Draft

ENVIRONMENTAL IMPACT STATEMENT
FOR
REAL PROPERTY MASTER PLAN IMPLEMENTATION AT MILITARY OCEAN TERMINAL SUNNY POINT, NORTH CAROLINA

DECEMBER 2024

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Draft Environmental Impact Statement for Real Property Master Plan Implementation at Military Ocean Terminal Sunny Point, North Carolina

Lead Agency:	Department of Army
Title of Action:	Draft Environmental Impact Statement for Real Property Master Plan Implementation at Military Ocean Terminal Sunny Point, North Carolina
Designation:	Draft Environmental Impact Statement
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Draft EIS Available:	https://www.sddc.army.mil/SitePages/Environmental%20Programs.aspx
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Comments:	Comments can be submitted during the comment period, ending February 4, 2025 to ATTN: Public Comments, James A. Rupkalvis, Installation Manager, 6280 Sunny Point Road, Southport, North Carolina 28461-7800, or by email to james.a.rupkalvis.civ@army.mil.

Abstract: This Draft Environmental Impact Statement (EIS) evaluates the potential environmental effects of implementing real property master planning actions at Military Ocean Terminal Sunny Point (MOTSU), North Carolina. The purpose of the Proposed Action is to comply with and implement the Army real property master planning process for MOTSU. The proposed action is needed to address MOTSU's required improvements to real property related to explosive safety, waterfront maintenance, security, and linear infrastructure. The projects and programs address compliance with federal, Department of Defense, and Army standards vital to safety, security, and mission needs. In addition to the No Action Alternative, the Draft EIS evaluates a Full Implementation Alternative and Partial Implementation Alternative. The Draft EIS incorporates the comments received during public scoping.

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EXECUTIVE SUMMARY

ES.1 Introduction

The Army Military Surface Deployment and Distribution Command (SDDC) proposes to implement master plan actions at Military Ocean Terminal Sunny Point (MOTSU). This Environmental Impact Statement (EIS) evaluates the potential effects of the implementation of specific projects and provides a programmatic analysis of the effects of implementing more broadly defined real property maintenance, repair, upgrade, and development actions that are still in the concept phase. This EIS is focused on master plan implementation actions that are currently planned or programmed to occur from approximately fiscal year 2025 to 2031.

ES.2 Background

MOTSU is an approximately 16,000-acre installation located on the banks of the Cape Fear River between the towns of Boiling Spring Lakes and Southport, North Carolina. MOTSU is operated by the Army's 596th Transportation Brigade under the SDDC, a major subordinate command to the United States (U.S.) Army Materiel Command (AMC). MOTSU is SDDC's east coast strategic ammunition port and is the primary Department of Defense (DoD) ammunition seaport supporting the European, African, and Middle Eastern areas of operation.

MOTSU is located in New Hanover and Brunswick Counties along both sides of the Cape Fear River. The main installation consists of 8,645 acres on the west bank of the Cape Fear River, 10 miles north of the mouth of the river and 25 miles south of the city of Wilmington. The main installation supports administrative, maintenance, cargo reception and holding functions, and waterfront operations. supports administrative and maintenance functions and the waterfront operations.

Surrounding the main installation to the north, west, and south is a 4,267-acre safety easement not owned by the government where private owner restrictions apply. The Leland Interchange Yard, a 652-acre rail yard where rail cargo from commercial carriers is transferred to the Army before being transported to MOTSU, is located approximately 17 miles north. On Pleasure Island in New Hanover County, across the Cape Fear River from the main installation is a 2,267-acre undeveloped and uninhabited crescent-shaped MOTSU Explosive Safety Clear Zone (ESCZ). This is retained by the government to mitigate the effect of any accidental blast at the wharf or on a ship docked at MOTSU.

ES.3 Purpose and Need

The purpose of the proposed action is to comply with and implement the DoD/Army real property master planning for MOTSU in accordance with DoD Instruction 4165.70, *Real Property Management*, and the requirements and guidance of Unified Facilities Criteria (UFC) 2-100-01, *Installation Master Planning*. At MOTSU, these are the real property planning goals:

- Enhance mission readiness through training and well-maintained, appropriate, and interoperable infrastructure components
- Strive for sustainable facilities, infrastructure, and operations
- Develop an enduring mission plan that provides for uninterrupted operations and adaptive response
- Provide for safety and security of MOTSU staff and assets
- Improve the work environment for MOTSU's workforce

The proposed action is needed to address MOTSU's required improvements to real property related to explosive safety, waterfront maintenance, security, and linear infrastructure. The projects and programs address compliance with federal, DoD, and Army standards vital to safety, security, and mission needs. Without the implementation of the proposed projects and programs, mission effectiveness would continue to be impeded over time.

ES.4 Proposed Action

In order to address MOTSU's needed improvements specifically as related to explosive safety, waterfront maintenance, security, linear infrastructure, and development, the Army's proposed action is to implement the real property master planning projects currently programmed for execution from Fiscal Year (FY) 25 through FY31. The following screening factors were considered when identifying a reasonable range of alternatives:

- Mission Compatibility: The alternative must allow for MOTSU to effectively and efficiently accomplish its mission.
- Short- and Long-Range Real Property Needs: The alternative must consider the goals of the long-term, 20-year planning horizon while also responding to current and short-range missions and requirements in a manner that is consistent with the master plan.
- Cost Efficiency/Financial Stewardship: The alternatives must be practical and feasible from a technical and economic standpoint and identify opportunities for reduced life-cycle costs of real estate assets and reduction in energy and water consumption, air emissions, and waste generation.

Based on these considerations, the Army determined that there are two alternatives—one for partial implementation and the other for full implementation of planned projects.

ES.5 Alternatives

ES.5.1 Full Implementation Alternative

Under the Full Implementation Alternative, MOTSU would implement the projects currently planned for implementation from approximately FY25–FY31 (**Table ES-1**).

ES.5.2 Partial Implementation Alternative

The Partial Implementation Alternative is a subset of the activities included in the Full Implementation Alternative. **Table ES-1** provides a comparison of the action alternatives as

categorized by function and analysis type. Although the Partial Implementation Alternative would not address all requirements as comprehensively as the Full Implementation Alternative, it would substantially improve conditions and adequately address immediate installation needs.

Table ES-1 Comparison of Action Alternatives

Barricade Safety	Full Implementation	Partial Implementation
Annual Barricade Repair and Maintenance	Yes	Yes
Install Lightning Protection System	Yes	Yes
Waterfront Maintenance		
Shoreline Protection – Phase 1	Yes	Yes
Maintenance Dredging of Channels, Berths, and Turning Basins for the South, Central, and North Wharves	Yes	Yes
Maintenance and Repairs of Waterfront Infrastructure (Wharves and Associated Infrastructure)	Yes	Yes
Maintenance and Repairs to Security Boat Dock, Ramp, and Wave Attenuator	Yes	Yes
Pleasure Island Explosive Safety Clear Zone Security		
Clearing and Fencing of Area Adjacent to the Property Line and Dow Road. Establishing Gates at Public Road Crossings of Property Boundary. Maintenance of Explosive Clearance Safety Zone Vegetation in Areas Not Controlled by Tenant.	Yes	Yes
Linear Infrastructure		
Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate	Yes	No
Repair and Repave Existing Roads, Hardstands, Parking Areas, and Pads	Yes	Yes
Upgrade and Repair Rail Lines	Yes	Yes
Improve utilities within existing corridors	Yes	Yes
Stormwater Mitigation		
Flood Mitigation for Classification Yard/Bridge Crane Area	Yes	No
Site-wide Stormwater Drainage Improvements	Yes	Yes
Cantonment Area Infill		
Improvement of Facilities and Infrastructure	Yes	Yes

ES.5.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the proposed projects. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific National Environmental Policy Act (NEPA) and other required compliance. This approach lacks the benefit of a comprehensive planning approach and would not be in line with the requirements of UFC 2-100-01. It would also not take into account the combined effects of all the projects in this EIS's proposed action, as well as cumulative effects. The No Action Alternative would not satisfy the purpose of or need for the proposed action and fundamental safety and infrastructure concerns might not be addressed. The No Action Alternative is included per the requirements of the Council on Environmental Quality's (CEQ's) and Army's NEPA regulations to provide a baseline for comparison with the proposed action.

ES.6 Public Involvement

The Army issued a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on October 12, 2023, initiating a 30-day public scoping period. Notices were also published in local newspapers, the *State Port Pilot* and *Star News.* The NOI provided a summary of the proposed action and provided information on the virtual public scoping process including materials made available for 30 days on the U.S. Army SDDC MOTSU Environmental website. Three comment letters were received and these were considered in the development of the Draft EIS.

This Draft EIS, which includes a Draft Finding of No Practicable Alternative (FONPA) in Appendix D, is available for review by the public on the SDDC MOTSU Environmental Website:

https://www.sddc.army.mil/SitePages/Environmental%20Programs.aspx

The Notice of Availability (NOA) of the Draft EIS and Draft FONPA was published in the *Federal Register* on December 20, 2024 beginning a 45-day comment period, which ends on February 4, 2025. Public review of the FONPA is per Executive Orders 11988 and 11990 due to activities anticipated in floodplains and wetlands. Comments can be submitted during the comment period to ATTN: Public Comments, James A. Rupkalvis, Installation Manager, 6280 Sunny Point Road, Southport, North Carolina 28461-7800, or by email to james.a.rupkalvis.civ@army.mil.

The public may also contact the Public Affairs Office, Surface Deployment and Distribution Command at (618) 220-6119, with questions. Members of the public also may make inquiries about the proposed action and EIS by telephone by calling Michael Burkhalter, Legislative Affairs Officer, Public and Congressional Affairs Office, Surface Deployment and Distribution Command: telephone (618) 220-6119, email michael.d.burkhalter.civ@army.mil.

Comments submitted within the public review period will be considered in developing the Final EIS. A NOA will also be published to announce public availability of the Final EIS and its associated 30-day waiting period, after which time the Record of Decision (ROD) may be signed. A ROD is a public document that states the decision, alternatives, and factors considered (to include public comments), and the proposed mitigation adopted. Once the ROD is signed, a NOA will be published announcing the availability of the ROD for public review.

ES.7 Environmental Consequences and Cumulative Effects

Environmental consequences that could potentially result from the alternatives analyzed in the EIS are summarized in **Table ES-2**. The proposed action would have significant impacts on wetlands from unavoidable disturbance during construction and operation of multiple proposed projects under both the Partial and Full Implementation Alternatives. Adherence to applicable permitting requirements and associated mitigation measures yet to be determined would mitigate these effects to the extent possible. Projects would be designed to avoid or minimize effects to wetlands and the boundaries of such features would be delineated prior to beginning

of each project, further minimizing impacts. The proposed action could also have significant effects on historic resources.

In accordance with Section 106 of the National Historic Preservation Act (NHPA), the Army has determined that there is the potential for significant impacts to archaeological resources and adverse effects on historic properties. MOTSU is consulting with the North Carolina State Historic Preservation Officer (SHPO) and other consulting parties regarding the potential to adversely affect historic properties. Measures to avoid, minimize, or mitigate effects to historic properties will be identified through this consultation and would reduce the impacts to less than significant to cultural resources.

In accordance with Section 7 of the federal Endangered Species Act (ESA), the Army has determined that the Proposed Action may affect, is likely to adversely affect the red-cockaded woodpecker and may affect but is not likely to adversely affect other federally listed threatened and endangered species. The Army is consulting with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS).

Short-term and long-term adverse effects on all other resources analyzed in the EIS would be less than significant. Short-term effects would primarily occur when proposed projects are implemented, while the long-term effects would be positive. The effects of both Alternatives would be similar, although short-term negative and long-term positive effects from the Partial Implementation Alternative would be less extensive as fewer projects would be implemented. The incremental implementation of the proposed projects over a 7-year period would ensure that not all effects occur simultaneously. Impacts would be further minimized through the implementation of best management practices (BMPs) and mitigation measures.

When considered with the incremental effects of other past, present, and reasonably foreseeable future projects occurring on and in the vicinity, the environmental consequences of the Full and Partial Implementation Alternatives would not contribute significant adverse cumulative effects on the resources analyzed in the EIS.

ES.8 Mitigation Measures

To mitigate significant adverse impacts on wetlands, protected species, and cultural resources from the Full and Partial Implementation Alternatives, the Army would adhere to applicable requirements: of Section 404 and 401 permits in accordance with the Clean Water Act; any terms and conditions resulting from ESA consultation; and any requirements that would provide for the protection of cultural resources.

Table ES-2 Environmental Consequences Summary

Resource	No Action Alternative	Full Implementation Alternative	Partial Implementation Alternative
Air Quality and Climate Change	No effects on local or regional ambient air quality.	Short-term, intermittent, dispersed emissions from equipment would not exceed thresholds. No permanent sources of emissions are proposed. Effects would be less than significant.	Effects would be similar to those resulting from the Full Implementation Alternative. Total emissions over the time would be lower because fewer projects would occur.
Noise	No effects on existing noise conditions.	Intermittent, localized, and temporary construction-related noise would be less than significant. No noise sensitive areas would be impacted. Effects would be less than significant.	effects would be similar to those resulting from the Full Implementation Alternative; however, the noise associated with construction of the secondary egress and flood mitigation work would not occur.
Geological Resources	No new or different effects on geology, topography, and soils. Shoreline erosion would be expected to continue.	Several projects (barricade maintenance and repair, rail replacement, flood mitigation, and shoreline stabilization) would modify and ultimately stabilize existing previously modified topography and would stabilize soils, reducing erosional loss. Construction projects could temporarily disturb soils. Dredging of channels would remove accumulated sediment, which would be deposited at an approved offshore location. Effects would be less than significant.	Effects would be similar to those resulting from the Full Implementation Alternative; however, flood mitigation work would not occur and the effects of flooding would continue. The secondary egress road would not be constructed and soils and topography in this area would not be affected.
Water Resources	No changes to water resources conditions. Shoreline erosion would continue to affect turbidity of adjacent surface waters.	Temporary minor localized effects to surface waters could result from activities under the Proposed Action that expose or disturb soils resulting in stormwater runoff, and increased turbidity from in-water work. No effects would be expected to groundwater resources. Barricade safety project, secondary egress gate, and ESCZ fencing would impact approximately 9.7 acres of wetlands. Other projects have the potential to impact wetlands but design footprints are not available. Barricade safety project and ESCZ security projects would take place in approximately 5.05 and 0.25 acres of floodplains, respectively. A portion of the phase 1 shoreline restoration work would occur in the floodplain, though project footprint is not available at this time to calculate the area affected. Repairs and maintenance of the security boat dock, ramp, and wave attenuators would be made to existing structures within the floodplain. No inhabited structures would be constructed within the floodplain as part of the Proposed Action.	Effects would be similar to those resulting from the Full Implementation Alternative; however, the secondary egress road would not be constructed, reducing known wetland impacts to approximately 7.6 acres.

Resource	No Action Alternative	Full Implementation Alternative	Partial Implementation Alternative
Biological Resources	No effects to biological resources.	Short-term, less than significant adverse effects on plant communities from vegetation removal. Long-term beneficial effects to wetland vegetation along the shoreline. Short- and long-term, intermittent, less than significant adverse effects on common wildlife species associated with habitat loss, noise and human presence, and direct injury and mortality. ESA Section 7 determination: May affect, likely to adversely affect red-cockaded woodpecker and may affect, not likely to adversely affect federally listed threatened and endangered species: northern long-eared bat, tricolored bat, loggerhead sea turtle, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, Atlantic sturgeon, shortnose sturgeon, and rough-leaved loosestrife.	Effects to plant communities and wildlife would be the same as the preferred alternative, although to a slightly lesser degree as several projects would not occur. Effects to threatened and endangered species would be the same as the preferred alternative.
Coastal Zone Management	No change to existing coastal zone conditions	The Army has determined that the Preferred Alternative is consistent to the maximum extent practicable with the North Carolina Coastal Management Program as described in CAMA. A FCD will be submitted to NCDEQ DCM once NHPA and ESA consultations are completed.	Same as Full Implementation Alternative
Aesthetics and Visual Resources	There would be no change to existing aesthetics and visual resources conditions.	Temporary and negligible effects from maintenance and repair of wharves and associated infrastructure and shoreline protection projects directly along the waterfront, which would be visible from points along the Cape Fear River. Shoreline protection would result in long-term beneficial effects from repair and prevention of erosion along the shoreline where currently there are exposed eroded banks, loss of natural vegetation and turbid waters adjacent to the shoreline. ESCZ security projects would minimally change the viewshed as the portions of the fence would be within the forested buffer inside the MOTSU boundary. effects would be less than significant.	The projects that would not be implemented would not impact aesthetics and visual resources; therefore, effects would be the same as described for the Full Implementation Alternative.

Resource	No Action Alternative	Full Implementation Alternative	Partial Implementation Alternative
Cultural Resources	No effects on historic and cultural resources	Potential significant effects to archaeological resources and adverse effects on historic properties. MOTSU is consulting with the North Carolina SHPO and other consulting parties regarding the potential to adversely affect historic properties. Measures to avoid, minimize, or mitigate effects to historic properties will be identified through this consultation and would reduce the effects to less than significant to cultural resources. The proposed action does not involve architectural resources and there are no NRHP-eligible buildings or structures on MOTSU. No traditional cultural properties have been identified at MOTSU. Government-to-government consultation between MOTSU and each federally recognized Tribal Nation with ties to the area is ongoing. No significant effects on Traditional Cultural Properties are anticipated.	Effects on archaeological and architectural resources and traditional cultural properties would be the same as the Full Implementation Alternative.

Legend: CAMA = Coastal Area Management Act; DCM = Division of Coastal Management; ESA = Endangered Species Act; ESCZ = Explosive Safety Clear Zone; FCD = Federal Consistency Determination; MOTSU = Marine Ocean Terminal Sunny Point; NCDEQ = North Carolina Department of Environmental Quality; NHPA = National Historic Preservation Act;; NRHP = National Register of Historic Places;; SHPO = State Historic Preservation Officer

TABLE OF CONTENTS

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

ADP	Area Development Plan
AEC	Area of Environmental Concern
AMC	U.S. Army Materiel Command
AR	Army Regulation
APE	Area of Potential Effect
BMP	Best Management Practice
CAA	Clean Air Act
CAMA	Coastal Area Management Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	Decibels
DCM	Division of Coastal Management
DMMP	Dredged Material Management Program
DoD	Department of Defense
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	United States Environmental Protection Agency
EPRB	Executive Plan Review Board
ESA	Endangered Species Act
ESCZ	Explosive Safety Clear Zone
FCD	Federal Consistency Determination
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FY	Fiscal Year
FONPA	Finding of No Practicable Alternative
GHG	Greenhouse Gas
HAP	Hazardous Air Pollutant
HTF	High Tide Flooding
ICRMP	Integrated Cultural Resources Management Plan
IPB	Installation Planning Board
ISWMP	Integrated Solid Waste Management Plan
LOD	Limit of Disturbance
LPS	Lightning Protection System
MBTA	Migratory Bird Treaty Act
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MOTSU	Military Ocean Terminal Sunny Point
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLEB	Northern long-eared bat
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
ODMDS	Ocean Dredged Material Disposal Site
Pb	lead
PDC	Project Design Criteria
PEA	Programmatic Environmental Assessment

$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RCW	red-cockaded woodpecker
REC	Record of Environmental Consideration
ROD	Record of Decision
ROI	Region of Influence
RPMP	Real Property Master Plan
SARBO	South Atlantic Regional Biological Opinion
SC-CH_4	Social Cost of Methane
SC-CO_2	Social Cost of Carbon
SC-GHG	Social Cost of Greenhouse Gas
SC-N_2O	Social Cost of Nitrous Oxide
SDDC	Surface Deployment and Distribution Command
SHPO	State Historic Preservation Officer
SMMP	Site Management and Monitoring Plan
SO_2	sulfur dioxide
SR	State Road
SWPPP	Stormwater Pollution Prevention Plan
U.S.	United States
U.S.C.	United States Code
UFC	Unified Facilities Criteria
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1.0 INTRODUCTION

The Army Military Surface Deployment and Distribution Command (SDDC) proposes to implement master plan actions at Military Ocean Terminal Sunny Point (MOTSU). This Environmental Impact Statement (EIS) evaluates the potential effects of the implementation of specific projects and provides a programmatic analysis of the effects of implementing more broadly defined real property maintenance, repair, upgrade, and development actions that are still in the concept phase. Although the master planning and implementation process is not static, the Army has planned and prepared this EIS in accordance with master plan and EIS policy, regulatory, and analytical timelines. Thus, this EIS is focused on master plan implementation actions that are currently planned or programmed to occur from approximately fiscal year (FY) 2025 to FY 2031 (FY25–FY31).

The EIS evaluates two action alternatives, which represent partial and full implementation of master planning actions, as well as the No Action Alternative. The Army has prepared this EIS in accordance with requirements of the National Environmental Policy Act (NEPA) (Title 42 of the United States Code [U.S.C.] Section 4321 et seq.); its implementing regulations (*40 Code of Federal Regulations* [CFR] Parts 1500–1508); and the Army's regulations implementing NEPA (32 CFR Part 651). The Army is the lead agency for the proposed action; there are no cooperating agencies (per 40 CFR Section 1501.8).

1.1 INSTALLATION DESCRIPTION AND MASTER PLAN BACKGROUND

MOTSU is an approximately 16,000-acre installation located on the banks of the Cape Fear River between the towns of Boiling Spring Lakes and Southport, North Carolina (**Figure 1.1-1**). MOTSU is operated by the Army's 596th Transportation Brigade under the SDDC, a major subordinate command to the United States (U.S.) Army Materiel Command (AMC). MOTSU is SDDC's east coast strategic ammunition port and is the primary Department of Defense (DoD) ammunition seaport supporting the European, African, and Middle Eastern areas of operation.

MOTSU is located in New Hanover and Brunswick Counties along both sides of the Cape Fear River. The main installation consists of 8,645 acres on the west bank of the Cape Fear River, 10 miles north of the mouth of the river and 25 miles south of the city of Wilmington. The main installation supports administrative and maintenance functions and waterfront operations. The facility serves approximately five active-duty soldiers and 300 civilians. There are no occupied residential housing areas, hospitals, commissaries, or publicly available services on MOTSU.

Surrounding the main installation to the north, west, and south is a 4,267-acre safety easement, which is not owned by the government and where private owner restrictions apply. The Leland Interchange Yard, a 652-acre rail yard where rail cargo from commercial carriers is transferred to the Army before being transported to MOTSU, is located approximately 17 miles north. On Pleasure Island in New Hanover County, across the Cape Fear River from the main installation is the 2,267-acre undeveloped and uninhabited crescent-shaped MOTSU Explosive Safety Clear Zone (ESCZ). This is retained by the government to mitigate the effect of any accidental blast that might occur at the wharf or on a ship docked at MOTSU.

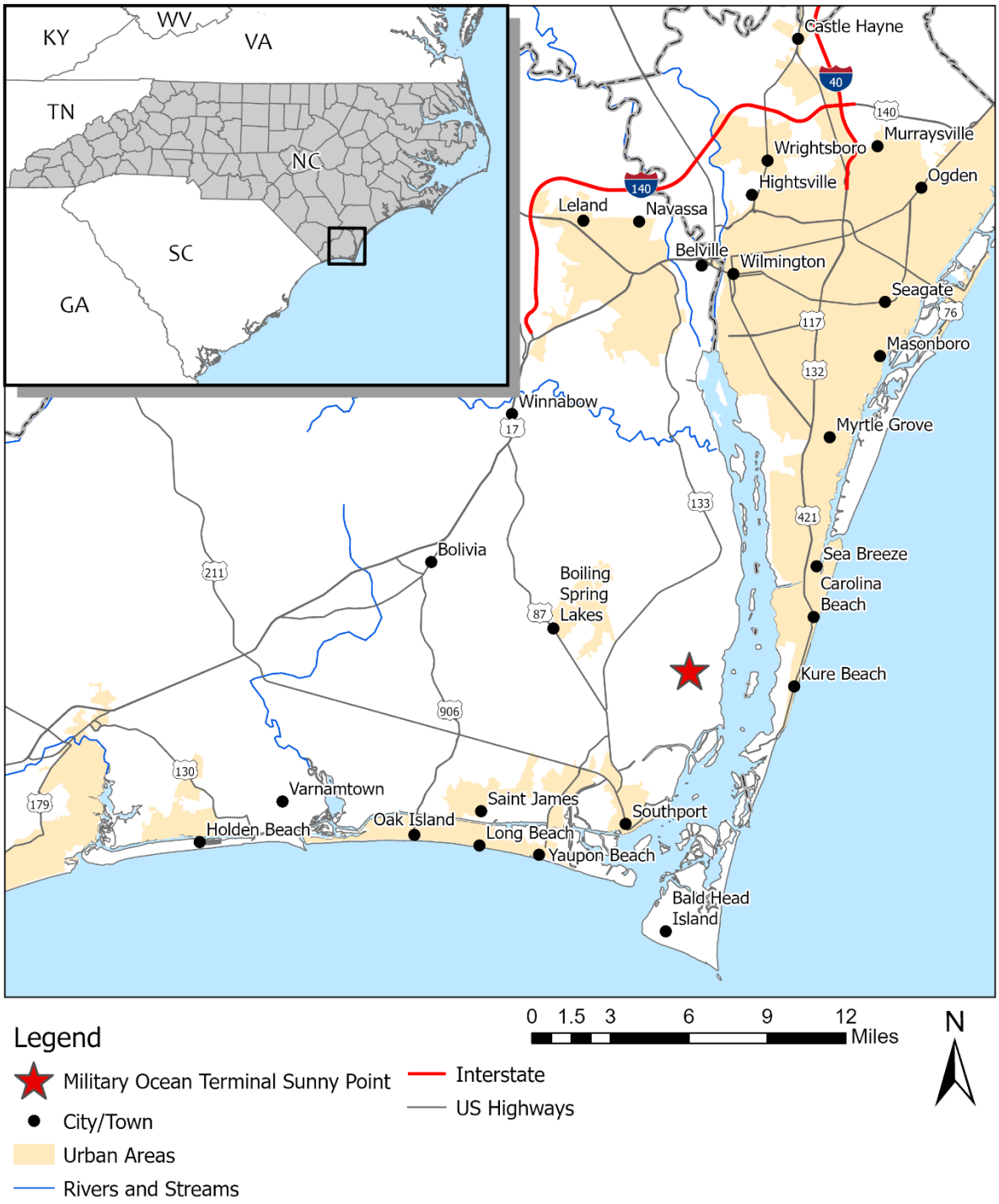

Figure 1.1-1 MOTSU Location

Real property master planning at MOTSU is a continuous process that enables MOTSU to meet its current facility and infrastructure requirements without compromising the ability to meet future mission requirements. With the development of the installation-wide Real Property Master Plan (RPMP) Vision Plan (July 2018) and Plan Summary (March 2019), as well as Area Development Plans (ADPs) for the Administrative, Reception and Holding, and Waterfront Operations Districts (March 2019) (**Figure 1.1-2**), updates are made to the RPMP through MOTSU's Installation Planning Board (IPB) and SDDC's Executive Plan Review Board (EPRB). As needed, projects are added, modified, removed, and re-prioritized in response to changing mission needs and funding availability.

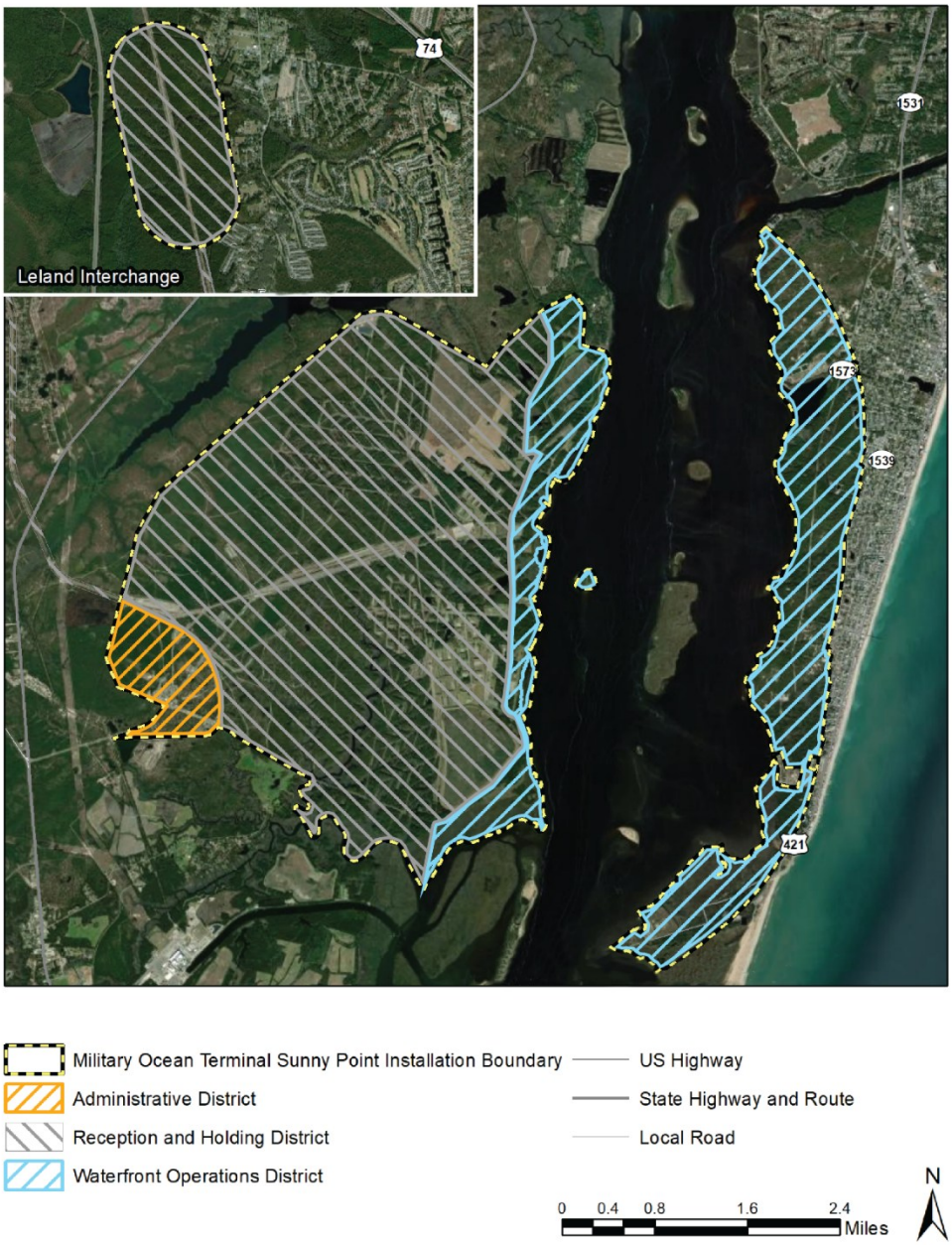

Figure 1.1-2 MOTSU Districts

The Administrative District is where most administrative and maintenance functions are located. The Reception and Holding District includes areas where cargo is received and held and this includes a large part of the main installation as well as the Leland Interchange Yard. The Waterfront Operation District includes the wharves where cargo is transferred to ships as well as the ESCZ. The ESCZ includes one manmade island across from the Center Wharf.

The ADPs for each of these districts provide strategies for long-range development that consider both current and future mission requirements. Implementing these strategies continues to evolve as the activities required to address needed improvements are further refined, developed, designed, evaluated, and prioritized for funding.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to comply with and implement the DoD/Army real property master planning process for MOTSU in accordance with DoD Instruction 4165.70, *Real Property Management* (DoD 2018), and the requirements and guidance of Unified Facilities Criteria (UFC) 2-100-01, *Installation Master Planning* (DoD 2020). At MOTSU, these are the real property planning goals:

- Enhance mission readiness through training and well-maintained, appropriate, and interoperable infrastructure components
- Strive for sustainable facilities, infrastructure, and operations
- Develop an enduring mission plan that provides for uninterrupted operations and adaptive response
- Provide for safety and security of MOTSU staff and assets
- Improve the work environment for MOTSU's workforce

The proposed action is needed to address MOTSU's required improvements to real property related to explosive safety, waterfront maintenance, security, and linear infrastructure. The projects and programs address compliance with federal, DoD, and Army standards vital to safety, security, and mission needs. **Table 1.2-1** provides the need for each of the components of the proposed action, which are described in detail in **Section 2.3.** Without the implementation of the proposed projects and programs, mission effectiveness would continue to be impeded over time.

Table 1.2-1 Need for Proposed Action

Proposed Action	Need
Barricade Safety Projects: • Repair and Maintain Barricades • Install Lightning Protection System in the North Rail Holding Yard	Modernize mission-critical ammunition handling, holding, and transfer areas to be compliant with DoD explosive safety standards: • Some existing barricades require modification and repair to bring them into compliance with explosive safety regulations set forth in Defense Explosives Safety Regulation 6055.09 (V2.E5.4) • Lightning Protection Systems are required on all structures and areas containing, storing, or holding ammunition and explosives
Waterfront Maintenance Projects: • Phase 1 Shoreline Protection • Maintenance Dredging • Maintenance and Repairs of waterfront Infrastructure	Provide safety and security for mission-critical waterfront operations: • Repair and prevent erosion along the Cape Fear River shoreline that threatens access points to wharves • Dredging of channels, berths, and turning basins for the South, Central, and North Wharves is needed to provide safe water depths for vessel operations at MOTSU • Maintenance and repair of waterside real property to maintain compliance with DoD criteria, UFC 4-152-01, *Piers and Wharves*
Pleasure Island Explosive Safety Clear Zone Security Projects: • Clear and Fence Property Line • Install Gates • Maintain Vegetation	Improve physical security of the MOTSU perimeter to meet standards set forth in UFC 4-022-03, *Security Fences and Gates*.
Linear Infrastructure Construction, Repair, Maintenance Projects: • Construct Secondary Emergency Egress Road at Rail Gate • Repair and Repave Existing Roads Hardstands, Parking Areas, and Pads • Upgrade and Repair Rail Lines • Improve Utilities within Existing Corridors	Maintain and improve existing linear infrastructure, including utilities and transportation networks: • Provide for safe efficient evacuation of the installation during an emergency • Maintain, repair and improve infrastructure to prevent impacts to mission resulting from road, rail, or utility failure
Stormwater Mitigation Projects: • Flood Mitigation in Classification Yard and Bridge Crane Area • Site-wide Stormwater Drainage Improvements	Protect facilities and infrastructure: • Address current and future flooding that impedes operations
Cantonment Area Infill Development	Improve administrative functions, community support, maintenance, storage and supply activities, and safety and security.

Legend: DoD = Department of Defense; MOTSU = Military Ocean Terminal Sunny Point; UFC = Unified Facilities Criteria.

1.3 SCOPE OF ENVIRONMENTAL ANALYSIS

This EIS identifies, documents, and evaluates the potential environmental, cultural, and socioeconomic effects of implementing master planning projects and related actions that are sufficiently developed and planned for implementation from FY25–FY31. Additionally, this EIS

provides a programmatic analysis of the effects of implementing more broadly defined real property maintenance, repair, and upgrade actions and longer-term ADP actions that are still in the concept phase. This EIS also incorporates by reference the analysis contained within the 2020 Programmatic Environmental Assessment (PEA) for Real Property Master Plans on U.S. Army Installation Management Command Installations, and that PEA's resulting Finding of No Significant Impact (FONSI).

The EIS includes an evaluation of the short- and long-term effects to the environment, as defined in 40 CFR Section 1508.1(i), of implementing these actions, and informs decision-makers and the public of the potential environmental and socioeconomic effects along with associated mitigation. No project will be implemented until it undergoes the appropriate NEPA review. As planning and design details evolve, additional NEPA analysis (either a Record of Environmental Consideration [REC] to document use of an Army applied categorical exclusion or Environmental Assessment [EA]) may be tiered from this EIS in accordance with 40 CFR Section 1501.11.

Resources evaluated in this EIS include Air Quality, Noise, Geological Resources, Water Resources, Biological Resources, Coastal Zone Management, Aesthetics and Visual Resources, and Cultural Resources. Air Quality includes assessments for greenhouse gas (GHG) emissions.

1.4 DECISION TO BE MADE

As a result of the EIS process, the Army plans to select one of the alternatives analyzed in this EIS, enabling a decision informed by knowledge of anticipated environmental and socioeconomic effects, and the public's concerns. With the selection of an alternative, which will be documented in a Record of Decision (ROD), the Army decision-maker will also identify mitigations to be pursued to reduce the environmental effects of the selected alternative.

1.5 REGULATORY FRAMEWORK

In accordance with 32 CFR Section 651.14(a)(2), the Army considered applicable federal, state, and local regulations, laws, and Executive Orders (EO) during analysis of the proposed action's effects to individual environmental and social resources. The following were determined to be applicable to the proposed action:

- American Indian Religious Freedom Act (42 U.S.C. Section 21 et seq.)
- Archaeological Resources Protection Act (16 U.S.C. Section 470aa et seq.)
- Bald and Golden Eagle Protection Act (16 U.S.C. Section 668–668d)
- Clean Air Act (CAA) (42 U.S.C. Section 7401)
- Clean Water Act (CWA) (33 U.S.C. Section 1251)
- Coastal Zone Management Act (CZMA) (16 U.S.C. Section 1451 et seq.)

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. Section 9601 et seq.)
- Emergency Planning and Community Right-to-Know Act (42 U.S.C. Section 11001–11050)
- Energy Independence and Security Act (EISA) (42 U.S.C. Sections 6291, 6293, and 6295, as amended)
- Endangered Species Act (ESA) (16 U.S.C. Sections 1531–1543)
- Migratory Bird Treaty Act (MBTA), as amended (16 U.S.C. Sections 703–712)
- National Historic Preservation Act of 1966 (NHPA) as amended (54 U.S.C. Section 300101 et seq.)
- Native American Graves Protection and Repatriation Act (25 U.S.C. Ch. 32 Section 3001 et seq.)
- NEPA (42 U.S.C. Sections 4321–4347)
- Resource Conservation and Recovery Act (RCRA) (42 U.S.C. Section 6901)
- Safe Drinking Water Act (42 U.S.C. Section 300f et seq.)
- Sikes Act and Sikes Act Improvement Act (16 U.S.C. Sections 670a–6700)
- Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500–1508)
- National Pollutant Discharge Elimination System (NPDES) (40 CFR Part 122)
- Toxic Substances Control Act (15 U.S.C. Section 2601-2629)
- EO 11988 (as amended by EO 13690), Floodplain Management
- EO 11990, Protection of Wetlands
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12732, Intergovernmental Review of Federal Programs
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- EO 13007, Indian Sacred Sites
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks
- EO 13175, Consultation and Coordination with Indian Tribal Governments
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13834, Efficient Federal Operations
- EO 13900, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis
- EO 14008, Tackling the Climate Crisis at Home and Abroad
- EO 14096, Revitalizing our Nation’s Commitment to Environmental Justice for All

1.6 PUBLIC AND AGENCY INVOLVEMENT

Public involvement is a requirement of Sec. 102 (42 U.S.C. 4332) of NEPA and 40 CFR Sections 1501.9 and 1502.1(c). The Army invites and strongly encourages public participation in

the NEPA process. Consideration of the views of all interested parties promotes open communication and enables better decision-making. The Army specifically urges all agencies, organizations, and members of the public with a potential interest in the proposed action to participate in the decision-making process.

Regulations in 32 CFR Part 651 guide opportunities for public participation. The Army issued a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on October 12, 2023, initiating a 30-day public scoping period. Notices were also published in local newspapers, the *State Port Pilot* and *Star News*. The NOI provided a summary of the proposed action and information on the virtual public scoping process including materials made available for 30 days on the U.S. Army SDDC MOTSU Environmental website. Comments received during the scoping period were considered in the development of the Draft EIS; see **Appendix A.1** for a summary of agency and public comments.

This Draft EIS, which includes a Draft Finding of No Practicable Alternative (FONPA) in Appendix D, is available for review by the public on the SDDC MOTSU Environmental Website:

https://www.sddc.army.mil/SitePages/Environmental%20Programs.aspx

The Notice of Availability (NOA) of the Draft EIS was published in the *Federal Register* on December 20, 2024 beginning a 45-day comment period, which ends on February 4, 2025. Public review of the FONPA is per EOs 11988 and 11990 due to activities anticipated in floodplains and wetlands. Comments can be submitted during the comment period to ATTN: Public Comments, James A. Rupkalvis, Installation Manager, 6280 Sunny Point Road, Southport, North Carolina 28461-7800, or by email to james.a.rupkalvis.civ@army.mil.

The public may also contact the Public Affairs Office, Surface Deployment and Distribution Command at (618) 220-6119, with questions. Members of the public also may make inquiries about the proposed action and EIS by telephone by calling Michael Burkhalter, Legislative Affairs Officer, Public and Congressional Affairs Office, Surface Deployment and Distribution Command: telephone (618) 220-6119, email michael.d.burkhalter.civ@army.mil.

Comments submitted within the public review period will be considered in developing the Final EIS. An NOA will also be published to announce public availability of the Final EIS and its associated 30-day waiting period, after which time the ROD may be signed. A ROD is a public document that states the decision, alternatives and factors considered (to include public comments), and the proposed mitigation adopted. Once the ROD is signed, an NOA will be published announcing the availability of the ROD for public review.

1.7 ORGANIZATION OF THIS EIS

The organization of this EIS is as follows:

- **Chapter 1.0** provides background information and the purpose of and need for the proposed action.

