**U.S. Army Corps
of Engineers
Baltimore District**

Final SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

DORCHESTER COUNTY, MARYLAND

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT AT JAMES ISLAND

NOVEMBER 2024

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

NEPA Cover Sheet

Title: Mid-Chesapeake Bay Island Ecosystem Restoration Project: James Island *FINAL* supplemental Environmental Impact Statement

RESPONSIBLE AGENCIES: Lead Federal Agency - U.S. Army Corps of Engineers – Baltimore District; Non-Federal Sponsor – Maryland Port Administration; Cooperating Agencies – National Oceanic and Atmospheric Administration (NOAA); NOAA National Marine Fisheries Service; U.S. Environmental Protection Agency; U.S. Fish and Wildlife Service; Maryland Department of Natural Resources; and Maryland Department of the Environment

ABSTRACT: The U.S. Army Corps of Engineers (USACE), Baltimore District is developing the Mid-Chesapeake Bay Island Ecosystem Restoration Project (Mid-Bay Island Project) in partnership with the Maryland Department of Transportation Maryland Port Administration (MPA), the project's non-federal sponsor. The Mid-Bay Island Project is located at James Island and Barren Island, both on the Eastern Shore of Maryland and in Dorchester County, Maryland. The Mid-Bay Island Project addresses the need to restore remote island habitats to benefit wildlife including a diverse assemblage of birds, fish, herpetofauna, and invertebrates and to develop an acceptable long-term approach for dredged material placement. Section 7002 of Water Resources Reform and Development Act of 2014 authorized the Mid-Chesapeake Bay Island Ecosystem Restoration Project, as described in the U.S. Army Corps of Engineers Chief's Report, dated August 2009 and the *Mid- Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)*, dated September 2008 (and updated in April 2009). The Record of Decision was signed in July 2019 initiating the next phase of the study, Preconstruction, Engineering, and Design (PED). The project moved into the Construction Phase upon the execution of the Project Partnership Agreement, which allowed for the award of the first construction contract for Barren Island in August 2022This sEIS serves to update compliance with the National Environmental Policy Act due to the time that has elapsed and changed conditions since completion of the initial Feasibility Report (FR)/EIS in 2009.

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The EIS was prepared pursuant to 40 Code of Federal Regulations (CFR) Parts 1500 - 1508 (1978, as amended).

SUMMARY

The U.S. Army Corps of Engineers (USACE), Baltimore District is developing the Mid-Chesapeake Bay Island Ecosystem Restoration Project (Mid-Bay Island Project) in partnership with the Maryland Department of Transportation Maryland Port Administration (MPA), the project's non-federal sponsor. 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. Section 7002 of Water Resources Reform and Development Act of 2014 authorized the Mid-Chesapeake Bay Island Ecosystem Restoration Project, as described in the U.S. Army Corps of Engineers Chief's Report, dated August 2009 and the *Mid- Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (EIS)*, dated September 2008 (and updated in April 2009). The Record of Decision was signed in July 2019 initiating the next phase of the study, Preconstruction, Engineering, and Design (PED). The project moved into the Construction Phase upon the execution of the Project Partnership Agreement, which allowed for the award of the first construction contract for Barren Island in August 2022. USACE is updating NEPA compliance for the Barren Island (two supplemental Environmental Assessments published March 2022 and December 2023) and James Island (current action) components of the project. This sEIS serves to update compliance with the National Environmental Policy Act for the James Island component due to the time that has elapsed and changed conditions since completion of the initial Feasibility Report (FR)/EIS in 2009.

In addition to a "no action" plan, one other alternative was evaluated by this sEIS. The alternative included implementing the Congressionally-authorized plan with alterations to modernize the original 2009 design. This alternative was the recommended plan as presented in the 2009 FR/EIS with updated facilities designs, the incorporation of sea level rise into the design of the perimeter dikes and other components, and consideration of Engineering with Nature measures. The alternative, titled, "Implement a Modernized Version of the Feasibility Study's Recommended Plan," was identified as the environmentally preferable alternative and the recommended plan. The recommended plan would meet the project purpose, need, and objectives, as discussed in the sEIS; restore and protect wetland, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals; increase wetlands acreage in the Chesapeake Bay watershed; provide dredged material placement capacity for the maintenance of Federal navigation channels; and provide erosional protection to mainland shorelines in the study area. The modernized project includes features to address climate change, resiliency, and Engineering with Nature principles to the extent feasible. Implementation of the recommended plan would restore 2,072 acres of remote island habitat, provide for approximately 50 acres of shoreline habitat features (reefs, reefballs or other structures, and/or breakwaters), and provide capacity to place 90 to 95 million cubic yards of clean dredged material from Federal navigation channels to restore upland and wetland habitats over an estimated 32-year period. To restore the targeted habitats and place the dredged material, the following would be constructed: approximately 45,233 linear feet of armored dikes, breakwaters, and/or other structures; a 209-acre access channel with a turning basin, breakwaters, and bulkhead; a personnel pier; electric supply and communications lines; and operation facilities.

Impacts associated with implementing the recommended plan are expected to be direct and indirect, potentially moderate, and both short and long-term in duration. In total, the project would disturb 2,466 acres of bay bottom and open water habitat. Construction activities would permanently bury existing areas of the bottom along the proposed alignment and may affect adjacent areas of the bottom through drift and settling of finer particles. Fish and benthic species would be affected by loss of bottom habitat and disturbance (noise, water quality impairments such as increased turbidity, and increased vessel traffic) during dredging and construction. Some aquatic organisms could be buried or trapped by placement of rock and dredged material or entrained with dredged material. Other individuals would be expected to be displaced from the area by construction activities. While the project would impact nearly 2,500 acres of open water habitat, similar habitats are abundant within the adjacent waters and the Chesapeake Bay. Mobile individuals are expected to be displaced to similar habitats during construction. Over the long-term, the project is expected to provide a diverse array of habitats that would benefit fisheries and benthic organisms.

Opportunities for the incorporation of Engineering with Nature (EWN) measures into the project include the consideration to modify perimeter dikes along the eastern wetland shoreline to improve connectivity between the aquatic environment and the restored habitats, the inclusion of EWN approaches in the future design of internal habitats, and approximately 50 acres of shoreline features (e.g. reefs, reefballs, breakwaters, etc.) to diversify the shoreline and protect the mouth of tidal inlets. Ongoing efforts are evaluating the feasibility to modify the wetland perimeter dike. Design efforts will continue in coordination with resource agencies throughout the Construction Phase.

Inclusion of EWN measures would add positive impact by improving the connectivity between aquatic and terrestrial habitats, promoting the flow of aquatic species through the tidal inlets into wetland habitat, and adding diversity to submerged project features for oysters, fish, and benthic species. Opportunities to incorporate EWN measures determined to be feasible along the eastern wetland shoreline would be implemented once inflow of dredged material is complete and the dredged material has been dried and graded. Impacts from modifying perimeter dikes would be contained within the existing dike footprint. These modifications would largely be focused on reducing the height of the dike and adding in connectivity with the aquatic environment. Pending funding, reef enhancements could be implemented with or shortly after dike construction, unless the positioning of a reef would interfere with construction of other project features. The impact assessment accounts for 50 acres of shallow bottom water impacts from conversion to structural reef habitat. The establishment of offshore reef structures would provide a number of benefits to fishery resources. Reef structures would provide structural habitat for fish and benthic organisms where none currently exists; provide foraging, reproduction, and nursery habitat for resident finfish; provide foraging habitat for transient species; provide structural habitat as predation refuge for juvenile blue crabs; provide a connection from deeper water into island tidal inlets and marsh; increase primary and secondary benthic production to increase the complexity of trophic structure and provide for energy transfer to higher trophic levels; provide heterogeneity along the long, straight reaches of the containment dike; and provide an attractive resource for recreational fishing.

Future modification of wetland perimeter dikes along the eastern shoreline for EWN is not anticipated to have any further negative impacts on resources. The modifications would be confined to the footprint of the existing perimeter dike. It is not expected that the integration of EWN features and other elements of the final design will result in a significant change to environmental impacts. As such, it is not expected that further NEPA action will be required. However, if there are significant changes further NEPA analysis will be completed as appropriate.

Increased noise and lights during construction of the recommended plan has the potential to negatively impact mainland communities along the shoreline and waterway users. Impacts are expected to be long-term given the duration of the construction period, but minor. The commercial fishing industry would initially experience negative impacts from the project; however, increased shallow water habitat diversity including reef habitat and tidal inlets, as well as connectivity to and inputs from the restored wetlands are expected to provide long-term positive impacts to fisheries. Approximately 99 acres of the James Point oyster bar would be dredged to construct the access channel. Crabbing grounds and the location of three (3) pound nets (currently inactive) would be converted to restored island habitats within the project footprint. Crabbing and fishing activities in the waters adjacent to the project could experience disruptions during construction due to vessel activity and associated changes to water flows once the project is established. Waterway users will need to travel around the project, adding approximately 1 to 1.5 miles to trips to the Chesapeake Bay mainstem as measured from the mouth of the Little Choptank River. Cultural resource impacts are not expected. A Programmatic Agreement has been developed with the Maryland State Historic Preservation Office to conduct archaeological monitoring during the dredging of the access channel and turning basin and complete a survey of the electrical/communications line pathway.

In summary, cumulative impacts are projected to be positive. In combination with island restoration projects at Poplar Island, Barren Island, and Swan Island, implementation of the James Island project would restore remote island habitats lost to erosion and increase the connectivity with remaining remote island habitat and similar beneficial use projects along the Chesapeake Bay's eastern shore. The project is expected to have cumulative positive impacts to aquatic and terrestrial species that utilize remote island habitat.

All practicable means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the sEIS will be implemented to minimize impacts. The project is expected to be in compliance with all applicable laws, executive orders, and regulations upon completion. A water quality certification pursuant to section 401 of the Clean Water Act will be obtained from the Maryland Department of the Environment (MDE) prior to construction. A determination of conditional consistency with the Maryland Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 has been obtained from the Maryland Department of Natural Resources (MDNR).

TABLE OF CONTENTS

Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICES

A: SURVEY REPORTS AND DATA

- A1: Mid-Chesapeake Bay Island Ecosystem Restoration Project Environmental Surveys – Sampling and Analysis Report (Anchor QEA, 2022)
- A2: Submerged Aquatic Vegetation (SAV) Survey at James and Barren Island (Anchor QEA, 2021)
- A3: Mid-Chesapeake Bay Island Ecosystem Restoration Submerged Aquatic Vegetation (SAV) SPRING 2021 Surveys at James and Barren Islands (MDNR, 2021a)
- A4: Mid-Chesapeake Bay Island Ecosystem Restoration Submerged Aquatic Vegetation (SAV) SUMMER 2021 Surveys at James and Barren Islands (MDNR, 2021b)
- A5: Phase I Cultural Resources Programmatic Agreement
- A6: Engineering with Nature: Reef Enhancement Technical Memo
- A7: Relative Sea Level Change and Vertical Datum Assessment for James Island

B: PUBLIC AND AGENCY COORDINATION

- B1: Notice of Intent
- B2: Stakeholder Meetings
- B3: Notice of Availability
- B4: Agency Coordination/NEPA Meetings
- B5: Draft sEIS Public Review Comments and Responses

C: ENVIRONMENTAL COMPLIANCE

- C1: Correspondence Records
- C2: Essential Fish Habitat Assessment
- C3: Fish and Wildlife Coordination and Endangered Species Acts
  - USFWS Planning Aid Report
- C4: Clean Water Act Section 404(b)1 Evaluation
- C5: Greenhouse Gas Emissions Analysis
- C6: Federal Coastal Consistency Determination

ACRONYMS

ac	Acres
ACRE	Applied Coastal Research and Engineering
ACS	American Community Survey
ACJV	Atlantic Coast Joint Venture
ADCIRC	Advanced Circulation model
AMP	Adaptive Management Plan
APE	Area of potential effects
APHIS	Animal and Plant Health Inspection Service
ARI	Annual reccurence interval
BMP	Best Management Practice
CDC	Centers for Disease Control
CBF	Chesapeake Bay Foundation
CBP	Chesapeake Bay Program
CBRA	Coastal Barrier Resources Act
CMS	Coastal Modeling System
CMS-Wave	Coastal Modeling System Wave model
CSTORM	Coastal Storm Modeling System
CZMP	Coastal Zone Management Program
CEQ	Council of Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CY	Cubic yards
dBA	A-Weighted Decibel
DHQ	Diurnal high water inequality
DDR	Design Documentation Reports
DLQ	Diurnal low water inequality
DO	Dissolved oxygen
E2EM	Estuarine, intertidal, emergent wetland
E2FO	Estuarine, intertidal, forested wetland
E2SS	Estuarine, intertidal, scrub-shrub wetland
ECO-PCX	Planning Center of Expertise for Ecosystem Restoration
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive ordnance disposal
ERDC	Engineering Research and Development Center
ESA	Endangered Species Act
EUS	Estuarine, unconsolidated shore
EWN	Engineering with Nature

FR	Feasibility Report
ft	Feet
FY	Fiscal Year
FWCA	Fish and Wildlife Coordination Act
GBA	Gahagan & Bryant Associates, Inc.
GIS	Geographic Information System
GT	Great diurnal range
HAPC	Habitat Areas of Particular Concern
HTRW	Hazardous, Toxic, and Radioactive Wastes
ICU	Island Community Unit
IPaC	Information for Planning and Consultation
lf	Linear feet
LIDAR	Light Detection and Ranging
LOD	Limit of disturbance
LPPRP	Lands, Preservation, Parks and Recreation Plan
m	Meter
M&N	Moffat & Nichol Engineers
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
MEC	Munitions of explosive concern
MES	Maryland Environmental Service
MGS	Maryland Geological Survey
MHT	Maryland Historic Trust
MHW	Mean high water
MLLW	Mean lower low water
MMPA	Marine Mammal Protection Act
MN	Mean range of tide
MPA	Maryland Port Administration
MSA	Maryland State Archives
MT	Metric ton
MTL	Mean tide level
NAAQS	National Ambient Air Quality Standards
NACCS	North Atlantic Coastal Comprehensive Study
NAVD88	North Atlantic Vertical Data 1988
NBS	Nature based solutions
NCDC	NOAA National Climatic Data Center

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLAA	Not likely to adversely affect
NMFS	National Marine Fisheries Service
NNBF	Natural and Nature-based Features
NOB	Natural oyster bars
NOI	Notice of Intent
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
OPA	Otherwise Protected Area (Coastal Barriers Resources Act)
PA	Programmatic Agreement
PAR	Planning Aid Report
PDT	Project Development Team
PED	Preconstruction, Engineering, and Design
PEM	Palustrine emergent wetland
PIERP	Poplar Island Environmental Restoration Project
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RSLC	Relative sea level change
RTE	Rare, threatened, and endangered species
SAV	Submerged aquatic vegetation
sEA	Supplemental Environmental Assessment
sEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
STWAVE	Steady State Wave Model
SU	Standard Units
SWQS	State Water Quality Standards
T&E	Threatened and endangered
TNC	The Nature Conservancy
TOYR	Time of Year Restriction
UMCES	University of Maryland Center for Environmental Science
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
WQC	Water Quality Certificate
WMA	Wildlife Management Area
Ybp	Years before present

1 INTRODUCTION

The U.S. Army Corps of Engineers, Baltimore District, (USACE) in partnership with the Maryland Department of Transportation Maryland Port Administration (MPA), the non-federal sponsor, has prepared this supplemental Environmental Impact Statement (sEIS) 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 James Island. 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. Section 7002 of the Water Resources Reform and Development Act of 2014 authorized the Maryland Mid-Chesapeake Bay Island Project, as described in the Chief's Report, dated August 2009 and the *Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (2009 Mid-Bay FR/EIS)*, dated June 2009. The record of decision (ROD) was signed in July 2019 initiating the next phase of the project, Preconstruction Engineering and Design (PED) Phase. The project moved into the Construction Phase upon the execution of the Project Partnership Agreement, which allowed for the award of the first construction contract for Barren Island in August 2022. This sEIS serves to update NEPA compliance during the Construction Phase of the overall Mid-Bay Island Project. While the James Island component of the project is undergoing design, the Barren Island component is under construction. The sEIS evaluates impacts and benefits associated with the James Island component of the project. The NEPA analysis for the Mid-Bay Island Project incorporates supplemental NEPA documents for the Barren Island component published in March 2022 and a second published in January 2024.

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 (WRDA) of 2014 authorized the Mid-Bay Island Project, as described in the Chief's Report (USACE, 2009a) dated August 24, 2009, and the Mid-Bay Feasibility Report, dated April 2009 (USACE, 2009b). The record of decision was signed in July 2019 initiating the PED phase of the project, which has now progressed into the construction phase. The project is being completed in partnership with a nonfederal sponsor, MPA.

1.2 PROJECT LOCATION AND SETTING

The Mid-Bay Island Project is an environmental restoration and beneficial use of dredged material project planned in the Chesapeake Bay at James and Barren Islands along the Eastern Shore of the Chesapeake Bay in Dorchester County (Figure 1). The James Island project area is situated near the mouth of the Little Choptank River, about one mile north of Taylors Island. James Island was a privately-owned uninhabited island, located at approximately 38º 31’ N latitude and 76º 20’ W longitude (Maryland State Plane Coordinates N 310,000 E 1,503,000) (Figure 1). During the feasibility study three island remnants remained totaling less than 1 acre (ac). Since that time, all island remnants have eroded and the island footprint is under water. Prior to being lost to erosion and rising seas, James Island was one of the last remaining uninhabited islands, providing critically

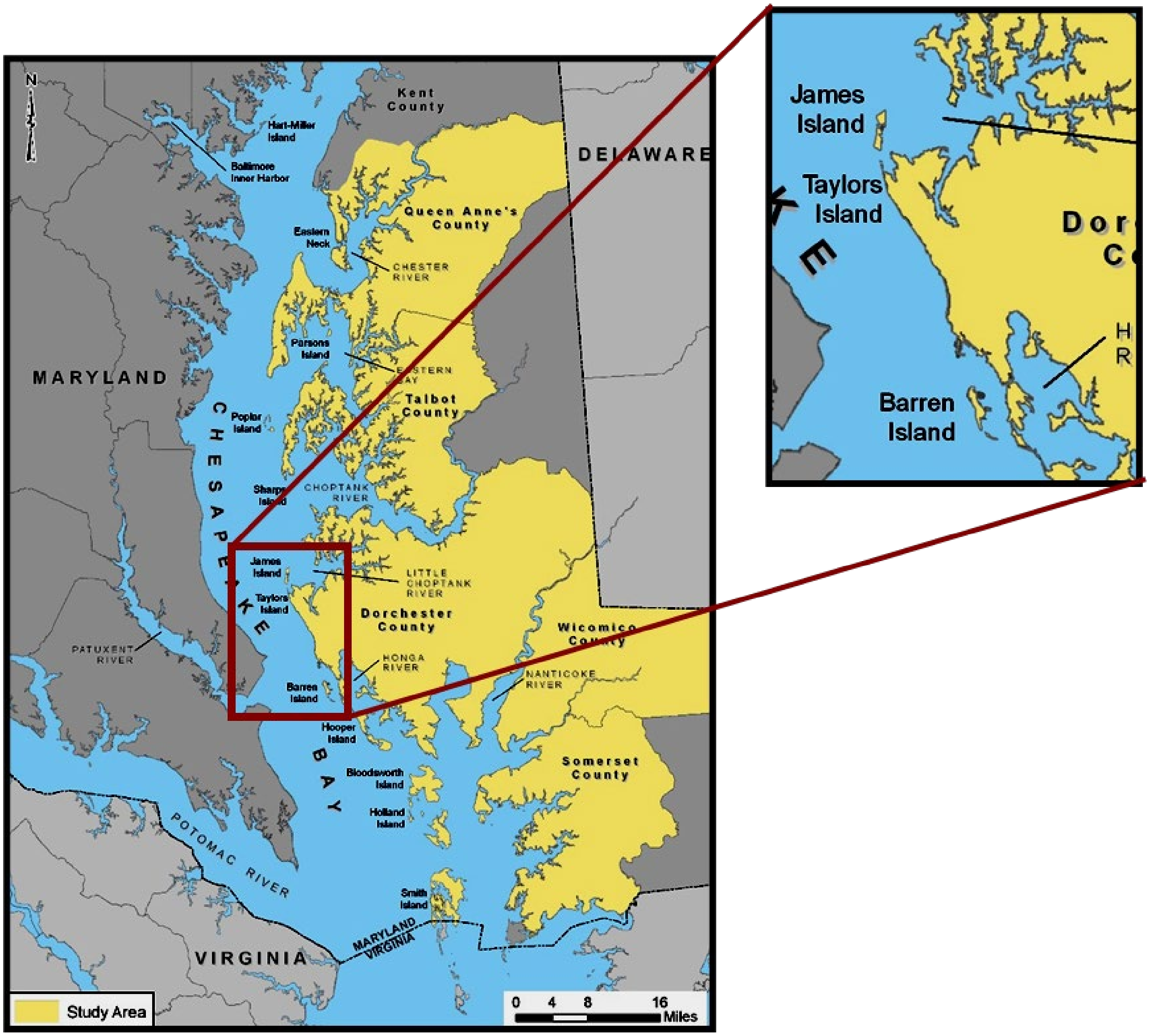

Figure 1. Mid-Chesapeake Bay Study Area

important remote island habitat. Historic mapping of the island indicates that the island once covered approximately 1,350 ac when it was settled in 1660 (Kearney, 1991) and extended to Taylors Island.

The Mid-Bay Island restoration project would support dredged material placement for the following navigation projects: 1) The Baltimore Harbor and Channels Federal Navigation Project, under the jurisdiction of the USACE-Baltimore District; 2) The Inland Waterway, Delaware River to Chesapeake Bay, Delaware and Maryland, C&D Canal Project under the jurisdiction of USACE-Philadelphia District; and 3) other Federal navigation channels under the jurisdiction of the USACE-Baltimore District that require periodic maintenance dredging located between the William Preston Lane, Jr. Memorial Bridge (Bay Bridge) and the State of Maryland's southern border with the Commonwealth of Virginia. Dredged material from within Baltimore Harbor, as statutorily defined by the North Point-Rock Point line within the Patapsco River, will not be considered for placement in the Mid-Bay Island project.

This James Island sEIS will serve as an update and compliment of the 2009 Mid-Bay FR/EIS. Similar data, results, and methods used in 2002, 2003, and 2004 environmental surveys for the 2009 Mid-Bay FR/EIS will be referenced for existing affected environment conditions. However, new studies have been performed in 2020 and 2021 to update information. These updated findings will be detailed and included in this sEIS.

1.3 RELEVANT FEDERAL ACTIONS NEAR THE PROJECT AREA

1.3.1 Federal Navigation Projects

Section 1.5.1 of the 2009 Mid-Bay FR/EIS provides a detailed description of the Baltimore Harbor and Channels Federal Navigation Project, the Baltimore Harbor Anchorages and Channels Project, and the Inland Waterway, Delaware River to Chesapeake Bay, Delaware and Maryland, Chesapeake and Delaware Canal Project. Figures 2 and 3 depict the channels within these projects authorized as sources of dredged material for placement at James Island.

Other Federal navigation channels that require periodic maintenance dredging and could potentially use James Island as a placement site are listed in Table 1. These channels are located between the William Preston Lane, Jr. Memorial Bridge (Bay Bridge) and the State of Maryland and Commonwealth of Virginia border. The numbers after each channel project correspond with the map as shown on Figure 4. Whereas, each of these channels could be a source of dredged material placed at James Island, the Cambridge Harbor, Madison Bay, and Slaughter Creek Federal navigation projects are located in the vicinity of James Island and would be the projects most likely to use James Island as a placement site. Only clean dredged material is planned to be used for the habitat restoration project, any dredged material placed at James Island will need to meet specifications as documented in applicable permits. Dredged material placement sites for these projects are developed on a case-by-case basis due to the limited funding available to dredge these projects and the infrequent dredging requirements of the projects.

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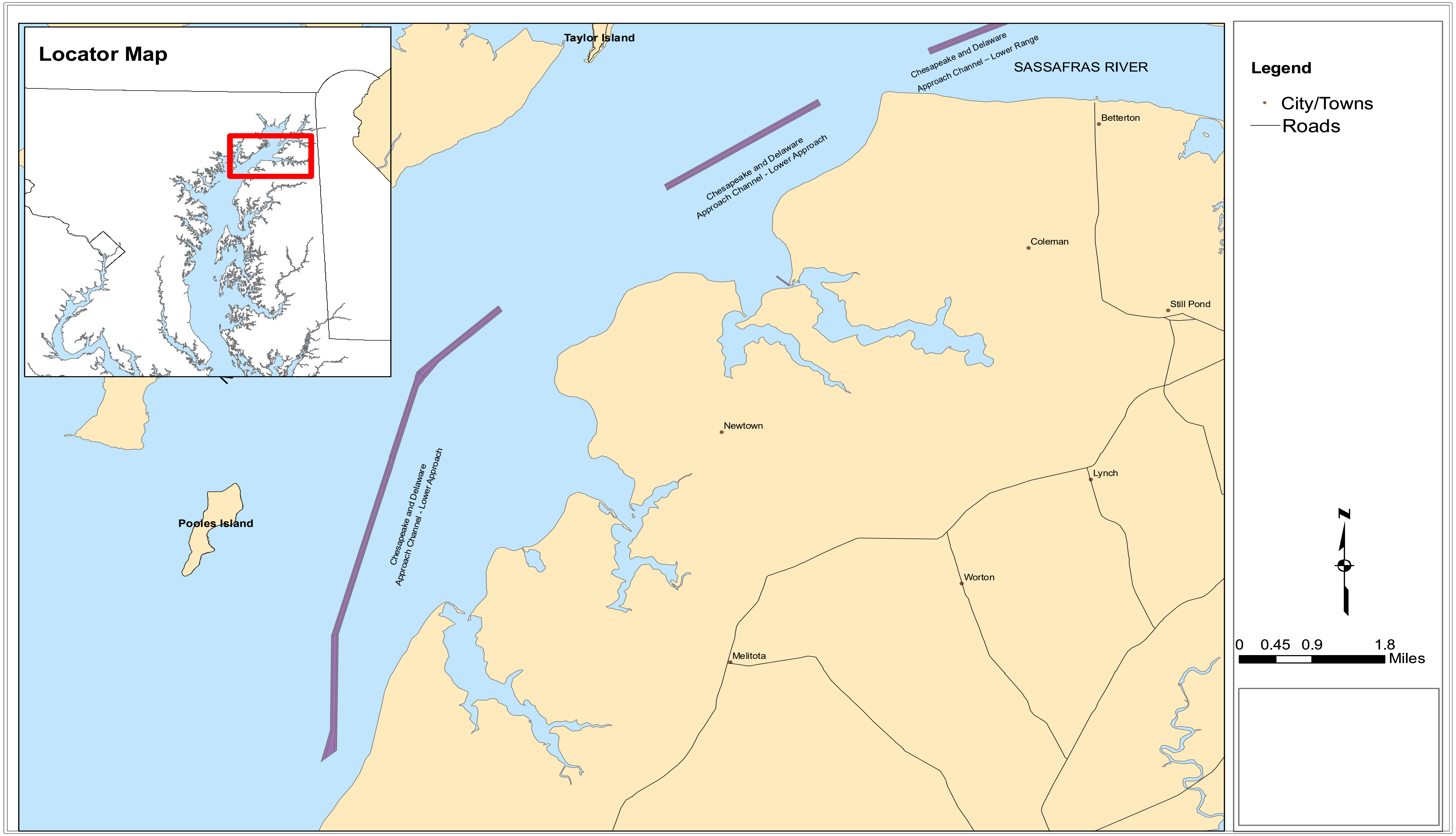

Figure 2. Chesapeake and Delaware (C&D) Canal Approach Channels

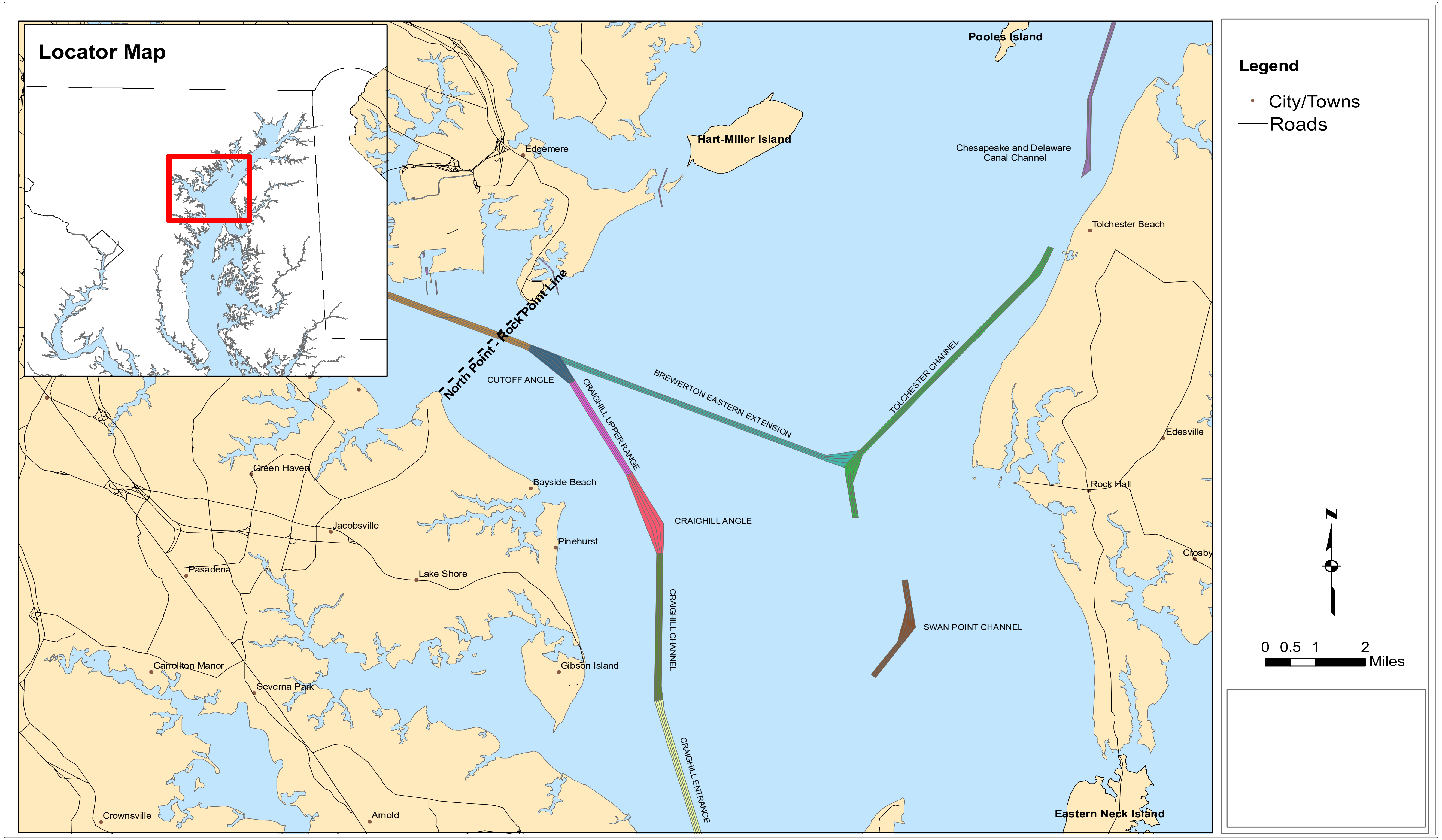

Figure 3. Upper Chesapeake Bay Approach Channels (MD)

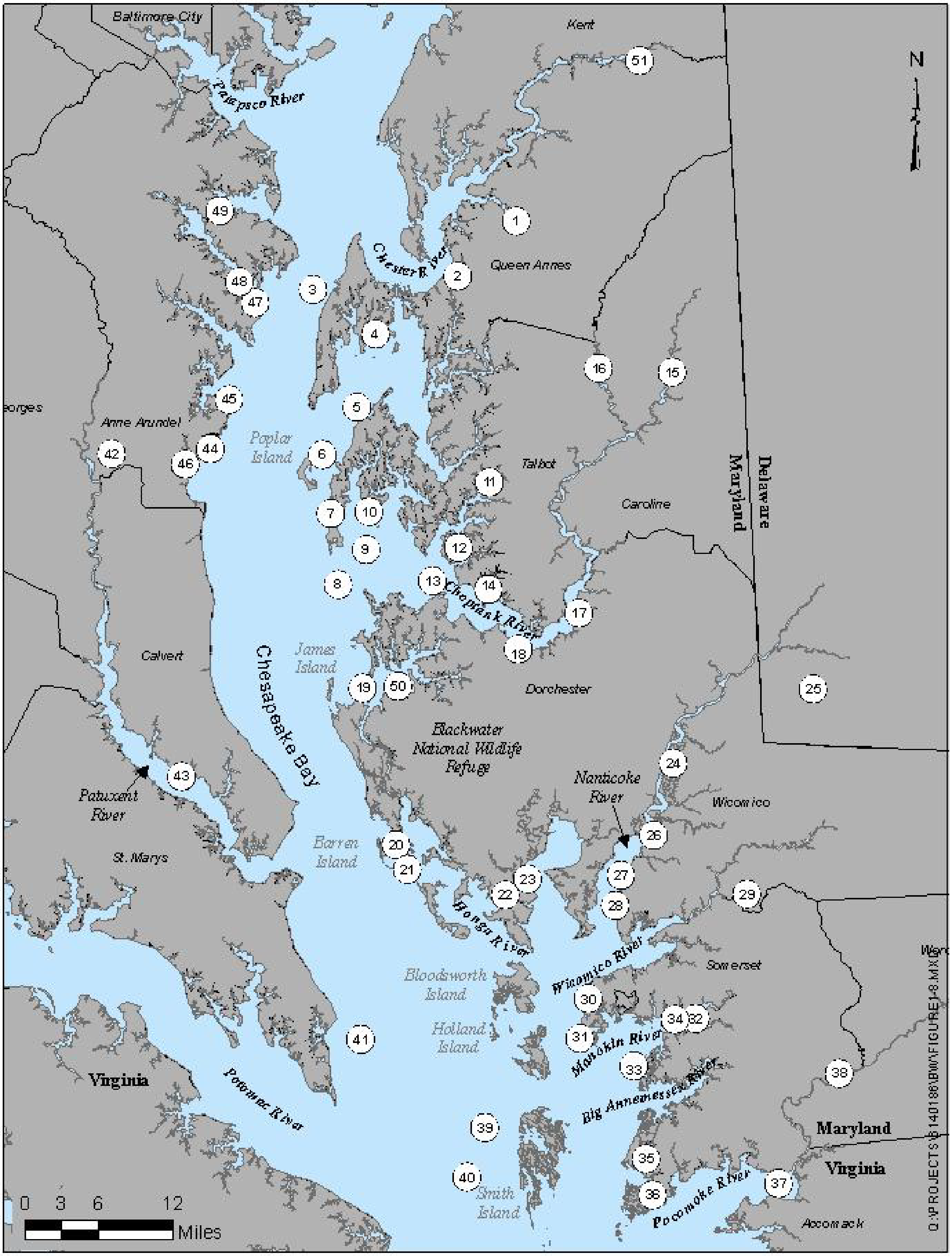

Figure 4. Federal Navigation Channels in the Chesapeake Bay

Table 1. Federal Navigation Channels Requiring Periodic Maintenance Dredging with Potential for Placement at the Mid-Bay Island Project

Western Side of the Chesapeake Bay	Eastern Side of the Chesapeake Bay
Annapolis Harbor, MD (48)	Black Walnut Harbor, MD (8)
Back Creek, MD (47)	Broad Creek, MD (36
Cypress Creek, MD (49)	Broad Creek River, DE (25)
Fishing Creek, MD (44)	Cambridge Harbor, MD (18)
Herring Bay and Rockhold Creek, MD (45)	Chester River, MD (51)
Nan Cove, MD (43)	Choptank River, MD (15)
Parish Creek, MD (46)	Claiborne Harbor, MD (5)
Patuxent River, MD (42)	Corsica River, MD (1)
St. Jerome Creek, MD (41)	Crisfield Harbor, MD (35)
	Duck Point Cove (Hearns Creek), MD (22)
	Fishing Bay, MD (23)
	Goose Creek, MD (33)
	Honga River and Tar Bay, MD (20)
	Island Creek, MD (13)
	Knapps Narrows, MD (7)
	La Trappe River, MD (14)
	Little Creek, Kent Island, MD (3)
	Lower Thorofare, MD (31)
	Lowes Wharf, MD (6)
	Madison Bay, MD (50)
	Manokin River, MD (32)
	Muddy Hook and Tyler Coves, MD (21)
	Nanticoke River at Bivalve, MD (27)
	Nanticoke River at Nanticoke, MD (28)
	Nanticoke River, DE & MD (24)
	Neavitt Harbor, MD (10)
	Pocomoke River, MD (37)
	Queenstown Harbor, MD (2)
	Rhodes Point to Tylerton, MD (40)
	Shad Landing State Park, MD (38)
	Slaughter Creek, MD (19)
	St. Michaels, MD (4)
	St. Peters Creek, MD (34)
	Tilghman Island Harbor (Dogwood Harbor), MD (9)
	Town Creek, MD (12)
	Tred Avon River, MD (11)
	Tuckahoe River, MD (16)

Western Side of the Chesapeake Bay	Eastern Side of the Chesapeake Bay
	Twitch Cove and Big Thorofare River, MD (39)
	Tyaskin Creek, MD (26)
	Upper Thorofare, MD (3)
	Warwick River, MD (17)
	Wicomico River, MD (29)

1.3.2 Beneficial Use of Dredged Material

1.3.2.1 Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island

The Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (Poplar Island) is an ecosystem restoration project located in the Chesapeake Bay, Talbot County, MD; 39 miles (34 nautical miles) south-southeast of the Port of Baltimore, and two miles northwest of Tilghman Island. Poplar Island is approximately 15.5 miles north of James Island. The original project authorization was signed in 1998 and allowed for dredged material from the Upper Chesapeake Bay Approach Channels that service the Port of Baltimore to be beneficially used to restore 1,140 ac of wetland and upland habitat providing approximately 40 million cubic yards (MCY) of dredged material. The restored island will resemble the approximate 1847 footprint, which, as of 1996 prior to restoration, had eroded to three separate islands with an area of less than 3 ac. To date, 372 acres of wetlands have been restored as part of the original project efforts. Approximately 45.3 million cubic yards (MCY) of dredged material has been placed at the site since 2001.

1.3.2.2 Poplar Island Expansion

USACE guidance specifies that the expansion of existing sites should be considered for placement capacity before new placement sites are proposed. The General Reevaluation Report and Supplemental Environmental Impact Statement for Poplar Island investigated the opportunities for expanding Poplar Island. The study was completed in September 2005 and recommended the construction of a northern lateral expansion of approximately 575 ac, consisting of 206 acres of wetland, 110 acres of open water embayment habitat and 259 acres of upland habitat, as well as vertical expansion of five feet (ft) for two existing upland cells. The final study was publicly released in September 2005. The Chief's report was signed on 31 March 2006. The Poplar Island project authorization was modified to include the expansion by Section 3087 of WRDA 2007. The construction of the containment dikes and spillway structures for the expansion was completed in January 2021 and dredged material started being placed in the new expansion cells in April 2021.

It is estimated that the Expansion will provide an additional 28 MCY of dredged material placement capacity. Poplar Island, including the Expansion are projected to reach capacity in 2030. Once habitat development is complete, Poplar and Poplar Expansion will have restored 1,715 acres of remote island habitat.

1.3.2.3 Mid-Chesapeake Bay Island Ecosystem Restoration Project: Barren Island

Barren Island is part of the Mid-Chesapeake Bay Island Ecosystem Restoration Project for which this sEIS is a supplement. Barren Island lies 13.5 miles south of James Island, in the Chesapeake Bay west of Hoopers Island. The Barren Island Supplemental Environmental Assessment was completed in March 2022 and the Barren Island Borrow Area Supplemental EA was completed in January 2024. The construction of the stone sills and breakwaters began in March of 2023. The restoration plan for Barren Island includes approximately 300,000 CY of dredge material from a local borrow area and dredge material from federally-maintained small navigation channels such as the Honga River to be used for island restoration and wetland development. The completion of the Barren Island component of the Mid-Bay Islands restoration project will convert approximately 121 ac of shallow water subtidal estuarine habitat to approximately 83 ac of wetlands, 8 ac of nesting bird islands, and 31 ac of sills and breakwaters.

1.3.2.4 Tar Bay Wildlife Management Area adjacent to Barren Island

Prior to the Mid-Bay Feasibility Report in the early 2000s, there had been restoration efforts undertaken by USACE at Barren Island to restore wetlands and nesting bird habitat. In the fall of 1981, USACE dredged the Federal channel leading from the Chesapeake Bay to the Honga River, accumulating over 176,500 cubic yards (CY) of fine-grained material to deposit nearby. For economic purposes, the site needed to be within 2 miles (3.2 kilometers (km)) of the dredging area. The decision was made to deposit the material in a shallow water area off of the northeast corner of Barren Island. This cove area had a moderate erosion rate ranging from 3.4 to 7.9 ft (1.2 to 2.4 meters (m)) per year; north of this area was an accretion area dominated by smooth cordgrass (*Spartina alterniflora)*, south of the cove and into the interior of the island was dominated by loblolly pine (*Pinus laeda*). Seeding of the site with *S. alterniflora* following dredge material placement was completed in spring 1982, and saltmarsh hay (*Spartina patens)* was transplanted at the uppermost tidal elevations (Earhart and Garbisch 1983). A ditch (9.8 ft, 1,200 ft long, and -1 ft MLW) was developed using high pressure water along the western end of the placement site. This was done to encourage tidal flushing to a pond area, to improve access for fish and to discourage access to the placement site by predators, ideally to maintain it as a predator-free least tern (*Sterna antillarum*) nesting site. Shell was deposited at this location to create a 0.25 ac (1,000 m^2) area to encourage nesting by shorebirds (Earhart and Garbisch 1983). This site was subsequently used by least terns in the summer of 1982, and USACE estimated a minimum of 462 least terns in the area, 30 black skimmers, 5 common terns, herring gulls (*Larus argentatus*), and killdeer (*Charadrius vociferous*). To further enhance the nesting area, an additional 0.11 ac (460 m^2) of oyster shell was placed and then raked in the winter of 1982 to create the conditions of documented nesting preferences of the aforementioned species.

In 1984, USACE dredged approximately 150,000 CY of material from the Honga River channel. USACE deposited approximately 49,700 CY of material on the northeast edge of the original wildlife habitat island that was established in 1981. North of the habitat island, over 99,000 CY of material was deposited. This created a 11.6 ac (4.7-hectare (ha)) island to provide additional protection to Barren Island. Habitat was developed in this area by controlled elevation of dredged material and post-placement landscaping. Following dredged material placement, *Spartina alterniflora* was planted in some areas, and sand and shell deposited in others to provide nesting substrate for the terns and skimmers that had historically been present (Earhart and Garbisch 1986).

1.3.2.5 Prior efforts at Barren Island

A small portion of the island on the northwest was created by USACE-Baltimore District Operations and Navigation Division using dredge material taken from the realignment of the adjacent Honga River channel. In 1994, a contract was awarded to allow filling and placing of geotextile tubes along the western side of Barren Island using dredged material from the Honga River channel. Approximately 1,800 ft of geotextile tubes were filled and placed along the northwest shoreline of Barren Island by USACE-Baltimore District to reduce erosion and capture material to restore wetlands habitat. The geotextile tubes were unable to perform as planned in the exposed environment. As a result, in 2003, the geotextile tubes were incorporated into stone sills. Following sill construction, 138,000 CY of dredged material was placed leeward of the 1,800 linear feet (lf) of sills and planted with marsh grasses to restore 5 acres of wetland habitat.

1.3.3 Ecosystem Restoration Project in Dorchester County

Wetland restoration in Dorchester County, MD is one of the seven alternatives recommended for additional study by the Federal Dredged Material Management Program (DMMP) (USACE, 2005). Blackwater National Wildlife Refuge (Blackwater NWR) is a 28,000-ac complex, consisting of 1/3 wetland, 1/3 forest, and 1/3 open water. More than 7,000 ac of tidal marsh in Blackwater NWR have drowned in place or have been lost to erosion since 1940 as a result of sea level rise, hydrologic changes, wildlife damage, and vegetation management practices (USACE, 2002). The importance of Blackwater NWR has been recognized nationally and internationally. Blackwater NWR wetlands are designated as Wetlands of International Importance and is one of six priority wetland areas identified by the North American Waterfowl Management Plan. Further, The Nature Conservancy has named Blackwater NWR one of the 'Last Great Places'. In 2001, USACE, U.S. Fish and Wildlife Service (USFWS), and Maryland Department of Natural Resources (MDNR) began investigations under Section 206 Aquatic Ecosystem Restoration of the Continuing Authorities Program to assess the feasibility of restoring several hundred acres of brackish marsh in the Blackwater NWR. MDNR, the study sponsor of that effort, has been involved in further Blackwater restoration studies under the auspices of the Maryland Marsh Restoration and Nutria Control Project.

As part of the Section 206 feasibility assessment (2001), USACE-Baltimore District conducted a demonstration project using thin-layer dredged material spraying and conventional dredged material placement techniques on approximately 15 to 20 ac of degraded marsh at Blackwater NWR. Dredged material was used to increase the surface elevation in areas where the marsh was failing or had recently failed. The raised areas were then planted with wetland flora (USACE, 2002 and 2004). Monitoring studies indicated that the marsh plants performed well during their first summer of growth (USACE, 2004). The demonstration area has persisted and continues to be well vegetated. An additional thin layer project was completed in 2016 at Blackwater NWR by USFWS in partnership with organizations such as The Conservation Fund and Audubon.

Future ecosystem restoration efforts at Blackwater NWR are necessary and important for several reasons: the Blackwater marsh system is of great regional ecological significance; tidal marsh losses have been extensive and are likely to have regional ecologically detrimental consequences; human activities have contributed to marsh losses; and the tidal marshes will not recover without human intervention. The project proposed in the Federal DMMP consists of placement of approximately 2 ft of dredged material (totaling approximately 6 MCY) over approximately 2,000 ac of degraded wetlands in Dorchester County. The dredged material would be hydraulically pumped into temporary containment (earthen berms) in the areas proposed for restoration.

1.3.4 Large-scale Oyster Restoration Efforts

Oyster populations in the Chesapeake Bay have declined, largely due to diseases, overharvesting, poor water quality, and loss of habitat. In the Chesapeake Bay approximately one percent of historic oyster populations remain. Oysters are an important resource in the region as they provide environmental and economic benefits such as commercial fishery, reef habitat, and water quality. In May 2009, President Obama issued Executive Order 13508, “Chesapeake Bay Protection and Restoration.” This executive order describes federal actions to protect and restore the health, heritage, natural resources, and social and economic value of the nation's largest estuarine ecosystem and the natural sustainability of its watershed including oyster restoration. In 2012, USACE drafted the Native Oyster Restoration Master Plan for sanctuary-based oyster restoration throughout the Chesapeake Bay and its tributaries in Maryland and Virginia. Subsequently, the 2014 Chesapeake Bay Agreement identified the goal to restore 10 tributaries by 2025. Large-scale oyster restoration includes creation of new oyster habitat, rehabilitation of existing non-productive oyster habitat, production of spat, planting of spat on restored reefs, and monitoring of restoration efforts with the goal of establishing self-sustaining populations that meet defined success metrics. Initial restoration efforts for the oyster restoration initiative of ten tributaries will be completed by 2025. Initial restoration efforts include placement of substrate to restore reef habitat and planting spat on shell. Monitoring and adaptive management will continue in subsequent years. Reefs are monitored to determine if they meet Oyster Metrics success criteria, which includes oyster density and biomass, presence of multiyear oyster classes and structural integrity (Maryland and Virginia Oyster Restoration Interagency Workgroups of the Chesapeake Bay Program’s Sustainable Fisheries Goal Implementation Team, 2023). Of the ten locations selected for restoration efforts, three are located in the vicinity of James Island: the Little Choptank River, Harris Creek, and the Tred Avon River (NOAA 2023).

1.3.4.1 Little Choptank River

The Little Choptank River restoration area is located approximately four miles east of James Island. Prior to the restoration efforts, approximately seven acres of oyster reefs existed in the Little Choptank River. Beginning in 2014, restoration work conducted in the Little Choptank River has resulted in a total of approximately 360 acres of restored reefs. With initial restoration work being completed in 2020, reef monitoring is ongoing. Monitoring to date shows that reefs are meeting the established minimum threshold success criteria (Maryland and Virginia Oyster Restoration Interagency Workgroups 2024a). All reefs monitored in 2021 and most reefs monitored in

2022/2023 made the higher restoration targets (Maryland and Virginia Oyster Restoration Interagency Workgroups 2022, 2024b).. .

1.3.4.2 Harris Creek

The Harris Creek restoration area is located approximately 15 miles north of James Island. Harris Creek restoration work was completed in 2015 with approximately 350 acres of reef restored. Continuous monitoring of the restoration area occurred for the first six years after completion. During the monitoring period all 90 restored reefs were evaluated based on the Oyster Metrics criteria. Of the 348 acres that received restoration treatment, all but five acres met the success criteria. With 98% of the reefs meeting the minimum threshold of oyster density and 76% of the reefs meeting the higher density and biomass, the oyster restoration at Harris Creek can be considered a success.

1.3.4.3 Tred Avon River

The Tred Avon River oyster restoration area is located approximately 20 miles northeast of James Island. Restoration efforts began in 2015 and approximately 130 acres of restored oyster reefs were completed in 2021. Monitoring of restoration sites has continued and as of 2022, more than 85% of restored reefs have met the minimum threshold of oyster density and biomass, indicating progress toward meeting long-term restoration goals.

2 PUPROSE, NEED, AND OBJECTIVES

2.1 PURPOSE

The 2009 Mid-Bay FR/EIS 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 purpose of the prior study that recommended James and Barren Island for the Mid-Bay Island Project was to determine 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 suitable dredged material from the Upper Chesapeake Bay Approach Channels. The purpose of the James Island component is to beneficially use dredged material to restore remote Chesapeake Bay Island habitat. The purpose of this sEIS is to update the NEPA documentation for the James Island component of the Mid-Bay Island Project in order to document changes in conditions and/or impacts at the James Island component since the initial study was conducted, and to document investigations aimed at modernizing the design of the James Island component by including Engineering With Nature (EWN) approaches for the exterior dike design.

2.2 NEED

The Mid-Bay Island Project addresses two needs: 1) the restoration of remote island habitat to benefit wildlife including a diverse assemblage of birds, fish, herpetofauna, and invertebrates; and 2) an acceptable long-term approach for dredged material placement. There is a need to restore Chesapeake Bay remote island habitat that is quickly being lost due to erosion and sea level rise that is exacerbated by climate change. Remote islands, a critical ecosystem component in the Chesapeake Bay, are offshore landforms that provide isolation, lack of human disturbance, and few predators. These conditions uniquely support isolated nesting and foraging habitat for a diverse assemblage of wildlife. Extensive island habitat loss has occurred within the Mid-Chesapeake Bay, as exhibited at James Island. At its time of settlement in the early 1600s, James Island was documented to be 1,350 ac (Cronin, 2005). During the feasibility study, James Island totaled less than 100 acres. The island eroded to multiple remnants of approximately 3 acres by 2020, and is now submerged (MES et al., 2002). Sea level rise and related erosion, as well as land subsidence and wave action are the primary drivers of island loss. The project provides an opportunity to utilize 90 – 95 million cubic yards of clean dredged material over an estimated 32-year period to restore 2,072 acres of remote island habitat at James Island.

2.3 OBJECTIVES

The objective of the Mid-Bay Island Project is to restore and protect valuable but threatened Chesapeake Bay remote island ecosystems through the beneficial use of dredged material incorporating resilience to climate change and coastal storms. The project will provide for habitat protection and restoration that contributes to multiple Bay-wide restoration goals.

