligible under normal tide condition as compared to storms. Normal tide conditions are associated with rather weak tidal currents. During the 2020-2021 Barren Island water quality surveys, locations BI-WQ-01, BI-WQ-02, BI-WQ-03, and BI-WQ-04 were closest to the Southern Borrow Area. Determined from the 2020-2021 Barren Island water quality surveys, the locations within the vicinity of the Southern Borrow Area had turbidity levels ranging from 1.4 to 13.3 NTU.

Impacts: Implementation of the preferred alternative would have direct short-term and long-term impacts to the Southern Borrow Area. The dredging of material to support the construction of the Barren Island restoration project would remove approximately 5 ft of material depth plus 1 – 2 ft overdepth, thereby increasing local water depths by -5 ft (plus a maximum of -2 ft) NAVD88. The period for substrate to return to current conditions is undetermined. A shallow dredging depth is targeted to minimize the amount of time for the dredged area to return to existing depths. During the dredging process there would be a temporary increase in turbidity during construction, but this would cease when construction is complete. Since the substrate is primarily sand, disturbed sediments would be expected to settle out of the water column within the general project area. Sand is not expected to become entrained in the water column and disperse as far as fine-grained sediment would following disturbance. Water quality and turbidity

monitoring would be performed prior to, during, and post-construction in accordance with the issued permits. Additional measures would be utilized as required to protect natural resources.

4.1.3 Bathymetry

On average, the Chesapeake Bay is approximately 21 ft deep. A few deep troughs run along most of the Bay's extent and are assumed to be remnants of the Susquehanna River. According to a survey performed by Maryland MES in 2023, water depths around the Southern Borrow Area vicinity range from -8 to -16 ft NAVD88 (Figure 10). The study concluded that the bathymetry around the east and south sides of the borrow area is shallower than the rest of the Southern Borrow Area. Bathymetry for Focus Area A is typically greater than -14.3 ft NAVD88. The mean depth of Focus Area A is -15 ft NAVD88 with depths ranging from -13.5 to -15.9 ft NAVD88. Focus Area B is shallower than focus area A with depths ranging from -15.5 to -8.7 ft NAVD88, and a mean of -12.7 ft NAVD88. Most depths in Focus Area B range between -11.5 to -13.6 ft NAVD88.

Impacts: Dredging of the Southern Borrow Area would have a direct and long-term effect to the depth of the waters in the immediate area until a future time when the area shoals to depths similar to existing conditions. Where dredging occurs in focus areas A and/or B, water depths would be increased by 33 1 – 2+/- ft NAVD88. It is anticipated that the Preferred Alternative would limit impacts to 25 to 30 acres in Focus Area B.

4.1.1 Sea Level Rise

According to the Mid-Bay Feasibility Report (USACE, April 2009), water levels at the borrow areas are predominately driven by astronomical tides; however, other factors such as sustained wind (i.e., fetch), freshwater inflow, runoff, and strong tides driven by storms can also affect water levels.

Impacts: Sea level rise would not be affected by implementation of the project. However, it is anticipated that water depths in the borrow area will gradually increase with future sea level rise.

4.1.2 Currents

Within the Southern Borrow Area currents typically do not exceed 0.7 knots (Shelter Island Mapping Company). Changing the bathymetry by 5 feet across the borrow area is not anticipated to affect current patterns.

Impacts: The dredging of material will not have any impacts to current patterns.

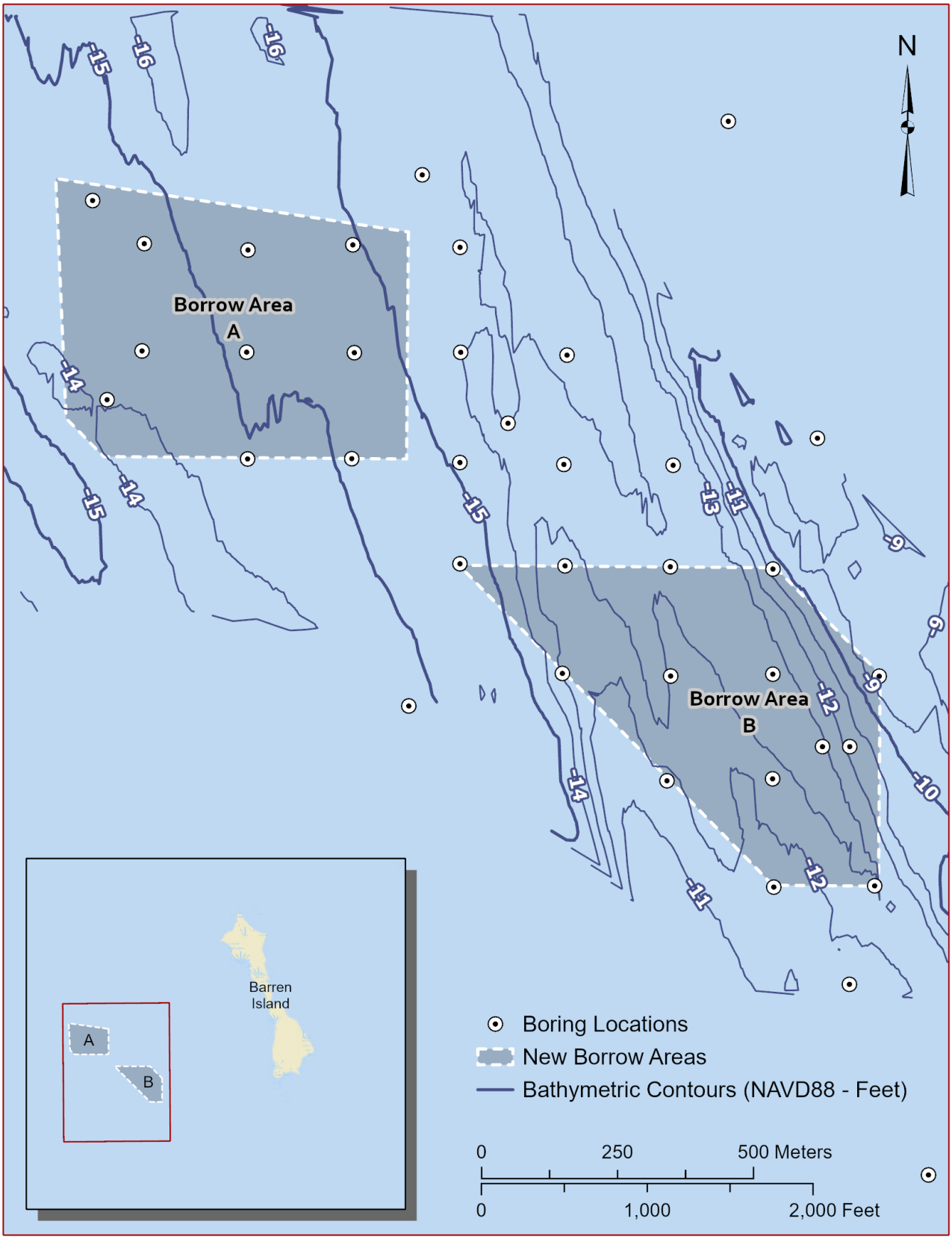

Figure 10. Southern Borrow Area Bathymetry

4.2 Water Quality

Surface water sampling was conducted at 11 locations around Barren Island in the summer (September) and fall (October) of 2020, and winter (March) and spring (May) of 2021. A full description of the methods and results of the samples taken at all sampling events is available in Appendix A6 (Anchor QEA, 2022). Of the 11 locations, sites BI-WQ-01, BI-WQ-02, BI-WQ-03 and BI-WQ-04 were in the vicinity of the Southern Borrow Area. BI-WQ-03 is the closest to the Southern Borrow Area and specifically to Focus Area B. A water quality meter was used to measure water temperature, salinity, dissolved oxygen (DO), turbidity, and pH (Table 8). The measurements were recorded at the surface, mid-depth, and bottom (within 1 meter) of the water column at each location. In addition, water samples were analyzed for total dissolved nitrogen, total dissolved phosphorous, orthophosphate, particulate phosphorous, particulate carbon, dissolved organic carbon, total nitrogen, total phosphorous, chlorophyll *a*, Phaeophytin *a*, and total suspended solids. Sampling results from the summer, fall, winter, and spring monitoring events are provided in the Mid-Chesapeake Bay Island Ecosystem Restoration Project Environmental Surveys Sampling and Analysis Report (Appendix A6, Tables 3-1 and 3-2) (Anchor QEA, 2022).

Lowest salinities typically occurred in the spring, with mean salinity of 11.8 ppt, and highest salinity occurs in fall with mean monthly salinity of 16 ppt. Sampling conducted in 2020 and 2021 recorded a salinity range of 11.3 to 16.3 (MPA 2021). Water temperature ranged from 43.2°F to 77.5 °F, with an average of 63.9°F. Warmer water temperatures were generally recorded during the summer (ranging from 58.5°F to 77.5°F) and coolest water temperatures recorded during the winter (43.2°F to 44.4°F).

DO concentrations varied seasonally. DO concentrations tend to be lower in the summer compared to the winter because warm water has less ability to hold DO than cold water. The lowest DO levels were measured during the summer season (7 milligrams per liter [mg/L]) and maximum DO levels were measured in the winter (12.5 to 12.9 mg/L). During all seasons, DO values were greater than 5.0 mg/L, which is considered healthy and allows the Chesapeake Bay's aquatic system to thrive.

Detectable nutrients were present in low concentrations; furthermore, ammonium and orthophosphate were not detected in most surface water samples. Overall, there was little variability in nutrients between sampling location and season.

In compliance with the Clean Water Act and the State of Maryland permitting process, the MPA as the non-federal sponsor will apply for a Water Quality Certificate (WQC) for USACE and MPA, as well as a Tidal Wetlands License. A Section 404(b)(1) evaluation was completed for the placement of the material to be dredged by the proposed action as part of the Mid-Chesapeake Bay Islands Barren Island Restoration Project sEA completed in March 2022 and is provided as Appendix C3.

Table 8. Water Quality Parameters
(Station BI-WQ-03 is closest to the preferred borrow area)

Season	Sample ID	Water Depth (feet)	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Turbidity (NTU)
Summer	BI-WQ-01	6	25.1	7	13	8.2	8.7
Summer	BI-WQ-02	4.5	25.3	7	13.3	8.3	4.8
Summer	BI-WQ-03	4.5	24.6	7	12.8	8.2	13.3
Summer	BI-WQ-04	4	24.7	7	13	8.2	10
Fall	BI-WQ-01	11	19.5	8.5	15.9	8.1	3.6
Fall	BI-WQ-02	7.5	19.9	8.6	16.3	8.2	1.4
Fall	BI-WQ-03	8.2	19.5	8.5	15.9	8.1	3.8
Fall	BI-WQ-04	8.7	19.6	8.6	15.9	8.1	1.9
Winter	BI-WQ-01	11.8	6.9	12.5	13.4	8.2	3.5
Winter	BI-WQ-02	9.1	6.2	12.9	13.8	8.2	2.3
Winter	BI-WQ-03	8.9	6.9	12.6	13.5	8.2	2.9
Winter	BI-WQ-04	7.2	6.5	12.6	13.6	8.2	2.8
Spring	BI-WQ-01	10.8	22.1	9.2	11.3	8.4	2.0
Spring	BI-WQ-02	8.8	22.1	8.8	11.7	8.3	1.5
Spring	BI-WQ-03	8.2	23.0	8.7	11.6	8.3	2.9
Spring	BI-WQ-04	7.5	24.7	7.5	12.6	7.8	5.3

Impacts: Implementation of the preferred alternative would have direct, short-term negative impacts on water quality. It is likely that nutrients would be released and turbidity increased during dredging, which could also reduce DO levels. These impacts would be expected to cease with the completion of dredging. Water quality and turbidity monitoring will be performed prior to, during, and post-construction in accordance with any issued permits. Implementation of the preferred alternative and subsequent placement of dredged material would have a direct and positive long-term impact on water quality in the near-shore environment by reducing and eliminating erosion and associated sedimentation, turbidity, and nutrient inputs.