- **Chapter 2.0** describes the proposed action and identifies alternatives carried forward for environmental analysis, including the No Action Alternative.
- **Chapter 3.0** describes the affected environment (i.e., the baseline conditions against which potential effects of the proposed action are measured) for each of the potentially affected resources; analyzes the potential effects of the alternatives on these resources.
- **Chapter 4.0** provides an assessment of cumulative effects as well as irreversible and irretrievable resources commitments.
- **Chapter 5.0** describes proposed mitigation measures that have been identified during the environmental analysis.
- **Chapter 6.0** lists the preparers of this document and contains a list of the persons and agencies contacted during the preparation of this document.
- **Chapter 7.0** provides the list of references cited in this EIS.
- **Appendices** include supporting information as follows
  - A: Summary of Public and Agency Comments
  - B: Standard Construction Equipment
  - C: Checklist for Tiered NEPA Compliance
  - D: Finding of No Practicable Alternative (Draft)
  - E: Threatened and Endangered Species Consultation Documentation
  - F: Coastal Consistency Determination
  - G: Cultural Resources Consultation Documentation
  - H: Air Quality Calculations and Assumptions
  - I: Best Management Practices and Standard Operating Procedures

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2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

In order to address MOTSU's needed improvements specifically as related to explosive safety, waterfront maintenance, security, linear infrastructure, and development, the Army's proposed action is to implement the RPMP projects currently programmed for execution from FY25 through FY31. Projects are discussed and effects evaluated commensurate with the level of detail currently available. Some projects are sufficiently developed for a detailed analysis, while other projects and actions are still in the concept phase.

2.1 ALIGNMENT OF MASTER PLANNING AND NEPA ALTERNATIVES ANALYSIS

Developing alternatives is a critical component of the master planning process. Both UFC 2-100-01 and 32 CFR Part 651 include guidance for incorporating master planning alternatives development into the NEPA process. Aligning the master planning and NEPA alternatives development is a means of streamlining the planning process and exploring and evaluating alternatives in a comprehensive and multidisciplinary manner. This fosters a broader analysis of environmental considerations and avoids inefficiencies of case-by-case and overly narrowly focused analyses for individual projects.

In the ADP planning process, alternatives are defined as options for long-range development of the district, including arrangement of functional areas, circulation, and utility systems. Alternatives are analyzed in terms of level of effectiveness in meeting real property planning goals, listed in **Section 1.2**.

During the ADP development process, ADP alternatives were evaluated for the level of effectiveness to meet the established real property planning goals. ADP alternatives were ranked from most to least effective and evaluated for areas of strengths and weaknesses. The ADP Preferred Alternative was prepared as a hybrid alternative that incorporated the most favorable elements of all three ADP alternatives, allowing MOTSU the flexibility to meet both sustainment and contingency missions. For NEPA analysis, only the ADP Preferred Alternative was considered (see **Section 2.4**). Project requirements and priorities are continuously evaluated with recommended adjustments reviewed by the IPB and SDDC's EPRB twice annually.

2.2 NEPA REASONABLE RANGE OF ALTERNATIVES

For NEPA alternatives to be considered reasonable and warrant further detailed analysis, they must meet the purpose of and need for the action, in this case to address MOTSU's required improvements related to explosive safety, waterfront maintenance, security, linear infrastructure, and development. The following screening factors were considered when identifying a reasonable range of alternatives:

- **Mission Compatibility:** The alternative must allow for MOTSU to effectively and efficiently accomplish its mission.
- **Short- and Long-Range Real Property Needs:** The alternative must consider the goals of the long term, 20-year planning horizon while also responding to current and short-range missions and requirements in a manner that is consistent with the master plan.
- **Cost Efficiency / Financial Stewardship:** The alternatives must be practical and feasible from a technical and economic standpoint and identify opportunities for reduced life-cycle costs of real estate assets and reduction in energy and water consumption, air emissions, and waste generation.

2.3 ALTERNATIVES CARRIED FORWARD FOR DETAILED EVALUATION

Since the ADPs were completed in 2019, master planning has continued principally through the ongoing work of the MOTSU IPB and SDDC's EPRB. Twice yearly, ADP implementation projects are reviewed and prioritized in conformance with Army Regulation (AR) 210-20, *Real Property Master Planning for Army Installations.* As the body responsible for ensuring orderly development and management of installation real property, the boards formally meet to consider all proposed projects and their prioritization for funding. This iterative master planning process ensures the projects are carefully vetted to address installation needs, while also providing flexibility for shifting priorities.

Based on the screening analysis presented in **Section 2.2**, the Army determined that variations on implementation of ADP projects provided a reasonable range of alternatives for the NEPA analysis. Two alternatives – one for partial implementation and the other for full implementation – are carried forward for detailed analysis in this EIS.

2.3.1 Full Implementation Alternative

Under the Full Implementation Alternative, MOTSU would implement the ADP projects and master planning actions currently planned for implementation from approximately FY25–FY31. The timeline for implementation presented here is based on the current government funding targets. Changes in prioritization and fluctuations in funding available could impact the timelines, but this will not affect meaningful and timely NEPA analysis to inform the Army's decision.

Sections 2.3.1.1 through Section 2.3.1.6 provide descriptions of the projects that are part of the Full Implementation Alternative, the Army's Preferred Alternative. Project descriptions provide the best detail currently available with a focus on the information that is necessary to inform meaningful impact analysis. The completeness of that impact analysis is commensurate with the available project detail. Where necessary, this EIS notes the follow-on compliance that would be deferred until more detail is available. For example, when project designs and footprints become available, additional survey work for wetlands, natural and cultural resources, and additional consultation and coordination with regulatory agencies may be required. As appropriate, reasonable assumptions are used as the basis for the analysis of effects. A key

assumption is that mitigation measures (detailed in **Chapter 5**) would be employed to minimize or eliminate potential adverse effects. These measures are considered part of the proposed action, and the evaluation of potential effects includes implementation of these measures. Another key assumption is that standard equipment and general construction methodologies would be employed (see **Appendix B**).

2.3.1.1 Barricade Safety

Annual Barricade Repair and Maintenance. At MOTSU, military munitions are staged on paved pads and in rail holding yards on spurs, short sections (approximately 530 to 620 feet) of rail that branch off main rail lines. Adjacent to these pads and spurs are earthen barricades designed to stop an explosion from reaching other explosive material and to reduce the separation distances required by explosives quantity distance regulations (**Figure 2.3-1**). There are a total of 157 earthen barricades at MOTSU, 61 at storage pads and 96 at railroad spurs. Additional barricades are in other areas of MOTSU (e.g., the Classification Yard). The location, height, length, and orientation of barricades varies from site to site. These dimensions are an important factor in determining the type, quantity, and configuration of materials that can be staged on pads and spurs. The barricades at pads and rail spurs at MOTSU are shown in **Figure 2.3-2.**

Figure 2.3-1 Typical Earthen Barricade at MOTSU

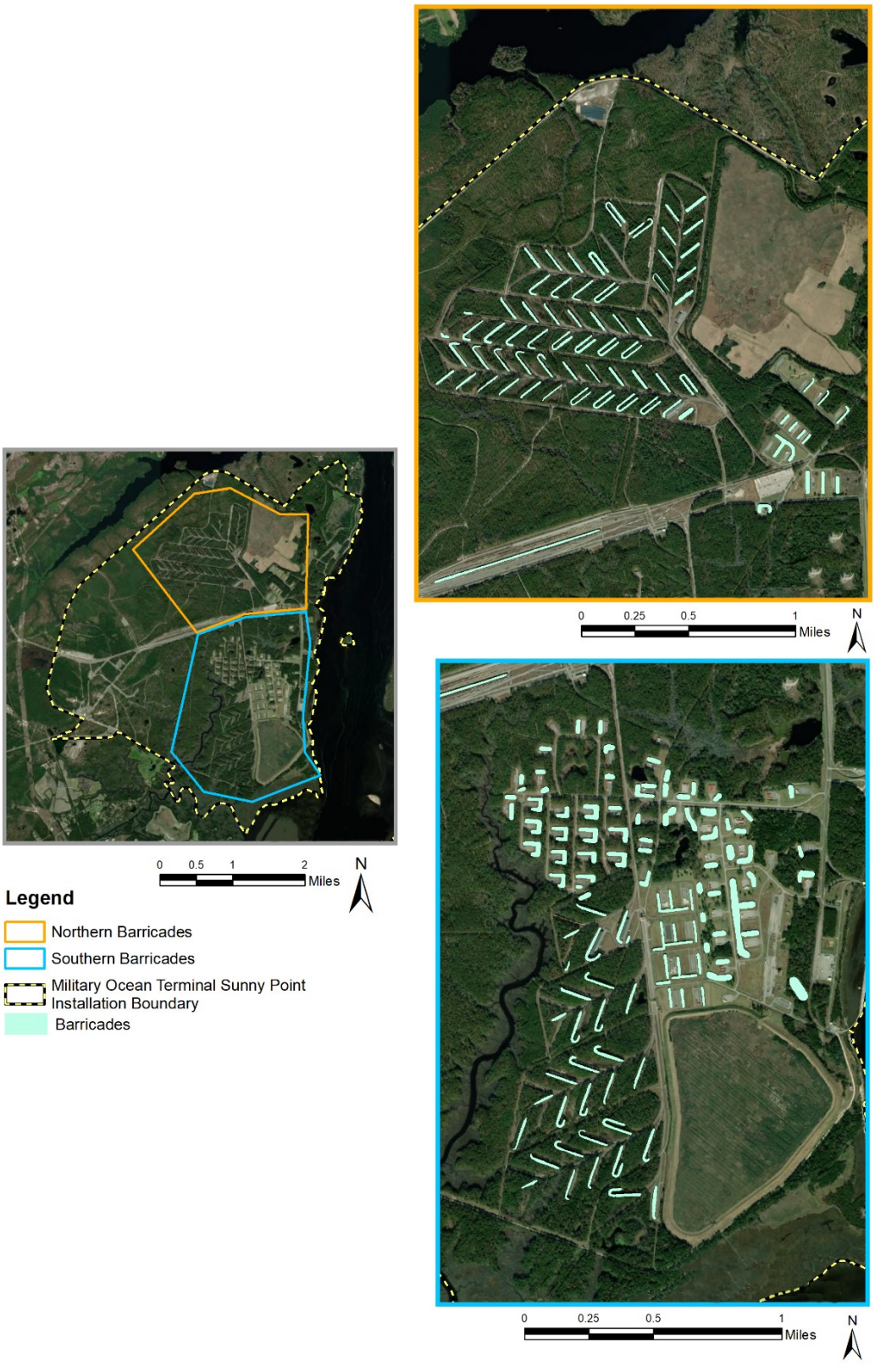

Figure 2.3-2 Existing Barricades at MOTSU

Some existing barricades at pads and rail spurs require repair to bring them into compliance with explosive safety regulations set forth in Defense Explosives Safety Regulation 6055.09 (V2.E5.4). This involves making repairs so that height and/or length meet staging capacity requirements. This EIS includes implementing the ongoing annual program of barricade repair and modification that would occur from FY26 through FY31. This program of repair began with 10 barricades in the South Rail Holding Yard, which were categorically excluded (CATEX G-1) and a REC was prepared (MOTSU 2022a). Additional barricade work in the South Rail Holding Yard, including clearing, as well as associated NEPA and other regulatory compliance was completed in 2023 and 2024 and is planned for 2025.

FY26–FY31 barricade repairs are based on a prioritized improvement program where approximately 1–8 rail barricaded sidings in the North and South Rail Holding Yards and seven to ten pad barricades would be modified each year, each requiring approximately three months. No work would occur in the Classification Yard. Repairs include raising the height and/or length of barricades and correcting crest widths and side slopes.

Barricade work would involve removing existing vegetation, in compliance with operational and fire prevention requirements in Army Pamphlet 385–64, *Ammunition and Explosives Safety Standards*. Vegetation including trees and understory plants would be removed and grubbing to a depth of two feet would remove roots and stumps from the soil of the barricades. Woody material would be accumulated and could be trucked off site for disposal. It is estimated that 138 tons of material would be removed from each barricade and adjacent areas used to access the barricade.

Once vegetation is cleared, repair to correct height and length deficiencies, and hydroseeding would follow. After repair, the barricades would be on average 500 feet long, 60 feet wide, and 20 feet high. To meet safety requirements, these earthen barricades are required to be one foot wide at the top with slopes of 2:1.

It is estimated that the amount of fill required per barricade is between 280 and 2,100 tons for barricades at pads and 11,400 to 18,000 tons for barricades at rail spurs. This material would be transported onto MOTSU using dump trucks. Materials used would meet cohesiveness standards or other stabilizing materials (such as geotextiles) would be used to ensure structural integrity. Material from existing barricades would be reused to the extent practicable.

Equipment would access the barricades adjacent to rail spurs from existing roads and fire breaks where possible. Maintenance strips, 10 feet wide, would be established at the toe of the barricade slope and an additional 10-foot area would be graded to provide a transition to existing topography.

As with all proposed actions, the Army will appropriately coordinate with environmental regulators. Surveys for protected plants and wildlife would occur as appropriate to inform planning for tree removal and clearing/grubbing. Consultation with the U.S. Fish and Wildlife

Service (USFWS) under Section 7 of the ESA on the effects to the red-cockaded woodpecker (*Picoides borealis*) (RCW) and rough-leaved loosestrife (*Lysimachia asperulaefolia*) is underway. Consultation documents will be included in the Final EIS. This will address potential effects to those species from the proposed tree removal, clearing/grubbing, and construction in the North Rail Holding Yard, where there is existing habitat for these species. The LOD in this area total approximately 215 acres, some of which would affect RCW habitat. Construction activities would conform to seasonal avoidances specified for RCW habitat where appropriate. Wetland delineations have been conducted and jurisdictional determinations made in consultation with the U.S. Army Corps of Engineers (USACE). As the phased planning, design, and implementation of these activities occur, additional consultation and coordination may be conducted with applicable regulatory agencies if detailed plans change. This is anticipated to include communications with regulatory agencies on ESA and CWA Section 404 and 401 permitting.

The operational and fire prevention requirements in Army Pamphlet 385-64, *Ammunition and Explosives Safety Standards,* require control of vegetation to limit the potential spread of an uncontrolled fire in ammunition and explosives storage and operating locations. Once barricades are restored, a system of regular maintenance, primarily annual mowing, would be implemented to comply with these standards.

Install Lightning Protection System. Lightning Protection Systems (LPS) are designed to intercept a lightning strike and safely direct it into the ground and are required on all structures and areas containing, storing, or holding ammunition and explosives. The proposed LPS at MOTSU would be constructed adjacent to existing rail spurs in the North Rail Holding Yard, where no system currently exists. The North Rail Holding Yard has four rail branches with 57 rail spurs (**Figure 2.3-3**). The LPS would consist of four or five 75-foot-tall precast concrete masts installed along each of the 57 rail spurs and two rail backup yards, or approximately 250 masts. Masts would be installed approximately 15 feet from the centerline of the rail line and would be buried to a depth of approximately 10 feet (**Figure 2.3-4**). Overhead wires would be strung between each pole between 30 and 40 feet above grade. Guy wires and anchors would be placed where lines turn and at the ends of lines. Connection trenches for grounding wires and guy wire anchors would be installed. Installation of the LPS along each branch would take approximately 30 days to complete.

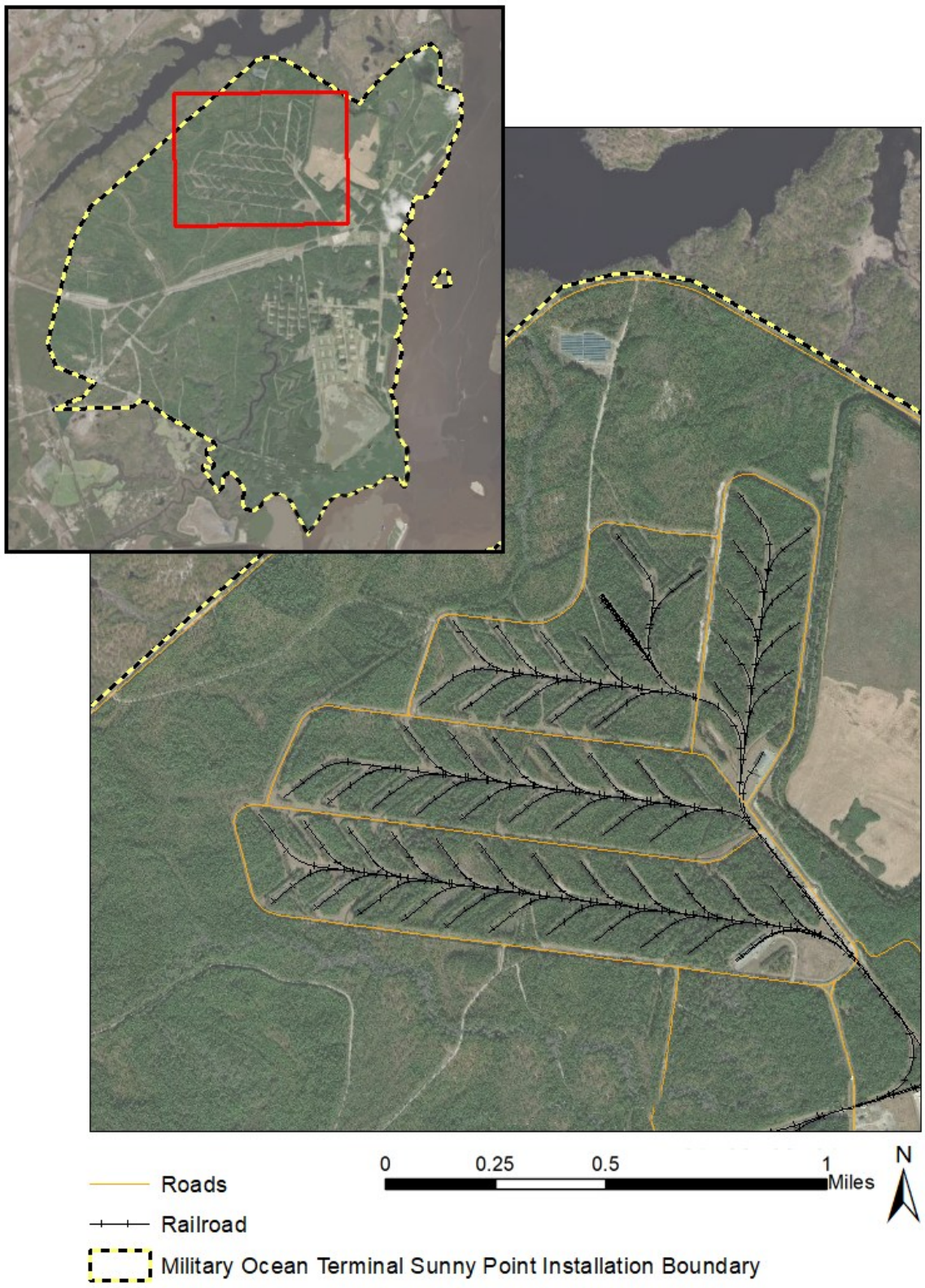

Figure 2.3-3 North Rail Holding Yard Configuration

Figure 2.3-4 Typical Lightning Protection System

Construction is currently planned to begin in FY33 with completion by FY35, but all or parts of this project could foreseeably be implemented sooner (FY27–FY31). This work would occur in the North Rail Holding Yard concurrent or following the barricade repair and modification work described above and would be located within the area disturbed by that work. For this reason, it is not anticipated that additional consultation would be required, but if required, that would occur prior to LPS installation.

2.3.1.2 Waterfront Maintenance

Shoreline Protection, Phase 1. Shoreline enhancement and stabilization is proposed to address erosion that is occurring in several areas along MOTSU's seven miles of Cape Fear River shoreline including at access points to wharves. This erosion is the result of wind and wave activity and is exacerbated by periodic storm and tide events and wake from ships that use the Cape Fear River to access MOTSU and the Port of Wilmington as well as climate change effects. The proposed shoreline stabilization would be implemented to prevent further shoreline and wetland erosion and to protect MOTSU's waterfront infrastructure. **Figure 2.3-5** shows an example of existing shoreline erosion. **Figure 2.3-6** illustrates revetments as well as living shorelines/wetland restoration. **Figure 2.3-7** provides an overview of the proposed resilience measures (i.e., revetment, living shoreline, and living shoreline/wetland restoration). Phase 1 addresses the existing shoreline erosion/high priority projects and is anticipated to be implemented in approximately FY25–FY27. Phases 2 and 3 of the shoreline protection project would occur later, outside the window evaluated in detail for this EIS and are addressed as reasonably foreseeable future projects in the cumulative effects analysis (**Section 4.0**).

Figure 2.3-5 Example of Existing Shoreline Conditions

Figure 2.3-6 Example of Shoreline Revetment and Wetland Restoration/Living Shoreline

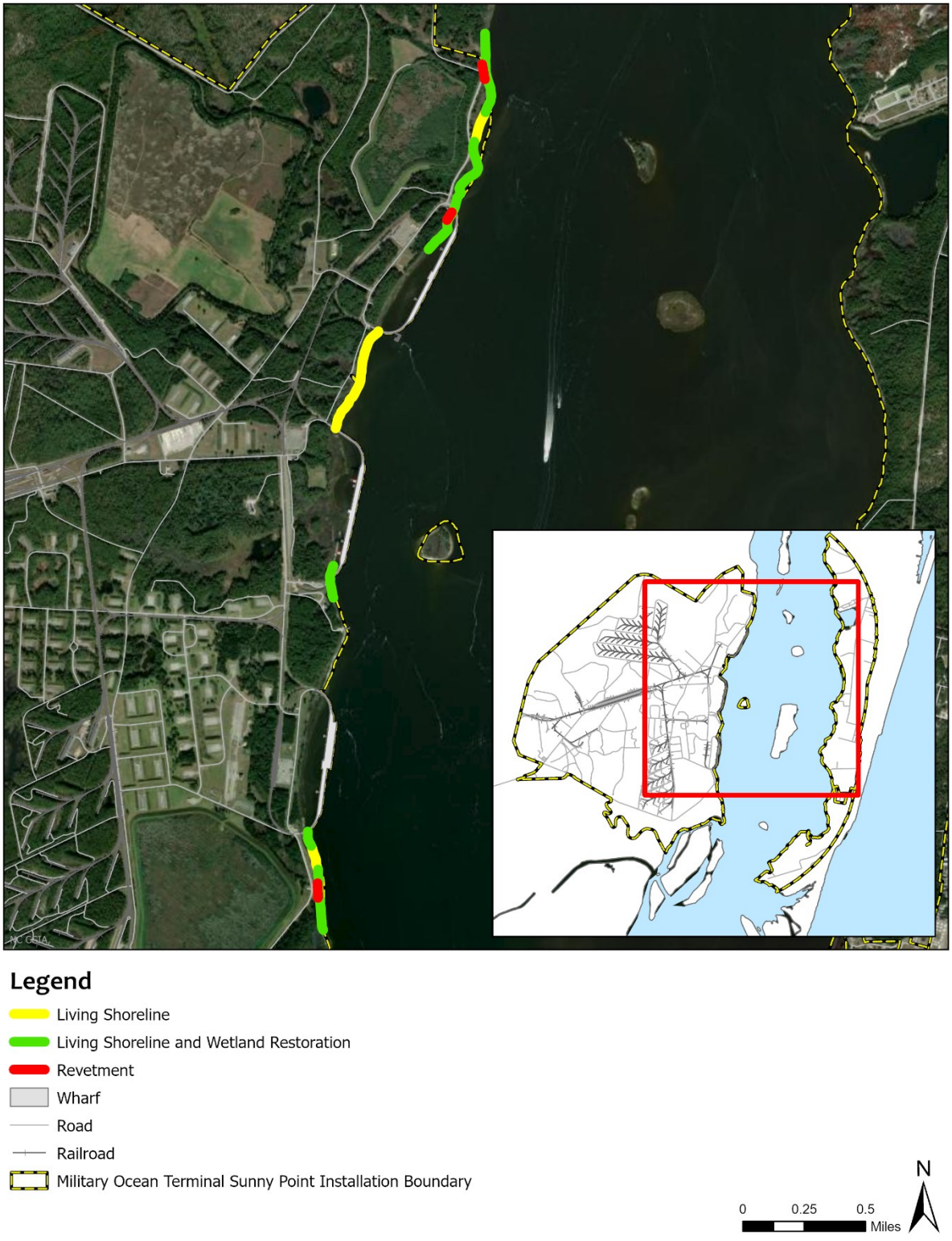

Figure 2.3-7 Proposed Resilience Measures

Phase 1 of the shoreline protection project includes the following:

- **North Perimeter Road Shoreline:** This area spans approximately 5,000 feet of shoreline from the North Wharf-North Access and North Perimeter Road. Revetment is proposed in two areas: approximately 350 linear feet of revetment (approximately 10 feet high) is proposed at the north end of the North Perimeter Road, and approximately 200 linear feet of revetment (approximately 8 feet high) is proposed to extend the existing riprap at the south end of the North Wharf-North Access riprap. A living shoreline sill is proposed along this 5,000 linear foot section of shoreline. The recommended maximum sill elevation is 3.3 feet North American Vertical Datum of 1988 (NAVD88, a standard of measurement for land elevations and water depths). The sill's base width would vary between 20–25 feet based on water depths. Wetland restoration is proposed across two sections of shoreline that total approximately 4,700 linear feet at a recommended maximum wetland fill elevation of 3.3 feet NAVD88. To provide a minimum 50 feet of wetland buffer, approximately 35,000 cubic yards of clean fill (i.e., sand or gravel that is free of pollutants and nutrients) would be needed.
- **Karlman Lane Shoreline**: Spans approximately 2,700 linear feet of shoreline between North Wharf and Center Wharf. A living shoreline sill with openings in locations of tidal creeks is proposed along the entire length. The recommended maximum sill elevation is 3.3 feet NAVD88. The sill width would vary between 20–25 feet based on water depths. Approximately 5,000 cubic yards of fill would be needed.
- **Center Wharf – South Access Shoreline:** Spans approximately 700 linear feet of shoreline centered on the Center Wharf. A living shoreline sill with wetland restoration would reduce coastal erosion and coastal storm damage to the Center Wharf – South Access roadway. The recommended maximum sill elevation is 3.3 feet NAVD88. The sill footprint would vary between 20–25 feet based on water depths. The recommended maximum wetland fill elevation under this phase is 2.3 feet NAVD88. To provide a minimum 50 feet of wetland buffer, approximately 7,000 cubic yards of clean fill is needed for wetland restoration in this area.
- **South Perimeter Road Shoreline:** Spans approximately 2,300 linear feet of shoreline south of the South Wharf – South Access. Shoreline erosion resilience projects in this area would reduce coastal erosion and coastal storm damage to the South Wharf – South Access and South Perimeter Road. Shoreline protection measures for this area include a revetment, living shoreline, and wetland restoration. Approximately 350 linear feet of revetment (approximately 12 feet high) is proposed along the shoreline centered on the South Waterfront Security Tower. A living shoreline sill is proposed along this 2,300 linear foot section. The recommended maximum sill elevation is 3.3 feet NAVD88. The sill width would vary between 20–25 feet based on water depths. Wetland restoration is proposed across two sections of shoreline that total approximately 1,900 linear feet. The recommended maximum wetland fill elevation is 2.3 feet NAVD88. To provide a minimum 50 feet of wetland buffer, approximately 15,000 cubic yards of clean fill is needed for wetland restoration in this area.

These Phase 1 actions are planned with adaptive management concepts and include potential for increasing sill elevation and wetlands elevations through thin layer placement to account for relative sea level change in Phases 2 and 3.

Maintenance Dredging. The proposed annual maintenance dredging of channels, berths, and turning basins for the South, Central, and North Wharves is needed to continue to meet requirements to provide safe water depths for vessel operations at MOTSU (**Figure 2.3-8**). Without dredging, MOTSU would become inaccessible to vessels. Three approach channels (Approach Channel South Entrance, Approach Channel Center Entrance, and Approach Channel North Entrance) branch from the Wilmington Harbor Navigation Channel, one to each of MOTSU's three wharves. Between the three wharves are two additional channels, Approach Channel South to Center Wharf and Approach Channel Center to North Wharf. Each of the three wharves has an associated berthing and turning basin. MOTSU is authorized to maintain the South and Center Entrance Channels and the Wharf Berthing and Turning Basins to a depth of 38 (+2) feet mean lower low water (MLLW). MLLW is defined as the average of the two low waters of any tidal day. The channels and basin associated with the North Wharf are authorized to a depth of 34 (+2) feet. The security boat dock, adjacent to the North Wharf, is authorized to a depth of 12 (+2) feet.

An EIS prepared in 1994 evaluated the effects of deepening the channels at MOTSU and widening the entrance channels and turning basin to meet operational requirements, and a ROD, which incorporated means to reduce environmental effects, was signed in 1995. These documents are hereby incorporated by reference (MOTSU 1994, 1995). The proposed dredging is specific to the ongoing maintenance dredging requirements at the MOTSU waterfront and from the waterfront to the Wilmington Harbor Navigation Channel. Its span includes Approach Channel South/Center/North Entrances, the branch from the Wilmington Harbor Navigation Channel to each wharf, between Approach Channel South to Center Wharf and Approach Channel Center to North Wharf and berthing and turning basin at each wharf (see **Figure 2.3-7**). While follow-on NEPA has been performed by USACE and U.S. Environmental Protection Agency (EPA) to address the improvements and maintenance of the Wilmington Harbor Navigation Channel and Wilmington Ocean Dredged Material Disposal Site (ODMDS), the NEPA coverage for the ongoing MOTSU maintenance dredging is being refreshed as part of the holistic approach of this EIS.

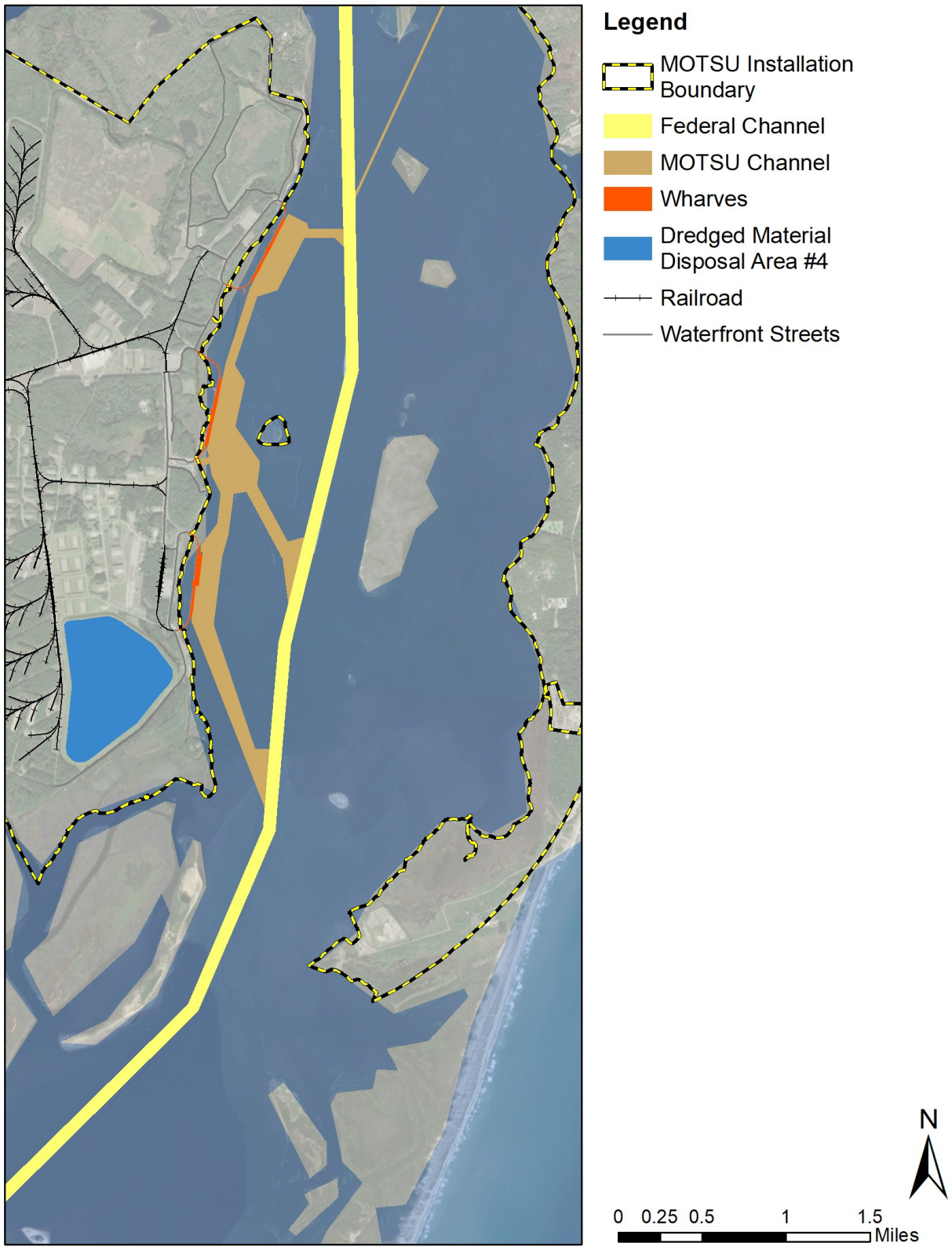

Figure 2.3-8 Location of Annual Maintenance Dredging at MOTSU

Maintenance dredging of the navigation channels and berths at MOTSU results in the removal of approximately one million cubic yards of dredged material about every 15 months. This is referred to as annual maintenance dredging because it is typically maintenance dredging that occurs in any given year. Generally, a bucket or clamshell dredge deployed on a barge is used for excavation of sediment, which is then transported by scow or hopper dredge to the ODMDS. Disposal of dredge spoils would be consistent with the requirements of MOTSU's Dredged Material Management Program (DMMP) (MOTSU 2014). Maintenance takes 90 to 120 days to complete each cycle.

The MOTSU DMMP primarily calls for disposal of fine-grained dredged material in the EPA-approved Wilmington ODMDS, approximately 22 miles south of MOTSU and 11 miles offshore of the mouth of the Cape Fear River. Effects associated with placement in the ODMDS have been addressed in EPA's Final EIS for the New Wilmington Ocean Dredge Material Disposal Site Designation, which is hereby incorporated by reference (EPA 2001), and disposal of these materials in this area is not considered part of this proposed action. The remaining capacity at MOTSU's upland dredged material disposal area (DA-4) is reserved for emergencies, and if it is used, dredged material would be transported to the site via hydraulic pipeline.

Maintenance dredging of the navigation basins and entrance channels is authorized under Department of Army Permit 1998-00432, and Department of Army Permit SAW-2011-02228 authorizes the transport of dredged material from MOTSU to the Wilmington ODMDS. The Site Management and Monitoring Plan (SMMP) for the New Wilmington ODMDS was originally finalized in July 2002, and an SMMP was updated in 2012 (USACE and EPA 2012).

Maintenance and Repairs of Wharves and Associated Infrastructure. UFC 4-152-01, *Piers and Wharves*, provides planning, design, construction, sustainment, restoration, and modernization criteria for DoD. Waterfront facilities at MOTSU include three crescent-shaped wharves constructed in the mid-1950s to accommodate the cargo, handling and loading operations, and vessel characteristics of that time. Each wharf has 1,862 linear feet of berthing space and is accessible by both truck and rail. The Center Wharf improvements between 2008 and 2010 included enlarging and improving the wharf apron, installing rails for two 60 to 80 long ton-rated lifting cranes, and installing two container (gantry) cranes to accommodate 105-foot-wide ships (MOTSU 2004). Periodic inspection, maintenance, and repair of waterside real property is ongoing at each wharf and its associated support facilities including the following:

- Wharf decking, deck frame, and support pilings — repairs and maintenance of corrosion, spalls (fractured or delaminated section of concrete) and fouling, could include repair of concrete decking, framing, and pilings; replacement of deck sections; installation of jacket systems including cathodic protection pile jackets to prevent future fouling. Work is performed from a barge or similar floating platform and by divers.
- Mooring dolphins — groups of wooden piles driven into the sediment and lashed together used to control the movement of moored and berthed vessels. These structures are maintained, repaired, and replaced as needed using cranes on barges to drive piles.

- Wharf fenders systems — used to absorb the energy of a berthed vessel to protect both wharves and ships from damage caused by movement from berthing, wind, waves, and tides. At MOTSU each of the wharves have multiple suspended floating fenders attached to the outer walls. These would be replaced as needed, with work accomplished from boats and barges.
- Fixed water barrier system — prevents access to MOTSU wharves by unauthorized persons or vessels. It surrounds the South and Center wharves and the Governor's Creek Bridge. The system is comprised of piles, pile dolphins, and metal cable forming an in-water security fence. Cables are equipped with reflective markings for safety. The entrance channels are equipped with movable floating barriers to allow vessel entrance and debarking. The fixed water barrier system is inspected by boat regularly and maintained and repaired as necessary.
- Navigation aids — used to mark channels and isolated dangers to ensure safe navigation and precise piloting in MOTSU shipping channel. This equipment must meet the U.S. Coast Guard and International Association of Marine Aids to Navigation and Lighthouse Authorities standards and specifications. These would be replaced as needed with work being accomplished from boats and barges.

Maintenance and Repair of Security Boat Dock, Ramp, and Wave Attenuators. The security boat dock, adjacent to the North Wharf, is used for mooring security patrol boats and fireboats. The security boat ramp, adjacent to the Center Wharf, is used to launch and retrieve security boats. Both locations include a floating dock, ramp, and wave attenuator. Periodic repairs of damage and deterioration is needed to address normal weathering and maintenance as well as storm-related damage. Repairs typically take place from the shore or dock.

2.3.1.3 Pleasure Island Explosive Safety Clear Zone Security

Trespassing and illegal dumping in the Pleasure Island ESCZ pose safety and security risks to MOTSU operations. To maintain the security of the ESCZ and to meet the standards set forth in UFC 4-022-03, *Security Fences and Gates*, approximately 35,330 linear feet of fencing would be installed, and clear zones would be established and maintained along the property boundary as well as along both sides of Dow Road (Secondary Road 1573) (**Figure 2.3-9**). Twelve gates would be installed to provide access to leased land within the MOTSU property boundary and to provide access to maintenance and fire protection personnel. Additionally, gates would be installed at Dow Road and K Avenue where public roads cross the installation boundary (**Figure 2.3-10**). Gates would be closed when the explosive arc extends into the full ESCZ.

The fencing is expected to be chain link that could extend below the ground surface up to 12 inches. Gates would be single or double swing gates that open into the secure area. Closed gates would be lit or have reflective material added to ensure motorist safety at night. The final design will adhere to the requirements of AR 190-51 3-2b.

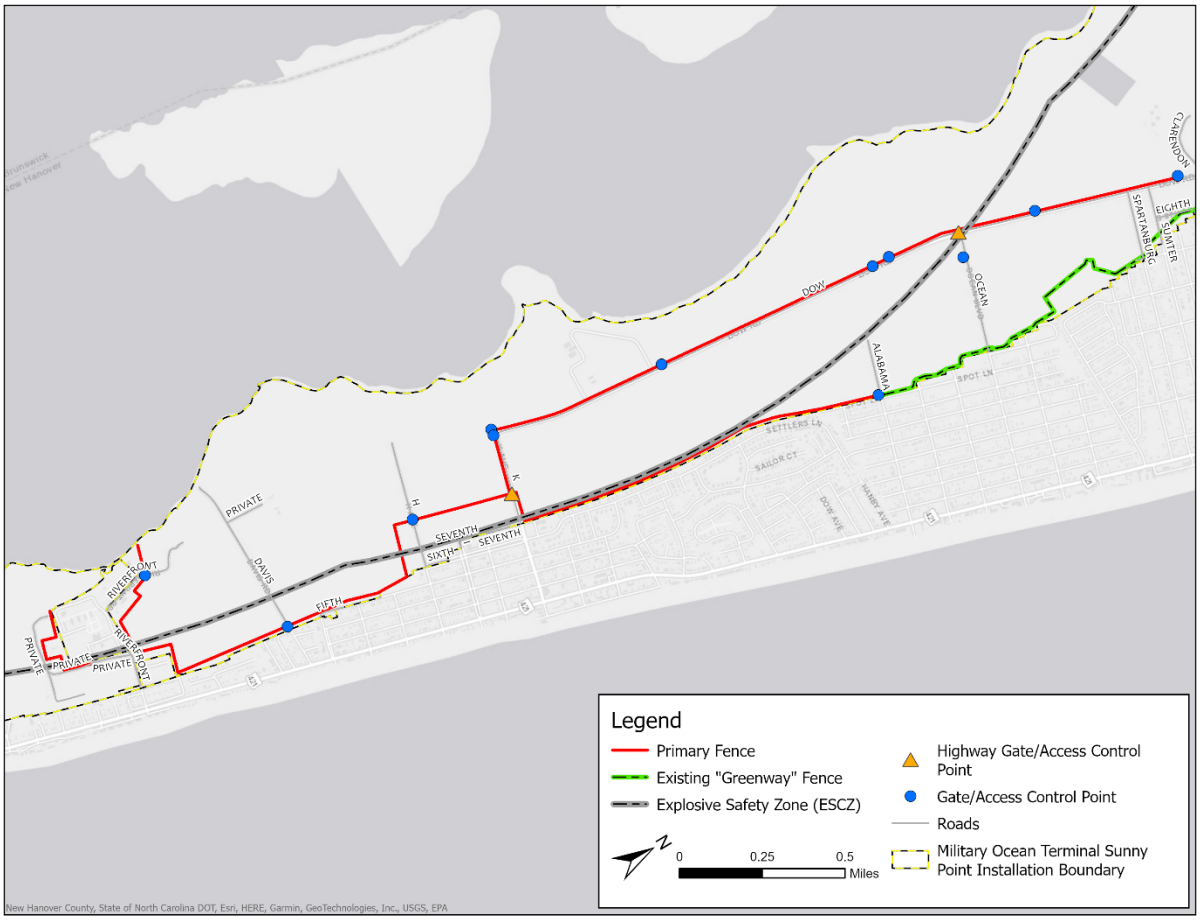

Figure 2.3-9 Pleasure Island Explosive Safety Clear Zone

Figure 2.3-10 Typical Gate at Road Crossing

Clear areas would be established to provide unobstructed views to enhance detection and assessment around fences. Where fencing is proposed, the physical disturbance for construction is estimated to be 50 feet wide, for a total disturbed area of approximately 55 acres. Work is expected to begin in 2026.