The objectives of the Mid-Bay Island Project (as outlined in the 2009 Mid-Bay EIS/FR) are listed below. All remain valid for the James Island project except the protection of existing island habitat, including sheltered embayments which is located at Barren Island and addressed by that project component.

- Restore and protect wetland, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals;
- Protect existing island ecosystems, including sheltered embayments, to prevent further loss of island and aquatic habitat;
- Provide dredged material placement capacity (3.2 MCY/yr) for Federal navigation channels;
- Increase wetlands acreage in the Chesapeake Bay watershed to assist in meeting the Chesapeake 2000 (2014) Agreement goals;
- Decrease local erosion and turbidity;
- Promote conditions to establish and enhance submerged aquatic vegetation; and
- Promote conditions that support oyster recolonization.

3 EXISTING RESOURCES

3.1 SETTING

James Island was a privately-owned uninhabited island, located in the Chesapeake Bay in Dorchester County, Maryland near the mouth of the Little Choptank River, about one mile north of Taylors Island. The location is approximately 38° 31’ N latitude and 76° 20’ W longitude (Maryland State Plane Coordinates N 310,000 E 1,503,000). James Island was historically a peninsula, consisting of uplands, connected to Taylors Island. James and Taylors Island together made up a several thousand-acre landmass. In 1847, James Island consisted of approximately 976 ac. As shoreline erosion continued, the connection between James Island and Taylors Island breached. An 1862 nautical chart showed James

Island separated by a small creek from Taylors Island. In 1942, the connection was completely breached. As shoreline erosion continued to occur, James Island became fragmented into three island remnants. In 1994, the three remnants that make up James Island totaled 92 ac. The MDNR estimated that erosion caused James Island to lose approximately 884 ac at a rate of 6 ac per year between 1847 and 1994 (MES *et al*., 2002). During the writing of the *Final Mid- Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement,* the three remnants contained areas of high and low salt marsh, upland and depressional wetlands, and mixed forest stands of loblolly pine. James Island has now fully eroded with all remnants fully submerged. Per Maryland state law, once land has eroded to a point where it is below water at MHW, it becomes State tidal wetlands and held in trust for the citizens of Maryland. As such, James Island is no longer considered privately-owned. Figure 5 depicts the history of island loss at James Island through a time series of the shoreline.

3.2 PHYSIOGRAPHY, GEOLOGY, AND SOILS

The geologic history of the Chesapeake Bay is dominated primarily by the changes in sea level that occurred throughout the Pleistocene epoch from 1.65 million to 6,000 years before present (ybp). Sea level rose as glaciers retreated and fell while they advanced during this time period. There are at least nine glacial advances during the Pleistocene. The present Chesapeake Bay evolved as river valleys became entrenched during the last Pleistocene low stand of sea level and were drowned as the Holocene transgression progressed. Thus, the deep portions of the Chesapeake Bay are the incised channels that flooded during the period of rapid sea level rise and the shallower margins are areas that have been eroded, filled, or flooded since then.

James Island is comprised of Holocene Tidal Marsh Deposits and the Kent Island Formation (Middle Wisconsin or Upper Sangamon) primarily consisting of silt and clay with thin beds of sand. Together these units have a thickness of approximately 10 ft to 25 ft. Underlying this is the Chesapeake Group Formation (older Miocene) consisting of interbedded micaceous sand, silt, and clay (MPA, 2002).

Feasibility phase soil borings at James Island indicated that the subsurface conditions consist of three strata. Stratum 1 is a silty clay, generally composed of soft dark gray strata. Stratum 1 is discontinuous and occurs at a depth of up to 15 ft thick. Stratum 2 is a slightly silty to silty sand, generally composed of loose to dense gray, brown strata. Stratum 2 varies in thickness from 0 to 40 ft. Stratum 3 underlies the entire site and consists of greenish gray silty clay with layers of green gray and light gray silty sand (MPA, 2002).

The project area lies within the Middle Atlantic Coastal Plain physiographic province. The Coastal Plain consists of layers of unconsolidated sediments including gravel, sand, silt, and clay composed in a wedge-shape beneath the surface. As a consequence of erosion and land-inundation**,** the Chesapeake Bay grows by several hundred acres per year. Erosion and subsequent conversion to shallow open water negatively impacts both terrestrial and aquatic species. Land losses occur Bay wide but are concentrated in the low-lying lower Eastern Shore (USACE, 1990).

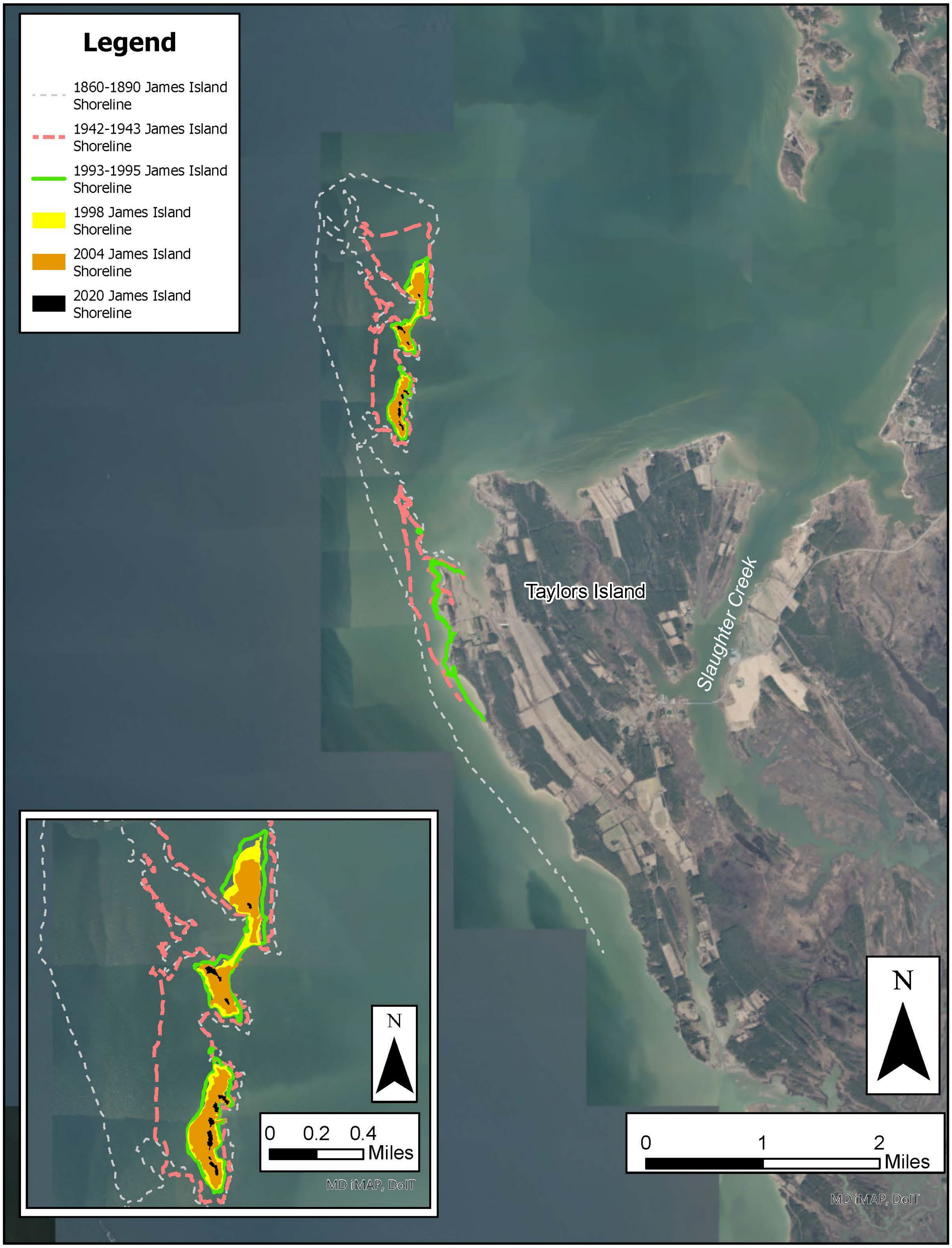

Figure 5. Historic Footprints of James Island (1847-1994)

James Island was historically a peninsula, consisting of uplands, connected to Taylors Island. James Island is located in the Albemarle Silty Lowlands and Tidal Marshes region, which is composed of alluvial sand and silt, estuarine sand and silt, saline marsh deposits and marine sand, silt, and clay that originate from the Quaternary age. The ecoregion is low in elevation and is comprised of terraces, tidal marshes, ponds, swampy streams, and wetlands. Elevations range from 0 to 50 ft and relief is less than 35 ft. James Island rested at a very low elevation and in 2023, no island remnants remain above mean high water (MHW).

3.3 CLIMATE

James Island exists 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).

3.4 TOPOGRAPHY AND BATHYMETRY

3.4.1 Topography

As of 2023, there are no areas above mean sea level at James Island.

3.4.2 Bathymetry

A bathymetric survey for the waters around James Island was conducted from April to May 2020 (Figure 6). Water depths within the vicinity of the James Island restoration project area vary from -0.3 m to -8.2 m (-1 ft to -27 ft) mean lower low water (MLLW) (-1.8 to -27.8 ft NAVD88). Water depths range from -0.6 m to -2.7 m (-2 ft to -9 ft) MLLW (-2.8 to -9.8 ft NAVD88) in the waters east of the project footprint where the island remnants are located. Within the footprint, the shallowest water depths are at the southern tip of the proposed project. The deepest water depths are -3.9 m (-13 ft) MLLW (-13.8 ft NAVD88). The perimeter dike is situated in waters that range from -1.2 m to -3.9 m (-4 ft to -13 ft) MLLW (-4.8 to -13.8 ft NAVD88) in depth. The existing bay bottom for the proposed turning basin varies in depth from -10 to -13 ft MLLW (-10.8 to -13.8 ft NAVD88) while the water depths within the footprint of the access channel varies from -13 to - 25 ft MLLW (-13.8 to -25.8 ft NAVD88).

3.5 METOCEAN CONDITIONS (HYDROLOGY/HYDRODYNAMICS)

3.5.1 Hydrology

There are over 50 tributaries delivering freshwater directly into the Chesapeake Bay. Eighty-five to 90% of the freshwater input is derived from tributaries entering the Chesapeake Bay on the north and west and the remaining 10 to 15% is from Eastern Shore tributaries. The Susquehanna River to the north supplies approximately 50% of the freshwater delivery [annual average of 1,098 m^3/s)]. Together, the Susquehanna, Potomac, Rappahannock, York, and James Rivers provide 90% of the freshwater to the Chesapeake Bay. A nearly equal volume of saltwater enters from the ocean at the

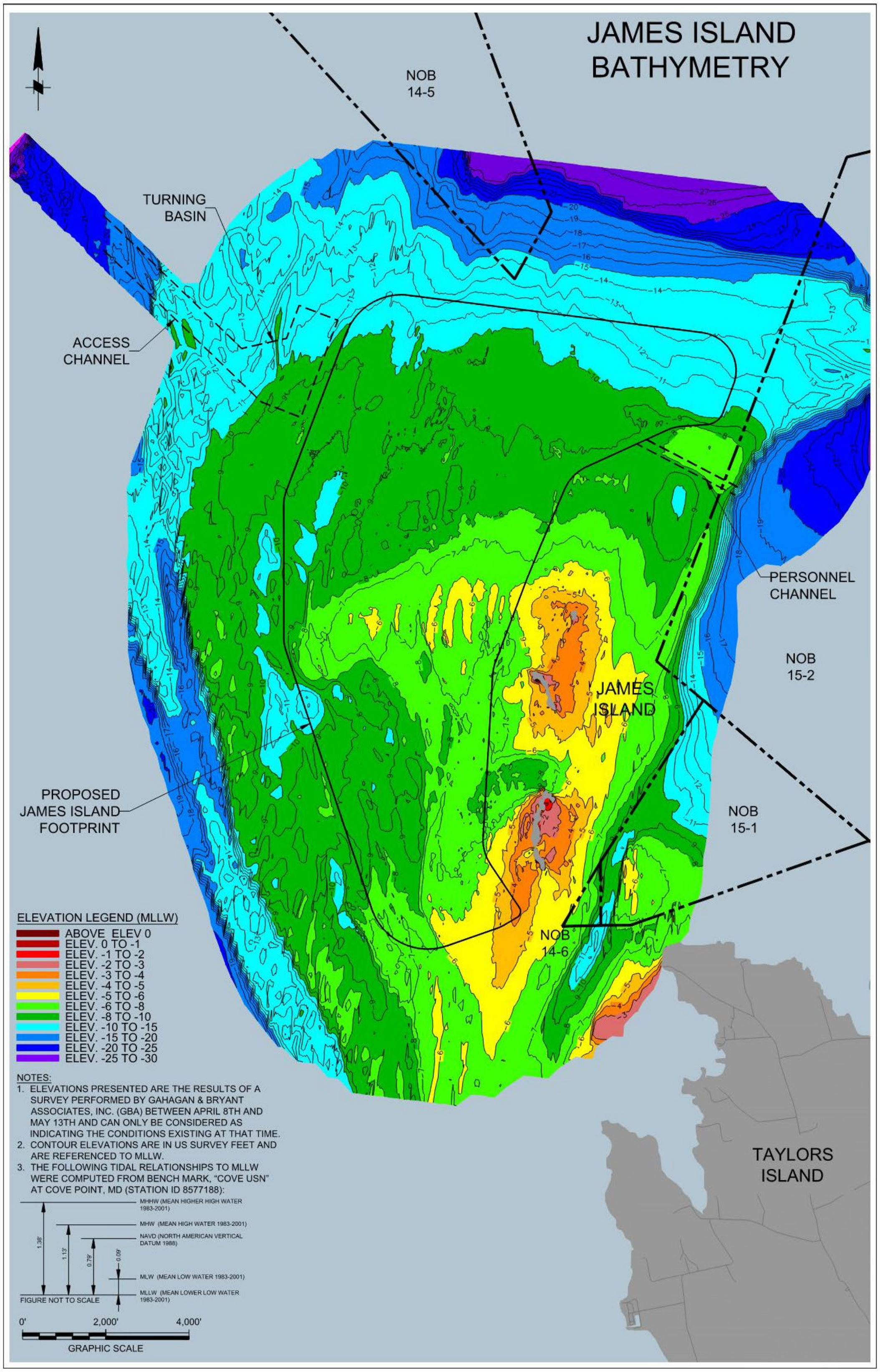

Figure 6. James Island Location Map and Bathymetry

mouth of the Chesapeake Bay. Thus, the salinity of Chesapeake Bay water varies from near seawater (32.5 ppt) at the mouth, to freshwater (0 ppt) north of Baltimore, MD. Surveys completed in 2020 to 2021 determined salinity in the project area ranged between a spring average of 11.5 ppt to a fall average of 16.2 ppt (Anchor QEA 2022).

3.5.2 Water Levels

Water levels are generally composed of tide, storm surge, and wave setup. Design water levels need to include local wave crest and relative sea level change (RSLC). The tide, storm surge and RSLC information are detailed in the RSLC and Vertical Datum Assessment for James Island provided in Appendix A7.

Water level in the Chesapeake Bay is also susceptible to weather conditions such as the strength and duration of wind speed and direction, and barometric pressure changes; tidal changes; runoff; and freshwater stream flow from the Susquehanna River basin, which typically contributes approximately 50% of the flow to the Chesapeake Bay. Higher water level can be produced by decreased barometric pressure and changing wind direction to the orientation of the basin during a meteorological event. For example, a local squall line may cause significant changes in local water level for a short duration, whereas a large-scale storm can alter the water level in the entire Bay for several days. In the Chesapeake Bay, relatively frequent meteorological patterns are also seen to significantly alter the water level. A moderate seasonal variation in water level, higher in the summer and lower in the winter, is usually observed in the Bay. Therefore, non-astronomical factors, such as the configuration of the shoreline, local bathymetry, and meteorological influences all contribute to altering the water level.

3.5.2.1 Tide

Normal water levels at James Island are dictated by astronomical tides, although other factors like wind and freshwater inflow can be important influences. Table 2 shows the tide levels near James Island through three National Oceanic and Atmospheric Administration (NOAA) gauges. The data duration of the tide gauge at James is very limited, thus the Solomons Island gauge is included to provide a long-term record of sea level rise in the region.

3.5.2.1 Relative Sea Level Change

The rate of sea level rise in the Chesapeake Bay, and the entire Mid-Atlantic area, is twice the worldwide average, likely due to isostatic adjustment from the last glacial retreat and land subsidence (USGS, 1998). Sea level rise is faster in the Chesapeake Bay region compared to other locations due to the added contribution from land subsidence. The rate of sea level rise decreases northward, possibly due to lesser isostatic rebound (USGS, 1998).

Current tide gauge records around the Chesapeake Bay show that the rate of sea level rise during the 20th century has not been constant and that modern rates are more rapid than those determined by geologic studies conducted several decades ago. Bay water rose approximately 1 foot over the past century. The current rate of sea-level rise was determined for the project from

Table 2. Selected tide gauge locations and data comparisons

Contents	Solomons Island	Barren Island	James Island
Gauge No	NOS 8577330	NOS 8571579	Local #1385
Measure period	~1937 to 2022	1/1/2002 to 3/31/2003	12/18/2004 to 2/9/2005
Date for MSL	1992	1992	1992
Data source	NOAA	NOAA	ERDC
MHHW (ft)	1.48	1.55	1.68
MLW (ft)	1.33	1.38	1.46
MSL (ft)	0.76	0.79	0.82*
MTL (ft)	0.75	0.77	0.80
MLW (ft)	0.16	0.16	0.16
MLLW (ft)	0.00	0.00	0.00
NAVD88 (ft)	0.85	1.22	0.80

Note: * estimated by author; MSL = mean sea level

the Solomons Island gauge record that span 1937 to the present providing a sufficiently long dataset for SLR analyses.

In 2023, USACE's Climate Preparedness and Resilience Community of Practice released a new tool named the Sea Level Analysis Tool (SLAT) for use in evaluating sea level rise projections (https://climate.sec.usace.army.mil/slat/). SLAT is designed to integrate and expand the functionality of two existing tools, the Sea Level Change Curve Calculator and the Sea Level Tracker and is now the recommended analysis tool for USACE projects. The prior Sea Level Change Curve Calculator projected a 3.41 mm/yr (0.01119 ft/yr) rate of RSLC based on data through 2006. The new recommended SLAT tool projects a 6.09 mm/yr (0.01998 ft/yr) RSLC rate using measured date from 1984 – 2024. The new SLAT tool prediction is much higher than that from the prior tool. Given the length of the data series available from the Solomons Island gauge, a modified SLAT projection was developed that incorporated the full Solomons Island gauge data record from 1937 – 2024 into SLAT. Using the full record, the SLAT tool predicts a RSLC rate of 4.07 mm/yr (0.01335 ft/yr). This rate will be used for the project's future RSLC projections as it appropriately represents the current trend. Recent SLR appears to be tracking above the Intermediate projection, but slightly below the High curve.

Figure 7 provides the sea level trend curves at Solomons Island based on the data from 1937 to 2024 using SLAT 2024. This prediction is based on the 1937-2024 87-yr full-data SLC rate of 4.07 mm per year (0.01335 ft/yr). The SLC rate of 4.07 mm/yr (0.013353 ft/yr) is in a 95% confidence interval based on the 87-year monthly sea level data from 1937-2024.

The thin light green line is the 5-year moving average. The thick red line is the 19-year mean sea level moving average. The red, blue and green lines provide the three USACE RSLC projection scenarios (High, Intermediate, and Low). The red line is the sea level change under the High projection. The blue line is sea level change under the Intermediate projection and the green line corresponds to the Low projection. Sea level rise has been tracking close to the high projection but lower than the high projection in this region.

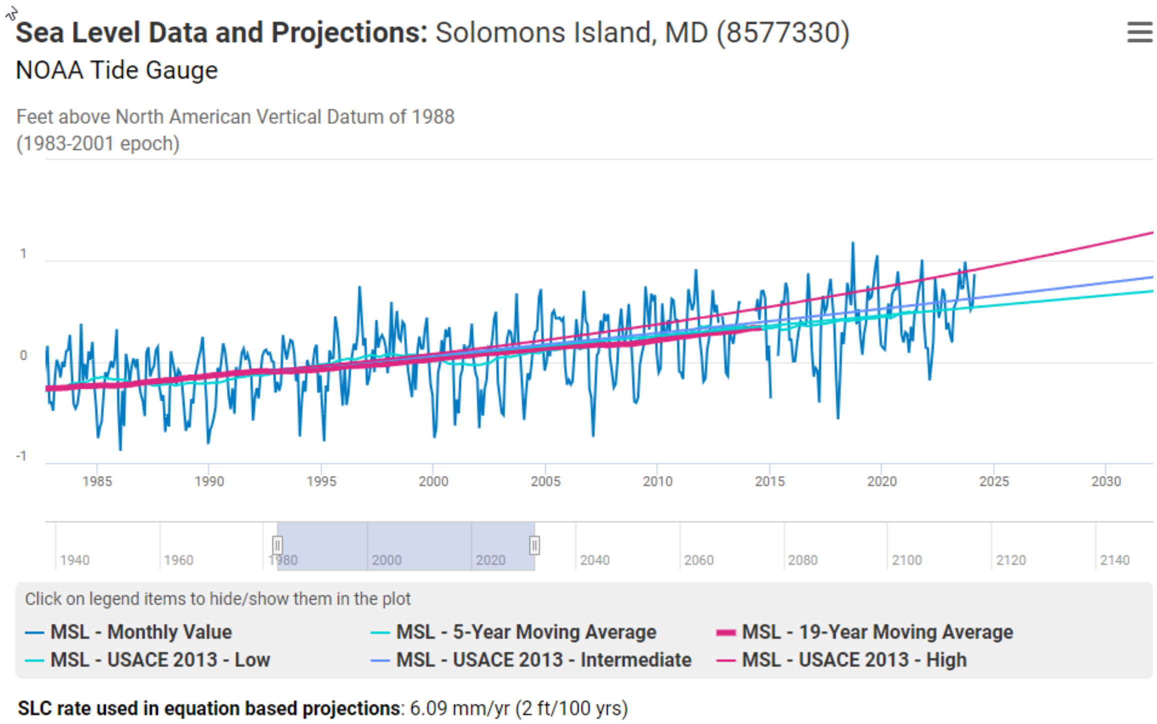

Figure 7. RSLC curve trend analysis by NOAA at Solomons Island using SLAT

Construction of the project is planned to begin in 2025 and continue through 2068 (43 years). Thus, the full-service starting year is 2068. The service life is 50-yr, necessitating a consideration of RSLC through 2118. Table 3 provides a comparison summary of four scenarios of RSLC using the Solomons Island gauge based on SLAT analysis.

Table 3. Summary of MSL values for four scenarios of RSLC at Solomon Island for James Island Project (Unit: ft Refer to NAVD88)

	RSLC: Low (ft)	RSLC: Interim (ft)	RSLC: High (ft)
Scenario 1: Start construction (2025)	0.346	0.443	0.749
Scenario 2: Start service (2068)	0.925	1.439	3.067
Scenario 3: 50-yr service life (2118)	1.593	3.005	7.479
Scenario 4: 100-yr service life (2168)	2.261	5.015	13.745

3.5.2.2 Stillwater levels with RSLC

Stillwater level is defined as the water level including tide level, storm surge, and sea level rise change. Table 4 provides the summary of the Stillwater levels with different RSLC at James Island for reference. The mean Stillwater level in 100-yr return period is approximately 5.9 ft NAVD88 in 2022.

Table 4. Mean Stillwater levels (ft NAVD88) in different return periods with different RSLC at James Island (Saved Point 2500)

		Storm Return Period						
Year	**RSLC (ft)**	**2**	**5**	**10**	**20**	**50**	**100**	**200**
2022		2.91	3.73	4.24	4.68	5.37	5.92	6.45
2068 Low	0.614	3.53	4.35	4.86	5.30	5.99	6.53	7.06
2068 Int	1.048	3.96	4.78	5.29	5.73	6.42	6.97	7.49
2068 High	2.422	5.34	6.16	6.66	7.10	7.80	8.34	8.87
2118 Low	1.282	4.20	5.02	5.52	5.96	6.66	7.20	7.73
2118 Int	2.613	5.53	6.35	6.85	7.30	7.99	8.53	9.06
2118 High	6.834	9.75	10.57	11.08	11.52	12.21	12.75	13.28
2168 Low	1.950	4.86	5.68	6.19	6.63	7.32	7.87	8.40
2168 Int	4.624	7.54	8.36	8.87	9.31	10.00	10.54	11.07
2168 High	13.100	16.01	16.83	17.34	17.78	18.47	19.02	19.55

3.5.2.1 Storm Surge

Extreme water levels, on the other hand, are dictated by storm tides (Applied Coastal Research and Engineering [ACRE], 2002; Moffatt & Nichol Engineers [MNE], 2002). Wind events can initiate a "non-tidal" water level response in the Chesapeake Bay, as water tends to "pile" against windward shorelines. Strong winds from the northwestern, northern, or northeastern directions are expected to lower water levels in the northern portion of the Chesapeake Bay, and southwestern, southern, or southeastern wind is expected to raise water levels in the northern Chesapeake Bay. Storm surges from the North Atlantic Coast Comprehensive Study (NACCS) (https://www.nad.usace.army.mil/CompStudy/) and recent Engineer Research and Development Center (ERDC) modeling study results (2023) were utilized to understand storm surge water levels. Table 4 presents simulated Stillwater levels in different periods including the storm surge component.

3.5.3 Tidal Currents

Per the 2009 Mid-Bay FR/EIS, approximately 2.5 miles west of James Island, peak tidal current velocities are approximately 0.3 m/s (1.0 ft/s) for flood currents and 0.24 m/s (0.8 ft/s) for ebb currents. Advanced Circulation Model (ADCIRC) modeling for James Island determined that the normal tidal current magnitude is generally small, with a maximum speed of 1.97 ft/s for the island. Conditions did not change sufficiently since the feasibility study to result in a change to tidal currents.

3.5.4 Wind Conditions

Per the 2009 Mid-Bay FR/EIS, prevailing winds in the Mid-Bay region are predominantly from the northwest and can intensify over the Chesapeake Bay. The design wind speed data for a 35-year return period storm ranges from 51 mph for the east direction to 76 mph for the southwest direction. Conditions did not change sufficiently since the feasibility study to result in a change to wind conditions.

3.5.5 Wave Conditions

Change in water level is also related to fetch, therefore, winds traveling along the longer north and south axis of the Chesapeake Bay should alter water levels to a greater degree than east-west winds of similar strength traveling across the Chesapeake Bay. The James Island component area is exposed to wind-generated waves approaching from all directions. The longest fetch distances to which James Island is exposed correspond to the north and south. Wave modeling was performed for wind-generated waves at James Island by ERDC (Melby et al., 2024) using wind data produced after Superstorm Sandy as reported in the NACCS (Cialone et al., 2015; Nadal-Carabella et. al., 2015). Figure 8 provides the plots of significant wave heights with 90% confidence limit around James Island in different return periods.

In general, the waves at the north and west sides are high and low in the east side. The waves at the northwest corner and north side reach the highest levels around the James Island, and the waves are lowest at the southeast corner. The highest wave height in the 100-yr return period at the north is about 7 ft, and the lowest of the 100-yr wave is 4 ft at the southeast corner.

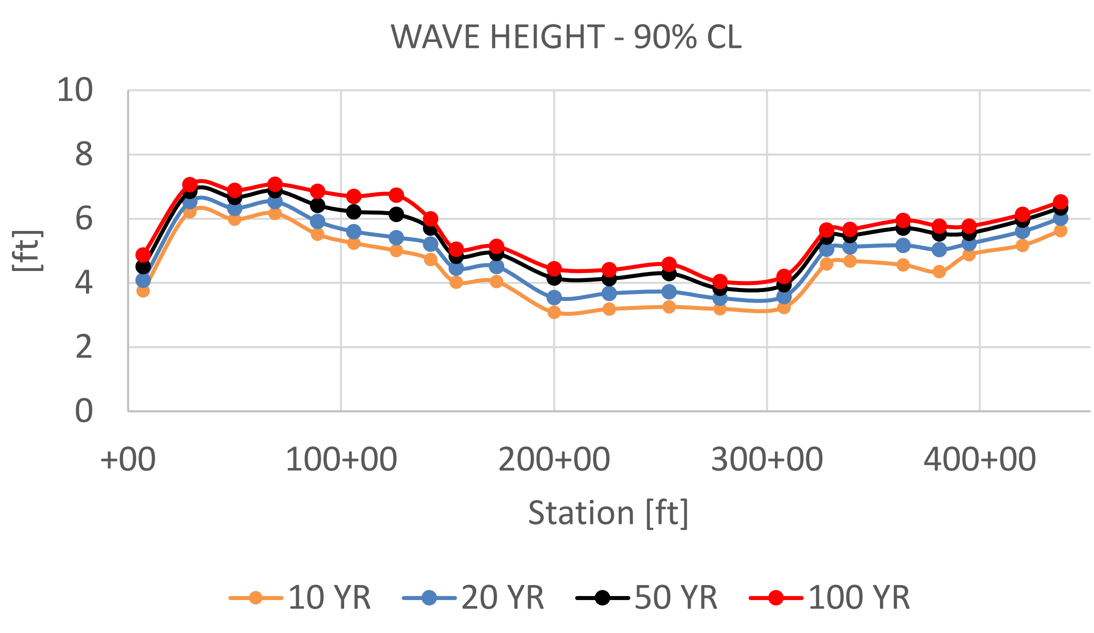

Figure 8. Significant wave heights at James Island from ERDC (Melby et al. 2024) (station 0 to 50: northwest, station 50 to 130: north, station 150 to 300: east, station 300 to 330: south, and station 340 to 450: southwest side)

3.5.6 Sedimentation

Changes in tidal current velocities, along with wind induced wave conditions can influence sedimentation patterns and rates. Per the 2009 Mid-Bay FR/EIS, the sediment model for both non-cohesive and cohesive sediments indicate that normal tidal currents are inadequate to directly cause sediment suspension and transport. The results also showed that a minimum wind speed of 16-mph caused sediment suspension and transport for non-cohesive sediments and 13-mph wind speed was the minimum needed to cause substantial sediment suspension and transport for cohesive sediments. It was determined through a comparison of sedimentation patterns with bathymetry that areas of erosion correspond to shallow water depths and deposition occurs in adjacent deep-water areas in the vicinity of the islands. Conditions have not change sufficiently since the feasibility study to require updated sediment modeling.

3.6 WATER QUALITY

The Maryland Environmental Service (MES) performed surface water sampling at 10 nearshore locations and one background location around James Island in the summer and fall of 2020 and winter and spring of 2021 (Figure 9). A water quality meter was placed at the surface, mid-depth, and bottom (within 1 foot) of the water column to measure temperature, salinity, dissolved oxygen (DO), turbidity, and pH. 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 within Appendix A1.

Salinity was found to be at its highest during the fall averaging 16.2 ppt, and the lowest levels occurred during the spring averaging 11.5 ppt. These results are similar to the sampling that was conducted in 2002 to 2004 where the highest salinity value was found during the fall (19.5ppt) and the lowest was in the spring (11.1 ppt). Water temperatures were found to be the highest during the summer ranging from 79ºF to 80ºF and were the lowest in during the winter ranging 40.3ºF to 41.7ºF.

Dissolved oxygen (DO) concentrations varied seasonally and tended to be lower during the summer months due to the physical properties of warmer water having less availability to contain DO then colder water. During the summer season DO concentrations ranged from 6.5 to 7.6 mg/L and during the winter concentrations peaked at (12.5 to 12.7 mg/L), which is considered healthy for the Chesapeake Bay's aquatic system.

The overall pH measurements were similar at each sample location throughout the testing period ranging from 7.9 to 8.3. Turbidity levels showed a similar trend and levels were similar throughout the testing period. The greatest value was during the summer and had a rating of 6.7 NTU while the lowest value was 0 NTU. During the spring 2021 sampling event Secchi depth was also recorded with a maximum reading of 5.7 ft.

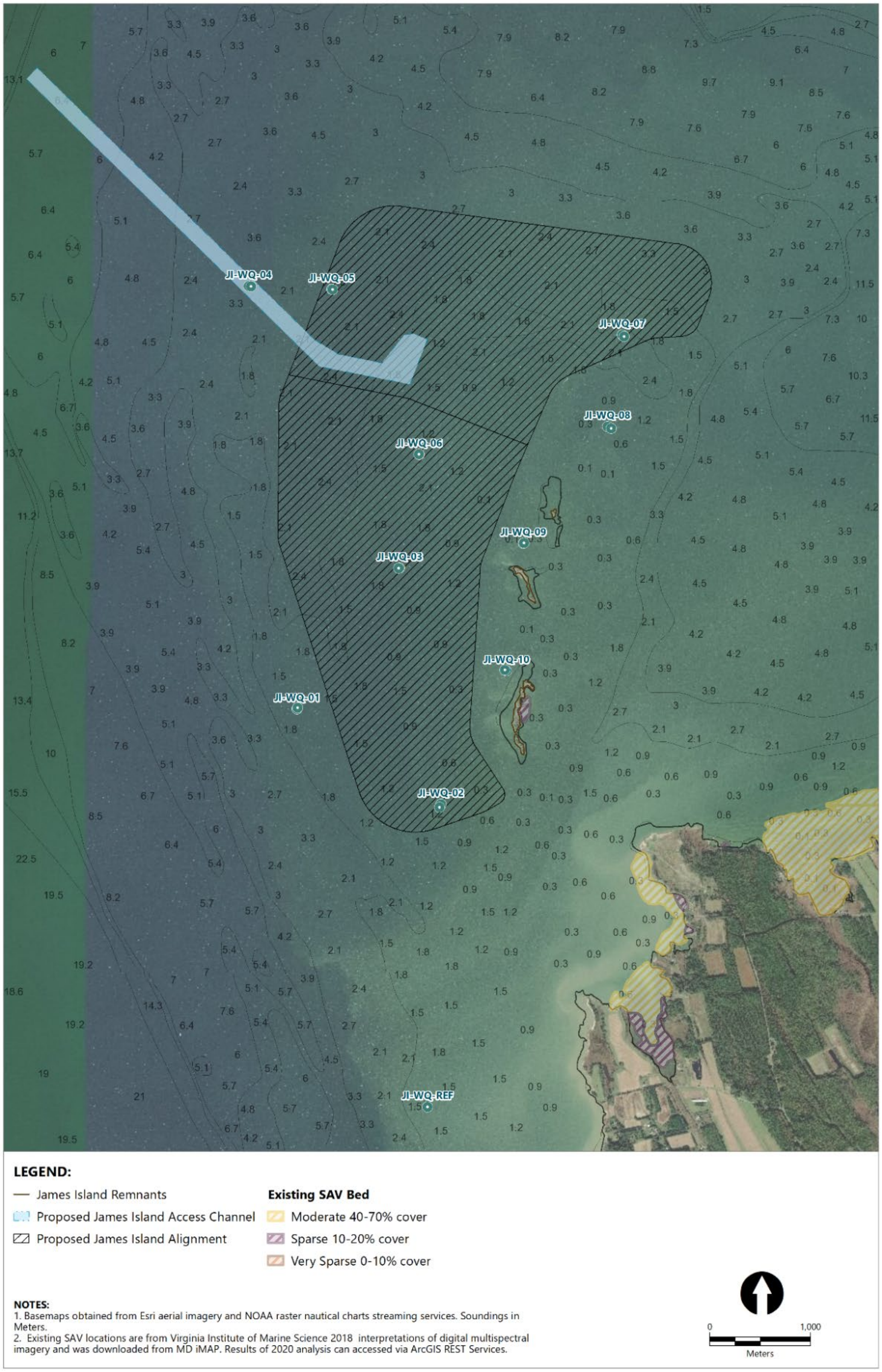

Figure 9. Water Quality Monitoring Stations at James Island. (Initial access channel alignment that was current at the time of sampling is depicted.)

Detectable nutrients resulted in low concentrations and ammonium and orthophosphate were not detected in most surface water samples. During the summer 2020 sampling resulted in the highest concentrations of chlorophyll, phaeophytin, organic phosphorous, particulate carbon, particulate nitrogen, particulate phosphorous, total dissolved phosphorous, and total phosphorous. The 2021 winter sampling resulted in the highest concentrations of nitrite + nitrate, total nitrogen, and total dissolved nitrogen, while nitrite and total suspended solids were measured in the greatest concentrations during spring 2021 surface water samples.

3.6.1 Chesapeake Bay Water Quality Monitoring

Water quality is analyzed by measuring a variety of physical properties and chemical constituents that can affect the health of the ecosystem and its living resources. During in situ water quality sampling, physical properties including temperature, pH, salinity, DO, and turbidity are recorded using a water quality instrument placed directly in the water body. Samples are also analyzed in a laboratory for chemical constituents such as nitrogen, phosphorus, and carbon.

MDNR has a Chesapeake Bay Water Quality Monitoring Program (CBWQM) that has routinely sampled year-round in the Chesapeake Bay since 1985 and in the Coastal Bays since 1999. Scientists collect data from 22 stations in Maryland’s Chesapeake Bay mainstem, from 60 stations in the Chesapeake Bay tidal tributaries, and from 30 stations throughout the Chesapeake and Coastal Bays (MDNR, 2023a).

Five years of water quality data (1999 to 2003) from the CBWQM were summarized for the fixed monitoring station closest to James Island (stations EE2.2) for the 2009 Mid-Bay FR/EIS. Station EE2.2 is located in approximately 12.5 m (41 ft) of water, near the mouth of the Little Choptank River less than a mile east of the northeast corner of the James Island project footprint. Means and ranges for physical parameters and ranges for nutrients for these two stations are presented in Tables 3-5 through 3-8 of the 2009 Mid-Bay FR/EIS (USACE 2009). Updated surface (14 ft) water quality data for years 2016-2020 was taken from station EE2.2 and is summarized Table 5.

Table 5. Average Water Quality Variables at CBWQM Station EE2.2 (1999-2003 & 2016-2020); results are averaged across sample period

		Sample Season							
		1999-2003				**2016-2020**			
Analyte	**Unit**	***Summer***	***Fall***	***Winter***	***Spring***	***Summer***	***Fall***	***Winter***	***Spring***
Temperature	°C	23.7	13.9	6.2	17.18	27.5	19.3	6.5	17.5
Dissolved Oxygen	mg/L	7.38	9.14	11.02	8.42	6.9	8.4	12	8
Salinity	ppt	11.7	15.62	15.28	11.92	11.6	14.4	11.2	10.4
pH	SU*	8.12	6.78	8.04	8.14	8.1	8.1	8.2	7.9
Secchi Depth	Ft	1.18	1.9	1.46	1.575	2.6	4.6	4.6	5.2

SU = standard units

Total Maximum Daily Load (TMDL) limits are a tool for implementing Maryland State water quality standards for water bodies that have been classified as "impaired" by the state. TMDLs establish the maximum limit for input of the identified contaminant into the specified water body. James Island is located at the mouth of the Little Choptank River, and Maryland Department of the Environmental (MDE) has identified the Little Choptank River as an impaired water body due to nutrient loads and bacteria. No TMDLs establishing the maximum nutrient limits for the Little Choptank have been released as of August 2023 (MDE, 2023). MDE has also identified Church Creek, a tributary of the Little Choptank River, as an impaired water body due to fecal coliform. The TMDL for fecal coliform input into Church Creek was developed in September 2004, and was approved by the EPA in May 2005 (U.S. Environmental Protection Agency [USEPA], 2005).

3.7 SEDIMENTS AND SEDIMENT SAMPLING

Shoreline erosion of the banks and coastal marshes of the Chesapeake Bay is a large source of fine-grained sediment, particularly in the Mid-Bay. As James Island eroded, the sediment entered the Chesapeake Bay waters as a source of sediment. While conducting SAV surveys in 2020, bottom sediments were classified as eroding peat nearshore and sandy offshore with the occasional submerged tree or stump (Anchor QEA, 2021).

Sediments from benthic community sampling stations around James Island were collected for chemical and nutrient analysis in fall 2001 and summer 2002. The results of that sampling analysis can be found in Table 3-12 in the 2009 Mid-Bay FR/EIS. An updated sediment analysis was performed in 2020-2021 using samples from ten benthic community sampling stations, the full results of which are presented in Appendix A1 (Table 4-6). Based upon the grain size analyses, the area surrounding James Island consists of sediments predominantly comprised of sand. The sample collected from station JI-BC-09 had the highest percentage of clay/silt content, at 49%. These results are roughly consistent with the 2001 and 2002 analyses, which recorded only one sample with majority clay/silt content collected among ten stations.

At sampling locations within the access channel and turning basin footprint, existing geotechnical borings have identified trace shell fragments at varying depths and thicknesses. Trace shell fragments are defined as small, broken pieces of shell mixed with other substrates. The boring data available does not suggest the presence of dense shell deposits or the presence of whole shells. While not conclusive, the data does not suggest a shell layer is present in the access channel or the turning basin.

3.8 AQUATIC RESOURCES

3.8.1 Wetlands

Due to erosion of James Island, no wetlands remain above the MHW level.

3.8.2 Submerged Aquatic Vegetation (SAV)

The term "submerged aquatic vegetation" is used for both marine angiosperms (the so-called true seagrasses) and freshwater macrophytes that have colonized the Chesapeake Bay and its tributaries. SAV encompasses 19 taxa from 10 vascular macrophyte families and 3 taxa from one freshwater macrophytic algal family, the Characeae, but excludes all other algae. SAV beds in the Chesapeake Bay are mapped and measured annually by VIMS using aerial photography. The reports from 2010 onward are available through the VIMS website at https://www.vims.edu/research/units/programs/sav/reports/index.php.

Historic data in the project area indicates that SAV was documented near James Island as early as 1990. SAV habitat has been limited to the waters immediately adjacent along the eastern shoreline of the island remnants. Since those initial observations, the extent of SAV has fluctuated significantly, ranging from 2 to 4 acres near James Island in recent years to a maximum of 22.6 acres in 2001. There were many years in the 1990s where no SAV was present. Figure 10 identifies recent SAV habitat as depicted by the Five-year composite for 2017 through 2021, as well as the 2001 SAV habitat. As the island eroded and remnants were submerged, the last remaining SAV habitat is associated with the southern remnant.

Horned pondweed (*Zannichellia palustris*) and widgeon grass (*Ruppia maritima*) are species typical of the James Island SAV assemblage. James Island is located just north and outside of the documented range of eelgrass (*Zostera marina*),

Results of four seasonal SAV surveys conducted at James Island in 2002 and 2003 are summarized in the 2009 Mid-Bay FR/EIS. The summer surveys observed widgeon grass and small patches of sea lettuce (*Ulva lactuca*), a microalgae, along the eastern shoreline, while the spring survey observed horned pondweed in a similar area.

Updated SAV surveys were conducted at James Island in June 2021 to observe the potential presence of horned pondweed and in August 2021 to observe the potential presence of widgeon grass and other late-season species. Five sampling transects were identified for James Island (Figure 11); a complete description of the transect locations and spacing is provided in Table 2-1 in Appendix A2. The 2021 spring survey observed no SAV along the sampling transects or in the shallow water around James Island, but floating fragments of both widgeon grass and horned pondweed were observed frequently (Figure 11) (Anchor QEA, 2021). In summer surveys, floating rafts of both horned pondweed and widgeon grass were observed within the project vicinity of James Island. However, only one small patch of widgeon grass was observed near James Island in August (Figure 11).

The water depth drops off quickly adjacent to the remaining remnants and is more commonly greater than 5 ft, limiting the potential establishment of any SAV. As documented by Anchor QEA (2021), the combination of water depths beyond optimal depths for SAV establishment, exposure to consistent wave action, and poor water clarity are limiting factors for SAV growth at James Island.

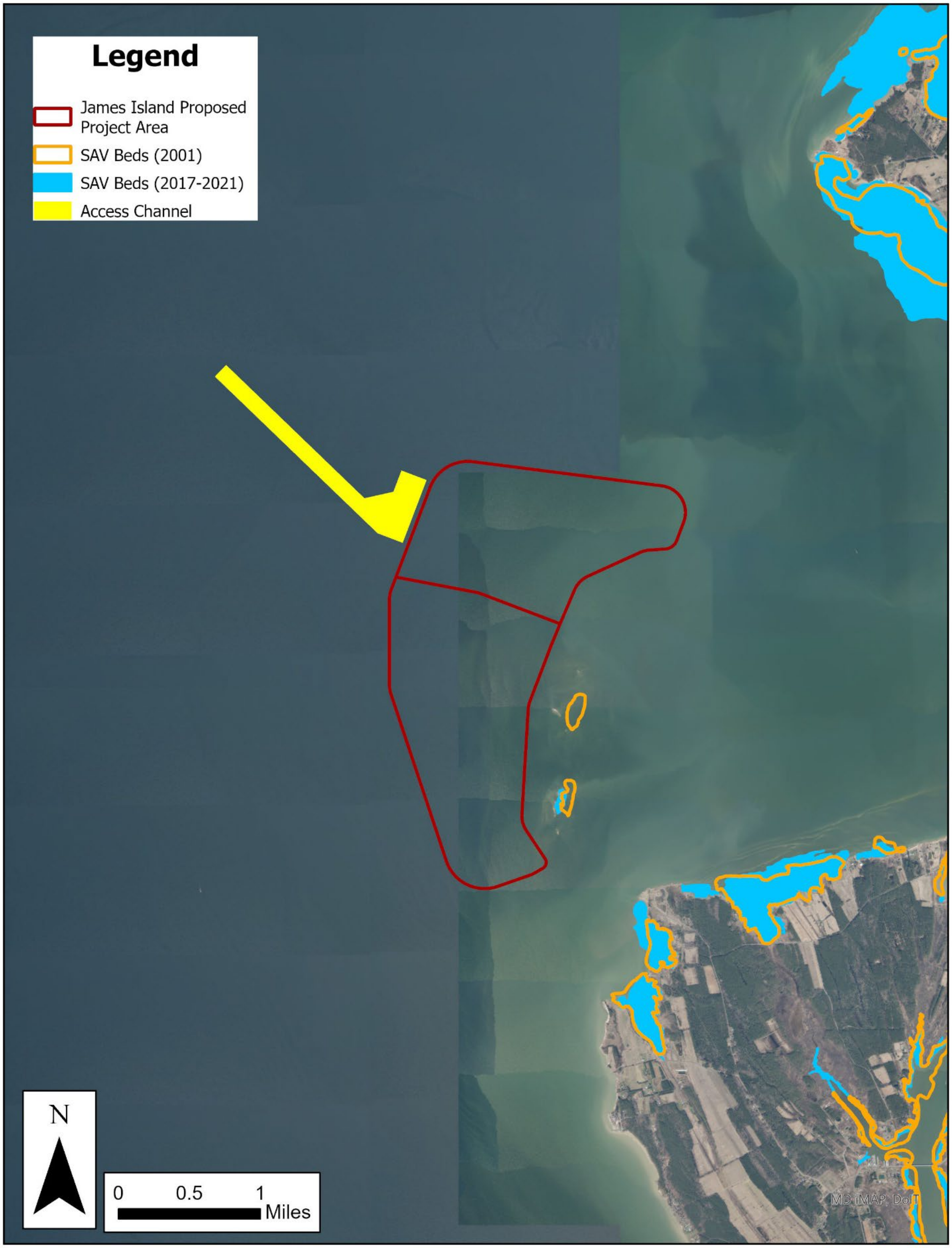

Figure 10. Historic SAV Habitat at James Island

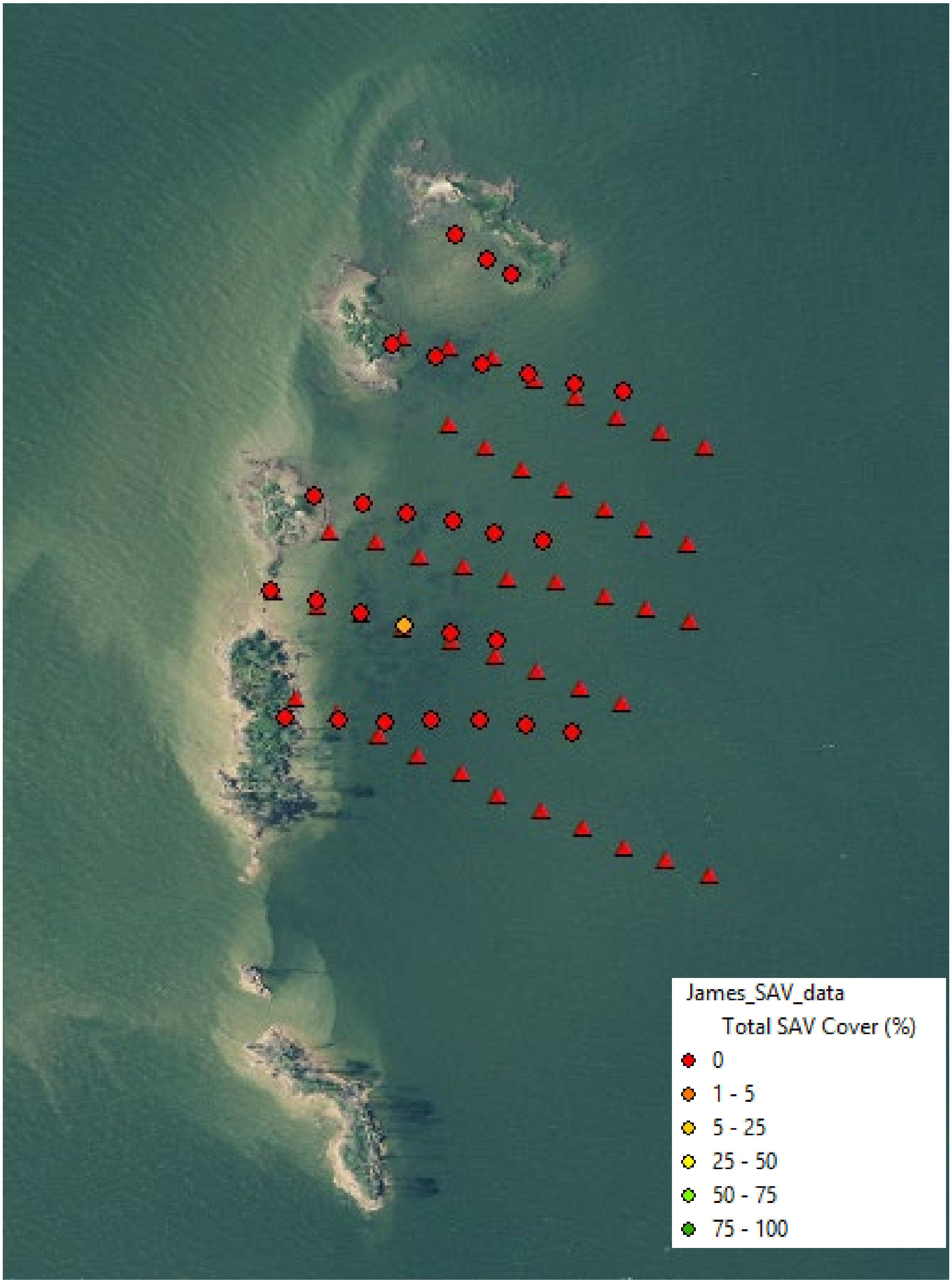

Figure 11. Total SAV percent cover observed at each quadrat location along James Island shoreline. Circles denote June 2021 observations. Triangles denote August 2021 observations.

3.8.3 Benthic Macroinvertebrates

3.8.3.1 Habitat Classification

The Nature Conservancy (TNC) was funded by NOAA to develop an Ecological Marine Unit classification for the Chesapeake Bay bottom (TNC, 2015). The Bay bottom at James Island is classified as Cluster 2 based on bathymetry, percent mud, dissolved oxygen, and salinity. The typical assemblage of Cluster 2 is illustrated in Table 6.