4.3 Aquatic Resources

Survey locations located within the vicinity of the Southern Borrow Area are discussed in this section and depicted on Figure 11. Benthic sampling was conducted specifically within the Southern Borrow Area. Descriptions and results of surveys conducted outside of, but within the vicinity of the preferred borrow location are located and discussed in the 2022 Sampling and Analysis Report (Anchor QEA, 2023) (Appendix A1).

4.3.1 Oysters

Within the vicinity of the borrow areas there are "natural oyster bars" (legal NOBs), Maryland historic oyster bars, and Yates Bars (Figure 12). The legal NOBs were formally adopted in 1983 to simplify complex oyster bar boundaries of historic oyster bar locations and to identify where legal oyster harvests are allowed. Maryland historic oyster bars are defined as the oyster bar boundaries where watermen have traditionally harvested oysters for centuries (MDNR, 2021). Yates Bars are oyster bars that were surveyed and named between 1906 and 1911 (MDNR, 1997). There is often overlap between the various oyster boundaries. Legal NOB 23-Maryland historic oyster bars within the vicinity of Barren Island include Stone Pile, Great Bay, Tar Bay Channel, Dry Rock, Tar Bay, Possum Island, and White Wood. The closest bar to the project is Great Bay, a Maryland historic oyster bar. Additionally, there are two oyster aquaculture sites southeast of the project area greater than 9,000ft away.

Impacts: As communicated by DNR via letter dated October 31, 2023, TOYR exist for projects within 500 yards of oyster habitat to protect oyster resources from dredging impacts (Appendix B2). The Southern Borrow Area is outside 500 yards of all oyster bars in the vicinity and does not necessitate TOYR. No impacts to oysters are expected from implementation of the Preferred Alternative.

4.3.2 Benthic Macroinvertebrates

The benthic macroinvertebrate assemblage in the Southern Borrow Area is typical of mesohaline, shallow Bay waters. Water depths of the proposed borrow area range between 8 to 16 ft and consists mainly of fine silty sand with limited extents of silt and clays. Benthic macroinvertebrate sampling for the borrow area occurred in July 2022. A complete description of benthic sampling locations, sample dates, and measured water quality parameters is provided in Appendix A1

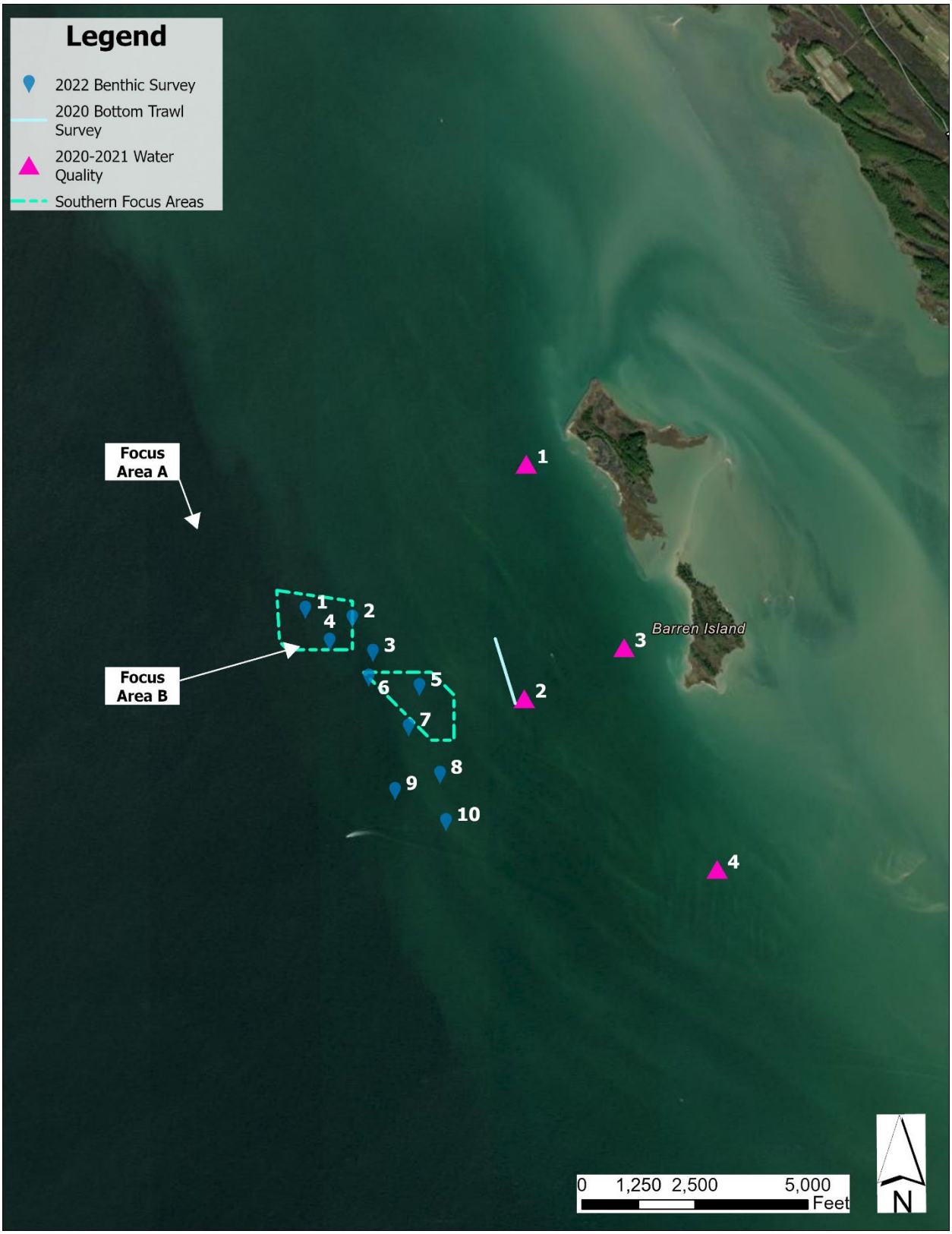

Figure 11. Benthic and Fish Sampling Locations in the Vicinity of the Southern Borrow Area

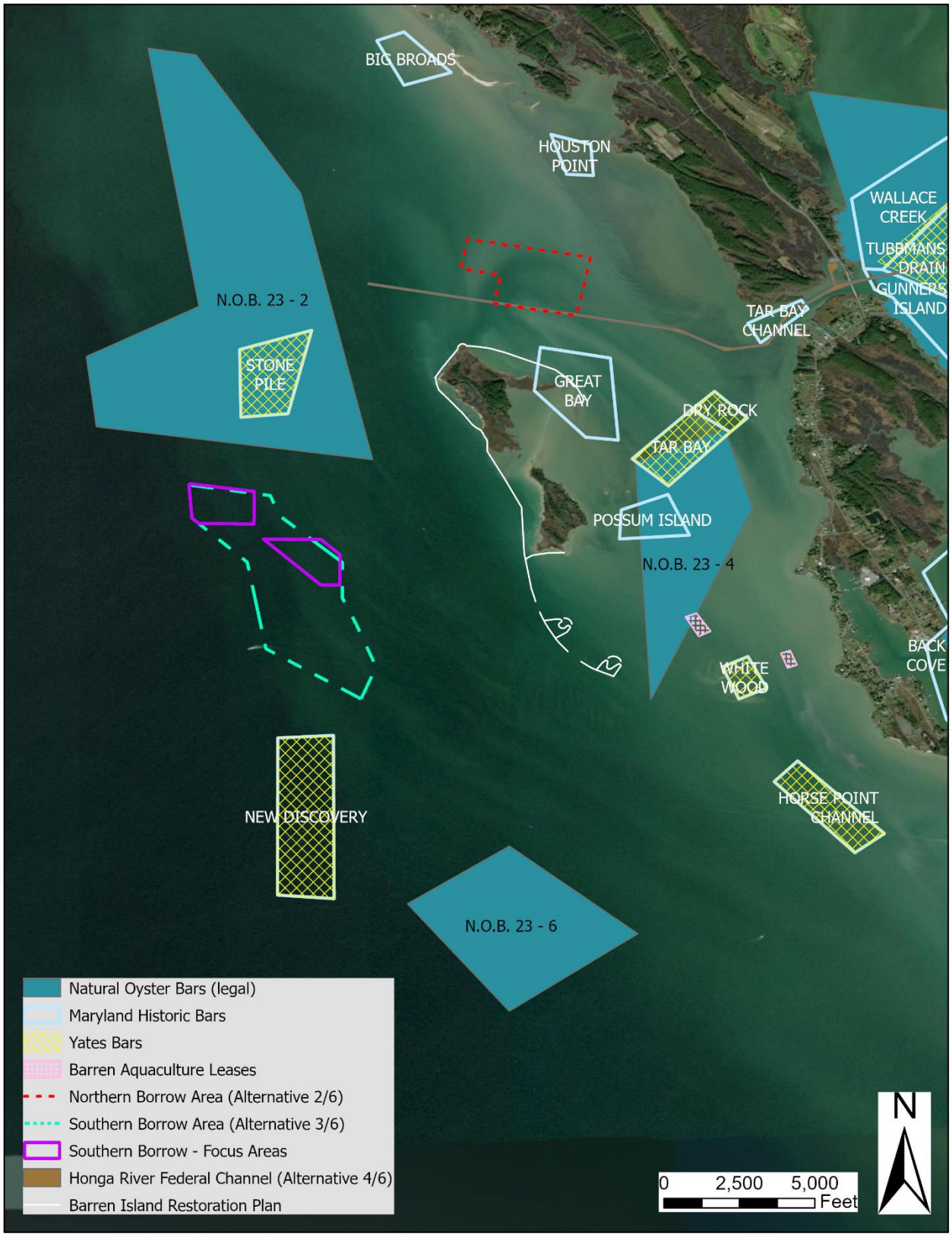

Figure 12. Oyster Bars in the Vicinity of Barren Island

(Anchor QEA 2023, Tables 1 and 2). Specifically, Focus Area A included benthic surveys SSB-01 and SSB-02, while Focus Area B includes SSB-05. Community composition, abundance, and diversity were analyzed and documented for each sample. Additionally, grain size and total organic carbon of sediment samples were determined during the summer seasonal monitoring and sampling event.

4.3.2.1 Habitat Classification

The Nature Conservancy was funded by NOAA to develop an Ecological Marine Unit classification for the Chesapeake Bay bottom (TNC 2015). The borrow area is classified as Cluster 2 based on bathymetry, percent mud, dissolved oxygen, and salinity. The typical assemblage of Cluster 2 is illustrated in Table 9; 11 of the 19 species of the Cluster 2 assemblage were confirmed to be present. Based on this classification, and confirmed by sampling, the assemblage of the proposed borrow area is dominated by small mollusks and worms.