The clear zones established adjacent to the fenced property line would be maintained by annual mowing to provide an unobstructed view to enhance security around fences. Vegetation throughout the ESCZ is managed per MOTSU's Integrated Natural Resources Management Plan and Wildland Fire Management Plan. As needed, brush cutting and prescribed burns would also be used to support safety and security requirements throughout the ESCZ.

2.3.1.4 Linear Infrastructure Construction, Repair, Maintenance

Construct Secondary Emergency Egress and Utility Connection at the Rail Gate. A new access road would be constructed adjacent to the train line from the rail gate to Route 133 to reestablish this as a secondary means of egress to be used during an emergency. The gate would be classified by UFC 4-022-01, *Entry Control Facilities, Access Control Points,* as a Limited Use gate that would remain closed at most times. The road would be two-lane, approximately 24-feet wide with adjacent 10-foot-wide shoulders on both sides, and depth of disturbance is estimated at 3 feet. Although the gate would not be regularly manned, it would include a small gate house (approximately 25 x 25 feet, including a restroom) for use when the gate is active with associated paved parking area for five cars and five tractor trailers and associated turnaround area for heavy equipment and fire trucks. Although the footprint would be refined during the design phase, the estimated footprint for the gatehouse and associated paved infrastructure is approximately ¾ of an acre as based on USACE standard design guidelines. Fiber optic and electric lines would be run to the gate house and a water connection to the Brunswick County water line would be installed beneath the road shoulder either by trenching (6-feet deep) or boring (12- to 15-feet deep). A total of approximately 4.5 acres would be disturbed (**Figure 2.3-11**).

Figure 2.3-11 Secondary Emergency Egress at the Rail Gate

Repair and Repave Existing Roads, Hardstands, Parking Areas, and Pads. Pavement repairs and maintenance on existing roads, parking lots, and hardstands could include repair of cracks, potholes, surface deformation, or more severe structural failures. A range of treatments is available depending on the existing pavement and the type of repair required. UFC 3-270-01, *Asphalt and Concrete Repair and Maintenance*, contains information on materials, equipment, and procedures for repairing asphalt and concrete pavements. Maintenance and repair of pavements extends the useful life of pavement and is needed to reduce mission effects resulting from road failure. Typical maintenance on asphalt and concrete pavements includes the care of joints, sealing of cracks, surface treatments, replacement of broken slab panels, full-depth and partial-depth repairs (including removal and replacement of the pavement surface and underlying base), sealing, and the correction of minor settlement and drainage faults. Repairs to existing roads includes repairs to grading, drop inlets, and culverts as incorporated into roadway design to divert any standing water away from roadways and shoulders. Design requirements would be coordinated with updates to the MOTSU Stormwater Pollution Prevention Plan (SWPPP) and NPDES permit.

All repair activities would occur within the existing roadway and previously disturbed shoulder. Since water infiltration is a primary cause of pavement distress, repair of the stormwater drainage systems, in areas where unintentional ponding is occurring, is also included in the road repairs. In areas where the subgrade has been compacted, road segments would be raised to original design height. In most areas, the roadway would be raised by approximately 1.5 feet to

restore grade and address potential concerns with rising sea levels resulting from climate change. Construction staging areas (i.e., laydown areas for temporary storage of equipment and supplies) would be sited on paved or previously disturbed vegetated areas near construction activities when possible or on lands that are subject to appropriate environmental review prior to use to ensure compliance.

Materials removed from roadbeds would be reused to the extent possible or would be stockpiled at previously established stockpile areas adjacent to the Class Yard for use as fill elsewhere at MOTSU. Soils identified as potentially contaminated would be evaluated and handled appropriately in accordance with applicable state and federal regulations. If disposal is required, it would occur off installation at an approved site in accordance with all applicable federal, state, and local regulations. All work would be conducted in accordance with the MOTSU Integrated Solid Waste Management Plan (ISWMP) (MOTSU 2022b) and Integrated Spill Contingency Plan as it addresses contaminated soil disposal (ISCP) (MOTSU 2021).

Upgrade and Maintain Rail Lines. Rail would be replaced between the Leland Interchange Yard and the Main Gate and within the MOTSU boundaries. This would include removing and replacing 17 miles of track, which currently is a combination of 80-, 90-, and 100-pound/yard capacity, and replacing with industry standard 115- or 132-pound/yard track. The upgrade is needed to safely accommodate the weight of modern engines and loads. Within MOTSU, some track has been upgraded, but approximately 100 miles requires replacement. The project would require replacement of the rail, track bed (ballast and rail ties), rail spikes, and track bolts and could also include stabilization of slopes including hardening with rip rap or concrete cast-in-place mattresses. Replacement ties would be larger, and more ballast would be used between the subgrade and the ties as necessary to ensure leveling of track. Rail replacement would require a large, temporary laydown area, which would be located at a paved or previously disturbed area either at Leland Interchange Yard or inside the fence at MOTSU. As currently planned, the project would commence in FY26 and would occur in phases over approximately 10 years; 2 to 6 miles of rail would be upgraded per year. It is estimated that replacing 1 section of track (39 feet of ties and rails) would take one working day. All work would conform to North Carolina Department of Transportation (NCDOT) and Federal Railroad agency standards. Any required road closures and any repairs of asphalt approaches would be coordinated with NCDOT. In addition to upgrading rail, a program of regular maintenance and replacement would continue to provide for repairs as necessary.

Improve Utilities within Existing Corridors. Repair and improvements to electrical, communication, water, wastewater, and sewer infrastructure within existing utility, road, and rail corridors are proposed to ensure continuous and efficient use of MOTSU facilities.

Most of the electric distribution system at MOTSU is underground. Improvements to the system could include installation of new underground power lines to replace remaining aboveground lines or to support new facilities and infrastructure. Electrical system installations would be

completed in accordance with the National Electrical Code, National Electrical Safety Code, and applicable local codes and standards. Good design practice would conform to the recognized industry standards, including the Institute of Electrical and Electronics Engineers, and the Telecommunications Industry Association.

The existing telecommunications network at MOTSU is underground, installed either by trenching (6 feet deep) or boring (12 to 15 feet deep). It is insufficient to support the expanded telecommunications needs of the installation. Where available, system upgrades would be accomplished by replacing fiber in existing conduits. In other areas, new trenching and boring would take place in previously disturbed areas, within or adjacent to existing linear infrastructure rights of way.

Minor repairs to water lines would be implemented, including replacement of fire hydrants, isolation valves, and backflow preventers; repair of water line leaks including replacement of lines within existing corridors; and modifications to increase flow capacity at hydrants. Sanitary wastewater at MOTSU is treated through septic systems. Existing systems could be repaired, improved, or replaced as needed or new systems could be installed to serve new or existing facilities.

Staging areas for storage of equipment and supplies for all infrastructure repair and improvement projects would be sited on paved or previously disturbed vegetated areas near construction activities when possible or on lands that are subject to appropriate environmental review prior to use to ensure compliance.

2.3.1.5 Stormwater Mitigation

Repair Drainage at Rail Tracks 216, 20, and 226 (Bridge Crane Area) and Repair Classification Yard Drainage. The Classification Yard and Bridge Crane Resilience Projects will address problems with the existing stormwater drainage system, improve its performance conveying stormwater during future storm events, and increase capacity to accommodate more frequent and intense precipitation events. The work is needed to address current and future flooding that impedes operations in this area.

Work would include repair and replacement of failed and failing components (culverts, inlets, pipes, headwalls); relocation of components of the systems to improve capacity and flow to prevent the flooding of roads and railroads; and include repair of pavements and rail infrastructure impacted by erosion as well as the proposed work. The area of potential effect is estimated at less than 10 previously disturbed acres and includes approximately 900 linear feet of piping and associated inlets and culverts in the Classification Yard area and approximately 700 linear feet of piping, and associated inlets and culverts in the Bridge Crane area. This action will mitigate the adverse effects of stormwater runoff and nonpoint source pollution, reduce debris accumulation at culverts, and increase stormwater drainage system resiliency. These projects are expected to begin in FY25.

Ongoing Site-wide Stormwater Drainage Improvement Projects. Stormwater drainage improvement projects include the following.

- Removal of debris, vegetation, and accumulated sediments from drainage ditches that run alongside all roads and rail lines on MOTSU and at the Leland Interchange Yard as well as and along both sides of the rail line between MOTSU and the Leland Interchange Yard.
- Repair or replacement of existing drop inlets and culverts or other stormwater drainage infrastructure. This could involve removing existing culverts and any headwalls, repairing culvert foundations including laying new stone beds, installing new reinforced concrete culverts and headwalls, and clearing and regrading drainage ditches up to 500 feet on either side of the road or rail crossing. Where greater flow volumes are needed, culverts could be replaced with trestles and sheet pile bulkheads to create an open water channel to facilitate waterflow.
- Installation of debris screening grates at culverts.
- Provide positive drainage to divert standing water away from roadways and shoulders.
- Installation of sump pits and pumps which would divert water to areas with available storage capacity (including dredge disposal areas or adjacent surface waters).
- Administrative area drainage repair project would address ongoing issues at Building 12 to include floodproofing, drainage improvements, and culvert and debris screen installation and maintenance throughout the drainage basin.

The work is needed to address current and future flooding that restricts operations. Design requirements would be coordinated with updates to the MOTSU SWPPP and NPDES permit. MOTSU would obtain a nationwide permit for this work. There are approximately 212 miles of drainage ditches and culverts on MOTSU. It is anticipated that approximately 13 miles (or 1.5 acres) would be improved per year. Each culvert replacement would take between five and 120 days.

2.3.1.6 Cantonment Area Infill Development

The RPMP included a developable area analysis, which took into account constraints such as force protection; environmental, cultural, topographic and natural constraints; existing buildings, roads, and pavement; and communications and electrical utilities constraints. Areas were identified for infill development as land that can be developed with minimal preparation, relocation, or demolition. These areas are shown in **Figure 2.3-12**, totaling 59 acres.

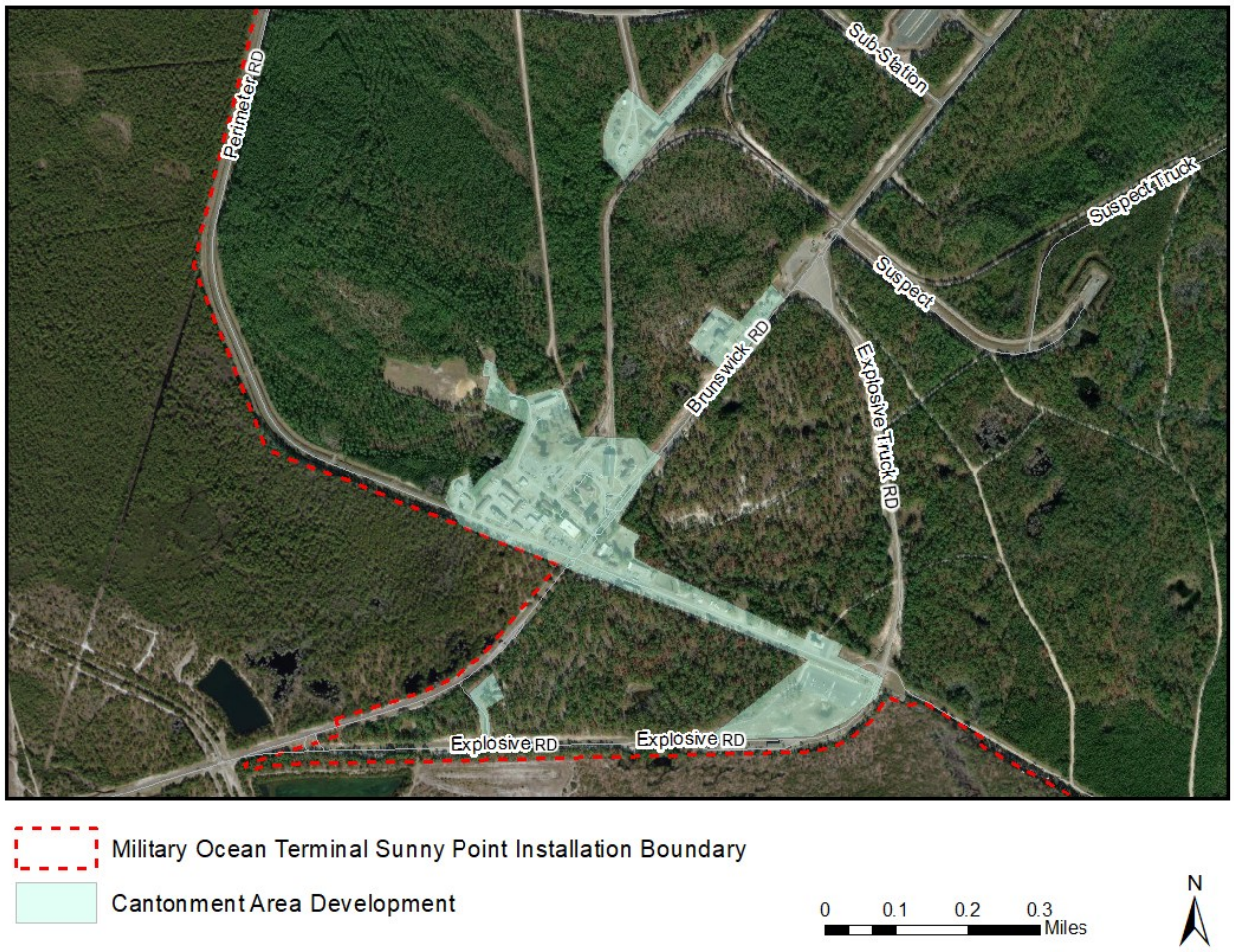

Figure 2.3-12 Cantonment Area Infill Development

The proposed action includes infill on parcels identified as developable. Future projects could include renovation, modernization, and new construction projects within the cantonment area to improve administrative functions, community support, maintenance, and storage and supply activities. Projects could include safety and security improvements, consolidation of functions, parking lot reconfiguration and stormwater mitigation, and utility expansion and upgrades. Safety improvements could be made by investing in new and improved lighting, enhancing pedestrian and vehicular accessibility to facilities and equipment, and expanding the mass notification system.

Security investments would be made in compliance with UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings* and UFC 4-022-03, *Security Fences and Gates* to improve overall security for the installation, and may include replacing fences, improving circulation through and around the Visitors Center and Main Gate, hardening buildings, and expanding security facilities to accommodate increased personnel, equipment, and mission.

Compatible functions could be consolidated to improve overall operations and service delivery, and may include demolition, renovation and expansion of existing facilities. Parking lots are

scattered throughout the cantonment area and may be reconfigured, consolidated, or relocated to improve capacity, security, and accessibility.

In general, individual projects to be implemented would occur on previously disturbed land and would have a footprint less than 5 acres in size. These projects would undergo additional NEPA analysis in the future, as needed. Many of these infill projects are expected to qualify for a categorical exclusion, with NEPA review typically documented in a REC. This EIS takes a programmatic look at the potential effects that would occur from this infill development. This EIS also looks at the cumulative effects of these projects, as well as past, present, and reasonably foreseeable actions. The checklist provided as **Appendix C** provides additional guidance for tiered analysis of site-specific projects.

2.3.2 Partial Implementation Alternative

The Partial Implementation Alternative is a subset of the activities included in the Full Implementation Alternative. **Table 2.3-1** provides a comparison of the action alternatives as categorized by function and analysis type.

Table 2.3-1 Comparison of Action Alternatives

Barricade Safety	Full Implementation	Partial Implementation
Annual Barricade Repair and Maintenance	Yes	Yes
Install Lightning Protection System	Yes	Yes
Waterfront Maintenance		
Shoreline Protection – Phase 1	Yes	Yes
Maintenance Dredging of Channels, Berths, and Turning Basins for the South, Central, and North Wharves	Yes	Yes
Maintenance and Repairs of Waterfront Infrastructure (Wharves and Associated Infrastructure)	Yes	Yes
Maintenance and Repairs to Security Boat Dock, Ramp, and Wave Attenuator	Yes	Yes
Pleasure Island Explosive Safety Clear Zone Security		
Clearing and Fencing of Area Adjacent to the Property Line and Dow Road. Establishing Gates at Public Road Crossings of Property Boundary. Maintenance of Explosive Clearance Safety Zone Vegetation in Areas Not Controlled by Tenant.	Yes	Yes
Linear Infrastructure		
Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate	Yes	No
Repair and Repave Existing Roads, Hardstands, Parking Areas, and Pads	Yes	Yes
Upgrade and Repair Rail Lines	Yes	Yes
Improve utilities within existing corridors	Yes	Yes
Stormwater Mitigation		
Flood Mitigation for Classification Yard/Bridge Crane Area	Yes	No
Site-wide Stormwater Drainage Improvements	Yes	Yes
Cantonment Area Infill		
Improvement of Facilities and Infrastructure	Yes	Yes

Although the Partial Implementation Alternative would not address all requirements as comprehensively as the Full Implementation Alternative, it would substantially improve conditions and adequately address immediate installation needs in a manner consistent with the ADP Preferred Alternative.

2.3.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the proposed action as described in its ADPs. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance. This approach lacks the benefit of a comprehensive planning approach and would not be in line with the requirements of UFC 2-100-01. It would also not take into account the combined effects of all the projects in this EIS's proposed action, as well as cumulative effects. The No Action Alternative would not satisfy the purpose of or need for the proposed action and fundamental safety and infrastructure concerns might not be addressed. The No Action Alternative is included per the requirements of the CEQ's and Army's NEPA regulations to provide a baseline for comparison with the proposed action.

2.4 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The environmentally preferable alternative is defined by CEQ as the alternative that "causes the least damage to the biological and physical environment.; it also means the alternative that best protects, preserves and enhances historic, cultural, and natural resources" (CEQ 1981). While the Army must identify an environmentally preferable alternative, there is no requirement to select it for implementation. After consideration of all factors, the Full Implementation Alternative is selected as the environmentally preferred alternative because it:

- Reduces danger from accidental explosion and propagating, causing fires and damage to surrounding areas;
- Protects the shoreline from continued erosion;
- Reduces risk to the public who may access the ESCZ; and
- Reduces risk to personnel and the public by ensuring the safe transport of munitions by rail, road, and ship.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED EVALUATION

2.5.1 ADP Alternatives

The alternatives considered in the ADP process, though never fully developed, are deemed NEPA alternatives considered but eliminated from further evaluation. The ADP process considered alternative development scenarios that were found to be suboptimal. This early consideration and elimination of alternative development scenarios from the reasonable range of alternatives under NEPA is consistent with the guidance for early integration, alignment, and

streamlining of planning process (specifically UFC 2-100-01 Sections 3-6.1.3.4 and 32 CFR 651 Section 14(a)(3)).

2.5.2 Move Operations to Military Ocean Terminal Concord

The Army considered moving MOTSU operations to Military Ocean Terminal Concord, California. However, this alternative would not efficiently or effectively support MOTSU's area of operations. Additionally, Military Ocean Terminal Concord is fully occupied with its Pacific area mission. Therefore, this alternative is not considered reasonable and is not carried forward.

2.5.3 Move Operations to Another East Coast Location

Another alternative considered would be to move MOTSU operations elsewhere on the East or Gulf Coast. This alternative would not be reasonable because of the prohibitive cost of establishing a new facility that would support MOTSU's mission. Utilizing an existing commercial port would not be feasible for safety reasons. Therefore, this alternative is not considered reasonable and is not carried forward.

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3.0 EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

NEPA and associated regulations, promulgated in 40 CFR Parts 1500–1508 and 32 CFR Part 651, require that an EIS address the general conditions and nature of the affected environment and establish the environmental setting against which environmental effects are evaluated. This chapter presents relevant general baseline conditions, focusing on specific aspects of the environment that may be impacted by the alternatives. All potentially relevant environmental resource areas were initially considered for analysis in this EIS. In compliance with NEPA, the CEQ, and Army guidelines, evaluation is limited to resource areas that are potentially affected by the proposed action and alternatives. This chapter also presents an analysis of the potential direct effects of each alternative on the affected environment.

3.1 RESOURCES ELIMINATED FROM DETAILED CONSIDERATION

CEQ regulations indicate that the lead agency should identify and eliminate from detailed study the issues that are not important or that have been covered by prior environmental review, narrowing the discussion of these issues in the document to a brief presentation of why they would not have a significant effect on the human or natural environment. The potential effects to the following resource areas are considered negligible or nonexistent so they were not analyzed in detail in this EIS:

Land Use and Recreation. MOTSU's Master Plan and associated land use policies were reviewed to ensure that all projects are consistent with the District ADPs which address specific mission-related land uses. There would be no change to existing land use under the proposed action, and all projects would be compatible with adjacent existing and future land uses. There are no public recreational resources in the project area.

Socioeconomics and Environmental Justice. Socioeconomics refers to the economic impact of a proposed action generally in terms of population, employment, and housing conditions. Environmental Justice is concerned with any disproportionate adverse effects of a proposed action to minority and low-income populations. The proposed action does not include any changes to personnel or economic output and does not affect housing demand. Demolition and construction associated with implementing the proposed action could result in the temporary minor increase of jobs within the project area. All projects would occur within the installation boundary where there are no low-income or minority populations.

Transportation and Traffic. Transportation in this EIS refers to roadways, parking, and rail. Any changes to existing roadways associated with the proposed action involve improvements (paving, repaving) or creating access ways. Parking lots and hardstands could also be repaired, repaved, and improved within existing boundaries. Rail line improvements would involve replacement and repairs of the existing rail infrastructure and could also include stabilization of

slopes. All of these anticipated effects to transportation are improvements with no anticipated negative effects. Material required for the proposed activities or demolition debris produced by them, would be temporarily stored in previously disturbed areas accessible to the project sites, and would be transported via existing roadways on and off installation, which are lightly used. This would temporarily add to traffic on existing roadways during the times when materials are transported. Where required, Erosion and Sediment Control Plans would be prepared and implemented to minimize effects.

Utilities. Utilities include infrastructure associated with drinking water production, storage, and distribution; wastewater collection, treatment, and disposal; stormwater management; solid waste management; energy production, transmission, and distribution; and communications. Some proposed action projects would involve updates, improvements, and additions to the existing utilities and service systems to accommodate mission requirements, thus effects would be positive. None of the proposed projects would result in substantial increases to MOTSU's utility requirements; therefore, there would be no or minimal effects on utility infrastructure supporting generation or storage. Projects would occur in previously disturbed areas adjacent to or within the path of existing linear infrastructure. Stormwater management system updates and additions would reduce runoff and flood risk in the project area, and thus effects would be positive. All projects associated with the proposed action would be implemented in compliance with established stormwater management, pollution prevention, and water quality monitoring plans as required.

Hazardous Materials, Hazardous Waste, Toxic Substances, and Contaminated Sites. MOTSU is defined by the RCRA as a Very Small Quantity Generator (generates less than 220 pounds per month of hazardous waste). Hazardous waste is temporarily stored prior to transfer by licensed hazardous waste disposal companies to an approved site under NC regulations. MOTSU uses 3rd party vendors to dispose of non-regulated hazardous waste and universal wastes. No radioactive waste is generated on the facility. The proposed action is not expected to generate any new hazardous materials or waste or toxic substances or to affect contaminated sites. When project designs are refined over time, the MOTSU Regulation 200-4, Hazardous Waste and Hazardous Materials Management Plan will be updated as necessary.

3.2 AIR QUALITY AND CLIMATE CHANGE

As part of the CAA, the EPA has established National Ambient Air Quality Standards (NAAQS) for major pollutants of concern, called "criteria pollutants." These criteria pollutants include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}), particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$), and lead. The NAAQS represent maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect the public health and welfare. Based on measured ambient criteria pollutant

data, the EPA designates areas in the U.S. as having air quality better than (attainment) or worse than (nonattainment) of the NAAQS. Geographic areas that are in compliance with the NAAQS are designated as attainment areas. Areas that do not meet NAAQS for criteria pollutants are designated “nonattainment areas” for that pollutant. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are also required to adhere to maintenance plans to ensure continued attainment.

The State of North Carolina has adopted the federal NAAQS. Most air pollutants originate from human-made sources, including mobile sources (e.g., cars, trucks, buses burning fossil fuels) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Air pollutants are also released from natural sources such as volcanic eruptions and forest fires. Lead has been greatly reduced in ambient air with the elimination of its use in fuel. There are no sources of lead associated with the proposed action and so lead is not carried forward in the air quality analysis.

In addition to the NAAQS for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA Amendments. The National Emission Standards for Hazardous Air Pollutants regulate HAP emissions from stationary sources (40 CFR Part 61). HAPs emitted from mobile sources are called Mobile Source Air Toxics. Mobile Source Air Toxics are compounds emitted from highway vehicles and nonroad equipment that are known or suspected to cause cancer or other serious health and environmental effects. The final Tier 3 Motor Vehicle Emission Standards were published on April 28, 2014 (*Federal Register* Volume 79, No. 81, pp.23414–23886, 2014) and established both tailpipe and evaporative emission standards for nonroad vehicles to reduce a variety of pollutants, including the primary Mobile Source Air Toxics. Unlike the criteria pollutants, there are no NAAQS for other HAPs. The primary control methodologies for these pollutants for mobile sources involve reducing their content in fuel and altering the engine operating characteristics to reduce the volume of pollutant generated during combustion.

The CAA also established a national goal of preventing degradation or impairment in federally designated Class I areas. Class I areas are defined as those areas where any appreciable degradation in air quality or associated visibility impairment is considered significant. MOTSU does not lie within 60 miles of a Class I area. The closest is Cape Romain Wilderness, which is over 100 miles south on the South Carolina coast.

GHGs are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates increasing global temperatures over the past century are due to an increase in GHG emissions from human activities. The climate change associated with global warming is producing negative economic and social consequences across the globe. The Region of Influence (ROI) for GHG emissions is global, as all emissions, summed across the planet, are what result in the phenomenon of climate change. For this reason, the GHG analysis is in the cumulative analysis in Section 4.

3.2.1 Affected Environment

MOTSU is located in Brunswick and New Hanover Counties in North Carolina, which serves as the ROI for criteria pollutants. These counties are in attainment for all criteria pollutants, which means that air quality in the region is considered very good. **Table 3.2-1** presents the applicable criteria pollutant design values for the areas closest to MOTSU that monitor criteria pollutant ambient air quality emissions. A design value is a statistic that describes the air quality status of a given location relative to the level of the NAAQS.

Table 3.2-1 Comparison of 2022 North Carolina Design Values with NAAQS

Pollutant	Averaging Time	NAAQS	Maximum Design Values (Station)	% of NAAQS
CO	1-hour	35 ppm	1.7 ppm (Mecklenburg)	5
	8-hour	9 ppm	1.3 ppm (Mecklenburg)	14
NO_2	1-hour	100 ppb	35 ppb (Mecklenburg)	35
	Annual	53 ppb	10 ppb (Mecklenburg)	20
PM_{10}	24-hour	150 µg/m^3	0.0 µg/m^3 (Mecklenburg)	0
$PM_{2.5}$	24-hour	35 µg/m^3	12 µg/m^3 (Wilmington)	34
	Annual	12 µg/m^3	4.4 µg/m^3 (Wilmington)	37
O_3	8-hour	0.07 ppm	58 ppm (Wilmington)	83
SO_2	1-hour	75 ppb	13 ppb (Beaufort)	17

Legend: % = percent; µg = microgram; CO = carbon monoxide; m^3 = cubic meter; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; O_3 = ozone; $PM_{2.5}$ = aerodynamic diameter of 2.5 microns or less; PM_{10} = aerodynamic diameter of 10 microns or less; ppb = parts per billion; ppm = parts per million; SO_2 = sulfur dioxide

Source: EPA 2023

Depending on the installation's location and whether it is considered a "major source" of air pollutants, the CAA may require permitting before construction or demolition commences. Currently, MOTSU holds a synthetic minor source air permit (North Carolina Department of Environmental Quality [NCDEQ] 2021) specifically for the use of no more than 10 tons of methyl bromide annually for the fumigation of contaminated cargo containers, and typically uses a fraction of the allowed amount.

3.2.1.1 Climate

The average temperature for the North Carolina Coastal Plain has been increasing since the 1960s and has remained consistently above average since the 1990s. The period 2015–2018 was one of the eight warmest on record, while 16 of the last 18 years have been above the long-term average of about 61 degrees Fahrenheit for the Coastal Plain region (Kunkel et al. 2020). Based on the virtual certainty that water vapor in the atmosphere will increase as global warming occurs, it is very likely that the risk of extreme precipitation will increase everywhere in the Coastal Plain. Depending on the rate of greenhouse gas emissions, global average sea level is projected to increase by 1–2 feet (moderate emissions scenario) to 2.0–3.6 feet (higher emissions scenario) by 2100 (Intergovernmental Panel on Climate Change 2022). Under both scenarios, many areas along the North Carolina coast will be impacted by high tide flooding

(HTF) near daily by 2100. In conjunction with this increase in sea level, HTF could occur as often as one out of every two days during the decade from 2050 to 2060, and daily after about 2080. Under higher sea level rise rates, HTF becomes a daily occurrence sooner, with corresponding increases in water depths.

North Carolina's coast experiences a hurricane an average of once every two to three years. In North Carolina's large Albemarle and Pamlico Sounds as well as many of the lesser sounds and river-estuaries, storm surge is enhanced by large distances of open water over which the wind can blow in a specific direction, shallow water depths, and a funneling effect as water moves to one end of the sound or up into the river-estuaries. Recent significant surge events along the sounds include surge exceeding 10 feet in New Bern, NC, during Hurricane Florence in 2018 and 6 feet in Ocracoke, NC, during Hurricane Dorian in 2019. Whereas the ocean front in most populated areas has a constructed dune line that provides protection from storm surge as long as it remains intact, the sounds have no similar protection, and inundation occurs as soon as the water level exceeds the low-lying adjacent topography. Hurricane Florence provided an example of inland flooding combined with storm surge, as this slow-moving storm deposited more than 25 inches of precipitation on the central and southeastern North Carolina coastal region, much of which was coincident with the wind-driven storm surge. Collectively, these findings make it clear that climate change is increasing both routine and extreme storm-related water levels and thereby exacerbating a range of flood hazards in coastal North Carolina (Kunkel et al. 2020).

Figure 3.2-1 presents the five-year average predominant wind direction for MOTSU and surrounding areas, along with the location of sensitive receptor locations (schools, parks, senior living, medical facilities). Winds are largely out of the southwest for most of the year, which indicates that areas that would be considered downwind of MOTSU, where pollutants would move off site, would primarily lie north and east of the installation (Iowa State University 2023).These are not expected to be affected by emissions from MOTSU because of their distance and the direction of prevailing winds.

On January 9, 2023, the CEQ published interim guidance to assist in analyzing GHG and climate change effects of proposed actions (CEQ 2023). The guidance explains how agencies should apply NEPA principles and existing best practices to their climate change analysis.

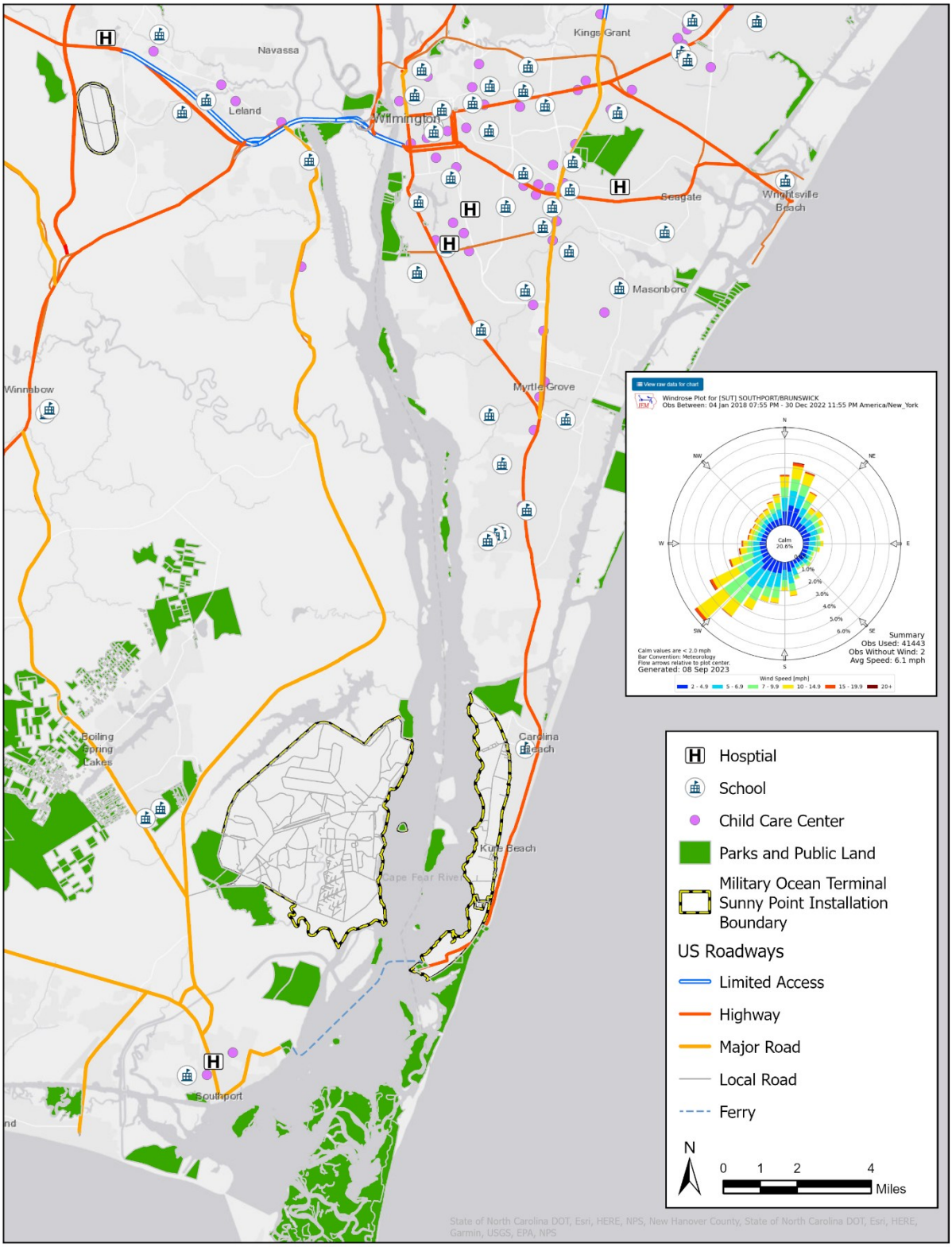

Figure 3.2-1 Sensitive Receptors Located Near MOTSU and Predominant Wind Patterns

The U.S. Army has published its Climate Strategy (Department of the Army 2022) in response to EO 14008, *Tackling the Climate Crisis at Home and Abroad* (*Federal Register* Vol. 86, No. 19, pp 7619–7633). Listed Army goals include achieving a 50 percent reduction in Army net GHG pollution by 2030, compared to 2005 levels. The most relevant tasks in the near term for the proposed action that the Army has identified for installations include the following:

- Field an all-electric light-duty non-tactical vehicle fleet by 2027
- Implement installation-wide building control systems by 2028
- Provide 100 percent carbon-pollution-free electricity for Army installations' needs by 2030
- Include climate change threat mitigation into Army land management decisions
- Incorporate the latest climate and environmental science into stationing, construction, and fielding decisions.

3.2.2 Environmental Consequences

The air quality analysis considers the degree of effects to the local air quality and evaluates short- and long-term effects, beneficial and adverse effects, effects on public health and safety as they relate to air quality, and effects that would violate federal, state, tribal, or local laws protecting the environment. Effects on air quality are based on estimated direct and indirect emissions associated with the action alternatives. This EIS provides a quantitative analysis of emissions where information is available, and a qualitative analysis of emissions where there is insufficient information available at this time on potential construction and maintenance activities.

Potential effects on air quality resulting from the No Action, Full Implementation, and Partial Implementation Alternatives are described in the following sections. The following thresholds were used to determine the potential significance of an adverse impact in the air quality analysis:

- In the context of criteria pollutants for which the proposed project region is in attainment of a NAAQS, the analysis compares the annual net increase in emissions estimated for each project alternative to the 250 tons per year Prevention of Significant Deterioration (PSD) permitting threshold. The PSD permitting threshold represents the level of potential new emissions below which a new or existing minor non-listed stationary source may acceptably emit without triggering the requirement to obtain a permit. Thus, if the intensity of any net emissions increase for a project alternative is below 250 tons per year in the context of an attainment criteria pollutant, the indication is the air quality effects for the ROI will not be significant for that pollutant. Additionally, the analysis includes review of activities and emissions to determine if any sensitive receptor locations could be negatively impacted.
- For GHGs, the analysis provides additional context for GHG emissions through the use of the best available social cost of GHG (SC-GHG) estimates to translate climate effects into the more accessible metric of dollars, to allow decision-makers and the public to

make comparisons, help evaluate the significance of an action's climate change effects, and understand better the tradeoffs associated with an action and its alternatives. Because the ROI for GHGs is global, this analysis is included in Section 4.0, Cumulative Effects.

3.2.2.1 Preferred Alternative – Full Implementation

The Full Implementation Alternative would include a variety of construction, repair, and maintenance activities, primarily on land, though some construction/repair of marine infrastructure could generate vessel activity for in-water work. Additionally, some of the maintenance activities identified would occur in the Cape Fear River, such as the maintenance dredging of channels, berths, and the turning basins for the South, Central, and North Wharves. The maintenance activities included in the Full Implementation Alternative are ongoing, and emission estimates were developed to provide context to the emissions contribution of the activity and also for use in developing the SC-GHG estimates. The equipment used during construction and maintenance activities would be operated intermittently over a large area and would produce negligible ambient HAPs in localized areas lacking in sensitive receptors. As a result, HAPs are not carried forward in the analysis. For the air quality analysis, emissions were estimated for the following projects, which would occur during the period 2025–2031:

- **Barricade Safety**
  - Annual Barricade Repair and Maintenance (2026-2031)
  - Install Lightning Protection System (2027-2031)
- **Waterfront Maintenance**
  - Shoreline Protection – Phase 1 (2025-2027)
  - Maintenance Dredging of Channels, Berths, and Turning Basins for the South, Central, and North Wharves
- **Pleasure Island Explosive Safety Clear Zone Security**
  - Clearing and Fencing of Area Adjacent to the Property Line and Dow Road
  - Establishing Gates at Public Road Crossings of Property Boundary
  - Maintenance of ESCZ Vegetation in Areas Not Controlled by Tenant
- **Linear Infrastructure**
  - Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
  - Upgrade and Repair Rail Lines

The projects evaluated qualitatively are numerous small projects that would be implemented over a period of years, or will be evaluated under NEPA in future years, such as the Cantonment Area Infill project. The following projects were evaluated qualitatively:

- **Waterfront Maintenance**
  - Maintenance and Repairs of Waterfront Infrastructure (Wharves and Associated Infrastructure)
  - Maintenance and Repairs to Security Boat Dock, Ramp, and Wave Attenuator

- **Linear Infrastructure**
  - Repair and Repave Existing Roads, Hardstands, Parking Areas, and Pads
  - Improve utilities within existing corridors
- **Stormwater Mitigation**
  - Flood Mitigation for Classification Yard/Bridge Crane Area
  - Site-wide Stormwater Drainage Improvements
- **Cantonment Area Infill**
  - Improvement of Facilities and Infrastructure

Table 3.2-2 presents the estimated air emissions (in tons per year) for the quantified planning projects and compares those emissions against the comparative indicator thresholds.

Table 3.2-2 Emission Estimates (tons per year) for Full Implementation Actions

Activity by Year	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
2025						
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Total	**2.83**	**9.87**	**63.03**	**0.06**	**1.86**	**1.57**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2026						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Upgrade/Maintain Rail Lines	0.07	0.53	1.12	0.00	0.16	0.08
Pleasure Island Fencing	0.06	0.40	0.80	0.02	0.16	0.07
Secondary Emergency Egress	0.02	0.11	0.22	0.00	0.04	0.02
Total	**2.98**	**10.84**	**65.01**	**0.08**	**2.24**	**1.73**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2027						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Total	**2.93**	**10.64**	**64.59**	**0.06**	**2.13**	**1.68**
Comparative Indicator	250	250	250	250	250	250

Activity by Year	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2028						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2029						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2030						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2031						
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**

Legend: CO = carbon monoxide; NO_x = nitrogen oxide; $PM_{2.5}$ = aerodynamic diameter of 2.5 microns or less; PM_{10} = aerodynamic diameter of 10 microns or less; SO_2 = sulfur dioxide; VOC = volatile organic compound

Criteria pollutant emissions would not exceed the comparative indicator for any of the years. As a result, the air emissions would not be considered significant. Additionally, emissions would be

generated almost exclusively by mobile sources, primarily from dredging activities and also construction equipment and road trucks. As a result, the emissions would be intermittent and not concentrated in single areas for sustained periods of time. Emissions that are generated would not likely impact any sensitive populations because MOTSU is surrounded by undeveloped land and water. The primary downwind areas for MOTSU lie north and east, with developed areas 2.75 or more miles distant across the Cape Fear River.

3.2.2.2 Partial Implementation Alternative

The Partial Implementation Alternative does not include the following construction projects:

- Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
- Flood Mitigation for the Classification Yard/Bridge Crane Area.

With the reduction in construction activity associated with these actions, there would be a commensurate reduction in emissions. As the Full Implementation Alternative would not result in significant increases in air emission effects, the Partial Implementation Alternative, as a subset of the Full Implementation Alternative, would also not result in significant emission increases or effects. **Table 3.2-3** presents the estimated emissions (in tons per year) summary for the Partial Implementation Alternative.