Table 6. Ecological Marine Unit Classification: Typical Assemblage of Cluster 2

Scientific name	Common name	Confirmed Presence within James Island Area by Sampling
Marenzelleria viridis	Acorn Worm	-
Saccoglossus kowalevskii	Carnivorous Flatworm	-
Stylochus ellipticus	Oyster Flatworm	X
Leitoscoloplos fragilis	segmented worm	X
Leptosynapta tenuis	White Synapta	-
Lyonsia hyalina	Glassy Lyonsia	X
Sayella chesapeakea	minute seas snail/gastropod Minute Sea Snail/Gastropod Mollusk	X
Streblospio benedicti	Barred-gilled mud Mud Worm	X
Spiophanes bombyx	worm	-
Ameritella/Macoma mitchelli	Mitchell macoma/Macoma mollusk	X
Paraonis fulgens	segmented worm	X
Mulinia lateralis	Dwarf surfclamSurfclam/Coot Clam	X
Heteromastus filiformis	Capitellid thread Thread Worm	X
Glycinde solitaria	Chevron Worm	X
Glycera dibranchiata	Bloodworm	X
Scolelepis texana	unsegmented worm	X
Gemma gemma	Amethyst Gemclam	X
Haminoea solitaria	Solitary Bubble Snail	X
Micrura leidyi	Red ribbon Ribbon Worm	X

Through sampling during feasibility and PED, a benthic macroinvertebrate community was documented that is typical of mesohaline, sand habitats in the middle Chesapeake Bay. Benthic sampling was conducted in fall 2001, summer 2002, and spring 2003 at 10 locations and then again in summer 2020, fall 2020, and spring 2021 at 10 locations, all withing the vicinity of James Island (Figure 12; Table 7). A complete description of sampling station locations, dates, methods, abundance and distribution of the 2001 – 2003 sampling can be referenced in the 2009 Mid-Bay FR/EIS. Similar information for the 2020 – 2021 surveys can be found in Appendix A1 (Table 3-5). Sediments were also collected during the summer 2020 survey, which only one location was not predominately sand. Station JI-BC-09 was composed of 51% and 49% silts and clays. *In situ* water quality measurements (Section 3.6.1) were taken during summer 2020, fall 2020, winter 2021 and spring 2021. Results of the benthic community studies at James Island were found to be typical of this area of the Chesapeake Bay. The complete benthic community taxa collected from all seasons of the 2020 – 2021 surveys are reported in Appendix A1 (Tables 4.7 through 4.9).

Table 7. James Island Surveyed Benthic Species (2001-2003 and 2020-2021); X=observed

Common Name	Scientific Name	Observed 2001-2003	Observed 2020-2021
Barrel Bubble Snail	*Acteocina canaliculata*	X	X
Pile Worm	*Alitta succinea*	-	X
n/a; mysid shrimp	*Americamysis almyra*	X	X
n/a; amphipod	*Americoculodes edwardsi*	X	-
Mitchell Macoma	*Ameritella/Macoma mitchelli*	X	X
Unknown Amphipods	*Ameroculodes spp. Complex*	-	X
Four Eyed Amphipod	*Ampelisca Abdita*	X	-
Unknown Nemertean	*Amphiporidae sp.*	X	-
n/a; unsegmented worm	*Amphiporus bioculatus*	X	X
Ribbon Worm	*Amphiporus ochraceus*	-	X
n/a; anthropod	*Ampthoe rubricata*	X	-
n/a; amphipod	*Apocorophium lacustre*	X	-
n/a; segmented worm	*Aricidea catherinae*	X	-
Bay Barnacle	*Balanus improvisus*	X	X
n/a; segmented worm	*Boccardiella ligerica*	-	X
Impressed Odostome	*Boonea impressa*	X	-
Blue Crab	*Callinectes sapidus*	X	-
n/a; unsegmented worm	*Carinoma tremaphoros*	X	X
Sand Isopod	*Chiridotea coeca*	X	X
n/a; caridean shrimp	*Crangon sapidus*	X	-
Slender Isopod	*Cyathura polita*	X	X
Copepod	*Cyclaspis varians*	-	X
Wave-diver Tube-builder Amphipod	*Cymadusa compta*	X	-
n/a; sea snail	*Editorium rubicola*	X	-
Mounded-back Isopod	*Edotia triloba*	X	X
Burrowing Anemone	*Edwardsia elegans*	X	X
n/a; segmented worm	*Eteone foliosa*	X	-
n/a; segmented worm	*Eteone heteropoda*	X	-
n/a; ostracod	*Eusarsiella zostericola*	X	-
Rose Worm	*Fragilonemertes rosea*	-	X
n/a; amphipod	*Gammarus mucronatus*	X	X
Gem Clam	*Gemma gemma*	X	X
Ribbed Mussel	*Geukensia demissa*	-	X

Common Name	Scientific Name	Observed 2001-2003	Observed 2020-2021
Bloodworm	*Glycera dibranchiata*	X	-
n/a; segmented worm	*Glycinde multidens*	-	X
Chevron Worm	*Glycinde solitaria*	X	-
Solitary Glassy-bubble	*Haminella solitaria*	-	X
Solitary Bubble Snail	*Haminoa solitaria*	X	-
Capitellid Thread Worm	*Heteromastus filiformis*	X	X
Truncated Marsh Hydrobia	*Hydrobia truncate*	X	-
n/a; segmented worm	*Hypereteone foliosa*	-	X
n/a; segmented worm	*Hypereteone heteropoda*	-	X
n/a; segmented worm	*Hyperteone fauchakli*	X	-
n/a; amphipod	*Incisocalliope Aestaurius*	X	-
Hooked Mussel	*Ischadium recurvum*	X	-
Pitted Baby-bubble	*Japonactaeon punctostriatus*	-	X
n/a; segmented worm	*Leitoscoloplos fragilis*	-	X
n/a; segmented worm	*Leitoscoloplos robustus*	X	-
Unknown Annelids	*Leitoscoloplos spp.*	X	-
n/a; amphipod	*Lepidactylus dytiscus*	-	X
n/a; amphipod	*Leptocheirus plumulosus*	X	X
n/a; bivalve	*Limecola petalum*	-	X
n/a; bivalve	*Lyonsia hyalina*	X	-
Baltic Clam	*Macoma balthica*	X	-
n/a; segmented worm	*Marenzellaria jonesi*	X	-
Red-gilled Mud Worm	*Marenzellaria viridis*	X	X
n/a; segmented worm	*Mediomastrus ambiseta*	X	X
n/a; segmented worm	*Mediomastrus californiensis*	X	-
n/a; amphipod	*Melita nitida*	-	X
n/a; amphipod	*Microprotopus raneyi*	X	-
Red Ribbon Worm	*Micrura leidyi*	X	-
Sea Grape	*Molgula manhattensis*	X	-
Coot Clam	*Mulinia lateralis*	X	X
Soft-shell Clam	*Mya arenaria*	X	X
Plate Mysella	*Mysella planulata*	X	-
Unknown Oligochaete	*Naididae sp.*	-	X
n/a; segmented worm	*Neanthes succinea*	X	-
Opossum Shrimp	*Neomysis americana*	X	X
n/a; sea snail	*Odostomia iamimpresa*	X	-
n/a; sea snail	*Odostomia producta*	X	-
n/a; caridean shrimp	*Oxyurostylis smithi*	X	-
Eelgrass (isopod)	*Paracereis caudate*	X	-
n/a; segmented worm	*Paraionospio alata*	-	X

Common Name	Scientific Name	Observed 2001-2003	Observed 2020-2021
n/a; segmented worm	*Paraonis fulgens*	X	X
Fringe-gilled Mud Worm	*Paraprionospio pinnata*	X	-
Many-lined Lucine	*Parcilucina crenella*	-	X
Trumpet Worm	*Pectinaria gouldii*	X	X
False Angel Wing	*Petricolaria pholadiformis*	X	X
Horseshoe Worm	*Phoronis psammophila*	-	X
unknown Phoronid	*Phoronis sp.*	X	-
n/a; segmented worm	*Podarkeopsis levifuscina*	X	-
Whip Mudworm	*Polydora cornuta*	X	X
Oyster Mud Worm	*Polydora websteri (b)*	X	-
n/a; anthropod	*Psudoleptocum a minor*	X	-
n/a; sea snail	*Rictaxis punctostriatus*	X	-
n/a; sea snail	*Sayella chesapeakea*	X	X
n/a; segmented worm	*Scolelepis (Parascolelepis) texana*	X	-
Round Worm	*Siphonenteron bicolour*	-	X
Sea pill bug	*Sphaeroma quadridentata*	X	-
n/a; caridean shrimp	*Spilocuma watlingi*	-	X
n/a; segmented worm	*Spiochaetopterus oculatus*	-	X
Barrel-gilled Mud Worm	*Streblospio benedicti*	X	X
Oyster Flatworm	*Stylochus ellipticus*	X	X
n/a; bivalve	*Tagelus divisus*	X	-
Stout Razor Clam	*Tagelus plebeius*	-	X
Northern Dwarf-Tellin	*Teliina agilis*	X	-
n/a; segmented worm	*Tharyx sp. A Scolelepis (Parascolelepis) texana*	X	-
Unknown Oligochaetes	*Tubificoides spp.*	X	-
Unknown Oligochaetes	*Tubificoides spp.*	-	X
Unknown Platyhelminth	*Turbellaris sp. E(a)*	X	-

In total 57 unique benthic taxa were collected during the 2020 – 2021 sampling events compared to 75 collected by 2001 – 2003 sampling efforts. During all sampling events, bivalves and polychaetes were the most common, but most samples were dominated by the amethyst gem clam (*Gemma gemma)* which was similar to the 2001 – 2003 surveys. A primary difference between feasibility phase survey results and those conducted during PED in 2020 – 2021 is a large decrease in the abundance, particularly of the amethyst gem clam (Table 8). During the feasibility surveys, the gem clam composed >91% of the benthic assemblage for each survey at all points except for JM-010 in Fall 2001 (55.5%) and JM-001 in spring 2003 (28.2%). During PED surveys, the gem clam contributed a much-reduced percentage of the benthic assemblage. Gem clam consisted of <30% of the benthic assemblage in 21 out of 30 samples (10 sampling sites across 3 seasons).

Table 8. Benthic Abundance and Contribution of Amethyst Gem Clam

Survey	Total benthic abundance (#/m^2)	Gem Clam Abundance (#/m^2)	Gem Clam Percent of Assemblage (average of all sampling sites)
Fall 2001	4,304 – 356,000	2,387 – 355,097*	98.1% (without JM-010)
Summer 2002	45,906 – 351,145	41,794 – 347,100	97.7%
Spring 2003	4,007 – 261,760	1,127 – 259,153	96.7% (without JM-001)
Summer 2020	1,091 – 6,206	38 – 2,360	21.6%
Fall 2020	1,595 – 26,726	77 – 22,835	27.2%
Spring 2021	746 – 12,732	0 – 10,378	31.6%

*JM-010 contained 2,387 gem clam/m^2. The fewest abundance at all other sampling sites was 30,769 gem clam/m^2.

3.8.3.2 Community Metrics

Six particular metrics were used to describe the overall characteristics of the benthic community at James Island—total abundance, unique taxa collected, species richness, species evenness, Simpson's Dominance Index, and the Shannon-Wiener Diversity Index. Results for all metrics are provided in Appendix A1 (Table 4-9).

Current results for all benthic community metrics measured at the James Island benthic community sampling locations were within the range of metrics measured at the James Island reference site for the summer and fall sampling events. Additionally, with the exception of the fall sample from JI-BC-06, the high evenness and Shannon-Wiener Species Diversity Indices and low Simpson's Dominance Indices indicate that the benthic community surrounding James Island is a diverse community. The exceptionally high abundance of the gem clam at JI-BC-06 during the fall monitoring event affected the species diversity and dominance in the sample.

Common metrics used in the 2020 – 2021 survey sample and the 2001 – 2003 survey sample show changes in the benthic community. For instance, while Shannon-Wiener Diversity Index scores were higher in the more recent survey, abundance was overall lower than during the feasibility phase. This is due to the sharp decline in gem clam abundance. The full results of the 2001 – 2003 James Island community metrics scoring can be found at Table 3-20 in the 2009 Mid-Bay FR/EIS.

Based on the benthic community metrics, the current benthic community surrounding James Island is a diverse community dominated by bivalves (specifically *Mitchell macoma* and amethyst gem clam) and polychaetes (specifically pile worm and ram's horn worm [*Streblospio benedicti*]).

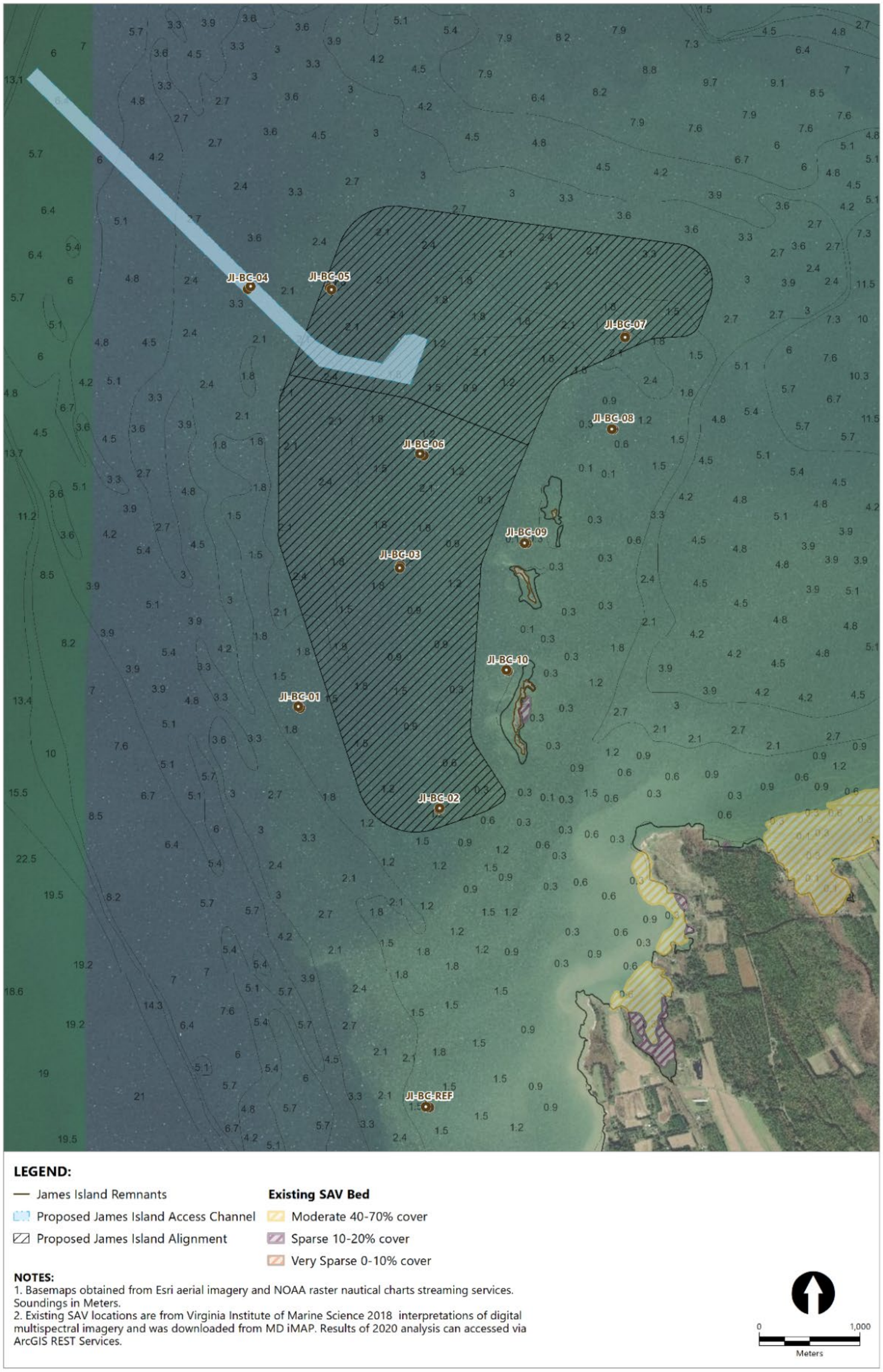

Figure 12. Benthic Sampling Locations at James Island. (Initial access channel alignment that was current at the time of sampling is depicted.)

3.8.3.3 Data Analysis: Benthic Index of Biotic Integrity

The Chesapeake Bay Benthic Index of Biotic Integrity (B-IBI) was used to evaluate the benthic community. The B-IBI combines individual metrics and assigns a score to each of the metrics to describe the benthic community and to provide an assessment of benthic community conditions. The scores for each of the B-IBI metrics (scaled from 1 to 5) at each location are averaged across attributes to calculate an index value for each location.

The indices used to evaluate the benthic community and calculate the B-IBI include Abundance, Shannon-Weiner Diversity, Stress-Sensitive Taxa Abundance, Stress-Indicative Taxa Abundance, and the Carnivore/Omnivore Abundance Index.

Index values are compared to the Chesapeake Bay Restoration Goal to assess the present condition of benthic community structure and composition at a given location. Locations that meet or exceed the Chesapeake Bay Restoration Goal of 3.0 are considered to have good benthic condition and are indicative of good habitat quality. Index values equal to or greater than 2.7 but less than 3 indicate a marginally stressed community. Index values equal to or greater than 2.1 but less than 2.7 indicate a degraded community. Index values less than 2.1 indicate a severely degraded community (USEPA, 1994).

B-IBI values were calculated for benthic sampling stations around James Island in 2002 – 2003 and 2020 – 2021 using the summer survey. The B-IBI results are provided in Table 9 (See Tables 3-20 and 3-21 in the 2009 Mid-Bay FR/EIS for full results). The full results of the 2020 – 2021 B-IBI calculation can be found in Appendix A1. (Table 4-10). The summer 2020 B-IBI scores for James Island stations were low at all stations, ranging from 2.0 to 2.9, but have increased compared to 2002 – 2003. The increase is largely due to the decrease in gem clam abundance that resulted in an improvement in Shannon-Weiner Diversity in the 2020 – 2021 survey. All but two sites were 'severely degraded' in 2002 – 2003; JM-001 and JM-010 were 'degraded' and correspond to the sites with lower abundance numbers of gem clam. Currently, some sites have improved to 'marginal' (JI-BC-01, JI-BC-03, JI-BC-07, and JI-BC-10) or 'degraded' (JI-BC-REF, JI-BC-02, JI-BC-04, JI-BC-05, JI-BC-08, and JI-BC-09). JB-BC-06, where gem clam abundance remained high is still characterized as 'severely degraded'. These results are generally consistent with the 2002 – 2003 sampling results and indicate a degraded benthic community at James Island.

3.8.4 Fish

In the summer and fall of 2002 and winter and spring of 2003 and again in 2022 – 2021, fish surveys using various collection methods were conducted to evaluate the fish assemblage in the vicinity of James Island. Updated fish surveys were conducted in the summer and fall of 2020 and winter and spring of 2021. Collection methods that were used during both surveys included beach seines, bottom trawls, gill nets, and pop nets. The complete results of feasibility study surveys can be found in the 2009 Mid-Bay FR/EIS; updated survey results are provided in Appendix A1. The sampling designs and locations of the fish surveys in 2020 – 2021 were consistent with the baseline 2002 and 2003 surveys. The sampling period included the spring, summer, fall, and winter seasons. When prior sampling locations were inaccessible in 2020 – 2021 due to consistent erosion since the baseline study, some of the sampling locations were repositioned (Figures 13 and 14). The new sampling locations were relocated to areas with similar characteristics or removed from the program if a suitable replacement was not available. Tables 10 to 13 illustrate the total number of species caught during the 2002 – 2003 and 2020 – 2021 surveys for each collection method.

Table 9. James Island Benthic Monitoring Data (Common Metrics; Summer 2002 and Summer 2020)

	Type of Metric											
	Abundance (#/m2)		Shannon-Weiner Diversity		Stress-Sensitive Taxa Abundance (%)		Stress-Indicative Taxa Abundance (%)		Carnivore/Omnivore Abundance (%)		B-IBI	
Sampling Location	Summer 2002	Summer 2020	Summer 2002	Summer 2020	Summer 2002	Summer 2020	Summer 2002	Summer 2020	Summer 2002	Summer 2020	Summer 2002	Summer 2020
Jam 001/JI-BC-01	1.00	3.00	1.00	3.00	1.00	3.00	5.00	3.00	1.00	1.00	1.80	2.70
JAM 002/JI-BC-02	1.00	4.30	1.00	1.70	1.00	3.00	5.00	4.30	1.00	1.00	1.80	2.60
JAM 003/JI-BC-03	1.00	1.70	1.00	3.00	1.00	3.00	5.00	5.00	1.00	1.00	1.80	2.70
JAM 004/JI-BC-04	1.00	2.30	1.00	2.30	1.00	3.00	5.00	5.00	1.00	1.00	1.80	2.60
JAM 005/JI-BC-05	1.00	1.70	1.00	1.00	1.00	3.00	5.00	5.00	1.00	1.00	1.80	2.10
JAM 006/JI-BC-06	1.00	1.00	1.00	1.00	1.00	1.00	5.00	5.00	1.00	1.00	1.80	2.00
JAM 007/JI-BC-07	1.00	3.70	1.00	3.00	1.00	2.30	5.00	4.30	1.00	1.00	1.80	2.80
JAM 008/JI-BC-08	1.00	1.00	1.00	1.00	1.00	5.00	5.00	3.00	1.00	1.00	1.80	2.30
JAM 009/JI-BC-09	1.00	3.00	1.00	3.00	1.00	-	5.00	-	1.00	1.00	1.80	2.30
JAM 010/JI-BC-10	1.00	2.30	1.00	2.30	1.00	3.00	5.00	5.00	1.00	1.70	1.80	2.90

3.8.4.1 Bottom Trawling Results

Six locations that represented various types of habitats around James Island were selected for bottom trawling surveys. Results are provided in Table 10. Bottom trawling involves dragging or towing a net at the bottom of the sea floor to capture benthic and aquatic species. At each sampling location two separate 5-minute otter trawl tows were conducted, which the total number of organisms were summed to represent 10 minutes of total effort. The 2020 – 2021 survey resulted in three new species being captured; however, ten species were detected in the 2002 – 2003 surveys that were not in the 2020 – 2021 surveys. In the 2020 – 2021 sampling period, the spring 2021 survey resulted in the greatest number of diverse species and total amount caught, while the summer 2020 survey resulted in the lowest number of species and individual species caught. The most common species caught during the bottom trawling method of each survey period was the bay anchovy. Overall, the 2002 – 2003 sampling period resulted in greater species diversity and individuals caught when compared to the 2020 – 2021 sampling period.

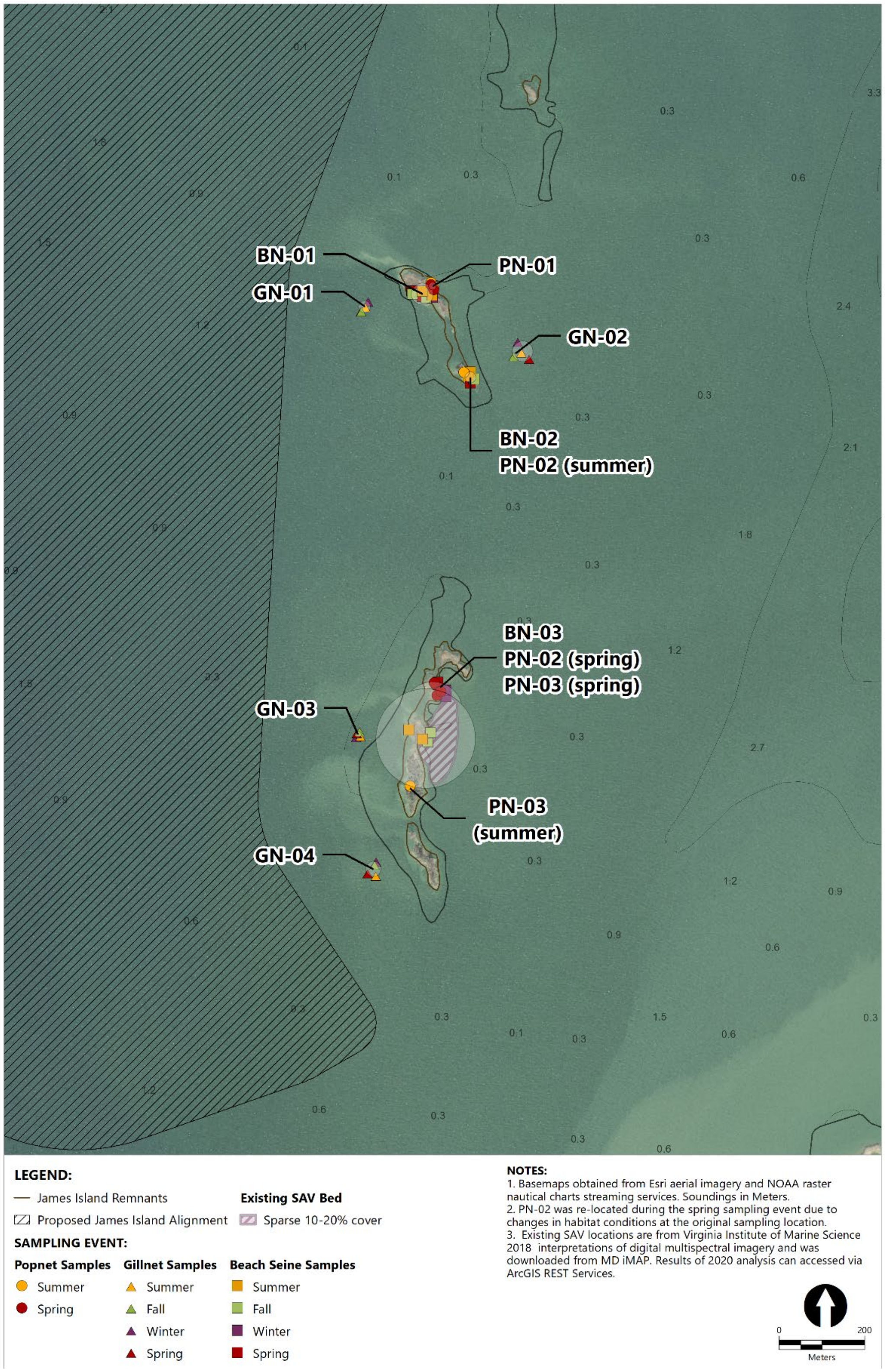

Figure 13. James Island Fisheries Survey Sampling Locations (Pop net, Gillnet, and Beach Seine Samples, 2020 – 2021)

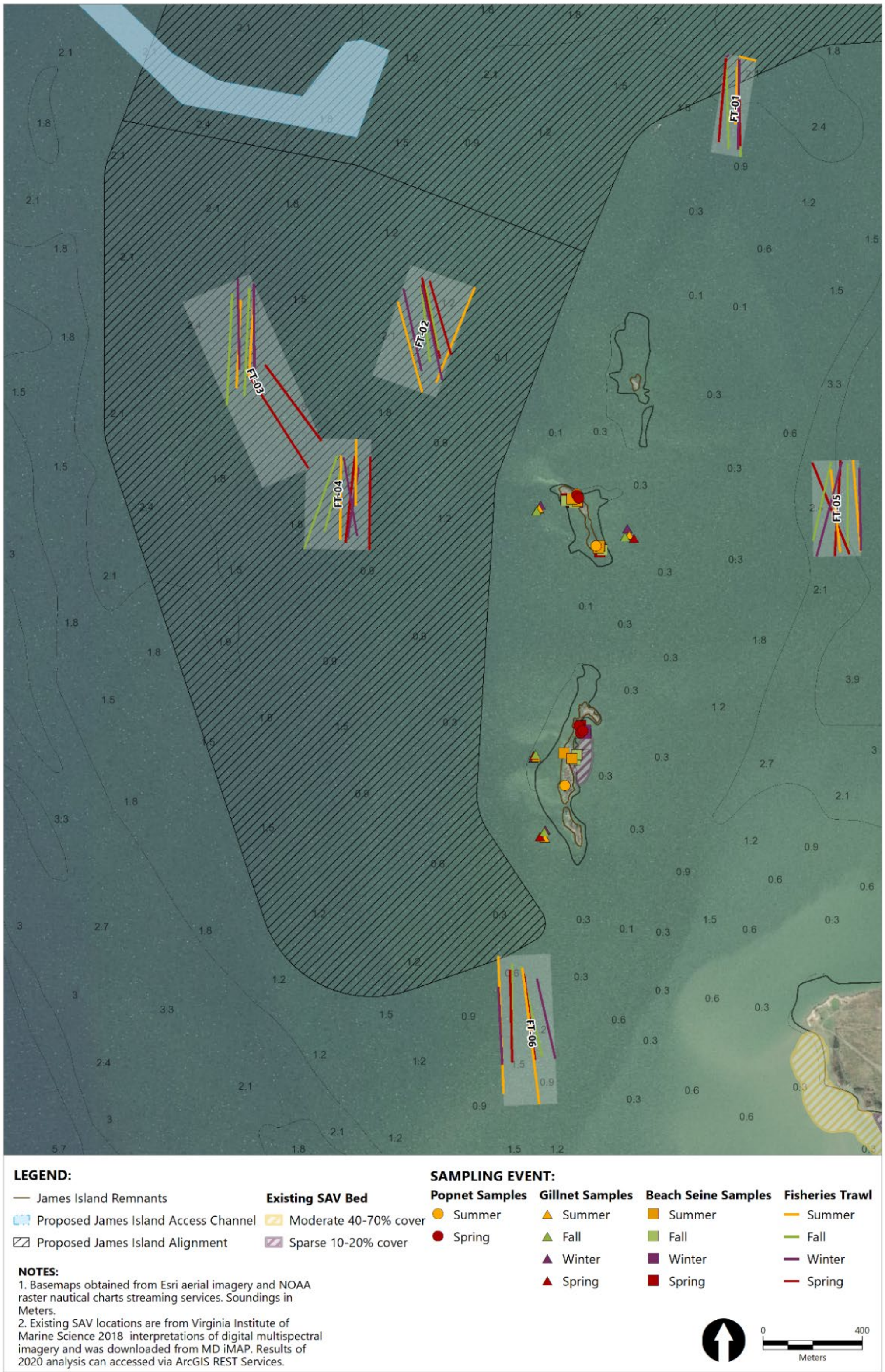

Figure 14. James Island Fisheries Survey Sampling Locations (Bottom Trawl Samples, 2020 – 2021). (Initial access channel alignment that was current at the time of sampling is depicted.)

Table 10. James Island Bottom Trawl (Net) Survey Species (2002-2003 and 2020-2021); X= observed

Common Name	Scientific Name	Observed 2002-2003	Observed 2020-2021
American Shad	*Alosa sapidissima*	-	X
Atlantic Horseshoe Crab	*Limulus polyphemus*	X	-
Atlantic Menhaden	*Brevoortia tyrannus*	-	X
Atlantic Silverside	*Menidia menidia*	X	-
Bay Anchovy	*Anchoa mitchilli*	X	X
Black-fingered Mud Crab	*Panopeus herbstii*	X	-
Blue Crab	*Callinectes sapidus*	X	X
Feather Blenny	*Hypsoblennius hentz*	X	-
Hogchoker	*Trinectes maculatu*	X	X
Naked Goby	*Gobiosoma bosc*	X	-
Northern Pipefish	*Syngnathus fuscus*	X	-
Sand Shrimp	*Crangon septemspinosa*	X	-
Silver Hake	*Merluccius bilinearis*	X	-
Skilletfish	*Gobiesox strumosus*	-	X
Spot	*Leiostomus xanthurus*	X	-
Striped Bass	*Morone saxatilis*	X	-

3.8.4.2 Beach Seine Sampling Results

Three locations were chosen that represented various types of offshore-zone habitat surrounding James Island. Beach Seine method utilizes nets operated by hand or small boat to create a circular shape to collect nearshore benthic and aquatic species. A 100-foot seine net was deployed in an arc perpendicular to the shoreline and sampled approximately 30 meters of shoreline. Two consecutive and adjacent hauls were made at five different locations for a combined shoreline distance of approximately 60 meters. Results are provided in Table 11. The 2020 – 2021 survey resulted in two species that were not identified in the 2002 – 2003 survey; however, twenty species were identified in the 2002 – 2003 study and not during the 2020 – 2021 study. Referring to the 2020 – 2021 surveys, summer 2020 survey resulted in the greatest number of species caught and total individuals caught. Atlantic silverside was the most abundant species caught during both survey periods. Overall, the 2002 – 2003 sampling period resulted in greater species diversity and individuals caught when compared to the 2020 – 2021 sampling period. There were no surveys using the beach seine capture method in winter of 2021.

Table 11. James Island Beach Seine Survey Species (2002-2003 and 2020-2021); X=observed

Common Name	Scientific Name	Observed 2002-2003	Observed 2020-2021
Atlantic Croaker	*Micropogonias undulatus*	X	-
Atlantic Menhaden	*Brevoortia tyrannus*	X	X
Atlantic Needlefish	*Strongylura marina*	X	X
Atlantic Silverside	*Menidia menidia*	X	X
Atlantic Threadfin	*Polydactylus octonemus*	-	X
Bay Anchovy	*Anchoa mitchilli*	X	X
Blackcheek Toungefish	*Symphurus plagiusa*	X	-
Blue Crab	*Callinectes sapidus*	X	X
Blueback Herring	*Alisa aestivalis*	X	-
Bluefish	*Pomatomus saltatrix*	X	-
Dagger Blade Grass Shrimp	*Palaemonetes pugio*	X	-
Halfbeak	*Hemiramphidae*	X	-
Hogchoker	*Trinectes maculatus*	X	-
Lined Seahorse	*Hippocampus erectus*	X	-
Mummichog	*Fundulus heteroclitus*	X	-
Naked Goby	*Gobiosoma bosc*	X	-
Northern Pipefish	*Syngnathus fuscus*	X	-
Rainwater Killifish	*Lucania parva*	X	-
Red Drum	*Sciaenops ocellatus*	X	X
Sheepshead Minnow	*Cyprinodon variegatus*	X	-
Silver Perch	*Bidyanus*	X	-
Skilletfish	*Gobiesox strumosus*	X	-
Spot	*Leiostomus xanthurus*	X	X
Spotted Seatrout	*Cynoscion nebulosus*	X	-
Striped Anchovy	*Anchoa hepsetus*	-	X
Striped Bass	*Morone saxatilis*	X	-
Striped Killifish	*Fundulus majalis*	X	-
Summer Flounder	*Paralichthys dentatus*	X	-
White Perch	*Morone americana*	X	-

3.8.4.3 Gillnetting Sampling Results

Eight locations were chosen around James Island for sampling. One gillnet was set at each location. The gillnet method is conducted by a net that is attached to poles that are fixed in the substrate or anchored or prevent movement of the net. The nets are kept afloat at a specific depth by using a system of weights and/or buoys attached to the nets. The nets for the 2020 – 2021 survey were 100 ft in length with five panels of varying mesh sizes, ranging from 0.75 to 2.5 inches, to target all fish species. Results are provided in Table 12. Compared to the 2002 – 2003 results, one new species of fish (Spanish mackerel) was captured using this method and seven species were detected in the feasibility survey were not captured during the 2020 – 2021 surveys. Referring to both survey periods, the fall 2002 survey and the summer 2020 survey had the greatest species diversity and individuals caught. During the 2002 – 2003 surveys the most common species was Atlantic menhaden while the least common was southern kingfish and alewife. In 2020 – 2021 surveys, spot was the most common species, while alewife was the least common. Overall, the 2002 – 2003 sampling period resulted in greater species diversity and individuals caught when compared to the 2020 – 2021 sampling period.

Table 12. James Island Gillnet Survey Species (2002-2003 and 2020-2021); X=observed

Common Name	Scientific Name	Observed 2002-2003	Observed 2020-2021
Alewife	*Alosa pseudoharengus*	X	X
Atlantic Croaker	*Micropogonias undulatus*	X	-
Atlantic Herring	*Clupea harengus*	X	-
Atlantic Horseshoe Crab	*Limulus polyphemus*	X	-
Atlantic Menhaden	*Brevoortia tyrannus*	X	X
Blue Crab	*Callinectes sapidus*	X	X
Bluefish	*Pomatomus saltatrix*	X	X
Gizzard Shad	*Dorosoma cepedianum*	X	X
Hogchoker	*Trinectes maculatus*	X	-
Southern Kingfish	*Menticirrhus americanus*	X	-
Spanish Mackerel	*Scomberomorus maculatus*	-	X
Spot	*Leiostomus xanthurus*	X	X
Striped Bass	*Morone saxatilis*	X	X
Striped Mullet	*Mugil cephalus*	X	-
Summer Flounder	*Paralichthys dentatus*	X	X
Weakfish	*Cynoscion regalis*	X	X
White Perch	*Morone americana*	X	-

3.8.4.4 Pop Net Sampling Results

Three locations were chosen at James Island which were set in areas as close to beach seine locations as possible and in areas of submerged aquatic vegetation if present. Two pop nets were set for at least one full tidal cycle at each location. The nets were deployed two hours after peak daytime high tide. Results are provided in Table 13. Compared to the 2003 results, two new species of fish (spot and striped anchovy) were captured using this method and five species were detected in the feasibility survey were not captured during the 2020 – 2021 surveys. Referring to the most recent surveys the 2020 summer survey had the greatest species diversity and individuals caught. The most common species caught was the bay anchovy while the least common species was Atlantic silverside. Overall, the 2020 – 2021 sampling period resulted in greater individuals caught, but less species diversity when compared to the 2003 sampling period.

Table 13. James Island Pop Net Survey Species (2003 and 2020-2021); X=observed

Common Name	Scientific Name	Observed 2003	Observed 2020-2021
Atlantic Needlefish	*Strongylura marina*	X	-
Atlantic Silverside	*Menidia menidia*	X	X
Bay Anchovy	*Anchoa mitchilli*	X	X
Blue Crab	*Callinectes sapidus*	X	-
Feather Blenny	*Hypsoblennius hentz*	X	-
Grass Shrimp	*Palemonetes*	X	-
Scud	*Amphipoda*	X	-
Spot	*Leiostomus xanthurus*	-	X
Striped Anchovy	*Anchoa hepsetus*	-	X

3.8.4.5 Essential Fish Habitat (EFH)

"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 Fishery Conservation and Management Act, 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 National Marine Fisheries Service (NMFS) during the 2009 Mid-Bay FR/EIS, 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. The list was finalized in coordination with NMFS on August 11, 2021, and reaffirmed for James Island in coordination with NMFS on December 19, 2022. Below is the list of EFH species and their life stages:

- Windowpane flounder (*Scophthalmus aquosos*), juvenile and adult stages;
- Bluefish (*Pomatomus saltatrix*), juvenile and adult stages;
- Summer flounder (*Paralicthys dentatus*), larvae, juvenile and adult stages;
- Atlantic butterfish (*Peprilus triacanthus*), 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.

Adverse effects to EFH can result from habitat-wide impacts which can cause individual, cumulative, or synergistic impacts. As such, prevalent prey listed below is included in EFH.

- Stout razor clam (*Tagelus plebeius)*
- Blue crab (*Callinectes sapidus)*
- Atlantic menhaden (*Brevoortia tyrannus)*
- Bay anchovy (*Anchoa mitchilli)*
- Atlantic silverside (*Menidia menidia)*
- Spot (*Leiostomus xanthurus).*

Sampling during the feasibility study and the current project phase has provided information on the presence of these species in the James Island vicinity. Windowpane flounder, Atlantic butterfish, black sea bass, and clearnose skate were not identified in the 2002 – 2003 feasibility study or the 2020 – 2021 updated fish surveys. Scup was only identified during the 2002 – 2003 sampling. During the 2002 – 2003 feasibility study twenty-seven bluefish were identified, while in the 2020 – 2021 survey only three individuals were caught. Similarly, summer flounder was identified more during the 2002 – 2003 study then the updated 2020-2023 fish survey. In all surveys, prey species were identified in the vicinity of James Island.

The full EFH assessment is provided in Appendix C2. James Island area waters constitute EFH for adult and juvenile summer flounder, and adult and juvenile bluefish (in occasional years) based upon EFH habitat preferences and documented occurrences. Accordingly, 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. Section 6.8.4.1 below discusses potential effects to EFH species from this proposed action. NMFS provided consultation on the EFH assessment and identified Conservation Recommendations (Appendix B5). USACE provided a response to NMFS on how it will incorporate the Conservation Recommendations into the Project (Appendix C1)

3.8.5 Commercially Important Species and Commercial Fisheries

3.8.5.1 Clams

Razor clams (*Tagelus plebeius)* and soft-shell clams (*Mya arenaria*), two commercially important species, have historically been found in the vicinity of James Island. Bivalve surveys were conducted by a licensed commercial clammer during the 2020 fall season only, consistent with the baseline survey and commercial clam season. Five transects were selected and were approximately 100 to 200 meters in length and required 15 minutes to complete. A hydraulic dredge was used to conduct the bivalve survey. The 2020 survey transects JI-CS-05 yielded the greatest number of individuals caught, measuring 817 razor clams and one soft-shell clam. Data collected from the other transects can be found in Appendix A1. Clam data collected for the 2009 Mid-Bay FR/EIS showed a general lack of a substantial number of clams in the vicinity of James Island, though it was consistent with the 2020 survey data in that razor clams were the most common clam species observed.

3.8.5.2 Eastern Oyster

The Eastern Oyster, (*Crassostrea virginica)* is an important keystone species in the Chesapeake Bay. During the 19th century, the Chesapeake Bay oyster industry was the largest in the world and by 1920 nearly three quarters of the Bay's oyster reefs were lost. Over-harvesting, loss of habitat, pollution, and disease are responsible for the decline of the oyster populations. Suspended solids and elevated levels of nutrients have resulted in eutrophication within the Chesapeake Bay, limiting the quality and quantity of oyster habitat. Disease and parasites have also influenced the oyster population, with two parasites *Perkinsus marinus* (Dermo) and *Haplosporidium nelson* (MSX) are the major sources of oyster mortality in the Chesapeake Bay (Chesapeake Bay Program [CBP], 2023).

MSX thrives in higher salinity, while Dermo tolerates lower salinity, thus is more detrimental to the oyster population.

Oysters are a valuable species to the overall health of the Chesapeake Bay. Oysters are filter feeders and consume algae and other water-borne nutrients at a rate of up to 50 gallons per day (CBP, 2023). Oyster reefs historically provided biogenic habitat for benthic invertebrates, fish, and crustaceans. The oyster usually lives in water depths between 2.4 and 7.6 m (8 and 25ft). Seasonal deficiencies in dissolved oxygen throughout the Bay prevent establishment in most waters over 10.7 m (35ft) deep.

There are 10 oyster bars in the James Island vicinity (Figure 15):

- *James Point* (MD Historic Oyster Bar, Yates Bar)
- *Travers* (MD Historic Oyster Bar, Yates Bar)
- *Hills Point South* (MD Historic Oyster Bar, Yates Bar, Legal Natural Oyster Bar (NOB))
- *Peanut Hill* (MD Historic Oyster Bar, Yates Bar, Legal NOB)
- *Little Choptank* (MD Historic Oyster Bar, Yates Bar, Legal NOB)
- *Cators* (MD Historic Oyster Bar, Yates Bar, Legal NOB)
- *Granger* (MD Historic Oyster Bar, Yates Bar, Legal NOB)
- *Oyster Creek* (MD Historic Oyster Bar, Yates Bar)
- *Marshall* (MD Historic Oyster Bar, Yates Bar)
- *Ragged Point* (MD Historic Oyster Bar, Yates Bar, Legal NOB)

Seasonal harvests data from oyster bars in the vicinity of James Island, as reported by seafood dealer reports, were collected from October 1, 2015 through March 31, 2023 and amounted to 35,158 bushels harvested in that timeframe (MDNR, personal communication, September, 28, 2023) (Table 14).

Table 14. James Island Eastern Oyster Harvests (bushels), 10/01/2015 through 3/31/2023

Oyster Bar	Harvest (bu)
James Point	296
Travers	42
Hill Point South	0
Peanut Hill	13,922
Little Choptank	1,812
Cators	11
Granger	0
Oyster Creek	88
Marshall	0
Ragged Point	18,998

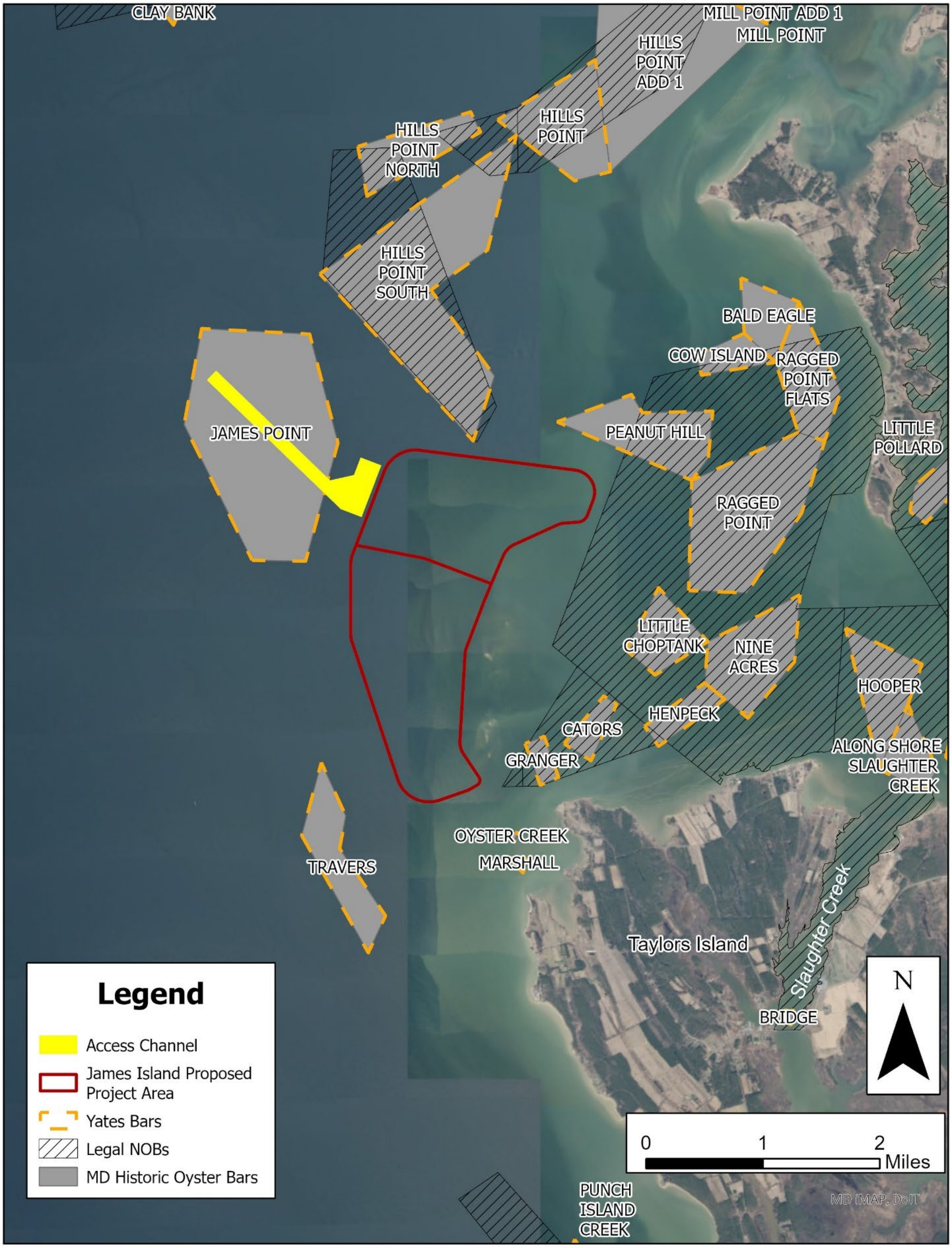

Figure 15. James Island (1:50,000): Oyster Bar Delineations

3.8.5.3 Blue Crab

The blue crab (Callinectes sapidus) is both commercially and ecologically important to the Chesapeake Bay region. Commercially, the blue crab industry is the most valuable that the Chesapeake Bay provides. In Maryland and Virginia combined, the annual commercial harvest value is between $22 to $45 million (Chesapeake Bay Foundation [CBF], 2023). Blue crabs are classified as general scavengers: bottom carnivores, detritivores, and omnivores. At different stages of development, they serve as both prey and as consumers of plankton, benthic macroinvertebrates, fish, plants, mollusks, crustaceans, and organic debris. Throughout their lifecycle they are preyed upon by various fish, bird. And mammalian species.

Blue crabs are found throughout the bay and are most active during the spring through fall before burrowing into the sediment during the winter months. Mating occurs from June to October and in shallow waters that contain submerged aquatic vegetation, typically in middle and upper portions of the bay (CBF, 2023).

During the feasibility phase surveys of 2002 – 2003, blue crab was the dominant species during the Spring 2003 bottom trawling survey conducted at James Island. Blue crabs were also caught during the other sampling methods, however during the 2020-2021 fisheries surveys (across all seasons) they were seldom observed by any of the sampling methods at James Island. This can be due to population decline, the loss of James Island to erosion, and the reduced amount of submerged aquatic vegetation around James Island.

In August 2020, September 2020, May 2021, June 2021, and July 2021 an updated crab pot survey was conducted in the vicinity of James Island (Anchor QEA, 2021). Transects were established every 500 meters through the study area of 3,846 acres that included the James Island Project Restoration area with an additional 0.25-mile perimeter. The findings of the survey as documented in Table 15 found that James Island serves as a primary crabbing ground. During the survey period, 3,848 pots were identified in the survey area with the majority being located to the north and south of James Island. Figure 16 identifies the area covered by the crab surveys. Complete results can be found in Appendix A1.