Table 9. Cluster 2 Assemblage

Scientific name	Common name	Confirmed Presence within Southern Borrow Area by Sampling
Marenzelleria viridis	Acorn worm	X
Saccoglossus kowalevskii	Carnivorous flatworm	
Stylochus ellipticus	Oyster flatworm	X
Leitoscoloplos fragilis	worm	X
Leptosynapta tenuis	White synapta	
Lyonsia hyalina	Glassy lyonsia	X
Sayella chesapeakea	minute seas snail/gastropod mollusk	
Streblospio benedicti	Barred-gilled mud worm	X
Spiophanes bombyx	worm	X
Macoma mitchelli	Mitchell macoma mollusk	
Paraonis fulgens	worm	X
Mulinia lateralis	Dwarf surfclam	X
Heteromastus filiformis	Capitellid thread worm	X
Glycinde solitaria	Chevron worm	
Glycera dibranchiata	polychaete worm	X
Scolelepis texana	worm	
Gemma	Amethyst gem clam	X
Haminoea solitaria	Solitary glassy-bubble snail	
Micrura leidyi	Red ribbon worm	

4.3.2.2 Benthic Community Composition and Metrics

A taxonomic list and abundance (number per square meter) of the benthic fauna collected at the borrow area during benthic sampling in the July 2022 survey is provided in Appendix A1 (Anchor QEA 2023, Tables 7 and 8). A total of 23 unique benthic taxa were collected. Bivalves (specifically

Ameritella mitchelli, *Gemma*, and *Mulinia latera*lis) and polychaetes (specifically *Alitta succinea*, *Mediomastus ambiseta and Polydora cornuta*) were the dominant taxa in the Southern Borrow Area. Within Focus Area A, survey locations SSB-01 and SSB-02 contained 21 and 17 unique taxa, respectively. The dominant species within SSB-01 was *Glycinde multident* (81 individuals), while SSB-02 was dominated by *Ameritella mitchelli* (62 individuals). Within Focus Area B, SSB-05 contained 20 unique taxa with *Mediomastus ambiseta* (147 individuals) being the dominant species.

Six metrics were used to describe the overall characteristics of the benthic community at the borrow area—total abundance, unique taxa collected, species richness, species evenness, Simpson's Dominance Index, and the Shannon-Wiener Diversity Index. Results are provided in Appendix A1 (Anchor QEA, 2023, Table 6). Based upon these matrices, it was concluded that the Southern Borrow Area contained a diverse benthic community.

4.3.2.3 Chesapeake Bay Benthic Index of Biotic Integrity

The total Benthic Index of Biotic Integrity (B-IBI) score for each location is derived by averaging individual scores for each of the six metrics. A summary of the benthic community metrics and scores used to calculate the Chesapeake Bay B-IBI are presented in Appendix A1 (Anchor QEA 2023, Table 10). Only species that met the Chesapeake Bay B-IBI macrofaunal criteria (Versar 2002) were included in the calculation. The B-IBI was derived using data for warmer months and is only indicated for the summer season.

Ninety percent (9 of 10) of the sampling locations within the Southern Borrow Area vicinity met restoration goals. Site SSB-09 (degraded) was the lone site that did not meet restoration goals. B-IBI scores of the sites designated as meeting restoration goals ranged from 3 to 3.67, while the degraded site score was 2.67. These scores were compared to the data from the 2015 through 2021 Chesapeake Bay Benthic Monitoring Program (Anchor 2022, Table 11). In general, the B-IBI scores from the proposed Southern Borrow Area graded slightly higher and would be considered a healthy benthic ecosystem. Within Focus Area A, survey locations SSB-01 and SSB-02 B-IBI scores were 3 and 3.67 respectively. Within Focus Area B SSB-05, the B-IBI score was 3.

Impacts: There would be direct, multi-year (2-3 years) negative impacts to benthic macroinvertebrate habitat within the proposed borrow area. Although there is a potential to impact benthic habitats throughout the 85 acres within Focus Areas A and B, dredging is expected to impact 25 to 30 acres within Focus Area B. From that area and the Honga River Channel, approximately 258,000 cubic yards of material would be dredged for use in the Barren Island restoration project. As a result of dredging, current habitat and non-motile species within the dredging footprint would be destroyed while mobile species are expected to move from the area. Comparable organisms would likely recolonize the channel within a short period-3 years if not sooner (Newell, 1998; Michel et al., 2013). Recovery has been found to be dependent on the type of sediments dredged (assemblages in sand recover faster than those in mud), the successional status of the species within the benthic assemblage (opportunistic assemblages recover faster than longer-lived equilibrium assemblages), the timing of the dredging with respect to the life

cycles for reproduction of benthic species, the hydrodynamic regime of the dredged area, and depth of dredging (shallower depths recover faster than deeper dredged areas) (Michel et al., 2013). All factors related to the Southern Borrow Area suggest that recovery will occur within the anticipated 2-3 years (Newell, 1998; Michel et al., 2013).

The benthic assemblage is dominated by worms and small bivalves (opportunistic species,), the Southern Borrow Area would be dredged to shallow depths, the area is situated in a dynamic environment with respect to hydrodynamics, and dredging would be conducted in sandy substrates. Areas adjacent to the footprint of the preferred alternative would likely experience a short-term, minor, and direct negative impact characterized by increased turbidity, reduced dissolved oxygen, and possibly a small increase in nutrients as bottom sediments are disturbed during construction. This impact would be expected to subside following the completion of borrow activities. Water quality and turbidity monitoring will be performed prior to, during, and post-construction in accordance with any issued permits. Additional measures will be utilized as required to protect natural resources.

Benthic invertebrates could also be negatively impacted by placement of the pipeline to transport dredged material on the Bay bottom. The pipeline will only be present in the project area as needed between 16 October to 14 April. The pipeline would be moved as needed to deliver dredged material to the various project locations at Barren Island, and therefore is expected to be positioned along a certain pathway for a period no longer than a few weeks at a time. The pipe is expected to be 12 to 24 inches in diameter. The footprint on the bottom would be no more than that width. Immobile benthic invertebrates within the pipeline footprint could be smothered or buried. As the duration of impact is short-term (weeks), the areas are expected to recolonize during the next growing season. Mobile benthic invertebrates would be expected to move away from direct impacts. The pipeline would only be in place during dredging activities in colder months which should limit the benthic assemblage impacted.

4.3.3 Fish

Fishing and bottom trawl surveys were employed to characterize the fish community in the waters around Barren Island. An initial survey was conducted in the summer and fall of 2002 and the winter and spring of 2003 for fish and crab species in the proximity of Barren Island. The results are provided in the 2009 Barren Island Feasibility Report (USACE 2009). Updated surveys were completed in the summer and fall of 2020, as well as winter and spring of 2021 within the proximal waters around Barren Island. Of the surveys, one bottom trawl location, FT-03, was within proximity to the Southern Borrow Area (Figure 11). Table 10 provides the total number of species caught during all fishing trawl surveys and specifically FT-03. A complete description of the methodology, species, size, and other sampling results can be found in Appendix A6 (Anchor QEA, 2022).

Table 10. Bottom Trawl Survey Results

Species		Comprehensive 2020-2021 Bottom Trawl Surveys			Bottom Fishing Trawl FT-03		
		2020 Survey		2021 Survey*	2020 Survey		2021 Survey*
Scientific Name	*Common Name*	*Summer*	*Fall*	*Spring*	*Summer*	*Fall*	*Spring*
Anchoa mitchilli	Bay anchovy	0	15	70	0	1	0
Symphurus plagiusa	Blackcheek Tonguefish	3	0	0	0	0	0
Callinectes sapidus	Blue Crab	3	4	1	0	0	0
Dorosoma cepedianum	Gizzard Shad	0	1	0	0	1	0
Leiostomus xanthurus	Spot	2	0	29	0	0	0
Urophycis regia	Spotted Hake	0	0	1	0	0	0
Peprilus triacanthus	Butterfish	0	0	1	0	0	0
Cynoscion regalis	Weakfish	1	0	0	1	0	0
Total Individuals		**9**	**20**	**102**	**1**	**2**	**0**
Total Number of Species Caught		**4**	**3**	**5**	**1**	**2**	**0**
*No fish were captured using the Bottom Trawl method in Winter 2021							

Bottom trawling, which involves dragging or towing a net at the very bottom of the sea floor to capture benthic and aquatic species, was another sampling method utilized within the project vicinity. Two separate 5-minute otter trawl tows were conducted at each location. The total number of organisms collected during the two trawl tows were summed up to represent 10 minutes of total effort at each station. During the 2020-2021 bottom trawl survey, 8 different species were caught. The spring 2021 survey resulted in the greatest number of individuals collected and the highest diversity. However, during this time no individuals were collected in the vicinity of the Southern Borrow Area.

Impacts: Implementation of the preferred alternative would have a direct, short-term, and minor negative impact on fisheries in the vicinity of the Southern Borrow Area. Species affected are mobile and would be expected to vacate the project area during construction. These impacts would cease when construction is over. Indirect, short-term, and minor negative impacts could result from disruptions to foraging during construction due to increased turbidity and the possibility that prey may move from the area.

4.3.4 Bivalves

Two commercially important clams, soft-shell and razor clams, are found in the vicinity of Barren Island and the borrow area. Bivalve surveys were conducted at four locations around Barren Island on December 14, 2020. Four transects approximately 100 to 200 m in length were surveyed. Soft-shell and razor clam surveys identified razor clams as more prevalent than soft-shell clams. Survey results as well as water quality parameters, including temperature, DO, salinity, and pH, were measured at each transect and are provided in Appendix A5 (Anchor QEA, 2022, Table 3-17).

Four hydraulic surveys located between Barren Island and the Southern Barrow Area identified a combined total of 15 legal soft-shell clams (no soft-shell clams less than 2 inches in length were identified), 267 razor clams, and 25 oysters. There were no locations in the Barren Island survey with a productive natural clam bar ranking as defined by the Maryland Code of Regulations (COMAR) 08.02.08.11 criteria (producing 500 hard-shell clams per hour, one-half bushel of soft-shell clams per hour, or one-half bushel of razor clams per hour).

Impacts: Minor impacts are possible to razor or soft-shell clams as a result of implementation of the preferred alternative. These species are not anticipated to be in the waters where the preferred alternative would be implemented.

4.3.5 Commercially Important Species and Commercial Fisheries

The Chesapeake Bay is the location of one of the leading fishing industries in the world. The fishing industry is a key component to local and national economics by providing for jobs and tourism. Data available from NOAA for 2021 identify Maryland's commercial harvest landings were valued at $68,894,794 an increase from $68,024,899 in 2020 (NOAA 2023). According to the 2020 Fisheries Economics of the U.S. report by NOAA (most recent year available) Maryland ranked third in the Middle Atlantic region for employer firms in the seafood retail section (76), behind New York (370) and New Jersey (111) (NMFS, 2020). The total landings revenue (with imports) supported 20,915 jobs and $3,437,255 in sales (NMFS, 2020). Commercially and recreationally important finfish species identified during the 2020 fisheries surveys include blue crab (*Callinectes sapidus*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic silverside (*Menidia menidia*), Bay anchovy (*Anchoa mitchilli*), and striped bass (*Morone saxatilis*) (Anchor, March 2021), along with Eastern oysters (*Crassostrea virginica*). The oyster fishery, including shellfish aquaculture, is also import in the vicinity of Barren Island.