Table 3.2-3 Emission Estimates (tons per year) for Partial Implementation Actions

Activity by Year	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
2025						
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Total	**2.83**	**9.87**	**63.03**	**0.06**	**1.86**	**1.57**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2026						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Total	**2.96**	**10.73**	**64.79**	**0.08**	**2.19**	**1.71**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2027						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Total	**2.93**	**10.64**	**64.59**	**0.06**	**2.13**	**1.68**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2028						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04

Activity by Year	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2029						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2030						
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**
2031						
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**
Comparative Indicator	250	250	250	250	250	250
Exceed Indicator?	**No**	**No**	**No**	**No**	**No**	**No**

Legend: CO = carbon monoxide; NO_x = nitrogen oxide; $PM_{2.5}$ = aerodynamic diameter of 2.5 microns or less; PM_{10} = aerodynamic diameter of 10 microns or less; SO_2 = sulfur dioxide; VOC = volatile organic compound

3.2.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the real property master planning actions proposed. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance. Air emissions from any individual projects would be evaluated as part of the overall NEPA analysis for the projects and any necessary mitigations would be implemented to ensure that no significant effects to Air Quality would occur.

3.3 NOISE

Noise is often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Noise may be intermittent or continuous, steady or impulsive, and may be generated by stationary or mobile sources. The individual response to

similar noise events can vary widely and is influenced by the type and characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day.

Sound, expressed in decibels (dB), is created by vibrations traveling through a medium such as air or water. A sound level of 0 dB is the approximate threshold of human hearing and is barely audible under extremely quiet conditions. By contrast, normal speech has a sound level of approximately 60 dB. Sound levels above 100 dB begin to be felt inside the human ear as discomfort. Sound levels between 110 and 130 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual noise events that an average human ear can detect is about 3 dB. On average, a person perceives a doubling (or halving) of a sound's loudness when there is a 10 dB change in sound level. Noise effects to wildlife is provided in **Section 3.6, Biological Resources.**

3.3.1 Affected Environment

The existing noise environment at MOTSU is characterized by localized and temporary sound generated by the transportation of materiel by truck, rail, and crane, use of vehicles for operational and maintenance activities, and equipment used to conduct maintenance.

MOTSU would be considered an industrial area if zoning designations applied. It has typical daytime noise level of that kind of area. Noise levels in areas such as this may be around 80 dB (Federal Aviation Administration 2022), but would vary by time of day, as well as by types of activities occurring.

The Port of Wilmington is just upriver from MOTSU and is a major shipping port for North Carolina. This 284-acre facility receives over 350 container ships annually and has seen steady growth year after year (Port of Wilmington 2023). The facility has seven berths and a minimum depth of 42 feet. The Port area is relatively busy with shipping traffic as well as routine maintenance dredging activities by the port and other industrial facilities along the river to maintain access for large ships. The Cape Fear River is also a popular place for recreational boating and fishing and commercial fishing. All boating activities would add to the local noise environment.

3.3.2 Environmental Consequences

For noise, an impact would be considered significant if it would (1) result in the violation of applicable federal, state, or local noise ordinance; (2) create incompatible land uses for areas with sensitive noise receptors outside the installation boundary; or (3) would be loud enough to threaten or harm human health.

3.3.2.1 Preferred Alternative – Full Implementation

Under the Preferred Alternative, a number of construction projects would be undertaken throughout various areas of MOTSU. Effects from construction noise would be similar no matter where they occurred within the MOTSU boundary and are described generally here.

Construction noise would be temporary in nature and would generally occur during daytime working hours. **Table 3.3-1** lists typical construction equipment that may be used for the various construction projects at MOTSU. Of these pieces of equipment, an impact pile driver is the loudest and would present the most impact in terms of noise.

Table 3.3-1 Sound Levels for Typical Construction Equipment

Equipment	Sound Level at 50-feet (A-weighted Decibels)
Dozer	82
Dump Truck	76
Excavator	81
Impact Pile Driver	101

Source: Federal Highway Administration 2006

Sound dissipates at a regular rate as distance from the sound increases. This is known as a spreading loss model, and generally, sound decreases by 6 dB for every doubling of distance. For the typical equipment, sound levels would drop below background noise levels of 80 dB by the time the observer was 100-feet from the equipment operating and would be reduced to less than 65 dB by 400-feet. The impact pile driver would be the only exception from this selection of typical equipment. During pier maintenance and pile replacement, sound levels from an operating impact pile driver would dissipate to less than 80 dB at 800-feet and 65 dB by 3,200-feet from the waterfront construction areas. At this distance the noise would dissipate to even lower levels across the Cape Fear River, which is over 8,000 feet away from the wharf areas. While this would represent the largest impact from construction noise, the effects would be temporary and occur during daytime hours, as with all other construction activities within full implementation of the proposed action. No aspect of the Proposed Action would create a permanent change to the noise environment, nor would it create a situation where noise sensitive areas would be impacted, as none exist in the vicinity of the wharf areas where construction noise would be greatest. Noise would be very localized and temporary. Therefore, there would be no significant effects to the noise environment from the full implementation of the proposed action.

3.3.2.2 Partial Implementation Alternative

Effects to the noise environment from partial implementation would be identical to those outlined under full implementation, but to a slightly lesser degree. Pile driving for wharf maintenance would be the same as the full implementation and would be the loudest activity under the proposed action to occur. Effects would be identical to those described above for pile driving, but overall, there would be slightly less construction-related, temporary noise under this alternative. Construction noise would be lessened under this alternative as the Secondary Emergency Egress Road and Utility connection and flood mitigation control at Classification Yard/Bridge Crane Area would not occur. There would be no significant effects from partial implementation of the proposed action.

3.3.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the real property master planning actions proposed. There would be no foreseeable change to existing noise conditions. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance. Noise from any individual projects would be evaluated as part of the overall NEPA analysis for the projects and any necessary mitigations would be implemented to ensure that no significant effects would occur.

3.4 GEOLOGICAL RESOURCES

Geological resources consist of the topography, geology, and soils of a given area. Topography refers to the elevation, slope, aspect, and surface features of an area. The geology of an area includes surface and bedrock materials, its orientation and faulting, and may contain valuable geologic resources such as mineral deposits, petroleum reserves, and fossils. Soil refers to the unconsolidated earthen materials overlaying bedrock or other parent material. The soil structure, elasticity, strength, shrink-swell potential, liquefaction potential, and erodibility can all determine the ability of the ground to support structures and facilities.

3.4.1 Affected Environment

MOTSU is located in the coastal plain of southeastern North Carolina, within the Atlantic Coastal Plain Physiographic Province, a typically flat area sloping gently to the east and southeast to the Atlantic Ocean. The province is formed by recently emerged marine sedimentary rock with an overlying thin layer of marine deposits. The topography is relatively flat, ranging in elevation from 10 to 40 feet above mean low water. The installation is characterized by areas that are swampy and poorly drained and by karst topography. Karst areas are formed from the dissolution of layers of soluble bedrock, which can cause ground subsidence and sinkholes, which typically fill with water, forming ponds (MOTSU 2017).

The principal soils of the main installation and the Pleasure Island ESCZ are provided in **Table 3.4-1**. Hydric soils of each area are provided in **Table 3.4-2**.

Table 3.4-1 Principal Soils of MOTSU Main Installation and Pleasure Island Explosives Safety Clear Zone

Soil Type	Description
Main Installation	
Baymeade fine sand, 1 to 6 percent slopes	This well-drained soil is found on low ridges and convex divides. Typically, the surface layer is dark gray fine sand 3 inches thick. The subsurface layer, 20 inches thick, is light gray fine sand in the upper part and very pale brown fine sand in the lower part. The subsoil is 39 inches thick. It is yellowish brown fine sandy loam in the upper part, light yellowish brown fine sandy loam in the middle part, and light yellowish brown loamy sand in the lower part. The underlying material to a depth of 80 inches is very pale brown fine sand. Surface runoff is slow. Permeability is moderately rapid, and the available water capacity is low. The soil is very strongly acid or strongly acid throughout. The seasonal high-water table is 4 to 5 feet below the surface. Baymeade soil is mostly in woodland. With regard to urban usage, seepage, and caving of cutbacks are the main limitations. Lawns and shrubs are difficult to establish and maintain because of droughtiness and leaching of plant nutrients. The sandy nature of this soil is its main limitation.
Leon Fine Sand	This nearly level, poorly drained soil is in broad, smooth, interstream areas and in depressions in undulating areas. Typically, the surface layer is dark gray fine sand 6 inches thick. The subsurface layer is light gray fine sand 8 inches thick. The subsoil is black and dark reddish brown fine sand 9 inches thick. The underlying material to a depth of 80 inches is light gray fine sand in the upper part, black and brown fine sand in the middle part, and black fine sand in the lower part. Surface runoff is slow. Permeability is rapid in the surface layer and moderate to rapid in the subsoil. The available water capacity is low. When artificially drained, the subsoil exhibits properties of a weakly cemented pan and may restrict some root penetration. Ditchbanks cave, and the soil has a high seepage rate. The soil is extremely acid or very strongly acid throughout unless the surface layer has been limed. The seasonal high-water table is at or near the surface. Leon soil is mostly in woodland. Leaching of plant nutrients, seasonal high-water table, and caving of cutbanks are the main limitations.
Murville mucky fine sand	This nearly level, very poorly drained soil is in depressions in broad interstream areas. Typically, the surface layer is black mucky fine sand 5 inches thick. The subsoil to a depth of 80 inches is black and dark reddish brown fine sand. Surface runoff is very slow. Permeability is rapid in the surface layer and moderately rapid in the subsoil. The available water capacity is low. When artificially drained, the subsoil may exhibit properties of a weakly cemented pan that may restrict some root penetration. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high-water table is at or near the surface. Murville soil is mostly in the woodland. Wetness from a seasonal high-water table, surface ponding, high rates of seepage, and caving of cutbanks are the main limitations.

Soil Type	Description
Yaupon silty clay loam, 0-3 percent slopes	This soil consists of somewhat poorly drained to moderately well drained, clayey soil. It is near the edges of the mainland and Cape Fear River. Typically, the surface layer is dark gray silty clay loam 7 inches thick. The underlying material to a depth of 85 inches is dark gray silty clay in the upper part, dark greenish gray silty clay in the middle part, and black fine sandy loam in the lower part. Surface runoff is slow. Permeability is slow or very slow, and the available water capacity is moderate. This soil has a high shrink-swell potential that produces wide, deep cracks during the dry season. The soil ranges from very strongly acid to medium acid in the surface and subsurface layers. It ranges from very strongly acid to moderately alkaline in the underlying material. The seasonal high-water table is about 2 to 4 feet below the surface. This soil is generally not used for forestry, agricultural, residential, or recreational uses because of high shrink-swell potential, slow or very slow permeability, and wetness.
Pleasure Island Explosives Safety Clear Zone	
Kureb fine sand, 1 to 8 percent slopes	This excessively drained soil is in undulating areas. Nearly all of the acreage is in woodland. Typically, the surface layer is gray fine sand 4 inches thick. The subsurface layer is light gray fine sand 16 inches thick. The underlying material to a depth of 80 inches is brownish yellow fine sand in the upper part and light yellowish brown fine sand in the lower part. Surface runoff is slow. Permeability is rapid, and the available water capacity is very low. Seepage is rapid, and trench walls and ditchbanks cave. The soil ranges from strongly acid to neutral throughout, unless the surface layer has been limited. Caving of ditchbanks and trench walls and seepage are other urban problems.
Tomahawk loamy fine sand	This nearly level, moderately well drained and somewhat poorly drained soil is on low, slightly convex ridges. Typically, the surface layer is dark grayish brown loamy fine sand 6 inches thick. The subsurface layer is light yellowish brown loamy fine sand 6 inches thick. The subsoil is 53 inches thick. It is brownish yellow fine sandy loam in the upper part, yellowish brown loamy fine sand in the middle part, and dark reddish gray and dark reddish brown fine sand in the lower part. The underlying material to a depth of 80 inches is grayish brown sand. Surface runoff is slow. Permeability is moderately rapid in the sandy surface and subsurface layers and moderate to moderately rapid in the subsoil. The available water capacity is moderate. The soil has a high seepage, and ditchbanks and trench walls cave. The soil is very strongly acid or strongly acid throughout unless the surface layer has been limed. The seasonal high-water table is between 1.5 and 3 feet below the surface. Tomahawk soil is mostly in woodland. Wetness from a seasonal high-water table is the main limitation. The sandy nature of the soil, seepage, and caving of cutbanks are also limitations.
Lynchburg fine sandy loam	This nearly level, somewhat poorly drained soil is in interstream areas. Typically, the surface layer is dark gray fine sandy loam 9 inches thick. The subsoil is 55 inches thick. It is light yellowish brown fine sandy loam in the upper part and gray sandy clay loam in the lower part. The underlying material to a depth of 80 inches is gray clay loam. Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. The soil ranges from extremely acid to strongly acid throughout, unless the surface layer has been limed. The seasonal high-water table is 0.5 foot to 1.5 feet below the surface. Lynchburg soil is mostly in woodland. Wetness from a seasonal high-water table is the main limitation.

Source: MOTSU 2017

Table 3.4-2 Hydric Soils of MOTSU Main Installation and Pleasure Island Explosive Safety Clear Zone

Area	Soil Types Present
Main Installation	Bohicket Dorovan Leon Murville Torhunta
Pleasure Island Explosives Safety Clear Zone	Dorovan Johnston Leon Murville Lynn Haven

Source: MOTSU 2017

3.4.2 Environmental Consequences

Effects to geological resources would be considered significant if the proposed action resulted in: erosion that resulted in a violation of federal or state air or water quality laws; changes to the landscape that precluded the military mission; or alteration of soils, topography, or geology in a manner that would expose structures or people to risk.

3.4.2.1 Preferred Alternative – Full Implementation

Several aspects of the Preferred Alternative would result in temporary and permanent effects to topography. Annual barricade maintenance and repair would involve earth-moving activities to achieve the dimensions and slopes required by explosives safety regulations. This work would occur in areas where topography was previously modified to construct the barricades and would stabilize the barricades to reduce effects of erosion on adjacent topography. Similarly, the repair of rail lines may involve replacement of track bed and ballast and stabilizing slopes. Stormwater mitigation projects would involve modifying existing grades and stormwater infrastructure to achieve improvements in drainage. Stormwater mitigation would occur in previously disturbed areas and, like barricade work, would be expected to result in reduced erosion and flooding effects on existing topography. Similarly, the proposed Phase 1 Shoreline Protection work would modify the existing shoreline with the goal of stabilizing and protecting it from further erosion. These projects would occur in previously disturbed areas and would be expected to have a stabilizing effect on adjacent topography.

The implementation of the Preferred Alternative would result in temporary and permanent effects to soils. The majority of the proposed projects would occur in previously developed or disturbed areas, and existing soils would be largely unchanged. During the construction phase, best management practices (BMPs) (e.g., the use of traps and containment barriers for stormwater management) would be used to minimize the migration of soils off-site. Annual maintenance dredging of navigation channels and berths at MOTSU would continue and would result in the removal of approximately one million cubic yards of dredged sediments, which

accumulated over the previous months. The removed sediment would be deposited at the ODMDS.

The implementation of the Preferred Alternative could result in temporary and minor permanent effects to geology resulting from construction in the cantonment area and from pile driving associated with waterfront projects. Minor effects to the surface and near-surface geology would occur because of grading and leveling and/or drilling or digging to secure foundations for the new facilities. No mineral resources or sensitive geologic resources would be impacted by implementation of the Preferred Alternative. Therefore, effects to geological resources would be less than significant.

3.4.2.2 Partial Implementation Alternative

The Partial Implementation Alternative does not include the following construction projects:

- Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
- Flood Mitigation for the Classification Yard/Bridge Crane Area

Effects to topography, soils, and geology resulting from implementation of the Partial Implementation Alternative would be the same as described in **Section 3.4.2.1**.

3.4.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the proposed activities. Generally there would be no change to existing geology, topography, or soil conditions; however, erosion at the waterfront and on-installation associated with needed shoreline stabilization and stormwater management projects would continue as described in **Section 3.4.1** and this could result in significant soil loss, changes in topography as well as impacting infrastructure.

3.5 WATER RESOURCES

Water resources include the quantity and quality of surface water bodies, groundwater, stormwater, floodplains, and wetlands. Surface water resources generally include wetlands, lakes, ponds, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. Surface waters in the U.S. are protected under the CWA, the goal of which is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”

The CWA (Section 401) requires that any point source facility that discharges polluted wastewater into a body of water must first obtain a NPDES permit that is issued at a national level through the EPA, or an approved state agency. Stormwater collects during periods of frequent precipitation and is typically diverted into a facility’s stormwater sewer system. Stormwater runoff management addresses measures to reduce flow energy and pollutants in stormwater and to control discharge from point and nonpoint sources. Point source pollution is

produced by a single, identifiable source. Nonpoint source pollution affects surface water and groundwater resources as a result of pollution from diffuse sources.

Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells. Groundwater is used for water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition. Groundwater is an important component of the overall hydrologic cycle of the earth.

Floodplains are defined by EO 11988 as amended by EO 13690 as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year." Areas subject to a 1 percent or greater chance of annual flooding are also referred to as 100-year floodplains and areas subject to a 0.2 percent or greater chance of annual flooding are referred to as 500-year floodplains. EO 11988 was issued to avoid, to the maximum extent possible, the long- and short-term adverse effects associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practical alternative. If it is not practicable to fully avoid the floodplain, the proposed action needs to be designed or modified to minimize potential harm to or within the floodplain. Any construction project to be located in a floodplain would require a FONPA under EO 11988. A FONPA for this project is provided in **Appendix D**.

Wetlands are considered sensitive habitats and may be subject to federal regulatory authority under Sections 401 and 404 of the CWA and EO 11990, *Protection of Wetlands* depending on location of wetlands in relation to defined "Waters of the United States." Wetlands are defined by the USACE as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Any proposed project that affects a wetland would require a FONPA under EO 11990 (**Appendix D**).

3.5.1 Affected Environment

3.5.1.1 Surface Water

The Cape Fear River, which has one of the largest watersheds in North Carolina, bisects MOTSU. The MOTSU main installation is on the west bank of the river and the ESCZ is on the east bank. The Cape Fear River enters the Atlantic Ocean less than 10 miles downstream of MOTSU. Within the installation, surface water bodies include several ponds, wetlands, and streams including Nigis, Fishing, and Governors Creeks. In addition, Tom Branch traverses the north-central portion of the main installation and contributes to Orton Pond, located outside of the installation boundary. There are many freshwater ponds located at MOTSU. Approximately 20 of these ponds are frequently used for fishing on the installation. Most of the streams are

considered part of the Wilmington River saltwater estuary system (MOTSU 2017). MOTSU currently has one NPDES permit for three outfalls into Nigis Creek (North Carolina Permit NCS000208) that was issued on July 1, 2023 and expires on June 30, 2028. MOTSU uses a watershed management approach to protect water quality and conserve aquatic resources.

The State of North Carolina classifies surface waters based on the best uses to be protected within those waters and carry with them an associated set of water quality standards to protect those uses. The major surface water bodies on or adjacent to MOTSU are listed below in **Table 3.5-1**, with their current rating by NCDEQ.

Table 3.5-1 Surface Water Classifications in Vicinity of MOTSU

Water Body	NCDEQ Surface Water Classification
Cape Fear River	SC
Governor's Creek	SC, Sw; HQW
Walden Creek	SC, Sw; HQW
Nigis Creek	SC; Sw; HQW
White Spring Creek	SC: Sw: HQW
Fishing Creek	SC, Sw; HQW
Orton Creek (Orton Pond)	C, Sw
Tom Branch	C, Sw

Legend: SC = Aquatic Life, Secondary Contact Recreation, Tidal Salt Water; C = Aquatic Life, Secondary Contact Recreation, Fresh Water; Sw = Swamp Waters; HQW = High Quality Waters
Source: NCDEQ 2024a

The State of North Carolina also maintains a list of impaired waters in accordance with section 303(d) of the CWA. These waters are listed as impaired for various water quality standards and have a Total Maximum Daily Load limit for various regulated pollutants or contaminants. Currently, the Lower Cape Fear River is on the 303(d) list of impaired waters and immediately borders MOTSU to the east. However, in the Draft 2024 Integrated Report for Impaired Waters in North Carolina, this section of the Lower Cape Fear River is reported as meeting criteria for pollutants, or data inconclusive (NCDEQ 2024b). No Total Maximum Daily Load limits have been established for any waters adjacent to MOTSU.

3.5.1.2 Groundwater

Southeastern North Carolina hydrogeologic units consist of the water table aquifer, tertiary limestone aquifer, and cretaceous aquifer. The water table aquifer consists of shallow surficial sands and some shell beds; thickness ranges between 20 to 80 feet. The tertiary limestone aquifer system consists of the Castle Hayne formation, the Beaufort formation, and the Peedee formation. The cretaceous aquifer system consists of interbedded layers of sand and clay or limestone and clay.

Regional groundwater flow is influenced by the Cape Fear River and, therefore, deep groundwater on MOTSU flows east before discharging into the Cape Fear River. Shallow groundwater flow is expected to flow toward tributaries of the Cape Fear River including Nigis,

Fishing, and Governors Creeks then discharge into these surface water bodies. Groundwater is the main source of drinking water in the Brunswick County area. There are known public drinking water wells in the confined aquifer (i.e., Brunswick County Highway 211 Water Treatment Plant extraction wells). MOTSU drinking water is also supplied by Brunswick County. The primary groundwater resources at MOTSU include the Castle Hayne and the Peedee aquifers.

Castle Hayne Aquifer. The Castle Hayne Aquifer is an eastward sloping and thickening wedge of limestone and sandstone, located in a 12,500 square mile area in the eastern part of North Carolina (Lyke and Coble 1987). It is the most productive aquifer and serves as the principal groundwater source of municipal supply for Brunswick County (Harden et al. 2003). This aquifer ranges from 12 to 755 feet thick with an average thickness of 153 feet (NC Water 2024).

Peedee Aquifer. The Peedee Aquifer is located beneath the Castle Hayne Aquifer. It consists of gray or light brown sandstone and contains freshwater only in its uppermost sands. (McSwain et al. 2014). The upper part of the Peedee aquifer is an important source of ground water supply for domestic and commercial use. Ground water in the lower part of the Peedee aquifer is not known to be used as a source of supply in Brunswick County (Harden et al. 2003). The Peedee Aquifer ranges in thickness from 8 to 750 feet thick with an average thickness of 133 feet (NC Water 2024).

Groundwater sampled from the Peedee and Castle Hayne aquifers both have elevated chloride concentrations. A study prepared by the U.S. Geological Survey (USGS) in cooperation with the Cape Fear Public Utility Authority in 2013 stated that if existing groundwater withdrawal practices continue in the area, further chloride concentration and saltwater intrusion would be present in both Castle Hayne and Peedee aquifers. As of 2020, the Peedee Aquifer in the vicinity of MOTSU is considered to be “salty” due to elevated chloride content, while the Castle Hayne Aquifer is still considered “fresh” by the North Carolina Division of Water Resources (NC Water 2024).

3.5.1.3 Wetlands

Wetlands at MOTSU are primarily forested wetlands and marshlands. Marsh areas and small lakes are especially common toward the eastern half of the main installation. Some of these wetlands include manmade alterations including construction of protective barriers, sewage lagoons, and at least three relatively large dike-enclosed areas that have been used for dumping of dredged material removed from the Cape Fear River. The sewage lagoons are no longer in operation and have been closed, with septic systems installed at North, Central and South Wharves. Mapped delineations between wetland and upland habitats are defined within MOTSU. The mapped locations should in no way be construed to mean that a jurisdictional (Section 404, CWA) determination has been made or is implied. Not all wetlands are “waters of the United States” and therefore are not subject to Section 404 of the CWA. The definition of

wetlands in EO 11990 is broader and covers wetlands that are not necessarily associated with "waters of the United States." Before any action, a wetland delineation would be necessary to confirm the exact extent of wetlands in the proposed development area (MOTSU 2017). MOTSU uses regular monitoring programs to identify potential erosion problems and any associated sedimentation effects to wetlands and streams located on MOTSU.

Table 3.5-2 shows the type and acreage of wetlands within the MOTSU boundary. A total of approximately 2,762.6 acres of wetlands exists at MOTSU with tidal marshes being the most abundant and pine/evergreen shrub wetlands being the second largest. Of note, these wetlands are not necessarily Section 404 of the CWA jurisdictional but correspond to the definition of wetland as in EO 11990. A small survey of the wetlands associated with the barricade maintenance identified some small wetland areas as Section 404 jurisdictional wetlands. A total 6.8 acres were identified as Section 404 jurisdictional wetlands all located within the north and south rail yards.

Table 3.5-2 Wetland Types and Acreages within MOTSU

Wetland Type	Area (acres)
Depression Swamp Forest	68.8
Herbaceous Depression	34.6
Pine/Evergreen Shrub	1,119.4
Riparian Swamp Forest	278.0
Salt Shrub	28.1
Stormwater Retention Pond	2.6
Tidal Marsh	1,139.1
Open Water	84.6
Unclassified	7.55
Total	***2,762.6***

Source: MOTSU 2017

3.5.1.4 Floodplains

MOTSU is within the lower elevations of surface water drainage courses. In the south and southwest regions of MOTSU, surface runoff drains into Nigis, Fishing, and Governors Creeks. In the north and northwestern portions, surface runoff drains into Toms Branch, Orton Creek, and Orton Pond (U.S. Army Environmental Hygiene Agency 1991). Elevations range from near sea level along shorelines of MOTSU to a maximum of approximately 56 feet above mean sea level at some localities in the western part of MOTSU (MOTSU 2017). Several areas within MOTSU are susceptible to flooding based on the current Federal Emergency Management Agency (FEMA) 100-year flood zone map. FEMA has established zones that identify relative risk of flooding. Zones that begin with the letters "A" or "V" are high risk flood zones. On MOTSU, these areas include the southern end of the main installation, the Pleasure Island ESCZ, and multiple areas along the rail line connecting the main installation to the Leland Interchange Yard. The main installation has approximately 1,017 acres of area within the VE and AE Flood Zones and approximately 870 acres within the Pleasure Island ESCZ that are

classified as AE, Ao, and VE. MOTSU is also susceptible to flooding with storm surges, intermittent hurricanes, and Atlantic storms.

3.5.2 Environmental Consequences

For water resources, an impact would be considered significant if it: (a) violates any water quality standard or waste discharge requirement; (b) substantially depletes groundwater supplies or interferes substantially with groundwater recharge; (c) substantially alters the existing drainage pattern of the site in a manner which would result in substantial erosion or siltation on-site or off-site; (d) substantially increases the rate or amount of surface runoff in a manner that would result in flooding on-site or off-site; (e) creates or contributes runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or (f) otherwise substantially degrades water quality.

3.5.2.1 Preferred Alternative – Full Implementation

Surface Water

Generally, effects to surface waters could occur from construction and maintenance-related activities under the proposed action due to exposed soil, stormwater runoff, and increased turbidity from any in-water work. As stated, at this time, many projects associated with the proposed action do not have enough project specifics to determine quantifiable effects.

Barricade maintenance and repairs have the potential for increased soil erosion and runoff into nearby surface waters due to exposed soil during construction. Barricade maintenance would require approximately 382 acres of land to have exposed soil during maintenance. During repairs, all required ground-disturbing permits would be obtained and followed, as well as activities adhering to the existing SWPPP to prevent stormwater related to surface waters during construction.

Installation of living shorelines and revetments at various locations would create temporary effects to surface waters during construction. Effects would include increased turbidity, and localized disturbance of surface waters during construction. These temporary effects would improve shoreline stability, decrease erosion, and give way to increased water quality and habitat due to creation over the long term. Revetments would similarly increase shoreline stability and decrease erosion, thereby improving water quality over the long term.

Continued maintenance dredging of the existing channels at MOTSU would have temporary effects to surface water quality from increased turbidity. Dredging effects to water quality would be temporary and would subside shortly after dredging activity has stopped. Maintenance dredging of the navigation basins and entrance channels is authorized under Department of the Army Permit 1998-00432, and Department of the Army Permit SAW-2011-02228 authorizes the transport of dredged material from MOTSU to the Wilmington ODMDS. The USACE has

updated and issued all necessary permits to continue maintenance of the existing channels at MOTSU. All permit requirements would continue to be adhered to, including any permit-required mitigations from dredging activities.

Maintenance and repair of security boat dock, ramp, and wave attenuators could have potential temporary effects to surface water quality from increased turbidity and disturbance from in-water work. Effects to water quality would be temporary and would subside shortly after activity has stopped.

Construction of secondary emergency egress and utility connection at the rail gate, and installation of LPS could have minor effects to surface waters, namely White Springs Creek, due to disturbance from construction activities. effects would be minor and temporary.

Minor effects to surface waters due to disturbance from construction activities could occur with the following actions:

- The repair and repaving of existing roads, hardstands, parking areas, and pads; cantonment construction projects on previously disturbed lands
- The construction within existing rail lines to update and repair through routine maintenance activities; the trenching and replacement of existing electrical and communications utilities with upgraded modern systems and minor upgrades to water lines
- The repair and replacement of failed or failing components of stormwater system within rail tracks and Classification Yard.

Effects would be minor and temporary. Stormwater mitigation projects could cause increased effects through disturbed soil during construction. Stormwater mitigation and improvement projects would alleviate stormwater issues over the long term. Soil disturbance and construction would all be done in accordance with NPDES permitting and in compliance with MOTSU's SWPPP, preventing any significant effects to water quality.

Groundwater

No effects would be expected to groundwater resources. No aspects of the proposed action require groundwater withdrawal or well drilling. While the surficial aquifer may be encountered during construction activities in areas where groundwater is near the surface, this would not impact any drinking water sources, as currently there are no drinking water wells used at MOTSU. Construction activities associated with road construction and trenching for utilities would have limited interaction with groundwater and therefore minimal contribution to effects. No aspect of the proposed action would incorporate any type of construction that would create effects to groundwater, as standard construction methods to repair/replace existing infrastructure would be used. To prevent uncontrolled releases from construction entering the groundwater or flowing toward surface waters, construction BMPs, including a SWPPP, Spill Response Plan, and Hazardous Material Storage Plan, would be utilized where applicable.

Wetlands

The full implementation of the real property master planning actions would have the potential to adversely impact wetlands. At this time, footprints for many projects are unknown. The footprint for barricade maintenance, and the general footprint and location of the Secondary Emergency Egress Road and Utility Connection and ESCZ fence are known and can be used to generate approximate wetland effects. The shoreline stabilization project design is generally known, but footprint specifics do not have enough fidelity at this time to generate impact acreages.

A summary of wetland effects are shown in **Table 3.5-3.** The limits of disturbance for barricade maintenance and the general dimensions of the Secondary Emergency Egress Road and Utility Connection were used to calculate potential wetland effects. An estimated total of 8.39 acres of wetlands exist within the footprint required for barricade maintenance. The majority of this impact would be to pine/evergreen shrub wetlands (2.71 acres), riparian swamp forest (1.48 acres), and herbaceous depression wetlands (0.74 acres). The Secondary Emergency Egress Road and Utility Connection could impact up to 0.61 acre of riparian swamp forest wetlands. The ESCZ fence line clearing will remove vegetation from a total of 0.46 acre of wetlands. This includes 0.31 acre of pine/evergreen shrub wetlands and 0.15 acre of tidal marsh.

Table 3.5-3 Potential Wetland Effects by Project

Wetland Type	Area (acres)
Barricade Maintenance	
Depression Swamp Forest	0.39
Herbaceous Depression	0.74
Pine/Evergreen Shrub	2.71
Riparian Swamp Forest	1.48
Salt Shrub	0.04
Tidal Marsh	0.05
Open Water	0.27
Unclassified Wetlands	2.71
Subtotal	*8.39*
Secondary Emergency Egress	
Riparian Forest Swamp	0.61
Subtotal	*0.61*
ESCZ Fence Clearing	
Pine/Evergreen Shrub	0.31
Tidal Marsh	0.15
Subtotal	*0.46*
Total	***9.46***

Legend: ESCZ = Explosive Safety Clear Zone

Prior to any construction activities occurring, areas would be surveyed for wetlands as necessary. The EO 11990 process, as amended by EO 13690, would determine if no practicable alternatives exist, and any permits required due to land disturbance or potential wetland effects would be obtained and adhered to. It should be noted however, that due to the location of these wetlands, Section 404 of the CWA permitting may not be required, as they may not be considered “waters of the United States.”

Installation of living shorelines and revetments at various locations would create temporary effects to tidal wetlands during construction. Effects would include localized disturbance of wetlands and potential sedimentation from increased turbidity during construction. This would be temporary and would likely give way to increased quality habitat due to creation of the living shoreline stabilizing erosion, therefore creating beneficial effects in the long term by restoring wetland areas and protecting the shoreline from erosion.

Maintenance and repair of security boat dock, ramp, and wave attenuators could have potential temporary effects to wetlands from increased turbidity and disturbance from in-water work. Effects to water quality would be temporary and would subside shortly after activity has stopped.

Installation of LPS could have minor effects on any wetlands in the vicinity due to disturbance from construction activities. Effects would be minor and temporary.

Minor effects to wetlands due to disturbance from construction activities may occur with the following actions:

- The repair and repaving of existing roads, hardstands, parking areas, and pads; cantonment construction projects on previously disturbed lands
- The construction within existing rail lines to update and repair through routine maintenance activities; the trenching and replacing existing electrical and communications utilities with upgraded modern systems and minor upgrades to water lines
- The repair and replacement of failed or failing components of stormwater system within rail tracks and Classification Yard.

Stormwater mitigation projects could cause increased effects through disturbed soil during construction. Soil disturbance and construction would all be done in accordance with NPDES permitting and in compliance with MOTSU's SWPPP, preventing any significant effects to water quality.

Floodplains

The full implementation of the real property master planning actions would have actions taking place in floodplains. The installation would comply with EO 11988, which requires federal agencies to design or modify activities in order to minimize potential harm to or within the floodplain. Due to the nature of the MOTSU mission, avoiding construction within the floodplain is impossible, and effects to the floodplain would be unavoidable.

Table 3.5-4 shows the floodplain impacts by project. Annual barricade repair and maintenance construction would be required to take place within floodplains, as proximity to the river is necessary for the mission. A total of 5.05 acres of area for barricade maintenance would occur within the AE flood zone, which is considered high risk by FEMA. The Pleasure Island fence clearing would impact 0.15 acre of AE floodplain, and 0.10 acre of VE floodplain, both considered high risk by FEMA. No inhabited structures would be constructed within the

floodplain as part of the proposed action. Repairs of security boat dock, ramp, and wave attenuators would be made to existing structures within the floodplain.

Table 3.5-4 Floodplain Impacts by Project and Flood Zone

Project	FEMA Flood Zone	Floodplain	Acres
Barricade Maintenance	AE	1% Annual Chance of Flood Hazard	5.05
ESCZ Fence	AE	1% Annual Chance of Flood Hazard	0.15
ESCZ Fence	VE	1% Annual Chance of Flood Hazard	0.10
Total			5.30

Legend: % = percent; ESCZ = Explosive Safety Clear Zone; FEMA = Federal Emergency Management Agency

Adverse effects to floodplains could result from inundation, mobilization of contaminants, and damage to infrastructure/construction equipment. Many of the project locations are subject to potential flooding, with the nearshore and shoreline having the greatest susceptibility to flooding rain, storm surge, or other coastal flooding.

Project design, including BMPs, would minimize the potential for adverse effects. BMPs would be implemented to locate and maintain work areas away from the shoreline and cease operations when weather conditions indicate the potential for flooding.

Adverse effects would be minimized through BMPs designed to minimize potential for contact with any contaminants. These measures would be implemented to comply with applicable state and federal standards and would include appropriate permits, certifications, and stormwater management. Therefore, effects to floodplains from construction are expected to be negligible.

3.5.2.2 Partial Implementation Alternative

The Partial Implementation Alternative does not include the following construction projects:

- Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
- Flood Mitigation for the Classification Yard/Bridge Crane Area

Therefore, the environmental consequences that would occur to surface water, wetlands, groundwater, and floodplains in the Partial Implementation Alternative actions would be the same as those described for the Full Implementation Alternative, although to a slightly lesser degree.

For wetlands, a total of approximately 7.1 acres of wetlands that have the potential to be impacted by barricade maintenance and repair. The ESCZ fence line clearing will remove vegetation from a total of 0.46 acre of wetlands. As with the Full Implementation, the footprints of other projects are unknown to a degree to give quantifiable impact acreages.

There would therefore be no significant effects to water resources under the Partial Implementation Alternative.

3.5.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the real property master planning actions including flood mitigation and shoreline restoration projects. Water resources would be expected to remain as described under existing conditions in Section 3.5.1. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project- specific NEPA and other required compliance. Water effects from any individual projects would be evaluated as part of the overall NEPA analysis for the projects and any necessary mitigations, including permitting, would be implemented to ensure that no significant effects would occur.

3.6 BIOLOGICAL RESOURCES

Biological resources include plant and animal species, and the habitats within which they occur. This analysis focuses on plant communities, wildlife, and special status species. Plant communities include plant associations and dominant constituent species that occur in the project area. Wildlife includes the characteristic animal species that occur in the project area. Special consideration is given to bird species protected under the MBTA and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. Special Status Species are those plant and animal species that are listed, have been proposed for listing, or are candidates for listing as threatened or endangered under the federal ESA and other species of concern as recognized by state or federal agencies. Essential fish habitat (EFH) and marine species protected by NMFS are also considered in the special status species assessment.

3.6.1 Affected Environment

3.6.1.1 Plant Communities

Vegetation at MOTSU can generally be categorized into four habitat categories: estuarine, palustrine, upland, and modified or constructed habitat, these are described in **Table 3.6-1**.

Table 3.6-1 Habitat Types at MOTSU

Habitat Type	Description
Estuarine	Estuarine systems sustain a variety of marsh plants depending on salinity and flooding regimes. Representative plants include cordgrass (*Spartina* sp.), salt grass (*Distichlis spicata*), black needle rush (*Juncus roemerianus*), three-square (*Scirpus* sp.), cattail (*Typha* sp.), and common reed (*Phragmites australis*). Scrub and shrub thickets are also found in these environments, but tree-size individuals of certain species are not uncommon.
Palustrine	Palustrine systems are in areas that receive fresh water from rainfall or stream flow or both. Species typical to these environments include waterweed (*Egeria densa*), duckweeds (*Spirodela* spp. and *Wolffia* spp.), yellow pond lily (*Nuphar lutea)*, water loosestrife (*Decodon verticillatus*), and black willow (*Salix nigra*). A wide range of hardwood species are also found in these systems, including red maple (*Acer rubrum*), black gum (*Nyssa biflora*), sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), tulip poplar (*Liriodendron tulipifera*), and pond pine (*P. serotina*).

Habitat Type	Description
Upland	Hardwood forest stands within the project area are generally small and uncommon. Intensive land use practices including timbering, farming, and burning may have been responsible for precluding the regeneration of hardwood forest stands. Most of the stands in the project area are associated with sandy ridges located along the east bank of the Cape Fear River in New Hanover County. Canopy species include longleaf pine (*Pinus palustris*), loblolly pine, sweetgum, oak (*Quercus* spp.), and hickory (*Carya* spp.). Subcanopy species include American holly (*Ilex opaca*), dogwood (*Cornus florida*), and shrubs such as yaupon, wild olive (*Osmanthus americanus*), and American beauty berry (*Callicarpa americana*).
Modified or Constructed	Modified or constructed features are those habitats that have been created as a result of the activities of man. Urban-residential areas, borrow pits, landfills, dredged material disposal areas, utility areas, construction areas, roads, fields and agricultural areas, buildings, and recently abandoned usage areas are all considered part of this habitat, which occupies a significant area of the installation. Typical species include: yellow nutsedge (*Cyperus esculentus*), crab-grass (*Digitaria filiformis*), persimmon (*Diospyros kaki*), frost aster (*Aster pilosus*), horse-weed (*Conyza canadensis*), common reed, silverling (*Paronychia argyrocoma*), camphor weed (*Heterotheca subaxillaris*), pig-weed (*Chenopodium ambrosioides*), and Johnson grass (*Sorghum halepense*).

Source: MOTSU 2017

3.6.1.2 Wildlife

The habitats at MOTSU support numerous wildlife species, many of which are popular game species, and some of which are protected species, as discussed in Section **3.6.1.3**. Common wildlife species include white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis)*, Eastern cottontail (*Sylvilagus floridanus*), and red fox (*Vulpes vulpes*). **Table 3.6-2** lists migratory bird species that may occur at MOTSU.

Table 3.6-2 Migratory Birds with Potential to Occur at MOTSU

Common Name	Scientific Name
Woodcock	*Scolopax minor*
Wilson's snipe	*Gallinago delicata*
Mourning dove	*Zenaida macroura*
Clapper rail	*Rallus crepitans*
King rail	*Rallus elegans*
Virginia rail	*Rallus limicola*
Wild turkey	*Meleagris gallopavo*
Fulvous whistling-duck	*Dendrocygna bicolor*
Brant	*Branta bernicla*
Canada goose	*Branta canadensis*
Mute swan	*Cygnus olor*
Tundra swan	*Cygnus columbianus*
Wood duck	*Aix sponsa*
Blue-winged teal	*Spatula discors*
Northern shoveler	*Spatula clypeata*
Gadwall	*Mareca strepera*
American wigeon	*Mareca americana*
Mallard	*Anas platyrhynchos*
American black duck	*Anas rubripes*

Common Name	Scientific Name
Northern pintail	*Anas acuta*
Green-winged teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Greater scaup	*Aythya marila*
Lesser scaup	*Aythya affinis*
King eider	*Somateria spectabilis*
Common eider	*Somateria mollissima*
Harlequin duck	*Histrionicus histrionicus*
Surf scoter	*Melanitta perspicillata*
White-winged scoter	*Melanitta fusca*
Black scoter	*Melanitta americana*
Long-tailed duck	*Clangula hyemalis*
Bufflehead	*Bucephala albeola*
Bald eagle	*Haliaeetus leucocephalus*

Source: MOTSU 2017

3.6.1.3 Special Status Species

Federally Listed Species

Species listed as threatened and endangered under the ESA (including those that are proposed for or are candidates for listing) that have any potential to occur in the vicinity of MOTSU and the Cape Fear Estuary are listed in **Table 3.6-3**. Those species that are known or have potential to occur in the project area are further described in **Table 3.6-4**. Additionally, the bald eagle (*Haliaeetus leucocephalus*) is known to occur at MOTSU and is protected under the Bald and Golden Eagle Protection Act and is also state-listed as threatened.