Table 15. Crab Pot Survey Results (2020-2021)

Survey Month	Number of Crab Pots Observed
August 2020	1,123
September 2020	971
May 2021	50
June 2021	1,106
July 2021	598

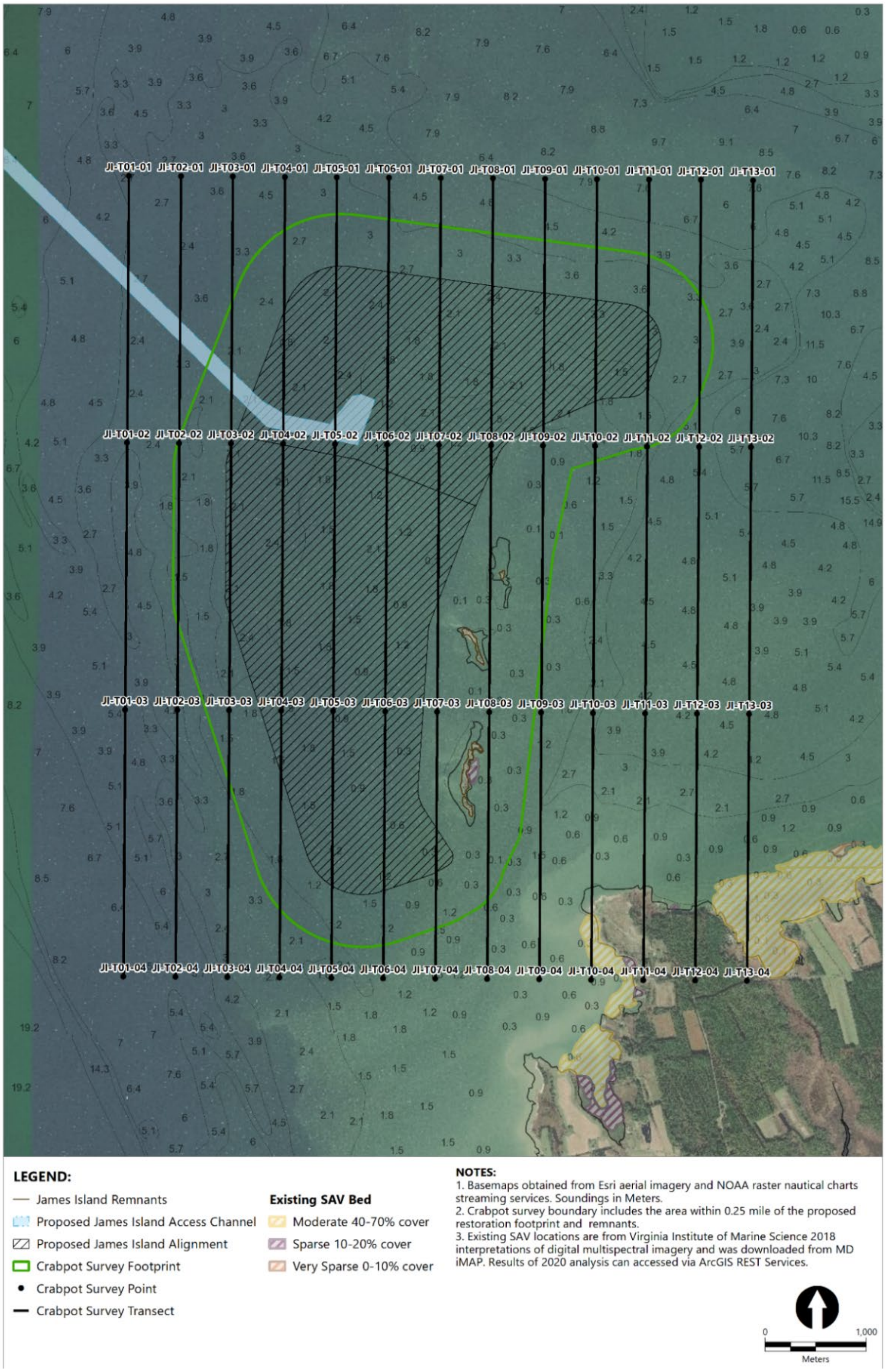

Figure 16. James Island Crab Pot Survey Transects Location (2020 – 2021). (Initial access channel alignment that was current at the time of sampling is depicted.)

Additionally, DNR surveys wintering blue crab habitat. Survey results have identified few wintering blue crabs. The area around James Island is too shallow for suitable over-wintering blue crab habitat and the shelf west of the island is hard sand. Crabs have been found in the muddy bottom east of James Island or along the edge of the Little Choptank River bed north of James Island that runs from the northeast to southwest into the False Channel. Overwintering crabs have also been identified on the edge of the ship channel west of James Island, typically water depths >30 ft.

3.8.5.4 Horseshoe Crab

Horseshoe crabs (*Limulus polyphemus*) are benthic, bottom dwelling organisms that are found in estuarine and continental shelf habitats. The horseshoe crab populations range from the Yucatan peninsula to northern Maine, but they are commonly found in the mid-Atlantic region between Virginia and New Jersey. Spawning occurs in late May, when adult horseshow crabs gather upon sandy beaches to mate and lay eggs. With the continuation of habitat loss and increased commercial harvesting, the horseshoe crab is listed as vulnerable by the International Union for Conservation of Species, but is not listed on the Endangered Species List. Therefore, there is no legal protection, but efforts have been made to regulate commercial harvesting.

Horseshoe crabs are a vital member of the Chesapeake Bay ecosystem, especially to turtles, fish, birds, and crabs. Horseshoe crab eggs are relied on by migratory birds, primarily the endangered red knot (*Calidris canutus*) that need to replenish their fat supply, while traveling to their arctic breeding grounds. Adults are also an important component in the diet of juvenile loggerhead turtles, which are a threatened species that utilizes the Chesapeake Bay as a summer nursery area.

Horseshoe crabs were collected at James Island in the 2003 spring bottom trawl and gillnet survey but were not captured during the 2020-2021 surveys.

3.8.5.5 Finfish

The most significant finfish fisheries in the Chesapeake Bay in the area around James and Barren Islands consist of croaker, menhaden, spot, and striped bass (MPA, 2003a). The total catch within the water body surrounding James Island ranged from 1,119,532 to 1,962,384 pounds in the years 1998 to 2003 (University of Maryland Center for Environmental Science [UMCES], 2004).

3.8.5.6 Pound Nets

Of the nine pound nets in the James Island project area, three lie within the project footprint (Figure 17). None of these pound nets are currently active. Two of the nets were actively set and fished during the feasibility study time period. Catch data were available for one pound net licensed in the James Island vicinity at that time. Between August 1999 and November 2000, 9,134 pounds of striped bass were captured within four pound nets located far to the west of the southern remnant. Fishing was mostly conducted from July through November. Catch data were unavailable at that time for five other net locations in the James Island vicinity (MPA, 2004c).

3.8.6 Marine Mammals

Marine mammals such as bottlenose dolphins (*Tursiops truncatus*) are frequent visitors to the Chesapeake Bay, the Choptank River, and the Little Choptank River. 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). Marine mammals, particularly bottlenose dolphins, are common in the project area in months where water temperatures are at their warmest (May to October).

3.9 TERRESTRIAL RESOURCES

Due to erosion of James Island, no uplands remain above the mean high-water level.

3.10 AVIFAUNA

The Chesapeake Bay provides valuable and diverse habitat for avian species. The waters surrounding James Island are recognized as a Historic Waterfowl Concentration Area under Maryland's Critical Area Act. Seasonal surveys conducted in the Chesapeake Bay have identified five major groups of inhabiting birds—colonial waterbirds, shorebirds and marsh birds, waterfowl, predatory and scavenging birds (raptors), and other land birds. Colonial nesting waterbirds that inhabit the Chesapeake Bay region include great blue heron (*Ardea herodias*), the great egret (*Ardea alba*), the snowy egret (*Egretta thula*), the little blue heron (*Egretta caerulea*), the green-backed heron (*Butorides striatus*), the night heron (*Nycticorax nycticorax)*, tricolored heron (*Egretta tricolor*), glossy ibis (*Plegadis falcinellis*), white ibis (*Eudocimus albus*), and cattle egret (*Bubulcus ibis*). Colonial waterbirds hunt in shallow water habitat, feeding mainly on small fish, amphibians, and arthropods. They nest in tall trees in mainland areas, but can nest on shrubs and even dense grassy vegetation on islands isolated from terrestrial predators. Colonial waterbirds concentrate their reproductive energies in colonies at just a few locations.

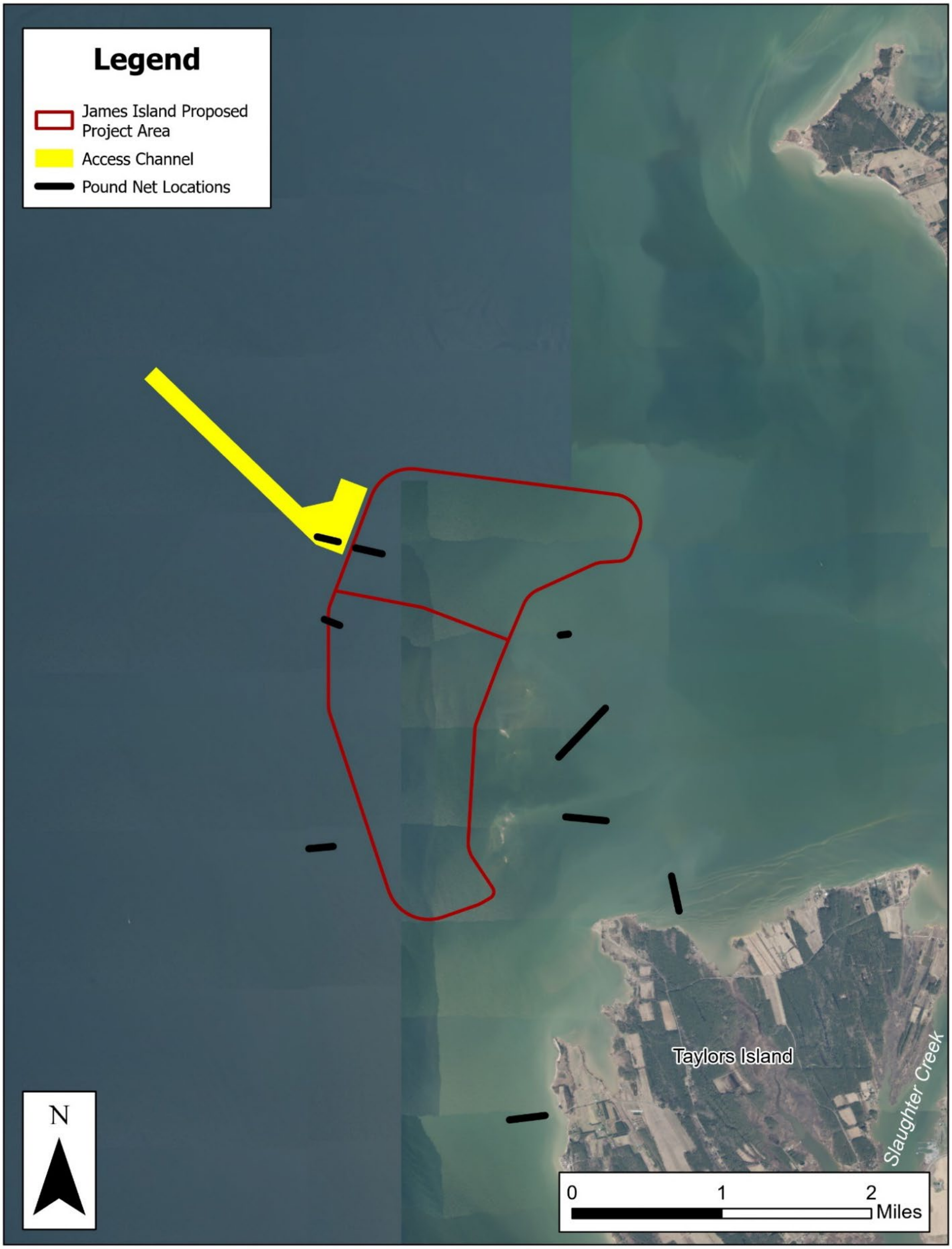

Figure 17. Pound Nets within the James Island Project Area

Avian surveys were conducted at James Island in 2002 and 2003, which documented 73 species present across all four survey seasons. Results from these surveys are summarized in the 2009 Mid-Bay FR/EIS (USACE 2009). Updated avian surveys were conducted at James Island in 2020 – 2021.

These updated surveys observed 36 species of birds at James Island, 27 of which were observed during the 2002 – 2003 surveys, and three of which were nesting on the island remnants: the American oystercatcher (*Haematopus palliatus*), the Canada goose (*Branta canadensis*), and the great blue heron (*Ardea Herodias*) (Table 16). The full results of the 2020 – 2021 surveys, including survey sampling locations, are provided in Appendix A1.

Table 16. James Island Avian Survey Species (2002-2003 and 2020-2021); X=observed

Common Name	Scientific Name	Observed 2002-2003	Observed 2020-2021
American Black Duck	*Anas rubripes*	X	-
American Crow	*Corvus brachyrhynchos*	X	X
American Goldfinch	*Carduelis tristis*	X	-
American Kestrel	*Falco sparverius*	X	-
American Oystercatcher	*Haematopus palliatus*	-	X
American Robin	*Turdus migratorius*	X	-
Bald Eagle	*Haliaeetus leucocephalus*	X	X
Barn Swallow	*Hirundo rustica*	X	X
Barred Owl	*Strix varia*	X	-
Black Scoter	*Melanitta americana*	X	X
Blue Jay	*Cyanocitta cristata*	X	-
Brown Creeper	*Certhia americana*	X	-
Brown Pelican	*Pelecanus occidentalis*	X	X
Brown-headed Cowbird	*Molothrus ater*	X	-
Bufflehead	*Bucephala albeola*	X	X
Canada Goose	*Branta canadensis*	X	X
Carolina Chickadee	*Poecile carolinensis*	X	-
Carolina Wren	*Thryothorus ludovicianus*	X	-
Caspian Tern	*Hydroprogne caspia*	-	X
Chimney Swift	*Chaetura pelagica*	-	X
Common Grackle	*Quiscalus quiscula*	X	X
Common Loon	*Gavia immer*	X	-
Common Tern	*Sterna hirundo*	X	X
Double-crested Cormorant	*Phalacrocorax auritus*	X	X
Downy Woodpecker	*Picoides pubescens*	X	-
Dunlin	*Calidris alpina*	X	-
Eastern Bluebird	*Sialia sialis*	X	-
Eastern Kingbird	*Tyrannus tyrannus*	X	-
Eastern Phoebe	*Sayornis phoebe*	X	-

Common Name	Scientific Name	Observed 2002-2003	Observed 2020-2021
European Starling	*Sturnus vulgaris*	X	-
Forster's Tern	*Sterna forsteri*	X	X
Golden-crowned Kinglet	*Rebulus satrapa*	X	-
Gray Catbird	*Dumetella carolinensis*	X	-
Great Black-backed Gull	*Larus marinus*	X	X
Great Blue Heron	*Ardea Herodias*	X	X
Great Egret	*Ardea alba*	X	-
Greater Yellowlegs	*Tringa melanolueca*	X	-
Green Heron	*Butorides virescens*	X	-
Hairy Woodpecker	*Picoides villosus*	X	-
Herring Gull	*Larus argentatus*	X	X
Horned Grebe	*Podiceps auritus*	X	-
House Wren	*Troglodytes aedon*	X	-
Killdeer	*Charadrius vociferus*	X	-
Laughing Gull	*Leucophaeus atricilla*	X	X
Least Sandpiper	*Calidris minutilla*	X	X
Least Tern	*Strenula antillarum*	X	X
Long-tailed Duck	*Clangula hyemalis*	X	X
Louisiana Waterthrush	*Seiurus motacilla*	X	-
Mallard	*Anus platyrhynchos*	X	-
Mourning Dove	*Zenaida macroura*	X	-
Mute Swan	*Cygnis olor*	X	-
Northern Cardinal	*Cardinalis cardinalis*	X	-
Northern Flicker	*Colaptes auratus*	X	-
Northern Rough-winged Swallow	*Stelgidopterix serripennis*	X	-
Osprey	*Pandion haliaetus*	X	X
Peregrine Falcon	*Falco peregrinus*	-	X
Pine Warbler	*Steophaga pinus*	X	-
Purple Martin	*Progne subis*	-	X
Red-breasted Merganser	*Mergus serrator*	X	-
Red-winged Blackbird	*Agelaius phoeniceus*	X	X
Ring-billed Gull	*Larus delawarensis*	X	X
Royal Tern	*Thalasseus maximus*	X	-
Ruby-throated Hummingbird	*Archilochus colubris*	-	X
Ruddy Turnstone	*Arenaria interpres*	X	X
Sanderling	*Calidris alba*	X	X
Semipalmated Plover	*Charadrius semipalmatus*	X	X
Semipalmated Sandpiper	*Calidris pusilla*	-	X
Sharp-shinned Hawk	*Accipiter straitus*	X	-

Common Name	Scientific Name	Observed 2002-2003	Observed 2020-2021
Snow Goose	*Chen (Anser) caerulescens*	X	-
Song Sparrow	*Melospiza melodia*	X	-
Spotted Sandpiper	*Actitis macularius*	X	X
Surf Scoter	*Melanitta perspicillata*	X	X
Swamp Sparrow	*Melospiza georgiana*	X	-
Tree Swallow	*Tachycineta bicolor*	X	-
Tufted Titmouse	*Baeolophus bicolor*	X	-
Turkey Vulture	*Cathartes aura*	X	X
Unidentified Crow	*Corvus sp.*	-	X
Unidentified Peep	*Calidris sp.*	-	X
White-winged Scoter	*Melanitta deglandi*	X	-
Yellow Warbler	*Dendroica petechia*	X	-
Yellow-rumped Warbler	*Dendroica coronata*	X	-

3.11 TERRESTRIAL MAMMALS

When there was still significant land mass on James Island several mammalian species were identified. Based on the feasibility study in 2002 – 2003 visual observations or animal sign resulted in the identification of Sika deer, river otter, white-tailed deer, muskrat, and racoon.

Due to the eroding of James Island, there is no sustainable land mass to support terrestrial mammals.

3.12 RARE, THREATENED, AND ENDANGERED SPECIES (RTE)

3.12.1 Federally-listed Species

The Endangered Species Act (ESA) of 1973 and the Maryland Nongame and Endangered Species Conservation Act (NESCA) of 1975 are Federal and State Acts that protect certain species of plants and animals. Section 7 of the ESA provides a consistency clause that requires consultation with USFWS and NMFS if a proposed project may affect RTE species. A similar requirement for consultation is required in the NESCA, if a proposed project may affect state RTE species.

Consultation was conducted, in accordance with Federal and state requirements, with USFWS Ecological Services office in Annapolis, Maryland; the Habitat Conservation Division of the NMFS in Oxford, Maryland; and MDNR's Fish, Heritage, and Wildlife Administration in Annapolis, Maryland. Requested information included critical habitat and Federal- and state-listed RTE species. The following threatened and endangered species were identified in the project area:

- Eastern Black Rail *(Laterallus jamaicensis)*
- Green Sea Turtle *(Chelonia mydas)*
- Atlantic Sturgeon *(Acipenser oxyriynchus oxyriynchus)*
- Shortnose sturgeon *(Acipenser brevirostrum)*
- Kemp's Ridley Sea Turtle *(Lepidochelys kempii)*

- Leatherback Sea Turtle *(Dermochelys coriacea)*
- Loggerhead Sea Turtle *(Caretta caretta)*

Biological surveys have been performed to document whether any RTE species are within the vicinity of James Island. None of the identified species were observed in 2002 – 2003 surveys of James Island and its vicinity; the full findings of those RTE species surveys can be found at Table 3-41 in the 2009 Mid-Bay FR/EIS. During feasibility, a bald eagle nest existed on the James Island remnants. The bald eagle was delisted from the endangered species list in 2007, but continues to be a species of concern. No other federal listed RTE plant or animal species were observed during feasibility phase field investigations at James Island. Surveys conducted in 2020 and 2021 similarly did not identify the presence of any listed species. NOAA completed consultation February 2018 concurring that there were no significant impacts on listed species under their jurisdiction. NOAA confirms that, due to the fact that no new listed species or designated critical habitat overlap with the project's action area, re-initiation of consultation is unnecessary for species under their management (Appendix C1). ESA coordination with USFWS, however, for their resource species, was reinitiated resulting in preparation of a Planning Aid Report in March 2021, updated February 2024 (Appendix C3).

3.12.2 State-listed Species

Feasibility phase surveys identified one avian species and one plant species in the vicinity of James Island that was listed as "endangered" in the State of Maryland at that time. A species population listed as "endangered" in the State of Maryland is considered to be in jeopardy of continued existence (MDNR, 2021). The royal tern (*Thalasseus maximus*) was listed as an "endangered" avian species in the State of Maryland (MPA, 2004b). Canby's bulrush *(Schoenoplectus etuberculatus)* was observed on James Island and was listed as an "endangered" plant in the State of Maryland (MPA, 2004a; MPA, 2004b). Further, two avian species observed in the vicinity of James Island were listed as "threatened" in the State of Maryland at the time of the feasibility report: least tern (*Strenula antillarum*) and American bald eagle (MPA, 2004b; MDNR, 2021). A species population listed as "threatened" in the State of Maryland is considered to be in jeopardy of becoming "endangered." Of these state-listed species, only the least tern and bald eagle were observed in 2020 – 2021 surveys. The royal tern remains listed as endangered and the least tern remains listed as threatened, but the bald eagle was delisted in 2010. Canby's bulrush is now listed as endangered extirpated as no naturally occurring populations are known to exist.

Avian species listed on the state RTE species list as rare breeders were identified by the surveys in 2002 – 2003 included the golden-crowned kinglet (*Regulus satrapa*), double-crested cormorant (*Phalacrocorax auratus*), brown pelican (*Pelecanus occidentalis*), laughing gull (*Leucophaeus atricilla*), sharp-shinned hawk (*Accipiter striatus*), spotted sandpiper (*Actitis macularius*), northern harrier (*Circus hudsonius*), yellow-bellied sapsucker (*Sphyrapicus varius*), and dark-eyed junco (*Junco hyemalis*) (MPA, 2003b; MPA, 2003c; MPA, 2004a; MPA, 2004b). Only the double-crested cormorant and spotted sandpiper were documented in 2020 – 2021 surveys. The big sand tiger beetle (*Cicindela Formosa*), listed as rare on the State's RTE list, was observed on James Island during feasibility. Plant species observed on James Island in 2002 – 2003 surveys and listed as rare on the State's RTE species list included yellow thistle (*Cirsium horridulum* Michaux var. *horridulum)*, Elliot's goldenrod (*Solidago latissimifolia* Miller), beaked spikerush (*Eleocharis rostellata* (Torrey) Torrey), and pearly everlasting (*Anaphalis margaritacea* (Linnaeus) Benth) (MPA, 2003b; MPA, 2003c; MPA, 2004a; MPA, 2004b). None of these terrestrial resources remain in what is left of James Island.

3.13 AIR QUALITY

The Maryland Healthy Air Act (Annotated Code of Maryland Environment Title 2 Ambient Air Quality Control Subtitle 10 Health Air Act Sections 2-1001-20-1005) was developed to aid with meeting the attainment constraints for the National Ambient Air Quality Standards (NAAQS). The USEPA has established national ambient (outdoor) air quality standards for six common pollutants: ozone, carbon monoxide, sulfur dioxide, particulate matter, oxides of nitrogen, and lead. The NAAQS is separated into primary and secondary standards, from which ambient air quality is determined by measuring ambient pollutant concentrations and comparing the concentrations to the corresponding standard (USEPA, 2023c).

Attainment is defined when an area has met the NAAQS established for a specific pollutant. Nonattainment is the opposite and occurs when the concentration of a particular NAAQS is not met. The majority of Maryland is in attainment for particulate matter, nitrogen dioxide, sulfur dioxide, lead, and carbon monoxide. Metropolitan regions, specifically the Baltimore and Washington DC metropolitan areas, are in nonattainment for ozone (USEPA, 2023b).

Primary air quality standards were designed to establish an adequate margin of safety for public health of sensitive populations, children, elderly, and health compromised. Secondary standards were established to protect public welfare, including protection of personal property and buildings from adverse effects associated with pollutants in the ambient air (USEPA, 2023b).

3.13.1 Ozone Standard Status

The primary and secondary ambient air quality standard for ozone is .070 parts per million (ppm) over an 8-hour period and is defined by the annual fourth highest daily maximum 8-hour average concentration, averages over 3 years. Dorchester County is in attainment for ozone, but the entire state of Maryland is part of the Ozone Transport Commission, meaning that there is a significant contribution of ozone to the region originating from sources outside of the northeast (Maryland State Archives [MSA], 2023a; USEPA, 2023b).

3.13.2 Carbon Monoxide Standard Status

USEPA has established a primary eight-hour ambient air quality standard for carbon monoxide of 9 ppm and a 35 ppm maximum not to be exceeded more than once per year (USEPA, 2023d). The Dorchester County air quality region is in attainment with carbon monoxide standards (USEPA, 2023b).

3.13.3 Sulfur Dioxide Standard Status

USEPA has established a primary 1-hour ambient air quality standard of 75 parts per billion (ppb) for sulfur dioxide, defined by being within the 99th percentile, averaged over 3 years (USEPA, 2023h). The secondary standard for sulfur dioxide is 0.05 ppm over a three-year period, not to be exceeded more than once per year. In addition, the annual standard is 0.02 ppm and is defined by the annual arithmetic average. Dorchester County is in attainment for sulfur dioxide (USEPA, 2023b).

3.13.4 Particulate Matter (PM10) Standard Status

The national primary and secondary air quality standard for particulate matter is 150 micrograms per cubic meter over a 24- hour period, not to be exceeded more than once per year on average over a three-year period (USEPA, 2023g). Dorchester County is in attainment for particulate matter (USEPA, 2023b).

3.13.5 Nitrogen Dioxide Standard Status

The national primary and secondary 1- hour air quality standard for nitrogen dioxide is 100 ppb, defined by the 98th percentile, 1-hour daily maximum, averaged 3 years (USEPA, 2023f). Dorchester County is classified as in attainment for nitrogen dioxide (USEPA, 2023b).

3.13.6 Lead Standard Status

The primary and secondary ambient air quality standard for lead is 0.15 micrograms per cubic meter over a three-month period (USEPA, 2023e). Dorchester County is classified as in attainment for lead (USEPA, 2023b).

3.14 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 (Wenz 1962).

Noise is often operationally 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 sound 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, sound 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.

James Island has no on-site sound sources and has generally low sound levels. However, the areas around James Island can have substantial sound sources generated from boat traffic in adjacent waters and natural sound sources such as wind, waves, and birds contribute to sound levels. Recreational and fish industrial watercrafts may generate sound levels of 70 to 85 dBA at 50 ft similar to normal freeway traffic (Noise Unlimited, 1995). Background sound levels for residents in the vicinity of James Island may typically be 40 dBA with occasional acute sound sources such as farm equipment and lawn equipment. James Island is generally free of anthropogenic sounds other than occasional fishing boats or recreational boats, and the island is far away from any major roadway or shipping lanes. Air traffic may cause more frequent sound due to the Patuxent Naval Air Station.

Intensity, pressure, pitch or frequency (i.e., high, mid-, or low frequency), impulsive/non-impulsive, and velocity (e.g. particle motion) 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. The SPL of an underwater sound can be described as the root mean square (RMS) pressure level in a stated frequency band over a specified time window. Source level (SL) is typically described at 1 meter (m) from the source. 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). Anthropogenic or manmade sources of sound 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 2009). SLs of small boat traffic falls within the range of 160 – 180 dB re 1 µPa at 1 m (OSPAR 2009). All potential sources in the area are categorized as non-impulsive sources.

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 sounds influence the behavior of fish and other marine animals, including hunting for prey, avoiding predators, or social interaction. Elevated levels of sound can affect behavioral patterns and increase stress of marine life. Changes in vocalization, behavior, breathing, and diving patterns, and active avoidance of sound sources by marine life have all been observed in response to anthropogenic sound (Earth Island Institute, 2002).

3.15 LIGHT

There are currently no light sources on James Island. Overall, there are few human-made light sources surrounding the island. Sources on the adjacent mainland includes car headlights, streetlights, and residential and commercial buildings. The mainland around James Island is comprised of single-family homes, agricultural fields, wetlands and forests.

Within the Chesapeake Bay, navigational aids such as buoys, lighthouses, dock lights, other markings or signage and lighted boats exist in the water surrounding James Island. None of these light sources are considered a hinderance to neighboring residences.

3.16 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES (HTRW)

There are no known issues related to hazardous materials, manufacturing, storage, or use on James Island. During original site visits between October 2001 and September 2004, there was no evidence of such materials or clandestine dumping found at site. There have been no new sources of HTRW since feasibility. There is no evidence that James Island contains HTRW that would influence the proposed island restoration project.

3.17 PROTECTED AREAS

Federal, state, and local laws have been created to protect certain types of areas such as sensitive habitats, flood zones, and agricultural lands from adverse effects of development. Prior to being submerged, James Island was undeveloped consisting of wetland, beach, and little forest. These types of habitats can be subject under Coastal Zone Management regulations, Critical Areas, or floodplain regulations.

3.17.1 Navigation and Navigable Channels

Navigational uses closest to the project area consist of recreational boating and commercial fishing and crabbing. James Island is located along the Eastern Shore of Maryland, 2.75 nautical miles east of the navigation shipping channel in the main-stem Chesapeake Bay. The federally-maintained Slaughter Creek (Figure 4, #19) channel that enables access to the Bay and Little Choptank River from Slaughter Creek is an important access point for local watermen and the Taylors Island community. The mouth of Slaughter Creek is approximately 4 miles from James Island.

3.17.2 Coastal Zone Management

The Maryland Coastal Zone Management Program (CZMP) is a partnership among local, regional, and state agencies that was established by the Coastal Zone Management Act of 1972. This partnership established by the Act provides an avenue for consultation between these agencies to aid in complex resource management issues. The goal of MD Coastal Consistency reviews is to ensure that federal-related projects or activities with foreseeable effects on Maryland coastal resources (e.g., wetlands, forests, rivers, beaches) and coastal uses (e.g., navigation, fishing, agriculture, energy development) are consistent with Maryland CZMP's enforceable policies. With James Island being located within the Chesapeake Bay, James Island is within the CZMP. The submerged remnants of James Island could be considered a coastal hazard.

3.17.3 Coastal Barrier Resources Act

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. Under the Act, a federal agency proposing to spend funds affecting a system unit must consult with USFWS. Other Protected Areas (OPAs) within the system are not subject to restriction of Federal funds other than prohibition on flood insurance and do not require consultation with USFWS is required specific to CBRA (USACE 2009). James Island is neither within a CBRA system unit nor a OPA and no consultation with USFWS is required.

3.17.4 Critical Areas

James Island is designated as a Resource Conservation Area under Maryland's Chesapeake Bay Critical Area Act (Critical Area Law). Rare, threatened, and endangered species utilizing James had been documented prior to the island being lost below the waterline. Additionally, James Island is within waterfowl areas that are protected under Critical Area Law.

3.17.5 Floodplains

Floodplains are low-lying areas, adjoining a watercourse (river, stream, etc.) or water body (ocean or bay) likely to be inundated by floodwater. For insurance purposes, floodplains are delineated by mapping areas that have been inundated in the past or are expected to be inundated by a flood of a specific magnitude (FEMA, 2004l). In furtherance to the NEPA, Executive Order 11988 is a federal law that has regulations regarding protection of floodplains from long or short-term adverse impacts that may be caused by Federal actions (Carter, 1977). All areas of James Island are designated as 100-year floodplains, except for a small portion of the northern tip of James Island (MDNR, 2023b). A 100-year floodplain is an area that has a 1% annual chance of becoming flooded. The elevation of the 100-year flood hazard in Dorchester County is between 4 ft and 6 ft.

3.17.6 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (16 U.S.C. 1271-1287) was passed on October 2, 1968. It declares that certain "selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments, shall be protected for the benefit and enjoyment of present and future generations." There are no designated wild and scenic rivers in project area or within the Chesapeake Bay watershed.

3.18 CULTURAL RESOURCES

This section describes existing cultural resources within the project's area of potential effects (APE). Figure 18 depicts the APE investigated during feasibility and PED study phases. The eastern edge of the project footprint was not surveyed during feasibility due to the presence of tidal flats from eroding island remnants.

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 of 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.

A historic property must also possess enough integrity to portray its significance. A resource that retains integrity will embody several, and usually most, of the seven aspects of integrity:

- Location is the place where the historic property was constructed or the place the historic event occurred.
- Design is the combination of elements that create the form, plan, space, structure, and style of a property.
- Setting is the physical environment of a historic property.
- Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- Workmanship is the physical evidence of the crafts of a particular cultural or people during a given period in prehistory or history.
- Feeling is a property's expression of aesthetic or historic sense of a particular period of time.
- Association is the direct link between an important historic event or person and a historic property.

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 for proposed federal actions that may affect historic properties. The Maryland Historical Trust (MHT) is designated as the SHPO for Maryland. USACE initiated consultation with the MHT, Delaware Tribe of Indians, and Delaware Nation in January 2020; however, only the MHT and Delaware Nation responded to the correspondence. These letters provided project information, delineated an APE that included an access channel at James Island, and recommended the need for a Phase I archaeological investigation for submerged resources within the proposed access channel. In June

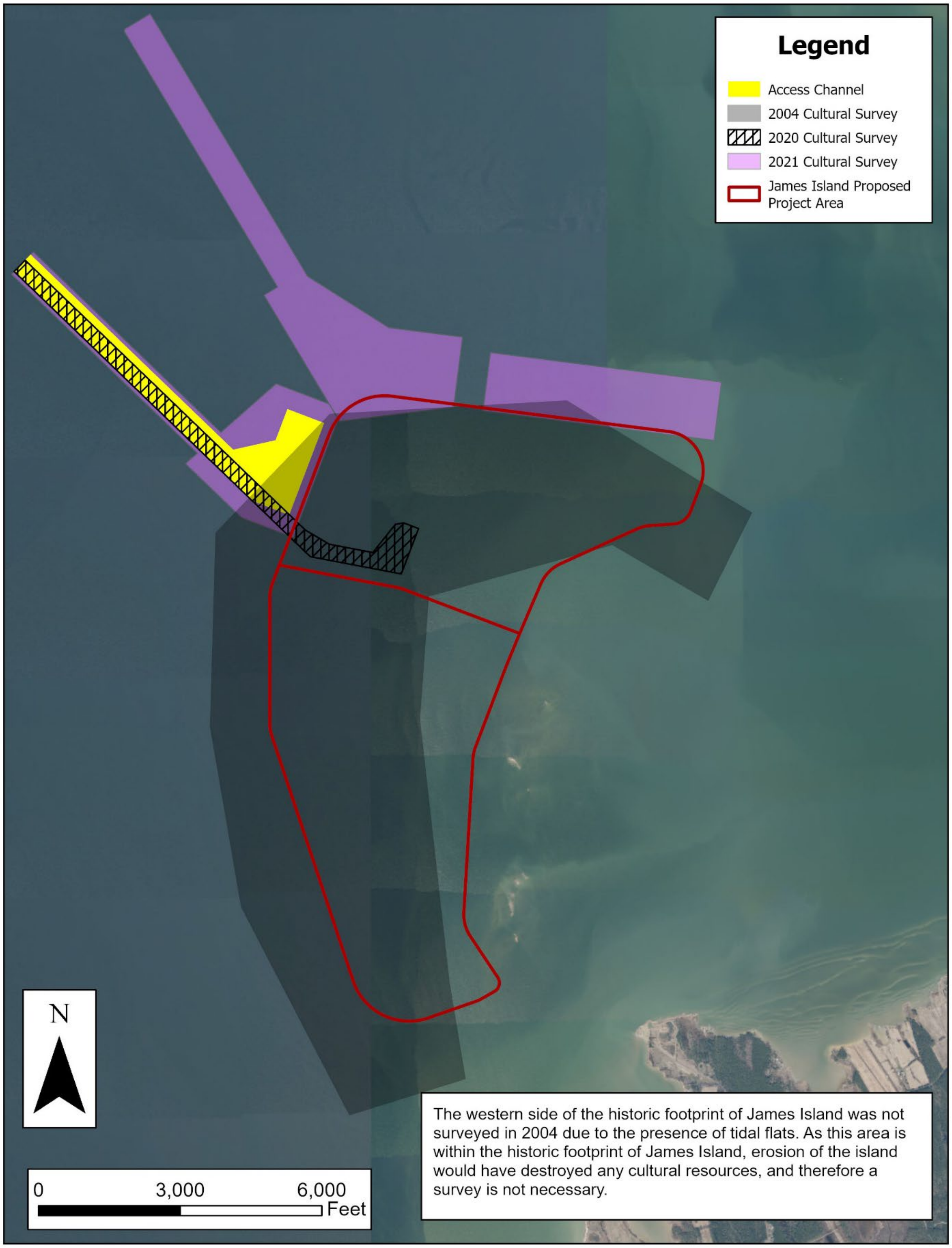

Figure 18. Cultural Investigation Survey Areas (APE)

2020, USACE provided the draft Phase I archaeological report to the MHT and Delaware Nation for review and comment. The Phase I report documented a low potential for submerged shipwrecks or craft within the APE; however, three buried paleochannels were recorded through sub-bottom profiler imagery. It was recommended that the paleochannels be subject to additional investigation or avoided.

In March 2021, USACE sent additional project information to the MHT regarding the drafting of a supplemental environmental document for the James Island portion of the project. In January 2022, USACE contracted Phase II investigations of the buried paleochannels documented in the earlier investigation. Two of the three paleochannels were documented as predating human entry into the Americas, while the third paleochannel continued to be recommended for additional investigation or avoidance because it may have been exposed and available for human occupation from the late Pleistocene to the mid-Holocene.

During 2023, updated access channel and turning basin designs at James Island necessitated further archaeological investigations. Similar to previous investigations, the survey documented a low potential for submerged shipwrecks or craft within the APE; however, four buried paleochannels were recorded through sub-bottom profiler imagery. Again, additional investigation or avoidance was recommended. USACE provided this draft report to the MHT and Delaware Nation for review and comment. In December 2023, the MHT stated that they suspect additional investigation of the buried paleochannels within the APE would result in data and recommendations similar to those provided in previous reports. Rather than conducting additional archaeological work, the MHT recommended coordination with consulting parties regarding potential mitigation options.

In February 2024, USACE sent updated consultation letters to the MHT, Delaware Tribe of Indians, and Delaware Nation proposing the development of a programmatic agreement for the project. The purpose of the programmatic agreement is to conclude Section 106 coordination for this sEIS while stipulating archaeological monitoring and survey, unanticipated discovery, and public interpretation protocols regarding the buried paleochannel and margin system within the APE. The programmatic agreement is included in Appendix A5.

The potential for cultural resources within the APE was assessed using the MHT's cultural resources information system, Medusa. Information gathered from Medusa included previously mapped archaeological and above-ground resources and surveys within 0.5 miles of the APE. This information is presented in Tables 17 and 18. Only resources noted as potentially eligible for, eligible for, or listed in the NRHP are featured in Table 17. Information from the 2009 Mid-Bay FR/EIS has also been incorporated here.

Medusa includes four archaeological sites within the historic James Island footprint. One site featured a multi-component precontact and historic affiliation, while the other three were associated with the historic period. No above-ground resources have been documented within the APE. None of the archaeological sites have been proposed for listing and evaluated for the NRHP; however, all are likely lacking integrity due to the erosion of James Island.

Table 17. Cultural Resources at James Island

Resource Name (Site No.)	NRHP Status	Time Period	Description
Eshelman (18DO410)	Not evaluated	Historic	18th-20th century artifact scatter; does not have subsurface integrity; inundated/eroded
Michele (18DO411)	Not evaluated	Historic	late 19th and early 20th century possible oyster processing facility; unknown site stratigraphy; inundated/eroded
E. James Island (18DO360)	Not evaluated	Multi-component	Late Archaic and Middle Woodland short-term camp; 19th and early 20th century house site; inundated/eroded
James Island Cemetery (18DO366)	Not evaluated	Historic	19th-early 20th century family cemetery; inundated/eroded

Five cultural resources investigations have been conducted within 0.5 miles of the APE. All but one was conducted in association with the Mid-Bay Island Ecosystem Restoration Project. The earliest, conducted by Lowery in 1996, was a shoreline survey that included James Island in its scope. The remaining four investigations were conducted in 2004, 2020, 2022, and 2023 to investigate proposed alignments, access channels, and turning basins. Information about these investigations is included in Table 18.

Table 18. Cultural Resources Investigations near James Island

Investigation Name (Survey No.)	Author	Year	Description
Archaeological Survey Work on Maryland's Eastern Shore During the 1996 Field Season (DO 51)	Lowery, Darrin	1996	Phase I survey of Maryland's Eastern Shore.
Underwater Archaeological Surveys in the Vicinity of James and Barren Islands in the Chesapeake Bay, Maryland: James Island Survey (DO 57)	Lydecker, Andrew D. W. and Michael C. Krivor (Panamerican Consultants, Inc.)	2004	Phase I survey that documented four clusters of magnetic anomalies within proposed dike alignments at James Island. The deposits appeared to be geological features formed by the rise and

Investigation Name (Survey No.)	Author	Year	Description
			fall of river/Chesapeake Bay waters with glacial cycles. No further investigations were recommended.
Cultural Resource Investigation of a Proposed Channel for the Mid-Bay Island Ecosystem Restoration Project, James Island, Maryland	Grinnan, Joseph et al. (SEARCH)	2020	Phase I survey of a proposed access channel at James Island. SEARCH identified three buried paleochannels that could have been occupied during the precontact period. Additional investigation or avoidance was recommended.
Phase II Cultural Resource Investigation of a Proposed Access Channel for the Mid-Bay Island Ecosystem Restoration Project at James Island, Dorchester County, Maryland	Puckett, Neil, Joseph Grinnan, and Ben Wells (SEARCH)	2022	Phase II investigation of three buried paleochannels within a proposed access channel. The investigation consisted of geomorphological borings and analysis, radiocarbon dating, and palynology. Two of the three paleochannels were recommended as too old for human occupation, while one was recommended for additional investigation or avoidance.
Final Cultural Resource Investigation of a Proposed Borrow Area, Access Channel, and Turning Basin for the Mid-Bay Island Ecosystem Restoration Project, Barren and James Islands, Maryland	Bendig, Charles et al. (SEARCH)	2023	Phase I investigation necessitated by updated access channel and turning basin designs. SEARCH identified four buried paleochannels and recommended either additional investigations similar to the 2022 Phase II analyses or avoidance.

3.19 SOCIOECONOMIC CONDITIONS

The waters around James Island present mainly recreational and commercial opportunities. The activities that are generated from these opportunities are important to the economic and cultural integrity of the region. Using Dorchester County as the study area, land and water use, demographics, employment and industry, environmental justice, and public safety are discussed in the following sections.

3.19.1 Land and Water Use

Individuals who crab, fish, or collect shellfish either commercially or recreationally use the waters surrounding the James Island archipelago. Commercial fishers and recreational boaters represent a major group of waterway users who contribute to the economic well-being of the region. Transportation and commercial shipping occur in the mainstream Chesapeake Bay channel, approximately 3 miles west of James Island.

3.19.2 Demographics

Dorchester county is considered a rural area and has a relatively low population density. In 2022, approximately 32,726 individuals resided in Dorchester County in contrast to the 6,164,660 in the State of Maryland (Census Bureau, 2021). Dorchester County is anticipated to include approximately 35,160 individuals in 2030 and 37,300 in 2040 (MSA, 2023b). The distribution of the population between male (47.3%) and female (52.7%) in Dorchester County is similar to the male (48.7%) and female (51.3%) populations of the rest of Maryland. Of the Dorchester County population, Caucasian ethnic group accounts for 63.7% of the population followed by African American (25.3%) and Hispanic (5.9%). The population consists of a slightly elevated proportion of seniors, with 21.6% of persons aged 65 years or older compared to a state average of 16.3%. The largest age range that resides in Dorchester County are the 65 to 74-year-olds (Census Bureau, 2021).

Three County Subdivisions of Dorchester County are in the vicinity of James Island, including Taylors Island, Neck, and Madison. In 2021, approximately 185 individuals resided in Taylors Island, 744 individuals resided in Neck, and 408 individuals resided in Madison. Cumulatively, the number of individuals residing in the three subdivisions amounts to 4.1% of the total Dorchester County population in 2021 (Census Bureau, 2021).

3.19.3 Employment and Industry

Within Dorchester County, 15% of the population lives below the poverty level compared to 10.3% in the State of Maryland. Median average household income is $55,652, substantially below the state median of $90,203. The 2021 employment rate is 56.5% distributed across five primary occupations. Nearly a third of the workforce is employed in management, business, science, education, and arts occupations (Census Bureau, 2021).

3.20 ENVIRONMENTAL JUSTICE

On February 11, 1994, President Clinton issued Executive Order (EO) 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]).

Environmental Justice efforts were further advanced by the Biden Administration. In 2021, the Biden Administration set a goal that 40 percent of the overall benefits of certain Federal climate, clean energy, affordable and sustainable housing, and other investments flow to disadvantaged communities that are marginalized by underinvestment and overburdened by pollution. This commitment was made through EO 14008, Tackling the Climate Crisis at Home and Abroad. USACE's aquatic ecosystem restoration construction projects that received funding from the Bipartisan Infrastructure Law, P.L. 117-58, including the Mid-Bay Project, are subject to the Justice 40 program. Subsequently, EO 12898 was reinforced with E.O. 14096: Revitalizing Our Nation's Commitment to Environmental Justice for All in April 2023. EO 14096 established a whole- of-government approach to environmental justice. Further, EO 13985, Advancing Racial Equity and Support for Underserve Communities Through the Federal Government, calls on federal agencies to advance equity through identifying and addressing barriers to equal opportunity that underserved communities may face due to government policies and programs.

The USEPA's Environmental Justice Screening and Mapping tool (EJScreen) and the Council of Environmental Quality, Climate and Economic Justice Screening Tool (CEJST) have been utilized to evaluate indicators for a specified area to gauge whether there are potential Environmental Justice (EJ) communities in the area. The Unit of Geographic Analysis was defined as Dorchester County. As the project is located in the Chesapeake Bay and needs to be accessed by boat, the county was delineated for analysis to include a broad area from which waterway users may originate. Based on the EJ indices from EJScreen for the projects area's census block, there are no potential EJ communities in the immediate vicinity (USEPA, 2023a).

The EJ indices consider air pollutant 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 year of age). The closest CEQ Tract identified as a disadvantaged community by the CEJST screen is Cambridge, MD within Dorchester County (Tract 24019970600) (Council of Environmental Quality [CEQ], 2023; Figure 19). This area is disadvantaged due to the population being designated as low income with elevated energy costs. This area is approximately 15 miles to the northeast of James Island inland on the Delmarva Peninsula.

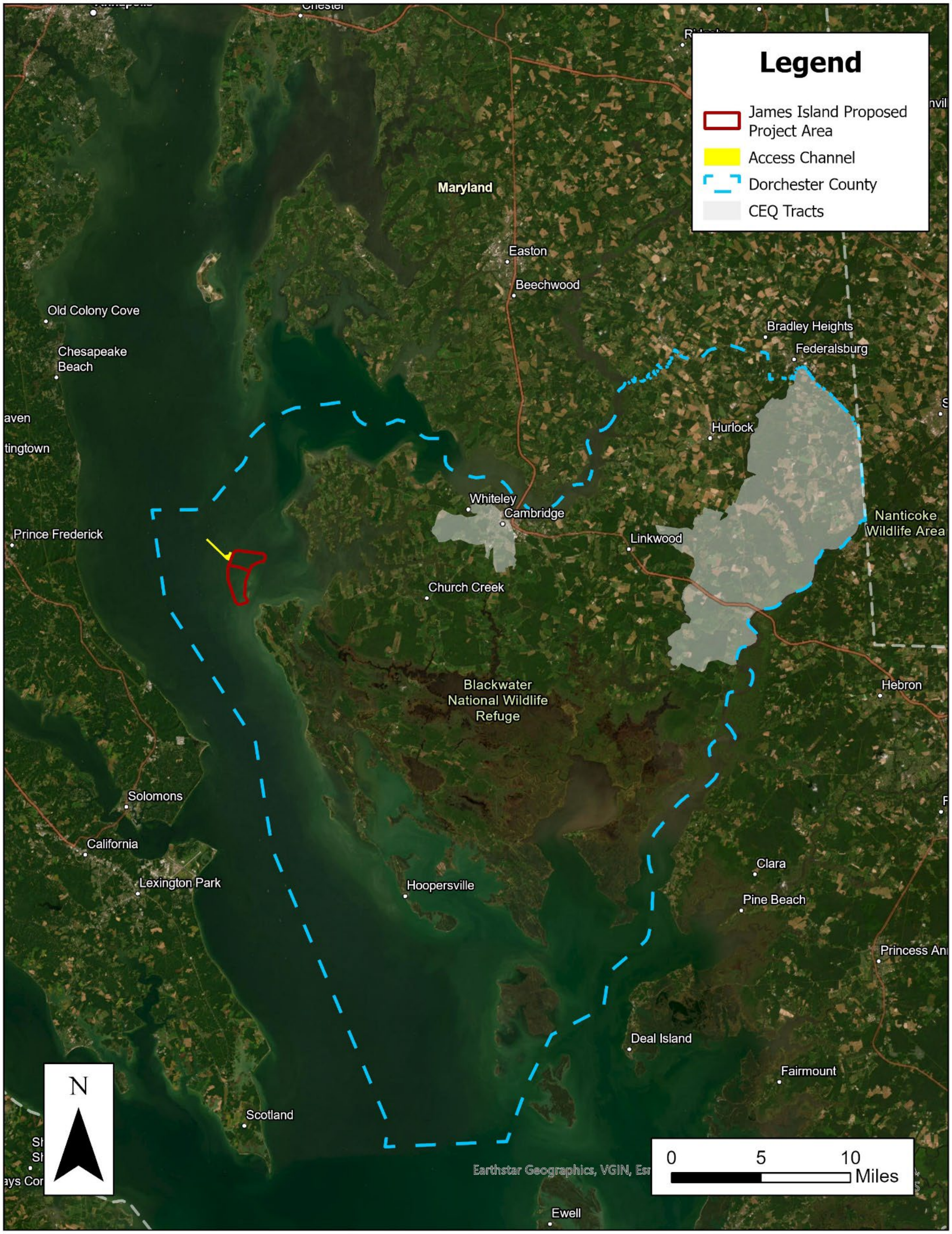

Figure 19. Environmental Justice Communities Analysis

3.21 PUBLIC SAFETY

Public safety provides protection of individuals' health and property. There are currently no existing conditions that result in public safety issues related to the restoration project. However, the existing James Island submerged remnants do currently pose a potential navigation hazard as they are not marked to prevent vessel groundings.

3.22 AESTHETIC CONDITIONS AND RECREATIONAL ACTIVITIES

3.22.1 Aesthetics

Dorchester County and the mid-Chesapeake Bay area are considered to have high aesthetic value. Low levels of development, low topographic relief, extensive open water features, wetlands with natural vegetation, and diverse wildlife make this area of the Bay visually pleasing and attractive to the public. There are no National Scenic Byways or Wild and Scenic Rivers in Dorchester County; however, James Island was able to be viewed from North Point Road and Hoopers Neck Road on Taylor Island prior to the island being submerged. Nearby roads meander through the Blackwater National Wildlife Refuge and Taylors Island Wildlife Management Area (WMA), as well as through small fishing towns and tidal marshes.

3.22.2 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 around and adjacent to James Island and Dorchester County that include fishing, fly-fishing, oystering, birding, crabbing, kayaking, sailing, and boating. Fishermen, boaters, and hunters represent a large group of users who contribute to the local economy. Currently, none of the island is left above mean high water due to erosion, reducing its recreational value.

4 ALTERNATIVES

4.1 ALTERNATIVES CONSIDERED

The purpose of this sEIS is to supplement the 2009 FR/EIS for the Mid-Bay Island Project recommended plan described by the 2009 Chief's Report and authorized under Section 7002 of WRDA 2014. This inherently limited the array of alternatives to actions that could fulfill the authorized project within the authorized footprint. The alternatives array was provided to cooperating agencies for concurrence. Feedback provided by cooperating agencies was utilized to develop the alternatives described below. Specifically, the Maryland Department of the Environment requested a third alternative be evaluated based on state/federal resource agency input to maximize the inclusion of nature-based solutions (NBS) in the project. Through the consultation process with the cooperating agencies, it became clear that an alternative that maximizes NBS or Natural and Nature-based Features (NNBF) would be the only viable alternative considering the current changed site conditions, future environmental projections, and current project performance requirements. Therefore, maximizing the inclusion of NBS was incorporated into Alternative 2, and a third alternative was not necessary.

NBS or NNBF will be developed, evaluated, and incorporated into the project under USACE's (EWN initiative. EWN is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaboration.

4.1.1 Alternative 1: No Action

Alternative 1 is the No Action Alternative. The No Action Alternative would involve no further actions to implement a restoration project at James Island. This alternative does not meet the purpose and need of the project.