4.3.5.1 Blue Crabs

The waters around Barren Island are a prime crab harvesting area. Crab harvesting is primarily conducted using crab pots. There is very little trot lining for crabs in the waters around Barren Island. Crab pot surveys conducted during the feasibility study are summarized in the 2009 Feasibility Report (USACE 2009). Updated crab pot surveys in the vicinity of Barren Island were conducted in August 2020, September 2020, May 2021, June 2021, and July 2021. The survey area included the Barren Island Project restoration area with an additional 0.25-mile perimeter.

While the Southern Borrow Area was not specifically included in these surveys the area is used by commercial crabbers and the surveys are viewed as typical of crab harvesting effort in the Southern Borrow Area. The completed crab pot surveys are representative of the high crab pot volume in the vicinity of Barren Island and the Southern Borrow Area. The goal of the survey was to document visible buoys marking the location of high use pots with GPS coordinates. Survey results are summarized in Table 11 of the Barren sEA (March 2022). Complete results and maps are available in Appendix A5 (Anchor QEA, 2022, Figures 3-1 to 3-5). With regards to crab overwintering habitat, the location of the Southern Borrow Area consists of hard, sand bottom, which is unsuitable overwintering habitat for blue crabs. Recent winter crab studies have detected no wintering blue crabs in the South Borrow Area (MDNR, personal communication).

Impacts: Dredging is planned to occur between October and April to avoid prime commercial crabbing activity and impacts to blue crabs. Negative impacts to blue crabs are anticipated to be minimal as a result of implementing the preferred alternative during the fall and winter months. The composition of the Southern Borrow Area contains unsuitable overwintering habitat for blue crabs. As the weather warms in the spring, it would be expected that any blue crabs within the area during dredging would relocate to adjacent areas. Considerations to minimize impacts to commercial crabbers were developed through outreach with the local watermen. The dredging plan has been designed to minimize the spatial extent of dredging impacts while maintaining a shallow dredging depth.

Construction is expected to cause a short-term disruption to crab harvesting activity based on proximity of crab pots to construction activities including the pipeline pathway, but this is minimized by dredging in the fall and winter. Crabbers who utilize the Bay bottom within the footprint of the Southern Borrow Area and along the pipeline pathways would be displaced from those fishing areas during construction. It is expected that the crab harvesting activity would relocate to other locations in the region during dredging and return following dredging. Crabbing activity may be less productive until the site returns to pre-dredging conditions. Comparable benthic organisms are expected to recolonize the channel within approximately 2-3 years.

4.3.5.2 Pound Nets

Pound nets have been used by commercial fisherman in the Barren Island vicinity. There are two registered pound nets within the vicinity of the borrow area. Both pound nets are currently not active.

Impacts: As none of the pound nets within the proposed borrow area are identified as being active by MDNR, no impacts to current pound net activity are expected. If the pound nets were active, dredging would be expected to disrupt fish activity. This impact would cease once dredging was complete. If the pound nets were active, the altered bathymetry may affect fish activity and alter historic production levels from the pound nets until the site recovers.

4.3.6 Essential Fish Habitat

"Pursuant to Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation & Management Act, the Corps of Engineers is required to prepare an Essential Fish Habitat (EFH) Assessment for all proposed actions that occur within coastal waters of the United States" (Magnuson-Stevens, 2007). EFH includes habitats such as wetlands, reefs, seagrass, rivers, and coastal estuaries that fish can spawn, breed, feed, and grow to maturity (USFWS 2021). Prior coordination with NMFS during the 2009 Feasibility Report, in 2017 to complete the Record of Decision, and during the current project phase, identified that the proposed project lies within waters designated as EFH for the following species and their life stages:

- Windowpane flounder (*Scopthalmus aquosos*), juvenile and adult stages;
- Bluefish (*Pomatomus saltatrix*), juvenile and adult stages;
- Summer flounder (*Paralicthys dentatus*), larvae, juvenile and adult stages;
- Atlantic butterfish (*Peprilus triancanthus*), eggs and larvae stages;
- Black sea bass (*Centropristus striata*), juveniles and adults;
- Scup (*Stenotomus chrysops*), juveniles and adults; and
- Clearnose skate (*Raja eglanteria*), juveniles and adults.

Sampling during the feasibility study and the current project phase has provided information on the presence of these species in the Barren Island vicinity. Although no butterfish of any life stage were identified in the 2002 – 2003 sampling, updated seasonal fish surveys in 2020 – 2021 document the presence of one Atlantic butterfish in spring 2021 bottom trawl sampling. Bluefish juveniles and adults were among the most frequently caught fish in Barren Island waters in sampling conducted for the study in 2002 – 2003. Several bluefish were caught in summer 2020 and spring 2021 sampling. The 2002 – 2003 fish surveys identified summer flounder as a minor component (0.06%) of the fish community in the vicinity of Barren Island (MPA, 2005) (no larvae, 10 individuals in summer sampling), but no summer flounder were detected in 2020 – 2021 sampling. No black sea bass, scup, windowpane flounder, or clearnose skate were captured in any sampling conducted for the project.

The full EFH Assessment is provided in Appendix C1. Based upon EFH habitat preferences and documented occurrences, potential effects to summer flounder EFH are of principal importance for this assessment to ensure compliance with the Magnuson-Stevens Fishery Conservation and Management Act, followed by potential effects to bluefish EFH.

Impacts: Fish surveys of the borrow areas waters found no summer flounder in the most recent survey; and no black sea bass, scup, windowpane flounder, or clearnose skate were captured in any sampling conducted for the project (feasibility and PED). Although EFH has been designated in the Barren Island vicinity, the fish surveys indicate minimal use of the area by black sea bass, scup, windowpane flounder, clearnose skate, and summer flounder. Potential project effects upon these Federally-managed species is expected to be of minimal or negligible concern.

Potential project effects upon these species for which the Barren Island area does not likely constitute EFH are of minimal or negligible concern with respect to the Magnuson-Stevens Act.

Additionally, NMFS identified several additional species that are not federally managed but are of concern to the agency due to their ecological, economic, and/or historical value. These estuarine-resident prey species play an important role in estuarine food web dynamics and have occurred in the project area. These species include sheepshead minnow, striped bass, and menhaden. While the 2020 – 21 surveys did not document the presence of these species within the project area, they were present in the surveys completed during the 2009 feasibility study. Construction could have short-term, negative impacts to these species through temporary disruption of available habitat and displacement to another nearby habitat. Alterations to prey species could have short-term, negative impacts to predator species. These impacts would be expected to end once dredging activities are completed.

Following coordination with NMFS, USACE-Baltimore has determined that the proposed action would have an adverse effect on EFH, Habitat Areas of Particular Concern (HAPC, or on species with designated EFH in the project area). Direct, secondary, and cumulative impacts to EFH, associated species, and HAPC would occur in the near-term as a result of dredging activities. The direct effects to EFH are temporary as benthic microorganisms are expected to recruit from neighboring areas and recolonize the dredge areas. The impacts are anticipated to end once dredging is complete. However, in the long term, the Preferred Alternative would enable completion of the Barren Island restoration project and provide for the preservation of Barren Island, its wetlands, and SAV habitat, with subsequent value to fisheries resources. Further, the restoration project could enhance some habitat features for species managed under the Magnuson-Stevens Act by incorporating tidal access in the restored wetlands design, including a diversity of structured habitats, incorporating oysters, and providing a continuity of refugia for aquatic species.

4.3.7 Rare, Threatened and Endangered Species

Extensive biological surveys have been performed and described in previous sections to prepare for the Barren Island Project and to protect and preserve threatened and endangered species (T&E). USACE consulted with Federal and state agencies including USFWS, NMFS, and MDNR on the potential impacts to rare, threatened, and endangered species. Coordination and consultation with USFWS and NMFS began in 2002 for the 2009 FR/EIS. Since the publishing of the EIS, ongoing coordination with USFWS and NMFS began in 2017 to enable the ROD to be signed in 2019. Coordination was reinitiated for the 2022 supplemental Environmental Assessment of the Mid-Chesapeake Bay Island Ecosystem Restoration Project at Barren Island. During both coordination efforts, the project was considered to have no substantial adverse effects on rare, threatened, and endangered species. USFWS has provided a draft Planning Aid Report (PAR) that identifies species utilizing the habitat within the project area (Appendix C2, *Draft Planning Aid Report: Mid-Chesapeake Bay Island Ecosystem Restoration Project*) (USFWS

2021). Several T&E species were identified through the USFWS Information for Planning and Consultation (IPaC) report, the PAR, and NMFS's response to coordination letters:

- Atlantic Sturgeon (*Acipenser oxyriynchus oxyriynchus*),
- Shortnose Sturgeon (*Acipenser breviorstrum*)
- Green Sea Turtle (*Chelonia mydas*),
- Kemp's Ridley Sea Turtle (*Lepidochelys kempii*),
- Leatherback Sea Turtle (*Dermochelys coriacea*), and
- Loggerhead Sea Turtle (*Caretta caretta*).

Surveys conducted in 2020 and 2021 did not identify the presence of any listed species within the project area.

Impacts: No impacts to rare, threatened, or endangered species are expected as a result of implementing the preferred alternative. USFWS has concurred with USACE's determination that the project is not likely to adversely affect endangered species. Upon reviewing the draft sEA, NOAA determined that it is not necessary to reinitiate ESA coordination with their agency for the project because the project description has not changed, there are no new listed species, and there is no overlap between designated critical habitat and the action area.

4.3.8 Marine Mammals

Marine mammals such as bottlenose dolphins (*Tursiops truncates*) are frequent visitors to the Chesapeake Bay. They spend most of their lives along the Atlantic Coast but will make frequent visits to the Bay during the summer months and have been documented as early as February. Researchers have identified nearly 2,000 individual dolphins within the Potomac River, beginning in 2015. Groups such as the Potomac-Chesapeake Dolphin Project identify and catalogue dolphins by their dorsal fins and have even witnessed the first dolphin birth in the Potomac River in 2019. Scientists now believe the Bay could be providing a habitat to protect dolphins from predators and provide a place for mating, birthing, and caring for calves. The most frequent dolphin sightings have been along the lower to middle Bay shorelines and at the mouths of the Potomac, Rappahannock, and York Rivers (Pipkin, 2021).

Impacts: No impacts to marine mammals are anticipated. Any bottlenose dolphins and their fish prey species would be expected to leave the project area during the period of dredging disturbance.

4.3.9 Submerged Aquatic Vegetation

SAV beds are extensive in Tar Bay to the east of Barren Island. There are no SAV beds within the vicinity of the southern borrow area.