Table 3.6-3 Species Protected by the Endangered Species Act with Potential to Occur in the Vicinity of the Project Area

Common Name	*Scientific Name*	*Status*	*Occurrence in the Project Area*
Mammals			
Northern long-eared bat	*Myotis septentrionalis*	E	Potential to occur
Tricolored bat	*Perimyotis subflavus*	PE	Potential to occur
Florida manatee	*Trichechus manatus latirostris*	T	Potential to occur in Cape Fear Estuary
Birds			
Piping plover	*Charadrius melodus*	T	Not known to occur
Rufa red knot	*Calidris canutus rufa*	T	Not known to occur
Red-cockaded woodpecker	*Picoides borealis*	E	Known to occur on installation
Reptiles			
American alligator	*Alligator mississippiensis*	SAT*	Known to occur in aquatic habitats
Green sea Turtle	*Chelonia mydas*	T	Potential to occur in Cape Fear Estuary
Kemp's Ridley sea turtle	*Lepidochelys kempii*	E	Potential to occur in Cape Fear Estuary
Leatherback sea turtle	*Dermochelys coriacea*	E	Not known to occur

Common Name	*Scientific Name*	*Status*	*Occurrence in the Project Area*
Loggerhead sea turtle	*Caretta caretta*	T	Potential to occur in Cape Fear Estuary
Hawksbill sea turtle	*Eretmochelys imbricata*	E	Potential to occur in Cape Fear Estuary
Fish			
Atlantic sturgeon	*Acipenser oxyrinchus*	E CH	Potential to occur in Cape Fear Estuary
Shortnose sturgeon	*Acipenser brevirostrum*	E	Potential to occur in Cape Fear Estuary
Invertebrates			
Magnificent Ramshorn	*Planorbella magnifica*	E	Approximately 400 Individuals have been released in designated critical habitat Orton Pond and Big Pond, just west and north of MOTSU; not known to occur on MOTSU
Monarch Butterfly	*Danaus plexippus*	C	Potential to occur
Plants			
Cooley's Meadowrue	*Thalictrum cooleyi*	E	Not known to occur
Rough-leaved Loosestrife	*Lysimachia asperulaefolia*	E	Known to occur on installation

Note: *American alligator is listed to prevent take of other listed crocodilians, there is no import/export of animals associated with the proposed action, therefore there are no project effects.
Legend: C= Candidate for Listing; E = Endangered; SAT= Similarity of Appearance, T = Threatened, CH = Critical Habitat
Sources: MOTSU 2017; USFWS 2023a

Table 3.6-4 Threatened and Endangered That May Occur at MOTSU

Species	Description
Northern Long-eared Bat	The NLEB is found across 37 states in the eastern and north-central U.S. and in Canada. Adults emerge at dusk and use echolocation to catch insects in the understory of forested areas. This bat also feeds by gleaning motionless insects from vegetation and water surfaces (USFWS 2024a). In the North Carolina and South Carolina coastal plain, this species is active almost year-round (Jordan 2020; Kindel 2019). Habitat utilized in the coastal plain for roosting and foraging is highly variable, ranging from expansive hardwood dominated swamps to frequently burned longleaf pine forests (Jordan 2020; Kindel 2019). Suitable habitat for NLEBs is defined as forested habitat containing suitable roost trees, which are live or dead trees ≥ 3 inches diameter-at-breast-height with exfoliating bark, cracks, crevices, and/or cavities. The species has been observed in Brunswick County (North Carolina Parks 2024) and because of the wide variety of habitats it uses for roosting and feeding it could occur, but has not been documented, at MOTSU..
Tricolored Bat	The tricolored bat is a small bat ranging across the eastern and central U.S. and portions of southern Canada, Mexico, and Central America. This species is known to forage most commonly over waterways and at forest edges (USFWS 2024b). This species is widespread throughout North Carolina and lives in a wide variety of habitats. In the coastal plain, they roost in clumps of leaves or needles in trees year-round (LeGrand et al. 2024). The species has been observed in Brunswick County (LeGrand et al. 2024) and because of the wide variety of habitats it uses for roosting and feeding, it could occur at MOTSU.
Florida Manatee	Manatees are large, slow, seal-shaped marine mammals which may be found in either saltwater or freshwater environments where they feed on marine or freshwater vegetation. They may be found on the east coast of the U.S. from as far east as Texas, to Massachusetts at the northern end of their range and Brazil to the south (USFWS 2023b). Locally, informal sightings within the Cape Fear River system have been reported and on MOTSU, they are likely to occur in the Cape Fear Estuary. In addition to being listed as federally threatened, manatees are protected by the MMPA, which prohibits any form of take (including killing, capturing, or harassment) of marine mammals.
Red-cockaded Woodpecker	This medium-sized bird generally prefers to inhabit dense stands of mature longleaf pines. They prefer to forage for arthropods and excavate nest cavities in live pine trees containing little to no resin and with soft or no heartwood (cavity trees), which is typically a result of fungal decay in older trees (MOTSU 2017). The loss of these suitable old trees (typically above 60+ years) has resulted in these birds' population decline (USFWS 2023c). An aggregate of cavity trees is called a cluster and may include 1 to 20+ cavity trees. A cluster is occupied by a group of RCWs; a group can be a solitary male or a non-breeding pair, but typically consists of a breeding male and female and often 1 or more helpers (typically male offspring from previous years). There are 24 identified RCW clusters on MOTSU, located throughout the installation in mature pine and mixed pine-hardwood forest (MOTSU 2017). In and within 200 feet of the project area, there are portions of four RCW clusters that overlap the barricade safety project area, containing 26 cavity trees.

Species	Description
Sea Turtles	North Carolina's sounds and estuaries provide important developmental and foraging habitats for post-pelagic juvenile loggerhead, green, and Kemp's ridley sea turtles (NOAA 2023 a, b, c, d). All three species move inshore during the spring and disperse throughout the sounds during the summer. All three species leave the sounds and move offshore during the late fall and early winter. Epperly et al. (2007) reported the presence of sea turtles in back-barrier estuaries along the North Carolina coast from April through December. Juvenile loggerhead, green, and Kemps ridley sea turtles utilize the lower Cape Fear River estuary during the warmer months. Although there are no published data on the distribution and movements of juvenile sea turtles in the Cape Fear River estuary, during a tracking study of 18 gill netted green and Kemps ridley juveniles in the lower estuary, only one individual (a presumed mortality) moved north of Snows Cut (Snoddy and Williard 2010). Hawksbill sea turtles have been reported along the Atlantic and Gulf Coasts from Massachusetts through Texas; however, sightings north of Florida are rare (NMFS and USFWS 2013).
Atlantic Sturgeon and Shortnose Sturgeon	Atlantic and shortnose sturgeon may occur in the Cape Fear Estuary. Both are very large, long-lived fish species found along the east coast of North America. Primary threats to these species include unintentionally being caught, vehicular strikes (though rare), and habitat modification, development or degradation (NOAA 2023e, f). Both species spawn and are born in freshwater. As such, critical habitat exists in the Cape Fear River system for the Carolina DPS of Atlantic sturgeon, which, unlike the shortnose, spends much of its life in the ocean (NOAA 2023g). Less than 50 total shortnose sturgeons and less than 300 adult Atlantic sturgeons are estimated to occur in the Cape Fear River (NMFS 2020, 77 *Federal Register* 5914). While the likelihood of their presence in the project area is thought to be rare, past monitoring efforts demonstrate they may occur during their annual migrations down river each summer. Only adult and subadult life stages could occur, as eggs and larvae would not be present due to high salinities and lack of appropriate spawning habitat.
Monarch Butterfly	This species has a range essentially across the continental U.S., but populations are rapidly declining due to loss of breeding and overwintering habitat. Threats include development, herbicide and insecticide use, and climate change. Throughout its range, the monarch's host plants are milkweed species (*Asclepias* spp.). Adults feed on nectar from a variety of flowering plants (USFWS 2024c). The only milkweed species regularly encountered on MOTSU is savanna milkweed (*Asclepias pedicellata*). Adult monarchs are regularly observed nectaring on flowering plants on MOTSU, particularly in late summer and autumn during migration.
Rough-leaved Loosestrife	Rough-leaved loosestrife is a member of the primrose family is an edge specialist which prefers a poorly drained substrate in longleaf pine uplands. It requires open understory and a regular fire regime; as such, competition from other plant species growing as a direct result of fire suppression, urban development, and destruction of wetlands are all contributing factors to habitat loss for this species (MOTSU 2017; USFWS 2023d). Known from 12 counties within North Carolina, more than half of known occurrence sites are on military bases. In fact, MOTSU contains one of the largest known populations of this species. Eight sites situated on the northern half of MOTSU, in close proximity to the barricade safety activities under the proposed action, are regularly enhanced to promote this species. No critical habitat has been designated.

Legend: DPS = Distinct Population Segment; MMPA = Marine Mammal Protection Act; MOTSU = Military Ocean Terminal Sunny Point; NLEB = northern long-eared bat; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; RCW = Red-cockaded Woodpecker; U.S. = United States

Essential Fish Habitat

Marine and estuarine portions of the project area provide habitat for numerous aquatic species. An EFH Assessment was prepared in support of the proposed action to assess the potential effects on EFH and federally managed species under the jurisdiction of NMFS. Consultation is ongoing and documentation will be provided in **Appendix E** of the Final EIS. Three types of EFH were identified as potentially being impacted by the proposed action: unvegetated soft bottom, emergent wetlands, and the estuarine water column. The wetland and soft bottom habitats are utilized as foraging areas, refuge areas, and nursery areas at different life stages for several federally managed species and complexes of fish and invertebrates. Species/complexes identified as utilizing these habitats are: penaeid shrimp, snapper-grouper complex (59 species of snappers, groupers, and similar species); coastal migratory pelagics (includes king mackerel [*Scomberomorus cavalla*], Spanish mackerel [*S. maculates*], and cobia [*Rachycentron canadum*]); highly migratory species (open ocean fish, including tuna, marlin, and shark species); and coastal demersal species (primarily bottom feeding fish).

State-Listed Species

Species known or with a potential to occur on MOTSU and are listed by the North Carolina Natural Heritage Program as threatened or endangered are provided in **Table 3.6-5**.

Table 3.6-5 State Threatened and Endangered Wildlife Species Potentially Occurring in the Project Area

Common Name	*Scientific Name*	*State Status*	*Habitat*
Mammals			
Eastern woodrat	*Neotoma floridana floridana*	T	Deciduous forests of floodplains, ravines, swamps, and forested areas near marshes
Eastern cougar	*Puma concolor cougar*	E	Generalist that is equally at home in forests, swamps, and jungles
Birds			
Peregrine falcon	*Falco peregrinus*	E	Nesting occurs on tall mountain cliffs
Gull-billed tern	*Gelochelidon nilotica*	T	Salt marshes and sandy beaches
Reptiles and Amphibians			
Carolina gopher frog	*Rana capito*	T	Stump holes, root tunnels, and mammal and crayfish burrows; nearly all breeding sites are upland ephemeral ponds in longleaf pine savannas
Eastern diamondback rattlesnake	*Crotalus adamanteus*	E	Long- leaf pine flatwoods and sandhill habitats
Eastern coral snake	*Micrurus fulvius*	E	Primarily underground in sandy areas
Fish			
Carolina pygmy sunfish	*Elassoma boehlkei*	T	Slow-moving acidic waters of ponds, ditches, and streams in the coastal plain

Common Name	*Scientific Name*	*State Status*	*Habitat*
Invertebrates			
Barrel floater	*Anodonta couperiana*	E	Slow-moving streams or ponds
Waccamaw spike	*Elliptio waccamawensis*	E	Freshwater bodies associated with the Waccamaw River drainage
Greenfield ramshorn	*Helisoma eucosmium*	E	Freshwater streams and ponds
Eastern pondmussel	*Ligumia nasuta*	T	Freshwater bodies
Cape Fear threetooth	*Triodopsis soelneri*	T	Damp detritus surrounding swamps

Legend: E = State Endangered; T = State Threatened
Source: MOTSU 2017

3.6.2 Environmental Consequences

The significance of potential effects to biological resources is based on: (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and (4) the duration or ecological ramifications of the impact(s).

3.6.2.1 Preferred Alternative – Full Implementation

Potential effects on native and special status species are described below. The Army, in accordance with Section 7 of the ESA, is consulting with the USFWS and NMFS on the potential effects of the proposed action on federally listed species. The results of the consultation will be included in **Appendix E** in the Final EIS**.**

Plant Communities

Under the proposed action, barricade repair and maintenance would result in the removal of up to approximately 215 acres of vegetation over the course of the project in the North Rail Holding Yard, where native plant communities have reestablished on previously disturbed land. The existing barricades, where vegetation effects would occur, vary from being vegetated with herbaceous species and low shrubs, maintained by periodic mowing, to being forested with loblolly, slash, or longleaf pines ranging from 0-55+ years of age, as well as approximately 7 acres of wetlands (see **Section 3.5**). Installation of the lightning protection system would occur in the same areas after barricade repairs are complete and would not add to effects to plant communities. Following vegetation clearance of up to 215 total acres, the restored barricades would be seeded with low-growing plant species and would be regularly maintained, primarily annual mowing, to comply with operational and fire prevention requirements in Army Pamphlet 385-64, *Ammunition and Explosives Safety Standards.* Shoreline protection could result in minor losses to existing tidal wetlands. However, in the long term, the project is expected to have a positive effect, providing restoration and protection to adjacent wetland communities. The extent of effects will be better known when project design is available. This is discussed further in **Section 3.5.**

Clearing and fencing of the property line and along both sides of Dow Road in the Pleasure Island ESCZ would result in the removal of up to 55 acres of vegetation. Although portions of

the cleared area may contain trees and shrubs associated with previously disturbed mixed pine-hardwood forest, the majority of the cleared vegetation would be disturbed, ruderal vegetation. This area would be mown and/or burned annually to maintain it as clear in perpetuity.

Construction of a secondary egress gate would result in the removal of up to 4.5 acres of disturbed longleaf pine-turkey oak woodland, much of which has previously been cleared for the rail corridor. Other projects, including repaving, stormwater mitigation, linear infrastructure upgrades, and construction in the cantonment area, would not impact plant communities or would only affect modified habitat such as mown areas.

Wildlife

Terrestrial wildlife could potentially be impacted by habitat loss, noise, and human presence, and injury and mortality associated with construction activities. This includes those bird species protected under the MBTA.

Habitat Loss. The majority of vegetation removal would occur in areas that are dominated by invasive species and/or areas that have been previously disturbed. However, certain native species, including bird species protected by the MBTA, may occupy and/or otherwise utilize such habitats. Although commonly occurring native wildlife species may occupy the non-native dominated habitats that would be impacted under the proposed action, the loss of approximately 275 acres of vegetation would represent a total loss of less than 2.8 percent of the more than 10,000 acres of unimproved lands and commercial forest lands on MOTSU. Because vegetation clearance would occur in dispersed areas and over time primarily in areas that have been previously disturbed, any loss of habitat would not result in habitat fragmentation that would hinder the connectivity of any population of species. Nor would it affect the ability for species to continue using those areas for dispersal in and near MOTSU.

Noise and Human Presence. Noise and human presence during construction may cause terrestrial wildlife to temporarily avoid areas in the immediate vicinity of construction activities. Nesting or breeding adults of various wildlife species can also be disturbed by noise and construction activities, including foot traffic, which may result in abandonment or depredation of eggs or young and may also temporarily displace wildlife from breeding habitat, resulting in reduced breeding success. Likewise, noise generated by construction and repair activities for the waterfront maintenance projects may cause aquatic wildlife to temporarily avoid areas in the immediate vicinity of those activities. Specifically, maintenance, repair, or replacement of wooden piles may temporarily increase ambient noise levels. However, NMFS (2020) determined that auger, drop punch, jetting, installation by land-based equipment, and hand installation of wood pilings did not result in noise levels that would cause physical injury or behavioral effects on federally listed species.

Direct Injury or Mortality. Direct injury or mortality from construction equipment is possible. Larger, mobile species such as birds and large mammals and reptiles would likely avoid

construction equipment, resulting in no impact to these species. Smaller, less mobile species may not be able to avoid construction equipment; however, the temporary and dispersed nature of the construction activities, occurring in relatively low-value habitats, would not significantly impact any terrestrial wildlife species that occurs on MOTSU.

Special Status Species

Federally Listed Species

Biological Assessments prepared in support of this EIS provide a complete analysis of potential effects. The monarch butterfly is not included because it is currently a candidate for listing; nor is the American alligator since it is listed due to similarity of appearance to other ESA-listed species which do not have the potential to occur at MOTSU. Potential stressors to wildlife associated with the proposed action, as described in the section above, also apply to the species analyzed in this section and are discussed as appropriate below.

Maintenance dredging activities at MOTSU are executed by the USACE Wilmington District in accordance with the programmatic South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast U.S. (SARBO) (NMFS 2020). All dredging projects incorporate Project Design Criteria (PDCs) that are required under the SARBO to minimize effects on ESA-listed species under the jurisdiction of the NMFS. All maintenance dredging activities will be implemented through the SARBO programmatic consultation process. Although the SARBO found that there would likely be incidental take of sea turtles and Atlantic and shortnose sturgeon throughout the entirety of the southeastern coast of the U.S., dredging activities would not jeopardize the continued existence of any federally listed species. The effects discussed here assume incorporation of the SARBO and other recommended mitigation measures into the proposed action (see **Section 5.0**).

Northern long-eared bat.. The species has been observed in Brunswick County (Jordan personal communication 2024) and because of the wide variety of habitats it uses for roosting and feeding it could occur, but has not been documented, at MOTSU. The USFWS Range-wide Determination Key for the northern long-eared bat was used to evaluate the potential for effects based on factors such as the amount of potential habitat to be cleared for the proposed action and determined that the proposed action may affect but is not likely to adversely affect the northern long-eared bat.

Tricolored bat. Like the northern long-eared bat, the tricolored bat has not been documented on MOTSU, but no surveys are known, and the species is widespread throughout North Carolina in a variety of habitats. As with the northern long-eared bat, the proposed action may affect but is not likely to adversely affect the tricolored bat.

Florida manatee. Manatees may occur in the Cape Fear Estuary; however, numbers and densities are expected to be low. Noise generated by construction and repair activities for the waterfront maintenance projects may cause manatees to temporarily avoid the immediate

vicinity of those activities. However, NMFS (2020) determined that auger, drop punch, jetting, installation by land-based equipment, and hand installation of wood pilings would not result in noise levels that would cause physical injury or behavioral effects on federally listed species, including marine mammals. An EIS prepared in 1994 evaluated the effects of deepening the channels at MOTSU and widening the entrance channels and turning basin in order to meet operational requirements (MOTSU 1994). The proposed dredging is specific to the ongoing maintenance dredging requirements at the MOTSU waterfront and from the waterfront to the Wilmington Harbor Navigation Channel. The 1994 EIS and supporting Biological Assessments found that proposed dredging would have no effect on the manatee. In addition, all in-water activities, including dredging, would adhere to the USFWS' *Guidelines for Avoiding Impacts to the West Indian Manatee* (USFWS 2003a), thereby reducing the potential of affecting individual manatees. Installation of living shorelines and revetments at various locations would create temporary increases in turbidity and localized disturbance of surface waters during construction. However, given the low likelihood of a manatee occurring in the project area during shoreline construction activities, no effect is expected.

Red-cockaded woodpecker. Under the proposed action, RCWs in and near the barricade safety project area would be exposed to loss of cavity trees (up to 5 to 10 cavity trees could be removed or otherwise impacted), loss of foraging habitat (pine stands over 30 years old), and harassment from the use of heavy equipment, increased traffic on infrequently used roads, and an increase in human activity from timber clearing operations and project construction. The Biological Assessment prepared in support of this EIS found that the proposed action may affect and is likely to adversely affect the RCW, with the potential for incidental take of up to three potential breeding groups of RCWs. Adherence to the recommended conservation measures (**Section 5.0**) would reduce the overall potential for adverse effects to the species. In addition, the proposed action is not expected to prevent MOTSU from reaching its RCW Installation Regional Recovery Goal of 17 potential breeding groups.

Leatherback sea turtle. Although leatherback sea turtles may be present in nearshore ocean waters during warmer months, this species is primarily associated with deep, offshore waters. Consequently, the presence of a leatherback within project area waters during this action is considered extremely unlikely. Furthermore, the pelagic feeding habit of the leatherback reduces its vulnerability to displacement from dredging, and there are no records of incidental take during conventional dredging operations throughout the South Atlantic Ocean or the Gulf of Mexico. Based on the low probability of occurrence in the project area during construction and maintenance actions, none of the waterfront projects under the proposed action are expected to affect the leatherback sea turtle.

Loggerhead, green, hawksbill, and Kemp's ridley sea turtles. The higher incidence for occurrence in inshore waters during the warmer months of the year would increase the potential for loggerhead, green, hawksbill, and Kemp's ridley sea turtle to be affected during construction

of the proposed living shoreline sill. However, given that the sill will be built in shallow subtidal habitat less than 3 feet NAVD88, and due to the ability of sea turtles to avoid encounters, the likelihood of any direct or indirect effects is reduced. Noise generated by construction and repair activities for the waterfront maintenance projects may cause turtles to temporarily avoid areas in the immediate vicinity of those activities. However, NMFS (2020) determined that auger, drop punch, jetting, installation by land-based equipment, and hand installation of wood pilings would not result in noise levels that would cause physical injury or behavioral effects on sea turtles. Adherence to the recommended conservation measures (**Section 5.0**) would also help ensure that adverse effects to sea turtles do not occur during construction of the proposed action. Based on the proposed conservation measures and the anticipated limited extent and effect of the proposed waterfront project action, it is anticipated that the risk of sea turtle injury or mortality under the proposed action would be negligible. In addition, the MOTSU shorelines do not provide nesting habitat for sea turtle species. As such, the proposed action would have no impact on sea turtle nesting. Therefore, the proposed action may affect, but is not likely to adversely affect, the loggerhead, green, Kemp's ridley, and hawksbill sea turtles.

Atlantic and short-nosed sturgeon. Construction of the proposed Phase 1 shoreline erosion control and resiliency measures may result in the minor loss of shallow silty-sand subtidal foraging habitat (less than 3.3 feet NAVD88) for sturgeons. However, it would not adversely affect migration patterns of sturgeon and would not result in indirect effects on sturgeon due to limited elevations in turbidity during construction. Shallow-water habitat for foraging is not limited in the river and the small loss of shallow unvegetated silty-sand habitat due to sill placement and wetland restoration for a living shoreline would not adversely affect either sturgeon species or Atlantic sturgeon critical habitat. Maintenance and repairs of the wharves, supporting infrastructure and boat dock, ramp, and wave attenuators are not expected to adversely affect either sturgeon species, as water quality would not be adversely affected, no activities proposed would affect or alter benthic foraging habitat, and short-term vessel operations would not alter or affect movement patterns of passing sturgeon. Short-term underwater noise during replacement of wooden piles would generate acoustic effects; however, these would be minimal due to the ability of both sturgeon species to avoid such operations. Therefore, the proposed action may affect, but is not likely to adversely affect both species of sturgeon and critical habitat for Atlantic sturgeon.

Rough-leaved loosestrife. Rough-leaved loosestrife colonies are well documented and are monitored annually at MOTSU. Although rough-leaved loosestrife occurs in the vicinity of the barricade safety project area, none of the proposed work would occur in occupied loosestrife habitat. Therefore, the proposed action would have no effect on rough-leaved loosestrife.

Bald Eagle. Bald eagles are frequently observed on MOTSU in the central and southern portions of the installation, but no known nesting locations are in the vicinity of the proposed action. Therefore, the proposed action would have no impact on the species.

Essential Fish Habitat

The EFH Assessment that was prepared in support of the proposed action found that effects to EFH and marine species managed by NMFS would include potential minimal loss of existing tidal marsh and shallow subtidal unvegetated soft bottom habitat, short-term elevated turbidity levels, and sediment suspension within the water column, temporary removal/burial of primary producers (i.e., microalgae) and prey species during dredging, and temporary, short-term increases in underwater noise. Conservation measures listed in **Section 5.1.2** would reduce the potential project effects on EFH and marine species. Although the proposed action may have temporary and localized effects on EFH and the species that utilize the habitats, the EFH Assessment found that effects would largely be negligible and, over time, the benefits of the living shoreline and restored tidal marsh would compensate for any minor effects on wetlands and loss of unvegetated soft bottom habitat, with a substantial long-term increase in shallow water refuge, primary productivity, and benthic diversity and abundance. Therefore, the proposed action would not significantly impact EFH or the species that utilize those habitats.

State-Listed Species

As shown in **Table 3.6-5**, wildlife and invertebrate species listed as threatened or endangered in the state of North Carolina have the potential to occur at the installation. Potential effects to these species would be similar to those described in the preceding section, **Wildlife**. Specifically, less mobile species or species that largely occur underground, such as the eastern woodrat (*Neotoma floridana floridana*), Carolina gopher frog (*Rana capito*), eastern diamondback rattlesnake (*Crotalus adamanteus*), and eastern coral snake (*Micrurus fulvius*) would be susceptible to direct injury or mortality from construction equipment. However, the temporary and dispersed nature of the construction activities, occurring in relatively low-value habitats, would not significantly impact any state-listed wildlife species that occurs on MOTSU. As state-listed species could potentially be impacted by habitat loss, noise, human presence, and other anthropogenic disturbance associated with construction and maintenance at the installation, adherence to the recommended conservation measures (**Section 5.0**) would also help ensure that effects to state-listed species would be less than significant under the proposed action.

3.6.2.2 Partial Implementation Alternative

The Partial Implementation Alternative does not include the following construction projects:

- Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
- Flood Mitigation for the Classification Yard/Bridge Crane Area

Therefore, the environmental consequences that would occur to biological resources under the Partial Implementation Alternative would be the same as those described above, although to a slightly lesser degree. There would be no significant effects to biological resources under the Partial Implementation Alternative.

3.6.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the real property master planning actions. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance. Effects from any individual projects would be evaluated as part of the overall NEPA analysis for the projects and any necessary mitigations would be implemented to ensure that no significant effects would occur.

3.7 COASTAL ZONE MANAGEMENT

The federal CZMA (16 U.S.C. Section 1451, et seq., as amended) is a voluntary law enacted to encourage coastal states and territories to develop and implement programs to manage the nation's coastal resources. In accordance with Section 307 of the CZMA and 15 CFR Part 930, Subpart C, federal agency activities affecting land or water use or natural resource of a state's coastal zone must be "consistent to the maximum extent practicable" with the enforceable policies of the state's coastal management program. The CZMA establishes national policy to protect resources in the coastal zone; CZMA policy is implemented by state coastal management programs that have been approved by NOAA.

Federal lands are excluded from the jurisdiction of such approved state coastal management programs. However, the CZMA and its implementing regulations provide that federal agencies must determine if it is reasonably foreseeable that their proposed actions, whether inside or outside of a state's coastal zone, will directly or indirectly affect any land or water use or natural resource within that coastal zone. To implement the provisions of the CZMA, federal agencies must make "consistency determinations" on their proposed activities.

MOTSU is located in Brunswick and New Hanover Counties, which are considered part of North Carolina's coastal zone. The North Carolina Coastal Area Management Act (CAMA) of 1974 was passed in accordance with the federal CZMA. It establishes a cooperative program of coastal area management between local and state governments. The Coastal Area Management Act establishes the North Carolina Coastal Resources Commission, required local land use planning in the coastal counties, and provides for a program for regulating development. Upon approval by the North Carolina Coastal Resources Commission, each plan becomes part of the North Carolina Coastal Management Plan (NCDEQ 2024c). The North Carolina Coastal Management Program was federally approved in 1978. North Carolina's coastal zone includes the 20 counties that are adjacent to, adjoining, intersected by, or bounded by the Atlantic Ocean or any coastal sound. The coastal zone extends seaward to the 3 nautical mile territorial sea limit.

The Brunswick County Comprehensive Plan (Coastal Area Management Act Core Land Use Plan), adopted by the Brunswick County Board of Commissioners on October 15, 2007, and recertified by the Coastal Resource Commission on January August 25, 2011, addresses land

use planning in relation to CAMA. According to this Comprehensive Land Use Plan, MOTSU is zoned as a Military Reservation and is limited to activities determined to be appropriate by the military (Brunswick County 2012).

The New Hanover Comprehensive Plan was adopted by the New Hanover County Board of Commissioners on July 11, 2016, and certified by the Coastal Resource Commission on February 1, 2017. It addresses land use planning in relation to CAMA. According to its most recent land use planning map update, MOTSU is not given a zoning designation(New Hanover County 2017).

As a Federal Agency, the Army is required to provide a Federal Consistency Determination (FCD) to the State of North Carolina, demonstrating that the proposed action would be conducted in a manner that is consistent to the maximum extent practicable with the State's coastal zone enforceable policies unless "…full consistency is prohibited by existing law applicable to the Federal government." For this proposed action, the Army will submit a statement and supporting documentation (i.e., the FCD) to the NCDEQ Division of Coastal Management (DCM), indicating that the proposed action is consistent with the program (NCDEQ 2024c).

3.7.1 Affected Environment

There are two tiers of regulatory review for projects within the coastal zone. The first tier includes projects that are located in state-designated Areas of Environmental Concern (AECs). Under North Carolina Administrative Code 07K.0402 all federal agency development activities in AECs are exempt from the CAMA permit requirement but would still be subject to a consistency review. The second tier includes land uses with the potential to affect coastal waters, even though they are not defined as AECs (NCDEQ 2024d). These projects are reviewed under the CAMA General Policy Guidelines. Both of these are explained in more detail below.

An AEC is an area of natural importance, and its classification protects the area from uncontrolled development. AECs include almost all coastal waters and about 3 percent of the land in the 20 coastal counties. The four categories of AECs are:

- the Estuarine and Ocean System, which includes public trust areas, estuarine coastal waters, coastal shorelines, and coastal wetlands;
- the Ocean Hazard System, which includes components of barrier island systems;
- Public Water Supplies, which include certain small surface water supply watersheds and public water supply wellfields; and
- Natural and Cultural Resource Areas, which may include coastal complex natural areas; areas providing habitat for federal- or state-designated rare, threatened or endangered species; unique coastal geologic formations; or significant coastal archaeological or historic resources (NCDEQ 2024d).

Projects that are located outside of an AEC are reviewed under the General Policy Guidelines. The North Carolina CAMA sets forth 11 General Policy Guidelines, addressing:

- Shoreline erosion policies
- Shorefront access policies
- Coastal energy policies
- Post-disaster policies
- Floating structure policies
- Mitigation policy
- Coastal water quality policies
- Policies on use of coastal airspace
- Policies on water and wetland-based target areas for military training areas
- Policies on beneficial use and availability of materials resulting from the excavation or maintenance of navigational channels
- Policies on ocean mining

The purpose of these rules is to establish generally applicable objectives and policies to be followed in the public and private use of land and water areas within the coastal area of North Carolina (NCDEQ 2024d). The following is a brief summary of the AECs located at MOTSU.

MOTSU includes coastal resources that North Carolina designates as AECs. Under the Estuarine and Ocean System AEC are the estuarine coastal waters, coastal shorelines, and coastal wetlands at MOTSU. All land located within 75 feet of the normal high-water level of coastal waters and within 30 feet of the normal high-water level of inland water is also considered to be coastal shoreline within the Estuarine and Ocean System AEC. As noted in **Section 3.5.1.1**, the Cape Fear River, which enters the Atlantic Ocean less than 10 miles downstream of the installation, bisects MOTSU with the main area of the installation on the west bank and the ESCZ, on the east bank.

Also, MOTSU has habitat for federal- or state-designated species and archaeological or historic resources that are under the Natural and Cultural Resource Area AEC. The Cape Fear River is one of the largest watersheds in North Carolina, making it a source of both Public Water Supply and Estuarine and Ocean System AECs. The surface water bodies within MOTSU borders, such as ponds, lakes, streams, and wetlands, are considered AECs due to estuarine systems and recreational and habitat significance. There are approximately 2,600 acres of estuarine and coastal wetlands on MOTSU (see **Table 3.5-1**). Additionally, most of the streams are considered part of the Wilmington River saltwater estuary system further contributing to AECs (MOTSU 2017). Federally listed species known to have habitat within the lands, wetlands, and waterbodies at MOTSU are shown in **Table 3.6-2**. Additionally, most of the streams are considered part of the Wilmington River saltwater estuary system further contributing to AECs (MOTSU 2017). Further details will be provided in the FCD which is being developed and will be included as **Appendix F** of the Final EIS.

3.7.2 Environmental Consequences

Effects to Coastal Zone Management would be considered significant if any aspect of the proposed action violated or was inconsistent with any of the affected counties enforceable policies under the CZMA and those laid out in the counties CAMA Land Use plans that are required by the 20 coastal counties within the state of North Carolina.

3.7.2.1 Preferred Alternative – Full Implementation

The Army has determined that the Preferred Alternative is consistent to the maximum extent practicable with the North Carolina Coastal Management Program as described in CAMA. A FCD will be submitted to NCDEQ DCM once NHPA and ESA consultations are completed and will be included as **Appendix E** in the Final EIS.

3.7.2.2 Partial Implementation Alternative

Based upon the FCD prepared for the Preferred Alternative, the Army has determined that the Partial Implementation Alternative is consistent to the maximum extent practicable with the North Carolina Coastal Management Program. A FCD will be submitted to NCDEQ DCM once NHPA and ESA consultations are completed.

3.7.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the proposed real property master planning actions. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance. Coastal zone effects from any individual projects would be evaluated as part of the overall NEPA analysis for the projects.

3.8 AESTHETICS AND VISUAL RESOURCES

The visual environment – comprised of both natural and artificial landscape features – is considered to be a vital component of an area's overall resource value. It contributes to perceived visual images and the aesthetic value of a view.

3.8.1 Affected Environment

Because of MOTSU's mission, the installation incorporates significant buffer areas that serve as safety and security features and also provide for very minimal public observation of activities on installation. The installation is characterized by industrial and mission-related functions. Large areas of forest and undeveloped shoreline buffer much of the main installation (Administrative and Reception and Holding Districts) from view from adjacent land; therefore, most projects would not be visible to surrounding communities and would not affect viewsheds from outside the project area. Projects along and close to the shoreline would be visible to commercial and recreational traffic along the Cape Fear River and work in the ESCZ would be visible from adjacent residential and public land.

Some project activities that take place outside the main installation boundaries would be visible to the public, and the analysis of effects is limited to these projects, including clearing, fencing and maintenance of the Pleasure Island ESCZ; repair and replacement of the rail between the Leland Interchange Yard and main installation; and activities along the shoreline of the Cape Fear River. These projects would be visible from some neighborhoods in Boiling Spring Lakes and Leland, where homes back up to the rail corridor, as well as homes bordering the installation boundary on Pleasure Island, and from the Cape Fear River.

3.8.1.1 Shoreline Activities

As described in **Section 2.3.1.2**, Phase 1 of the Shoreline Protection project will address erosion that is occurring in several areas along MOTSU's 7 miles of Cape Fear River shoreline on its west bank. Visually, the shoreline in that area consists of bluff, sandy beach, wetlands, and minor pockets of riprap, as well the main wharves for transferring cargo to and from ships (see **Figure 2.3-5**). This area is located within the Waterfront Operations District of MOTSU. From the river, this shoreline area is visually consistent with the industrial activities occurring at MOTSU.

3.8.1.2 Pleasure Island ESCZ Security

MOTSU is bisected by the Cape Fear River and the ESCZ extends to the eastern section of MOTSU on Pleasure Island (see **Figure 2.3-8**). The area along the existing "greenway" fence is forested buffer to the west and residential (single-family home subdivisions and apartments) to the east. The Carolina Sands subdivision backs up to the installation boundary between Spartanburg Avenue and Ocean Boulevard. Forested buffer to the west and residential to the east of the MOTSU boundary fence continues south along State Road (SR) 1573 (also referred to as Dow Road). The ESCZ fencing terminates near Clarendon Avenue/Boulevard to the north. The ESCZ continues south and turns west within the MOTSU boundary south of Riverfront Road. Land to the west is primarily forested buffer. From north to south, the ESCZ boundary is buffered from Carolina Beach, Wilmington Beach, and Kure Beach by forested area and SR 1573.

3.8.1.3 Upgrade and Maintain Rail Lines

As part of the upgrades and maintenance of the MOTSU rail lines, repair and replacement of the rail between the Leland Interchange Yard and main installation would occur. MOTSU maintains approximately 115 miles of railway including an approximately 17 mile access line that connects the main installation to the Leland Interchange Yard (see **Figure 1.1-2**). Materials are transferred from commercial to Army-owned locomotives at the Leland Interchange Yard before being taken to MOTSU for sorting, staging, and shipment (MOTSU 2010). The Leland Interchange Yard is bounded by Interstate 140 to the west and a mix of forested buffer and low-density residential to the east. The Interchange Yard and track connecting it to MOTSU were established in 1955, along with the main installation. The 17 mile portion of track traverses

forested and natural areas with wetlands as well as residential and commercial areas in both the towns of Boiling Spring Lakes and Leland, which have grown up around the railway. Single-family homes back up to track directly in various places along the way. The track crosses over Town Creek, and runs parallel to Clarendon Road SE until Highway 17, before continuing to the railyard. The current visual impact is minimal to the surrounding area.

3.8.2 Environmental Consequences

Effects to visual resources would be considered significant if a proposed action introduced physical features that were substantially out of character with adjacent areas or altered a site such that observation points were obstructed or adversely affected.

3.8.2.1 Preferred Alternative – Full Implementation

Aesthetic and visual effects of the proposed action would be considered temporary and negligible. Demolition and construction associated with implementing projects directly along the waterfront would be visible from points along the Cape Fear River but would be temporary in nature.

Effects to panoramic viewsheds during maintenance and repair of wharves and associated infrastructure and installation of shoreline enhancement and stabilization projects would be considered temporary and negligible. Long-term beneficial effects would result from repair and prevention of erosion along the shoreline where currently there are exposed eroded banks, loss of natural vegetation, and turbid waters adjacent to the shoreline.

Fencing the property line in the ESCZ would establish clear zones on both sides of the fences to provide unobstructed views along the property perimeter. Changes to the viewshed would be minimal as the portions of the fence would be co-located with the installation perimeter, or well within the forested buffer inside the MOTSU boundary.

3.8.2.2 Partial Implementation Alternative

The Partial Implementation Alternative does not include the following construction projects:

- Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
- Flood Mitigation for the Classification Yard/Bridge Crane Area

Because the projects identified above are not considered to impact aesthetics and visual resources, the effects associated with the Partial Implementation Alternative would be the same as described under the Preferred Alternative.

3.8.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the proposed real property master planning actions as described. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance.

3.9 CULTURAL RESOURCES

Cultural resources can be broadly defined as pre-contact and historic sites and districts; structures; artifacts; features that display evidence of human activity; and landscapes and features that play a fundamental role in a specific community's identity, beliefs, or value system. Cultural resources are divided into three major categories: archaeological (pre-contact and post-contact), architectural, and traditional cultural resources and sacred sites.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., tools, projectile points, or bottles). "Pre-contact" refers to resources that predate the advent of written records in a region. These resources can range from a scatter composed of a few artifacts to village sites and rock art. "Post-contact" refers to resources that postdate the arrival of Europeans in the area. Archaeological resources can include campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for protection under existing cultural resource laws. However, more recent structures, such as Cold War-era military buildings, may warrant protection if they have exceptional characteristics and the potential to be historically significant structures.

Archaeological resources and architectural resources must also retain integrity according to the Secretary of the Interior's seven aspects of integrity (location, design, setting, materials, workmanship, feeling, and association). A property will retain several, and usually most, of the aspects to possess historic integrity.

Traditional cultural resources and sacred sites are eligible for inclusion in the National Register of Historic Places (NRHP) because of their association with cultural practices and beliefs of a living community that are (a) rooted in the community's history and (b) important to maintaining the continuing cultural identity of the community (National Park Service 1998). Traditional cultural resources can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other groups consider essential for the continuance of traditional cultures. Sacred sites are "any specific, discrete, narrowly delineated location that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion, provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site" (EO 13007).

Cultural resources that have been determined eligible for inclusion in the NRHP are historic properties. Historic properties are afforded protection and consideration under the NHPA. To be

determined eligible for inclusion in the NRHP, a resource must meet at least one of the following criteria:

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

Historic properties must retain aspects of integrity defined in the regulations as location, design, setting, materials, workmanship, feeling, and association.

Several federal laws and regulations address cultural resources, including the NHPA (1966), the Archaeological and Historic Preservation Act (1974), American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and Native American Graves Protection and Repatriation Act (1990). Additionally, MOTSU consults with tribal governments on a government-to-government basis in recognition of their sovereignty as a nation.

Under Section 106 of the NHPA, federal agencies must consider the effect of their undertakings on historic properties, consult with the State Historic Preservation Officer (SHPO) and other consulting parties, and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment. The federal agency evaluates the NRHP eligibility of resources within the proposed undertaking's Area of Potential Effects (APE) and assesses the possible effects of the proposed undertaking on historic properties in consultation with the SHPO and other parties.

The affected environment for cultural resources is based on the establishment of the APE of an undertaking, through consultation with the SHPO. An APE is defined in 36 CFR Section 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE, and therefore the affected environment, for this project encompasses the areas where ground-disturbing activities, including new construction, building demolitions, and visual effects on nearby historic properties would occur.

MOTSU maintains an Integrated Cultural Resources Management Plan (ICRMP) to aid in management of the cultural resources on the installation in accordance with appropriate federal laws and other applicable Army regulations.