4.1.2 Alternative 2: Implement a Modernized Version of the Feasibility Study's Recommended Plan

Alternative 2 would implement a modernized authorized project as depicted in Figure 20. The authorized project is the Recommended Plan from the 2009 Mid-Bay FR/EIS. Since the completion of the feasibility study and FR/EIS in 2009, there has been increased understanding of climate change, future projections, and effects on restoration projects. A modernized design would account for current conditions, climate resiliency, and provide a means to maximize NNBF, aligning the project with the Assistant Secretary of the Army (Civil Works) memorandum titled "Incorporation of Nature-Based Solutions in Civil Works Project", issues April 22, 2024. The main components of the Feasibility Study's recommended plan remain unchanged in Alternative 2 and consist of constructing a 2,072-ac island with a habitat proportion of 45% upland to 55% wetland and a +20 ft MLLW final upland dike height, including the option to reconfigure the wetlands and upland ratios during design. The upland dike heights would initially be built above the authorized +20 ft (to + 25 ft using sand only) to contain the dredged material prior to material dewatering and final grading. The final elevation of the uplands will be the authorized +20 ft MLLW. The uplands are planned to be developed on the northern half of the island over the sand borrow area, and the wetlands in the south. The recommended plan would provide the capacity to place 90 to 95 million cubic yards of clean dredged material over an estimated 32-year period. Armored dikes (approximately 45,233 lf), breakwaters, and/or other structures would be constructed to approximate the island's historical footprint. The enclosed area would be filled with clean dredged material from Federal navigation channels in the Chesapeake Bay to restore upland and wetland habitat. The authorized project includes dredging an access channel on the northwest end of the island. The positioning and size of this access channel is being reevaluated during the design phase. The sand for dike construction would be hydraulically dredged from within the island footprint or from the access channel.

Alternative 2 would also include a turning basin outside the footprint of the island, breakwaters to protect the equipment within the turning basin, a bulkhead between the turning base and the island, and a personnel pier for accessing the island along the eastern shoreline. Since completion of the Feasibility Study, there has been an increased understanding of climate change projections and impacts. Alternative 2 would evaluate and incorporate nature-based features that are determined to be scientifically practical and feasible, and acceptable with respect to future operations and maintenance, to provide resilient habitats that maximize value to terrestrial and aquatic species. Through coordination with resource agencies, potential opportunities for inclusion

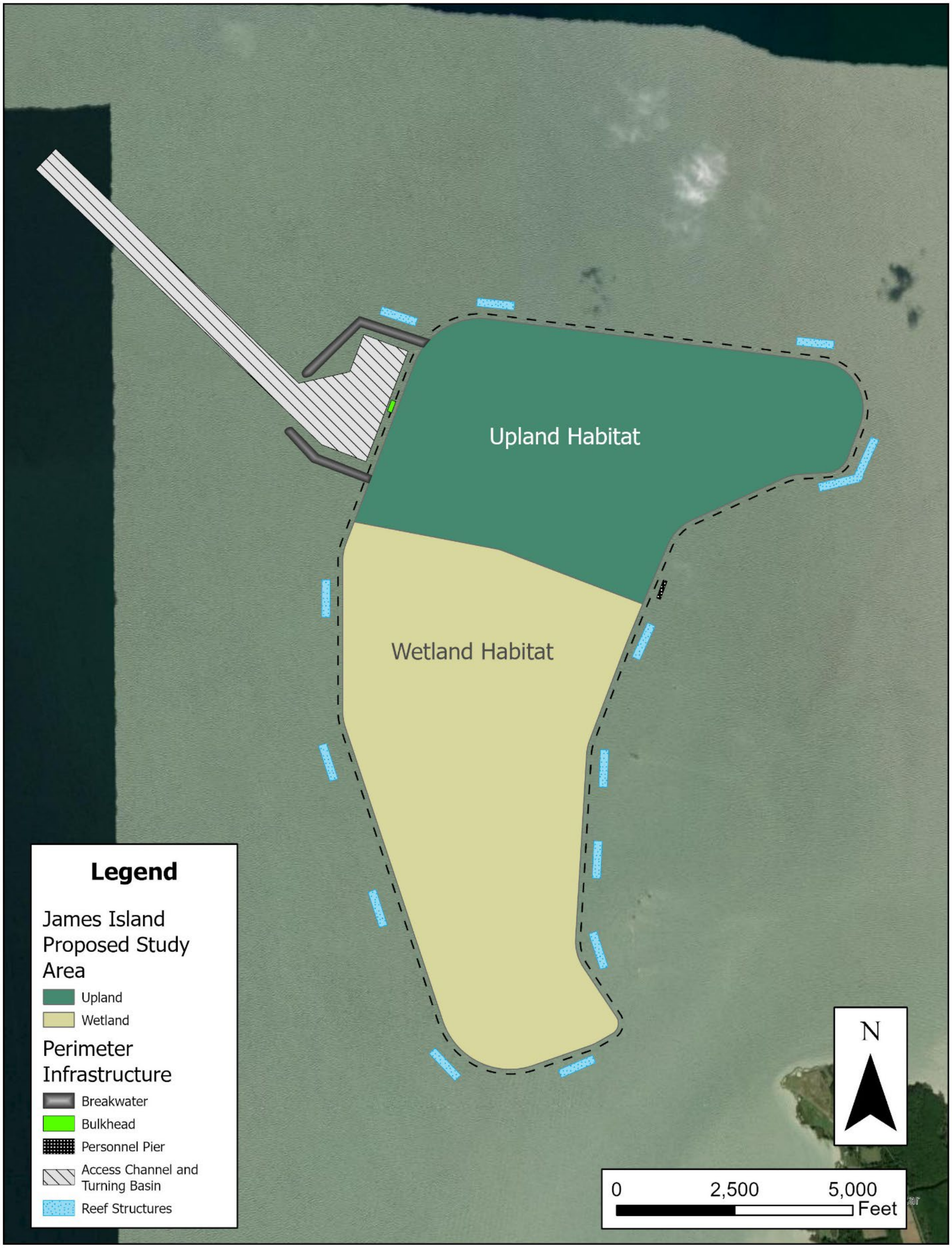

Figure 20. Alternative 2

of EWN at James Island have been identified as modifications to the perimeter containment dike along the eastern wetland's shoreline, offshore reef habitat to diversify the perimeter dike and provide for natural or softer tidal inlets, and internal habitat modifications. Those opportunities that would affect the perimeter of the project and the project's footprint are evaluated as components of Alternative 2 and are presented in further detail in Section 5.1.1.1. These include modifications to the perimeter containment dike along the eastern wetland's shoreline and offshore reef habitat to diversity the perimeter dike. As the footprint of the project is being evaluated by this sEIS, and not the full habitat design for the project, an aerial impact is included for shoreline features that would be needed to implement EWN features. Actions to modify the perimeter wetland dike to develop EWN measures would be undertaken once the dredged material placed in the wetland cells is dewatered and graded. All impacts would be contained to the footprint of the perimeter dike except for offshore reef/breakwater features. EWN approaches for interior habitats would all be confined to areas that will receive dredged material and be developed into wetlands or uplands. Further, Alternative 2 as defined for this sEIS includes up to 50 acres of nearshore reef habitat features in waters adjacent to the James Island dike alignment within approximately 150 – 200 ft of the perimeter dikes. The features could include breakwaters, reefs, or other structures or enhancements that would enable a softer, more natural design for the island perimeter. At this stage of the design, the exact form or location of these features has not been designed, but a proposed concept plan is included in Appendix A6. Considering the potential for these features in the sEIS provides the capacity to implement those features once the design is further developed.

4.2 ALTERNATIVE EVALUATION AND COMPARISON

4.2.1 Alternative 1

Alternative 1, the No Action Alternative, would not restore or protect habitat, and would provide no capacity for beneficial use of dredged material. There is no remaining remote island habitat to protect as James Island has been lost to erosion and converted into shallow open water habitat. The alternative would not meet the project purpose, need, or objectives. The No Action Alternative would result in no additional restoration of remote island habitat. Further, there would be no additional capacity for placement or beneficial use of dredged material from the approach channels once Poplar Island and Poplar Island Expansion Projects are complete.

4.2.2 Alternative 2

Alternative 2 would implement the authorized plan with alterations to modernize the original 2009 design. That is, the base plan is the recommended plan as presented in the 2009 FR/EIS with revisions to address changed conditions since project authorization. The alternative would meet the project purpose, need, and objectives. Alternative 2 would provide capacity for placement of 90 – 95 MCY of dredged material over 32 years, as well as the restoration of 2,072 acres of remote island habitat. Alternative 2 provides the capability to incorporate EWN into the project's design to maximize sustainability, resiliency, connectivity, and habitat value.

4.2.2.1 Benefits

As documented in the 2009 Mid-Bay FR/EIS, Alternative 2 (the James Island component of the recommended plan) would provide wide-ranging benefits. Net habitat benefits were quantified through the development of the Island Community Units (ICU) Model, which captured benefits to the diverse assemblage of potential island communities:

- Colonial nesting wading birds (herons, egrets, and ibises)
- Waterfowl
- Colonial nesting waterbirds (terns, gulls, and skimmers)
- Raptors
- Shorebirds
- Herpetofauna
- Benthic invertebrates
- Resident/forage fish
- Commercial, predatory, and higher trophic level fish

The Planning Center of Expertise for Ecosystem Restoration (ECO-PCX) (Mississippi Valley Division) conducted review of this planning model and approved it for use for this study. The ICU Model was used to evaluate and compare project alternatives. Rigorous Independent Technical Review of the model was conducted in accordance with EC 1105-2-407 and the Protocols for Certification of Planning Models (July 2007).

Restoring James Island will provide needed remote island habitat for a diverse assemblage of birds, fish, invertebrates, and herpetofauna. Restoration of James Island will contribute 1,043 acres of wetlands to the CBP goal of restoring 25,000 ac of tidal and non-tidal wetlands within the watershed. The restored remote island habitat has significance that extends past Chesapeake Bay residents (humans and animals) to the region and world. There is a very limited amount of remote island habitat within the chain of islands that lines the Eastern Shore of Maryland. Implementation of Alternative 2 will contribute a critical link and connectivity to the island chain which includes islands in Tangier Sound, Barren Island, Poplar Island, and Hart-Miller Island. These islands are extremely important stops within the Atlantic Flyway for migrating birds to rest and refuel. The Chesapeake Bay is an area where many migratory routes converge. Hundreds of bird species including songbirds, waterfowl, shorebirds, and raptors transverse the Chesapeake Bay each year during their annual migration. Approximately one-third of all waterfowl that winter along the Atlantic Coast, do so in the Chesapeake. The Bay is important wintering area for the Canada goose, three scoter species, and the long-tailed duck.

Using the ICU model, it was determined in the 2009 Mid-Bay FR/EIS (Section 4) that the James Island restoration component would provide a total of 24,598 ICUs over a 50-year period (yearly average ICUs = 492). When accounting for open water impacts, the James Island project, alone, results in a net 6,468 ICUs. These benefits include interim benefits from sheltered open water habitat and mudflat habitat of the upland cells prior to planting. A risk analysis was completed for the benefits quantification in the 2009 Mid-Bay FR/EIS. One uncertainty analyzed that now has more clarity was shifting acreage from low to high marsh to account for sea level rise. This change is expected to be implemented in the final design given future SLR projections. The ICU Model analysis assumed that the low marsh would persist in the face of RSLC. Sea level rise effects as represented by a shift in the marsh ratio was determined to result in fewer ICUs than the originally formulated plan, but it would provide for the potential for marsh migration that would increase the lifespan of the wetlands. Shifting to 50% high marsh and 50% low marsh under the sea level rise scenario did, however, provides more ICUs than maintaining 20% high marsh with 80% low marsh under the sea level rise scenario. Other changes that would reduce the ICU quantification from the 2009 Mid-Bay FR/EIS is loss of the remaining James Island habitat and reduced or lost SAV habitat. Removing wetland dikes at the earliest possible time during construction would provide additional ICUs over those quantified for the recommended plan.

Implementation of Alternative 2 is also projected to reduce further erosion of the remaining submerged island remnants and provide a minor benefit to erosional protection of the mainland shoreline east of James Island.

The Mid-Bay Project was developed as one aspect of the Federal and State DMMP. Placement of dredged material at James Island would be part of a coordinated effort to manage dredged material between Poplar Island, Poplar Island Expansion, and James Island. The addition of James Island as a placement site would increase efficiency in dredged material placement across the sites, maximize time permitted for drying of placed material, and extend the lifespan of these projects to accept dredged material. Ensuring that material is sufficiently dried is key to developing sustainable habitats from the dredged material.

4.2.3 Comparison of Alternatives

Implementing the No Action Alternative (Alternative 1) would provide no benefits but would also have no impacts. None of the purpose, needs, or objectives of the feasibility study would be met. The now submerged island remnants would continue to erode resulting in deeper water depths over time. The area would become unsuitable for SAV habitat. There could also be increased erosional forces reaching the mainland shoreline as the water deepens. Poplar Island and Poplar Island Expansion would be overloaded with dredged material until no capacity remained resulting in inefficient placement and sub-optimal habitats. Implementing Alternative 2 would provide critically needed habitats and dredged material placement capacity but would have a permanent impact on shallow water habitat and immobile benthic invertebrates. There would also be impacts to waterfowl foraging habitat, commercial crabbing and fishing, recreation, noise, light, and aesthetics during construction. These are discussed in detail in Section 6. Table 19 provides a summary of the impacts and benefits evaluation for the two alternatives.

Table 19. Summary of the Alternative Evaluation and Comparison

	Alt 1: No Action	Alt 2: Modernized Authorized Project
Alternative meets		
Purpose	N	Y
Needs	N	Y
Objectives	N	Y
Benefits		
Remote island habitat acres restored	0	2,072 ac
Dredged Material Capacity Provided	0	3.2 MCY/yr (90 – 95 MCY total)
Net Island Community Units (James Island only)	0	6,468 ICU
Maximum size of impact area	0	2,466 ac
Avoids/minimizes impacts to commercial fisheries		
Blue crabs	Y	N
Pound Nets	Y	minimizes
Oysters	Y	minimizes
Avoids/minimizes impacts to cultural resources	Y	minimizes
Avoids/minimizes impacts to habitats		
SAV	N	Y
Oysters	Y	minimizes
Crabs - wintering habitat	Y	Y
Shallow-water habitat/benthic invertebrates	Y	N
Contributes to reduced erosion	N	Y
Environmental Justice	N	minimal, positive effects
Incorporates NNBF/NBS	N	Y
Contributes to efficient dredged material management	N	Y

4.2.4 Preferred Alternative

Alternative 2 is selected as the preferred alternative (Figure 20). The preferred alternative (Alternative 2) was selected due to its ability to achieve the project purpose, need, and objectives while incorporating sustainability and resiliency. The preferred alternative involves the construction of approximately 45,233 lf of perimeter dike, plus internal dikes to contain 90 – 95 MCY of dredged material placed to restored remote island habitat (wetlands and uplands). The preferred alternative will be referred to as the recommended plan throughout the remainder of the sEIS. The recommended plan includes the following features:

- A restored island with a 2,072-ac footprint (includes approximately 79 acres of perimeter dikes and 1,994 ac of internal habitats),
- Armored dikes (approximately 45,233 lf) would be constructed to approximate the island's historical footprint. A +20 ft mean lower low water final upland dike height. A +11 ft mean lower low water final wetland dike height for containment. A portion of the wetland dikes on the eastern shoreline would potentially be modified to incorporate EWN measures once material is dry and graded for planting.
- The restored island would provide the capacity to place 90 to 95 million cubic yards of clean dredged material from Federal navigation channels into the enclosed area to restore upland and wetland habitat over a 32-year period.
- Within the habitat restoration footprint, restoration of island habitats with a proportion of 45% upland to 55% wetland. Upland habitats will be situated on the northern half of the island with wetlands in the south.
- Wetland habitats are projected to include high and low marsh, hummocks, tidal channels, and mudflat and sand beaches.
- An access channel on the northwest end of the island, approximately 8,400 ft long and 600 ft wide with 3:1 side slope and a turning basin 2,500 ft long and 1,000 ft wide dredged to -26 ft MLLW (-26.8 ft NAVD88). The dredging footprint of the channel and turning basin is 173 acres. An additional 36 acres would be affected by the slope that develops after dredging resulting in a total impact of 209 acres.
- Breakwaters to protect the turning basin (20-ac footprint).
- A bulkhead along the cross dike adjacent to the turning basin (1-ac footprint).
- Dredging of sand for dike construction from within the island footprint and access channel.
- Dredging the access channel to a depth of -15 ft MLLW (-15.8 ft NAVD88) in front of the bulkhead with a transition to -26 ft MLLW (-26.8 ft NAVD88),
- A personnel pier on the northeast shoreline (0.4-ac footprint),
- Running electric supply and communications lines (buried to a depth of 8 ft) from Taylors Island to the personnel pier (8-acre temporary impact),
- A utility yard on Taylors Island (0.1 ac),
- The consideration of modified perimeter dikes along the eastern wetland shoreline to incorporate EWN measures,
- The inclusion of EWN approaches in the design of internal habitats, and
- Approximately 50 acres of shoreline features (e.g. reefs, reefballs, breakwaters, etc.) to diversify the shoreline and protect the mouth of tidal inlets.

5 RECOMMENDED PLAN

A detailed description of the recommended plan as formulated in the feasibility phase is provided in the 2009 Mid-Bay FR/EIS. An updated internal design is underway but will not be fully presented in this sEIS. This sEIS focuses on the impacts of implementing the project, and therefore the island footprint that will be encompassed by dikes and filled with dredge material, as well as external features. The design is being updated throughout the construction phase and will be documented in subsequent Design Documentation Reports (DDR). The design for upland and wetland habitats will continue through the Construction Phase in cooperation with resource agencies and stakeholders including opportunities to incorporate EWN.

This recommended plan would provide between 90 and 95 million cubic yards of dredged material placement capacity, depending upon sand borrow excavation within the island footprint. Construction is slated to begin in 2025 and extend over 43 years. Upland placement capacity would last at least two full years beyond anticipated wetland placement to ensure proper wetland development. The project has a 50-year service life following construction.

Construction at James Island will necessitate dredging an access channel and turning basin off the northwest corner of the island. The access channel would be approximately 8,400 ft in length, 600 ft in width at base with a 3:1 side slope. The access channel will lie completely outside the island footprint. A bulkhead (having a 1-ac footprint) will be constructed along the cross dike adjacent to the turning basin. Breakwaters will be needed to protect the turning basin. The breakwater design will be documented in a future DDR.

Approximately 45,233 ft of perimeter dikes would be constructed. Upland perimeter dikes will be constructed to a higher elevation than those around the wetlands. Sea level rise is being accounted for in the design of the perimeter dikes, particularly with respect to the determination of their final heights. The sand for dike construction will be hydraulically dredged from within the island footprint or from the access channel. The 2009 FR/EIS estimated that 17 MCY would be dredged from the upland footprint. This material would be primarily sand. Currently, it is estimated that another 3 – 4 MCY would be dredged from the access channel and turning basin to reach the targeted water depths for navigation. A portion of this material is expected to be sand that can be used in project construction and a portion will be unsuitable for construction needing to be placed within the island containment. Measures to green or soften the exterior dike while ensuring site resiliency to environmental forces will be incorporated following analyses to determine their feasibility and contingent on recognized constraints.

The sediment to construct the proposed wetland and upland habitats at James Island will be dredged from the C&D Canal approach channel and the Chesapeake Bay approach channel to the Port of Baltimore in MD and potentially other Federal navigation channels in the James Island Vicinity.

The length of the main separator dike between the uplands and wetlands is estimated to be 6,300 ft. The outside of the perimeter dike will be comprised of a toe dike with a crest elevation of approximately +1 MLLW and an armored slope extending from the toe dike to the perimeter roadway. The toe dike will consist of a core of quarry run stone and a double layer of armor stone. The armored slope will consist of a double layer of armor stone with varying stone underlayers depending on the size of the armor stone. The top elevation of the toe dikes will be determined by the final design that is in progress.

The separator dike is located between the upland cells on the northern portion of the island and the wetland cells on the southern portion. The upland cell will not be subdivided into smaller cells. The wetland area will be subdivided into 3 wetlands complexes that are initially each subdivided into 5 to 7 smaller cells. Individual wetland cells within these complexes will be formed by constructing sand dikes, some of which will be temporary.

To adequately operate and maintain the project site, various facilities are required for the project. Office space in the form of an operations building or trailer complex will be required and located along the upland/wetland separator dike in the northern wetland complex. Near the end of construction, the facilities will be removed/relocated to complete wetlands restoration. A personnel pier will be constructed on the east side of the project near the upland/wetland border to provide access for work crews during construction. The east side of the island was chosen because it is anticipated that personnel will be coming from the eastern shore. A fuel farm will be required to supply the various vehicles and generators which will be operating on-site. Power and telephone service from the mainland will be required. To provide these services, a bundled cable will be run from Taylors Island towards the southeast corner of the restoration project on the southside of N.O.B. 14-6; and once west of N.O.B. 14-6, the cable pathway will head north along the eastern shoreline of the former James Island. The total cable will be approximately 14,000 lf in length. The pathway avoids oyster bars and SAV habitat. The cable will be buried 8 ft deep below the bay bottom. Additionally, a land base will be required on the mainland, most likely at the marina along Slaughter Creek. The various infrastructure components are discussed in further detail in Section 5.1.7.

5.1.1 Habitat Design

As the design of internal habitats will be further developed during the Construction Phase, the ecological design considerations for habitat development that were outlined in Table 5.2 of the 2009 Mid-Bay FR/EIS will be incorporated based on current conditions and limitations. These design features were produced from the Island Community Unit analysis completed for the 2009 Mid-Bay FR/EIS. They are a record of habitat features that were included in the quantification of environmental benefits. The inclusion of these features in the constructed habitats is critical to ensure that quantified ecological benefits are fully realized. Further, monitoring and adaptive management plans will be developed by the appropriate workgroups to track the progress of restoration efforts and take corrective action if needed to reach restoration goals.

At the current stage of the design, USACE and MPA intend to change the high:low marsh ratio from what was previously established during the feasibility stage (i.e., 80% low and 20% high marsh) to 50% low marsh and 50% high marsh due to anticipated RSLR. This ratio is currently proposed based on monitoring and analyses of marshes restored at Poplar Island Environmental Restoration Project (PIERP), as well as investigations using the Coastal Wetland Equilibrium Model (Staver et al., 2024, Morris and Staver, 2004). The low to high marsh ratio will continue to be evaluated for each wetland complex as designs mature.

5.1.1.1 Incorporation of Engineering with Nature into the Design

As the Construction Phase progresses, analyses will continue to determine how the project's design can be revised to include EWN measures. Since the completion of the feasibility study, there has been increased understanding of climate change, future projections, and effects on restoration projects. There is a critical need to account for sustainability and resiliency in restoration projects. The current considerations are focused on refinements to soften the perimeter stone dike. Inclusion of EWN approaches for the design of internal habitat features will occur at a later point. Incorporating EWN measures will not only promote sustainability and resiliency, but maximize habitat connectivity, diversity, and value for terrestrial and aquatic species. Towards that effort, a working group was convened with agency representatives and stakeholders to focus on developing measures for incorporating resiliency into the Mid-Bay project. The Mid-Bay Resiliency Working Group met monthly from August 2021 through February 2023, before merging into the Habitat Development Workgroup. The Resiliency Working Group developed a catalog of potential measures that continue to be evaluated and developed by the Habitat Development Workgroup. The focus, thus far, has been on external or shoreline measures. Internal habitat features will be developed as internal habitats are designed later in the construction phase.

The measures proposed for consideration are listed below. Proposals submitted from resource agency partners that are part of this list are documented in Appendix C1.

- Vegetated sand dike: In-lieu of a rock dike, this proposal would utilize a vegetated sand dike for the external perimeter or shoreline of the island either for the full island extent or in targeted areas.
- Vegetated sand dike with stone sills: In-lieu of a rock dike, the proposal would provide for a vegetated sand dike with a stone sill constructed in front at the Bay shoreline.
- Vegetated sand dike with cobble beach: In-lieu of a rock dike the proposal would provide for a vegetated sand dike and transitions to a cobble beach near the surf zone.
- Vegetated sand dike with segmented breakwaters (on-shore): In-lieu of a rock dike, the proposal would provide for a vegetated sand dike with segmented breakwaters constructed immediately in front at the Bay shoreline (sometime referred to as a tombolo).
- Vegetated sand dike with segmented breakwaters (off-shore): In-lieu of a rock dike, the proposal would provide for a vegetated sand dike with segmented breakwaters constructed off-shore from the dike.
- Vegetated sand dike with embedded tree materials: In-lieu of a rock dike, the proposal would provide for a vegetated sand dike with tree material incorporated into the protective structure to provide refugia for aquatic species.
- Reef structures along toe dike: This proposal would add reef habitat, either as reefballs, stone piles, or other features, in subtidal waters adjacent to the perimeter dike.
- Natural tidal inlets: This proposal would remove hardened structures from tidal inlets to provide for natural tidal flow from the Bay to the interior habitats. The measure could include off-shore breakwaters or reefs to diminish energy, marsh plantings along the shoreline, seeding the marsh plantings with mussels, and other enhancement.
- Offshore breakwater with tombolo

- Living shoreline with rock sill
- High-crest vegetated revetment with stone dike: The upper portion is vegetated and the lower portion is stone. This is proposed for the perimeter dikes along the upland habitat.
- Oyster ball breakwater
- Submerged stone toe with cobbled beach shore: This proposal includes a submerged stone toe that transitions to a cobbled beach shore prior to the wetland habitat.
- Cobbled stone berm with sand beach: This proposal includes a cobbled beach shore transitioning to a sand beach prior to the wetland habitat.
- Stone dike with offshore reef structures: The proposal reduces the size of the rock materials on the dike and installs offshore reef structures.

Constraints associated with the project's 2009 Congressional authorization as well as environmental concerns were outlined to screen the EWN measures for their suitability to be included in the project:

- Initial cost of the measure is consistent with the Recommended Project's initial cost,
- Operations and Maintenance (O&M) costs,
- The measure's footprint is consistent with the Recommended Project's footprint,
- The measure does not reduce the Recommended Project's dredge material capacity,
- The measure will perform similarly as the Recommended Project with respect to storm management risk criteria,
- The measure does not require additional sand resources which would necessitate the use of a borrow area, and
- The measure has controls approved by MDE to prevent sediment loss during inflow.

The working groups also identified the goals and objectives for including EWN into the design. Two overarching goals are 1) maximize the heterogeneity and aquatic habitat complexity of exterior containment structures, and 2) maximize the overall function of the island as an ecological system of interconnected habitats and its hydrologic connection to the aquatic environment. Objectives include adding habitat value, particularly for fisheries; improving habitat connectivity for fisheries to wetlands, and uplands to wetlands (by reducing hard structure); providing capacity for high marsh to develop into low marsh as sea level increases; and providing capacity for thin layer placement at a future time(s) to maintain marsh elevations in the face of sea level rise.

The screening of potential measures with Authority constraints eliminated the following measures:

- All vegetated sand dike measures
- Submerged stone toe with cobbled beach shore, and
- Cobbled berm with sand beach.

Five potential alternatives have been developed out of the remaining measures for further evaluation. The first four alternatives would modify the eastern perimeter dike along the wetlands once the dredged material is contained, dewatered, and graded in order to develop increased connectivity in the wetland habitat. These alternatives would also include the addition of reef features along the perimeter of project. The fifth alternative would not modify the containment dike. The fifth alternative is limited to the reef features along the perimeter of the project.

- Alternative 1 – Mixed-measures: a combination that includes alternating sections of tombolos with segmented breakwaters in deeper water depths and sections of living shoreline with rock sill in shallower water depths along the wetland shoreline with living breakwaters and/or reefs offshore of tidal inlets and the perimeter toe dike in selected areas.
- Alternative 2 – Living shoreline with rock sill: installation of a living shoreline with rock sill along the wetland shoreline with living breakwaters and/or reefs offshore of tidal inlets and the perimeter toe dike in selected areas.
- Alternative 3 – Lower stone dike and offshore submerged breakwater: installation of a lower stone dike with adjacent offshore submerged breakwaters along the wetland shoreline with living breakwaters and/or reefs offshore of tidal inlets and the perimeter toe dike in selected areas.
- Alternative 4 – Funding-limited option: installation of limited extents of living shoreline with rock sill adjacent to the tidal inlets along the wetland shoreline with living breakwaters and/or reefs offshore of tidal inlets and the perimeter toe dike in selected areas.
- Alternative 5 – Reef-only option: EWN measures limited to living breakwaters and/or reefs offshore of tidal inlets and perimeter toe dike in selected areas. A reef enhancements technical memo has been drafted to guide development of the reef proposal. The technical memo is included in Appendix A6.

These proposed alternatives will continue to be evaluated and modified based on modeling results and coordination with resource agencies to identify a final design that maximizes the inclusion of feasible EWN approaches into the project design, consistent with the project's authority and appropriations. Development of EWN measures for inclusion in the design of tidal inlets and interior habitats will occur at a later point during the construction phase.

5.1.2 Construction procedures

In general, construction procedures will be similar to those used on the Poplar Island project where the sand portion of the dikes will be built using mechanical methods. Hydraulic placement of material directly into the perimeter dikes will not be permitted due to the higher material losses associated with that method. Based on geotechnical surveys conducted during this phase, estimated surplus amounts of sand are not available to risk hydraulic placement. Instead, construction quality sand from the borrow areas (within the project footprint) and access channel will be hydraulically dredged and stockpiled. Within the island footprint, sand will be dredged from within the upland footprint in the north. The stockpile area will be centrally located within the northern wetland cell that is just below the upland/wetland boundary. From the stockpile area, the material will be mechanically placed within the perimeter or cross dikes.

The armor stone, underlayer stone, and bedding/core stone will be barged in from commercial sources. Initial construction of the stone toe dikes will be accomplished by barge. However, it is assumed that all subsequent stone placements will be from the sand dike surface. Construction of the stone toe dike will be required prior to the construction of the sand dikes in order to minimize the loss of sand.

As construction of the toe dike advances, the main dike section construction can begin. The construction of the main dike will be accomplished by conventional means from land. During the entire construction process, the toe dike section will need to stay ahead of the sand placement to provide the needed protection against large amounts of sand erosion. Sand will be hydraulically dredged and pumped into a large stockpile. The proposed stockpile area will be midway along the separator dike in the uplands area. This sand will then be mechanically moved from the stockpile to be placed as the dike construction progresses. Depending on time requirements for dredged material inflow into the site, an upland cell could be closed off initially while construction progressed over the remainder of the site.

5.1.3 Perimeter Dikes

The high rate of sea level change drives increased crest elevations because increased sea levels increase the risk of overtopping. Construction at James Island will use armor stone under the roadway to reduce damages from overtopping. The use of crest armor stone enables the crest to be set 2 to 3 ft lower that would be needed if crest armor is not utilized. It is necessary to utilize crest armor to limit dike elevation because there is not sufficient sand available within the project footprint to construct dikes at the higher elevations needed to address the risk of overtopping. The addition of armor stone creates a functionally higher dike elevation without building to the higher elevation. Without the armor stone under the crest, the dikes would be much taller and require more sand than is available. The armor stone, underlayer stone, and roadway stone is a total thickness of 3 ft. Sections 5.1.3.1 and 5.1.3.2 discuss the planned elevations for upland and wetland perimeter dikes. Elevations are higher than those outlined in the 2009 FR/EIS. The increased elevations are a result of sea level rise. The risk of overtopping damage increases as the sea level rises resulting in the need for higher dike elevations (than documented in the 2009 FR/EIS).

In areas where the existing Bay bottom substrate does not have the strength to support the weight of the dike structure, foundation replacement will be required. Foundation replacement involves the dredging of the sediment from the footprint of the dike, placement of that material within a confined cell of the island, and placement of sand within the dredged area prior to dike construction. It is projected that 8,500 lf of perimeter dike construction will require foundation replacement for a removal of approximately 600,000 CY of foundation. This length of foundation replacement equates to approximately 20 acres. The areas where foundation replacement is expected are the northeastern corner, the southeastern corner, and a portion near the center of the western shoreline.

5.1.3.1 Upland Dikes

The stone armor of the upland perimeter dikes will initially be built to El. +11 MLLW (+10.2 ft NAVD88) and then raised over time to approximately El. +25 ft MLLW (+24.2 ft NAVD88). The dikes would be heightened from El. +11 to +25 ft MLLW with sand only. The dike armoring will be limited to the initial construction of the dike to El. +11 MLLW including the roadway which will be underlain with armor stone. Elevating the dike to El. +25 ft MLLW would not be an extension of the stone portion of the dike. The dikes would not need to be widened to accommodate the increased height. The dikes would remain at El. +25 ft MLWW during inflow until the final material is placed in the uplands to achieve the El. +20 ft elevation. It is anticipated that dikes will remain at El. +25 ft MLLW elevation for approximately 15-20 years to complete placement in the uplands.

5.1.3.2 Wetland Dikes

The stone armor of the wetland perimeter dikes will be built to El. +11 MLLW. The perimeter dike will include a sand core to El. +8 ft MLLW (+7.2 ft NAVD88). The sand core needs to extend to El. +8 ft MLLW in order to perform inflows into the wetland cells. The sand core is the main filter for the slurry dredged material and constructing to El +8 ft creates the freeboard required when inflowing. Insufficient freeboard raises the risk of dike failure and increases the difficulty and reduces the efficiency of inflows when nearing cell capacity. The remaining 3 ft of elevation is occupied by the armor stone, underlayer stone, and roadway stone.

The wetland perimeter dikes may be modified to incorporate EWN measures once all cells within a complex have reached capacity and material has been dried and graded. Modifications are anticipated to be focused on reducing the height of the perimeter dike and adding better connectivity to the Chesapeake Bay.

5.1.4 Wetland Cell Development

Wetland construction with dredged material will be undertaken after the appropriate wetland perimeter dikes and interior dikes are constructed for a given wetland section. At this point, wetland construction is expected to be performed in a similar manner to the construction of Cell 5AB at Poplar Island. This would involve dividing the overall wetland area into smaller cells, approximately 80 – 100 ac in nominal area. The wetland subcells planned for James Island are approximately the same size as the largest wetland cells that have been developed at Poplar Island.

Each cell would then be developed by a combination of hydraulic dredged material inflows and surface dewatering/crust management. During the first inflows into a wetland cell, dredged material will be inflowed into the cell up to approximately the water line. The remaining volume will be inflowed into the cells in lifts no thicker than approximately three feet until final grades (after predicted settlements) are achieved.

After each inflow event, an aggressive dewatering/crust management process will need to be undertaken. Once a stable surface and an elevation is achieved which is close to the target elevation (+1.5 ft MLLW at Poplar Island), mechanical excavation of the channel features and grading of the site to provide the required topography for the different plant types would begin. This excavation and grading process will allow for channels of varying widths and alignments to be cut, as well as desired elevation variations in the marsh areas to be created. Once the final grades are met, an outlet structure will be installed at the site to connect the wetland channel to the tidal gut or the Chesapeake Bay as required. EWN approaches are being investigated to soften the inlet design and maximize natural connectivity between aquatic and terrestrial habitats. Potential approaches include the removal of hardened inlet structures, the addition of offshore breakwaters where the tidal gut meets the Chesapeake Bay to permit removal of hardened inlet structures, incorporation of mussels into plantings along the tidal inlet shoreline, and the use of smaller stone or lower dikes.

Planting of the wetland cells will commence as each wetland cell is filled, primary channel systems are excavated, and surface grading is completed. Planting schemes will be determined during the adaptive management process with input from the Project Development Team (PDT) and technical advisory team. These procedures will continue to be adjusted throughout the adaptive management process and will be included in the Cell Development Plans and AMP.

5.1.5 Upland Cell Development

The upland area will not be subdivided. Once all the dredged material has been inflowed into the uplands and before the final planting of the uplands, the dikes (sand portion) will be cut down to approximately El. +20 MLLW from El. +25 ft MLLW. Erosion control measures will be formulated during the construction phase. Until the dredged material is filled above the Chesapeake Bay water level, the cells will contain open water. Based on lessons learned at Poplar Island, a high potential exists for erosion to occur due to wave action within the cells. Erosion prevention measures are being investigated. Geotextile tubes were placed within upland cells at Poplar Island but were not successful in preventing erosion. Surface treatments of erosion-resistant geosynthetics or clays may also be employed.

An access channel and a turning basin will be dredged outside the northwestern corner of the island and an offloading bulkhead will be constructed. This cell will serve as the primary dredged material and equipment offloading area throughout most of the life of the project. This area will be the most centrally located and protected area available for offloading on the site. Breakwaters will be constructed along the access channel to protect the entrance to the turning basin.

The final elevation of the upland cells will average +20 ft MLLW due to allowances for development of the habitat and drainage toward the wetlands. Once this elevation has been achieved, upland development will commence. This will include providing drainage features to handle surface runoff from storm events, as well as preventing concentrated areas of open water or erosion from runoff. It will be difficult to keep any drainage features functioning as designed due to the likelihood of continued settlement for years after the final inflow into the cell. This settlement will be greatest at the center of the cell. Therefore, it may be desirable to overbuild the center portion of the cell to account for this. Lessons learned from upland grading at Poplar Island will be incorporated into the upland cell development for James Island.

5.1.6 Upland to Wetland Transition Zone

An area between the uplands and wetlands has been set aside on James Island to provide for a transition zone. The transition zone is needed to drain runoff from the upland habitats into the wetland habitats. Freshwater input into wetlands is important for developing a salinity progression, as well as delivery of nutrients and sediment. Sediment delivery is critical to maintaining elevations in the face of rising sea levels. Providing a landscape with a sufficient transition zone from the uplands to wetlands is a primary driver in developing the wetland cell layout. The wetland design will continue through the construction phase.

5.1.7 Site Operation and Maintenance

The construction and operation and maintenance of James Island will be a cooperative effort between USACE-Baltimore District and MPA similar to the arrangement for the restoration and maintenance of Poplar Island. As each functional element of the project is completed and determined to be functioning as intended, it will become the responsibility of the MPA to operate, maintain, repair, replace, and rehabilitate the project elements as needed. Such functional elements include containment dikes including armor stone, internal dikes, service structures, access channels, and each of the wetland and habitat areas defined by permanent cell divisions. Ultimately, the operations and maintenance of the entire site will become the responsibility of the MPA.

5.1.7.1 On-site Infrastructure

Site infrastructure will include those facilities required to support the project. Infrastructure at James Island will include dike roadways, personnel and equipment access, storage areas, piers and off-loading facilities, a fuel farm, and on-site operations buildings and monitoring facilities.

5.1.7.1.1 Roadway

The roadway for access around the island will be located on the crest of the armored stone dike. The perimeter road will have a length of 45,233 ft and a width of 25 ft. The roadway is planned to have a 1% slope to the interior of the island.

5.1.7.1.2 Access Channel, Breakwaters, Turning Basin, and Bulkhead

An access channel will be located on the northwest corner of the island to enable marine vessels that require deep drafts to access the island. The access channel will be used to deliver heavy materials such as the stone for dike construction and dredged material for placement in containment cells and habitat development. The access channel is approximately 8,400 ft long and 600 ft wide. The turning basin is planned to be 2,500 ft long and 1,000 ft wide. Both the access channel and turning basin will be dredged to -26 ft MLLW (-26.8 NAVD88) with a 3:1 side slope and flat bottom. The dredging footprint of the channel and turning basin is 173 acres. An additional 36 acres would be affected by the slope that develops after dredging resulting in a total impact of 209 acres. The approximate amount of material to be dredged is 3 – 4 million cubic yards. The bay bottom material to be dredged is a made up of multiple layers of sands, silts, and clays. The material will be hydraulically dredged onto James Island and into the wetland region. The material will be stockpiled in two locations. Suitable (sandy) material will be stockpiled in one area for recovery and used for dike construction. Unsuitable (silty/clayey) material with be spoiled in a separate stockpile for use in developing the wetlands. Both stockpiles will be confined with a sand dike.

Vessels would utilize the bulkhead to dock at the island. Breakwaters on the north and south side of the turning basin will provide protection to docked vessels. The breakwaters will tie into the island’s perimeter dikes and are projected to be 6,000 ft long with a maximum width of 130 ft (including the geotextile tail), occupying approximately 20 acres. The bulkhead and associated pier are projected to have a 1-acre footprint.

5.1.7.1.3 Personnel Pier

A personnel pier will be positioned on the eastern shore near the wetlands and uplands border. The personnel pier will be used for transporting employees and visitors to the island, as well as smaller materials.

5.1.7.1.4 Site Operations and Monitoring Facilities

Site operations and monitoring facilities will be housed in trailers. It is expected that these trailers will be positioned at the northeast corner of the north wetland complex and have a footprint of ~4.5 acres. These facilities will be removed or relocated in the final years of construction to enable development of wetland habitat in the northern wetlands complex.

5.1.7.1.5 Fuel Farm and Water Infrastructure

The fuel storage will serve to power vehicles and generators on the island. A traditional fuel farm as well as wind and solar energy sources, or a combination of sources, are being considered. Sewage and water will be disposed of through a septic system.

5.1.7.2 Off-site Infrastructure

Off-site infrastructure includes those project features located away from the island footprint. Off-site infrastructure includes the electrical supply and communications cable and the land base.

5.1.7.2.1 Electrical Supply and Communications Cable

To ensure proper communication and electrical needs are met a ~14,000-foot-long submarine cable will be installed from a power source on Taylors Island (at the utility yard) to the island facilities near the personnel pier. The conduit will run northwest from the tip of Taylors Island between existing oyster bars (NOB 14-6 to the north and Oyster Creek (Yates Bar) to the south of the pathway) to the southeast corner of the project, and then turn north to run along the eastern shoreline of the project to the personnel pier. The pathway would be approximately 350 ft from the toe of the perimeter dike. To install the bundle of coated wires, an approximately 12-inch conduit will be placed using a 24-foot weighted underwater sled dragged behind a vessel to cut an 8-foot deep by 2-foot-wide self-sealing trench to encompass the wire. The footprint of the installation is approximated as 8 acres. The utility cable is expected to serve the project for its full lifespan without needing to be replaced.

5.1.7.2.2 Taylors Island Utility Yard

A utility yard will be constructed on Taylors Island to enable connection of the electrical and communication cable to the mainland supply. The utility yard will consist of a 60 ft by 60 ft concrete pad surrounded by an approximate 8 ft perimeter fence to support equipment such as transformers to connect to the mainland supply. It is expected that the utility yard will be located within approximately 300 ft of shoreline. A manhole will enable access to the underground cable. To install the cable once it reaches the shoreline, a trench would be dug by a small excavator or similar equipment for cable placement. It is expected that the trench would be ~3 to 5 ft wide and 3 to 5 ft deep, backfilled with gravel, covered with soil, and replanted. The area now is an existing mowed lawn with scrub/shrub vegetation.

5.1.7.2.3 Land Base

A land base refers to any existing structures used by USACE, MPA, and contractors for office space as well as launching vessels for access to the island. It is anticipated that the land base will be established at the marina along Slaughter Creek, but a location has not been selected. It is expected that access to the island will require one to two additional trips on an average working day. This level of additional boat traffic would not be expected to be noticeable to the system. No buildings or access structures would be constructed to establish the land base.

5.1.7.3 Adaptive Management and Monitoring Plans

An integral component to the site operations and maintenance at James Island is the Adaptive Management Plan (AMP) and monitoring framework agreed upon by the PDT. As the design progresses, an Ecosystem Restoration Project Coordination Team has been formed to steer habitat development and adaptive management. This group will include the following subteams: Site Development Team, Site Operations Team, and Adaptive Management Team.

5.1.8 Implementation and Construction Sequencing

The project will be completed in phases that will be determined through the construction phase. Phase I is targeted to begin in 2025. The primary task of Phase I will be the construction of the upland perimeter dike.

The construction of the perimeter dikes, infrastructure, and major features are anticipated to take 10 years. The construction of the perimeter dike is expected to occur over the first 5 years. The upland perimeter dike will be constructed first and then continue building the wetland perimeter dike. The upland dike will be constructed first to enable the sand dredging from the borrow area to be completed simultaneously in the first 5 years with perimeter dike construction. A long-term stockpile of sand will remain on the island for use during the life of the project. It will be used for raisings, cross dike construction, and repairs. The stockpile is planned to be positioned in the northwestern portion of the north wetlands complex. In the final stages of construction, this area will be restored to wetlands habitat.

It is anticipated that the turning basin and access channel will be dredged and the breakwaters constructed between years 3 to 5. The facilities, fuel farm, bulkhead, personnel pier, and perimeter spillway structures will also be constructed within that period. Cross dikes in the wetlands will be placed to start breaking up the wetland region into cells. During this time frame the submarine utility cable and mainland utility yard will be installed to supply electricity and communication to the project followed by on-site underground electrical and communication lines will to various facilities and features.

Between years 5 to 7, it is anticipated James Island will begin to receive dredged material from the Federal channels. Dredged material placement will begin in the southern-most wetland cells. Over the next 30 – 40 years, wetland cells will be created in the south first and progress to the north end of the wetland region. Gated spillway structures, weirs, and channels will be constructed in the wetland cells to allow for controlled drainage of water.

Between years 7 to 10, it is anticipated the remaining cross dikes will be constructed to finish delineating all the wetland cells. More channels, gated spillways, and weirs will be installed to convey water from the wetland cells. Dredged material will be placed in the upland cell and the wetland cells.

6 IMPACTS TO PROJECT AREA

The NEPA process requires extensive evaluation of potential impacts from the proposed alternatives at James Island. The proposed alternatives are: (1) the No Action Alternative, which would involve no further USACE actions at James Island or (2) the proposed action alternative, which includes the restoration of a 2, 072 acre island through the beneficial use of dredged material from Baltimore Harbor approach channels, plus the required access channel and turning basin for dredge material placement, associated infrastructure, and offshore reef features to enhance fisheries. The defined project area, and area that would be affected by the proposed alternative, is the adjacent waters to James Island and western Dorchester County, Maryland.

The 2009 FR/EIS documented that the primary impact of the no action alternative at that time was the continued erosion of James Island, and possibly the Eastern Shore mainland that was shielded by James Island. With the expected erosion of James Island, the no action alternative (of the 2009 FR/EIS) was projected to result in the loss of the aquatic and terrestrial habitats on the island and in the associated protected waters. Additionally, turbidity generated by erosion would reduce water clarity. In the time since the publication of the 2009 FR/EIS, the loss of James Island from erosion has occurred. All wetland and terrestrial habitats have been lost, and the shelter provided to the leeward waters that support SAV are being lost as the footprint of the prior island deepens, with associated negative impacts to fisheries. Given the recent submergence of James Island, the primary impact of the No Action alternative as documented in this Final sEIS would be a permanent loss to the remote island habitat and network within the Chesapeake Bay. All ecosystem value and diversity from James Island’s previous wetland and terrestrial habitats would be unrecovered, possibly causing higher erosion rates on the exposed mainland of Maryland’s Eastern Shore as the remnants continue to erode and water depths increase. Erosion/subsidence of tidal wetlands and subsequent conversion to shallow water is detrimental to both terrestrial and fisheries resources including SAV. The small amount of remaining SAV habitat would be expected to be degraded and lost as waters deepen with continued erosion of submerged remnants and sea level rise. It can be expected that turbidity would remain at levels impairing water clarity in the near term as erosion continues. The submerged remnants could cause navigational hazards to unaware waterway users.

Section 6 focuses on impacts from implementing the recommended plan. Impacts from the proposed alternative generally concern the displacement of aquatic resources by converting shallow water habitats to 2,072 acres of either wetland or upland habitats, and associated project features. The impacts cover constructing the perimeter containment dikes, placing dredged material within the containment dikes, and all external project features including off-shore reef enhancements. The shoreline-focused EWN measures being considered for modification of the eastern wetland perimeter dike would occur within the footprint of the existing perimeter dikes and are therefore captured by the impacts from constructing the perimeter dikes. It is anticipated that implementation of these EWN measures would entail reducing the height of the containment dikes and/or modifying the dikes to improve aquatic/terrestrial connectivity. The off-shore structures associated with the EWN measures are discussed in the following sections.

The impacts described in this section include direct, indirect, and cumulative effects on resources in the vicinity of the proposed restoration sites. Direct effects are determined to be either short-term or long-term. Short-term effects are temporary impacts that would occur during construction or dredged material placement activities, and which would diminish after the disturbance has ended. Long-term effects are permanent and do not diminish after construction or placement ceases. Indirect effects are those impacts that may result from the proposed plan but occur later in time or are further removed in distance but are still reasonably foreseeable. Cumulative impacts are those combined effects on quality of the human environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of whether the Federal or non-Federal agency or person undertakes such other actions [40 CFR 1508.7, 1508.25(a), and 1508.25(c)]. Cumulative actions can result from individually minor but collectively significant actions taking place over a period or taking place within a defined area or region. The combination of these impacts and resulting environmental degradation is the focus of a cumulative impact analysis.

The impacts discussed in this section were determined by utilizing information from technical reports regarding previous conditions from 2001 – 2003 and current conditions from 2020 – 2021. Evaluation of potential impacts from the design of the recommended plan have also been informed through comparison of the recommended plan to a similar island habitat restoration project at Poplar Island as discussed in the Poplar Island, MD Environmental Restoration Project Integrated Feasibility Report and Environmental Impact Statement (USACE and MPA, 1996) and the Final General Reevaluation Report and Supplemental Environmental Impact Statement for the Poplar Island Environmental Restoration Project, Chesapeake Bay, Talbot County, MD (USACE, 2005).

Inclusion of EWN measures would add positive impact by improving the connectivity between aquatic and terrestrial habitats and adding diversity to submerged project features for oysters, fish, and benthic species. Opportunities to incorporate EWN measures determined to be feasible along the eastern wetland shoreline would be implemented once inflow of dredged material is complete and the dredged material has been dried and graded. Impacts from modifying perimeter dikes would be contained within the existing dike footprint. These modifications would largely be focused on reducing the height of the dike and adding in connectivity with the aquatic environment. Pending funding, reef enhancements could be implemented with or shortly after dike construction, unless the positioning of a reef would interfere with construction of other project features. The impact assessment accounts for 50 acres of shallow bottom water impacts from conversion to structural reef habitat. EWN Alternative 3 includes an offshore breakwater along the full extent of the eastern wetland shoreline. Alternative 3 would have the largest offshore impact, but is within the 50 acres documented for shallow water impacts associated with reef enhancements.

6.1 SETTING

Implementation of the proposed project is expected to beneficially impact the general setting around James Island. Erosion has reduced James from approximately 1,350 ac in the 1680s to no remaining landmass above water level in 2023. This project would restore 2,072 ac of James Island to the west of the existing island.

Implementation of Alternative 2 would have a direct, long-term impact to the setting by converting 2,144 acres of Bay bottom to island and associated infrastructure, including the stone perimeter dikes, external shoreline, internal habitats, breakwaters, reefs, bulkhead, and personnel pier. Including the access channel, the electrical supply/communications cable pathway, and the disturbance buffer on the perimeter dike, 2,466 acres of bay bottom would be disturbed. Table 20 provides a summary of the project features and impacts.

Table 20. Summary of Bottom Impacts from Implementation of the Recommended Plan

Project feature	Impact acres
Island habitat restoration	1,994
Perimeter dikes	79
Perimeter dike buffer (LOD)	106
Access channel	209
Breakwaters (adjacent to access channel)	20
Bulkhead (within access channel footprint)	1
Personnel pier	0.4
Shoreline habitat features (reefs)	50
Electrical supply/communication line placement	8
TOTAL DISTURBED AREA	**2,466**
AREA OF TEMPORARY IMPACT OR NON-STRUCTURAL HABITAT IMPACTS	*322*
AREA CONVERTED TO HABITAT OR STRUCTURE	*2,144*

The impacts are further presented in Table 21 with additional context regarding water depths impacted and benefits associated with each impact. Potential future modifications to wetland perimeter dikes along the eastern shoreline is not expected to impact additional bay bottom. Modifications would be expected to be confined to the footprint of the existing perimeter dike.

Dredge material from the Baltimore Harbor navigation channels would be placed to create a permanent transformation of 2,072 acres of open water to island habitat. The restoration would include 55% wetland and 45% upland habitat. As described in Section 5, habitat would be restored within cells separated by dikes to create approximately 1,043 ac of wetlands and 853 ac of uplands. Side slopes of the separator dikes between cells and transition areas to perimeter dikes would complete the approximately 1,140 ac (55 %) apportioned to wetlands and 932 ac (45 %) apportioned to uplands. Much of the internal separator dike extent is expected to be converted into wetlands habitat upon final habitat development. A tidal gut and channels would be constructed through each of the three wetland complexes to allow for tidal flushing. The final elevation of the upland cells would be plus 20 ft above MLLW. Over time, the island would evolve to support a variety of habitat types.