Impacts: No direct impacts will occur from dredging sand from the southern borrow area as there are no SAV beds to the west of Barren Island. Indirectly, the transport of dredged materials to

and from the northeast wetland cell will require a HDPE pipeline that crosses SAV habitat. The pipeline will transport dredged material from the northeast foundation replacement footprint to the southern wetland cell, and sand from the borrow area to the northeast wetland cell for foundation replacement and geosynthetic tube construction. The pipeline will be submerged, marked, and maintained in accordance with all U.S. Coast Guard requirements for navigational safety. It is expected that the pipeline will have a diameter between 12 and 24 inches. It is anticipated that the pipeline to move materials to and from the northeast wetland cell will need to be in place for approximately 4 weeks. The pipeline will be removed as soon as practicable, upon completion of the dredging and placement activities. Placement, use and removal of the pipeline is not anticipated to have a long-term impact on SAV habitat. The short-term impact associated with the presence of the pipeline on the Bay bottom should not negatively impact SAV beds as the pipeline will only be present during dredging operations in alignment with the typical SAV TOYR which prohibits sediment/turbidity producing activities (dredging and material placement) in/near/within 500 yards of SAV bed from 15 April to 15 October.

4.4 Avian Resources

Avian surveys for Barren Island were conducted in 2002 and 2003 for the 2009 Feasibility Report (USACE 2009) and 2020 and 2021 during PED phase for the Barren Island sEA (USACE 2022). Results across all surveys have identified 91 species and 5,451 individuals at Barren Island. Survey results are documented in USACE 2009 and USACE 2022. Specific to this sEA and dredging of a borrow area, the relevant avian species to consider are migratory wintering waterfowl. Although mallards were the only waterfowl documented in recent surveys, the area is recognized by the Atlantic Coast Joint Venture as a waterfowl focus area that may support priority species such as black scoter (*Melanitta nigra*), long-tailed duck (*Clangula hyernalis*), red-throated loon (*Gavia stellate*), surf scoter (*Melanitta perspicillata*), and white-winged scoter (*Melanitta fusca)* in addition to common loon (*Gavia immer*) and other waterfowl species.

Impacts: Dredging of the southern borrow area and deepening of the area may have minor impacts to migratory wintering waterfowl as the dredging is planned to occur in late fall and winter when these species are migrating and using the area for foraging and resting. However, these effects are anticipated to be minor and temporary displacement of the birds will not likely cause large population impacts. There is an abundant amount of similar habitat within the project area for use by these species while dredging is being conducted.

4.5 Community Setting

4.5.1 Recreation

Ecotourism has increased within the last few decades, specifically in the middle Chesapeake Bay counties that include numerous open waters, tidal rivers, land and water trails, as well as educational, and scientific opportunities at nearby wildlife refuges. The public can partake in activities in the vicinity of the Southern Borrow Area including fishing, oystering, crab harvesting, boating, and swimming. Local watermen and boaters may crab or fish commercially or

recreationally within the Southern Borrow Area. The navigation channel is dredged for maintenance activities on a recurring basis. Boaters may be inconvenience during dredging operations.

Impacts: Implementation of the preferred alternative would be expected to result in a direct, minor, and short-term negative impact to recreational activities in the vicinity of the borrow area during dredging operations. Operation activities would temporarily displace recreational activities.

4.5.2 Cultural and Historic Resources

This section describes existing cultural resources within the project's preliminary area of potential effects (APE).

Cultural resources are locations of human activity, use, or occupation. They can be defined by expressions of human culture and history in the physical environment such as precontact historic archaeological sites, buildings, structures, objects, districts, landscapes, and sacred sites, among others. Cultural resources may also include natural features, plants, and animals that are deemed important or significant to a group or community. It is important to note that historic properties, as defined by 36 CFR Part 800, the implementing regulations of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, are cultural resources that are eligible for or listed in the National Register of Historic Places (NRHP). To be considered a historic property, the resource must possess at least one of the following significance criteria:

- Association with events that have a made a substantial contribution to the broad patterns of our history; or,
- Association with the lives of persons substantial in our past; or,
- Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a substantial or distinguishable entity whose components may lack individual distinction; or,
- Have yielded, or may be likely to yield, information important in prehistory or history.

Section 106 of the NHPA requires consultation with the State Historic Preservation Office (SHPO), federally recognized Native American Indian Tribes, and other interested consulting parties as appropriate for proposed federal actions that may affect historic properties. The Maryland Historical Trust (MHT) is designated as the SHPO for Maryland. Consultation has been ongoing with MHT and the Delaware Nation throughout the Mid-Bay Island Project, however, USACE provided a letter to MHT on January 13, 2023, specifically regarding the borrow activities associated with the Barren Island component. MHT responded on January 24, 2023. Based on this consultation, it was recommended that USACE archaeologically survey the southern borrow area to identify historic properties. The correspondence is provided in Appendix B2 (pages 26-30).

During Spring 2023, Stell and SEARCH, Inc., under USACE contract, conducted a Phase I maritime archaeological survey of the southern borrow area utilizing side-scan sonar, magnetometry, and sub-bottom profiling. No anomalies representative of resources significant for the NRHP were documented within the borrow area. Stell and SEARCH, Inc. provided a preliminary recommendation that no historic properties would be affected by dredging within the southern borrow area. By letter dated December 5, 2023, MHT concurred with this determination except for three areas that were not surveyed due to the presence of barges during the survey. MHT recommended that these areas be excluded from dredging. USACE intends to comply with this recommendation. There were no exclusion areas identified in Focus Area B. However, if Focus Area A were to be used at a future time, there is an exclusion area within Focus Area A. MHT confirmed that all requirements have been met and Section 106 consultation has been completed (Appendix B2).

Impacts: No impacts.

4.5.3 Hazardous, Toxic, and Radioactive Waste

Based upon a review of the USEPA Envirofacts and NEPA assist databases, no hazardous materials or reports exist within the project area limits (USEPA, 2021a; USEPA, 2021b).

Impacts: No impacts. The dredged material shall be sampled in accordance with the February 1998 EPA "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual: Inland Testing Manual". Results of these samples shall be provided to MDE. Dredged material that does not meet the criteria of the Inland Testing Manual shall not be placed on Barren Island. Honga River channel material was last tested in 2008 and met all criteria. The project will comply with any requirements included in the pending Tidal Wetlands License (TWL) modification.

4.5.4 Socioeconomic Conditions

Dorchester County and the area surrounding Barren Island have low population densities and are relatively rural. In 2021, approximately 32,486 individuals resided in Dorchester County in contrast to 6,165,129 in the State of Maryland (US Census Bureau, 2021). Dorchester County is forecasted to include approximately 35,160 individuals in 2030 and 37,300 individuals in 2040 (MD Dept of Planning, 2022). The census block (240199708041) containing the project area extends from Taylors Island south through Hoopersville. The census block has a population of 1,067 residents and covers 87.4 square miles. Dorchester County's demographics are relatively consistent with those of the State of Maryland. In Dorchester County males make up 47.3% and females represent 52.7% of the population. These percentages are consistent with the State of Maryland which are represented by 48.7% of males and 51.3% of females. White persons account for 63.7% of Dorchester County's population followed by Black or African American (25.3%) (ACS 2021). The largest age range that resides in Dorchester County are the 65 to 74-year-olds (12.7%).

Within Dorchester County, 15.0% of the population lives below the poverty level compared to 10.3% in the State of Maryland. Average household income is $75,871, substantially below the state average of $119,958 (ACS 2021). Within the county, 36% of the population is low income. The 2021 employment rate was 60.0% distributed across five primary occupations (Table 11) (ACS 2021). Nearly a third of the workforces is employed in management, business, science, education, and arts occupations. The second leading occupation is service occupations.

Impacts: Implementation of the preferred alternative is expected to have direct and indirect, and short and long-term positive impact on the socioeconomic conditions within the project area. Construction of Barren Island and specifically utilizing the Southern Borrow Area, is expected to have a direct, short-term, positive impact by providing an opportunity for jobs during construction. Maintaining Barren Island and restoring additional habitat would provide an indirect, long-term positive impact to the economy within the project area by adding value for tourism and recreation associated businesses, and the commercial fisheries professions.

Table 11. Occupations in Dorchester County

Occupations by Industry Sector	Percent
Management, business, science, education, and arts	32.5%
Sales and office	19.2%
Service	21.9%
Production, transportation, and material moving	14.9%
Natural resources, construction, and maintenance	11.5%

4.5.5 Visual and Aesthetic Resources

The Southern Borrow Area is located within the open waters of the Chesapeake Bay. There are no National Scenic Byways or Wild and Scenic Rivers in Dorchester County; however, the Southern Borrow Area can be viewed from Maryland State Road 335 along Hoopers Island shoreline. The road meanders through the Blackwater National Wildlife Refuge and Taylors Island WMA, as well as through small fishing towns and tidal marshes (USACE, 2009).

Impacts: During dredging, short-term, negative impacts to aesthetics would be expected due to the presence of construction equipment. These impacts would cease once dredging is complete.

4.5.6 Noise

Background or ambient sound can be described as sounds that occur in the environment without distinguishable sources. Ambient sound is continuous, but with considerable variation, on time scales ranging from several seconds to over the course of an entire year. Ambient sound typical of undeveloped dynamic estuarine environments can include natural (i.e., wind, waves, and bird vocalization) and manmade (i.e., passing vessels) sources.

Noise is defined as unwanted sound that is disruptive and diminishes the quality of the surrounding environment. It is emitted from many sources including airplanes, factories,

railroads, power generation plants, and highway vehicles, etc. The magnitude of noise is described by its sound pressure. A logarithmic scale is used to relate sound pressure to a common reference level, as the range of sound pressure varies greatly. This is called the decibel (dB). A weighted decibel scale is often used in environmental noise measurements (weighted-A decibel scale or dBA). This scale emphasizes the frequency range to which the human ear is most susceptible. The threshold of human hearing is 0 dBA. A 70-dBA sound level can be moderately loud (similar to an indoor vacuum cleaner) with values above 85 – 90 dBA considered loud and potentially harmful to hearing depending on length of exposure. A 120 dBA can be uncomfortably loud, as in a military jet takeoff at 50 ft (15.24 m), and a 40-dBA sound level can be very quiet and is the lowest limit of urban ambient sound.

To ensure a suitable living environment, the Department of Housing and Urban Development has developed a noise abatement and control policy, as seen in 24 CFR Part 51. According to this policy, noise not exceeding 65 dBA is considered acceptable. Noise above 65 dBA but not exceeding 75 dBA is normally acceptable, but noise above 75 dBA is unacceptable. Normal freeway traffic noise levels range from 70 to 90 dBA.

Sounds generated by recreational users of the refuge and surrounding waters is low and would remain the same. Motorized vessels in the project area generate low to moderate levels of noise and would be expected to remain the same. Ambient underwater sounds in the project area are expected to be weather, waves, shipping, boating, and biological activity (i.e., fish and marine mammals) (Martine et al., 2014).

Intensity, pressure, pitch or frequency (i.e., high, mid-, or low frequency), impulsive/non-impulsive are characteristics that can describe underwater sound. The pitch of a sound depends on the frequency of the sound wave, which is measured in Hertz (Hz). Underwater sound is also described as impulsive (transient or brief sounds such as explosions or pile driving) or non-impulsive (continuous or intermittent sounds such as drilling or an engine running). The intensity of underwater sound is measured as sound pressure level (SPL) in decibels referenced to 1 microPascal of pressure (dB re 1 µPa) and is typically described at a distance from a sound source. There are a variety of SPL quantification methods used to describe acoustical properties. Source level (SL) is typically measured at 1 meter (m) from the source. Root Mean Square (RMS) is a measure of average loudness.