3.9.1 Affected Environment

3.9.1.1 Archaeological Resources

Previous studies conducted at MOTSU include archaeological surveys of several portions of the facility, including underwater investigations in the Cape Fear River (MOTSU 2023a). The

majority of known cultural resources are archaeological in nature, both pre-contact and post-contact. Currently, a total of 236 archaeological sites have been identified at MOTSU. Of the 236 sites, 44 are isolated finds (i.e., a single artifact or feature greater than 50 years of age). Out of these 236 sites, 111 are post-contact sites, 100 are pre-contact sites, and 25 contain both pre- and post-contact components. The post-contact components include a wide variety of site types related to either the Civil War occupation of the area (e.g., Fort Fisher, Fort Anderson, entrenchments, rifle pits, earthworks, palisades), homesteading/historic industries (e.g., house foundations, tar kilns, plantations), or unidentified historic artifact scatters. The pre-contact occupation of MOTSU includes Late Archaic and Woodland period artifact scatters (MOTSU 2023a).

Of the 236 archaeological sites, 138 have been recommended as not eligible for listing in NRHP, 74 are currently unevaluated (potentially eligible) for the NRHP, 21 have been recommended as eligible for listing in the NRHP, and three are listed in the NRHP (including the Fort Fisher National Historic Landmark; Newton Homesite and Cemetery; and an eighteenth to nineteenth century domestic house site) (MOTSU 2023a).

No eligible underwater sites have been located in the channels leading to MOTSU's three wharves, but numerous shipwrecks are known to have occurred in the vicinity. The Cape Fear Civil War Shipwreck District was placed in the NRHP in 1985. According to the nomination form, the Cape Fear area consists of the largest collection of Civil War shipwrecks anywhere in the world, and the artifacts are well-preserved (MOTSU 2023a). The district presently encompasses several known shipwrecks in noncontiguous areas of the nearby Atlantic Ocean, the Cape Fear River, and associated inlets. One component of the Cape Fear Civil War Shipwreck District, BW814, is situated in the Cape Fear River only approximately 1,000 feet east of the main Wilmington and MOTSU shipping channel. Some of these shipwrecks are situated in the waters near Fort Fisher on both sides of the peninsula. This district may be expanded as more shipwrecks are located.

3.9.1.2 Architectural Resources

The MOTSU facility was constructed between 1951 and 1955. Its primary mission was to plan, coordinate, and accomplish the safe movement of ammunition, explosives, and other dangerous or inert cargo between highway and rail carriers to oceangoing vessels, and the reverse of the process for retrograde cargo. That original mission of MOTSU remains essentially unchanged today (MOTSU 2023a). There are approximately1,090 buildings and structures at MOTSU, 351 (51 buildings and 300 structures) of which are 45 years or older. MOTSU has conducted two comprehensive architectural surveys of its buildings and structures to evaluate them for NRHP eligibility. Of the 51 buildings, 47 have been previously evaluated as not eligible for the NRHP. The structures of historic age consist of a wide variety of designed elements mostly related to infrastructure and utilities (e.g., disposal areas, dredged channels and basins, earthen barricades, gates, generators, lightning protection, open storage areas, pads, parking, poles,

pumps, rails, and roads). Most of these elements were included within the two comprehensive inventories and were all recommended as not eligible for the NRHP. To date, there are no NRHP-eligible buildings or structures on MOTSU, although there is one structure partially within MOTSU property that is potentially eligible, The Rocks (BW248/NH3640) (MOTSU 2023a). The Rocks is a late nineteenth-century levee that was constructed by the USACE in the 1880s and 1890s to prevent siltation of the Cape Fear River through closing off New Inlet (MOTSU 2023a).

3.9.1.3 Traditional Cultural Resources

Government-to-government consultation between MOTSU and each federally recognized Tribal Nation associated with MOTSU is being conducted for this action to afford the Tribal Nations the opportunity to provide input in the decision-making process in recognition of their status as sovereign nations, to provide information regarding Tribal concerns per Section 106 of the NHPA to the MOTSU, and to provide information on traditional cultural resources that may be present at the MOTSU.

To date, no traditional cultural resources or Native American sacred places have been identified at MOTSU (MOTSU 2023a). Six federally recognized Tribal Nations claim affiliation with the MOTSU and/or the geography in which the facility occurs: Eastern Band of Cherokee Indians, Cherokee Nation of Oklahoma, United Keetowah Band of Cherokee Indians, Catawba Indian Nation, Choctaw Nation of Oklahoma, and the Tuscarora Nation (MOTSU 2023a). Government-to-government consultation letters have been sent to the six federally recognized Tribal Nations. Section 106 and government-to-government correspondence will be included as **Appendix G** in the Final EIS.

3.9.2 Environmental Consequences

Section 106 of the NHPA empowers the Advisory Council on Historic Preservation to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or eligible for inclusion in the NRHP. Once cultural resources have been identified, significance evaluation is the process by which resources are assessed relative to established significance criteria and criteria considerations. Cultural resources that have been determined to be eligible for listing in the NRHP are called “historic properties.”

Analysis of potential effects on cultural resources considers both direct and indirect effects. Direct effects may occur by: (1) physically altering, damaging, or destroying all or part of a resource; (2) altering characteristics of the surrounding environment that contribute to resource significance; (3) introducing visual, audible, or atmospheric elements that are out of character with the property or alter its setting; or (4) neglecting the resource to the extent that it deteriorates or is destroyed. The potential to directly disturb cultural resources can be assessed by identifying the type and location of the proposed action and by determining the exact locations of cultural resources that could be affected. Effects that are farther removed from the

immediate project area, including visual, audible (noise), or atmospheric changes due to project implementation are harder to quantify.

3.9.2.1 Preferred Alternative – Full Implementation

Archaeological Resources

Five projects identified as part of the Preferred Alternative would involve ground disturbance. Previously recorded archaeological resources are located within two of those, the cantonment infill area and the fence line footprint associated with the Pleasure Island ESCZ.

A total of 28 previously recorded archaeological resources are located within the two project footprints that include ground disturbance (**Table 3.9-1**). Of those, three archaeological resources are within the cantonment infill development area, all of which are not eligible for listing in the NRHP. There are 26 archaeological resources within the proposed fence line footprint associated with the Pleasure Island ESCZ (MOTSU 2023a). Five of these resources are contributing sites to the Fort Fisher National Historic Landmark, 16 resources are not eligible for listing in the NRHP, and seven resources have not been evaluated for their NRHP eligibility (MOTSU 2023a) (**Table 3.9-1**). These sites would require evaluation prior to construction. The contributing sites to the Fort Fisher National Historic Landmark have been determined as eligible for the NRHP as part of a thematic district, which is in the ESCZ. Two of the unevaluated sites were noted as being destroyed and therefore are not considered eligible for listing in the NRHP. The remaining five unevaluated sites (see **Table 3.9-1**) consist of four pre-contact period scatters and one post-contact period Civil War defensive line segment (MOTSU 2023a).

These archaeological resources are located within lands that have been surveyed according to the North Carolina Office of State Archaeology Guidelines (2017). The Preferred Alternative has the potential to have significant effects on these archaeological resources and adverse effects on historic properties. Per the ICRMP Standard Operating Procedure No. 1, *Project Review, NEPA, and Section 106 Responsibilities,* MOTSU is currently consulting with the North Carolina SHPO other consulting parties regarding the potential to adversely affect historic properties per 36 CFR 800.5(a)(1) (MOTSU 2023a). Measures to avoid, minimize, or mitigate effects to historic properties will be identified through this consultation and would reduce the effects to less than significant to cultural resources.

Table 3.9-1 Archaeological Resources Located within the Area of Potential Effect

Site Number	*Period*	*Description*	*NRHP Eligibility*	*Project*
31BW645	Pre-contact	Late Archaic – Lithics (tertiary debitage) ceramic (limestone/marl) site is mostly disturbed by push piles	DNE	Cantonment Area Infill
31BW647	Pre-contact	Pre-contact (unknown) – lithics (tertiary debitage)	DNE	Cantonment Area Infill

Site Number	*Period*	*Description*	*NRHP Eligibility*	*Project*
31BW648	Pre-contact	Late Archaic – limited activity with secondary debitage and fiber tempered pottery sherd	DNE	Cantonment Area Infill
31NH89**1	Pre-contact	Late Woodland – limited activity, light shell and ceramic scatter	DNE (damaged)	Fence line footprint associated with the Pleasure Island ESCZ
31NH89**2	Pre-contact	Early, Middle and Late Woodland – artifact scatter including Hanover and Oak Island ceramics	NEV	Fence line footprint associated with the Pleasure Island ESCZ
31NH89**3	Pre-contact	Early-Middle Woodland – shell scatter with Deep Creek and Hanover ceramics	NEV	Fence line footprint associated with the Pleasure Island ESCZ
31NH89**6	Pre-contact	Middle Woodland – light scatter	NEV	Fence line footprint associated with the Pleasure Island ESCZ
31NH89**4	Post-contact	19thcentury – Civil War earthwork: 3 rifle pits (2 circular and 1 half-moon shape)	NREC^	Fence line footprint associated with the Pleasure Island ESCZ
31NH89**7	Post-contact	19th century – Civil War linear earthwork entrenchments east to west trending	NREC^	Fence line footprint associated with the Pleasure Island ESCZ
31NH89**8	Pre-contact	Middle Woodland – Hanover sherd	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH90**1	Multi-component	Early-Middle Woodland and 20th century – artifact scatter	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH90**3	Multi-component	Early, Middle, and Late Woodland shell scatter and 18th–19th century ceramic	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH390	Pre-contact	Archaic and Middle-Late Woodland ceramic surface scatter	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH397	Pre-contact	Archaic and Middle-Late Woodland ceramic surface scatter	NEV	Fence line footprint associated with the Pleasure Island ESCZ
31NH398**2	Pre-contact	Woodland – ceramic scatter	NEV (destroyed)	Fence line footprint associated with the Pleasure Island ESCZ
31NH398**3	Pre-contact	Woodland – ceramic scatter	NEV (destroyed)	Fence line footprint associated with the Pleasure Island ESCZ
31NH642**1	Post-contact	20th century – remains of house site, artifact scatter with construction material	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH642**2	Post-contact	20th century – push pile from Davis Road construction	DNE	Fence line footprint associated with the Pleasure Island ESCZ

Site Number	*Period*	*Description*	*NRHP Eligibility*	*Project*
31NH642**3	Post-contact	19th–20th century – clear glazed earthenware	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH653	Pre-contact	Early, Middle and Late Woodland – artifact scatter including Deep Creek, Hanover, Oak Island ceramics	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH659	Pre-contact	Middle-Late Woodland – surface scatter including Hanover, Oak Island sherds	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH661**1	Pre-contact	Middle Woodland – Hanover sherd fragments	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH661**2	Pre-contact	Late Woodland – ceramic sherds scatter with Oak Island sherd and uniface	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH667	Post-contact	19th century – Civil War earthwork: gun emplacements for shoreline battery	NREC^	Fence line footprint associated with the Pleasure Island ESCZ
31NH668	Post-contact	19th century – Civil war: natural upland rise used for artillery in the vicinity of Lamb's headquarters	NREC^	Fence line footprint associated with the Pleasure Island ESCZ
31NH678	Pre-contact	Pre-contact (unknown) – Quartz secondary flake	DNE	Fence line footprint associated with the Pleasure Island ESCZ
31NH697	Post-contact	19th century – Civil War encampment: Post-contact trash pit, remains of a campaign tent, and traces of shell road	NREC^	Fence line footprint associated with the Pleasure Island ESCZ
31NH896	Post-contact	19th century – Civil War intact segment of Sugar Loaf line	NEV	Fence line footprint associated with the Pleasure Island ESCZ

Legend: ^ = Associated with Fort Fisher National Historic Landmark; DNE= Determined Not Eligible for Listing; ESCZ = Explosive Safety Clear Zone; NEV = Not Evaluated; NREC = Contributing Element of National Register Eligible District; NRHP = National Register of Historic Places
Sources: MOTSU 2023a

In the event that previously unidentified archaeological deposits or human remains are encountered during the construction and ground-disturbing activities, the activity will stop, and the Cultural Resources Manager will be notified. The protocols outlined in Standard Operating Procedure No. 3, *Accidental Discovery of Archaeological Sites, Paleontological Deposits, or Human Remains,* in the ICRMP will be followed (MOTSU 2023a).

Architectural Resources

Projects for the full implementation of the Preferred Alternative do not involve architectural resources. To date, there are no NRHP-eligible buildings or structures on MOTSU. Therefore,

no significant effects on architectural resources due to the full implementation of the Preferred Alternative are anticipated.

Traditional Cultural Properties

No traditional cultural properties have been identified at MOTSU (MOTSU 2023a). Government-to-government consultation between MOTSU and each federally recognized Tribal Nation that may be associated with MOTSU is being conducted for this action in recognition of their status as sovereign nations. Such consultation will provide information regarding tribal concerns per Section 106 of the NHPA, as well as information on traditional resources that may be present on or near MOTSU. No significant effects on Traditional Cultural Properties are anticipated due to the implementation of the Preferred Alternative.

3.9.2.2 Partial Implementation Alternative

The Partial Implementation Alternative does not include the following construction projects:

- Construct Secondary Emergency Egress Road and Utility Connection at the Rail Gate
- Flood Mitigation for the Classification Yard/Bridge Crane Area

effects on archaeological and architectural resources and traditional cultural properties resulting from implementation of the Partial Implementation Alternative would be the same as described in **Section 3.9.2.1**

3.9.2.3 No Action Alternative

Under the No Action Alternative, MOTSU would not implement the real property master planning actions as described. Cultural resources would be expected to remain as described in **Section 3.9.1**. Ongoing maintenance and repair would continue, and individual projects could be implemented, subject to completion of project-specific NEPA and other required compliance. Cultural resources effects from any individual projects would be evaluated as part of the overall NEPA analysis for the projects and any necessary mitigations would be implemented to ensure that no significant effects would occur.

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4.0 CUMULATIVE EFFECTS

CEQ regulations (40 CFR 1502.16; 40 CFR 1508.1(i)) require that the environmental consequences of the proposed action consider cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative effects.

4.1 PAST, PRESENT, REASONABLY FORESEEABLE ACTIVITIES

Past, present and reasonably foreseeable activities at MOTSU are listed in **Table 4.1-1**. This includes ongoing programs of maintenance and management and reasonably foreseeable master planning activities that could contribute to cumulative effects at MOTSU.

Table 4.1-1 Ongoing and Reasonably Foreseeable Activities Occurring at MOTSU

Project/Program Name	Description	Timing
Ongoing Programs of Maintenance and Management		
Annual barricade maintenance	Barricade maintenance has been ongoing at MOTSU since 2023.	Past and reasonably foreseeable. Part of ongoing program of maintenance.
Timber management	Timber management at MOTSU involves harvesting, planting, maintenance of fire breaks, and controlled burning. Timber harvest, planting, and fire break maintenance occur as needed and based on available funding. Prescribed burning occurs annually from January through July to restore and maintain longleaf pine ecosystem.	Past, present, and reasonably foreseeable. Part of an ongoing program of management.
Annual maintenance dredging	Channels, berths, and turning basins for the South, Central, and North Wharves are dredged annually to provide safe water depths for vessel operations at MOTSU.	Past, present, and reasonably foreseeable. Part of an ongoing program of maintenance.
Acquisition of rail line right of way between Leland Interchange Yard and MOTSU	384 acres along the rail track from the Leland Interchange Yard to MOTSU will be acquired to facilitate required force protection measures.	Ongoing

Project/Program Name	Description	Timing
Rail repair and improvement	Rail repairs and improvements at the Leland Interchange Yard at MOTSU and along the rail between the two as needed.	Past, present, and reasonably foreseeable. Part of an ongoing program of maintenance.
Pavement maintenance	Each year, a number of ammunition pads, roads, hardstands, and parking lots are repaired and repaved.	Past, present, and reasonably foreseeable. Part of an ongoing program of maintenance.
Anticipated Future Real Property Master Planning Actions		
Project	**District**	**Timeframe***
Shoreline Stabilization Phases 2 and 3	Waterfront Operations	8–20 years
Construct U.S. Army Reserve Center	Administrative	8–20 years
Implement SDDC TEA Entry Road Recommendations	Administrative	8–20 years
Repair railroad crossings at Karlman Lane and Reclaim Yard	Waterfront Operations	8–20 years
Initiate South Wharf development projects	Waterfront Operations	8–20 years
Construct Center Wharf staging and marshalling Area	Waterfront Operations	8–20 years
Construct Maintenance and Dispatch Center	Administrative	8–20 years
Expand Rail Line Transfer Area 1	Reception and Holding	20+ years
Upgrade turning circle rejection lane (Main Gate)	Administrative	20+ years
Install speed bumps / traffic circles / chicane road (Main Gate and Truck Gate)	Administrative	20+ years
Redesign Visitor Center parking lot for commercial truck parking	Administrative	20+ years
Add standoff protection	Administrative	20+ years
Construct Leland Interchange Yard staging and marshalling area	Reception and Holding	20+ years
Construct South Wharf Hardstand Loading and Sorting Ramp	Waterfront Operations	20+ years
Construct Logistics Readiness Center	Administrative	20+ years
Replace search canopy (Main Gate)	Administrative	20+ years
Expand security facilities for additional personnel	Administrative	20+ years
Install toilets for security towers	Waterfront Operations	20+ years
Access road to Leland Interchange Yard	Reception and Holding	20+ years

Note: *Based on current mission needs and prioritization, these projects could be implemented sooner than currently projected.

Source: Military Ocean Terminal, Sunny Point Installation Development Program (March 2019). The Program is a consolidated list of the major planned and programmed projects presented in MOTSU's three ADPs.

Additionally, reasonably foreseeable projects in the region include the following.

- The Wilmington Harbor improvement project would involve improvements to the federal navigation system at Wilmington Harbor. It would allow the accommodation of larger cargo vessels and include deepening and widening the main channel, extending the entrance channel offshore, and expanding the Anchorage Turning Basin. MOTSU is a cooperating agency for the EIS. Public scoping occurred in July of 2024. A Final EIS is anticipated to be completed in 2026.
- Housing development in Brunswick County from 2015 to present includes 50,500 approved units in 130 developments and 4,485 proposed units in 6 developments. These are located primarily in the south and along Route 17 (Brunswick County 2024).

4.2 CUMULATIVE EFFECTS ANALYSIS

This cumulative effects analysis focuses on the resources where an incremental impact from the proposed action could have the potential for significant direct or indirect cumulative effects. Based on the analysis presented in Chapter 3.0, the following resource areas are carried forward for further analysis of potential cumulative effects: air quality, water resources, biological resources, and cultural resources.

For the purposes of this EIS, the following resources are not carried forward for cumulative effects analysis: noise, coastal zone management, and aesthetics and visual resources. Since the direct and/or indirect effects to these resources are localized and temporary, and recovery is anticipated within a short period of time, another action would need to occur in the same localized area and at the same time for cumulative effects to be possible. While a few other actions potentially affecting these resources may occur in the same localized area, the potential for cumulative significant effects due to the incremental impact of the proposed action would not exist as the proposed action was found to result in no, negligible, or minor direct/indirect adverse effects to these resource areas.

4.2.1 Air Quality

The ongoing projects in **Table 4.1-1** have been quantified for air quality effects, including barricade maintenance, annual maintenance dredging, rail repair and improvement, and pavement maintenance. These emissions were assumed to continue at similar annual levels for years that extend past 2032 for the purposes of the air quality analysis. Criteria pollutant emissions from these activities were estimated to be well below the comparative indicator values. When combined with the limited scope of ongoing timber management activities, the total air emissions would not be anticipated to have a significant impact on air quality in the air quality control region.

Some of the actions listed in **Table 4.1-1** have been proposed further out in time (8 to 20+ years). Since these projects have not been fully developed, effects cannot be quantified at this

time and evaluation of these actions for NEPA and CAA compliance would occur when planning for implementation is underway.

As described in Chapter 3.2, the CEQ published interim guidance on January 9, 2023, entitled *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* (CEQ 2023). For GHGs, the ROI is global and effects are cumulative by nature. The cumulative analysis evaluates emissions considering the existing conditions and the proposed action alternatives. Implementation of the proposed action alternatives would contribute directly to emissions of GHGs from the combustion of fossil fuels. Emissions for these alternatives and the No Action Alternative were estimated. These estimates were prepared to provide a measure of the difference between the proposed action alternatives. The lifetime GHG emission analysis for both the Full and Partial Implementation Alternatives is based on the construction of the projects evaluated quantitatively and using a 25-year time horizon for quantified maintenance projects, which are assumed to be ongoing indefinitely. The emissions are summarized in **Table 4.2-1** and detailed calculations and assumptions are included in **Appendix H**.

Table 4.2-1 GHG Emissions Estimates and Comparison for Proposed Alternatives, Full and Partial Implementation

Activity	CO_2e tons	CO_2e metric tons
Full Implementation Alternative – Construction	9,264	8,404
Full Implementation Alternative – Annual Dredging Maintenance	8.916	8,088
25-yr emissions	222,888	202,201
Partial Implementation Alternative – Construction	9,140	8,292
Partial Implementation Alternative –Annual Dredging Maintenance	8.916	8,088
25-yr emissions	232,028	210,492
Annual GHG net change between full and partial implementation	124	112

Legend: CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; yr = year.

The social cost of carbon ($SC\text{-}CO_2$), social cost of methane ($SC\text{-}CH_4$), and social cost of nitrous oxide ($SC\text{-}N_2O$) allow agencies to understand the benefits of reducing each of these GHGs or the social costs of increasing such emissions, in the policy making process. Collectively, these are referenced as the SC-GHG and is defined as the monetary value of the net harm to society associated with adding a small amount of carbon to the atmosphere in a given year. In principle, net harm cost includes the value of all climate change effects, including but not limited to changes in net agricultural productivity, human health effects, property damage from increased flood risk natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services (Interagency Working Group 2021).

The SC-GHG analysis covers the construction period from 2025 to 2031. **Table 4.2-2** identifies the projected cost, in 2020 dollars, of implementing the Full Implementation Alternative construction activities using an average discount rate of 3 percent and what would be

anticipated to represent the worst-case scenario, which is defined as the 95th percentile of the 3 percent average (Interagency Working Group 2021). Note that these figures only include the construction activities that were quantified for the air quality analysis. Waterfront infrastructure repairs, road, parking, hardstand repairs, stormwater mitigation, and cantonment area infill activities were not quantified but were evaluated qualitatively. Estimated SC-GHG costs are based on CO_2 emissions, as the quantity of CH_4 and N_2O emitted each year is so low that they do not notably change the monetary damage calculation. The totals are presented in **Table 4.2-2** for 2025 through 2031 to provide an indication of the increasing monetary value of net harm for each year of construction. The calculation is included in Appendix H, Tab M. The SC-GHG for partial implementation of construction projects is essentially the same as for full implementation, so is not included here.

Table 4.2-2 SC-GHG Yearly Estimates for Full Construction Implementation

Year	[1]SC-GHG Estimates (2020$/Metric Ton @ 3% average damages)	Annual Net Change Emissions in Metric Tons	SC-GHG Emissions 2020$ – 3% average discount
		Total Cost 2025–2031	**$3,963,750**
Year	**[1]SC-GHG Estimates (2020$/Metric Ton @ 3% 95th Percentile average damages)**	**Annual Net Change Emissions in Metric Tons**	**SC-GHG Emissions 2020$ – 3% average discount, 95th Percentile average damages**
		Total Cost 2025–2031	**$11,942,855**

Note: [1]Values from Office of Management and Budget 2021; represented here rounded to closest whole number.
[2]The data this far into the future is not currently available from the EPA but will be included should it become available.
Legend: CO_2 = carbon dioxide; SC-GHG = Social Cost of Greenhouse Gas

There are a number of limitations associated with the modeling used to derive the monetary values presented in **Table 4.2-2** due to the broad scope of scientific and economic issues across the complex global landscape (Interagency Working Group 2021). Nonetheless, providing a monetary characterization of GHG effects is a useful tool for generally assessing effects from the emissions as well as effects from implementing mitigation measures to reduce those emissions.

4.2.2 Geological Resources

Effects to geological resources from the implementation of the Proposed Action would contribute to effects to estuarine sediments, which would be removed from channels in the Cape Fear River as well as the disposal of those sediments in the ODMDS. In the ROI, the Cape Fear River and the ODMDS, this ongoing work has occurred before and would continue to occur after the timeframe that is the focus of this EIS. Additionally, the Wilmington Harbor improvement project would involve deepening and widening the main channel, extending the

entrance channel offshore, and expanding the Anchorage Turning Basin. The location for disposal of spoils from this project is not known at this time however beneficial use is being considered. Permitting conditions for dredging and disposal of dredged material would minimize environmental effects. If the Wilmington Harbor project were to result in increased traffic, larger ships, or more heavily laden ships traversing the Cape Fear River, increased erosion from wake on shorelines, including at MOTSU could occur.

4.2.3 Water Resources

Effects to water resources from the implementation of the Proposed Acton would contribute to additive effects on local water resources, particularly surface water and wetlands. All aspects of construction and disturbance would temporarily increase the risk of impacting surface waters from increased turbidity from erosion and sedimentation during ground-disturbing activities. The general operation and maintenance activities described in **Table 4.1-1** would also contribute to the potential for surface water effects. Additionally, the improvements to Wilmington Port would also contribute to temporary surface water effects due to additional dredging to widen and deepen the federal channel system within the Cape Fear River. These effects would be temporary and conditions would return to normal after activities ceased. Use of BMPs, as well as NPDES guidelines, would decrease the potential for long-term effects to surface waters.

Similarly for wetlands, full implementation would impact up to 9.46 acres of wetlands due to barricade maintenance, Secondary Emergency Egress, and ESCZ clearing. This would contribute to an overall reduction of wetlands on base. Other project footprints and total effects to wetlands are unknown at this time. The Wilmington Port Improvement would have no effects to wetlands, as it is a project to widen and deepen the federal channel system. At this time, it is unknown if Section 404 permitting for all wetland effects would be required. Delineations and assessments would be undertaken as designs and plans are finalized. During the permitting process MOTSU may be given options to purchase wetland credits for in-kind wetlands or be required to restore wetlands in-kind. These types of permit requirements help to offset the long-term cumulative effects to water resources. Additionally, wetland restoration work under Phase I of the shoreline protection projects would protect and enhance existing wetlands and likely increase the area of tidal wetlands along the Cape Fear River shorelines at MOTSU, having overall beneficial effects to wetlands. Use of BMPs and adherence to erosion and sediment control procedures required on base would also prevent long-term effects to adjacent wetlands during construction activities.

Although the potential exists for cumulative effects to water resources from implementation of the proposed action, through the use of required permitting and BMPs, no significant cumulative effects to water resources are likely to occur.

4.2.4 Biological Resources

Effects to biological resources from implementation of the proposed action would contribute to additive effects on regional biological resources, specifically direct impact and/or loss of up to 215 acres of vegetation and potential adverse effects on federally listed species. Construction and maintenance activities would temporarily increase the potential for localized noise and disturbance effects to wildlife. The past, present, and reasonably foreseeable activities described in **Section 4.1** would also contribute to the potential for habitat loss, disturbance, and adverse effects on federally listed species. However, such projects would undergo the proper environmental regulatory processes to identify potential effects to biological resources, and conservation measures, BMPs, and mitigation measures would be implemented where appropriate to minimize regional effects to biological resources.

Although, the potential exists for cumulative effects to biological resources from implementation of the proposed action, through the fulfillment of ESA Section 7 consultations, adherence to any mitigation measures that are required through the Section 7 consultation process, continued implementation of an active Integrated Natural Resources Management Plan (MOTSU 2017), and implementation of conservation measures and BMPs, no significant cumulative effects to biological resources are anticipated.

4.2.5 Cultural Resources

Adverse effects from past, present, and reasonably foreseeable future projects on cultural and historical resources would result primarily from construction activities; these effects would be periodic and short term. Construction activities would potentially present visual effects while producing residual dust, noise, and vibrations, which may affect the physical and acoustic environment of historic properties during the construction periods. Construction of present and future projects would also potentially contribute significant effects on cultural and historic resources due to new development and excavation that would affect archaeological resources and unanticipated cultural discoveries. Activities that are required to comply with Section 106 would likely include a construction monitoring plan and other mitigation measures designed to avoid or minimize effects on archaeological and historic resources. In addition, if effects are unavoidable, recovery and/or recordation of the resources would occur prior to construction.

With implementation of avoidance, minimization, and mitigation measures (as required), and adherence to MOTSU's ICRMP, master planning projects would result in less than significant effects on architectural and archaeological resources. Therefore, incremental effects of the proposed action, in conjunction with the less than significant effects of past, present, and future projects, would result in less than significant cumulative effects on historic and cultural resources from implementation of the master planning projects.

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5.0 MITIGATION MEASURES, REQUIRED PERMITS, SUMMARY OF EFFECTS

5.1 MITIGATION MEASURES

Mitigation measures are those that the Army would implement to mitigate possible adverse effects to resources identified in the EIS. These include applicable permits, consultation, and implementation of project-specific requirements. Recommended mitigation measures are summarized by resource below. The Army is conducting consultation with: SHPO and potentially affected Tribes concerning the proposed action as required by Section 106 of the NHPA; NMFS and USFWS as required by Section 7 of the ESA; and NMFS as required by the Magnuson-Stevens Fishery Conservation and Management Act. Additional avoidance, minimization, and compensation measures that result from these consultations will be clearly outlined in the Final EIS and decision document. For projects for which sufficient details are not currently available, mitigations would be identified at a later date when detailed design and siting are available. **Table 5.1-1** provides a summary of required permits and consultations. In addition to mitigations, identified here by resource, the Army would implement, as appropriate, applicable standard operating procedures and BMPs, summarized in **Appendix I**. These are implemented by the Army on an ongoing basis to provide environmental protection and are distinguished from mitigation measures because they are (1) existing requirements for the proposed action, (2) ongoing, regularly occurring practices, and (3) not specific to the proposed action.

Table 5.1-1 Regulatory Compliance Requirements

Resource	Consultation and Permit Requirements
Air Quality	none
Noise	none
Geological Resources	Existing Permits: Maintenance dredging: Department of Army Permit 1998-00432 Dredge Material transport: Department of Army Permit SAW-2011-02228
Water Resources	Existing maintenance dredging: Department of Army Permit 1998-00432 NPDES Construction Permit(s) CWA Section 404 and 401 Water Quality Certification Permit CWA Section 404 Wetland Permit (where necessary)
Biological Resources	ESA Consultation with USFWS and NMFS EFH Assessment with NMFS
Coastal Zone Management	FCD with NCDEQ DCM
Aesthetics and Visual Resources	none
Cultural Resources	NHPA Consultation with SHPO and American Indian Tribes

Legend: CWA = Clean Water Act; DCM = Division of Coastal Management; EFH = Essential Fish Habitat; ESA = Endangered Species Act; FCD = Federal Consistency Determination; NCDEQ = North Carolina Department of Environmental Quality; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; NPDES = National Pollutant Discharge Elimination System; SHPO = State Historic Preservation Officer; USFWS = United States Fish and Wildlife Service

5.1.1 Water Resources

To minimize effects to water resources from general construction efforts of the proposed action, standard BMPs would be employed to reduce erosion and sedimentation from exposed soil during construction. These could include, but are not limited to the following:

- An Erosion and Sediment Control Plan would be prepared and implemented in construction plans and practices to the maximum extent practicable.
- Topsoil removed from the site would be placed in the immediate area and reused for re-compaction purposes (if appropriate).
- Soil exposed near water as part of the project would be protected from erosion with erosion control blankets (organic or synthetic fibers held together with net to cover disturbed areas) after exposure and stabilized as soon as practicable (with vegetation matting, hydroseeding, etc.).
- Silt-containment (silt fences and other physical barriers that intercept runoff from drainage areas).
- Re-vegetate as soon as possible after any ground disturbance or grading.
- Minimize construction and grading during inclement weather.
- Soil piles and exposed slopes covered during inclement weather.
- Stockpiling of excavated materials behind impermeable berms and away from the influence of water bodies and runoff.
- Vegetation/mulch stabilization (applying coarse plant residue to cover soil surface). The vegetation/mulch should be free of invasive species viable reproductive parts, such as rhizomes, seeds, and plants.
- Level spreader (non-erosive outlet for runoff to disperse flow uniformly across slope).
- Sediment basin (barrier that retains sediment from runoff).

Additionally, a Stormwater Management Plan would be developed and adhered to as part of CWA Section 401 compliance. The Stormwater Management Plan described the procedures and practice used to reduce the surface flow of water and subsequent discharge of pollutants to storm drainage systems. A Stormwater Management Plan includes both structural and non-structural practices that may include:

- Check dams (small temporary stone dam across drainage).
- Diversion dike/swale (berm or ditch that channels water to desired location).
- Lined waterway (lined outlet for drainage).
- Storm drain inlet protection (permeable barrier around inlets reducing sediment let into storm drain).
- Stormwater ponds and wetlands.
- Infiltration practices (capture/temporarily store water before infiltrating into the soil).
- Use of groundwater recharge wells and infiltration basins, where applicable.
- Filtering practices (capture/temporarily store water and pass through filter beds of sand, organic matter, soil, or other media).

During construction activities, adherence to the existing SWPPP would also be required to maintain compliance with the existing NPDES permit at MOTSU.

Lastly, the use of Low Impact Development Design Technology would be employed to reduce effects further. Examples may include:

- Grassed vegetation maintained on berms.
- Native plant landscaping.
- Avoidance of pesticides and fertilizers.
- Watershed-based management which could consider:
  - Participating in the development of a watershed management plan.
  - Implementing and adopting specific watershed protection strategies.
  - Designing land use planning techniques that reduce or shift impervious cover and enhance percolation.
  - Work toward achieving important water resource goals.

5.1.2 Biological Resources

To minimize effects to RCW resulting from barricade work in the North Rail Holding Yard, the following measures could be implemented. These may be amended pending the outcome of consultation with USFWS and NMFS on effects to threatened and endangered species and EFH associated with the proposed action.

These measures under consideration are::

- Active cavity trees would not be cut during the nesting season, April–July.
- Cavities or advanced starts in live trees within the limits of disturbance (LOD) would be screened to prevent RCWs from roosting in them at the time of cutting.
- A qualified biologist would evaluate cavities in dead trees to be cut and screen them if use is likely.
- Cavity trees that are cut would be destroyed onsite or collected for educational purposes with appropriate permitting.
- Cavity trees within 200 feet of the proposed LOD would be left in place and will not be screened; if these trees die during or after construction, artificial cavities would be provisioned to replace them.
- Artificial cavities would be installed in Clusters MOTSU 5B and RC 10 in order to ensure that both clusters have at least four suitable cavities ≥ 50 feet from the proposed LOD.
- No artificial cavities are recommended in MOTSU 4 at this time; should they be required in the future prior to project completion, recipient trees will be chosen outside of the 200-foot buffers.
- Activity within 200-foot RCW cluster areas will be conducted between one hour after dawn and one hour prior to dusk.
- Activity within RCW cluster areas will be limited to outside of the RCW nesting season, which is generally April–July, unless RCW biologists document nestlings fledging prior to July.

- All clusters on MOTSU will continue to be monitored and managed with suitable cavities, regardless of "take" status, and painted tree bands will not be removed. If RCW groups persist and are productive after the berm project is completed, these clusters could potentially be counted again toward MOTSU's recovery and population goals with concurrence from USFWS.

Marine Species and EFH:

- PDC required by the SARBO (NMFS 2020) would be implemented for dredging operations. These include general and equipment specific PDCs as well as PDCs that would minimize and monitor effects to sturgeons. While it is expected that dredging discussed in this EIS would be accomplished using a clamshell or bucket dredge, if other methods were employed, dredging would incorporate appropriate PDCs including seasonal monitoring by trained observers.
- The following conservation measures are recommended to minimize adverse effects on sea turtles from the proposed shoreline protection project:
  - Maintain no-wake speed limit during transport of barge and work vessels.
  - Adhere to use of protected species observer during construction of sill and wetlands.
  - Attempt to construct living shoreline sill between December 1 and April 30, when sea turtles are typically absent from the lower river estuary.
  - For maintenance and repair of wharf, boat docks, ramps, and wave attenuators, it is also recommended to maintain no-wake speeds.

Conservation measures to avoid and or minimize additional effects on managed and associated species within their associated EFH in the project area includes the following:

- Turbidity booms should be deployed around construction activities in shallow intertidal or subtidal habitat at all times to minimize movement of suspended sediments and turbidity.
- BMPs should be adhered to during any construction to minimize high levels of suspended solids and turbidity in the action area.
- All operation and support vessels should adhere to a no-wake speed limit when in transit within the project areas in order to minimize the resuspension of sediments or unintentional groundings.
- Living marine shoreline sills should be designed to maintain adequate breaks to allow for ingress and egress of managed species and their prey.
- Dredging would follow SARBO PDCs.
- Disposal of dredge spoils would be consistent with the requirements of MOTSU's Dredged Material Management Program (MOTSU 2014).

5.2 ALTERNATIVES EFFECTS SUMMARY

A comparison of the environmental consequences of the alternatives evaluated in this EIS is provided in **Table 5.2-1**.

Table 5.2-1 Environmental Consequences Summary

Resource	No Action Alternative	Full Implementation Alternative	Partial Implementation Alternative
Air Quality and Climate Change	No effects on local or regional ambient air quality.	Short-term, intermittent, dispersed emissions from equipment would not exceed thresholds. No permanent sources of emissions are proposed. Effects would be less than significant.	Effects would be similar to those resulting from the Full Implementation Alternative. Total emissions over the time would be lower because fewer projects would occur.
Noise	No effects on existing noise conditions.	Intermittent, localized, and temporary construction-related noise would be less than significant. No noise sensitive areas would be impacted. Effects would be less than significant.	Effects would be similar to those resulting from the Full Implementation Alternative; however, the noise associated with construction of the secondary egress and flood mitigation work would not occur.
Geological Resources	No new or different effects on geology, topography, and soils. Shoreline erosion would be expected to continue.	Several projects (barricade maintenance and repair, rail replacement, flood mitigation, and shoreline stabilization) would modify and ultimately stabilize existing previously modified topography and would stabilize soils, reducing erosional loss. Construction projects could temporarily disturb soils. Dredging of channels would remove accumulated sediment, which would be deposited at an approved offshore location. Effects would be less than significant.	Effects would be similar to those resulting from the Full Implementation Alternative; however, flood mitigation work would not occur and the effects of flooding would continue. The secondary egress road would not be constructed and soils and topography in this area would not be affected.
Water Resources	No changes to water resources conditions. Shoreline erosion would continue to affect turbidity of adjacent surface waters.	Temporary minor localized effects to surface waters could result from activities under the Proposed Action that expose or disturb soils resulting in stormwater runoff, and increased turbidity from in-water work. No effects would be expected to groundwater resources. Barricade safety project, secondary egress gate, and ESCZ fencing would impact approximately 9.7 acres of wetlands. Other projects have the potential to impact wetlands but design footprints are not available. Barricade safety project and ESCZ security projects would take place in approximately 5.05 and 0.25 acres of floodplains, respectively. A portion of the phase 1 shoreline restoration work would occur in the floodplain, though project footprint is not available at this time to calculate the area affected. Repairs and maintenance of the security boat dock, ramp, and wave attenuators would be made to existing structures within the floodplain. No inhabited structures would be constructed within the floodplain as part of the Proposed Action.	Effects would be similar to those resulting from the Full Implementation Alternative; however, the secondary egress road would not be constructed, reducing known wetland effects to approximately 7.6 acres.

Resource	No Action Alternative	Full Implementation Alternative	Partial Implementation Alternative
Biological Resources	No effects to biological resources.	Short-term, less than significant adverse effects on plant communities from vegetation removal. Long-term beneficial effects to wetland vegetation along the shoreline. Short- and long-term, intermittent, less than significant adverse effects on common wildlife species associated with habitat loss, noise and human presence, and direct injury and mortality. ESA Section 7 determination: May affect, likely to adversely affect RCW and may affect, not likely to adversely affect federally listed threatened and endangered species: NLEB, tricolored bat, loggerhead sea turtle, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, Atlantic sturgeon, shortnose sturgeon, and rough-leaved loosestrife.	Effects to plant communities and wildlife would be the same as the preferred alternative, although to a slightly lesser degree as several projects would not occur. Effects to threatened and endangered species would be the same as the preferred alternative.
Coastal Zone Management	No change to existing coastal zone conditions	The Army has determined that the Preferred Alternative is consistent to the maximum extent practicable with the North Carolina Coastal Management Program as described in CAMA. A FCD will be submitted to NCDEQ DCM once NHPA and ESA consultations are completed.	Same as Full Implementation Alternative
Aesthetics and Visual Resources	There would be no change to existing aesthetics and visual resources conditions.	Temporary and negligible effects from maintenance and repair of wharves and associated infrastructure and shoreline protection projects directly along the waterfront, which would be visible from points along the Cape Fear River. Shoreline protection would result in long-term beneficial effects from repair and prevention of erosion along the shoreline where currently there are exposed eroded banks, loss of natural vegetation and turbid waters adjacent to the shoreline. ESCZ security projects would minimally change the viewshed as the portions of the fence would be within the forested buffer inside the MOTSU boundary. Effects would be less than significant.	The projects that would not be implemented would not impact aesthetics and visual resources; therefore, effects would be the same as described for the Full Implementation Alternative.

Resource	No Action Alternative	Full Implementation Alternative	Partial Implementation Alternative
Cultural Resources	No effects on historic and cultural resources	Potential significant effects to archaeological resources and adverse effects on historic properties. MOTSU is consulting with the North Carolina SHPO and other consulting parties regarding the potential to adversely affect historic properties. Measures to avoid, minimize, or mitigate effects to historic properties will be identified through this consultation and would reduce the effects to less than significant to cultural resources. The proposed action does not involve architectural resources and there are no NRHP-eligible buildings or structures on MOTSU. No traditional cultural properties have been identified at MOTSU. Government-to-government consultation between MOTSU and each federally recognized Tribal Nation with ties to the area is ongoing. No significant effects on Traditional Cultural Properties are anticipated.	Effects on archaeological and architectural resources and traditional cultural properties would be the same as the Full Implementation Alternative.