Table 21. Project Bottom Impacts and Benefits

Type of Impact	Size (ac)	Length (LF)	Ecosystem impacted/water depths	Impact	Impacts	Benefits	Total acreage
Shallow water habitat disturbance							
Dredged material placement - Uplands (center of roadway through interior)	897		aquatic	permanent habitat conversion to terrestrial			1994
	0		>20 ft		Filling of 897 ac of shallow water habitat and conversion to upland island habitat.	Restore 897 acres of upland remote island habitat (forest, meadows, freshwater wetlands, ponds, etc.) for birds, mammals, and herptofauna including internal dikes and side slopes of perimeter dikes. It is estimated that 65.5 acres of the total 1994 acres will be converted to side slope habitat of the perimeter dikes and internal half of roadway. Internal dikes will ultimately be transitioned into uplands habitat. A portion is expected to be used for the transition from uplands to wetlands.	
	92		12-20 ft				
	805		6-12 ft				
	0		0-6 ft				
Dredged material placement - Wetlands (center of roadway through interior)	1097		aquatic	permanent habitat conversion to wetlands habitats			
	0		>20 ft		Filling of 1,097 ac of shallow water habitat and conversion to wetland island habitat.	Restore 1,097 acres of wetlands remote island habitat (including small islands, hummocks, mudflats, beach, ponds, and tidal channels) for birds, fish, mammals, macrobenthic invertebrates, and herptofauna including internal dikes and side slopes of perimeter dikes. It is estimated that 65.5 acres of the total 1994 acres will be converted to side slope habitat of the perimeter dikes and internal half of roadway. Internal dikes will ultimately be transitioned into wetlands habitat. Current Master Plan includes ~8 mi (42,240 lf) of internal tidal channels and 4 tidal inlets. A portion is expected to be used for the transition from uplands to wetlands.	
	0		12-20 ft				
	1083		6-12 ft				
	14		0-6 ft				
Uplands Exterior dike (center of roadway to toe of dike)	36	20,713	aquatic	Permanent habitat conversion to stone dike			79
	0		>20 ft		Filling of 36 acres of shallow water habitat and conversion to stone dike and roadway. Construction of 20,713 lf of upland exterior dike.	It is estimated that ~9.5 ac (the submerged portion) of the perimeter dike and toe will provide value as reef structure for fish, oysters, and macrobenthics. Inclusion of ecologically-enhanced concrete structures to add habitat diversity in targeted sections is under consideration.	
	16		12-20 ft				
	20		6-12 ft				
	0		0-6 ft				
Wetlands Exterior dike (center of roadway to toe of dike)	42	24,520	aquatic	Permanent habitat conversion to stone dike			
	0		>20 ft		Filling of 42 acres of shallow water habitat and conversion to stone dike and roadway. Construction of 24,520 lf of wetlands exterior dike.	It is estimated that ~11.3 ac (the submerged portions) of the perimeter dike and toe will provide value as reef structure for fish, oysters, and macrobenthics. Inclusion of ecologically-enhanced concrete structures to add habitat diversity in targeted sections is under consideration.	
	0		12-20 ft				
	39		6-12 ft				
	3		0-6 ft				
The total area of perimeter dikes is 144.5 acres. Of that, 79 acres consumes the center of roadway to the dike toe and 65.5 acres is considered the internal half of the dike from the center of the roadway to the interior. The total perimeter dike length is 45,233 LF. Total island footprint is 2,073 ac. FOUNDATION REPLACEMENT: It is projected that 8,500 LF of perimeter dike construction will require foundation replacement for a removal of approximately 600,000 cy of foundation. This length of foundation replacement equates to approximately 20 acres.							2072
Uplands project buffer (100 ft buffer around 2,073 ac)	48		aquatic	Temporary disturbance			
	0		>20 ft		This area represents the potential limit of disturbance for dike construction. Area within this buffer is not expected to be within the dike footprint, but would be temporarily disturbed by construction activities (including EWN modifications). A small portion could be permanently converted to structure if dike modifications are needed based on field conditions. Foundation replacement activities would fall within this buffer. EWN reefs would partially fall within this area as a permanent conversion to reef habitat. Impacts and benefits from those structures are discussed below.		
	23		12-20 ft				
	25		6-12 ft				
	0		0-6 ft				106

Type of Impact	Size (ac)	Length (LF)	Ecosystem impacted/water depths	Impact	Impacts	Benefits	Total acreage
Wetlands project buffer (100 ft buffer around 2,073 ac)	58		aquatic	Temporary disturbance			
	0		>20 ft		This area represents the potential limit of disturbance for dike construction. Area within this buffer is not expected to be within the dike footprint, but would be temporarily disturbed by construction activities (including EWN modifications). A small portion could be permanently converted to structure if dike modifications are needed based on field conditions. Foundation replacement activities would fall within this buffer. EWN reefs would partially fall within this area as a permanent conversion to reef habitat. Impacts and benefits from those structures are discussed below.		
	0		12-20 ft				
	52		6-12 ft				
	6		0-6 ft				
Access channel and turning basin	173		aquatic	Permanent deepening; loss of historic oyster habitat			209
	45		>20 ft	all within James Point Bar	The area will be permanently deepened to -26.8 ft NAVD88. The change in depth will vary based on current depths. This is the impact of the dredging footprint and includes 99 acres of oyster bar habitat. It is estimated that another approximately 36 acres of bottom will be impacted by slope development for a total impact of 209 acres. The current condition of the oyster habitat is suspected to be in poor condition as harvests from 2015 to 2023 totaled 296 bushels, but surveys are underway to document existing hard habitat.	It is unclear if dredging will produce shell. If meaningful quantities of shell are encountered, USACE/MPA are investigating methods that would enable the shell to be set aside for use in the project or in other oyster-related projects.	
	61		12-20 ft	42 ac within James Point Bar			
	76		6-12 ft	12 ac within James Point Bar			
	0		0-6 ft				
Breakwaters for access channel	20		aquatic	Permanent conversion to stone structure			20
	0		>20 ft		The area will be permanentaly converted to stone breakwaters. The area impacted includes the geotextile tail which is expected to be quickly covered with sediment.	The submerged portions of the breakwater and toe will provide value as reef structure. The 20 acre breakwater is estimated to provide ~7.4 acres of potential reef surface. The project is investigating inclusion of ecologically-enhanced concrete structures and/or reefs perpendicular to the breakwaters to add habitat diversity.	
	10		12-20 ft				
	10		6-12 ft				
	0		0-6 ft				
Bulkhead (within access channel)	1.0		aquatic, -6 to -12 ft	Permanent impact	Includes buffer, expected design footprint is 0.5 ac of which some overlaps the existing dike. Footers are driven into bay bottom as well as the perimeter dike. The remainder of the bottom is untouched, but covered above the surface by the bulkhead. Area will experience noise from vessel traffic.		1
Dredge transition from bulkhead to turning basin	0.2		aquatic, -6 to -12 ft	Permanent deepening	Area will be permanently deepened from existing depth to -15.8 to -26.8 ft NAVD88.		0.2
Personnel pier	0.4		aquatic, -6 to -12 ft	Permanent impact	Includes buffer, expected design footprint is 0.25 ac. Footers are driven into bay bottom. The remainder of the bottom is untouched, but covered above the surface by the bulkhead. Area will experience noise from vessel traffic.		0.4
Electrical line placement	8	14,000	aquatic	Temporary disturbance	The pathway will run 14,000 lf from Taylors Island to the southeast corner of the project and north along the project's eastern shoreline to the personnel pier. A 24-ft weighted sled with a self-sealing 8 ft deep by 2 ft wide trench. The pathway will avoid oyster habitat, but fall within the 500 yard oyster buffer. The area will have a temporary impact during line placement, but then is expected to return to pre-existing conditions.		8
Oyster reef/living breakwaters/external EWN structures	50		aquatic	Permanent conversion to structured oyster habitat.	The current concept would permanently convert 41 ac of shallow water habitat to structured reef habitat. An additional 9 acres is included to enable the further development of plans.	Up to 50 acres of reef habitat.	50
Taylors Island Utility Yard	0.1		terrestrial	Permanent impact	Establishment of a utility yard on private property on Taylor's Island for utility connection.		0.1
TOTAL IMPACT AREA							**2466**
AREA CONVERTED TO HABITAT OR STRUCTURE (PERMANENT IMPACT) (Dike, island, pier, bulkhead, reefs, breakwater)							**2144**
AREA CONVERTED TO HABITAT (uplands, wetlands, and reefs) (Does not include ~28.2 ac of potential reef habitat provided by the submerged portions of the perimeter dikes and breakwaters).							1978
AREA CONVERTED TO STRUCTURE (Dike, pier, bulkhead, breakwater)							166
AREA OF TEMPORARY IMPACT OR NON-STRUCTURAL HABITAT IMPACTS (Access channel, dike buffer, electrical line placement)							**322**

6.2 PHYSIOGRAPHY, GEOLOGY, AND SOILS

Construction of the project would have direct and long-term impact to the Bay bottom at the project site, but would not impact physiography or geology of the project area. Approximately, 2,144 acres of the existing bay bottom substrate would be permanently buried beneath stone and dredged material. Within that impact area, it is expected that dike construction will require approximately 20 acres of foundation replacement. In those areas, bottom substrates would be excavated and replaced with sand. Exposed dredged material sediments on the surface would be converted into upland or wetland soils and would eventually differ in composition from sediments placed at depth. Another 209 acres of bay bottom would be dredged and deepened within the access channel footprint.

The primary borrow area for dike construction at James Island would be located within the northern portion of the alignment where the uplands would be created. Approximately 17 MCY of primarily sand from the upland's footprint and 3 – 4 MCY of material from the access channel and turning basin footprint would be excavated and placed within the project. The borrow areas within the upland footprint would then be backfilled in with dredge material from the Baltimore Harbor navigation channels until targeted elevations for upland habitat area reached.

Armor stone/crushed stone needed to protect the slopes of the exposed dike sections at James Island and quarry run stone for the core of the rock toe dike would be sourced from regional quarries.

Approximately, 0.03 acres of upland will be temporarily disturbed to dig a trench to bury the telecommunications/electrical supply line from the shoreline to the utility yard on Taylors Island. It is expected that the trench will be no more than 300 ft. It is expected that the trench would be ~3 to 5 ft wide and 3 to 5 ft deep, backfilled with gravel, covered with soil, and replanted.

Approximately, 0.08 acres of upland will be developed into the utility yard. The utility yard will consist of a 60 ft by 60 ft concrete pad surrounded by an approximate 8 ft perimeter fence to support equipment such as transformers to connect to the mainland supply. These upland soils will be permanently covered by concrete and infrastructure.

6.3 CLIMATE

The regional climate, as described in Section 3.3, would not be affected by implementation of the project, but emissions will be generated by construction activities. Air quality impacts are addressed in Section 6.13. A GHG assessment has prepared (Appendix C5) and is discussed in Section 6.13.1.

6.4 TOPOGRAPHY AND BATHYMETRY

Implementation of Alternative 2 is expected to help maintain existing topography and bathymetry immediately east of the project area. Under the No Action alternative (1), further erosion of the remaining submerged island remnants would continue, thereby further increasing the bathymetry within the historic island footprint. Over time, the bathymetry of the waters to the east of the project footprint is expected to gradually deepen without the restoration project.

The bathymetry of 173 acres of bay bottom would be deepened to -26.8 ft NAVD88 within the footprint of the access channel. An additional 36 acres would be deepened along the edges of the dredged channel through development of a slope from the existing bathymetry to the bottom of the dredged channel. The bathymetry within the island footprint (2,072 ac) would be permanently converted from shallow water habitat to island habitat. Final habitat elevations will vary across the island between wetland habitats, wetland and upland dikes, and upland habitats. Water depths are not anticipated to change within the project buffer area except where reef structures are placed. The bathymetry within the footprint of any placed reef structures (approximately 50 acres) would be altered depending on whether the structure is emergent or submerged. Emergent reefs would extend above the water surface. The design of submerged reef features will be completed at a future time, but it is expected that these structures would maintain approximately 2 ft or more of water depth above their surface. The bathymetry of approximately 20 acres would be permanently altered by placement of the breakwaters adjacent to the access channel. A portion of the breakwater would now have elevations above existing surface water levels. The submerged portion of the breakwater would have water depths ranging from a minimal alteration of existing depths to intertidal.

Upon project completion, the bathymetry of the project within the island footprint will be changed from existing depths ranging from -4 ft to -13 ft MLLW (-4.8 to -13.8 ft NAVD88) to +20 ft MLLW (+19.2 ft NAVD88) for upland habitats. However, bay bottom within the sand borrow area of the upland cell will initially be deepened to -26 ft MLLW (-26.8 ft NAVD88) from dredging of sand for use in the project. Bathymetric changes within the wetland habitats will range from no change in the tidal inlets and main channels (existing water depths will be maintained in these areas) to +8 to +11 ft MLLW (+7.2 to 10.2 ft NAVD88) where wetland perimeter dikes will be placed. Wetland habitat elevations will be determined based on current conditions and sea level rise projections specific to each complex at the time of design and construction. Any wetland perimeter dikes modified by EWN measures would be expected to be reduced from initial heights.

6.5 METOCEAN CONDITIONS

6.5.1 Hydrology

Implementation of Alternative 2 is not expected to impact hydrology, as characterized in Section 3.5.1. Due to the local scale of the project, regional hydrology is not expected to be affected, but there are anticipated effects on local water levels and waves (see sections below).

6.5.2 Water Levels

6.5.2.1 Tides

Implementation of Alternative 2 is not expected to affect astronomical tides. Modeling conducted during feasibility (See Section 6.1.3 of the 2009 FR/EIS) concluded that the proposed project would have minimal impacts on local astronomical tide elevations. The areas within the footprint that will be filled with dredged material to restore upland would permanently no longer experience tides and currents. The areas that would be restored to wetlands would be designed to have suitable flushing and tidal exchange to support healthy flora and fauna.

6.5.2.2 Storm Surge

Implementation of Alternative 2 would not alter storm activity but is expected to reduce waves and water levels generated by storms in the waters to the east of the project, with benefits extending to the Taylors Island shoreline. As determined in the 2009 FR/EIS, the restoration of James Island is projected to reduce the maximum wave height near the shoreline by as much as 2 ft (USACE 2009). No increases in wave height along the shoreline are expected from the project. The future without project condition increases the wave height at the shoreline slightly.

6.5.2.3 Relative Sea Level Change

Implementation of Alternative 2 is not expected to impact relative sea level change. However, the project is being designed to account for future RSLC. Dike heights will be determined by projected water and wave levels from modeled storms as well as RSLC. RSLC will also need to be accounted for when determining design elevations for wetland habitats. Thin-layer placement of dredged material is a potential best management practice (BMP) that could be undertaken to adaptively manage wetland habitats in the face of RSLC.

6.5.3 Tidal Currents

Implementation of Alternative 2 is expected to have a minimal impact on tidal currents. Modeling of the proposed project alignment as documented in the 2009 FR/EIS estimated that current speed would remain low and have a maximum speed of 2.1 ft/s at the southeast corner of the James alignment (USACE 2009, Attachment G (Moffatt and Nichol Engineers (2002, 2004) and Attachment O (Dinicola et al. 2006)) under normal conditions. During modeled hurricanes and northeasters, current speed was less than 3.58 and 2.53 ft/s, respectively. Modeling locations along the eastern shoreline typically were reduced with the project, and those along the western shoreline slightly increased. The current velocity also became stronger in the waters between the project and Taylors Island because of the narrower water exchange area between the land masses.

6.5.4 Wind Conditions

Implementation of Alternative 2 is anticipated to provide calmer conditions in the waters immediately east of the restored island by serving as a wind break.

6.5.5 Wave Conditions

Implementation of Alternative 2 is anticipated to provide reduced wave conditions in the waters east of the restored island that are generated from the north and west. Additionally, the restored island is expected to reduce wave energies that affect Taylors Island.

6.5.6 Sedimentation

Implementation of Alternative 2 is anticipated to have a positive impact on sedimentation in the immediate vicinity of James Island by reducing further erosion of the submerged island remnants.

The restored island will serve as a protective measure to the historic island remnants. Sedimentation modeling of cohesive and non-cohesive sediments was conducted during the feasibility phase to estimate the change in bay sedimentation and scouring patterns and relative rates if the James Island component was constructed. The modeling identified that sediment movement is insignificant under normal tidal conditions due to the weak tidal current (USACE 2009, Vol 3, Attachment G (MNE 2002) and Attachment O (Dinicola et al. 2006)). Bottom elevation change was determined to be greater for hurricanes than northeasters. The greatest bed erosion (approximately 10 cm) occurred at the southeast corner of the project under hurricane conditions. While there was historical erosion of James Island, the recommended plan design would prevent this type of erosion at the site.

6.6 WATER QUALITY

Dredging of the access channel and construction activities would be expected to cause short term, locally elevated turbidity and possibly nutrient levels in the surrounding waters during construction. Minor, temporary, and localized reduction in dissolved oxygen in conjunction with elevated turbidity levels may occur in the immediate vicinity of dredging and construction operations. Mobile species such as summer flounder would be expected to avoid the area. This temporary habitat disturbance would not be expected to impact species populations because of the abundance of adjacent suitable habitat.

Although the presence of the dredged channel could inhibit lateral water exchange, the area is not expected to be below the pycnocline which would inhibit vertical exchange. The nearest Chesapeake Bay Monitoring Station (CB 4.3E) is approximately 3,200 ft to the northwest of the outer limit of the access channel. CB4.3E is situated in much deeper water (22.5 m (73.8 ft)). However, based on Chesapeake Bay Program Water Quality Monitoring Data for station CB4.3E, over the past 10 years, the lower pycnocline has been situated at water depths deeper than those of the dredged access channel (CBP 2024). Therefore, although the area will be deepened, it is not anticipated that the water within the access channel will become hypoxic or anoxic in warmer months of years when impaired water quality problems are pervasive below the pycnocline in the Bay. The northwest corner is a high energy environment which is expected to promote circulation within the channel.

Minimal disturbance is expected from installation of the electrical/communication line along its ~14,000 lf path. Additionally, 8 acres of surface disturbance is included in the impact table. Turbidity of bottom waters would be expected to be elevated temporarily during installation of the cable.

Short-term localized elevations in turbidity would likely be associated with transportation of material to the island due to the operation of tug and barge traffic in the relatively shallow waters surrounding the proposed dike alignment and in the access channel.

In compliance with the Clean Water Act and the State of Maryland permitting process, MPA is applying for a Water Quality Certificate (WQC) and Tidal Wetlands License (TWL) for the project. A Section 404(b)(1) evaluation is provided in Appendix C4.

To dewater the placed dredged material, water is discharged to the surrounding waters. In addition to the testing that is completed to confirm dredged material is not contaminated prior to placement, and is thereby suitable for habitat development, water discharged from the containment cells is monitored to avoid impairing water quality. A discharge water quality monitoring plan is expected to be required by the WQC. The James Island monitoring plan is expected to follow the plan in place at PIERP. The plan will outline extensive interior water quality monitoring to be conducted prior to discharge and exterior monitoring sampling, which is collected just offsite, to ensure any impacts on surrounding surface and groundwater are minimized. James Island will be required to meet an extensive list of water quality parameters prior to the discharge of water from the site. Along with turbidity and pH, onsite ponded water will be tested for metals concentrations before discharge occurs to ensure water is within the State Water Quality Standards (SWQS) and meets all other water quality parameter limits. If all permit limits are not met, onsite ponded water will be held within the containment ponds. The exterior samples (collected within 100 yards from the discharge locations) will be collected on a quarterly basis. Results will be compared to a water quality reference site, to show any impacts, or lack thereof, that discharge has on the surrounding water quality.

6.7 SEDIMENTS

Implementation of Alternative 2 would have a direct and long-term impact on the sediments within the project footprint. The sediments within the restoration area would be buried under stone and dredged material. The development of habitats using dredged material (silt) will constitute a change in the composition of bottom sediments in areas where bottom sediments are now sand. Within the footprint of the perimeter dike impact area, it is expected that dike construction will require approximately 20 acres of foundation replacement. In those areas, bottom substrates would be excavated and replaced with sand. Further, sand within the access channel and turning basin would be dredged from the bottom and used in construction of the project. It is expected that restoration of James Island would minimize the further erosion of the remaining island remnants. Based on modeling conducted during feasibility (USACE 2009, Attachment G (Moffatt and Nichol Engineers (2002, 2004) and Attachment O (Dinicola et al. 2006)) the project would have little effect on littoral drift for south-southeast and west-northwest winds. There would continue to be erosion along the Taylors Island shoreline with deposition offshore in deeper waters. However, for north-northwest winds, the project would reduce erosion along Taylors Island.

The bay bottom material to be dredged from the access channel and turning basin consists of multiple layers of sands, silts, and clays at varying depths and thicknesses. The material will be hydraulically dredged onto James Island and into the wetland region. The material will be stockpiled in two locations. Suitable (sandy) material will be stockpiled in one area for recovery and used for dike construction. Unsuitable (silty/clayey) material with be spoiled in a separate stockpile for use in developing the wetlands. Both stockpiles will be confined with a sand dike. Geotechnical borings do not suggest the presence of dense shell deposits or whole shells within the area to be dredged. However, if such material would be found, USACE/MPA would discuss the feasibility of stockpiling the shell for use in restoration efforts.

Sediments within the pathway of the electric supply and communications cable would be disturbed to bury the line at an 8-foot depth. Minimal disturbance is expected from installation of the electrical/communication line along its ~14,000 lf path. However, 8 acres of surface disturbance is included in the impact table. The bottom sediments are expected to return to pre-construction condition shortly after installation is complete. Turbidity of bottom waters would be expected to be elevated temporarily during installation of the cable.

6.8 AQUATIC RESOURCES

6.8.1 Wetlands

Erosion rates have increased since the writing of the 2009 Mid-Bay FR/EIS, resulting in no remnants of James Island located above water level. The proposed project is expected to provide long-term beneficial impacts to wetlands by creating approximately 1,140 ac of wetland habitat within the island complex. Inclusion at a future time of EWN measures to enhance the wetland perimeter dike and tidal inlets would improve the connectivity of the restored wetlands to the mainstem Bay and the flow of aquatic species through the tidal inlets into wetland habitat. Any modifications of the eastern wetland perimeter dike undertaken to improve connectivity and habitat will be evaluated during the design process to confirm that the integrity of the restored wetlands habitat will not be compromised.

Due to proximity to the Eastern shore, impacts may arise from seed exchange between the proposed alternative and the mainland. Wind, water, or animal movements can transfer seeds between the mainland and the proposed project area. Conversely, an invasive species such as the common reed (*Phragmites australis*) could colonize new areas through wind-driven seeds, complicating control efforts at the proposed project. Instituting vegetation monitoring and invasive species control plans must be a consideration for the proposed project according to Executive Order 13112 (February 3, 1999).

6.8.1.1 Intertidal Mudflat Habitat

Intertidal mudflats are known to support an important ecosystem of benthic and infauna species. The presence of these species attracts larger avian, macroinvertebrate, and finfish predators. Intertidal flats therefore facilitate the interaction of a diverse number of species.

During the environmental studies for the 2009 Mid-Bay FR/EIS, no intertidal habitats were located on James Island. This condition remains unchanged as of 2023, following the complete erosion of the James Island remnants. The recommended plan would restore approximately 113 ac of intertidal/mudflat habitat. During construction of James Island, there would be roughly 60 to 100 ac of mudflats temporarily created at any one time through the placement of dredged material.

6.8.2 Submerged Aquatic Vegetation

No SAV beds were found in the waters around James Island at the time of the most recent, 2020 survey. This condition is most likely associated with the loss of the last island remnants in the area, as a 2002 – 2003 survey indicated that widgeon grass (*Ruppia maritima*), sea lettuce (*Ulva lactuca*), and horned pondweed (*Zannichellia palustris*) were present in the island's vicinity. The restoration of 2,072 ac of island habitat is thus expected to promote conditions for the reestablishment of SAV in the waters surrounding the James Island remnants.

The final location for the mainland utility line connection to Taylors Island will be determined at a later point in the design process. A connection to the mainland at the end of North Point Road would avoid any impacts to SAV habitat. A connection slightly south of that point along the western shoreline of Taylors Island would pass through waters that previously supported SAV. Depending on the final location, a utility line pathway south along the western shoreline would pass through 200 – 500 lf that was covered by a SAV bed in 2018, equating to a potential temporary impact between 0.04 to 0.27 ac to potential SAV habitat. Over the past 10 years, 2018 was the only year when SAV was present. By the time of construction, it is anticipated that the Five-Year SAV Composite (2019 – 2023) will not indicate the presence of SAV as SAV was only present in this area in one year (2018) over the past 10 years. Figure 21 depicts the utility line pathway, its proximity to SAV and oyster habitat, and the general location of the utility yard on Taylors Island. Either location would be situated within the protective SAV buffer. Placement of the utility line is expected to occur between November and March to avoid construction during the SAV growing season. The area of disturbance to potential SAV habitat will be approximately 24 ft wide and 200 to 500 ft in length. The impact would be temporary, and the area is expected to remain potential SAV habitat once installation of the utility line is complete.

The land base would have sufficiently deep waters for access, limiting interaction with SAV and other sensitive shallow water habitats. The planning of the land base will incorporate avoidance and minimization measures to ensure that sensitive habitats are not destroyed or degraded.

The project will comply with a TOYR to protect SAV habitat. Any work that involves bottom excavation (e.g. foundation replacement) within 500 yards of a SAV bed would be restricted from being undertaken from April 15 through October 15 of any year. Work that involves rock placement for dike construction with no excavation or backfilling is considered a minimal sediment generating activity. This work is limited within 100 yards of a SAV bed; and would be restricted from being undertaken from April 15 through October 15 of any year. The five-year composite map will be used to determine the location of SAV beds each year. It is expected that the SAV TOYR will be coordinated and fully defined as part of the TWL and WQC.

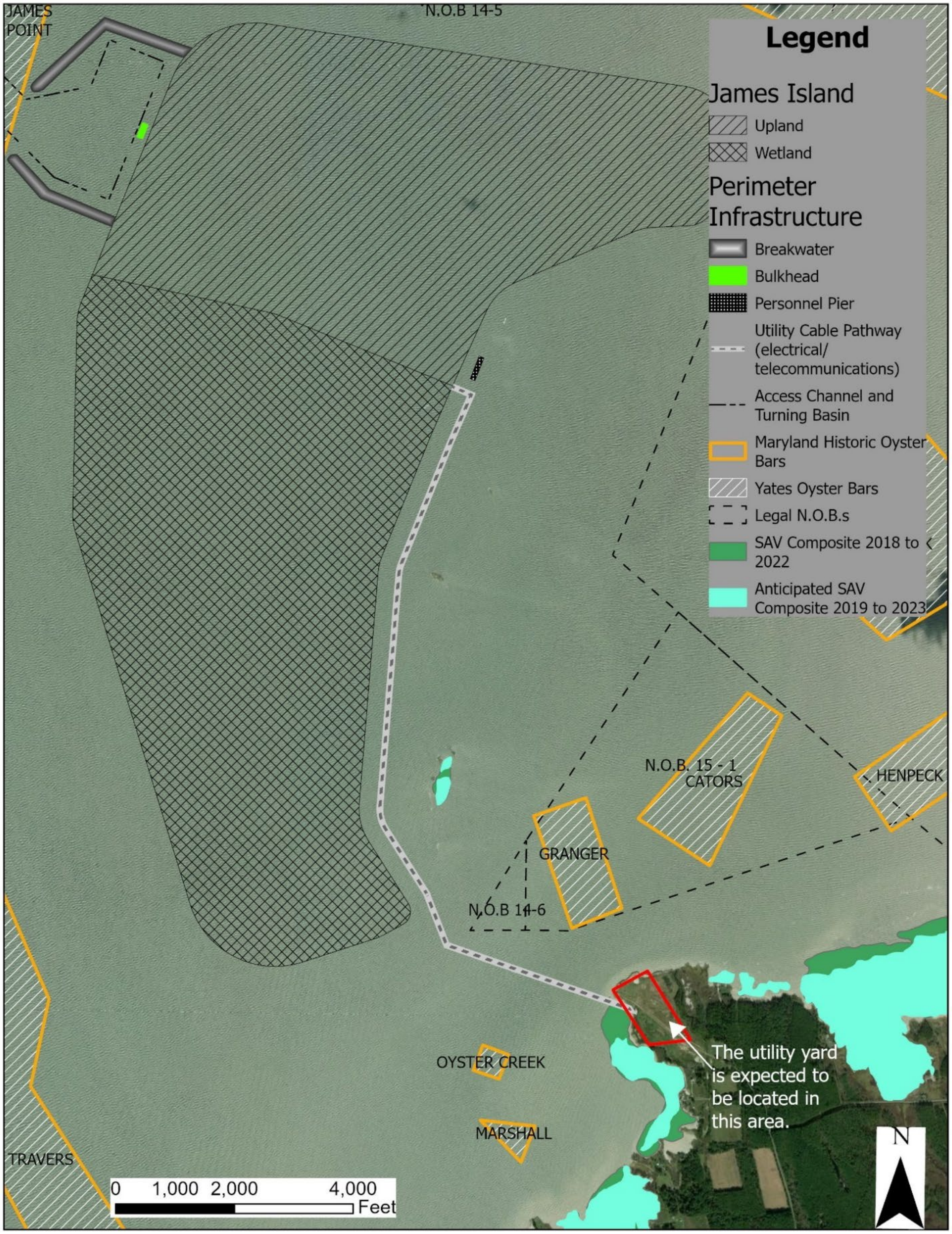

Figure 21. Proposed Location of Utility Line Pathway and Utility Yard on Taylors Island

6.8.3 Benthic Macroinvertebrates

Implementation of the recommended plan will have a direct and long-term impact on macroinvertebrates within the footprint of the project. Breakwater and dike construction would permanently bury existing areas of the bottom along the proposed alignment and may affect adjacent areas of the bottom through drift and settling of finer particles. Approximately 2,072 acres of shallow water habitat would be converted to perimeter dikes and internal habitats, and another 72 acres of bottom would be converted to breakwater, personnel pier, bulkhead, and external habitat features. Immobile benthic macroinvertebrates would be lost within these footprints. Construction of the initial dike at James Island would include dredging an 8,400-foot-long access channel from deep-water (-26 ft MLLW) northwest of the proposed alignment to – 15 ft MLLW (-15.8 ft NAVD88) in front of the bulkhead, impacting 209 acres of bottom (Figure 20). The channel would be dredged to a width of 600 ft and a depth of -26 ft MLLW (-26.8 NAVD88), and the turning basin a width of 1,000 ft and length of 2,500 ft. Approximately 3 – 4 MCY of material would be removed by dredging. Immobile benthic macroinvertebrates removed with the material during dredging would be lost. After initial dike or breakwater construction, dredged material from other channels in the Chesapeake Bay would periodically be placed within the diked area smothering the benthic invertebrates within the habitat internal of the perimeter dikes. The long-term impacts of displacing shallow water habitat may be offset by the restoration of intertidal wetland habitat. They do, however, represent a trade-off between open water habitats used by fishery resources, benthic invertebrates, and waterfowl and upland/wetland resources utilized by various avian and fishery species, as well as herpetofauna and benthic invertebrates. The restoration of offshore reef habitat is expected to provide direct benefit to fisheries resources impacted by the loss of shallow open water habitat.

Additionally, approximately 8 acres of bay bottom between Taylors Island and along the eastern side of the historic James Island footprint would be temporarily impacted by placement of the electric supply/communications cable at a depth of 8 ft below the bay floor. The area of disturbance will be approximately 24 ft wide and 14,000 ft in length. It is expected that benthic macroinvertebrates would recolonize the area within a short timeframe. Kraus and Carter (2018) reviewed survey data from available subsea communication and power cable installation. Their review highlighted that the sedimentary environment and mode of cable burial drives site-specific recovery, but summarized trends based on water depths for zones of the offshore and continental shelf. In the inner shelf (0 – 30 m water depths), physical recovery typically occurs within 2 years, and often sooner where there are active waves and currents and a sediment supply. Biological recovery is expected to be related to physical recovery. Biological time series demonstrate little significant effects on biological communities studied by burial of cables. On the inner shelf (assumed to be representative of the Mid-Bay Project), invertebrates returned to pre-impact levels within a year.

6.8.4 Fish

Construction activities are expected to affect the fish community in several distinct ways with an overall long-term positive impact. There will be short-term and long-term negative impacts associated with dredging the access channel and placement of stone and dredged material within the project footprint, but long-term beneficial impacts from the restoration of island habitats and offshore reef habitat. Dredging of the access channel and subsequent placement along the dike alignment would disturb up to 2,466 ac of bottom. Approximately 2,072 ac of near-shore habitat would be buried within the containment area at James Island and 209 ac would be disturbed due to the dredging of the access channel. This, however, constitutes only a minimal loss of shallow open water areas regionally within the main stem of the Chesapeake Bay. This is the total project limit including a buffer, which allows a border around the project where adjustments could be made to the alignment if needed. The current open water habitats will be permanently lost and converted to either island habitat, stone dike, deep access channel, or reef structures. Species that currently use this habitat would be displaced to neighboring, similar habitats within the region. Some of those along the alignment may be trapped and destroyed as the material is placed. This is expected to be a very small portion of the local fish community, and the action is not predicted to have lasting impacts on any species.

There will also be short-term, negative impacts from the dredging activity related to noise (Section 6.14), turbidity, and water quality, as well as potential entrainment of some individuals. Pelagic fishes (e.g. menhaden, striped bass) and more mobile members of the demersal fish community (e.g., flounder) are expected to easily move out of or generally avoid the area during dredging. The fish most affected would be smaller, mostly resident species of limited mobility (e.g., gobies, blennies) and the young of fish utilizing the area as a nursery. The fish species within influence of the suction head would be entrained with the material being moved.

The short-term elevated suspended solids levels associated with dredging within the project area are expected to have a negligible effect on larger members of the fish community that would likely avoid the areas of highest turbidity. Early life stages are expected to be most affected: eggs and larvae/juveniles of many fish species are sensitive to high turbidity. Many fish eggs are adhesive and readily accumulate particulates, making them less buoyant (in the case of pelagic eggs) or placing them at risk of smothering (in the case of demersal eggs). Some larval fish are similarly affected by high concentrations of particulates. Suspended solids are also known to influence the feeding abilities of some larvae/juveniles, particularly those most dependent on vision to detect prey (e.g., young striped bass). These species, however, are all very common regionally and any impacts to the populations would be small and short term.

When construction of the exterior dike is completed, fish enclosed within the proposed dike at James Island would likely be lost. Existing conditions surveys confirmed that all species currently using the area are common in the Mid-Chesapeake Bay region. The loss of fish habitat within the diked area at James Island is not expected to be a significant impact to regional fishery resources. This area provides no cover or structure and there is similar habitat within the region. Seasonal monitoring did not identify a diverse benthic community that would make this open water particularly valuable to fishery resources.

Positive, long-term benefits would be provided by the submerged sections (approximately 28 acres) of the exterior dikes for benthic colonization and foraging and refugia for fish. The stone armor that would protect the dike at James Island in many areas is expected to provide cover habitat for some fish species. In addition, the stone armor would provide a food source upon colonization of the rocks by epibenthic species. Exterior monitoring studies performed on similar exterior dikes at the PIERP document abundant epibenthic organisms, which provide a potential food source for juvenile fish that take refuge and forage in the rock cover (MPA, 2004d). The results of PIERP monitoring indicate that the expected epibenthic colonization of the dike provides a beneficial impact to aquatic species and helps to offset the loss of habitat.

Additional long-term benefits would be provided by the restored habitats and shoreline. An important habitat feature of islands is the associated shoreline. Shallow near-shore areas have been noted as being among the most productive habitat of some estuaries, second only to tidal marshes (Ayvazian et al., 1992). This habitat is not unique to the region, but it is unique in its occurrence not adjacent to the mainland. The construction of dikes would not provide a substantial amount of natural shoreline, but in turn would diversify the habitat in the area. The shift in the predominant aquatic habitat is expected to manifest fundamental changes within the fish community utilizing the area during the transition period following dike completion at James Island, particularly within and directly adjacent to the proposed dike alignment. The usage of the tidal creeks and ponds is expected to shift fish species populating the project area to earlier life stages and smaller species that commonly utilize marsh habitat. Following the establishment of smaller species, it is expected that larger species or life stages would utilize these areas as well for foraging. Species composition in the waters surrounding the proposed island is not expected to change significantly in the long term. Inclusion at a future time of EWN measures to enhance the wetland perimeter dike and tidal inlets would improve the connectivity of the restored wetlands to the mainstem Bay and the flow of aquatic species through the tidal inlets into wetland habitat.

The establishment of offshore reef structures would provide a number of benefits to fishery resources. Reef structures would provide structural habitat for fish and benthic organisms where none currently exists; provide foraging, reproduction, and nursery habitat for resident finfish; provide foraging habitat for transient species; provide structural habitat as predation refuge for juvenile blue crabs; provide a connection from deeper water into island tidal inlets and marsh; increase primary and secondary benthic production to increase the complexity of trophic structure and provide for energy transfer to higher trophic levels; and provide heterogeneity along the long, straight reaches of the containment dike.

Future modification of wetland perimeter dikes along the eastern shoreline for EWN is not anticipated to have any further negative impacts on fishery resources. The modifications would be confined to the footprint of the existing perimeter dike.

The recommended plan for James Island would likely protect much of the existing SAV and potentially allow an increase in abundance. This in turn would increase the area of Habitat Areas of Particular Concern (HAPC) in the vicinity of the islands. Although, there is currently no SAV (HAPC) acreage in the James Island vicinity and no SAV resources are adjacent to the location of the access channel, implementation of the recommended plan for James Island would likely reestablish the protected conditions suitable for SAV habitat eastward of the island.

Summer flounder is one of the species potentially utilizing the HAPC around James Island. Although not expected (reference to Section 6.6), parts of the access channel at James Island that are dredged to - 25 ft or greater have the potential to become hypoxic or anoxic in warmer months of years. Under these conditions, the bottom in the access channel would be unsuitable as habitat for summer flounder, and the species would be expected to avoid this area. This loss of habitat would not be expected to impact summer flounder populations because of the abundance of suitable habitat remaining elsewhere in the Chesapeake Bay. The USACE prepared an EFH Assessment for the proposed project (Appendix C2) and a response to NMFS conservation recommendations (Appendix C1). The proposed project footprint at James Island does not contain any documented SAV or other HAPC resources.

The most noteworthy change in habitat character due to the James Island restoration is that existing open water within the project area would be reduced; however, the wetland portion of the habitat restoration areas would provide increased nursery habitat for aquatic species and add diversity to the existing habitat.

6.8.4.1 Essential Fish Habitat

In consultation with NMFS, it was determined that the James Island project area lies within waters designated as EFH for several fish species and their various life stages. The full EFH assessment is provided in Appendix C2 and the response to NMFS conservation recommendations is provided in Appendix C1). Based on the analysis provided in the EFH assessment, James Island area waters constitute EFH for adult and juvenile summer flounder, and adult and juvenile bluefish (in occasional years) based upon EFH habitat preferences and documented occurrences. Conversely, James Island area waters do not appear to constitute EFH (or perhaps only infrequently-used EFH) for Atlantic butterfish, black sea bass, scup, windowpane flounder, and clearnose skate.

Collectively, all species that have EFH listed for the James Island area would be displaced during dredging and construction activities and potentially experience decreased water quality and clarity. Impaired water quality and clarity could affect predator/prey interactions. All species are mobile, reducing the risk of entrainment and destruction by dredging and construction. All species except winter flounder and clearnose skate are expected to migrate from the project area in the late fall/winter, returning with warming waters in the spring. Black sea bass, scup, summer flounder, clearnose skate, and younger juvenile bluefish feed to some extent on benthic invertebrates. The habitat value of the James Island area to these species would be diminished until the benthic community is re-established. Cumulative long-term effects from the James Island restoration project are most notably the conversion of open water habitat to shoreline and upland habitat. The marshes and tidal creeks created as part of island restoration at James would support juveniles of summer flounder and bluefish, as well as a wide variety of their forage species. The creation of this habitat is expected to compensate somewhat for loss of open water and benthic habitats.

Cumulatively, the multiple, on-going and proposed beneficial use USACE projects would constitute a loss of EFH, and thus an adverse effect, with some associated benefits to EFH that prefer tidal inlets, marshes, structured habitat, and SAV. Regulations serve to present other large-scale conversions of open water to non-habitat, such as commercial or industrial islands that would not provide ecological benefits compensating for open water habitat loss. However, considering ongoing habitat changes concomitant with rising sea-level as described above, these losses would largely be offset by natural processes resulting in additional open water, and therefore no detrimental effect overall to species with EFH in the region is expected as a result of the projects.

Because this project would result in minor adverse impacts to summer flounder and bluefish EFH but is designed to protect and enhance EFH and HAPC over the long-term, no mitigation specific to protection of populations of these species or their habitat has been proposed. However, the proposed project incorporates numerous measures designed to maximize the environmental benefits of the project, while minimizing adverse impacts. These include incorporation of reef features adjacent to the external dike toe to diversify the shoreline and protect the mouth of tidal inlets as well as continued analyses to soften (i.e. use less stone and add connectivity) the design with EWN approaches. The addition of structural habitats is expected to benefit black sea bass ad scup. Further, some project activities are expected to be conducted in fall and winter to the extent possible to avoid interactions with species that migrate from the area as temperatures drop including black sea bass, butterfish, bluefish, scup, summer flounder, and clearnose skate. Dredging activities would be constrained by spatial and temporal restrictions to protect mapped oyster and SAV beds in the project area. Additional monitoring would be undertaken at James Island to avoid impacting viable SAV beds.

In response to NMFS's Conservation Recommendations, the following actions will be carried forward:

1. Develop a work plan that avoids dredging activities within 500 ft of a designated natural oyster bar during June 1 through September 30 (mechanical and hydraulic) and December 15 through March 15 (mechanical only), in any year;
2. Evaluate the potential to recover shell material during dredging of the proposed access channel. To the extent practicable, reuse any harvested shell to create/enhance oyster reef habitat in the immediate project vicinity; and
3. Continue to coordinate with resource agencies throughout the entirety of the Construction Phase.

6.8.5 Commercially Important Species and Commercial Fisheries

6.8.5.1 Clams

Two commercially important bivalve species, soft clams and razor clams, occur within the proposed footprint of the project, although the harvesting rate, as determined by sampling was not sufficient in any locations for these areas to be considered productive natural clam bars. Dredging and construction is expected to permanently eliminate the bivalve community that currently inhabits the bottom within the project footprint. Moreover, there would be no potential for reestablishment because the area would be completely covered with dredged material and stone when the island is constructed. However, due to the lack of productivity, commercial clam harvest in the area around James Island should not be adversely impacted by construction of the proposed island restoration project.

6.8.5.2 Eastern Oysters

There are three natural oyster bars (NOBs) in the vicinity of James Island. The island footprint does not directly impact any oyster bar habitat, but the access channel runs directly through the James Point bar, a Maryland Historic Bar and Yates Bar, but not a Legal NOB (Figure 22). Dredging of the access channel would have a direct impact on the James Point bar. Approximately 99 acres of the James Point bar would be dredged to establish the access channel. An alternate location for the access channel to the northeast was considered (Figure 18). The alternate location would avoid direct dredging impacts to the James Point bar but would position the access channel directly between the James Point bar and the Hills Point South bar (a Legal NOB). Impacts to the James Point bar have been discussed with MDNR. MDNR communicated their preference for the original access channel location rather than the alternate location that would potentially increase impacts to the Hills Point South bar (Appendix C1). MDNR has also advised that any shell recovered during dredging operations for the access channel be preserved and utilized to rehabilitate oyster bar habitat at a location to be determined in consultation with the agency.

Sediment transport modeling of with-project conditions during the feasibility study did not indicate that the modeled hurricanes and northeasters would negatively impact oyster habitat in the vicinity. Modeling results propose minimal reductions in sediment accretion over these areas, but no erosion or accumulation.

It is anticipated that time of year restrictions (TOYR) will be applied to the dredging work, portions of the perimeter dike construction where foundation replacement is needed, and installation of the utility line to protect oyster habitat. These activities involve bottom excavation or sediment generating activities. A TOYR within the Chesapeake Bay prohibits hydraulic or mechanical dredging from being conducted within 500 yards of the boundary of an oyster bar from June 1st through September 30th to avoid impacts to oyster resources. A winter TOYR prohibits mechanical dredging within 500 yards of the boundary of an oyster from December 16th to March 14th to protect oyster bars during periods of low metabolic rates when oysters are more susceptible to smothering by suspended sediments. Project construction would comply with any TOYR presented by resource agencies to protect oyster habitat and minimize impacts. Based on input received from MDNR on May 15, 2024, installation of the utility line should abide by both the winter and summer TOYR for oysters. Figures 21 and 22 depict the location of the utility line pathway in relationship to oyster resources.

As discussed in Section 1.3.4, the Little Choptank River oyster restoration project is adjacent to the James Island project site. This large-scale tributary restoration project has restored 360 acres of oyster reef habitat within the Little Choptank River sanctuary. In conjunction with the Harris Creek and Tred Avon River oyster restoration projects within the Choptank River, these three projects are

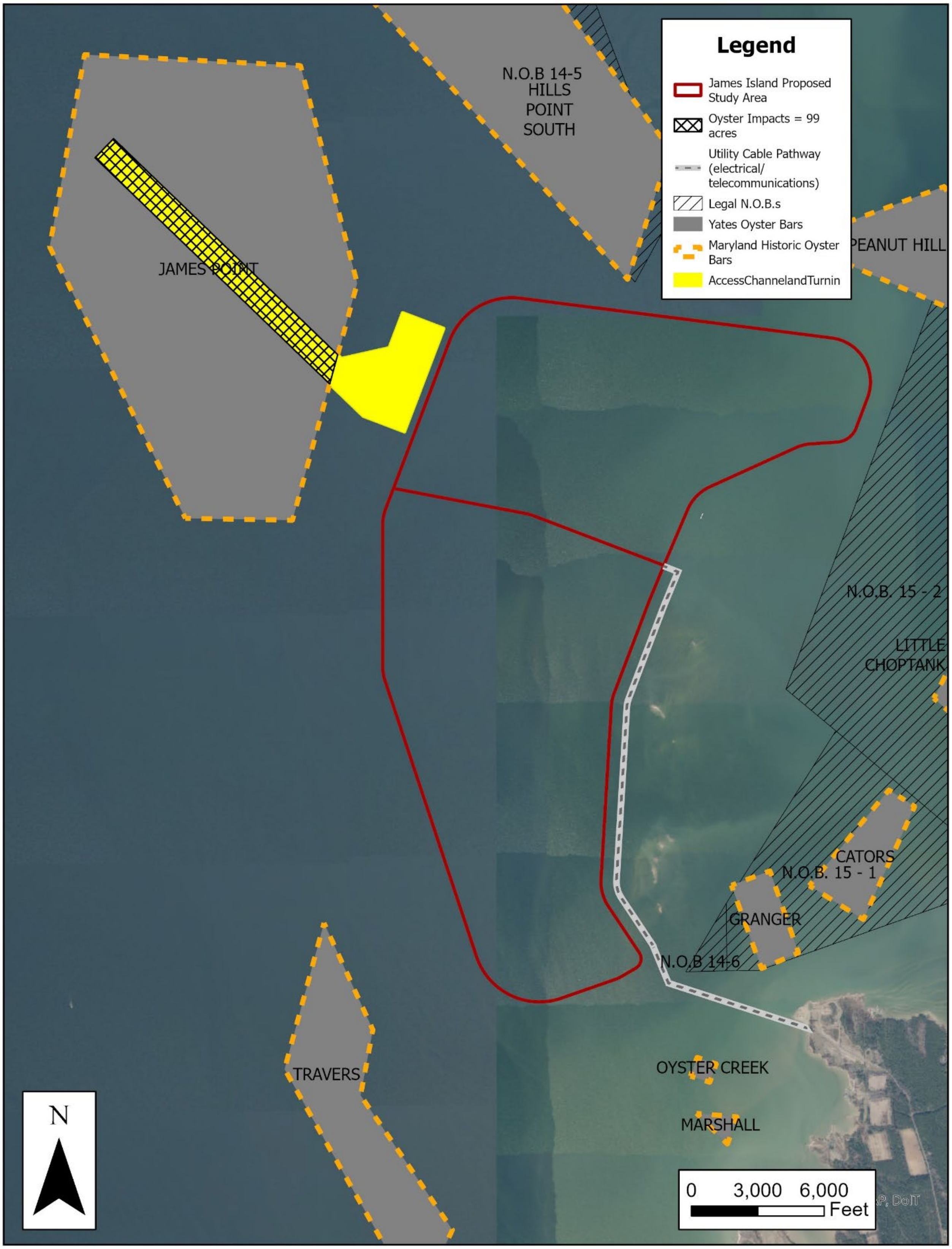

Figure 222. Impacts to Oyster Resources

serving as reproductive engines for the oyster population. The stone perimeter dikes and breakwater constructed as part of this project are expected to provide approximate 28 acres of substrate on which oyster spat exported from the restoration sanctuaries can set to expand oyster habitat. Further, any reef habitat created along the perimeter of the island (approximately 50 acres) will additionally augment oyster habitat and connectivity in the region.

6.8.5.3 Blue Crabs

The 2020-21 fishing surveys documented fewer crabs compared with similar surveys conducted during the feasibility phase of this project in 2002 – 03, likely due to erosional loss of James Island and associated SAV. However, the waters surrounding James Island have been identified as a regionally important area for harvesting of blue crabs as confirmed .by the existing conditions surveys. A short-term impact to blue crabs could include a period of lower usage of the island restoration area during construction. Blue crabs are highly mobile and are expected to vacate the area during construction, except for crabs that are contained within the confines of the perimeter dike and those that may be over-wintering within the area. There could be a minimal, direct impact to any blue crabs trapped within the dike alignment after stone placement. If crabs are trapped within the alignment, they could be smothered by dredged material placement. Based on DNR surveys indicating few wintering crabs, no impact to wintering crabs is anticipated. Losses to blue crabs are expected to be minimal, particularly if dike construction is completed when the crabs are in deeper waters (October through April). The main impact to this resource would be the loss of 2,072 ac at James Island summer blue crab habitat to burial and island construction. The shallows surrounding the remnant islands provide habitat (cover and food sources) sought by juvenile and adult crabs in the summer.

The marsh creeks formed by the restored island construction are expected to provide excellent crab habitat in the future (particularly for young life stages and soft crabs). Likewise, any SAV beds that reestablish after the project is constructed would continue to provide prime blue crab habitat. Restoration at James Island would represent a net loss of currently productive blue crab habitat that is not associated with SAV. The largest impact is to the commercial crabbers who fish the waters within the proposed project area and would have to relocate their operations.

Inclusion of offshore reef habitat is expected to benefit juvenile blue crabs. Reef habitat has been shown to serve as predation refuge for juvenile blue crabs.

6.8.5.4 Horseshoe Crab

The proposed project is expected to provide long-term, beneficial impacts to horseshoe crab nesting, by potentially providing new nesting habitat on sand dikes and beach. Previously, horseshoe crab utilized the eastern and northern side of James Island, however due to erosion, the area is no longer utilized. Short-term adverse impacts may result from the potential for increased boat traffic during the construction phase that could disturb horseshoe crab activities.

6.8.5.5 Finfish

Existing conditions studies in the vicinity of James Island found that five commercially important finfish species utilize the area. Of these, the most important in terms of poundage landed and dollar value were Atlantic menhaden and striped bass according to the MDNR catch data. As stated previously, the composition of the adult finfish community in the waters surrounding the proposed projects is not expected to be impacted significantly in the long-term.