Anthropogenic or manmade sources of noise in the area include large vessels (shipping container traffic) and small boat traffic. SLs of large vessels ranges from 180 – 190 dB re 1 µPa at 1 m (OSPAR 2009a). SLs of small boat traffic falls within the range of 160 – 180 dB re 1 µPa at 1 m (OSPAR 2009a). All potential sources in the area are categorized as non-impulsive sources.

Impacts:
Project-related noise from dredging consists of the dredge engine, pumps and impellers pushing sediment-slurry through pipes, the sound of dredged material passing through the pipe, and ship machinery sounds, including those associated with the lowering and spuds and moving anchored

cables (Suedel et al. 2019). Hydraulic suction dredging involves raising loosened material to the sea surface by way of a pipe and centrifugal pump along with large quantities of water. Suction dredgers produce a combination of sounds from relatively continuous sources including engine and propeller noise from the operating vessel and pumps and the sound of the drag head moving across the substrate. Based upon data collected by Reine *et al*. (2012), sediment removal and the transition from transit to pump-out would be expected to produce the highest underwater sound levels as an estimated source level (SL) of 172 dB re 1µPa at 3 ft (0.91 m). The two quietest activities would be seawater pump-out (flushing pipes) and transiting, with expected SLs of approximately 159 and 163 dB re 1µPa at 3 ft (0.91 m), respectively. Based upon attenuation rates observed by Reine *et al*. (2012), it would be expected that at distances approximately 1.6 – 1.9 miles from the source, underwater sounds generated by the dredges would attenuate to background levels. Similar to in-air sounds, ambient noise sounds such as those related to wind (and corresponding sea-state), would play a major role in dictating the distance to which project-related underwater sounds would be above ambient levels and potentially audible to nearby receptors. Dredging noise would be generated 24 hours a day until dredging is complete. Water depth and the type of material being dredged will also affect noise levels.

Dredging sounds are typically of continuous and low frequency, generally less than 1000 Hz. Reine and Dickerson (2014) monitored underwater sounds during maintenance dredging in the Stockton Deepwater Ship Channel, California by cutter suction dredge (CSD). SL ranged from 151 dB (upstream, bow) to 157 dB (downstream, stern) re 1 µPa at 3.28 ft (1 m). An average SL of 153 dB re 1 µPA at 3.28 ft (1 m) was calculated for combined data. CSD source levels have been previously measured between 168 and 175 dB re 1 µPa at 3.28 ft (1 m) (Greene 1987, Reine et al. 2012, Reine and Dickerson 2014) (as summarized in Suedel 2019) and will dissipate with distance from the dredge. Sounds from dredging are expected to be similar to other anthropogenic noise sources at Barren Island that contribute to ambient noise in the area such as large vessels (shipping container traffic) and small boat traffic.

4.5.6.1 Effects on Humans

The areas around Barren Island can have substantial noise sources generated from boat traffic in adjacent waters. Natural sound sources such as wind, waves, and birds contribute to background noise levels. Personal watercraft and powerboats may generate noise levels of 70 to 85 dBA at 50 ft (15.24 m) and which would be the typical background noise in the vicinity of the Southern Borrow Areas (Noise Unlimited, 1995). Barren Island is generally free of anthropogenic noises other than occasional fishing boats or recreational boats, and the island is far away from any major roadway or shipping lanes. Air traffic can occasionally cause more frequent noise due to the Southern Borrow Area's proximity to the Patuxent Naval Air Station.

Impacts: Dredge noise is expected to be similar to background noise at Barren Island, which is popular for recreational boating. Generally, noise impacts associated with the restoration at Barren Island would be minimal and not interfere with normal human activities. Due to the

distance of adjacent communities (>2.25 miles), the project is not anticipated to have direct impacts on communities. Dredging noise would be expected to dissipate before reaching Upper Hoopers Island. The project would be constructed following local noise ordinances and all applicable worker safety regulations.

4.5.6.2 Effects on Wildlife

Many wildlife species in the Chesapeake Bay use sound to communicate, navigate, breed, and locate sources of food. The sensitivity varies among species, location, and season (e.g., breeding, migration, and roosting). Underwater noise influences fish and other marine animal behavior, resulting in changes in their hearing sensitivity and behavioral patterns. Sound is important when hunting for prey, avoiding predators, or engaging in social interaction. Fish can also suffer from acoustically induced stress in their own habitat. Changes in vocalization behavior, breathing and diving patterns, and active avoidance of noise sources by marine life have all been observed in response to anthropogenic noise (Earth Island Institute, 2002).

Underwater ambient noise levels have not been identified for the Southern Borrow Area but would be typical of mid-Chesapeake Bay estuarine habitats. Underwater noise levels can vary with time of day, weather, tide, season, and other factors. Ambient sound sources could include biological sources (e.g., birds, marine mammals) and anthropogenic sources such as from vessels and aircraft overflights.

Impacts: Terrestrial and avian species are not expected to be affected by project noise either due to their absence from the project area or ability to leave the area. Marine mammals and sea turtles are also sensitive to anthropogenic noise, but are not expected to be in the project area. However aquatic species including fish and invertebrates could be negatively impacted by increased noise levels during dredging operations. A review of existing scientific information by Suedel et al. (2019) on the effects of dredging sounds on fish species did not identify any studies that have directly measured the effects. Suedel et al. (2019) concluded that ecological risks related to dredging noise are expected to be limited to non-lethal effects including auditory injury, masking, and behavioral responses (Boyd et al. 2008, Todd et al. 2015; Hawkins et al. 2015).

Fish can detect low frequency sounds that are produced by dredging activities (<1000 Hz). Suedel et al. (2019) summarized that the 100 to 400 Hz frequencies are detected by the majority of fish studied (Offutt 1974, Yan 2001, Codarin et al., 2009, Parmentier et al. 2011). Fish are sensitive to sound pressures due to air-filled cavities such as swim bladders and to the particle motion of sound detected by auditory hair cells (Slabbekoorn 2016 and OSPAR 2009a). The sensitivity of fish to underwater noise is differentiated between hearing generalists and hearing specialists. Hearing generalists detect sounds over a narrow frequency bandwidth and have lower sensitivities to sound pressure levels (SPL) whereas hearing specialists have anatomical structures (such as connections between inner ear structures and swim bladders) that increase the hearing frequency thresholds. Cod and salmon are examples of generalists (Suedel et al. 2019). Clupeiformes such herrings and sardines, Sciaenids (drums and croakers) are examples of

specialists (Popper and Hastings 2009). Most species in the project area are likely generalists, but feasibility study surveys conducted in 2002 – 2003 identified some specialists such as red drums, black drums, and hogchokers (although none were detected in recent studies). Permanent hearing loss is not expected to occur as a result of dredging-generated sound as fish are capable of regenerating lost or damaged sensory cells (hairs) of the ear (Smith 2016). Smith et al. (2006) documented the regrowth of hair cells and recovery of functional hearing following the onset of inner ear damage in goldfish. Therefore, permanent hearing loss is not expected (Suedel et al. 2019). Impacts are also expected to be size dependent with smaller fish (< 2 grams) being more susceptible to temporary injury than larger fish (>2 grams) (Heinis et al. 2013).

A study in the United Kingdom by Nedwell et al. (2008) concluded that underwater sounds generated by a hopper dredge [117 dB (at 200 Hz) and 122 dB (at 320 Hz)] did not pose a risk of auditory injury to fish (Clupeidae and flat fish). The noise generated from the dredges utilized for the Barren Island project are expected to exceed the SLs in the Nedwell et al. (2008) study and and has some potential for injury (temporary threshold shift) to fish in the area. However, Suedel et al. (2019) concluded that the currently available effects data from anthropogenic sources indicate that dredging-induced sounds do not pose a significant risk to direct injury or mortality in juvenile or adult fish. Fish are mobile and would be expected to move away from the dredge, not only because of the sound but the motion through the water. If any fish did experience minor injuries, they would be expected to recover once construction ends. If fish left the project vicinity to avoid the noise, they would be expected to return once construction ends.

Masking is defined in Suedel et al. (2019) as an animal's diminished ability to detect relevant sounds against background due to increased ambient sounds that may impact the ability to orient, navigate, and select habitat (Southall et al. 2007). Suedel et al. (2019) recognized that dredging sounds have not been evaluated for the potential to cause masking. However, vessel sounds have been shown to impact the communication of fish, interfering with the detection of conspecific (same species) sounds (Codarin et al. 2009).

Other behavioral effects of dredging noise could be impairment of startle responses and avoidance (Everley et al. 2016; Hawkins and Popper 2016). Simpson et al. (2015) determined the juvenile European eels (*Anguilla anguilla)* had slower startle responses to ambush predators and showed other indicators of stress (e.g., elevated ventilations and metabolic rates) when exposed to shipping sounds [153 dB re 1 µPa at 0.91 ft (1 m)]. Recreational boating sounds are not expected to have an adverse effect on the behavior of larval fish (Jung and Swearer 2011), but dredging sounds have not been investigated.

Few investigations have focused on the effects of anthropogenic noise on invertebrates, and none were identified that focused on dredging noise (Suedel et al. 2019). Wale et al. (2013a) studied the effects of shipping noise on shore crabs (*Carcinus maenas*, also known as the European green crab) and found that the ability to find food was not affected, but that more crabs were distracted during feeding when exposed to shipping sounds, and crabs took longer to return to shelter following a simulated attack (Wale et al. 2013b). Recognizing the difference in

crab species, blue crabs would be unlikely to be affected by dredging noise given that dredging will occur in the colder months when crabs are dormant.

In summary, sound associated with dredging activities would result in a temporary increase in noise levels that would have minor, temporary negative effects on fish species such as masking and behavioral effects. Temporary hearing impairment is an unlikely possibility. Impacts associated with implementing the recommended plan are expected to be direct, potentially moderate (if individuals do not move from the area in response to the noise), and short-term in duration. Some observations in the vicinity of dredging operations and other industrial activities have documented avoidance behavior while in other cases, animals seem to develop a tolerance for industrial noise (Malme *et al*., 1983; Richardson *et al*., 1995).

Conducting dredging in fall and winter is expected to reduce exposure and minimize impacts. During the colder months, fewer species and individuals are expected to be in the area, and those that are present, are less active, potentially reducing noise-induced impacts on behavior. Impacts to mobile marine species are not expected as individuals will move away from the disturbance, thereby reducing the risk of physical or physiological damage.

4.6 Environmental Justice

On February 11, 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. This order requires that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities, on minority populations and low-income populations" (Executive Order 12898, 59 Federal Register 7629 [Section 1-201]). Subsequently, President Biden issued Executive Order 14096, *Revitalizing Our Nation's Commitment to Environmental Justice For All*. EO 14096 expands the directives and concepts outlined in EO 12898 to identify, analyze, and address disproportionate and adverse human health and environmental effects and hazards of federal activities.

The USEPA's EJScreen was utilized to evaluate indicators for a specified area to gauge whether there are potential EJ communities in the area. Based on data in EJSCREEN, the screening analysis did not identify communities with EJ concerns in the vicinity of the project area (USEPA, 2023). The indices consider air pollutant levels; respiratory hazards; cancer risk; traffic levels; lead paint; proximity to Superfund sites, hazardous waste, and wastewater discharge; as well as demographic indicators such as minority populations, low income, linguistic isolation, education level, and age (under 5 and over 64 years of age). The Climate and Economic Justice Screening (CEJST) tool is another tool to evaluate possible EJ communities and distinguishes areas by tract number. Tract 24019970804 extends from Taylors Island south through Hoopersville. CEJST determined that this tract is not considered an EJ community due to not meeting at least one associated socioeconomic threshold (Council of Environmental Quality).