Legend: CAMA = Coastal Area Management Act; DCM = Division of Coastal Management; ESA = Endangered Species Act; ESCZ = Explosive Safety Clear Zone; FCD = Federal Consistency Determination; MOTSU = Marine Ocean Terminal Sunny Point; NCDEQ = North Carolina Department of Environmental Quality; NHPA = National Historic Preservation Act; NLEB = Northern Long-eared Bat; NRHP = National Register of Historic Places; RCW = Red-cockaded Woodpecker; SHPO = State Historic Preservation Officer

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6.0 LIST OF PREPARERS, PERSONS AND AGENCIES CONTACTED

NEPA implementing regulations (40 CFR Section 1502.18) state that an EIS shall list the names and qualifications of persons who were responsible for preparing the EIS. Below are the Army and contractor staff who contributed to the preparation of this EIS.

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K. Roland Project Manager	U.S. Army Corps of Engineers Mobile District Planning and Environmental Division
J. Overstreet Biologist, Project Manager	U.S. Army Corps of Engineers Mobile District Military Planning and Environmental Compliance Branch
T. Young Biologist	U.S. Army Corps of Engineers Wilmington District.

EIS Contractors	
Name/Title	**Project Responsibility**
Stantec	
C. Young, AICP Army Client Lead	Program Manager QC Reviewer
E. Pruitt Sr. NEPA Planner	Project Manager Geological Resources Author
K. Briscoe Architectural Historian/ Archaeologist	Architectural Resources Author
E. Ferguson, AICP Sr. Planner	Coastal Zone Management and Aesthetics and Visual Resources Author
L. Hamilton Senior Air Quality Specialist	Air Quality and Climate Change Author
M. Harrison Environmental Scientist	Noise and Water Resources Author
C. Hoffman Sr. Project Manager	QC Review

EIS Contractors	
Name/Title	**Project Responsibility**
I. Nelson, RPA Archaeologist	Archaeological and Traditional Cultural Resources Author; Section 106 consultation support
C. Scheuerman Senior Biologist/Project Manager	Biological Resources Author
A. Thompson Environmental Scientist	Water Resources contributor, production support
K. Wilson Project Coordinator and Document Production Specialist	Technical Production
Contractors	
Dr. J.H. Carter III & Associates, Inc. A. Jackson, lead author	Biological Assessment for North Rail Holding Yard
Dial Cordy and Associates, Inc. S. Dial, primary contact	Biological Assessment for Waterfront Projects Essential Fish Habitat

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APPENDIX A
AGENCY AND PUBLIC INVOLVEMENT

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Scoping Summary

EIS for Implementing Real Property Master Planning Projects at Military Ocean Terminal Sunny Point, North Carolina

On October 12, 2023, the Department of the Army published its Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) for proposed near-term real property actions and the update of the Real Property Master Plan for Military Ocean Terminal Sunny Point (MOTSU) in the Federal Register and in local newspapers, *The State Port Pilot* and *Star-News*. In addition to the publication of the NOI, 56 stakeholders received letters notifying them directly and inviting their participation.

The NOIs and letter provided a link to a project website where virtual scoping materials were available. Materials consisted of a series of posters describing the need for the project, project components, the NEPA process, and an invitation to provide comments to be considered in development of the EIS. The materials were available during the entire scoping period, 12 October through 11 November 2023. During this time, comments could be submitted via mail or email to James A. Rupkalvis, Installation Manager.

Three comments were received during the scoping period and are summarized below.

- The North Carolina Division of Parks and Recreation suggested incorporating living shoreline techniques for shoreline stabilization; ensuring floodplain mitigation measures do not adversely affect the Carolina Beach State Park's natural resources, marina, or shoreline; and considering potential species impacts outside the MOTSU footprint.
- The North Carolina Wildlife Resources Commission provided a list of suggestions that included consultation with United States Fish and Wildlife (USFWS), minimizing impacts to wetlands, and incorporating mitigation measures where necessary.
- The Brunswick County Planning Department noted population growth, increases in traffic in the area and development encroachment on the rail line from Leland Yard to MOTSU.

All comments will be considered in developing the EIS and a summary of comments will be incorporated into the EIS. Scoping comment letters, along with the letters sent to stakeholders, NOIs published in the Federal Register and local newspapers, and virtual public meeting materials are part of the project administrative record.

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APPENDIX B
CONSTRUCTION DETAILS FOR MOTSU PROJECTS

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Equipment Required for Projects

Equipment	Horsepower
Explosives Safety	
Maintain and modify barricades at pads and rail sidings	
Dump truck	450
Chainsaw	7
Excavator	450
Bulldozer	275
Mulching mower	270
Waterfront Maintenance	
Shoreline protection	
Bulldozer	275
Dump truck	450
Grader	145
Loader	262
Generator	264
Excavator	450
Maintenance dredging of channels, berths, and turning basins for the wharves	
Tow boat	671
Crew launch boat	75
Work tug	750
Clamshell dredge	2,500
Clamshell offloader	2,500
Pleasure Island Explosive Safety Clear Zone (ESCZ) Security	
Chainsaw	7
Bulldozer	307
Loader	262
Dump truck	450
Welder	10
Generator	264
Forklift	74
Grader	145
Excavator	450

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APPENDIX C
CHECKLIST FOR TIERED NEPA COMPLIANCE

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ENVIRONMENTAL CHECKLIST FOR CANTONMENT AREA INFILL DEVELOPMENT

1.0 INTRODUCTION

The purpose of this checklist is to ensure compliance with the National Environmental Policy Act of 1969 (NEPA) (Title 42 of the United States Code Section 4321), the Council on Environmental Quality (CEQ) NEPA regulations (Title 40 of the Code of Federal Regulations [CFR] Parts 1500–1508), and the Army's NEPA implementing regulation (32 CFR Part 651), Environmental Analysis of Army Actions.

This checklist supports the Environmental Impact Statement (EIS) for MOTSU Real Property Master Planning Activities. Specifically, the checklist is meant to facilitate consideration of environmental effects of infill development in the cantonment area by identifying NEPA requirements.

2.0 USING THE CHECKLIST

This checklist can be used to help determine whether reliance on this EIS or other existing NEPA analysis is appropriate or if additional NEPA analysis is required before implementing a proposed action. When completing the checklist, multiple installation-level subject matter experts should be consulted to ensure careful and informed consideration of all potential impacts.

Based on the responses in the checklist, the appropriate NEPA documentation is required as follows:

If the response to each checklist item is "no," no further NEPA analysis would be required. The Proposed Action would qualify for a record of environmental consideration (REC), indicating that the analysis in the PEA has adequately addressed the action. If any Categorical Exclusions (CX) apply, the REC should cite them.

If the response to any checklist item is "yes" or "maybe," details of the Proposed Action (such as siting or timing) should be reconsidered to determine if effect to the resource can be avoided (and the checklist answer changed to "no").

If the response to any checklist item is "yes" or "maybe" to any checklist item and the effect(s) cannot be avoided, additional environmental analysis may be required as part of an installation-level NEPA process.

If no further NEPA analysis is required, installations should prepare a REC reflecting that determination, which includes the following.

- The name of the applicable NEPA analysis (e.g., the PEA) and associated FNSI or Record of Decision, and reference to 32 CFR § 651.12(a)(2): "*action is adequately covered within an existing EA or EIS*"
- The completed checklist
- Any CXs that may apply

- Any specific issues that prompted modification or special consideration of the Proposed Action (e.g., the items for which the initial response was “yes” or “maybe”)

If additional NEPA analysis is necessary, documentation must be prepared before any decision is made or there are irreversible and irretrievable commitments of resources for the Proposed Action. The NEPA document can focus on resource areas for which “yes” was checked and tier from the EIS for resource areas for which the response was “no.”

3.0 CHECKLIST

This checklist is designed to assist in identifying the coordination and documentation required to meet the requirements of NEPA as well as other applicable laws, regulations, and policies required to ensure that there are no significant impacts to the human and natural environment. For some resources, this includes coordination and consultation with other agencies and groups. For others it involves adherence to the terms of plans and policies.

Resource Area and Questions	Response
Biological Resources	
Would the Proposed Action have a substantial detrimental effect on native wildlife or plants (other than those protected by federal law)?	☐ Yes ☐ No ☐ Maybe
Would the Proposed Action result in an unpermitted take of a species protected under the ESA, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act?	☐ Yes ☐ No ☐ Maybe
Would the Proposed Action result in detrimental alteration of U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS)-designated critical habitat?	☐ Yes ☐ No ☐ Maybe
Note: All required USFWS and NMFS informal or formal consultation must be completed prior to implementing a proposed action.	
Cultural Resources	
Does the Area of Potential Effects (APE) require a survey for historic architectural resources (areas with the potential presence of historic architectural resources not previously surveyed)?	☐ Yes ☐ No ☐ Maybe
Would the proposed construction affect a building or structure that was built before the end of the Cold War (1991)?	☐ Yes ☐ No ☐ Maybe
Are there any architectural resources within the APE that are potentially eligible for but have not been evaluated for listing in the National Register of Historic Places (NRHP)?	☐ Yes ☐ No ☐ Maybe

Resource Area and Questions	Response
Would the Proposed Action result in adverse effects, as defined by the National Historic Preservation Act (NHPA), on a historic property listed or eligible for listing on the NRHP that are not resolved through a Memorandum of Agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), and possibly with the Advisory Council on Historic Preservation (ACHP)?	☐ Yes ☐ No ☐ Maybe
Does the APE require a survey for archeological resources (those areas not previously surveyed or disturbed)?	☐ Yes ☐ No ☐ Maybe
Is the APE in a high probability area for archeological resources?	☐ Yes ☐ No ☐ Maybe
Are there any previously identified Traditional Cultural Properties (TCPs) within the APE?	☐ Yes ☐ No ☐ Maybe
Would the Proposed Action create conditions that would stop the traditional use of sacred or ceremonial sites or resources by a Tribe or Tribes without discussions on a government-to-government level with the affected Tribe(s)?	☐ Yes ☐ No ☐ Maybe
Note: All required NHPA Section 106 consultation with SHPO, ACHP, federally recognized Native American Tribes must be completed prior to the approval of the expenditure of any federal funds on the undertaking. Proposed projects requiring ground disturbance in areas not yet surveyed for cultural resources would require a survey prior project initiation.	
Health and Safety	
Would the Proposed Action increase human exposure to a health hazard or safety risk?	☐ Yes ☐ No ☐ Maybe
Would the Proposed Action result in noncompliance with or a violation of laws and regulations governing human health and safety?	☐ Yes ☐ No ☐ Maybe
Note: Compliance with safety requirements related to OSHA must be implemented as part of the Proposed Action.	
Coastal Zone Management	
Are the activities associated with the installation *inconsistent* with enforceable policies of local coastal county Coastal Zone Management Plan?	☐ Yes ☐ No ☐ Maybe
Note: If proposed activities were inconsistent with a Coastal Zone Management Plan, compliance with CZMA requirements, through development of a Federal Consistency Determination, must be implemented as part of the Proposed Action.	

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APPENDIX D
DRAFT FINDING OF NO PRACTICABLE ALTERNATIVE

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DEPARTMENT OF DEFENSE
UNITED STATES ARMY

DRAFT FINDING OF NO PRACTICABLE ALTERNATIVE FOR REAL PROPERTY MASTER PLAN IMPLEMENTATION AT MILITARY OCEAN TERMINAL SUNNY POINT, NORTH CAROLINA

1.0 Introduction

The Department of the Army (Army) proposes to implement various real property master planning actions at Military Ocean Terminal Sunny Point, North Carolina (MOTSU). These consist of maintenance, repair, upgrade, and development actions. The Army has determined that elements of the proposed action needed to meet safety, security, and mission needs must be located within portions of the floodplain and wetlands on MOTSU. Under Executive Order (EO) 11988, *Floodplain Management*, the Army must find that there is no practicable alternative to development within the floodplain. Under EO 11990, *Protection of Wetlands*, federal agencies must avoid undertaking new construction located in wetlands unless the head of the agency finds that there is no practicable alternative to such construction. Further, the Army must take all practicable measures to minimize harm to or within floodplains and wetlands.

EO 11988 requires federal agencies to determine whether a proposed action would occur within a floodplain and to avoid floodplains to the maximum extent possible when there is a practicable alternative. The 100-year floodplain is defined as an area adjacent to a water body that has a 1 percent or greater chance of inundation in any given year. The 500-year floodplain encompasses an area that has a 0.2 percent chance of being inundated in any year. This area includes the 100-year floodplain. The Army has determined that two of the proposed projects would necessarily occur in 5.3 acres of floodplains.

EO 11990 requires that each federal agency, to the extent permitted by law, “shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds: (1) that there is no practicable alternative to such construction; and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.” Wetlands are defined by the USACE as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The Army has concluded that three of the proposed projects would take place in 9.46 acres of wetlands and several others have the potential to affect wetlands, though their precise footprints are not known at this time.

This Draft Finding of No Practicable Alternative (FONPA) incorporates the analysis and conclusions of the Draft MOTSU Real Property Master Plan Implementation Environmental Impact Statement (EIS). It is being made available with the Draft EIS for public comment, in accordance with both EOs.

2.0 Proposed Action

The Army proposes to implement various real property master planning actions at MOTSU that are required improvements related to explosive safety, waterfront maintenance, security, and linear infrastructure. The projects and programs address compliance with federal, Department of

Defense, and Army standards vital to safety, security, and mission needs. These projects would be implemented in fiscal years (FY) 25 through 31.

- **Barricade Safety Projects:** annual barricade repair and maintenance and installation of lightning protection system in the North Rail Holding Yard.
- **Waterfront Maintenance**: implementing Phase 1 of shoreline protection program; maintenance and dredging of channels, berths, and turning basin and the MOTSU wharves; maintenance and repair of waterfront infrastructure; and maintenance and repair of security boat dock, ramp, wave attenuator.
- **Pleasure Island Explosive Safety Clear Zone (ESCZ) Security:** clearing and maintenance of vegetation at MOTSU's property line; fencing the area adjacent to MOTSU's property line; and establishing gates to control public access.
- **Linear Infrastructure Improvements**: constructing a secondary emergency egress road at the existing rail gate; repair and repave existing roads, hardstands, parking areas, and staging pads; upgrade and repair rail lines; and improve utilities within existing corridors.
- **Stormwater Mitigation**: flood mitigation in the Bridge Crane Area and Classification Yard; and installation-wide stormwater drainage improvements.
- **Cantonment Area Infill Development:** infill on parcels identified as developable including renovation, modernization, and new construction projects within the cantonment area to improve administrative functions, community support, maintenance, and storage and supply activities.

3.0 Assessment of the Direct Impact to the Floodplain

The barricade safety projects would take place within 5.05 acres of the floodplain, in an area of high risk as designated by the Federal Emergency Management Agency (FEMA). The ESCZ fence clearing would impact 0.25 acre of floodplain considered high risk flood zone by FEMA. Additionally, the phase 1 shoreline restoration work would occur in the floodplain, though project footprint is not available at this time to calculate the area affected. Repairs and maintenance of the security boat dock, ramp, and wave attenuators would be made to existing structures within the floodplain. No inhabited structures would be constructed within the floodplain as part of the proposed action.

The nature of each of these projects dictates their siting and therefore no practicable alternatives are available. The barricade safety projects would affect existing infrastructure that cannot be relocated without considerable cost as well as mission interruption, environmental, and safety impacts. The ESCZ boundary lies partially within the floodplain. Fencing addresses public safety issues. Phase 1 of the shoreline restoration work must occur at the shoreline and would be protective of the floodplain. Similarly, stormwater mitigation projects would be designed to be protective of existing infrastructure in the floodplain. When other project footprints are known, they would be subject to additional appropriate environmental review, including avoidance/minimization of impacts to the floodplain.

4.0 Assessment of the Direct Impact to Wetlands

Based on available project footprints, the barricade safety projects, construction of a secondary emergency egress road, and ESCZ fencing on Pleasure Island would impact up to 8.39, 0.61, and 0.46 acres of wetlands, respectively. Impacts to wetlands may also result from phase 1

shoreline restoration work, though the project footprint is not available to calculate the area affected. Additionally, other projects have the potential to affect wetlands though their specific locations and footprints are not available at this time. These include waterfront maintenance projects, linear infrastructure improvements, stormwater mitigation, and cantonment area infill development—none of which are new construction projects.

The nature of each of these projects dictates their siting and therefore no practicable alternatives are available. The barricade safety projects would affect existing infrastructure that cannot be relocated without considerable cost as well as mission interruption, environmental, and safety impacts. The secondary emergency egress road is sited at the rail gate where there is existing installation access. When project design is available, impacts to wetlands may be less than estimated here or wetlands could be avoided. Fencing the ESCZ boundary on Pleasure Island addresses public safety issues. Waterfront maintenance projects would occur on existing infrastructure. Shoreline restoration work must occur at the shoreline and would be protective of the floodplain. Similarly, stormwater mitigation projects would be designed to be protective of existing infrastructure, some of which may impact wetlands. When other project footprints are known, they would be subject to additional appropriate environmental review, including an assessment to impacts on wetlands.

5.0 Minimization of Impact from the Proposed Action

Design, siting, and construction of the components of the proposed action would be implemented in accordance with permit requirements, MOTSU environmental management plans, and best management practices as appropriate to reduce the potential for adverse impacts to the floodplains and wetlands.

6.0 Public Availability

A Notice of Availability of this Draft FONPA, along with the Draft EIS was published in the Federal Register as well as local newspapers, *State Port Pilot* and *Star News*. Interested parties can review the documents on the SDDC MOTSU Environmental Website:

https://www.sddc.army.mil/SitePages/Environmental%20Programs.aspx

Comments can be submitted during the comment 45-day period December 20, 2024 through February 4, 2025 to ATTN: Public Comments, James A. Rupkalvis, Installation Manager, 6280 Sunny Point Road, Southport, North Carolina 28461-7800, or by email to james.a.rupkalvis.civ@army.mil.

The public may also contact the Public Affairs Office, Surface Deployment and Distribution Command at (618) 220-6119, with questions.

Comments submitted within the public review period will be considered in developing the Final FONPA and EIS.

7.0 Finding

Following an evaluation of the impacts associated with the proposed action and the impacts of alternatives for implementing the proposed action, I find there is no practicable alternative that is located outside of the floodplain or that would not involve impacts to wetlands. Pursuant to EO 11988 and EO 11990, the Army will take all practicable measures to minimize impacts associated with the proposed actions.

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APPENDIX E
THREATENED AND ENDANGERED SPECIES CONSULTATION DOCUMENTATION

This appendix will be included in the Final EIS when consultation has been completed.

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APPENDIX F
FEDERAL CONSISTENCY DETERMINATION

This appendix will be included in the Final EIS when consultation has been completed.

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APPENDIX G
CULTURAL RESOURCES CONSULTATION DOCUMENTATION

This appendix will be included in the Final EIS when consultation has been completed.

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APPENDIX H
AIR QUALITY CALCULATIONS AND ASSUMPTIONS

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Tab A - Emissions Summary

FULL IMPLEMENTATION ALTERNATIVE

Activity by Year	tons/year									
	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
2025										
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12	952.13	0.01	0.00	953
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905	0.06	0.03	8,916
Total	**2.83**	**9.87**	**63.03**	**0.06**	**1.86**	**1.57**	**9,857.55**	**0.07**	**0.03**	**9,869**
2026										
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02	228	0.00	0.00	228
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12	952	0.01	0.00	953
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05	678.37	0.00	0.00	679
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905	0.06	0.03	8,916
Pleasure Island Fencing	0.06	0.40	0.80	0.02	0.16	0.07	873	0.01	0.00	874
Secondary Emergency Egress	0.02	0.11	0.22	0.00	0.04	0.02	124	0.00	0.00	124
Total	**2.98**	**10.84**	**65.01**	**0.08**	**2.24**	**1.73**	**11,760**	**0.08**	**0.04**	**11,773**
2027										
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02	228	0.00	0.00	228
Shoreline Protection	0.11	0.67	1.43	0.00	0.36	0.12	952.13	0.01	0.00	953
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905	0.06	0.03	8,916
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05	678	0.00	0.00	679
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04	318.85	0.00	0.00	319
Total	**2.93**	**10.64**	**64.59**	**0.06**	**2.13**	**1.68**	**11,083**	**0.08**	**0.03**	**11,095**
2028										
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02	228	0.00	0.00	228
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905	0.06	0.03	8,916
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05	678	0.00	0.00	679
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04	318.85	0.00	0.00	319
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**	**10,131**	**0.07**	**0.03**	**10,142**
2029										
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02	228	0.00	0.00	228
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905.42	0.06	0.03	8,916
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04	318.85	0.00	0.00	319
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05	678	0.00	0.00	679

Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**	**10,131**	**0.07**	**0.03**	**10,142**
2030										
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02	228	0.00	0.00	228
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905.42	0.06	0.03	8,916
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04	318.85	0.00	0.00	319
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05	678	0.00	0.00	679
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**	**10,131**	**0.07**	**0.03**	**10,142**
2031										
Barricade Repair	0.02	0.14	0.27	0.00	0.07	0.02	228	0.00	0.00	228
Dredging Maintenance	2.72	9.20	61.60	0.06	1.49	1.45	8,905.42	0.06	0.03	8,916
Lightning Protection	0.04	0.31	0.60	0.00	0.09	0.04	318.85	0.00	0.00	319
Upgrade/Maintain Rail Lines	0.04	0.33	0.69	0.00	0.10	0.05	678	0.00	0.00	679
Total	**2.82**	**9.97**	**63.16**	**0.06**	**1.76**	**1.56**	**10,131**	**0.07**	**0.03**	**10,142**

Tab B - Barricade Repair

Assumptions:

453.59	grams/lb	
27	cubic feet per cy	
12	CY dump truck capacity	
9	CY truck concrete capacity	
44	RT miles to solid waste transfer station	(Brunswick County Landfill - 172 Land Fill Rd)
16	RT miles material delivery and worker RT trip lengths	(Hoffman Eco Works Landscape Supply - 4923 Trail End SE)
4	RT miles average distance for onsite dump truck activity	
0.45614	MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)	

Phase Lengths: Based on 3 months of construction period per year — 8 work hours per day

Construction years 2026-2032

Site Preparation 45 days

Grading 15 days

60 total days

Debris Removal:

138 tons per barricade

12 barricades per year

1656 tons per year

6624 cy vegetation debris (Vegetative Debris, Hardwoods: 1 ton = 4 cy. From FEMA/USACE https://www.fema.gov/sites/default/files/2020-07/fema_329_debris-estimating_field-guide_9-1-2010.pdf)

552 truck trips per year

Fill Material Delivery: topsoil 1600 lb/CY 2020 Caterpillar reference guide

Barricades at pads

61 barricades at storage pads — 0.8 ton/CY

2100 total tons

300 tons per year

375 cy fill material — between 280 and 2,100 tons fill material per barricade at pads — 61 barricades at pads — 7-10 per year

31 truck trips per year — 11,400 to 18,000 tons per barricades at rail spurs — 96 barricades at RR spurs — 1-8 per year

Barricades at rail spurs

96 barricades at rail spurs

18000 total tons

2571 tons per year

3214 cy fill material

268 truck trips per year

Worker Trips:

Daily worker trips: 5 worker trips per day — Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during combined site prep/grading phase which would include 4 pieces of equipment.

300 total worker trips per year

Site Preparation + Grading

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Loader	2	960	300	0.48	10.55	50.54	151.32	0.45	9.38	9.10	163,578	0.92	0.42
Dozer	1	480	275	0.58	3.30	14.91	49.47	0.24	2.80	2.71	90,600	0.27	0.12
Excavator	1	480	450	0.53	8.07	51.31	138.50	0.37	8.22	7.97	135,465	0.71	0.32
				Subtotal in pounds	**21.92**	**116.75**	**339.28**	**1.07**	**20.39**	**19.78**	**389,643**	**1.90**	**0.86**

Debris Removal Haul Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	24,288	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**16.42**	**93.08**	**170.79**	**0.18**	**73.48**	**17.81**	**52,089**	**0.78**	**0.13**

Fill Material Delivery Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	4,786	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**3.23**	**18.34**	**33.65**	**0.03**	**14.48**	**3.51**	**10,264**	**0.15**	**0.02**

Onsite Dump Truck Activity

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	15	1,196	0.61	3.40	5.80	0.00	4.37	0.89	1,445	0.03	0.01
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**1.60**	**8.96**	**15.29**	**0.01**	**11.54**	**2.34**	**3,812**	**0.08**	**0.01**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	4,800	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**0.45**	**47.80**	**1.40**	**0.03**	**31.87**	**4.80**	**4,087.59**	**0.15**	**0.02**

Total

Annual Emissions										
Emissions Source	**VOC**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**	**CO2e**
Construction Equipment	0.01	0.06	0.17	0.00	0.01	0.01	195	0.00	0.00	195
Haul Trucks (Debris Removal)	0.01	0.05	0.09	0.00	0.04	0.01	26.04	0.00	0.00	26
Material Deliveries	0.00	0.01	0.02	0.00	0.01	0.00	5.13	0.00	0.00	5
Worker Trips	0.00	0.02	0.00	0.00	0.02	0.00	2.04	0.00	0.00	2
Total in Tons per Year	**0.02**	**0.14**	**0.27**	**0.00**	**0.07**	**0.02**	**228**	**0.00**	**0.00**	**228**

Tab C - Shore Line Protection Phase 1

Assumptions:

453.59	grams/lb	
27	cubic feet per cy	
12	CY dump truck capacity	
9	CY truck concrete capacity	
44	RT miles to solid waste transfer station	(Brunswick County Landfill - 172 Land Fill Rd)
16	RT miles material delivery and worker RT trip lengths	(Hoffman Eco Works Landscape Supply - 4923 Trail End SE)
4	RT miles average distance for onsite dump truck activity	
0.45614	MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)	

Revetment Material:

North Perimeter Road Shoreline	350	ft length	10	ft hgh	Assume stone	1 ft dia
	200	ft length	8	ft hgh		
	5,100	sf revetment area				
	189	cy stone				
South Perimeter Road Shoreline	350	ft length	12	ft hgh	Assume stone	1 ft dia
	4200	sf revetment area				
	156	cy stone				
Total revetment	344	cy stone				
	29	truck trips				

Fill Material Delivery: From DOPAA

North Perimeter Road Shoreline	35,000	cy gravel/sand
Karlman Lane Shoreline	5,000	cy gravel/sand
Center Wharf - South Access Shoreline	7,000	cy gravel/sand
South Perimeter Road Shoreline	15,000	cy gravel/sand
Total	62,000	cy gravel/sand
	5,167	truck trips

Worker Trips:

Daily worker trips	6.25	worker trips per day	Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment which would include 5 pieces of equipment.
	1,500	total worker trips per year	Assumed 240 work days per year

Equipment Emissions

Equipment Usage	Hours
Dozer	1,920
Excavator	2,583
Grader	2,583
Loader	861
Generator - Light Plant 1	1,085

24 cy capacity

6 cy bucket capacity

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO2 g/hp-hr	CH4 g/hp-hr
Dozer	1,920	275	0.58	0.02	0.09	0.29	0.00	0.02	0.02	537	0.00
Excavator	2,583	450	0.53	0.03	0.20	0.55	0.00	0.03	0.03	537	0.00
Grader	2,583	145	0.58	0.02	0.13	0.46	0.00	0.03	0.03	537	0.00
Loader	861	300	0.48	0.03	0.17	0.50	0.00	0.03	0.03	537	0.00
Generator - Light Plant 1	1,085	264	0.43	0.21	0.67	2.57	0.00	0.13	0.13	530	0.01

	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO2 lb	CH4 lb	N2O lb
Dozer	13	60	198	1	11	11	362,400	1.07	0.49
Excavator	43	276	745	2	44	43	729,064	3.83	1.75
Grador	10	64	220	1	15	14	257,101	0.84	0.38
Loader	9	45	136	0	8	8	146,728	0.82	0.37

Generator - Light Plant 1	58	182	698	0	36	35	144,033	2.78	1.27
Subtotal in Pounds	**133.9**	**627.3**	**1,997.6**	**4.5**	**114.9**	**111.5**	**1,639,326**	**9.35**	**4.26**

Construction Trips Emissions

Revetment Material Delivery Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	459	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**0.31**	**1.76**	**3.23**	**0.00**	**1.39**	**0.34**	**985**	**0.01**	**0.00**

Fill Material Delivery Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	82,667	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**55.88**	**316.79**	**581.30**	**0.60**	**250.10**	**60.63**	**177,291**	**2.65**	**0.43**

Onsite Dump Truck Activity

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	15	20,781	0.61	3.40	5.80	0.00	4.37	0.89	1,445	0.03	0.01
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**27.80**	**155.63**	**265.51**	**0.23**	**200.40**	**40.70**	**66,210**	**1.43**	**0.25**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
POVs	45	24,000	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**2.26**	**239.00**	**6.98**	**0.14**	**159.37**	**23.98**	**20,438**	**0.75**	**0.11**

Total

Annual Emissions										
Emissions Source	**VOC**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**	**CO2e**
Construction Equipment	0.07	0.31	1.00	0.00	0.06	0.06	820	0.00	0.00	820
Haul Trucks	0.03	0.16	0.29	0.00	0.13	0.03	89.14	0.00	0.00	89
Onsite Truck Movements	0.01	0.08	0.13	0.00	0.10	0.02	33.11	0.00	0.00	33
Worker Trips	0.00	0.12	0.00	0.00	0.08	0.01	10.22	0.00	0.00	10
Total in Tons per Year	**0.11**	**0.67**	**1.43**	**0.00**	**0.36**	**0.12**	**952**	**0.01**	**0.00**	**953**

Tab D - Dredging Maintenance

Assumed clamshell dredge productivity rate: 30 CY/hr

Volume of material dredged annually: 1,000,000 CY/15 months

800,000 CY/yr

26,960 hrs of dredge operation/yr

Clamshell dredge operates 20 hrs/day 1,348 days

Clamshell offloader operates 25% of the time: 6,740 hrs of operation/yr

Crew boats operate 2 hours/day

0.45614 MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)

Dredging

Off-road Equipment	Hours of Operation	# vessels	Engine HP	Load Factor	BSFC (g/hp-hr)	VOC g/hp-hr	CO g/hp-hr	Nox g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH4 g/hp-hr
Clamshell dredge	3008	1	2500	0.66	168.28	0.08	0.31	2.59	1.52E-03	0.05	0.05	536.62	0.01
Clamshell Offloader	752	1	2500	0.66	168.28	0.08	0.31	2.59	1.52E-03	0.05	0.05	536.62	0.01
Off-road Equipment	**Hours of Operation**	**# vessels**	**Engine kW**	**Load Factor**	**BSFC (g/kWh)**	**VOC (g/kWh)**	**CO (g/kWh)**	**Nox (g/kWh)**	**SO2 (g/kWh)**	**PM10 (g/kWh)**	**PM2.5 (g/kWh)**	**CO_2 (g/kWh)**	**CH4 (g/kWh)**
Clamshell dredge auxiliary	3008		358	0.66	213	0.22	0.90	6.10	6.25E-03	0.14	0.13	679.47	0.004
Clamshell offloader auxiliary	752		358	0.66	213	0.22	0.90	6.10	6.25E-03	0.14	0.13	679.47	0.004
Tow Boat - propulsion	3008		671	0.68	213	0.30	0.92	5.64	6.25E-03	0.15	0.14	679.47	0.003
Tow Boat - propulsion	3008	2	671	0.68	213	0.30	0.92	5.64	6.25E-03	0.15	0.14	679.47	0.003
Tow Boat - auxiliary	3008		149	0.43	213	0.30	0.92	5.64	6.25E-03	0.15	0.14	679.47	0.003
Work tug - propulsion	3008	1	112	0.50	213	0.30	0.92	5.64	6.25E-03	0.15	0.14	679.47	0.003
Work tug - auxiliary	3008		19	0.43	248	0.30	0.92	5.64	7.27E-03	0.15	0.14	791.12	0.003
Crew/launch boat 2	301	2	75	0.45	213	0.30	0.92	5.64	6.25E-03	0.15	0.14	679.47	0.003
Crew/launch boat 2 - auxiliary	301		30	0.43	248	0.30	0.92	5.64	7.27E-03	0.15	0.14	791.12	0.003

Off-road Equipment	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH4 lb	N2O lb	CO2e lb
Clamshell dredge	825.58	3,423.38	28,330.05	16.59	581.87	564.41	5,871,667	64.97	29.64	5,882,123
- auxiliary	346.49	1,410.21	9,558.09	9.79	217.45	210.93	1,064,662	6.58	3.00	1,065,721
Clamshell Offloader	206.40	855.84	7,082.51	4.15	145.47	141.10	1,467,917	16.24	7.41	1,470,531
Clamshell offloader auxiliary	86.62	352.55	2,389.52	2.45	54.36	52.73	266,165	1.65	0.75	266,430
Tow Boat - propulsion	1,788.97	5,559.87	34,145.22	37.80	895.94	869.07	4,111,933	16.22	7.40	4,114,543
	1,788.97	5,559.87	34,145.22	37.80	895.94	869.07	4,111,933	16.22	7.40	4,114,543
- auxiliary	251.20	780.71	4,794.61	5.31	125.81	122.03	577,390	2.28	1.04	577,757
Work tug - propulsion	109.78	341.19	2,095.35	2.32	54.98	53.33	252,332	1.00	0.45	252,492
- auxiliary	16.02	49.78	305.70	0.39	8.02	7.78	42,863	0.15	0.07	42,886
Crew/launch boat	13.24	41.15	252.73	0.28	6.63	6.43	30,435	0.12	0.05	30,455
- auxiliary	5.06	15.73	96.60	0.12	2.53	2.46	13,545	0.05	0.02	13,552
Total Annunal in tons	**2.72**	**9.20**	**61.60**	**0.06**	**1.49**	**1.45**	**8,905**	**0.06**	**0.03**	**8,916**

Tab E -Pleasure Island Explosive Safety Clear Zone Security **2026**

Assumptions:

4840	SY/acre	266,200 total SY
453.59	grams/lb	
27	cubic feet per cy	
3.09	cy/thousand board feet (mbf)	
12	CY dump truck capacity	
16	RT miles material delivery and worker RT trip lengths	
4	RT miles average distance for onsite dump truck activity/burn location	
1000	LF fencing installed per day	from VDOT production rates spreadsheet 2020
35	days to install fencing	
5	days added for the gates etc.	
0.45614	MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)	

Phase Lengths: 8 work hours per day

Land Clearing	28 days		
Rough Grading	67 days	4,000 SY/day	VDOT productivity table lists 2000 SY for fine grading; doubled to 4000 SY/day for rough grading
Fencing Installation	35 days	67 days	
Gate Construction	5 days		
Total	134 total days	134 total days	

Debris Removal: The debris is brush removed from the 55-ft right of way for fence installation; 55 acres total

35330 ft length (fencing)
1 ft depth
15 MBF/acre
825 MBF total
2546 cy vegetation waste
212 truck trips

15 MBF/acre
825 MBF total
2546 cy vegetation waste

From: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5279251.pdf

So, Land clearing (brush removal): 2 acres/day (VDOT)
28 days total

Worker Trips:

Land Clearing: 16.25 worker trips per day; 1528 total worker trips per year. Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during combined land clearing/grading phase which would include 13 pieces of equipment.

Fence Construction: 11.25 worker trips per day; 397 total worker trips per year. Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during fencing/gate construction phase which would include 9 pieces of equipment.

Land Clearing + Rough Grading

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Loader	7	5,267	300	0.48	57.89	277.26	830.16	2.46	51.46	49.92	897,432	5.03	2.29
Dozer	4	3,010	275	0.58	20.70	93.46	310.16	1.52	17.53	17.00	568,062	1.67	0.76
Grader	1	532	145	0.58	1.98	13.14	45.42	0.14	3.06	2.97	52,986	0.17	0.08
Excavator	1	752	450	0.53	12.64	12.64	12.64	12.64	12.64	12.64	12.64	1.12	0.51
			Subtotal in pounds		**93.21**	**396.51**	**1,198.38**	**16.77**	**84.69**	**82.53**	**1,518,493**	**7.99**	**3.64**

Debris Removal Haul Trips (Onsite)

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	15	849	0.61	3.40	5.80	0.00	4.37	0.89	1,445	0.03	0.01
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**1.14**	**6.36**	**10.84**	**0.01**	**8.18**	**1.66**	**2,704**	**0.06**	**0.01**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	24,453	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**2.31**	**243.51**	**7.11**	**0.14**	**162.38**	**24.43**	**20,824**	**0.77**	**0.11**

Fencing Installation + Gate Construction

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Forklift	4	1,131	74	0.48	4.53	17.27	225.51	0.14	1.40	1.36	52,765	0.79	0.36
Loader	3	848	300	0.48	9.32	44.64	133.65	0.40	8.29	8.04	144,481	0.81	0.37
Welder	1	283	10	0.19	1.39	6.24	5.63	0.00	0.73	0.70	820	0.09	0.04
Generator - Light Plant 1	1	283	264	0.43	15.16	15.16	15.16	15.16	15.16	15.16	15.16	0.73	0.33
			Subtotal in pounds		**30.39**	**83.31**	**379.95**	**15.70**	**25.58**	**25.26**	**198,081**	**2.42**	**1.10**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	6,359	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00

	Annual Emissions in Pounds								
	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Subtotal in pounds	**0.60**	**63.33**	**1.85**	**0.04**	**42.23**	**6.35**	**5,416**	**0.20**	**0.03**

Total

	Annual Emissions									
Emissions Source	**VOC**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**	**CO2e**
Construction Equipment	0.06	0.24	0.79	0.02	0.06	0.05	858.29	0.01	0.00	859
Haul Trucks (Debris Removal)	0.00	0.00	0.01	0.00	0.00	0.00	1.35	0.00	0.00	1
Worker Trips	0.00	0.15	0.00	0.00	0.10	0.02	13.12	0.00	0.00	13
Total in Tons per Year	**0.06**	**0.40**	**0.80**	**0.02**	**0.16**	**0.07**	**873**	**0.01**	**0.00**	**874**

Tab F - Construct Secondary Emergency Egress and Utility Connection at Rail Gate **2025**

Assumptions:

43560	sf/acre	
453.59	grams/lb	
27	cubic feet per cy	
12	CY dump truck capacity	
9	sf per sy	
9	CY truck concrete capacity	
44	RT miles to solid waste transfer station	(Brunswick County Landfill - 172 Land Fill Rd)
16	RT miles material delivery and worker RT trip lengths	(Hoffman Eco Works Landscape Supply - 4923 Trail End SE)
4	RT miles average distance for onsite dump truck activity	
3.09	cy/thousand board feet (mbf)	
5,800	roadway length (google maps)	
0.45614	MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)	

Phase Lengths:

8 work hours per day

Land Clearing

2 days

196020 SF
5 acre site total
3 acres/day clearing rate (VDOT)

Grading

9900 SY
5 days

89100 SF
2000 SY/day grading productivity rate (VDOT)

Paving

7733 tons gravel (asphalt base)
7 days

5800 ft length
24 ft width
0.33 ft depth
46400 CF
5156 CY
1.5 Assumed tons per cubic yard of gravel
1175 tons - productivity rate for asphalt base (VDOT)

10311 tons asphalt surface
21 days

5800 ft length
24 ft width
0.33 ft depth
46400 CF
5156 CY
2 Assumed tons per cubic yard of asphalt
500 tons - productivity rate for asphalt surface

Total

34 total days

Debris Removal (Onsite): Land Clearing

Total area to be cleared (24 ft road + 20 ft shoulders):

255200 SF
6 acres
88 MBF
271 cubic yards
23 truck trips

15 MBF/acre From: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5279251.pdf

Roadway Shoulder Grading (Onsite Trips):

5800 ft length (access road)
0.33 ft depth
24 ft width
46400 cubic feet
1719 cy removal
143 truck trips no truck trips

Fill Material Delivery:

92800 cf
3437 cy gravel/asphalt
286 truck trips

Worker Trips:

Site Prep/Grading

11.25 worker trips per day
73 total worker trips per year

Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during combined site prep/grading phase which would include 9 pieces of equipment.

Paving

10 worker trips per day
272 total worker trips per year

Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during paving phase which would include 8 pieces of equipment.