However, construction impacts such as bottom disturbance and increased turbidity may deter short-term usage by the adults and young of some commercially important species. Increased turbidity could also have a short-term, negative impact on prey species and predation of prey species. It is not anticipated that the project would have any long-term, negative impacts on commercially important finfish, and once the construction phase is completed, finfish are expected to move back into the area quickly. Project features such as offshore reef habitat that add subtidal heterogeneity to the stone dike perimeter would have positive benefits to finfish. Further, providing connectivity between the tidal channels of the restored wetlands and deeper waters of the Bay with offshore reef habitat would enhance fisheries.

6.8.5.6 Pound Nets

Implementation of Alternative 2 would have a direct, long-term impact on three pound net locations. These three areas are situated within the project footprint and would no longer be accessible for a pound net if there was interest in actively fishing those sites. The locations of these three pound nets would need to be relocated for them to become active. Currently, no pound nets are active in the James Island vicinity. Fishing at four additional pound net sites (one to the southwest and three immediately to the east) could experience indirect, but long-term impacts from changes in currents and fishery usage of the area after the project is constructed. The remaining two pound net locations that are close to Taylors Island are not anticipated to be affected.

6.8.6 Marine Mammals

The 2009 Mid-Bay FR/EIS documented Atlantic Bottlenose dolphin sightings south of James Island and off the western shore of Taylors Island during environmental surveys. Dolphins are potentially present in the project area during warmer months (and possible as early as February). 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 (Nichols, 2005). The project is not anticipated to have any impacts on marine mammals. It is expected that marine mammals will not be present in the James Island area during the winter months when noise generating dredge activities are planned to occur. As a result, it is not anticipated that the recommended plan will have an impact on marine mammals. Dredging of the access channel and turning basin is expected to occur in winter months when dolphins are not in the area.

6.9 TERRESTRIAL RESOURCES

Beneficial, long-term impacts are expected to result from project construction associated with the restoration of 2,072 ac of terrestrial habitats, and specifically approximately 850 acres of upland habitats. Upland habitats (anything above the tide line) would benefit amphibians, reptiles, mammals, nesting birds, diamondback terrapins, and horseshoe crabs.

Implementing Alternative 2 is expected to provide long-term, beneficial impacts specifically to diamondback terrapin nesting by potentially providing new nesting habitat. Previously, diamondback terrapins have utilized the eastern shoreline of James Island. However, due to erosion, the area is no longer utilized. Short-term adverse impacts may result from the potential for increased boat traffic during the construction phase, which could disturb or strike swimming turtles.

Construction impacts to terrestrial resources are limited to installation of the utility yard on Taylors Island. Approximately, 0.03 acres of upland will be temporarily disturbed to dig a trench to bury the telecommunications/electrical supply line from the shoreline to the utility yard on Taylors Island. It is expected that the trench will be no more than 300 ft. It is expected that the trench would be ~3 to 5 ft wide and 3 to 5 ft deep, backfilled with gravel, covered with soil, and replanted. Approximately, 0.08 acres of upland will be developed into the utility yard. The utility yard will consist of a 60 ft by 60 ft concrete pad surrounded by an approximate 8 ft perimeter fence to support equipment such as transformers to connect to the mainland supply. These upland soils will be permanently covered by concrete and infrastructure.

6.10 AVIFAUNA

Some bird nesting activity was documented on the island remnants by prior surveys, in addition to resting and foraging. This habitat has been lost due to erosion. Restoring James Island through the implementation of Alternative 2 would provide a long-term, positive value to resting, nesting, and foraging birds by re-establishing habitats once used by avifauna. A long-term impact to avian species would be a loss of 2,072 ac of potential foraging habitat to waterfowl at James Island. The 2009 FR/EIS documented the expectation that construction of the James Island project would result in the loss of valuable wintering waterfowl foraging habitat due to the high abundance of amethyst gem clam. However, current surveys indicate a substantial decrease in the abundance of benthic organisms, primarily gem clam. As a result, implementation of the project is now anticipated to have a long-term, minor impact on waterfowl foraging due to the apparent reduction in resources available.

The behavior of birds within the vicinity of the James Island restoration project may be influenced by noise and nearby human activity during construction and dredge material placement. The disturbance may displace birds utilizing habitat in the immediate vicinity of dike segment construction, and the degree of impact would vary depending upon the time and location of the construction activities.

Nesting benefits for many avian species can be contingent upon levels of terrestrial predators or competition for resources with other avian species. Remote islands minimize predators and promote nesting success. However, there is potential for populations of some avian species to "take over" restored habitats at the proposed project and displace desirable avian species. A management plan will be developed to control non-target avian and other species that may be attracted to the restoration project and occupy habitats similar to those of more desirable nesting species and consuming similar resources. Instituting avian monitoring and species control plans may be a consideration for the project.

It is anticipated that a Federal Migratory Bird Act permit will be required from USFWS on an annual basis for the management of selected avian species because of predation, nuisance species, and disease outbreaks, as is the case for the Poplar Island Ecosystem Restoration Project. A permit will enable the use of non-lethal and lethal control for nuisance species, including control measures that "discourage nesting," such as breaking up nests after eggs are laid. Management actions have been needed at Poplar Island to protect planted habitat or at-risk species and would be expected to be needed at James Island. It can be expected that certain bird species will undergo a change in status from the time the sEIS is written through the life of the project, and this will be accounted for in the annual permit process.

Human visitation would be controlled throughout the construction period of the James Island project. This includes the establishment of the wetlands and uplands habitats. It is likely that after the project is completed and turned over to the local sponsor there could be both controlled and uncontrolled visitation. Visitors would likely use the dikes as footpaths. Visitation during periods such as nesting and rearing could have a potential impact to some species. Many bird species would use habitat deep in the marsh and would not be disturbed by visitors on the dike footpaths. However, some species may be disturbed by visitors using the footpaths. Appropriate signage would be installed to notify visitors of their potential impact and to advise them to avoid or use caution when near these areas.

6.11 TERRESTRIAL MAMMALS

Mammals are expected to inhabit the restored uplands and wetlands habitats. Implementation of Alternative 2 would provide a long-term, direct, positive benefit to mammals. However, mammals are not a targeted species for which to restore habitat. If required, a management plan may be implemented to control non-target species that may be attracted to the restoration project. These species may require management because they over-consume the same resources used by desirable species, or their predation on rare or desirable species is determined to be too extensive.

6.12 RARE, THREATENED, AND ENDANGERED SPECIES

No federally or state-listed rare, threatened, or endangered species were found to be present in the proposed project area during 2020 and 2021 surveys of James Island, so it is unlikely that the project would detrimentally affect any listed species. NOAA-NMFS communicated their determination that the project will not affect resources under their management (Appendix C1). USACE is in compliance with USFWS mandates and procedures for the James Island restoration project. USFWS has communicated that a biological assessment (BA) is not needed as there are no species under their purview in the project area (Appendix C1). USACE has made a determination of not likely to adversely affect (NLAA) for species managed by USFWS. USACE will request concurrence on this determination during agency review. Implementation of Alternative 2 has the potential to have long-term beneficial impacts on saltmarsh sparrow, least terns, and bald eagles once habitats are restored.

6.13 AIR QUALITY

Construction and placement activities would produce emissions due to boat activity and use of gas-powered construction equipment and vehicles. A greenhouse gas emissions analysis has been completed (Appendix C5). Some potential for suspension of particulates exists during filling/grading activities. As the dredged material dries and is subjected to wind, lighter materials may become airborne. These are expected to be short-lived events with no significant impact on air quality. Once the island is revegetated and the soils stabilize, the potential for airborne particulates would be minimized. Impacts to air quality from dike construction and material placement are, therefore, expected to be localized and short-term. Dorchester County is not in a non-attainment zone for either ozone or particulate matter (2.5). Therefore, no long-term impacts on air quality are expected and no further consultation is needed for air quality compliance.

6.13.1 Greenhouse Gas Emissions

The generation of greenhouse gas (GHG) emissions resulting from implementing the project (Alternate 2) were estimated and documented in Appendix C5. Operational hours of equipment by year were utilized in conjunction with a 2023 GHG emission estimate for the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island to generate a GHG estimate for the James Island project. The Poplar Island GHG assessment calculated emissions from known fuel use in calendar year 2022 (construction year 2024) for various sources of emissions: mobile, stationary combustion, refrigeration, and electricity for construction and operations and maintenance activities on the island. The Poplar Island GHG assessment computes emissions in CO_2 equivalency for emissions stemming from the production of carbon dioxide, methane, and nitrous oxide. Poplar Island provides a comparable estimate to James Island for mobile source emissions as both sites have equipment lists and operational hours which are closely aligned. Poplar Island GHG emissions for stationary combustion, refrigeration, and electricity also serves as a reasonable proxy as there will be similar needs for these sources to implement restoration activities on James Island as are present on Poplar Island. However, a similar equipment list and operation hours for these non-mobile sources is unable to be formulated for James Island at this stage. As a result, the non-mobile emissions from construction year 24 for Poplar Island were applied to each year for James Island. This is a conservative estimate given that there will be some years in the beginning of the project that do not produce these emissions because it will take a number of years to fully establish the island's infrastructure.

The emissions for the 50-year service life would cover O&M activities. The emissions produced in construction year 43 were assumed to represent emissions generated from O&M activities that would occur annually through the 50-year service life. For the calculation, the emissions from construction year 43 of James Island were adopted for annual emissions throughout the 50-year service life.

Poplar Island is in its 24th construction year. An assumption was made that construction will progress at a similar pace for the James Island project as it did for the Poplar Island project; i.e. the emissions calculated from fuel usage at Poplar Island in 2022 (Construction year 24 at Poplar Island) are a realistic representation of the level of effort expected at James Island in construction year 24 (FY2048). Therefore, the combined GHG emission estimate (mobile, stationary combustion, refrigeration, and electricity for construction and operation and maintenance activities) from Poplar for 2022 was assigned to construction year 24 (FY2048) for James Island. Mobile GHG emission estimates were then generated for all other construction years based on a ratio of the equipment hours between each year and those of the 24th construction year plus the non-mobile emissions. This provided an expected range of mobile GHG emissions for the project over the project lifetime based on the annual hours of effort estimated. The non-mobile emissions were added to this calculation to estimate full emissions in each year.

GHG emissions were estimated for the 43-year construction phase and the following 50-year service life. It is estimated that the construction phase would generate a total of 33,470 metric tons (MT) of CO_2 equivalency over the 43 years. In each year of the 50-year service life, a generation of 362 MT CO_2 equivalency is estimated for a total emission of 18,079 MT CO_2 equivalency. Across the construction and service life (93 years), a total of 51,549 MT CO_2 equivalency are estimated to be emitted, ranging from 271 to 1,297 MT CO_2 equivalency annually with an average of 554 MT CO_2 equivalency per year.

Various factors could lead to increases or decreases in these projected numbers. There are a number of years (2035 – 2052) where equipment is identified in the projected effort without associated operational hours. Therefore, there are unaccounted GHG emissions associated with that equipment above the estimate calculated. Further, the James Island project is larger than Poplar Island. The quantity of dredged material to be placed in any given year is the same between the two projects. Therefore, the larger size of James Island equates to a longer duration of construction and associated emissions.

EPA's Greenhouse Gas Equivalencies Calculator projects that the average estimated emissions (554 MT CO_2) would be similar to operating 132 gas-powered vehicles for one year or the energy consumed by 69.8 homes for a year (EPA, 2023i). Running 0.154 wind turbines for a year or preserving 3.7 acres of forest would offset these emissions.

USACE and MPA will continue to evaluate implementing measures to reduce emissions such as using low sulfur fuel or clean diesel, limits on unnecessary idling, and diesel controls such as particulate filters, diesel oxidation catalysts, the use of electric equipment, and the generation of energy through renewable sources (such as solar) throughout the construction phase. Towards reducing project-generated emissions, it is also expected that there would be technological advances made over the course of the project that would result in emission reductions over the 43 years of construction at James Island that would contribute to reduced GHG emissions compared to current emission projections.

For further perspective, Maryland's 2017 GHG emissions were approximately 80.14 million MT of gross CO_2 (MDE, 2021), reduced 25.8 % from 108.06 million MT of gross CO_2 in 2006. The State of Maryland has a goal to achieve a minimum of a 40% reduction in statewide GHG emissions from 2006 levels by 2030. Maryland's targeted reduction is higher than the United States' international commitment under the Paris accord to reduce emissions by 26 – 28% by 2025. The project's annual contributions are a very minor percentage of statewide emissions.

This estimate does not include emissions generated by transportation of the dredged material to the restoration site as transportation of the dredged material to a placement (disposal) site would occur with or without the proposed project. With respect to transportation-generated emissions, the No Action Alternative is expected to produce the highest emissions. If the dredged material were not beneficially placed at James Island, the material would likely be transported much further to the ocean and dumped offshore, as ocean placement is the federal standard. In comparing transportation-generated emissions between James Island and Poplar Island, James Island does constitute a further trip (approximately 30 miles) for placement of material from the approach channel but would be a shorter trip for any material dredged from federal channels south of James Island. James Island is substantially less distance for placement than the No Action Alternative where the material would be placed in the ocean, a distance of at least 150 miles. There are no other placement sites within the Bay that have the capacity for the quantities of material generated on an annual basis from federal channels. Further, existing placement sites are committed to receiving material from designated channels. For example, Cox Creek and Masonville are for material dredged from within Baltimore Harbor, and the Wolf Trap Alternate Open Water Placement Site is for material dredged from the York Spit Channel. There will be ongoing creation of dredged material from maintenance of federal navigation channels. This project provides for new alternatives to avoid ocean dumping.

6.13.1.1 Carbon Sequestration

Estuarine wetlands sequester carbon which serves to maintain elevation in the face of sea level rise. Carbon sequestration also provides a positive offset for GHG emissions generated by the project. Staver et. al. (2020) estimated the annual carbon burial from a Poplar Island wetland is 206 g C m^{-2} y^{-1}. Assuming the Poplar Island sequestration rate is applicable to wetlands restored at James Island, the 1,140 acres of wetlands at James Island have the potential to cumulatively sequester 141,612 g CO_2 equivalent over the combined 43-year construction period and 50-year project service life. Assumptions made to quantify the carbon sequestration potential for the James Island wetlands are:

1. Based on the 2009 FR/EIS (USACE, 2009), of the 1,140 wetlands acres planned, 1,044 acres will be functioning wetlands habitat. The remaining 96 acres are dike and slope. The carbon sequestration estimate is based on the 1,044 acres of functioning wetlands habitats.
2. The sequestration rate determined for Poplar Island wetlands is representative of the rate of carbon sequestration to be expected at James Island.

3. It will take 5 years to complete each wetland complex and 10 years between completion of the first wetland complex (South) and the second wetland complex (Central). The final complex (North) will not be completed until the last 5 years of the project as it is also serving as a sand staging area.
4. The South wetland cell will be restored first. Planting will begin in 2040 and planted wetlands are projected to start to provide benefits in 2045. The Central wetland cell will be restored second starting in 2050 with planted wetlands beginning to provide benefits in 2055. The North wetland cell will be restored last at the end of the construction period beginning in 2063 and begin providing benefits in 2068.

Table 22 summarizes the carbon sequestration calculation for the James Island wetlands. Once wetland habitat begins to become functional, the annual carbon burial for the project ranges from 1,024 to 3,190 MT CO_2 equivalency depending on how many wetland complexes have been completed. The cumulative carbon sequestration estimate from wetlands restoration (141,612 MT CO_2 equivalency) exceeds the project's estimated GHG emissions (51,549 MT CO_2 equivalency) (Section 6.13.1 and Appendix C5) across the construction and service life periods while providing plenty of additional capacity to offset uncertainties in the emissions calculation. Additionally, the forests restored in the uplands and oyster reef habitat restored in the waters along the perimeter of the island have the potential to further sequester carbon.

Table 22. Carbon Sequestration Estimate for James Island Wetlands

Wetland Cell	Area (ac)	Date planting starts	Year wetlands complex comes 'on-line'	Carbon burial (g C/m^2/y)	Metric Tons Carbon (MT C)	MT CO_2 equivalent	Years of sequestration value	Cumulative CO2 equivalent sequestered (MT CO_2 equivalency)
North	350	2063	2068	292,078,721	292	1,071	50	53,548
Center	358	2050	2055	298,731,273	299	1,095	62	67,912
South	335	2040	2045	279,169,602	279	1,024	72	73,701
TOTAL	1,044							141,612

6.14 NOISE

6.14.1 Noise Transmitted Through Air

The highest *sustained* sound levels (above water) generated by construction and dredged material placement at James Island are likely to be around 90 A-Weighted Decibel (dBA) at 50 ft. This sound level represents several pieces of heavy equipment (e.g., dump trucks, dozers, compactors) working simultaneously near one another. Although sound transmission depends on many factors including air temperature, wind and atmospheric conditions, a standard sound transmission model that factors attenuation over water, molecular absorption, and analogous excess attenuation, can provide estimates of sound transmission under average or typical atmospheric conditions. Using that model, a 90-dBA sound is estimated to decrease to typical daytime neighborhood background levels (55 dBA) within 3,200 ft of the sound source. The 55 dBA standard is typical threshold level for noise regulation in rural areas. Geographic Information System (GIS) analysis results during feasibility determined that no parcels fall within 3,200 ft of the proposed island perimeter indicating that few if any people would notice these sounds under typical conditions. The closest land mass, Taylors Island, is 3,300 ft from the southeastern corner dike of James Island at its closest point. There would be no impacts to conditions within Blackwater National Wildlife Refuge. This noise zone also does not extend into the recreational areas used by most boaters.

Of the activities associated with island construction, back-up beepers create among the highest periodic sounds and their sound level can vary from 85 – 110 dBA at 50 ft. The placement of rock during initial phases of construction would also be in this sound range. These activities generally occur during daytime hours. A sound at the 110-dBA levels would be expected to attenuate to daytime background levels within about 10,000 ft of the source under typical atmospheric conditions. GIS analysis during feasibility (and confirmed to still be accurate) indicated that about 12 improved waterfront parcels and 17 improved non-waterfront parcels (agricultural, residential, and commercial) fall within this range of the proposed project perimeter and thus are likely to be affected by elevated sound levels during certain construction phases. Because sound is attenuated more rapidly over land by vegetation and structures, the sound reaching the 17 parcels that are not on the waterfront would most likely be attenuated below background levels under typical conditions. Several unimproved waterfront parcels on the northern edge of Taylors Island have the potential to be developed, suggesting that the future population affected by sound could be marginally higher. This zone of periodically elevated sound levels also extends west of the island over a major portion of the neighboring recreational fishing area.

Some sound-generating activities would occur day and night such as movement of tugs and barges and operation of pumps. These activities are associated with inflow and therefore would persist for the duration of the project development. Inflow is likely to occur only from October to March, so these effects are expected to be seasonal. Noise levels during dredging and inflow-related activities have the potential to be the most disruptive to adjacent neighbors based on experience from the PIERP project. Sound levels associated with these activities would be in the range of 82 dBA for barges, 81 dBA for generators used to power lights, and 76 dBA for pumps. These sounds would combine into the equivalent of a single source generated of 85 dBA at 50 ft. That sound level was estimated to be attenuated to a nighttime background level of 40 dBA in about 6,000 ft. Four improved parcels and four unimproved parcels on Taylors Island are within this range of the project. Table 6-6 in the 2009 Mid-Bay FR/EIS shows estimated duration and time of noise levels at James Island with numbers based off the typical noise conditions of restoration at PIERP (UMCES, 2004).

Generally, noise impacts associated with the restoration at James Island would be minimal and not interfere with activities to communities on the mainland. The loudest sounds would be periodic or of relatively short duration. Occasionally, sound levels at 10 – 20 nearby waterfront residences or businesses may exceed levels typical to quiet, suburban neighborhoods. During times of the year when residents are primarily inside (coincides with fall and winter inflow operations), the sound levels should not be noticeable by residents (UMCES, 2004).

The potentially significant effects would be to recreational boaters and the three closest improved parcels on Taylors Island (approximately one half a mile from James Island). Recreational boaters that typically use areas west of the island may be disturbed by the periodic sounds, particularly during dike construction, which would exceed typical ambient sound levels. Raised sound levels may also periodically disrupt recreational use of James Island by the three landowners or their guests. Three residences on Taylors Island may notice elevated nighttime sound levels when outside their homes or when windows are open. However, these sound levels would typically be in the 40 – 45 dBA range and not considered very loud. In addition, the sounds heard at night (associated with material inflow) would not tend to vary greatly in pitch or volume and therefore would not be among the most annoying types of sounds (UMCES, 2004).

Sound levels associated with sustained activities (e.g., operation of vehicles, pumping of dredged material) would generally not be noticeable to residents or boaters. Once the restoration project is complete, the occasional boat traffic that might be associated with limited visitation to the island would be consistent with pre-existing sound levels. Crew boats in and out of the land-base also has the potential to cause noise disruptions to local communities. Because the areas of noise disturbance do not extend far inland, any future residential development of unimproved or agricultural parcels in the vicinity should not have a significant effect on the number of people affected by noise (UMCES, 2004).

Boat sound and traffic at the completed project is not expected to be any greater than pre-construction levels. The project is not located near a populated area, and it is unlikely that it would become a popular weekend boating destination due to population levels and focused project goals to restore remote island habitats. Waters to the east of the project are shallow and although the water to the north and west is deep it is exposed to a wide fetch. Additionally, the toe-dike on the north, south, and west sides would extend approximately 100 ft from the center of the dike thereby making the project inaccessible by boat.

6.14.2 Underwater Noise

Project-related underwater sounds would be produced from placement of stone, dredging, and placement of dredged material. Stone and sand placement for dike construction is expected to occur year-round. Dredging and placement of dredged material would be restricted to winter months. Sound associated with placement of the stone includes vessel engines, crane operation, and the stone entering the water column and landing on the bay bottom or other stones. Sound associated with 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 sound 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 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. Project sound would be generated 24 hours a day while dredging and in-flow is occurring. These activities are expected to be limited to winter months. Water depth and the type of material being dredged will also affect sound 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 et al. 2019) and will dissipate with distance from the dredge. Sounds from dredging are expected to be similar to other anthropogenic sound sources at James Island that contribute to ambient sound in the area such as large vessels (shipping container traffic) and small boat traffic.

6.14.3 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 sound influences fish and other marine animal behavior, resulting in changes in their hearing sensitivity and behavioral patterns (Richardson et al., 2013). 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 (Popper et al., 2014). Changes in vocalization behavior, breathing and diving patterns, and active avoidance of sound sources by marine life have all been observed in response to anthropogenic sound (Earth Island Institute, 2002).

Underwater ambient sound levels have not been identified for the James Island area but would be typical of mid-Chesapeake Bay estuarine habitats. Underwater sound levels can vary with time of day, weather, tide, season, and other factors (e.g. see Wenz 1962). Ambient sound sources could include biological sources (e.g., birds, marine mammals) and anthropogenic sources such as from vessels and aircraft overflights (Wenz 1962).

Terrestrial and avian species are not expected to be affected by project sound 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 sound. Sea turtles are not expected in the project area. Dolphins have been sighted in the area, as transient species in warmer months. Noise generated from the project will be non-impulsive (continuous or intermittent sounds such as drilling or an engine running). Dredging and inflow of dredged material is expected to occur in the winter months when dolphins are not in the area.

Aquatic species including fish and invertebrates could be negatively impacted by increased sound levels during construction. 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 sound 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; OSPAR 2009a). The sensitivity of fish to underwater noise is differentiated between hearing generalists and hearing specialists (Popper et al., 2014). 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 (Popper et al., 2014). 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 2020 – 2021 identified some specialists such as red drums, Atlantic croaker, and hogchokers. Permanent hearing loss is not expected to occur as a result of project-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 sound generated from the dredges utilized for the Barren Island project are expected to exceed the SLs in the Nedwell et al. (2008) study 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. If fish left the project vicinity to avoid the sound, they would be expected to find similar adjacent habitats.

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 and project-generated sound 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 sound on invertebrates, and none were identified that focused on dredging sound (Suedel et al. 2019). Wale et al. (2013a) studied the effects of shipping sound 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 sound 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 sound 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 sound), 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 sound (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 sound-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. However, many aspects of the project would be carried out year-round, and effects cannot be minimized by conducting the activity in the fall/winter. Due to the long-term construction effort required for the project, it is expected that animals would either leave (or never enter) the area to avoid the increased sound or become accustomed to the altered background levels.

6.15 LIGHT

Lighting at PIERP was used as a model for analyzing potential light impacts associated with the recommended plan at James Island. Many light levels are specified by OSHA regulations and are therefore, not flexible. The brightest lights used at PIERP are shielded to direct light downwards toward operations, so glare does not typically reach nearby residences or affect boaters. Brightness of navigation lights are mandated by the Coast Guard and are typically designed to be visible for 2 miles. Per US Coast Guard Navigation Rules and Regulation, lights on barges must be visible for 3 – 5 miles depending on size and mast lights should be visible from 360° when boats are at anchor, such as when offloading dredged material. Light trespass from PIERP has been an infrequent source of complaints by neighboring residences. Most waterfront homes on the mainland adjacent to James Island are at least as far from the proposed site construction as waterfront homes nearest to PIERP, so light impacts can be expected to be similar.

Similar to PIERP, a noticeable increase in nighttime light at James Island would be limited to when work occurs 24 hours a day. Specifically, nighttime activities could occur during the sand dredging portion of the construction phase (but is unlikely) and during the material inflow (in winter months). Dredging and inflow-related operations are limited to winter (typically October to March). During those times, scows, vessels, and island operations would be lit. Light from these activities is likely to be visible for many miles. The inflow activities use the highest power bulbs of any project activity. These lights are raised to roughly 30 ft above sea level and have the potential to be seen over 10 miles away by an observer at 15 ft above sea level, under very clear atmospheric conditions (UMCES, 2004). With the turning basin and bulkhead positioned on the northwest of the project, some lighting is anticipated to be shielded from view by the island itself.

The duration of nighttime activities varies. Sand dredging would occur in the beginning of the project and then on and off until a stockpile area can be established, while inflow activities occur seasonally once initial construction is complete. Sand dredging could occur 24-hours a day, but typically is conducted during the daytime. Light impacts associated with these phases of activity would be temporary and seasonal. These operations typically use lights that are shielded, so glare should be minimal and would not be expected to reach residences. If lighting is a concern to neighbors, efforts could be undertaken to redirect light fixtures or shade the light on unshielded fixtures. This would not be an option for vessel lighting due to Coast Guard safety regulations.

A minor increase in nighttime light associated with illumination of some permanent facilities at James Island is likely to occur over the long-term. Structures (docks, piers, breakwaters, channels) are required to be lit temporarily during construction either by floodlight and/or by Federally maintained aids to navigation. Any water-related structures remaining after construction are likely to be permanently lit by aids to navigation or low-intensity lighting (e.g., for piers). Low-intensity lighting is not anticipated to be viewable from the adjacent shoreline. Facilities constructed on the island are not typically lit overnight. Additionally, marking the uncharted, restored James Island with aids to navigation would be a courtesy to watermen and recreational boaters in the area. These navigation lights may be visible at nearby residences but would be consistent with existing lights in the waterway.

In summary, implementation of Alternative 2 would introduce additional nighttime light to the project areas during the construction and inflow phases. The group primarily affected by this increased lighting would be the waterfront homes near the project, and any impact would depend on their perception of these increased light levels. The closest land mass, Taylors Island, is 3,300 ft (~0.63 mi) from the southeastern corner dike of James Island at its closest point. Residents would be at least that distance, and likely even further, from any new light sources. In addition, the unloading facility is on the western shore of the project which would further extend the distance from residents and be shielded from eastern view by the restored island. Evidence from Poplar Island suggests that lighting would be considered tolerable to those in support of the project. Permanent lighting of structures on James Island or aids to navigation used to mark the project would be comparable with existing lighting in the area. Therefore, long-term, direct lighting impacts are expected, but are anticipated to be minimal.

Increased lighting also has the potential for negative impacts to wildlife, particularly during nesting and migration. It is expected that most lighting would be restricted to winter months during dredging of the access channel and turning basin and dredged material inflow. Concerns with light impacts to bird migration is largely associated with lights pulling birds off course and into developed areas. This is not an issue related to this project as the project is within the Atlantic Flyway where birds are migrating. Lighting concerns during the winter would not impact nesting activity. Lighting concerns are not isolated but occur in tandem with other general construction-related impacts. The duration of different nighttime activities will vary based on specific construction activities. Sand dredging could be continuous, while inflow activities occur seasonally once initial construction is complete. Therefore, light impacts associated with these phases of activity will be temporary and seasonal, respectively, but limited by the concentration of related activities in winter months. Sea turtles wouldn't be in the project area during the wintertime to be affected by any night operations.

Lights can be shielded to direct light downwards or toward operations to limit glare. Throughout the project there will be ongoing coordination with wildlife experts and project partners (similar to PIERP efforts) to ensure that impacts to wildlife during construction are minimized and that after construction there will be no more impact. Negative light impacts from PIERP on wildlife have not been identified as a concern over the course of that project. Lessons learned from Poplar efforts will be incorporated throughout the construction period. If light issues arise for a certain species, adaptive management and coordination with resource agencies will be utilized to minimize or eliminate impacts.

6.16 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

The restored island would serve primarily as wildlife habitat and no other uses besides passive recreation is anticipated. There have been no findings of HTRW on James Island and there is no reason to suspect that James Island contains HTRW that would in any way influence the proposed restoration projects (USACE, 2003). The proposed restoration projects are not expected to pose any significant environmental liability concern. The dredged material to be placed at James Island is not expected to be a source of HTRW, but monitoring would be conducted to confirm. 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 at James Island. The project will comply with any requirements included in the WQC or TWL.

Munitions of explosive concern (MEC) may potentially be found in areas of the Chesapeake Bay as a result of historic or ongoing military activities. Therefore, the possibility exists that MEC may be found in dredged material and deposited through normal dredged material placement methods similar to occurrences at Hart-Miller Island (HMI). At HMI, MEC had been sighted in the immediate vicinity of hydraulic inflow pipe outlets after surface material has begun to dry. Generally, such MEC has consisted of a few hand grenades or small caliber shells. There was one occurrence of a hand grenade at Poplar Island approximately 20 years ago. While MECs are not expected at James Island, there may be MECs in dredged materials from the Chesapeake Bay. If a suspected MEC was to be identified in dredged material place at James Island, it would be investigated and cleared by qualified explosive ordnance disposal (EOD) personnel, normally from the county bomb squad.

To implement Alternative 2, fuel tanks would need to be placed on James Island for fuel storage during construction. A permit would be obtained for a fuel farm from MDE and all recommended safety measures will be followed.

6.17 IMPACTS TO PROTECTED AREAS

6.17.1 Navigation and Navigable Channels

The implementation of Alternative 2 would provide a long-term, direct, positive benefit to navigable federal approach channels to the Port of Baltimore by providing a beneficial use for the material removed from these channels to maintain their authorized depths. The project would have no impact on other navigable channels but would add a navigation channel for access to the project off the northwest corner of James Island. Commercial shipping traffic for Baltimore Harbor utilizes a shipping channel in the central portion of the Chesapeake Bay. The project footprint at James Island is located outside of the main Bay channel. Some impacts to commercial shipping may result from increased barge traffic in the shipping channel transporting dredged material to each of the project sites; however, both projects are expected to beneficially impact commercial navigation by providing a destination for material dredged out of the Baltimore Harbor approach channels.

The James Island restoration project would likely displace popular game fish and crabbing areas for watermen requiring watermen to navigate around the project to reach other fishing grounds. Implementation of Alternative 2 will necessitate waterway users to travel around the project to reach the Bay mainstem. This is estimated to increase transit by 1 to 1.5 miles. Increased barge traffic servicing dike construction and bringing dredged material to the project would affect local watermen. The area used by construction vessels such as tugs, and barges would be well-marked during the construction phase, and any fishing gear placed within them would be destroyed by vessel traffic. For comparison to Poplar Island, the James Island project is planned to receive 90 – 95 MCY of dredged material over the course of the project. Poplar Island has received 45.3 MCY to date since 2001 and is planned to receive 68 MCY in total.

6.17.2 Coastal Zone Management

Alternative 2 is located within the coastal zone, which is managed under MDNR's Coastal Zone Management Program. Although construction of the island habitat restoration project would displace shallow water habitat, which is protected under the Coastal Zone program, beneficial impacts from the proposed action is consistent with other goals of the Coastal Zone Management Program. The Coastal Zone Management Program includes goals to protect coastal land and water habitat. Restoring James Island is expected to provide some degree of protection to the protect exposed portions of the mainland shoreline along the Eastern Shore within the shadow of James Island from further erosion. As documented in the 2009 FR/EIS (Section 6.3.1), it is estimated that the proposed project would reduce the maximum wave height near the shore in the lee of James Island by as much as 2 ft which will contribute to reducing shoreline erosion.

A Federal consistency determination in accordance with 15 CFR 930 Subpart C has been made stating that the recommended plan is consistent with the enforceable policies of the State of Maryland's federally approved coastal management program. In a letter dated July 9, 2024, MDE confirmed the project to be consistent with the enforceable coastal policies of the Maryland Coastal Zone Management Program, subject to three conditions: 1) USACE/MPA will maximize the inclusion of NBS to the extent practicable and continue to coordinate on the project with resource agency partners, 2) the project will obtain a Tidal Wetlands License, and 3) the project will not result in adverse impacts to water quality (Appendix C1).

6.17.3 Coastal Barrier Resources Act

James Island is not within the jurisdiction of the Coastal Barrier Resources Act.

6.17.4 Critical Areas

James Island was designated as a Resource Conservation Area under the Critical Area Law in the 2009 Mid-Bay FR/EIS. Current conditions of the remnant islands have significantly eroded since the completion of that report. Beneficial impacts from the proposed project would replace and increase the total acreage of habitat that has been lost from the erosion of James Island.

6.17.5 Floodplains

In 2009, the majority of James Island was classified within the 100-year floodplain. As of 2023, the remnants of James Island have been eroded and submerged. Project construction would create land located in the floodplain at James Island. Executive Order 11988 was taken into consideration for this project, although the project requires construction of a beneficial use project in an area that was once a 100-year floodplain. With the Federal government being self-insured, flood insurance is not necessary for the Mid-Chesapeake Bay project and a variance to the County's Floodplain Management Regulations is not applicable.

6.17.6 Wild and Scenic Rivers

No water bodies with a "Wild and Scenic River" designation are located in the vicinity of the James Island project area. Therefore, no impacts are expected to water bodies with Wild and Scenic River designations as a result of this project.

6.18 IMPACTS TO CULTURAL AND ARCHAEOLOGICAL RESOURCES

Cultural resources investigations have been undertaken in accordance with Section 106 of the NHPA of 1966, as amended, through 2023. These have included Phase I and Phase II surveys to assess the presence of cultural resources within the APE. No submerged shipwrecks or craft have been documented within the APE; however, buried paleochannels have been recorded within the proposed access channel and turning basin. Although no cultural material has been observed or recovered, these locations could have provided a suitable landscape for past human occupation. In consultation with the MHT and other consulting parties and given the conditions of low visibility and preservation potential along the buried paleochannel margins, an archaeological monitoring program will be implemented during dredging for the proposed access channel and turning basin. Following review of the draft sEIS, the programmatic agreement was revised to include the electrical/communications cable pathway and utility yard construction on Taylors Island. The Programmatic Agreement is provided in Appendix A5.

Additionally, the proposed project will not have an effect on any of the four previously recorded archaeological resources. These sites have suffered a loss of integrity from the erosion of James Island's historic footprint.

6.19 IMPACTS TO SOCIOECONOMIC RESOURCES

6.19.1 Future Land and Water Use

Changes in land use patterns could affect the level of potential impact of the Island restoration and project. Residential trends in the vicinity of James Island do not show high growth rates for either area. Most of the shoreline with views of both Islands is already developed, although the potential for increased density of development is possible. In The Neck County Subdivision at Taylors Island near James Island, some open agricultural areas have the potential to be converted to residential uses and Madison County Subdivision has experienced some residential development.

The proposed project is projected to affect wave heights impacting shorelines in the project vicinity. The future without-project wave heights near the shore in the lee of James Island are similar to the existing condition, with small increases in height over limited area. James Island is relatively far from the shore, so the impact of the proposed island alternative on the shoreline is relatively small. It is estimated that the proposed island would reduce the maximum wave height near the shore by as much as 2 ft. No increases in wave height along the shoreline occurred due to implementation of the no action alternative.

6.19.2 Employment and Industry

The statewide economic impacts of dredging, material transport and placement, island restoration, and site maintenance and monitoring at James Island are expected to be approximately $1.1 billion over 43 years and create approximately 8,000 direct person-years of employment over the life of the project. After multiplier effects are considered, this spending is expected to generate approximately of 18,500 total person-years of employment in Maryland. Project spending creates direct impacts associated with the project itself, but this spending also generates indirect impacts or multiplier effects that are associated with purchases and sales by businesses that supply inputs to businesses that are directly impacted by project spending. Businesses unrelated to the project may also benefit as increases in household incomes that result from direct and indirect economic impacts generate additional consumer spending and induced impacts. Total (direct, indirect, and induced economic benefits) statewide business sales are expected to generate $2 billion in direct business sales in Maryland over the life of the project (UMCES, 2006).

The analysis shows that because of the imported inputs and labor, about half of the positive economic impacts associated with spending on dredging and material placement in Maryland are transferred outside the state. Analytical results also show that the use of dredged material to restore a Mid-Chesapeake Bay Island would generate economic long-term positive impacts that would last approximately 40 years from the time of initial site selection, through site development and construction, material placement, and site operation and restoration. Economic impacts would persist beyond 40 years as a result of long-term commitments to site monitoring and maintenance (UMCES, 2006).

Due to purchases of labor and inputs from elsewhere in Maryland and from out-of-state, Dorchester County would experience few direct economic impacts associated with dredging and material transport activities. However, the county would experience local economic impacts associated with material placement and transport activities that would involve work crews being stationed at nearby James Island, and a significant share of economic impacts associated with habitat restoration work and long-term site operation, monitoring and management.

The analysis at Table 6-13 in the 2009 Mid-Bay FR/EIS shows that, of the $1.1 billion in overall project spending over 43 years, approximately $549 million would be spent in the vicinity of the James Island restoration/placement sites on site construction, management, and monitoring. A significant amount of the indirect and induced economic impacts of local spending would be transferred outside the region because of the need to import labor and material to the restoration sites.

However, direct spending on the project is expected to generate nearly 3,000 person-years of employment in Dorchester County over the life of the project. After considering multiplier effects, the total number of Dorchester County jobs created by spending on the project, including new jobs for existing county residents or those who would relocate to Dorchester County, is estimated to be approximately 6,000 total person-years of employment over the 43-year life of the project, if the entire amount is spent within the county. If spending were spread over a larger economic area, jobs would shift to other counties within the area. Local multiplier effects of direct spending on James Island restoration are expected to result in indirect and induced spending of approximately $750 million over the life of the project (UMCES, 2006).

6.19.3 Economic Impact to Aquatic Resources

The impacts on commercial fisheries of Island restoration projects are associated with potential changes in the fishery resource, such as changes in the abundance, availability, or catch per unit effort, of fish. In addition, potential impacts on fishing operations are reflected by changes in travel time, searching time, or fishing time associated with the restoration projects. During development of the recommended plan, the project partners maintained a dialog with commercial fishermen to minimize any impacts caused by the projects. Details of the meetings and coordination are captured in Appendix G of the 2009 Mid-Bay FR/EIS. Additional public outreach efforts have been conducted during the design and construction phases as summarized in Section 8.1.2.

6.19.3.1 Soft-shell and Razor Clam Fishery

The soft-shell clam and the razor clam are the two commercially important clam species in the Chesapeake Bay. However, the soft clam has shown dramatic declines in catch and value in the vicinity of James and Barren Islands and bay-wide, over the past seven years. Dredging studies near James and Barren Islands show the densities of both soft and razor clams within either footprint are well below commercially harvestable levels.

No evidence suggests that clam densities would rise, so the level of future impact cannot be estimated. In summary, due to the lack of commercially productive beds and the low value of the potential catch, impacts on the commercial clam fisheries from restoration project at James Island and the restoration/protection at Barren Island appear to be negligible.

6.19.3.2 Oyster Fishery

The areas around James Island are not currently commercially productive for oysters although they have been productive in the past. As documented in Section 6.8.5.2, the project will have a direct, long-term, negative impact of the James Point bar. Harvesting of this bar will be disrupted in the short-term during dredging activities, but in the long-term due to loss of approximately 99 acres of bar. Further, potential adverse short-term impacts to any existing oyster beds in the area could result from suspended sediments caused by dike construction. Although, based on preliminary surveys, substantial amounts of shell are not anticipated to be generated by the dredging of the access channel and turning basin, USACE will continue to work with resource agencies to investigate how any recovered shell could be set aside and used in restoration efforts. The incorporation of reef habitat into the design is expected to enhance oyster resources in the area (See Reef Technical Memo in Appendix A6.

Sediment transport from the modeled hurricanes and northeasters is not anticipated to negatively impact NOBs at James Island. Modeling results propose minimal reductions in sediment accretion at James Island (monitored points 2 and 3), but no erosion or accumulation.

6.19.3.3 Blue Crab Fishery

Based on interpretation of the crab surveys at James Island, most of the proposed footprint of the habitat restoration project is productive commercial crabbing area (USACE, 2009b). An estimated 1,900 ac of productive crabbing area would be displaced by the restoration project. The largest impact would be to the commercial crabbers who harvest the waters within the proposed project area and therefore would have to relocate their operations. Depending on the area they relocate to may increase fuel and equipment expenses if longer travel time is necessary to access the new location. The associated impact on the blue crab fishery would depend on the current productivity of the displaced area and the ability of crabbers to shift pots to new locations. Adverse impacts to crab abundance are not expected, as there would be no effect on spawning and critical habitat areas at James Island. Restoration of wetlands and reef habitat is anticipated to benefit blue crab resources in the project area. There also could be beneficial long-term impacts on crab abundance if SAV beds increase, providing increased blue crab nursery habitat. This would suggest the projects should have a negligible impact on catch rates and expected economic returns from crab fishing, as both crabs and waterman relocate to nearby areas. Due to the higher concentration of crabs in these nearby areas, catch rates may slightly increase (crab catch per ac), but increased fishing pressure in these areas (pots per ac) may offset these beneficial impacts. Based on evidence that the project would not affect crab abundance, it is expected that the economic impacts of the project on crab fisheries would be negligible. The inclusion of offshore reef habitat is anticipated to benefit juvenile blue crabs by providing refuge from predators, which could benefit crab resources in the project area over time.

6.19.3.4 Finfish Fishery

The James Island restoration project is expected to result in short-term negative economic impact on the finfish fisheries during site development, followed by long-term positive economic impact. During initial site development, the placement of rip-rap and other construction activities may disturb both bottom sediments and water quality, causing increased turbidity. Also, construction activities may cause small, but unavoidable conflicts between equipment involved in site construction and fishermen as they travel to and from fishing areas and set gear. These impacts would be temporary and would subside once construction ends. After construction, there would be long-term beneficial impacts as the island habitats develop and provide improved fish habitat and fishing areas and reduce turbidity in nearby fish habitat areas.

At James Island, 2,144 acres of marginal to degraded sand and mud bottom fish habitat would be converted to project features and 324 acres would be temporarily impacted (Table 21), however this area is abundant regionally and is not expected to result in any decline in fish abundance, as most impacted fish populations are expected to find suitable alternative habitat nearby. The loss in the quantity of bottom fish habitat is expected to be offset somewhat by improving the quality of nearby fish habitat by reducing turbidity and providing underwater habitat structure in the form of rock reefs. Some commercial species may become more abundant as a result of the expected reestablishment of SAV beds, which provide nursery habitat, due to the wave and erosion-control that is expected to be provided by the restoration projects. Also, the restored wetlands would provide nursery habitat for some important commercial species. This is expected to be a long-term beneficial impact on commercial catch rates for some species.

At James Island, there would be impacts to non-active pound net sites, but not active point nets. Pound nets #443 and #740 are located within the proposed eastern dike.

The establishment of offshore reef structures would provide a number of benefits to fishery resources. Reef structures would provide structural habitat for fish and benthic organisms where none currently exists; provide foraging, reproduction, and nursery habitat for resident finfish; provide foraging habitat for transient species; provide a connection from deeper water into island tidal inlets and marsh; increase primary and secondary benthic production to increase the complexity of trophic structure and provide for energy transfer to higher trophic levels; provide heterogeneity along the long, straight reaches of the containment dike; and be expected to provide attractive areas for recreational fishing. All of these services could have positive benefits for the finfish fishery.

6.20 IMPACTS TO ENVIRONMENTAL JUSTICE

No environmental justice candidate communities were identified in the immediately adjacent vicinity of the James Island restoration project area, although EJ communities do exist within Dorchester County, which is defined as the Unit of Geographic Analysis. Cambridge, MD within Dorchester County was identified by CEJST as disadvantaged, and therefore applicable to the Justice40 initiative. Cambridge, MD is approximately 15 miles to the northeast of James Island inland on the Delmarva Peninsula. The project is unlikely to have disproportionately high and adverse human health or environmental effects on communities within the Unit of Geographic Analysis. The project is located offshore, which likely diminishes potential impacts, though disruptions to fisherman, including fisherman from disadvantaged communities in Cambridge, are possible due to construction activities associated with the restoration. The bay bottom within the project footprint would be permanently converted from open water to island habitats and no longer accessible for fishing and crabbing. The project is likely, over the long-term, to increase the diversity and abundance of aquatic life in the vicinity of James Island, which could benefit nearby communities that depend on fishing for a large share of their employment and/or recreation. Another potential benefit to the identified disadvantaged community in Cambridge would be the possibility that the project could create additional jobs for the community. Through MPA, the project has convened a Community Stakeholder group which is one way the project is conducting outreach and involving the community in the project.

6.21 IMPACTS TO PUBLIC SAFETY

No health or safety risks to children or the public associated with the proposed project have been identified. The only public safety concern is the safety of waterways users during construction. It is expected that permits will require the marking/lighting of in-water equipment, as well as buoys to mark the active construction zone. Some restored reefs may require marking depending on water clearance. The project will comply with all USCG regulations for marking waterway hazards. Whereas, the project will not include marking the existing submerged remnants, the presence of the project in the area would add structures to inhibit vessels from traversing the area where the remnants are located, and possibly minimize the risks to vessels posed by the submerged remnants. The project team will provide a safety release through existing stakeholder communication contact lists. Visitors to James Island during construction would be required to sign-in and follow all USACE safety policies.

On April 23, 1997, President Clinton issued Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks." Under this Executive Order, Federal agencies are required to make it a high priority to identify and assess environmental health risks and safety risks resulting from its policies, programs, activities, and standards that my disproportionately affect children.

"A growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks…Therefore, …each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." (Executive Order 13045, April 21, 1997).

Children are particularly prone to potential environmental health and safety risks because a child's bodily systems are still developing and they may ingest more pollutants in proportion to their body weight than adults do. A child's size and weight may reduce the effectiveness of standard safety features, and children's behavior patterns make them more susceptible to accidents because they are less able to protect themselves.

No health or safety risks to children associated with the project have been identified. The types of activities associated with the project would not generate chemical constituents that may pose health risks to children. Additionally, because the project is located offshore, children would not have general access to construction areas located on site.

6.22 IMPACTS TO AESTHETICS AND RECREATIONAL RESOURCES

6.22.1 Aesthetics

The general landscape character of the region's visual resources was discussed in Section 3.22.1 of this sEIS. Some important aspects of the landscape for evaluating visual impacts are the characteristically long views enjoyed by observers on the water or shoreline, the low and relatively flat elevation of the region, and the lack of public access points to the waterfront. Due to these characteristic features, the Islands in this region are highly visible for viewers on or near the water, but, due to the flat terrain, are not generally visible from inland areas. Little of the shoreline in this region is publicly owned or accessible and therefore, visual effects on the shoreline primarily affect a relatively small number of residents and water users.

The affected land area for James Island includes primarily residential and agricultural areas along the Little Choptank River and Chesapeake Bay mainstem. Near James Island, 79 land parcels are likely to have a view of the project. Of these, 20 are agricultural (12 are improved), 1 is tax-exempt (owned by The Nature Conservancy), and the remaining 58 are residential parcels, although only 31 of those parcels currently contain houses or other structures indicating regular use. The Nature Conservancy (TNC) parcel, located at the northwest tip of Taylors Island, was previously the O'Donnell Island preserve, but the Island is completely under water and the parcel is no longer managed as a preserve. The level of aesthetic impact to that parcel should be minimal because the proposed footprint is north of the parcel and would not occupy a significant portion of the view. It is evident that the James Island restoration has the potential to be a significant element in the landscape for some sensitive viewpoints, but from the majority of vantage points the Island would blend into the existing landscape. The perceived level of dominance in the landscape would depend on the observer's sight line and distance to the project. Construction lights and noise would be anthropogenic additions to a relatively, natural landscape.

Waterway users can be assumed to operate anywhere in the vicinity of the project, but the greatest number of boats in view of the restoration project at James Island would be passing through the area along the Chesapeake Bay mainstem channel and channels leading to the Choptank River. Transient boaters would have lower visual sensitivity than boaters using the waters around the Island. All boaters using the areas near James Island would have a clear view of the restored Island.

The restoration of James Island is generally harmonious within the setting since it is a restoration of a historic island. However, the restored shoreline of the Island would be more regular than the natural shoreline and thus would contrast with existing shoreline. The effect of low dikes and breached dikes associated with wetland cells has the potential to minimize this contrasting effect from some views.

6.22.2 Recreation

The feasibility report identified minimal passive recreational and educational features for the project (USACE 2009, Appendix L). This was due to the fact that the project creates unique remote island ecosystem habitat which is fragile and very susceptible to human interference. It was determined that even passive recreation could negatively impact nesting habitats. And so, the intention of the project is to develop minimal low-impact recreational/educational spaces in a way that benefits the local jurisdictions and the State of Maryland, while still meeting the objectives of the restoration project. Features may consist of signs, kiosks, trails or similar low impact elements. The potential passive recreational components are interpretive guidance and media, including: a self-guided/interpretive water trail, informative signage, and avian observation from the water.

Other components such as public tours of the islands, research opportunities for universities, and volunteer opportunities will be available during the construction of the project (estimated 30 years).

6.22.2.1 Fishing

An assessment of fishing areas indicates that prime recreational fishing areas in the vicinity of James Island would be minimally affected and remaining fishing areas have the potential to be enhanced. The high usage of the waters around James Island during certain seasons suggests there may be some potential for increased “fishing congestion” as the Island restoration project displaces some fishing activity to other areas. However, because the project footprint primarily takes up the shallow waters that are not prime fishing areas and is not on routes between most fishing ports and fishing areas, the project’s impact on the spatial allocation of fishing effort appears to be small.

The restoration of James Island would take up area of shallow Chesapeake Bay bottom, resulting in the loss of some shallow-water recreational fishing areas. For the James Island project, 2,072 ac of soft sands and muds and the overlying water would be converted to island habitat, with an additional 209 acres deepened for an access channel. However, the areas of primary interest to recreational fishermen in the vicinity of James Island are reported to be areas deeper than 15 ft. Except for the access channel, none of the bottom within the project footprint is deeper than – 13 ft NAVD88. The project would primarily impact bay bottom in water depths between -6 to -10 ft NAVD88. A moderate number of fishermen also use intermediate depths of roughly 5 to 15 ft and a small number of enthusiasts use the very shallow areas primarily to fish for red drum and spotted sea trout (Gary, M., personal communication, 2003). With respect to fishing use, the potential for negative, long-term impacts is greatest for fisherman that target intermediate water depths. There are comparable water depths within the vicinity that could provide alternate fishing areas. Because the number of recreational fishermen who seek out the shallow areas is relatively small, they should be able to shift to the abundant shallow areas adjacent to or near the site with minimal effect on congestion levels or catch rates.