Impacts: The proposed project is not expected to result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

4.7 Cumulative Impacts

Dredging would remove approximately 300,000 cy of sand from the borrow area. Impacts have been evaluated throughout the 85 acres within Focus Areas A and B, but dredging is expected to be limited to 25 – 30 acres within Focus Area B. Impacts from using the Barren Island borrow area must be considered with other dredging activities that occur on an annual basis throughout the Chesapeake Bay to maintain the channels in the Baltimore Harbor, the Baltimore Harbor Approach Channels, the C&D Canal, the C&D Approach Channels, and shallow navigation channels. USACE is provided funding to perform maintenance dredging on 1 to 2 small navigation channels within the Chesapeake Bay per year, removing approximately ~160,000 cy of material. Approximately 2 MCY of material is dredged from the Maryland Bay Approach Channels, approximately 1.2 MCY from the Baltimore Harbor channels, and approximately 0.6 MCY from C&D and C&D Approach Channels. Dredging of sand from the borrow area is not expected to add cumulatively to the nearly 4 MCY of material dredged from the Bay bottom on an annual basis.

In combination, restoration projects at Barren Island, Poplar Island, Poplar Expansion, and the future implementation of James Island, will restore 3,870 ac of remote island habitat to the mid-Chesapeake Bay. This is a substantial step to restore the loss of approximately 10,500 ac of remote island habitat that has been documented throughout the past several decades in the Bay. The restored habitat will serve a diverse assemblage of species including nesting and foraging birds, and finfish that utilize the tidal channels and shallow waters adjacent to the projects as well as the structure provided by sills, dikes, and breakwaters. This network of islands will play a vital role to migrating birds along the Atlantic Flyway. Cumulatively, these projects will require years of continued construction and operations along the middle eastern shore at the restoration sites that could result in minor disturbances to fish and fauna in what is a fairly undisturbed environment. There could also be disruptions to waterway users including to boaters, tourists, and commercial and recreational fisherman. Proposed island restoration projects would cause a loss of bottom and open water habitat for EFH and other species inhabiting shallow water habitats. However, much of this bottom had been island habitat, and regionally this habitat is abundant and expanding with sea level rise and erosion. Further, the restored island complexes would include tidal connections to restored wetlands to provide foraging, refuge, and nursery grounds for fisheries.

Maintaining Barren Island will also continue to promote conditions that support SAV habitat in Tar Bay. It is reasonable to expect that if Barren Island were left to erode, all wetland habitats would be loss, water depths would gradually deepen, and Tar Bay would become unsuitable to support SAV (~1350 acres maximum), with associated fisheries impacts. The addition of reef complexes at the cove of the bird islands will add diversity and three-dimensional reef habitat to the waters around Barren. These reefs as well as the stone sills and breakwaters are expected to

provide habitat for oysters, mussels, barnacles and other benthic invertebrates to colonize in addition to providing structure for fish to utilize for refuge and foraging.

As a result of the direct benefit of restoring island habitat and the indirect benefit that restoration has to SAV and fisheries habitat by providing a diverse estuarine ecosystem, no significant cumulative negative impacts to habitat or populations of aquatic or avian species are expected to result from the project.

5 ENVIRONMENTAL COMPLIANCE

Pertinent public laws applicable to the impact area are presented below. In some situations, the laws have been previously discussed and prior section references are provided. The status of compliance with applicable environmental laws and executive orders is summarized at the end of the section in Table 12.

5.1 National Environmental Policy Act of 1970, As Amended, 42 U.S.C. 4321, et seq.

NEPA requires that all federal agencies use a systematic, interdisciplinary approach to protect the human environment. NEPA requires the preparation of an EIS for any major federal action that could have a significant impact on quality of the human environment and the preparation of an EA for those federal actions that do not cause a significant impact but do not qualify for a categorical exclusion. Section 102 of the Act authorized and directed that, to the fullest extent possible, the policies, regulations and public law of the United States shall be interpreted and administered in accordance with the policies of the Act. An EIS was developed during the Feasibility Report (2009) that included both the Barren Island portion of the Mid-Bay Island Project and the James Island portion. A supplemental EA was completed in March 2022 for the Barren Island component of the Mid-Bay Island Project. This document is a supplemental EA that builds on the 2009 EIS and 2022 sEA and focuses on identification of a source of borrow material for actions planned at Barren Island.

5.2 Clean Air Act, as amended, 42 U.S.C. 7401, *et seq.*

The Clean Air Act regulates air emissions from stationary and mobile sources. The law authorizes USEPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of hazardous air pollutants. Based on ambient levels of a pollutant compared with the established national standards for that pollutant, regions are designated as either being in attainment or non-attainment. Dorchester County is in attainment for all priority pollutants.

In additional to the consideration of air quality priority pollutants, the generation of greenhouse gas (GHG) emissions by the project were considered. An analysis was completed to estimate the GHG emissions associated with dredging the material required for the project (Alternative 3) as well as the alternative to acquire the needed material from a quarry (Alternative 5) to investigate if a non-dredging alternative would be a more favorable action with respect to GHG emissions. The full analysis is presented in Appendix C4. The emissions from either alternative would meet

de minimis thresholds for priority pollutants as specified for EPA if the area were a non-attainment area for air quality (USEPA 2022). In terms of CO_2 equivalency (metric tons), Alternative 3 and 5 would produce a comparable amount of GHG emissions, between 4000 and 4200 metric tons. Barging material from a quarry to the site and incorporating the material into the project (Alternative 5) is projected to produce a slightly greater amount of GHG emissions, approximately 160 metric tons of CO_2.

5.3 Clean Water Act, 33 U.S.C. 1251, et seq.

Coordination was conducted to ensure the preferred alternative is in compliance with the Clean Water Act of 1977 and subsequent amendments (A 404(b)1 Assessment is included as Appendix C3). MDE determined that a Section 401 WQC will not be required for this project component, i.e., hydraulic dredging of the borrow area. A WQC (21-WQC-0033) has been acquired for placement as part of the Barren Island sEA (USACE, 2022). A request has been submitted to modify the existing Tidal Wetlands License to cover dredging of the borrow area. A public hearing was held on November 29, 2023, at the Madison Volunteer Fire Company, 1154 Taylors Island Road, Madison, MD 21648. With completion of the State's permitting process, implementation of the preferred alternative would not result in permanent negative changes in water quality. Following dredging activities, the additional wetland habitat, stabilized shorelines, and protection of SAV habitat that will be achieved through the full project will have long-term positive impacts to water quality in the areas surrounding Barren Island. All state water quality standards would be met.

5.4 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

The Coastal Barrier Resources Act (CBRA) and its amendments prohibit the spending of new federal expenditures that tend to encourage development or modification of coastal barriers that are within the defined Coastal Barrier Resource System. Barren Island falls within the jurisdiction of the CBRA; however, it is classified as an "Otherwise Protected Area" (OPA), MD-21P. Under the Act, OPAs are not subject to restriction of Federal funds; therefore, no consultation with USFWS is required specific to CBRA (USACE 2009). The beneficial impacts derived from shoreline restoration and protection and wetland restoration at Barren Island are consistent with the goals of the Act.

5.5 Coastal Zone Management Act of 1972

The preferred alternative (southern borrow area) is within the coastal zone, which is managed under MDNR's Coastal Zone Management Program (CZMP). As part of the Barren Island sEA (USACE 2022), construction of the island habitat restoration project would displace shallow water habitat protected under the Coastal Zone program with beneficial impacts determined to be consistent with other goals of the CZMP).

A Federal consistency determination in accordance with 15 CFR 930 Subpart C has been made for the preferred alternative stating that the use of the southern borrow area is consistent with

the enforceable policies of the State of Maryland's federally approved coastal management program. In a letter dated October 31, 2023, MDNR communicated their deferment of the coastal consistency determination to MDE as part of the Tidal Wetlands License modification project.

5.6 Endangered Species Act of 1973

The preferred alternative will be in compliance with the Endangered Species Act of 1973 (ESA). Coordination and consultation with USFWS and NMFS identified six species of concern for the project area as identified in Section 4.3.7. No listed species were identified during field surveys. The preferred alternative is not anticipated to affect rare, threatened, or endangered species. USFWS has concurred with USACE's determination that the project is not likely to adversely affect endangered species. Upon reviewing the draft sEA, NOAA determined that it is not necessary to reinitiate ESA coordination with their agency for the project because the project description has not changed, there are no new listed species, and there is no overlap between designated critical habitat and the action area.

5.7 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) requires Federal agencies to consult with the USFWS, NMFS, and the fish and wildlife agencies of States where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified" by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources." The intent is to give fish and wildlife conservation equal consideration with other purposes of water resources development projects.

USFWS has provided a draft Fish and Wildlife Coordination Act Report toward fulfillment of Section 2(b) of the FWCA (48 Stat.401, as amended, 16 U.S.C. 661 *et seq.*) (Appendix C2). Via email dated November 12, 2023, FWS communicated that consultation with their agency for the FWCA has been completed.

5.8 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation & Management Act is the primary law governing marine fisheries management in U.S. federal waters. Pursuant to Section 305 (b)(2) of this act, the USACE is required to prepare an Essential Fish Habitat [EFH] Assessment for the Barren Island project. The assessment is provided in Appendix C1. See Section 4.3.6 for a discussion of EFH in the study area and a summary of the EFH assessment. In a letter dated October 11, 2023, NMFS communicated the following conservation recommendations (CR) as well as additional comments:

(1) To the maximum extent practicable, avoid dredging previously un-dredged bottom for the purpose of mining sand for any project component. This could include more thorough consideration of Alternative 6.

(2) Should mining from the Southern Borrow Area be pursued, dredge in a manner that approximates ridge bedforms and, as a result, leaves undisturbed areas interspersed with disturbed areas.

(3) Limit over dredge depths to one foot, for a maximum depth of cut at 6 feet throughout the project.

(4) To the extent practicable, avoid dredging during warmer months (i.e., April to November) to minimize impacts during periods of peak biological activity in the Chesapeake Bay and speed the rate of benthic recovery.

(5) Monitor the results of the dredging on benthic geomorphology, fish assemblages, and benthic macroinvertebrate recovery to fully describe the effects of the proposed action. Work with state and federal resource agencies to develop a monitoring plan following the development of the final dredging plan. Pursue semi-annual monitoring for at least five years following the proposed dredging activity.

(6) Reinitiate consultation with NMFS should you pursue additional dredging beyond what is currently described for this initial project.

(7) Work with state and federal resource agencies to develop a comprehensive plan to offset the cumulative impacts to productive estuarine bottom through expanded oyster bar restoration efforts in the vicinity of both Barren and James islands.

USACE provided a written response on November 13, 2023 (Appendix B2).

5.9 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA), enacted in 1972, prohibits, with certain exceptions, the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. Feasibility investigations conducted in spring 2003 identified the potential for Atlantic Bottlenose dolphin to be in the vicinity of Barren Island due to their presence in the waters around James Island and off Taylors Island (MPA, 2004; USACE, 2009). At that time, consultation with NMFS concluded that Atlantic Bottlenose dolphins are not federally, or state listed as an endangered species and that exclusionary techniques to avoid impacts would not be required. No marine mammals were observed in 2003 or during 2020-21 surveys at Barren Island. The preferred alternative complies with the MMPA.