For fishermen who target fish attracted to hard bottom, the project has the potential to increase local fish abundance and catch rates of these recreational species in nearby fishing areas through dike and reef construction. It is estimated that ~28 acres of submerged rock habitat will be created by the project from the submerged portions of the perimeter dikes and breakwaters in addition to the approximate 50 acres of targeted reef habitat construction. Few studies have been done to quantify effect on fish abundance of the “rock reefs” that are created by dike construction, but evidence suggests that the rocks serve to attract fish to an area. Observations from PIERP and other artificial reefs indicate that fish make use of the rocks at the base of dikes for feeding and shelter. Striped bass, in particular, have been observed in the vicinity of rock dikes around Poplar Island and thus appear to be among the fish attracted to the artificial reef created through rock placement (Paynter, personal communication, 2003). The addition of new rock piles associated with dike construction of the Islands is therefore expected to increase catch rates of the same types of fish currently targeted at James and Barren Islands.

In addition to the potential benefits of rock reefs, some recreational species may become more abundant as a result of the reestablishment of SAV beds due to the wave and surge protection and erosion-control that is expected to be provided by the restoration projects. Proximity to the high-quality habitat provided by SAV beds would also be expected to enhance recreational catch rates for some species.

Other potential impacts of the project on recreational fishermen include changes in travel time or quality of the fishing experience. The effect of Island restoration on travel times to fishing destinations are not expected to be significant. Recreational fishermen would tend to use the same boat access channels and routes as commercial fishermen. Following the analysis done for commercial fishermen, it is expected that there would only be negligible effects on the time it takes most boaters to reach fishing destinations at either project location. Project construction is expected to have a temporary impact on fishermen due to noise and visual disturbances associated with construction activities.

6.22.2.2 Boating

During and after project construction, fishermen wishing to access shallow waters and approaching James Island from the east might need to travel a mile or so farther west to reach open water, but this group represents a small proportion of fishermen. Most fishermen would already be traveling this distance to access the more popular deeper water fishing areas. In general, boats approaching the Island from the east, north and south would not change their routes significantly because Island remnants and shallow water already prevent passage of most boats directly through the zone of the proposed footprint. The passage from the south of James, between James Island and Taylors Island, into the Little Choptank River would remain accessible during and after Island restoration. Even the small boats that choose to use the shallow waters adjacent to the channels would not typically be required to change course to avoid the Island. Boats not under power (e.g., kayaks and canoes) are not major users of this area and are typically directed by tourist literature to inland destinations (Dorchester County Dept. of Tourism, Water Trails of Dorchester County).

Boaters in the vicinity of James Island during construction would be exposed to temporary noise and visual disturbances. Boats that are not fishing or lingering in the area would experience these effects for a short duration only. Boaters that wish to avoid the areas immediately around the project have many alternative boating areas and would not be prevented from reaching common boating destinations in the Choptank River.

6.22.2.3 Hunting

The recommended plan at James and Barren islands is highly likely to attract a variety of waterfowl to the area, and nearby hunting opportunities are expected to increase. Alternatively, loss of potential foraging habitat for waterfowl in the James Island vicinity could reduce hunting opportunities by decreasing waterfowl numbers in the area. Waterfowl hunting is a popular type of hunting in the region and trends indicate that it would continue into the future.

6.23 CUMULATIVE IMPACTS

Implementation of the recommended plan at the James Island component of the Mid-Bay Project will provide a cumulative positive impact to remote island resources in the Chesapeake Bay. In combination, restoration projects at James Island (2,072 ac), Poplar Island (1,140 ac), Poplar Expansion (575 ac), Swan Island (25 acres) and the future implementation of the Barren Island component of the Mid-Bay Project (91.5 ac), will restore 3,904 ac of remote island habitat to the mid-Chesapeake Bay with an equivalent impact to shallow water habitat. These restoration projects are a substantial step to restore the loss 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.

The recommended plan for James Island fits within the context of Chesapeake Bay-wide restoration efforts. The Chesapeake Bay Agreement 2014 established. Extensive resources have been devoted by federal and state agencies, and their partners to address the 2014 Agreement goals. It is estimated that since 2014 over $19 billion dollars have been spent on efforts to meet the goals and outcomes of the 2014 Bay Agreement (Chesapeake Progress 2024). The 2014 Agreement has ten goals and 30 outcomes to guide restoration efforts across five themes: Abundant Life, Clean Water, Conserved Lands, Engaged Communities, and Climate Change. The recommended plan will restore habitats that contribute or are connected to a number of goals and outcomes including the following: 1) The Sustainable Fisheries goal has blue crab abundance, fish habitat, forage fish, and oysters outcomes; 2) the Vital Habitats goal includes black duck, SAV, and wetlands outcomes; 3) the Healthy Watersheds goal has a healthy watersheds outcome; and the Climate Resiliency Goal includes a climate adaptation outcome. The wetland goal provides the most direct connection to project activities. The wetland goal is to reestablish 85,000 acres of tidal and non-tidal wetlands, of which the recommended plan would contribute 1,140 ac. Thus far, 4,310 acres of wetlands have been gained within the Chesapeake Bay watershed.

Additionally, the recommended plan is within the regional impact of restoration and conservation efforts being undertaken by Envision the Choptank. Envision the Choptank looks for collaborative solutions to support healthy and productive oyster reefs, and restore fishable, swimmable waters to the Choptank River (to the northeast of James Island). Goals include 1) Conserve Natural Resources, 2) Restore Habitat and Clean Water, 3) Engage Communities, and 4) Strengthen and Expand the Partnership.

With respect to management of the federal navigation network, the recommended plan provides an opportunity to beneficially use the material recovered from channel maintenance. The channels must be dredged periodically, and without a beneficial use placement site, the State of Maryland would need to find an alternate placement site and pay the difference between the alternative and placing in the Chesapeake Bay deep trough which is USACE's base plan. This action would incur increased GHG emissions and impacts if the location is further than James Island (such as the ocean), impacts to bottom habitat within the placement site, and transportation costs without the trade-off of benefits from the development of habitat through beneficial use. Additionally, without the James Island component becoming available for placement, the final years of placement at Poplar Island will not be as efficient and would reduce the capacity for placement at Poplar Island. Having both James and Poplar Islands available for placement in the final years of PIERP enables optimum time for dewatering and consolidation of dredged material at Poplar Island while inflow is shifted to James Island, providing for the most efficient placement of dredged material.

6.23.1 Cumulative Adverse Impacts

Proposed island restoration projects would cause a loss of approximately 4,000 acres of bottom and open water habitat for EFH, immobile benthic invertebrates, and other species inhabiting shallow water habitats. However, much of this bottom had been island habitat, and regionally shallow-water habitat is abundant and expanding with sea level rise, subsidence, and erosion. Further, the restored island complexes would include tidal connections to restored wetlands to provide foraging, refuge, and nursery grounds for fisheries. Therefore, no significant cumulative negative impacts to habitat or populations of aquatic or avian species are expected to result from the project.

The proposed action at James Island would add approximately 45,233 ft of "armored" shoreline to the Chesapeake Bay watershed. Armoring, or "hardening", a shoreline is a protection measure that typically consists of installing dikes, riprap, or bulkheads adjacent to a shoreline to prevent erosion. Shoreline hardening can be considered an adverse impact because it does not provide a natural shoreline, and because it results in a trend of losing ecologically important intertidal areas such as marshes, beaches, and mudflats. In this application, the project would restore lost shorelines rather than harden existing natural shorelines. EWN efforts are underway to incorporate measures to soften the design where feasible to maximize habitat value and connectivity between terrestrial and aquatic resources.

The Mid-Bay and Poplar Island restoration projects will cumulatively increase vessel traffic and waterway construction activity along the middle Eastern Shore for the next two to three decades. The region is a quiet, natural landscape that will experience increased boat and construction noise, traffic, and lights that would likely be perceived as a negative impact to regional aesthetics, particularly homeowners along the adjacent shorelines. There will be project-generated GHG emissions from the vessel traffic, construction, and O&M activities as presented in Section 6.13.1 along with measures that could be taken to minimize emissions. For the initial years where construction overlaps at Poplar and James Islands, GHG emissions would be generated at both projects. The initial years of construction at James Island are projected to contribute approximately 700 MT CO_2 eq in combination with approximately 950 MT CO_2 eq from Poplar Island construction. The estimated emissions are minor compared to state-wide emissions and occur in an airshed that is in attainment for all air pollutants. The emissions stemming from dredging navigation channels and transporting the material to a placement or disposal site would occur with or without the project. Providing a placement site within the Bay avoids additional emissions associated with transporting the material to the ocean for placement. Measures that could be implemented to reduce emissions are discussed in Section 6.13.1.

6.23.2 Cumulative Beneficial Impacts

The complete erosion of the James Island remnants has resulted in the loss of wetlands in the project area. The recommended plan is expected to have cumulative beneficial impacts in the long-term by restoring vulnerable wetland habitat. The high productivity of tidal marshes and their trophic linkage to the water column supports many important ecological functions of the Chesapeake Bay. The upland restoration component of the recommended plan would contribute organic materials and litter to the aquatic and wetlands systems. The energy derived from the tidal exchange with the marshes and the contribution of the upland areas is expected to support the aquatic food web that supports finfish and shellfish such as striped bass, spot, bluefish, oysters, crabs, and clams. Many of the cumulative benefits of protecting and creating additional island habitat are associated with the ecological services provided by restoring wetland habitats, protection of existing habitats, and habitat diversification. The island restoration projects underway amount to approximately forty percent of the 10,500 acres of remote island habitat that has been estimated to have been lost from the region.

The protection that the proposed action would provide to the James Island remnants would also promote improvements in water quality and aquatic resources in the project area, potentially the recovery of SAV in waters to the east of the project. Although elevated levels of suspended sediments are expected to be a short-term impact during dike construction, the proposed action is expected to have beneficial long-term impacts to water clarity in the mouth of the Little Choptank River by dampening erosive forces.

Estuarine wetlands and shallow water environments serve as nursery and foraging grounds for finfish and shellfish. Although the proposed action would displace bottom used for shellfisheries, it is expected to provide beneficial cumulative impacts to finfish and shellfish habitat by creating 1,140 ac of intertidal and wetlands habitat at James Island that would provide detrital input to the ecosystem. The proposed action would also restore a complex of upland, wetland, and nearshore habitats that would provide the trophic foundation, cover, nursery function, and forage area for all life stages of desirable commercial species. Incorporation of reef habitat around the periphery of the project in addition to the stonework of the perimeter dikes is anticipated to provide hard substrate for oyster spat settlement generated from large-scale oyster restoration efforts in the Little Choptank River. Peripheral reef habitat would also provide structural refuge for fish as they move between habitats along the Bay's eastern shore.

Estuarine wetlands sequester carbon, providing a positive offset for GHG emissions, and helping wetlands to maintain elevation to combat sea level rise. Staver et. al. (2020) estimated the annual carbon burial from a Poplar Island wetland is 206 g C m^{-2} y^{-1}. Based on the restoration target to restore 1,140 acres of wetlands at James Island, the annual carbon burial for the recommended plan is approximately 3,190MT CO_2 equivalency once all wetlands are established. The cumulative carbon sequestration estimate from wetlands restoration (141,701 MT CO_2 equivalency) exceeds the project's estimated GHG emissions (51,549 MT CO_2 equivalency) (Section 6.13.1 and Appendix C5) across the construction and service life periods (93 years) while providing plenty of additional capacity to offset uncertainties in the emissions calculation. Additional carbon sequestration could be achieved once the forests are planted in the uplands and oyster reef habitat is established. Based on the calculations, these habitat restoration efforts would offset the project's GHG emissions over the life of the project (Section 6.13.1 and Appendix C5).

7 ENVIRONMENTAL COMPLIANCE

Pertinent public laws applicable to the James Island Project 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 in Table 23.

7.1 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 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 Phase that included both the Barren Island portion of the Mid-Bay Island Project and the James Island portion. This document is a supplemental EIS that builds on the 2009 Mid-Bay FR/EIS and focuses on the James Island portion of the Mid-Bay Island Project. A Notice of Intent (NOI) to prepare a supplemental Environmental Impact Statement for the James Island component of the Mid-Bay project was published in the Federal Register on November 7, 2022 (Appendix B1) and the draft sEIS was posted for public review in the Federal Register on March 29, 2024 (89 FR 22140) (Appendix B3).

7.2 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 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. Review of this draft sEIS by USEPA and MDE confirmed compliance with Section 309 of the Clean Air Act.

7.3 CLEAN WATER ACT, 33 U.S.C. 1251, ET SEQ.

Coordination is underway to ensure the recommended plan is in compliance with the Clean Water Act of 1977 and subsequent amendments (A 404(b)1 Assessment is included as Appendix C4). A Section 401 WQC is required for the project and is part of an application that will be submitted to the State by the MPA for the James Island component. In a letter dated October 10, 2024, MDE stated they do not foresee any issues that would preclude a decision on a WQC (Appendix C1). Upon completion of the State's permitting process, implementation of the recommended plan would not result in permanent negative changes in water quality. Following construction activities, the additional island and wetland habitat is expected to have long-term positive impacts to water quality in the areas surrounding James Island. All state water quality standards would be met. MDE will determine if a public hearing is needed as part of the permitting process.

7.4 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. James Island is neither an existing or proposed CBRA system unit or an otherwise protected area. Therefore, no consultation with USFWS is required specific to CBRA (USACE 2009).

7.5 COASTAL ZONE MANAGEMENT ACT OF 1972

The proposed project at James Island is within the coastal zone, which is managed under MDNR's CZMP. Although construction of the island habitat restoration project would displace shallow water habitat, which is protected under the Coastal Zone program, beneficial impacts from the proposed action are consistent with other goals of the CZMP. The CZMP includes goals to protect coastal land and water habitat. It is also anticipated that restoration at James Island would help reduce the exposure of populated Taylors Island to future erosion and land loss.

A Federal consistency determination in accordance with 15 CFR 930 Subpart C has been made stating that the recommended plan is conditionally consistent with the enforceable policies of the State of Maryland's federally approved coastal management program. The conditions as stated in MDE's May 29, 2024, letter (Appendix C1) are 1) USACE/MPA will maximize the inclusion of NBS to the extent practicable and continue to coordinate on the project with resource agency partners, 2) the project will obtain a Tidal Wetlands License, and 3) the project will not result in adverse impacts to water quality.

7.6 ENDANGERED SPECIES ACT OF 1973

The recommended plan is in compliance with the Endangered Species Act of 1973 (ESA). The recommended plan is not anticipated to negatively affect rare, threatened, or endangered species.

7.7 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 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

C3). USACE has satisfied all requirements for the FWCA but will continue to coordinate with USFWS and NMFS through the remainder of design development and construction phase.

7.8 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 updated Essential Fish Habitat [EFH] Assessment for the James Island project. The assessment is provided in Appendix C2. NMFS consultation with Conservation Recommendations is in Appendix B5. USACE's response to the Conservation Recommendations is in Appendix C1. See Sections 3.8.4.5 and 6.8.4.1 for a discussion of EFH in the study area and a summary of the EFH assessment, respectively. Coordination with NMFS for EFH will be ongoing through the remainder of the project.

7.9 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. It is not anticipated that the recommended plan will have an impact on marine mammals. The recommended plan complies with the MMPA. Should there be changed conditions as the project progresses, USACE will continue to consult with NMFS to ensure continued compliance with the MMPA.

7.10 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. The recommended plan is in compliance with the MBTA and Executive Order 13186. Restoring James Island will provide valuable foraging, nesting, and resting habitat to a broad array of avian species within the Atlantic Flyway. Remote island restoration projects have proven to attract an abundant and diverse assemblage of migratory birds. The recommended plan is aimed at providing benefits to avian species, but there may be situations once habitats begin to be developed where certain species need to be managed. It is anticipated that a Federal Migratory Bird Act permit will be required from USFWS on an annual basis for the management of selected avian species because of predation, nuisance species, and disease outbreaks, as is the case for the Poplar Island Ecosystem Restoration Project. A permit will enable the use of non-lethal and lethal control for nuisance species, including control measures that "discourage nesting," such as breaking up nests after eggs are laid. At Poplar Island, control is required for herring gulls, great black-backed gulls, double-crested cormorants, mute swan, and resident Canada geese. Management actions have been needed at Poplar Island to protect planted habitat or at-risk species and would be expected to be needed at James Island. It can be expected that certain bird species will undergo a change in status from the time the sEIS is written through the life of the project, and this will be accounted for in the annual permit process.

7.11 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 MD SHPO, 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 NRHP will be adversely affected, USACE must develop mitigation measures in coordination with the MD SHPO. Coordination with the MD SHPO and tribal nations has been ongoing since the feasibility phase and has determined that the proposed project will not have an effect on any previously recorded archaeological resources since they have suffered a loss of integrity from inundation and erosion. Given the presence of buried paleochannels and unsurveyed areas, an archaeological monitoring and survey program will be implemented in advance of dredging for the proposed access channel, turning basin, electrical/communication cable, and utility yard as stipulated in the Programmatic Agreement. The signed Programmatic Agreement is provided in Appendix A5. Consultation will continue through the remaining phases of the project.

7.12 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 Corps of Engineers, for the construction of any structure in or over any navigable water of the United States. The recommended plan is in compliance with the Rivers and Harbors Act.

7.13 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 3.16. In line with activities at PIERP, it is anticipated that an Oil Operations Permit will be acquired from MDE to cover the storage of fuel and oil. While MECs are not expected at James Island, there may be MECs in dredged materials from the Chesapeake Bay. If MECs are found they will be handled by an Army EOD unit. Any such handling would comply with RCRA as appropriate. The recommended plan is in compliance with the RCRA. The project will comply with all local, state, and federal permit requirements.

7.14 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 recommended plan is in compliance with the CERCLA.

7.15 EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS

This Executive Order directs federal agencies to avoid undertaking or assisting in new construction located in wetlands unless no practicable alternative is available. The recommended plan is in compliance with Executive Order 11990 and would result in the restoration of 1,043 acres of wetlands.

7.16 EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT

Executive Order 11988 directs federal agencies to evaluate the potential effects of proposed actions on floodplains. Such actions should not be undertaken that directly or indirectly induce growth in the floodplain unless there is no practicable alternative. The recommended plan is in compliance with Executive Order 11988 and would have no effect on development within floodplains.

7.17 EXECUTIVE ORDERS 12898, 13985, AND 14096, ENVIRONMENTAL JUSTICE

These Executive Orders direct Federal agencies to determine whether a federal action would have a disproportionate adverse impact on minority or low-income population groups, or environmental justice (underserved) communities, within the project area. See Section 6.20 for a discussion of Environmental Justice considerations for the recommended plan. The recommended plan is not expected to result in disproportionately high or adverse human health or environmental effects on minority or low-income populations.

7.18 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 recommended plan.

Table 23. Compliance with Federal Environmental Protections 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	Full
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
Protection of Wetlands (EO 11990)	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
Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (EO 13985)	Full
Revitalizing Our Nation's Commitment to Environmental Justice for All (EO 14096)	Full
Tackling the Climate Crisis at Home and Abroad (EO 14008)	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.
In Progress: Coordination efforts continue and are on-track for the current project status.

7.19 EXECUTIVE ORDER 14008, TACKLING THE CLIMATE CRISIS AT HOME AND ABROAD

This Executive Order requires federal agencies to move quickly to build resilience against the impacts of climate change. The EO has three primary objectives to 1) promote safe global temperature, 2) increase climate resilience, and 3) support financial a pathway toward low greenhouse gas emissions and climate-resilient development. The EO reinstates the Presidential Memorandum of September 21, 2016 (Climate Change and National Security), establishes the Climate Policy Office within the Executive Office of the President and establishes a National Climate Task Force. In addition, the EO aims to use Federal procurement to support robust climate action including a carbon pollution-free electricity sector, no later than 2035 and clean and zero-emission vehicles for Federal, State, local, and Tribal government fleets. The recommended plan aligns with EO 14008 by incorporating appropriate sea level rise projections into the project design. In particular, the recommended plan wetlands design will account for climate change to provide sustainable and resilient wetlands that are able to provide long-term ecosystem benefits and be adaptively managed in the face of climate change. The recommended plan seeks to restore remote island habitat and associated benefits that have been lost from historic sea level rise and erosion.

8 PUBLIC INVOLVEMENT AND AGENCY 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.

8.1 PUBLIC INVOLVEMENT

8.1.1 NOTICE OF INTENT AND SCOPING

A Notice of Intent (NOI) to prepare a supplemental Environmental Impact Statement for the James Island component of the Mid-Bay project was published in the Federal Register on November 7, 2022 (Appendix B1). Prior scoping meetings were held as part of the feasibility study. Public outreach events were held in May and June 2021, prior to publication of the NOI. An additional community outreach scoping session was held on Saturday, November 19, 2022, from 10:00 am to 12:00 pm at the Hoopers Island Fire Department [2756 Hoopers Island Road, Fishing Creek, MD 21634]. The public were invited to provide scoping input at that meeting or to USACE for 30 days following the meeting until December 19, 2022. No public comments were received in response to the NOI.

8.1.2 PUBLIC OUTREACH

Various outreach efforts have been made prior to and following scoping. Team members presented project information to stakeholders through in-person and virtual meetings as well as quarterly newsletters as listed below. MPA publishes a quarterly newsletter highlighting the project that is distributed to stakeholders through the mail and via email. Table 24 provides a summary of public outreach.

Table 24. Public Outreach Summary

December 17, 2019	Dorchester County Council (in-person)
February 19, 2020	Public Outreach Meeting: Church Creek Fire Hall (in-person)
May 19, 2021	MPA Spotlight Series (virtual webinar)
November 6, 2021	Mid-Bay Community Meeting: Madison Volunteer Fire Department (in-person)
November 19, 2022	Public outreach/scoping Meeting: Hoopers Island Fire Department (in-person)
April 17, 2024	Public meeting during public review period (in-person)

8.1.2.1 Ongoing and Future Efforts

USACE/MPA plan to continue public outreach efforts throughout the construction of the recommended plan in the form of newsletters, in-person poster sessions, and staff attendance at tabling events. The Mid-Bay Outreach Team distributes newsletters as well as important project updates to Mid-Bay stakeholders periodically. An annual community meeting is held in the project vicinity to provide community members an opportunity to learn about the Mid-Bay Project and have questions answered by the project team. Further, interested stakeholders can request to meet with the Outreach Team or have the Outreach Team present project information at community meetings and events. Finally, a Community Stakeholder Group has been convened to enable direct and regular communication with community representatives.

For easy access to current Mid-Bay Project information, both USACE and MPA maintain project websites. In the future, regular tours will be offered to the public to view the Mid-Bay Project's progress once roadways and facilities are developed at James Island.

8.1.3 PUBLIC REVIEW

The draft sEIS was provided for public review from March 29 to May 15, 2024. The draft sEIS was posted for public review in the Federal Register on March 29, 2024 (89 FR 22140) (Appendix B3). A public meeting was held on April 17, 2024, from 5:30 to 7:30 pm at the Madison Volunteer Fire Company, 1154 Taylors Island Road, Madison, MD 21648. The purpose of the meeting was to present the project to stakeholders and receive public comment. Notice of the public meeting and availability of the draft sEIS for review were posted in local newspapers, The Star Democrat and The Dorchester Star, from March 27 through April 10, 2024 (Appendix B3). A meeting summary from the public meeting is provided in Appendix B5. The draft sEIS was available at the USACE website: https://www.nab.usace.army.mil/Mid-Bay/. Two public comments and 121 agency-submitted comments were received. All comments received during the review period are included in Appendix B5 along with a response.

8.1.3.1 Overview of Public Comments

The following list summarizes the overarching, compiled comments received on the draft sEIS. A response has been provided for all comments in Appendix B4. As part of the response, it is identified if and how the draft sEIS was revised to address the comment, as well as where in the document revisions were made.

1. Support for the inclusion of EWN measures, and the recognition that using clean dredged material to reestablish lost island habitats is an EWN measure. While supporting EWN inclusion, some agencies would like to see more detailed designs included for evaluation in the sEIS.
2. Support for various low to high marsh ratios for the project based on agency mission.
3. Support for various habitats being included in the wetland design: hummocks, vegetated and non-vegetated bird islands within the wetland cells, and broad natural inlets.
4. Support for the incorporation of sea level rise into project plans and design, as well as a request to update the RSLR discussion with more current information.
5. Request for clarification of project components such as the size of the personnel pier and bulkhead, and dike heights, both permanent and temporary.
6. Further discussion and clarification of project impacts and benefits in a summary table including the utility line and its position relevant to oyster bars and SAV. Further, it was requested that all practical efforts be made to minimize impacts and offset unavoidable impacts.
7. Clarification of bathymetry impacts, potential to create new hypoxic or anoxic areas, impacts to littoral drift, noise and light impacts to humans and wildlife, economic impact on local fisheries, and impacts associated with developing a land base.
8. Concern with the size of the project compared to the historical size of James Island.
9. Concern with the potential toxicity of the dredged material, the need to sample material and the environment around James Island post-placement, and the proximity of the project to Dorchester County.
10. Request for further details on monitoring and adaptive management.
11. Request for additional information on thin layer placement and the possibility of using James Island has a dredged material handling facility to benefit the region. A concern was raised that the large-island restoration approach is not the way to maximize the ecological benefit that could potentially be realized from other uses of the dredged material.
12. Consideration of recovering any shell encountered during the dredging of the access channel through James Point Bar for use in oyster activities.
13. Request for continued coordination for various project aspects: future noise impacts once the island habitats are being used by birds, EWN measure development, and throughout the designs process to ensure that the designs maximize aquatic habitat value.
14. Request for further details on how the project could benefit oysters and reef habitat.
15. Request for SAV restoration to be a part of the project.
16. Clarification on how human use/disturbance following project completion will be managed to maintain the island as remote habitat.
17. The following recommendations: implement suggested measures to reduce Greenhouse Gas emissions, increase the number of tidal inlets in the project, understand the sediment budget when undertaking the wetlands design, and specify EWN measures to be included.

8.2 AGENCY COORDINATION

Agency coordination was initiated with a kick-off meeting on 22 January 2020 focused on the full Mid-Bay project. A series of 17 coordination meetings were held with resource agencies from project kick-off through release of the draft sEIS for public review, either in the form of a NEPA meeting, a Habitat Development Workgroup, or Monitoring Workgroup meeting. One additional meeting was held following public review to discuss comments received and EWN formulation. Table 25 summarizes the agency coordination meetings held to date. The agenda and minutes from these meetings are provided in Appendix B4. Meetings will continue following draft sEIS review.

Table 25. Agency Coordination Meetings

Date	Meeting	Topics covered that are relevant to James Island project
January 22, 2020	Project Kick-off Meeting (#1)	Project overview, next steps
June 20, 2020	Agency Coordination Meeting (#2)	Project update
September 24, 2020	Agency Coordination Meeting (#3)	Project update
December 6, 2021	Agency Coordination Meeting (#4)	Project update, biological survey results
August 30, 2022	Agency Coordination Meeting (#5)	Stakeholder Engagement Plan and Workgroup Structure Hierarchy, NEPA Status, Master Plan and Interactive GIS tool, Purpose and Need,
November 22, 2022	Agency Coordination Meeting (#6)	NEPA Update, revised Purpose and Need, Permitting Timetable, Focused Array of Alternatives preview, and review of input received on Master Plan
December 20, 2022	Habitat Development Workgroup (HWG) (Quarterly Meeting) and NEPA	Adaptive Management Plan, Poplar Island marsh studies
January 24, 2023	Monitoring Workgroup (MWG)	2023 and 2024 Monitoring
February 28, 2023	NEPA	NEPA update, modeling overview
March 28, 2023	HWG and NEPA	NEPA (update) and Habitat Working Group (wetlands and hummock design)
June 29, 2023	HWG and NEPA	NEPA update, modeling update
September 11, 2023	James Island Natural and Nature-based Solutions (NNBS) Workshop #1	NNBS approaches for James Island
September 26, 2023	HWG and NEPA	Project update, NNBS – goals, constraints, ideas

Date	Meeting	Topics covered that are relevant to James Island project
November 14, 2023	HWG and NEPA	Project updates, NNBS development
January 23, 2024	Monitoring Workgroup	Monitoring plan development
February 27, 2024	James Island Natural and Nature-based Solutions (NNBS) Workshop #2	NNBS Workshop
March 26, 2024	HWG and NEPA	Project updates, design, release of draft sEIS to agencies
September 24, 2024	HWG and NEPA	Project updates, Draft sEIS comment review and revisions, EWN formulation

Coordination letters were sent to USEPA, MDNR, MDE, NMFS, USFWS, and MHT in November 2022. Although the Executive Order has been rescinded, USACE has continued to coordinate One Federal Decision concurrence points with resource agencies to facilitate a smooth and timely federal review of the project. Table 26 summarizes public and agency correspondence that has been sent or received in addition to the meetings documented in Table 25. Unless otherwise noted, the correspondence is provided in Appendix C1. A significant portion of the agency coordination efforts have focused on incorporating EWN or NNBF into the James Island design.

Table 26. Agency Coordination Summary

Date	Summary of Correspondence
January 6, 2020	USACE provides coordination letters to the Delaware Nation and the Delaware Tribe of Nations.
February 19, 2020	USACE receives letter from the Delaware Nation in response to coordination letter.
May 7, 2020	USACE provides the 2020 Phase I Cultural Resource Investigation of a Proposed Channel for the Mid Bay Island Ecosystem Restoration Report, James Island, Maryland to the Delaware Nation for their review.
June 12, 2020	USACE receives letter from MHT in response to review of the 2020 Phase I Cultural Resource Investigation of a Proposed Channel for the Mid Bay Island Ecosystem Restoration Report, James Island, Maryland.
March 17, 2021	USACE provides coordination letter to MHT.
March 26, 2021	USFWS provides draft Planning Aid Report (PAR) (Appendix C3)
April 1, 2021	USACE receives email from MHT in response to March 17, 2021 coordination letter
May 19, 2021	MPA Hosts a Public Webinar through their Spotlight Series on the Mid-Chesapeake Bay Ecosystem Restoration Project with featured speakers from MPA, USACE, and USFWS.

Date	Summary of Correspondence
October 20, 2021	USACE receives via email a response from MDNR regarding the information provided on potential impacts to oyster resources.
October 4, 2022	USACE provides Concurrence Point #1 (Purpose and Need) to federal and state agencies.
November 7, 2022	Notice of Intent to prepare a supplemental Environmental Impact Study for the James Island component of the Mid-Bay Project published in the Federal Register (Appendix B1).
November 12, 2022	Email received from USGS stating no comment in response to the NOI.
November 22, 2022	USACE provides initial coordination letter to USEPA, USFWS, NMFS, NOAA, MDE, and MDNR.
December 2, 2022	Email received from NOAA confirming that it is not necessary to re-initiate Endangered Species Act consultation for the James Island project.
December 8, 2022	Email received from MDNR accepting invitation to serve as cooperating agency.
December 16, 2022	Letter received from MDE accepting invitation to serve as cooperating agency and providing feedback on Purpose and Need.
December 19, 2022	Letter received from NOAA/NMFS accepting invitation to serve as cooperating agency and confirming species to be included in the EFH Assessment.
March 14, 2023	USACE provides Concurrence Point #2 (Focused Array of Alternatives) to federal and state agencies.
March 17, 2023	Email received from USFWS communicating concurrence on the Focused Array of Alternatives and support for Alternative 2.
March 22, 2023	Email received from NMFS communicating concurrence on the Focused Array of Alternatives.
March 23, 2023	Email received from USEPA communicating concurrence on the Focused Array of Alternatives.
March 24, 2023	Letter received from MDE with comments on the Focused Array of Alternatives.
May 2, 2023	Email request provided to MDNR for input on the two alignments being considered for the access channel with respect to considerations for oyster bar impacts.
May 23, 2023	Email response provided to MDE in response to their comments and providing the final Focused Array of Alternatives
May 23, 2023	Email received communicating MDNR’s preference for the original alignment of the access channel.
July 13, 2023	Email provided to the Delaware Nation requesting review of the draft Cultural Resource Investigation report.

Date	Summary of Correspondence
July 13, 2023	Email received from the Delaware Nation communicating concurrence with the need for additional investigation if disturbance to the identified sites cannot be avoided by the project.
August 16, 2023	USACE provides letter to MHT requesting review of the draft 2023 Cultural Resource Investigation report.
September 22, 2023	Emailed received providing EWN concepts for the James Island design from NMFS.
September 25, 2023	Emailed received providing EWN concepts for the James Island design from MDE.
December 5, 2023	Letter received from MHT in response to review of draft Rather than conducting additional archaeological work, the MHT recommended coordination with consulting parties regarding potential mitigation options.
February 2024	Letters provided to MHT, Delaware Tribe of Indians, and Delaware Nation to request review of draft Programmatic Agreement.
April 25, 2024	Federal Consistency Determination Review Package submitted to the Maryland Coastal Zone Management Program.
May 14, 2024	Letter received via email from USFWS (DOI) providing agency comments on the draft sEIS (Appendix B5).
May 15, 2024	Letter received via email from MDE providing agency comments on the draft sEIS (Appendix B5).
May 15, 2024	Letter received via email from MDNR providing agency comments on the draft sEIS (Appendix B5).
May 15, 2024	Letter received via email from EPA providing agency comments on the draft sEIS (Appendix B5).
May 29, 2024	Letter received via email from NMFS providing agency comments on the draft sEIS and Magnuson Stevens Fisheries Conservation and Management Act EFH Conservation Recommendations (Appendix B5).
July 9, 2024	Letter received via email from MDE confirming the project is conditionally consistent with the enforceable coastal policies of the Maryland Coastal Zone Management Program.
September 3, 2024	Updated Draft Programmatic Agreement submitted to the MD SHPO for review through their e106 online portal.
September 13, 2024	Project notification sent to the Advisory Council on Historic Preservation through their e106 online portal.
September 17, 2024	Letter submitted via email to NFMS providing USACE's response to the EFH Conservation Recommendations.
September 20, 2024	Letter received via email from the Advisory Council on Historic Preservation stating their participation is not necessary.
October 3, 2024	Letter received via email from the MD SHPO stating they are prepared to sign the updated Draft Programmatic Agreement. The letter also provided minor revisions.

Date	Summary of Correspondence
October 10, 2024	Letter received via email from MDE stating MDE has no significant concerns regarding the project based on their review thus far, and does not anticipate any issues which would preclude a decision on the Section 401 WQC, provided that USACE/MPA submits a complete WQC request for the final project and MDE can confirm that any discharges from the proposed project are not likely to adversely affect Maryland's water quality standards.

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10 GLOSSARY

(***** denotes definitions which are quoted verbatim from guidelines, such as definitions at 40 CFR 230.3 and/or other parts)

A-Weighted Decibel (dBA): An overall frequency-weighted sound level in decibels, which approximates the frequency response of the human ear.

Abundance: Mean number of individual organisms.

Acute: An effect having a sudden onset, lasting a short time.

Algae: Simple rootless plants that grow in bodies of water (e.g. estuaries) at rates in relative proportion to the amounts of nutrients (e.g. nitrogen and phosphorus) available in water.

Ammonium: (NH4+) chemical compound that is a source of nitrogen for plants and microorganisms.

Amphipod: Small crustacean belonging to phylum Arthropoda.

Analyte: A single chemical constituent.

Anoxia/Anoxic: Without dissolved oxygen or in oxygen deficit. Dissolved oxygen concentrations of 0 mg/l (MDE 1994).

Anthropogenic: Influenced by the activities of humans.

Archipelago: Group or string of islands.

Astronomical tide: The periodic rising and falling of the water that result from the gravitational attraction of the Moon and Sun and other astronomical bodies acting upon the rotating Earth.

Bathymetry: The physical characteristics, including depth, contour, and shape of the bottom of a body of water, such as oceans, seas, bays and lakes.

Bay Bridge: WM Preston Lane Jr. Memorial Bridge. Located between Kent Island and Cape St. Clair, Maryland.

Benthic: Living in, on, or in close association with the bottom of a body of water.

Benthic macroinvertebrates: Macroinvertebrates are large, generally soft-bodied organisms that lack backbones. Macroinvertebrates may have hard exoskeletons. Benthic macroinvertebrates live in or on the bottom sediment in aquatic environments.

Benthos: Collective term for aquatic plants and animals living in or on the bottom sediments of a body of water.

Biotic: Life and living organisms.

Bivalve: An organism that has a two-part shell (e.g., clams, mussels, oysters).

Borrow area: Area from which material (e.g., sand, soil, etc.) is taken for use in another location.

Brackish: Somewhat salty water, as in an estuary.

Breakwater: A structure protecting a shore area, harbor, anchorage, or basin from waves.

Chemical constituents: Chemical substances associated with or contained in or on dredged material.

Chlorophyll *a*: A photosynthetic pigment found in plants, including phytoplankton. A measure of this is frequently utilized as an estimate of plant or phytoplankton standing crop.

Clay: An extremely small fragment of rock or mineral with a diameter less than 0.0039 millimeter; a physical property measured in sediment grain size analysis.

Coast: A strip of land of indefinite width that extends from the shoreline inland to the first major change in terrain features.

Coastal plain: The level land with soils composed of sediments transported downstream of the piedmont and fall line, where tidal influence is felt in the rivers.

***Contaminant:** A chemical or biological substance in a form that can be incorporated into, onto, or be ingested by and that harms aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment.

Copepod: Minute aquatic crustaceans having elongated bodies and forked tails belonging to the subclass Copepoda.

County Subdivision: The division or redivision of a lot, tract, or parcel of land by any means into two or more lots, tracts, or parcels including the changing of lot lines for the purpose.

Crab pot: An approximately one cubic yard cage used commercially and recreationally to trap blue crabs.

Crustaceans: The class of aquatic Arthropods including copepods, isopods, amphipods, barnacles, shrimp, and crabs which are characterized by having jointed appendage and gills.

Current: A flow of water, typically generated by wave action, tidal fluctuations, or winds.

Decibel (dB): A unit less measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to reference sound pressure amplitude. The reference pressure is 20 micropascals.

Demersal species: Fish that live on or near the bottom.

Depth: The vertical distance from a specified tidal datum to the sea floor.

Dike: An embankment constructed (typically using soil and rock) to contain dredged material or to serve as a protective barrier.

Direct Economic Impact: Economic activity occurring as a direct result of initial project spending.

Dissolved organic carbon (DOC): The fraction of carbon bound in organic compounds in water that is made up of particles smaller than 0.45mm, which is separated out from total organic carbon by filtration.

Dissolved oxygen (DO): Microscopic bubbles of oxygen that are mixed in the water and occur between water molecules. Dissolved oxygen is necessary for healthy lakes, rivers, and estuaries. Most aquatic plants and animals need oxygen to survive. Fish will drown in water when the dissolved oxygen levels get too low. The absence of dissolved oxygen in water is a sign of possible pollution.

District: A U.S. Army Corps of Engineers administrative area.

Diversity: A measure of the number of species coexisting in a community.

Dredged material: Material that is excavated or dredged from waters of the United States.

Ebb tide: A falling tide.

Effluent: The discharge to a body of water from a defined source, generally consisting of a mixture of waste and water from industrial or municipal facilities.

Environmental Impact Statement (EIS): Required by NEPA for actions that could result in significant environmental impacts or for projects that are not eligible for an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI). Results in a Record of Decision from the District Commander, Army Corps of Engineers (USACE).

Emissions: Refers to pollution being released or discharged into the air from natural or man-made sources. Pollutants may be released directly into the air from a structural device (i.e., smokestack, chimney, exhaust pipe) or indirectly via volatilization or dispersal (i.e., aerosol spraying).

Environmental Assessment (EA): A document required by NEPA, which provides sufficient information to the District Commander, USACE on potential environmental effects of the proposed action and its alternatives to determine if an EIS or FONSI is required.

Epibenthic: The area on top of the sea floor. Epibenthic organisms may be freely moving or sessile (permanently attached to a surface).

Estuary: Semi-enclosed coastal body of water which has free connection with the open sea, and which within freshwater and seawater mix.

Eutrophic: Describes an aquatic system with high nutrient concentrations. These high nutrient concentrations are generally from anthropogenic sources. These nutrient concentrations fuel algal growth. This algae eventually dies and decomposes, with reduces the amount of dissolved oxygen in the water.

Eutrophication: The fertilization of surface waters by nutrients that were previously scarce. Human activities are greatly accelerating the process. The most visible consequence is the proliferation of algae. The increased growth of algae and aquatic weeds can degrade water quality.

Evaluation: The process of judging data in order to reach a decision.

Exposure: The period of time during which an organism is exposed to a laboratory test concentration or field condition.

Federal Standard: The dredged material placement alternative(s) identified by the U.S. Army Corps of Engineers that represent the least costly, environmentally acceptable alternative(s) consistent with sound engineering practices and which meet the environmental standards established by the 404(b)(1) evaluation process. [See Engle et al. (1988) and 33 CFR 335-338].

Fetch: The area in which seas (waves) are generated by wind having a fairly constant direction and speed.

Flood tide: A rising tide.

Geotextile: A permeable synthetic fabric, which may be woven or non-woven that is used as a filter in construction projects.

Glare: Light emitted at intensity great enough to reduce a viewer's ability to see, and in extreme cases causing momentary blindness.

High tide (high water): Maximum elevation reached by each rising tide.

Hurricane: An intense tropical cyclone in which winds tend to spiral inward toward a core of low pressure. Maximum surface wind velocities equal or exceed 75 mph for several minutes or longer at some point.

Hypoxia/Anoxia: Deficiencies in the concentration of dissolved oxygen in aquatic systems.

Hypoxic/Hypoxia: Having dissolved oxygen concentrations less than 4 to 5 mg/L (MDE, 1994).

Impaired waters list (or impairments): Impaired waters are waters that do not meet State water quality standards. Under the Clean Water Act, section 303(d), States, territories and authorized tribes are required to develop lists of impaired waters. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters.

Indirect Economic Impact: Multiplier effects associated with purchases and sales by businesses that supply inputs to businesses that are directly impacted by project spending.

Induced Economic Impact: The effect of increased consumer-level spending in a region as a result of direct and indirect economic impacts.

Infauna: Aquatic organisms that live in the substrate of a body of water, especially in a soft bottom or reef.

Intertidal: The area of shore located between high and low tides.

Invertebrates: Animals which lack a backbone and include such as squids, octopuses, lobsters, or shrimps, crabs, shellfishes, sea urchins and starfishes.

Juvenile: Strictly speaking, a juvenile is any of a species which is not yet sexually mature. In the context of many finfish surveys, however, it is most often used interchangeably with young-of-year (YOY).

Keystone species: A predator at the top of a food web, or discrete sub-web, capable of consuming organisms of more than one trophic level beneath it.

Land use - The way land is developed and used in terms of the kinds of anthropogenic activities that occur (e.g. agriculture, residential areas, and industrial areas).

Light Trespass: Light that shines beyond the boundaries of the property on which it is located and onto areas where it is unwanted or interferes with land use.

Linguistically Isolated Population: Refers to the proportion of households in a geographic area in which no one over the age of 14 speaks English "very well," as defined by the Census Bureau.

Low Income Population: Refers to the proportion of individuals in a geographic area whose income is at or below 200% of the poverty line, as defined by the Census Bureau.

Lower low water: The lower of the two low waters of any tidal day.

Macroinvertebrate: Organisms greater than 0.5 mm, possessing no internal skeleton.

Maintenance dredging: Dredging necessary to keep the channels serving the Port at their nominal authorized depth and width.

Mean sea level: The average height of the surface of the sea for all stages of the tide over a 19-year tidal epoch.

Mean (Higher High, High, Low, Lower Low) Water: Average height of the (higher high, high, low, lower low) waters over a 19-year period.

Mesohaline: Moderately brackish water with low range salinities (from 5-18 parts per thousand).

Metocean: meteorology and physical oceanography

Migratory: Describing groups of organisms which move from one habitat to another on a regular or seasonal basis.

Nekton: Organisms with swimming abilities that permit them to move actively through the water column and to move against currents (i.e. fish, crabs).

Nitrate: Salt or ester of nitric acid (NO_3^-). It is an essential nutrient for phytoplankton growth, and its low surface water concentrations typically limit phytoplankton productivity. It is typically limiting in estuaries, it is not limiting in freshwaters.

Nitrite: Salt or ester of nitrous acid (NO_2^-).

Noise: Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

Nutrients: Compounds of nitrogen and phosphorus dissolved in water, which are essential to both plants and animals. Too much nitrogen and phosphorus act as pollutants and can lead to unwanted consequences - primarily algae blooms that cloud the water and rob it of oxygen critical to most forms of aquatic life. Sewage treatment plants, industries, vehicle exhaust, acid rain, and runoff from agricultural, residential and urban areas are sources of nutrients entering the Chesapeake Bay.

Opportunistic species: Generally small organisms that are short-lived and reproduce rapidly. They generally dominate communities in disturbed or stressed habitats.

Particulate matter: Matter composed of particles that are not bound together (e.g., sand or dust).

Pelagic: The open ocean, excluding the ocean bottom and shore.

Pelagic Species: Fish species that live at or near the water's surface.

People of Color Population: Refers to the proportion of individuals in a geographic area who are not non-Hispanic whites, as defined by the Census Bureau.

pH: A measure of acidity or alkalinity on a scale of 0 (acidic) to 14 (basic), with 7 being neutral.

Phaeophytin: Degraded product of chlorophyll *a.* The amount of this compound in the water is utilized to estimate the amount of phytoplankton in the surface water.

Phosphate: The anion (PO_4-) or a salt of phosphoric acid. Essential to the metabolism of living organisms because inorganic phosphate is required for the synthesis of ATP. Plants and microorganisms take up phosphorus mainly in the form of phosphates, and various phosphates are used as fertilizers. Excess phosphate washed into streams and lakes contributes to eutrophication and formation of algal blooms.

Plankton: Small or microscopic algae and organisms associated with surface water and the water column.

Plume: A space containing a substance or characteristic released from a point source.

Polychaete: A marine annelid worm of the class *Polychaeta*.

Population over Age 64: Refers to the proportion of individuals in a geographic area who are age 64 or older.

Population with Less than High School Education: Refers to the proportion of individuals in a geographic area who are over age 25 and have not attained a high school diploma.

Pound Net: A long net strung between stakes and arranged in such a manner to direct fish into a netted enclosure.

Pycnocline: A layer of water across which the density changes rapidly, due to salinity or temperature. An example from an estuary would be a pycnocline separating deep, more saline cooler water and shallow, fresher warmer water.

Reference site: The location from which reference sediment is obtained.

Region: U.S. Environmental Protection Agency administrative area.

Regulations: Administrative rules published in the Code of Federal Regulations (CFR) or Code of Maryland Regulations (COMAR).

Rip-rap: A layer of large stone or broken rock that is placed on an embankment for erosion control and protection.

Salinity regime: A portion of an estuary distinguished by the amount of tidal influence and salinity of the water. The major salinity regimes are, from least saline to most saline:

- **Tidal Fresh** – Describes waters with salinity between 0 and 0.5 parts per thousand (ppt). These areas are at the extreme reach of tidal influence.
- **Oligohaline** – Describes waters with salinity between 0.5 and 5 ppt. These areas are typically in the upper portion of an estuary.
- **Mesohaline** – Describes waters with salinity between 5 and 18 ppt (brackish). These areas are typically in the middle portion of an estuary.
- **Polyhaline** – Describes waters with salinity between 18 and 30 ppt (brackish). These areas are typically in the lower portion of an estuary, where the ocean and estuary meet.

Sand: Fine-grained sediment particles that have a diameters between 2.00 and 0.0625 millimeters.

Sediment: Matter that settles and accumulates on the bottom of a body of water or waterway.

Sedimentation: The separation of suspended particles from water by gravity.

Secchi disk: A white and black disc used to gauge depth of light penetration in the water column.

Secchi depth: A measure of the clarity of water, especially seawater.

Shallow water: Water of such depth that surface waves are noticeably affected by bottom topography.

Shallow water habitat (SWH): Areas generally less than six ft in depth.

Shannon-Weiner Diversity Index: Typically used to show the hierarchical species diversity and one of the parameters used to calculate the B-IBI. Formula is: H'=(ni/N)log(ni/N) where ni = number of individuals of a given species and N = total number of individuals in each sample (Brower and Zar 1984).

Shoal: An area of submerged accumulation of sediments in shallow or deep water.

Shore: The narrow strip of land in immediate contact with the sea.

Shoreline: The intersection of a specified plane of water with the shore or beach (typically taken as mean high water or mean higher high water).

Silt: A fine-grained sediment particle that has a diameter of less than 0.0625 millimeter and greater than 0.0039; a physical property measured in sediment grain size analysis.

Sound: A vibratory disturbance created by a vibrating object, which, when transmitted by longitudinal pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

Storm surge: A rise above normal water level on the open coast due to the action of wind stress on the water surface or atmospheric pressure differentials associated with storm events.

Stratification: Vertical arrangement in layers, e.g. distinct temperature bands within a water body.

Supernatant: Liquid floating on the surface of sediments or precipitate.

Surf zone: The area of breaking waves.

Submerged aquatic vegetation (SAV): Vascular plants that grow completely underwater are referred to as SAV. Light penetration, turbidity, water depth, salinity (mesohaline species require 5 to 18 ppt), and nutrient availability influence the distribution, growth and viability of SAV. SAV normally occurs in water depths to 10 ft, although SAV is more likely to be found in depths of 3 – 5 ft or less in the Chesapeake Bay because of increased turbidity levels (Batiuk et. al, 1992).

Substrate: A surface on which organisms live and grow. The substrate may simply provide structural support, or may provide water and nutrients. A substrate may be inorganic, such as rock or soil, or it may be organic, such as wood.

Tests/testing: Specific procedures which generate biological, chemical, and/or physical data to be used in evaluations. The data are usually quantitative, but may be qualitative (e.g., taste, odor, organism behavior). Testing for discharges of dredged material in waters of the United States is specified in 40 CFR 230.60 and 230.61 and is implemented through the procedures in this manual.

Tidal datum: The plane or level to which soundings, elevations, or tide heights are referred.

TMDLs: "Total Maximum Daily Load" or TMDL. A TMDL defines the pollutant load that a water body can assimilate without causing violations of water quality standards, and allocates the loading between contributing point sources and non-point source categories.

Topography: The configuration of a surface, including its relief and the positions of its streams, roads, buildings, etc.

Total dissolved nitrogen (TDN): Measures both the inorganic and organic forms of the dissolved nitrogen, which includes nitrate, nitrite, and ammonia.

Total dissolved phosphate (TDP): Measures both the inorganic and organic forms of the dissolved phosphorus.

Total organic carbon (TOC): The sum of all organic carbon compounds in water.

Total suspended solids (TSS): Organic and inorganic particles that are suspended in water; includes sand, silt, and clay particles as well as biological material.

Turbidity: Cloudiness in the water column created by suspended particles, algae, or other materials; high turbidity reduces the amount of light that penetrates into the water column and, therefore, high turbidity can be harmful to aquatic life.

Underserved Community: Underserved communities refers to communities that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. A community with a disproportionate percentage of any of the following populations can be considered an underserved community:

- People-of-color population
- Low-income population
- Linguistically isolated population
- Population with less than high school education
- Population over age 64

Water quality certification: A state certification, pursuant to Section 401 of the Clean Water Act, that the proposed discharge of dredged material will comply with the applicable provisions of Sections 301, 303, 306, and 307 of the Clean Water Act and relevant State laws.

Water quality standard: A law or regulation that consists of the beneficial designated use or uses of a water body, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular water body, and an anti-degradation statement.

Wave height: The vertical distance between a crest and the preceding trough.

Young-of-the-year: All of the fish of a species younger than one year of age. Usually scientists assign an arbitrary "birth date" to all fish of a species hatched over a two or three month period in one year. The fish are then assigned to Age 1 status on that birth date. By convention, this is usually January 1.

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