5.10 Migratory Bird Treaty Act, 16 U.S.C. 715 – 715s, and Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds

The Migratory Bird Treaty Act (MBTA) prohibits the taking or harming of any migratory bird, its eggs, nests, or young without an appropriate federal permit. Almost all native birds, including any bird listed in wildlife treaties between the United States and several other countries are covered by this Act. A "migratory bird" includes the living bird, any parts of the bird, its nest, or eggs. The take of migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreation purposes and requiring harvest to be limited to levels that prevent over-utilization. Section 704 of the MBTA states that the Secretary of the Interior is authorized and directed to determine if, and by what means, the take of migratory birds should be allowed and to adopt suitable regulations permitting and governing take. Disturbance of the nest of a migratory bird requires a permit issued by the USFWS pursuant to Title 50 of the CFR. Although, the 2020-21 surveys identified 65 bird species at Barren Island (APHIS, 2021 (Appendix C of USACE, 2022)), the preferred alternative is located offshore of Barren Island and will not result in the taking of any avian species. Due to the expectation for no takings, the preferred alternative is in compliance with the MBTA and Executive Order 13186.

5.11 Section 106 of the National Historic Preservation Act of 1966, as amended

The National Historic Preservation Act (NHPA) of 1966, as amended (54 U.S.C. § 306108), and its implementing regulations require USACE, in consultation with the Maryland Historic Trust (MHT), to consider the effects of the undertaking on historic properties in the project area. If any historic properties listed on or eligible for inclusion in the National Register of Historic Places will be adversely affected, USACE must develop mitigation measures in coordination with the MD State Historic Preservation Office (SHPO). Coordination with MHT and tribal nations has been ongoing since the feasibility phase and has determined that there were no cultural or historical resources within the project area for Phase 1 construction (USACE, 2009; USACE, 2022). Surveys identified no cultural or historical resources within the Southern Borrow Area. By letter dated December 5, 2023, MHT communicated that all requirements have been met and Section 106 consultation has been completed (Appendix B2). Recognizing that three areas within the southern borrow area were not surveyed due to the presence of barges in the area during surveys, MHT recommended that these areas be excluded from dredging. USACE intends to comply with this recommendation. There were no exclusion areas identified in Focus Area B. However, if Focus Area A were to be used at a future time, there is an exclusion area within Focus Area A.

5.12 River and Harbors Act, 33 U.S.C. 401, et seq.

Section 9 of this law and its implementing regulations prohibit the construction of any bridge, dam, dike, or causeway over or in navigable waters of the U.S. without Congressional approval. The U.S. Coast Guard administers Section 9 and issues bridge crossing permits over navigable waters. Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army**,** acting through the Army Corps of Engineers, for the construction of any

structure in or over any navigable water of the United States. The preferred alternative is in compliance with the Rivers and Harbors Act and does not involve any construction of prohibited works.

5.13 Resource Conservation and Recovery Act, as amended, 43 U.S. C. 6901, *et seq.*

The Resource Conservation and Recovery Act (RCRA) controls the management and disposal of hazardous waste. “Hazardous and/or toxic wastes”, classified by RCRA, are materials that may pose a potential hazard to human health or the environment due to quantity, concentration, chemical characteristics, or physical characteristics. This applies to discarded or spent materials that are listed in 40 CFR 261.31-.34 and/or that exhibit one of the following characteristics: ignitable, corrosive, reactive, or toxic. Radioactive wastes are materials contaminated with radioactive isotopes from anthropogenic sources (e.g., generated by fission reactions) or naturally occurring radioactive materials (e.g., radon gas, uranium ore). Hazardous materials are discussed in Section 4.5.4. There are no hazardous materials concerns associated with the preferred alternative. The preferred alternative is in compliance with the RCRA.

5.14 Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S. C. 9601, *et. seq.*

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) governs the liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous substance disposal sites. There are no Superfund sites in the project area. The preferred alternative is in compliance with the CERCLA.

5.15 Executive Order 12898, Environmental Justice

This Executive Order directs Federal agencies to determine whether a federal action would have a disproportionate adverse impact on minority or low-income population groups within the project area. See Section 4.5.7 for a discussion of Environmental Justice considerations for the preferred alternative. The preferred alternative is not expected to result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

5.16 Executive Order 13045, Protection of Children from Environmental and Safety Risks

This Executive Order requires federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure that policies, programs, activities, and standards address these risks. No risks to children are expected from the preferred alternative.

Table 12. Compliance with Federal Environmental Protection Statutes and Executive Orders

Federal Statutes	Level of Compliance*
Archaeological and Historic Preservation Act	Full
Bald and Golden Eagle Protection Act	Full
Clean Air Act	Full
Clean Water Act	Full
Coastal Barrier Resources Act	Full
Coastal Zone Management Act	Full
Comprehensive Environmental Response, Compensation and Liability Act	Full
Endangered Species Act	Full
Estuary Protection Act	Full
Farmland Protection Policy Act	N/A
Fish and Wildlife Coordination Act	Full
Magnuson-Stevens Fishery Conservation and Management Act	Full
Marine Mammal Protection Act	Full
National Environmental Policy Act	Full
National Historic Preservation Act	Full
Resource Conservation and Recovery Act	Full
Rivers and Harbors Act	Full
Wild and Scenic Rivers Act	N/A
Executive Orders (EO), Memoranda, etc.	
Migratory Bird (EO 13186)	Full
Protection and Enhancement of Environmental Quality (EO 11514)	Full
Protection and Enhancement of Cultural Environment (EO 11593)	Full
Floodplain Management (EO 11988)	Full
Environmental Justice in Minority and Low-Income Populations (EO 12898)	Full
Invasive Species (EO 13112)	Full
Protection of Children from Health Risks and Safety Risks (EO 13045)	Full
Prime and Unique Farmlands (CEQ Memorandum, 11 August 1980)	N/A
Wetland Protection (EO 11990)	Full

*Level of Compliance Relevant to the current study phase:
Full Compliance (Full): Having met all requirements of the statute, E.O., or other environmental requirements.
Not Applicable (NA): No requirements for the statute, E.O, or other environmental requirement for the current stage of planning.
Partial: Coordination was initiated and is ongoing

5.17 Executive Order 11990, Wetland Protection

Executive Order number 11990 requires federal agencies to evaluate potential impacts to wetlands, consider alternatives to wetland sites and limit damage to wetlands if impacts cannot be avoided. Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands perform important water quality functions such as filtration and provide food and habitat for fish and other wildlife. Along with open water, they are breeding, spawning, feeding, cover and nursery areas for fish and are important nesting, migrating, and wintering areas for waterfowl and other wildlife.

6 PUBLIC INVOLVEMENT AND COORDINATION

The purpose of public participation and agency coordination in the NEPA process is to ensure the productive use of inputs from, private citizens, public interest groups, and government agencies to improve the quality of the environmental decision-making process (Canter, 1996). CEQ regulations (Title 40 CFR, Chapter V and Part 1506.6) require the incorporation of public participation into multiple phases of the NEPA process, including project scoping and the review process of draft documents.

6.1 Public Involvement

A Public Notice communicating the intent to prepare the sEA for the Project was published on January 11, 2023. A community poster session was held on November 19, 2022 at the Hoopers Island Volunteer Fire Department in Hoopers Island, MD. A Notice of Availability was published on September 7, 2023 to communicate the start of public review of the draft sEA (Appendix B1). Public review was conducted from September 7 through October 9, 2023. Public comments received are provided in Appendix B2. Outreach completed for the prior Barren Island sEA is documented in the sEA (USACE, 2022).

Recognized as the primary users of the waters surrounding Barren Island, outreach events were specifically held with the watermen's community to discuss the project and receive their input on June 16, 2021, April 12, 2022, and April 13, 2023, at the Madison Fire Hall in Dorchester County. An email distribution list was compiled for all interested stakeholders in the community to use for direct communications. Input from the watermen's community led to additional consideration of the northern borrow area, the narrowing of the southern borrow area to Focus Areas A and B, the selection of Focus Area B as the initial dredging location, and the plan to restrict dredging to winter months to avoid conflicts with crabbing season.

6.2 Comments Received During Public Review

No comments were received from individual private citizens during public review. However, comments were received from USEPA, MDE, MDNR, NMFS/NOAA, USFWS, the Maryland State

Clearinghouse, and the Chesapeake Bay Foundation. All correspondence is provided in Appendix B2.

6.3 Agency Coordination

Agency coordination was initiated with a kick-off meeting on November 22, 2022. A series of four coordination meetings have been held thus far with resource agencies that have covered kick-off through release of the draft sEA for public review. Additional meetings will be conducted following draft sEA review. Coordination letters were sent to EPA, MDNR, MDE, NMFS, USFWS, and MHT on January 12, 2023. Table 13 summarizes public and agency correspondence activities that have been completed. Unless stated, correspondence is provided in Appendix B2.

Table 13. Summary of Agency and Public Correspondence

Date	Summary of Correspondence
November 22, 2022	USACE conducts Agency Coordination/NEPA meeting #1 with resource agencies – Kick-off Meeting (Appendix B3)
December 20, 2022	USACE conducts Agency Coordination/NEPA meeting #2 with resource agencies –Geotechnical and Initial Benthic Survey Results (Appendix B3)
January 11, 2023	USACE publishes Public Notice communicating intent to prepare a Supplemental EA (Appendix B1)
January 12, 2023	USACE provides initial coordination letters to federal and state agencies
January 24, 2023	Response (letter via email) received from Maryland Department of Planning/MHT to coordination letter
January 24, 2023	Response (email) received from USFWS to coordination letter regarding suggested best management practices to consider
February 3, 2023	Response (email) received from USEPA to coordination letter
February 10, 2023	Response (letter via email) received from NOAA/NMFS to coordination letter regarding Magnuson-Stevens Conservation Act and ESA
February 28, 2023	USACE conducts Agency Coordination/NEPA meeting #3 with resource agencies –Geotechnical and Full Benthic Survey Results (Appendix B3)
March 28, 2023	USACE conducts Agency Coordination/NEPA meeting #4 with resource agencies –Presentation of Bathymetric Survey Results (Appendix B3)
September 7, 2023	Notice of Availability published. (Appendix B1)
September 21, 2012	Acknowledgement letter of receipt received from Maryland Department of Planning for the State Clearinghouse Review Process.
October 1, 2023	Chesapeake Bay Foundation provided comments on the sEA via email.
October 3, 2023	NOAA responds to draft sEA with the determination that it is not necessary to reinitiate ESA coordination for the project.

Date	Summary of Correspondence
October 11, 2023	NMFS provided comments on the sEA via email.
October 20, 2023	MDE confirmed via email that a separate WQC was not needed for dredging the borrow area.
October 31, 2023	MDNR provided comments on the sEA via email.
November 2, 2023	The Maryland State Clearinghouse Recommendation letter received from the Maryland Department of Planning.
November 9, 2023	USFWS provides sEA comments via email, and confirms concurrence of USACE's NLAA determination for ESA.
November 13, 2023	USACE provides response to NMFS Conservation Recommendations.
November 13, 2023	USFWS confirms via email that FWCA coordination is complete.
December 5, 2023	Letter received from MHT concluding Section 106 consultation.

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