Land Clearing + Grading

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Loader	5	258	300	0.48	2.84	13.58	40.67	0.12	2.52	2.45	43,962	0.25	0.11
Dozer	2	103	275	0.58	0.71	3.20	10.64	0.05	0.60	0.58	19,479	0.06	0.03
Grader	1	52	145	0.58	0.19	1.27	4.40	0.01	0.30	0.29	5,135	0.02	0.01
Excavator	1	52	450	0.53	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.08	0.03

Subtotal in pounds	**4.60**	**18.93**	**56.57**	**1.05**	**4.29**	**4.18**	**68,577**	**0.40**	**0.18**

Debris Removal Haul Trips (Onsite to Burn Area)

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	15	90	0.61	3.40	5.80	0.00	4.37	0.89	1,445	0.03	0.01
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**0.12**	**0.68**	**1.16**	**0.00**	**0.87**	**0.18**	**288**	**0.01**	**0.00**

Material Delivery Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	4,583	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**3.10**	**17.56**	**32.22**	**0.03**	**13.86**	**3.36**	**9,828**	**0.15**	**0.02**

Onsite Dump Truck Activity (Fill Material)

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	15	1,146	0.61	3.40	5.80	0.00	4.37	0.89	1,445	0.03	0.01
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**1.53**	**8.58**	**14.64**	**0.01**	**11.05**	**2.24**	**3,650**	**0.08**	**0.01**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	1,161	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**0.11**	**11.56**	**0.34**	**0.01**	**7.71**	**1.16**	**989**	**0.04**	**0.01**

Paving

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Paving Machine	1	218	164	0.58	2.52	12.51	39.70	0.07	2.81	2.72	24,493	0.20	0.09
Compactor	3	653	19	1	10.13	42.64	104.92	0.06	4.98	4.83	16,117	0.84	0.38
Roller	2	435	401	0.58	10.36	68.15	190.57	0.34	9.52	9.24	119,781	0.77	0.35
Loader	2	435	300	0.48	4.78	4.78	4.78	4.78	4.78	4.78	4.78	0.42	0.19
			Subtotal in pounds		**27.80**	**128.08**	**339.98**	**5.25**	**22.09**	**21.57**	**160,395**	**2.22**	**1.01**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	4,353	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**0.41**	**43.34**	**1.27**	**0.02**	**28.90**	**4.35**	**3,707**	**0.14**	**0.02**

Total

Emissions Source	Annual Emissions									
	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
Construction Equipment	0.02	0.07	0.20	0.00	0.01	0.01	114.49	0.00	0.00	115
Haul Trucks (Debris Removal)	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0
Material Delivery	0.00	0.01	0.02	0.00	0.01	0.00	4.91	0.00	0.00	5
Onsite Dump Truck Activity	0.00	0.00	0.01	0.00	0.01	0.00	1.83	0.00	0.00	2
Worker Trips	0.00	0.03	0.00	0.00	0.02	0.00	2.35	0.00	0.00	2
Total in Tons per Year	**0.02**	**0.11**	**0.22**	**0.00**	**0.04**	**0.02**	**124**	**0.00**	**0.00**	**124**

Tab G - Pave Fire Breaks 35 and 34

Assumptions:

453.59	grams/lb	
27	cubic feet per cy	
12	CY dump truck capacity	
9	CY truck concrete capacity	
44	RT miles to solid waste transfer station	(Brunswick County Landfill - 172 Land Fill Rd)
16	RT miles material delivery and worker RT trip lengths	(Hoffman Eco Works Landscape Supply - 4923 Trail End SE)
4	RT miles average distance for onsite dump truck activity	
0.7	mile roadway length	
3696	ft roadway length	
0.45614	MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)	

Phase Lengths: 8 work hours per day

Paving

1780 tons	Gravel (asphalt base)	61,600 CF		1.5	Assumed tons per cubic yard of gravel
2 days		2,281 CY asphalt and gravel for road		1175	tons - productivity rate for asphalt base (VDOT)
		91 CY additional aggregate for 1-ft shoulders			
2373	Asphalt surface	2,373 CY total materials required		2	Assumed tons per cubic yard of asphalt
5 days		198 truck trips		500	tons - productivity rate for asphalt surface

Total 6 total days

Fill Material Delivery:

61600 cf
2281 cy gravel/asphalt
190 truck trips

Worker Trips:

Paving 7.5 worker trips per day — Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during paving phase which would include 6 pieces of equipment.
47 total worker trips

Material Delivery Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	3,042	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**2.06**	**11.66**	**21.39**	**0.02**	**9.20**	**2.23**	**6,524**	**0.10**	**0.02**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	751	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**0.07**	**7.48**	**0.22**	**0.00**	**4.99**	**0.75**	**640**	**0.02**	**0.00**

Paving

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Paving Machine	1	50	164	0.58	0.58	2.88	9.14	0.02	0.65	0.63	5,636	0.05	0.02
Compactor	2	100	19	1	1.55	6.54	16.10	0.01	0.76	0.74	2,472	0.13	0.06
Roller	2	100	401	0.58	2.38	15.68	43.85	0.08	2.19	2.13	27,563	0.18	0.08
Loader	1	50	300	0.48	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.05	0.02
			Subtotal in pounds		**5.07**	**25.65**	**69.64**	**0.65**	**4.15**	**4.04**	**35,672**	**0.40**	**0.18**

Total

Annual Emissions										
Emissions Source	**VOC**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**	**CO2e**
Construction Equipment	0.00	0.01	0.03	0.00	0.00	0.00	18	0.00	0.00	18
Material Delivery	0.00	0.01	0.01	0.00	0.00	0.00	3	0.00	0.00	3
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0
Total Tons Year 1	**0.00**	**0.01**	**0.02**	**0.00**	**0.00**	**0.00**	**11**	**0.00**	**0.00**	**11**
Total Tons Year 2	**0.00**	**0.01**	**0.02**	**0.00**	**0.00**	**0.00**	**11**	**0.00**	**0.00**	**11**

Tab H - Upgrade and Maintain Rail Lines

Assumptions:

453.59 grams/lb
27 cubic feet per cy
12 CY dump truck capacity
9 CY truck concrete capacity
44 RT miles to solid waste transfer station (Brunswick County Landfill - 172 Land Fill Rd)
16 RT miles material delivery and worker RT trip lengths
4 RT miles average distance for onsite dump truck activity
0.45614 MOVES 3 does not calculate N2O for nonroad equipment. The ratio of N2O to CH4 has been used to derive emission values for nonroad equipment (lb)

Phase Lengths: 60 total months to complete; 8 work hours per day

Site Preperation: 2 days; 5 acres; Assumed 4 acre laydown area and clearing productivity rate from (VDOT)

Demo Track: 203 days; Demo track planned replacement; 39 ft per day; 6 mi/yr; 31,680 ft/yr; 812 days to remove; 203 days of removal work for 4 crews

Track Installation: 158.4 days; 200 LF/day track installation; 158.4 days for 1 crew to install new track

Total: 205 total days; 5 work crews required total

Material Delivery:

Ties: 545 truck deliveries per year; avg tie = 9 feet; 617760 LF; 117 miles

Ballast: 545 truck deliveries per year; Assume same number of deliveries for ballast; 3,249 crossties/mile; 1 month construction; 380,133 crossties total; 190 ties/truckload; 137,280 ties total; Assume 100% require complete replacement; Materials delivered onsite via truck; 2723 truck deliveries

Worker Trips:

Site Prep: 8.75 worker trips per day; Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during combined site prep/grading phase which would include 7 pieces of equipment.
15 total worker trips per year

Rail Replacement: 2.5 worker trips per day; Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per equipment during rail replacement which would include 2 pieces of equipment.
904 total worker trips per year

Site Preparation

Off-Road Equipment	Quantity	Hours	HP	Load Factor	Emissions in lb								
					VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N2O
Loader	3	40	300	0.48	0.44	2.11	6.30	0.02	0.39	0.38	6,816	0.04	0.02
Dozer	1	13	275	0.58	0.09	0.41	1.37	0.01	0.08	0.08	2,517	0.01	0.00
Grader	2	27	145	0.58	0.10	0.66	2.27	0.01	0.15	0.15	2,654	0.01	0.00
Excavator	1	13	450	0.53	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.02	0.01
				Subtotal in pounds	**0.85**	**3.40**	**10.18**	**0.26**	**0.85**	**0.83**	**11,987**	**0.07**	**0.03**

Material Delivery Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Dump Truck	45	8,714	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**5.89**	**33.39**	**61.28**	**0.06**	**26.36**	**6.39**	**18,689**	**0.28**	**0.05**

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Flat Bed Truck	45	2,179	0.31	1.74	3.19	0.00	1.37	0.33	973	0.01	0.00
			Annual Emissions in Pounds								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
		Subtotal in pounds	**1.47**	**8.35**	**15.32**	**0.02**	**6.59**	**1.60**	**4,672**	**0.07**	**0.01**

Worker Trips

Equipment	MPH	Miles	g/VMT Emission Rate								
			VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Passenger Truck	45	233	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O
Subtotal in pounds	**0.02**	**2.32**	**0.07**	**0.00**	**1.55**	**0.23**	**199**	**0.01**	**0.00**

Rail Replacement

					Emissions in lb								
Off-Road Equipment	**Quantity**	**Hours**	**HP**	**Load Factor**	**VOC**	**CO**	**NOx**	**SO_2**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**N2O**
Excavator	1	2,892	450	0.53	48.60	309.11	834.42	2.25	49.51	48.03	816,123	4.29	1.96
Loader	1	2,892	300	0.48	31.79	152.23	455.81	1.35	28.26	27.41	492,749	2.76	1.26
Subtotal in pounds					**80.39**	**461.34**	**1,290.23**	**3.60**	**77.77**	**75.44**	**1,308,872**	**7.05**	**3.22**

Worker Trips

			g/VMT Emission Rate								
Equipment	**MPH**	**Miles**	**VOC**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**
Passenger Truck	45	14,459	0.04	4.52	0.13	0.00	3.01	0.45	386	0.01	0.00
			Annual Emissions in Pounds								
			VOC	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**
Subtotal in pounds			**1.36**	**143.99**	**4.21**	**0.08**	**96.01**	**14.45**	**12,313**	**0.45**	**0.06**

Total

	Annual Emissions									
Emissions Source	**VOC**	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**	**CH4**	**N2O**	**CO2e**
Construction Equipment	0.04	0.23	0.65	0.00	0.04	0.04	660	0.00	0.00	661
Material Delivery	0.00	0.02	0.04	0.00	0.02	0.00	12	0.00	0.00	12
Worker Trips	0.00	0.07	0.00	0.00	0.05	0.01	6	0.00	0.00	6
Total Tons per Year	**0.04**	**0.33**	**0.69**	**0.00**	**0.10**	**0.05**	**678**	**0.00**	**0.00**	**679**

Tab I - EQUIPMENT DATA AND EMISSION FACTORS

Construction Equipment	HP	Load Factor	Emissions Factors									
			VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	Benzene	Formaldehyde
			g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr
Grader	145	0.58	0.02	0.13	0.46	0.001	0.03	0.03	536.77	0.002	9.85E-04	5.39E-03
Dozer	275	0.58	0.02	0.09	0.29	0.001	0.02	0.02	536.77	0.002	7.92E-04	4.44E-03
Excavator	450	0.53	0.03	0.20	0.55	0.001	0.03	0.03	536.74	0.003	0.001	0.01
Roller	401	0.58	0.05	0.31	0.85	1.52E-03	0.04	0.04	537	0.003	0.002	0.01
Paving Machine	164	0.58	0.06	0.27	0.87	1.50E-03	0.06	0.06	537	0.004	0.003	0.02
Asphalt Curbing Machine	130	0.58	0.06	0.26	0.86	1.50E-03	0.06	0.06	537	0.004	0.003	0.02
Compactor	19	1	0.37	1.56	3.84	2.17E-03	0.18	0.18	589.31	0.031	0.019	0.11
Skidsteer Loader	95	0.23	0.73	3.89	3.81	0.002	0.55	0.54	693.89	0.029	0.023	0.18
Loader	300	0.48	0.03	0.17	0.50	0.001	0.03	0.03	536.73	0.003	0.002	0.01
Hydraulic Hammer	114	1	0.06	0.26	0.86	0.001	0.06	0.06	536.67	0.004	0.003	0.02
Compactor	105	1	0.06	0.26	0.86	0.001	0.06	0.06	536.67	0.004		
25 ton Crane	150	1	0.04	0.18	0.86	0.001	0.04	0.04	530.93	0.004	0.002	0.01
100 ton Crane	480	1	0.05	0.23	0.99	0.002	0.04	0.03	530.89	0.004	0.002	0.01
160 ton derrick	470	1	0.05	0.23	0.99	0.002	0.04	0.03	530.89	0.004	0.002	0.01
160 ton derrick generator	94	1	0.32	1.59	3.38	0.002	0.27	0.26	589.46	0.013	0.003	0.02
60 ton derrick	230	1	0.04	0.54	0.54	0.001	0.02	0.02	530.93	0.003	0.002	0.01
Vibrators/equipment	18	0.58	0.35	1.50	3.77	0.002	0.17	0.17	595.14	0.031	0.019	0.11
Misc Curing Equipment	60	0.58	0.11	0.70	2.83	0.002	0.08	0.08	595.83	0.012	0.005	0.03
Concrete Finisher	74	0.58	0.11	0.70	2.83	0.002	0.08	0.08	595.83	0.012	0.005	0.03
Telehandler	130	0.48	0.01	0.06	0.19	0.001	0.01	0.01	536.80	0.001	0.0004	0.002
Forklift	74	0.48	0.05	0.20	2.55	0.002	0.02	0.02	595.99	0.009	0.003	0.01
Air Compressor	173	1	0.06	0.24	1.04	0.002	0.06	0.06	530.86	0.005	0.003	0.02
Cable Puller	375	0.58	0.10	0.67	1.77	0.002	0.09	0.09	536.56	0.007		
Welder	10	0.19	1.17	5.27	4.76	0.003	0.61	0.59	692.63	0.077	0.052	0.32
Generator - Light Plant 1	264	0.43	0.21	0.67	2.57	0.002	0.13	0.13	530.42	0.010		
Generator - Light Plant 2	428	0.43	0.16	0.74	2.56	0.002	0.11	0.11	530.57	0.008		
Generator - Light Plant 3	142	1	0.24	0.76	2.85	0.002	0.17	0.16	530.35	0.012		
Generator - Light Plant 4	10.5	1	0.83	2.91	4.48	0.002	0.34	0.33	587.99	0.064		
Generator Skid Mounted	25	1	0.45	1.82	4.09	0.002	0.23	0.22	589.08	0.032		
Aerial Lift 1	87	0.21	0.59	3.19	3.34	0.002	0.43	0.42	694.31	0.022		
Aerial Lift 2	65	0.21	0.61	2.96	4.15	0.002	0.39	0.38	694.24	0.027		
Plate Compactor 1	6.5	1	0.83	2.59	4.26	0.002	0.26	0.26	587.97	0.071		
Plate Compactor 2	19	1	0.37	1.56	3.84	0.002	0.18	0.18	589.31	0.031		
Auger Rig	300	1	0.21	0.56	2.62	0.002	0.12	0.11	530.44	0.012	0.009	0.05
Roller	401	0.58	0.05	0.31	0.85	0.002	0.04	0.04	537	0.003		
Paving Machine	164	0.58	0.06	0.27	0.87	0.002	0.06	0.06	537	0.004		
Asphalt Curbing Machine	130	0.58	0.06	0.26	0.86	0.001	0.06	0.06	537	0.004		
Pile Drivers	350	0.59	0.03	0.20	0.55	0.001	0.03	0.03	537	0.005	0.001	0.01
Clamshell dredge	2,500	0.66	0.08	0.31	2.59	0.002	0.05	0.05	537	0.006		

Crane 2	2,500	0.66	0.08	0.31	2.59	0.002	0.05	0.05	537	0.006		
Crawler Dozer	275	0.58	0.02	0.09	0.29	0.001	0.02	0.02	536.77	0.002		
Portable Gensets	107	1	0.06	0.26	0.86	0.001	0.06	0.06	536.67	0.004		
Concrete truck	300	0.21	0.14	0.65	2.73	0.002	0.09	0.08	530.63	0.009	0.006	0.04
Clamshell Offloader	2,500	0.66	0.08	0.31	2.59	0.002	0.05	0.05	537	0.006		
Forklift - 10-17 ton	164	0.48	0.05	0.27	0.89	0.001	0.06	0.06	537	0.004	0.002	0.01
Forklift - 7 ton	107	0.48	0.05	0.27	0.89	0.001	0.06	0.06	537	0.004	0.002	0.01

Note: The MOVES model does not include emission factors for N2O for nonroad equipment. N2O for nonroad equipment is estimated using ratio N2O/CH4 ratio of 0.26/0.57 from EPA (2016), Table B-8.

Tab J - MOVES3.0.1 Emission Factors

Road Type	Vehicle Type	Speed (MPH)	Emission Factor Units	Emission Factor											
				CO	NOx	VOC	SO2	PM10	PM2.5	CO2	CH4	N2O	Total GHGs (CO2e)	Benzene	Formaldehyde
Highway	Passenger Car	35	g/VMT	4.1309	0.0676	0.0276	0.0020	3.4459	0.5175	297.8770	0.0112	0.0012	298.5200	0.0012	0.0004
Sidestreets	Passenger Car	15	g/VMT	6.5931	0.0844	0.0430	0.0031	6.9147	1.0377	469.0130	0.0173	0.0029	470.2970	0.0018	0.0006
Idle	Passenger Car	0	g/hr	1.9367	0.2963	0.1700	0.0209	0.0219	0.0000	3151.2200	0.0623	0.0432	3165.6400	0.0071	0.0024
Highway	Passenger Truck	35	g/VMT	4.5170	0.1319	0.0428	0.0026	3.0120	0.4532	386.2690	0.0142	0.0020	387.2170	0.0018	0.0006
Sidestreets	Passenger Truck	15	g/VMT	6.8668	0.1584	0.0673	0.0040	6.3331	0.9513	595.2660	0.0218	0.0047	597.1980	0.0028	0.0009
Idle	Passenger Truck	0	g/hr	4.0675	0.5445	0.2009	0.0266	0.0132	0.0116	4000.8500	0.0687	0.0701	4023.4500	0.0085	0.0029

Truck Emission Factors

Road Type	Vehicle Type	Speed (MPH)	Emission Factor Units	Maximum Emission Factor											
				CO	NOx	VOC	SO2	PM10	PM2.5	CO2	CH4	N2O	Total GHGs (CO2e)	Benzene	Formaldehyde
Highway	SUSH Truck	35	g/VMT	1.74E+00	3.19E+00	3.07E-01	3.31E-03	1.37E+00	3.33E-01	9.73E+02	1.46E-02	2.36E-03	9.74E+02	2.30E-03	2.41E-02
Sidestreets	SUSH Truck	15	g/VMT	3.40E+00	5.80E+00	6.07E-01	4.92E-03	4.37E+00	8.88E-01	1.45E+03	3.12E-02	5.52E-03	1.45E+03	4.52E-03	4.74E-02
Idle	SUSH Truck	0	g/hr	2.20E+01	3.42E+01	5.23E+00	1.95E-02	2.54E+00	2.34E+00	5.73E+03	2.70E-01	8.27E-02	5.76E+03	3.88E-02	4.06E-01

SUSH = Single Unit Short Haul

TAB K - EQUIPMENT DATA AND EMISSION FACTORS

Construction Equipment	HP	Load Factor	Emissions Factors VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH4 g/hp-hr
Grader	145	0.58	0.02	0.13	0.46	1.44E-03	0.03	0.03	536.77	1.75E-03
Dozer	275	0.58	0.02	0.09	0.29	1.44E-03	0.02	0.02	536.77	1.58E-03
Excavator	450	0.53	0.03	0.20	0.55	1.48E-03	0.03	0.03	536.74	2.82E-03
Skidsteer Loader	95	0.23	0.73	3.89	3.81	2.23E-03	0.55	0.54	693.89	0.03
Loader	300	0.48	0.03	0.17	0.50	1.47E-03	0.03	0.03	536.73	3.01E-03
Compactor	105	1	0.06	0.26	0.86	1.50E-03	0.06	0.06	536.67	4.22E-03
MOBILE CRANE	150	1	0.04	0.18	0.86	1.47E-03	0.04	0.04	530.93	3.58E-03
CRANE	700	1	0.05	0.33	0.96	1.51E-03	0.04	0.04	530.90	3.69E-03
TELEHANDLER	130	0.48	0.01	0.06	0.19	1.42E-03	0.01	0.01	536.80	7.00E-04
FORKLIFT	74	0.48	0.05	0.20	2.55	1.57E-03	0.02	0.02	595.99	0.01
Air Compressor	173	1	0.06	0.24	1.04	1.51E-03	0.06	0.06	530.86	4.96E-03
Cable Puller	375	0.58	0.10	0.67	1.77	1.64E-03	0.09	0.09	536.56	6.57E-03
Welder	10	0.19	1.17	5.27	4.76	2.55E-03	0.61	0.59	692.63	0.08
Generator - Light Plant 1	264	0.43	0.21	0.67	2.57	1.69E-03	0.13	0.13	530.42	0.01
Generator - Light Plant 2	428	0.43	0.16	0.74	2.56	1.69E-03	0.11	0.11	530.57	8.02E-03
Generator - Light Plant 3	142	1	0.24	0.76	2.85	1.70E-03	0.17	0.16	530.35	0.01
Generator - Light Plant 4	10.5	1	0.83	2.91	4.48	2.16E-03	0.34	0.33	587.99	0.06
Generator Skid Mounted	25	1	0.45	1.82	4.09	2.17E-03	0.23	0.22	589.08	0.03
Generator - Construction Power	671	1	0.16	0.74	2.56	1.69E-03	0.11	0.11	530.57	0.01
Aerial Lift 1	87	0.21	0.59	3.19	3.34	2.17E-03	0.43	0.42	694.31	0.02
Aerial Lift 2	65	0.21	0.61	2.96	4.15	2.19E-03	0.39	0.38	694.24	0.03
Plate Compactor 1	6.5	1	0.83	2.59	4.26	2.16E-03	0.26	0.26	587.97	0.07
Plate Compactor 2	19	1	0.37	1.56	3.84	2.17E-03	0.18	0.18	589.31	0.03
Pile Driver/Extractor	300	1	0.21	0.56	2.62	1.70E-03	0.12	0.11	530.44	0.01
Roller	401	0.58	0.05	0.31	0.85	1.52E-03	0.04	0.04	537	3.45E-03
Paving Machine	164	0.58	0.06	0.27	0.87	1.50E-03	0.06	0.06	537	4.31E-03
Asphalt Curbing Machine	130	0.58	0.06	0.26	0.86	1.50E-03	0.06	0.06	537	4.22E-03
Pile Drivers	350	0.59	0.03	0.20	0.55	1.48E-03	0.03	0.03	537	2.82E-03
Clamshell dredge	2,500	0.66	0.08	0.31	2.59	1.52E-03	0.05	0.05	537	5.94E-03
Crane 2	2,500	0.66	0.08	0.31	2.59	1.52E-03	0.05	0.05	537	5.94E-03
Crawler Dozer	275	0.58	0.02	0.09	0.29	0.00	0.02	0.02	536.77	1.58E-03
Portable Gensets	107	1	0.06	0.26	0.86	0.00	0.06	0.06	536.67	4.22E-03
Concrete truck	300	0.21	0.14	0.65	2.73	1.71E-03	0.09	0.08	530.63	8.74E-03
Clamshell Offloader	2,500	0.66	0.08	0.31	2.59	1.52E-03	0.05	0.05	537	5.94E-03

Note: The MOVES model does not include emission factors for N2O for nonroad equipment. N2O for nonroad equipment is estimated using ratio N2O/CH4 ratio of 0.26/0.57 from EPA (2016), Table B-8.

Construction Trucks	Emissions Factors VOC g/hr-vehicle	CO g/hr-vehicle	NOx g/hr-vehicle	SO2 g/hr-vehicle	PM10 g/hr-vehicle	PM2.5 g/hr-vehicle	CO2 g/hr-vehicle	CH4 g/hr-vehicle	N2O g/hr-vehicle
Onsite trucks - Idle	5.23	21.99	34.17	0.02	2.54	2.34	5,727.82	0.27	0.08
	VOC g/VMT	**CO** g/VMT	**NOx** g/VMT	**SO2** g/VMT	**PM10** g/VMT	**PM2.5** g/VMT	**CO2** g/VMT	**CH4** g/VMT	**N2O** g/VMT

Onsite trucks - 10 MPH	0.85	4.48	7.34	0.01	0.99	0.46	1,701.05	0.04	0.01	

Boat Equipment	Engine kW	Load Factor	Emissions Factors									
			VOC	CO	NOx	SO_2	PM10	PM2.5	CO_2	CH4	N_2O	BSFC
			(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)
Tow Boat - propulsion	671	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Tow Boat - auxiliary	149	0.43	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Crew/launch boat 1	149	0.45	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Work tug - propulsion	112	0.5	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Work tug - auxiliary	19	0.43	0.30	0.92	5.64	7.27E-03	0.15	0.14	791	2.68E-03	0.04	248
Clamshell dredge auxiliary	358	0.66	0.22	0.90	6.10	6.25E-03	0.14	0.13	679	4.20E-03	0.03	213
Crane 2- auxiliary	358	0.66	0.22	0.90	6.10	4.94E-03	0.14	0.13	537	4.20E-03	0.03	168
Clamshell offloader auxiliary	358	0.66	0.22	0.90	6.10	6.25E-03	0.14	0.13	679	4.20E-03	0.03	213
Ocean Tug- propulsion	1118	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Ocean Tug- auxiliary	224	0.43	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
SUV - propulsion	10784	0.6	0.63	1.40	17.00	0.36	0.15	0.14	590	0.01	0.03	185
SUV - auxiliary 1	1368	0.32	0.42	1.10	10.90	0.42	0.15	0.14	692	8.00E-03	0.03	217
SUV - auxiliary 2	1368	0.32	0.42	1.10	10.90	0.42	0.15	0.14	692	8.00E-03	0.03	217
SUV - auxiliary 3	658	0.46	0.42	1.10	10.90	0.42	0.15	0.14	692	8.00E-03	0.03	217
SUV - auxiliary 4	658	0.46	0.42	1.10	10.90	0.42	0.15	0.14	692	8.00E-03	0.03	217
Worker Ferry (50-person cap.)	560	0.42	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Worker Ferry (325-passenger cap.)	700	0.42	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Crew/launch boat 2	75	0.45	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213
Crew/launch boat 2 - auxiliary	30	0.43	0.30	0.92	5.64	7.27E-03	0.15	0.14	791	2.68E-03	0.04	248

For Harborcraft:

SO2 Emission factor calculated based on equation 4.5 in EPA (2020), Port Emission Guidance

CO2 Emission factor calculated based on equation 4.4 in EPA (2020)

CH4 Emission factor calculated based on 4.5.4 in EPA (2020)

N2O Emission factor calculated based on equation 4.3 in EPA (2020)

For ocean going vessels:

SUV engine power, load factors (Table 5/Table 11) and propulsion engine type (Table 1/Table 11) from Port of Oakland (2020), Appendix C Air Quality and Greenhouse Gas Analysis, Ocean Going Vessel Sheila Ann

CO2 Emission factor calculated based on equation 3.4 in EPA (2020)

PM2.5 calculated as 92% of PM10 as per 3.5.3 in EPA (2020)

TAB L - LIGHTNING PROTECTION SYSTEM

30 days per branch; 4 branches total
Assume 2 branch per year - 2 years of activity

453.59 grams/lb

8 hr work day

Off-Road Equipment	Quantity	Hours	HP	Load Factor	VOC	CO	NOx
Excavator	2	960	450	0.53	16.13	102.62	277.00
Loader	1	240	300	0.48	2.64	12.63	37.83
100 ton Crane	1	240	480	1	13.15	59.07	250.23
Skidsteer Loader	1	480	95	0.23	16.99	89.90	88.11
Cable Puller	2	640	375	0.58	29.38	204.74	544.09
				Subtotal in pounds	**78.29**	**468.96**	**1,197.26**

Worker Trips

Equipment	MPH	Miles	VOC	CO	NOx
Passenger Truck	45	15,750	0.03	4.13	0.07
			VOC	**CO**	**NOx**
		Subtotal in pounds	**0.96**	**143.44**	**2.35**

Based on CalEEMod App A. Maximum number of daily worker trips is based on 1.25 workers per pc

Annual Total	VOC	CO	NOx	SO2	PM10	PM2.5	CO2
Year 1	0.04	0.31	0.60	0.00	0.09	0.04	318.85
Year 2	0.04	0.31	0.60	0.00	0.09	0.04	318.85

FY25-FY31
Assume action occurs FY25 & FY26

Emissions in lb						
SO_2	PM10	PM2.5	CO_2	CH4	N2O	CO2e
0.75	16.44	15.94	270,930	1.42	0.65	271,102
0.11	2.35	2.27	40,895	0.23	0.10	40,922
0.38	8.95	8.69	134,833	0.96	0.44	134,949
0.05	12.82	12.43	16,044	0.66	0.30	16,124
0.50	27.71	26.88	164,661	2.02	0.92	164,905
1.80	**68.26**	**66.22**	**627,363**	**5.29**	**2.41**	**628,002**

g/VMT Emission Rate						
SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
0.00	3.45	0.52	298	0.011	0.001	298.52
Annual Emissions in Pounds						
SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
0.07	**119.65**	**17.97**	**10,343.18**	**0.39**	**0.04**	**10,365.51**

of equipment

CH4	N2O	CO2e
0.003	0.001	319
0.003	0.001	319

TAB M - GHGs

0.907185 metric ton/ton

	CO2e	
Construction Projects, 2025 - 203	tons	metric tons
Barricade Repair	1,369	1,242
Shoreline Protection	3,812	3,458
Pleasure Island Fencing	874	793
Secondary Emergency Egress	124	112
Lightning Protection	1,596	1,448
Upgrade/Maintain Rail Lines	3,395	3,080
Total	**11,170**	**10,133**
Maintenance		
Annual Dredging Maintenance	**8,916**	**8,088**
25-yr lifecycle	222,888	202,201
Total over 25 year period	234,058	212,334

Partial Implementation

	CO2e	
Construction Projects	tons	metric tons
Barricade Repair	1,369	1,242
Shoreline Protection	3,812	3,458
Pleasure Island Fencing	874	793
Lightning Protection	1,596	1,448
Upgrade/Maintain Rail Lines	3,395	3,080
Total	**11,046**	**10,021**
Maintenance		
Annual Dredging Maintenance	**8,916**	**8,088**
25-yr lifecycle	222,888	202,201
Total over 25 year period	233,934	212,221
Delta	124	112

SC GHG

Full Implementation Construction

Year	*[1] SC-GHG Estimates (2020$/Metric Ton @ 3% average damages)*	*Total Net Change Emissions in Metric Tons*	*SC-GHG Emissions 2020$ – 3% average discount*
CO2			
2025	56.423	8,943	$504,569
2026	$57.49	10,669	$613,354
2027	$58.56	10,054	$588,771
2028	$59.63	9,190	$548,005
2029	$60.70	9,190	$557,821
2030	$61.76	9,190	$567,636
2031	$62.91	9,190	$578,150
	Total 2025 - 2031	**66,427**	**3,958,307**

Year	*[1] SC-GHG Estimates (2020$/Metric Ton @ 3% 95th Percentile average damages)*	*Total Net Change Emissions in Metric Tons*	*SC-GHG Emissions 2020$ – 3% average discount, 95th Percentile average damages*
CO2			
2025	$169.16	8,943	$1,512,733
2026	$172.67	10,669	$1,842,196
2027	$176.18	10,054	$1,771,351
2028	$179.69	9,190	$1,651,433
2029	$183.20	9,190	$1,683,691
2030	$186.71	9,190	$1,715,958
2031	$190.54	9,190	$1,751,093
	Total 2025 - 2031	66,427	$11,928,457

Total GHG @ 3%	$3,963,750
Total GHG @ 3%, 95th percentile	$11,942,855

Partial Implementation

Year	*[1] SC-GHG Estimates (2020$/Metric Ton @ 3% average damages)*	*Total Net Change Emissions in Metric Tons*	*SC-GHG Emissions 2020$ – 3% average discount*
CH_4			
2025	$1,719.76	0.063	$109
2026	$1,766.70	0.075	$132
2027	$1,813.64	0.071	$129
2028	$1,860.58	0.064	$120
2029	$1,907.51	0.064	$123
2030	$1,954.45	0.064	$126
2031	$2,009.82	0.064	$130
	Total 2025 - 2031	**0.467**	**$868**

Year	*[1] SC-GHG Estimates (2020$/Metric Ton @ 3% 95th Percentile average damages)*	*Total Net Change Emissions in Metric Tons*	*SC-GHG Emissions 2020$ – 3% average discount, 95th Percentile average damages*
CH_4			
2025	$4,548.41	0.063	$288
2026	$4,676.82	0.075	$350
2027	$4,805.23	0.071	$341
2028	$4,933.63	0.064	$318
2029	$5,062.04	0.064	$326
2030	$5,190.45	0.064	$334
2031	$5,344.23	0.064	$344
	Total 2025 - 2031	0.467	$2,301.69

Year	*[1] SC-GHG Estimates (2020$/Metric Ton @ 3% average damages)*	*Total Net Change Emissions in Metric Tons*	*SC-GHG Emissions 2020$ – 3% average discount*
N_2O			
2025	$20,590.70	0.03	$582
2026	$21,027.79	0.03	$695
2027	$21,464.87	0.03	$673
2028	$21,901.95	0.03	$637
2029	$22,339.03	0.03	$649
2030	$22,776.11	0.03	$662
2031	$23,268.02	0.03	$676
	Total 2025 - 2031	**0.21**	**$4,574.66**

Year	*[1] SC-GHG Estimates (2020$/Metric Ton @ 3% 95th Percentile average damages)*	*Total Net Change Emissions in Metric Tons*	*SC-GHG Emissions 2020$ – 3% average discount, 95th Percentile average damages*
N_2O			
2025	$54,294.56	0.03	$1,534
2026	$55,502.28	0.03	$1,834
2027	$56,710.00	0.03	$1,779
2028	$57,917.72	0.03	$1,684
2029	$59,125.43	0.03	$1,719
2030	$60,333.15	0.03	$1,754
2031	$61,692.27	0.03	$1,794
	Total 2025 - 2031	0.21	$12,097.06

APPENDIX I
BEST MANAGEMENT PRACTICES AND STANDARD OPERATING PROCEDURES

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Table I-1 Summary of BMPs and SOPs Relevant to the Proposed Action.

BMP/SOP	Description	Phase		Resource			
		Design	Construction, Repair, Demolition	Geology and Soil	Water Resources	Biological Resources	Cultural Resources
Erosion Control	A range of best management practices (BMPs) would control erosion during construction, maintenance, repair, and operations to eliminate and/or minimize nonpoint source pollution in surface waters due to sediment. Erosion control BMPs include, but are not limited to, the following practices and procedures. **Construction:** • Erosion control through site approval process (whereby the proposed project site is reviewed for its erosion potential) • An Erosion and Sediment Control Plan would be prepared and implemented in construction plans and practices to the maximum extent practicable • Topsoil removed from the site would be placed in the immediate area and reused for re-compaction purposes (if appropriate) • Soil exposed near water as part of the project would be protected from erosion with erosion control blankets (organic or synthetic fibers held together with net to cover disturbed areas) after exposure and stabilized as soon as practicable (with vegetation matting, hydroseeding, etc.) • Silt-containment (silt fences and other physical barriers that intercept runoff from drainage areas) • Re-vegetate as soon as possible after any ground disturbance or grading • Minimize construction and grading during inclement weather • Soil piles and exposed slopes covered during inclement weather • Stockpiling of excavated materials behind impermeable berms and away from the influence of water bodies and runoff • Vegetation/mulch stabilization and applying coarse plant residue to cover soil surface (The vegetation/mulch should be free of invasive species' viable reproductive parts, such as rhizomes, seeds, and plants.) • Level spreader (non-erosive outlet for runoff to disperse flow uniformly across slope) • Sediment basin (barrier that retains sediment from runoff)	X	X	X	X	X	
Stormwater Management Plan (SWMP)	In compliance with the Clean Water Act (CWA) under Section 401, the proposed action components will require a SWMP. A SWMP is a document that describes the minimal procedures and practices used to reduce the surface flow and subsequent discharge of pollutants to storm drainage systems. Elements of a SWMP include structural and non-structural practices such as: • Check dams (small temporary stone dam across drainage) • Diversion dike/swale (berm or ditch that channels water to desired location) • Lined waterway (lined outlet for drainage) • Storm drain inlet protection (permeable barrier around inlets reducing sediment let into storm drain) • Stormwater ponds and wetlands • Infiltration practices (capture/temporarily store water before infiltrating into the soil) • Use of groundwater recharge wells and infiltration basins, where applicable • Filtering practices (capture/temporarily store water and pass through filter beds of sand, organic matter, soil, or other media)	X	X	X	X	X	
Stormwater Pollution Prevention Plan (SWPPP)	• A SWPPP is a self-implementing plan for compliance with an installation's stormwater permit • Facilities would be required to comply with the SWPPP during construction and then during day-to-day operations to ensure that stormwater remains free of contaminants • The SWPPP requires development of pollution prevention measures to reduce and control pollutants in stormwater discharge		X	X	X	X	
Water Quality Monitoring Plan (WQMP)	• Monitoring plans identify ambient or control conditions at a particular site and capture deviations from those conditions resulting from a project or operations of a facility • A WQMP may range in complexity from visual inspections for sedimentation and protection measure failure to laboratory or field analysis of chemical and biological effects on water quality or organisms (acute/chronic bioassay), dependent on a given water resource		X	X	X	X	

BMP/SOP	Description	Phase		Resource			
		Design	Construction, Repair, Demolition	Geology and Soil	Water Resources	Biological Resources	Cultural Resources
Leadership in Energy and Environmental Design (LEED) Certification	LEED is a voluntary point system tool that measures the degree of sustainability features incorporated into a development. Some LEED requirements include: • Reduction of electrical energy use in buildings by 10 percent to save power • Increased water efficiency • Renewable energy use • The sustainability/LEED initiatives would help reduce potable water use and should have a positive effect on demand for wastewater treatment	X	X	X	X	X	
Low Impact Development (LID) Design Technology	Examples of LID design include: • Grassed vegetation maintained on berms • Native plant landscaping • Avoidance of pesticides and fertilizers • Watershed-based management • A watershed protection management approach could consider: ▪ Participating in the development of a watershed management plan ▪ Implementing and adopting specific watershed protection strategies ▪ Designing land use planning techniques that reduce or shift impervious cover and enhance percolation ▪ Work toward achieving important water resource goals	X	X	X	X	X	
Energy Policy Act (EPACT)	Energy Policy Act compliance includes energy use analysis and life-cycle cost analysis using a simulated model and the following energy conservation measures: • Buildings achieve an energy consumption level that is 30 percent below the level achieved by ASHRAE Standard 90.1 • Use low energy consuming products that are either Energy Star-qualified or Federal Energy Management Program-recommended • Optimize building orientation to reduce cooling loads or energy loads to cool the buildings • Optimize building insulation • Seal building envelope for air tightness • Incorporate “cool roof” building designs • Use motion detectors to reduce lighting and to set back cooling in unoccupied buildings • Natural lighting	X	X	X	X	X	
Water Conservation Plan	Water Conservation Plans include the use of: • Low-flow faucets • Ultra-low-consumption toilets/urinals with electric flush sensors • Water-efficient cooling systems • Rainwater collection and reuse • Meters installed at all facilities and key locations within the water distribution system that can significantly improve the ability to quickly identify leaks and alert for corrective action	X	X		X		

BMP/SOP	Description	Phase		Resource			
		Design	Construction, Repair, Demolition	Geology and Soil	Water Resources	Biological Resources	Cultural Resources
Hazardous Materials Management Plan (HMMP)	HMMPs describe implementation procedures for the transportation, storage, use, and disposal of hazardous materials (HM). HMMPs would also include waste minimization plans that provide protocols designed to encourage and promote the efficient use of HM, substitute products that are less toxic whenever feasible, minimization of their use, and promote recycling and reuse of HM. HMMPs would contain procedures such as: • Hazardous materials spill/release control (use of secondary containment and leak detection methods in operations involving liquid hazardous substances) • Construction materials and all construction-related materials should be free of leachable pollutants • Train personnel (Department of Defense [DoD] personnel and contractors) in proper labeling, container, storage, staging, and transportation requirements for hazardous substances. Also, they are trained in accordance with spill prevention, control, and cleanup methods. • Perform all vehicle maintenance activities at existing DoD maintenance shops • Ensure that all personnel and contractors store, handle, and dispose of all petroleum, oils, and lubricants (POL) per all applicable local and federal laws, regulations, and requirements • Temporary equipment laydown or construction staging areas would be located in previously disturbed (e.g., paved) areas		X	X	X	X	
Hazardous Waste Management Plan (HWMP)	HWMPs include waste minimization plans that provide protocols designed to encourage the efficient use of hazardous waste (HW), substitute products that are less toxic whenever feasible, minimize their use, and promote recycling and reuse of HW. HWMPs include the following recommendations: • Update and implement the existing HWMP to include procedures for the transportation, storage, use, handling, and disposal of HW • Ensure personnel and contractor training regarding project- and facility-specific HW plans • The use of spill/release control (use of secondary containment and leak detection methods in operations involving liquid hazardous substances) • Ensure appropriate housekeeping protocol (improving overall HW housekeeping practices, keeping area swept, wiping up spills, etc.) • Perform all maintenance activities at existing DoD maintenance shops • Ensure all federal, state, and DoD laws and regulations are being observed via inspections/audits/surveillances and implement corrective actions as necessary. Also ensure that all personnel and contractors manage, store, handle, transport, and dispose of HW in accordance with applicable federal and state regulations. • Temporary equipment laydown or construction staging areas would be located in previously disturbed (e.g., paved) areas • When new construction occurs on sites where contamination and/or MEC has been identified, ensure that the risk of human/ecological exposure is minimized via the use of site-specific health and safety plans, engineering and administrative controls, and personal protective equipment (PPE) in accordance with 29 Code of Federal Regulations (CFR) Section 1910.120 (HW operations and emergency response operations). These site-specific health and safety plans must specifically address how these controls would be implemented to ensure the protection of human health and the environment.		X	X	X	X	

BMP/SOP	Description	Phase		Resource			
		Design	Construction, Repair, Demolition	Geology and Soil	Water Resources	Biological Resources	Cultural Resources
Spill Prevention Control and Countermeasure (SPCC) Plans and Facility Response Plans (FRPs)	• Update and implement existing SPCC Plan to assess and respond to hazardous substance spills and/or releases • Update and implement existing FRPs for responding to releases, leaks, or spills of hazardous substances • Ensure DoD personnel and contractors are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous substances. Also, ensure they are trained in accordance with spill prevention, control, and cleanup methods. • Ensure POL fuel transfers are kept away from water bodies and a response/contingency plan is in place in the event of any releases, leaks, or spills • Ensure proper labeling of all hazardous substance containers to prevent inappropriate storage or use • Contaminant migration control (e.g., reducing contaminant migration pathways by preventing releases to drains, pipelines, and sewers and the use of absorbent pads and materials to prevent and control spills and releases) • Ensure that contaminants (e.g., oils, greases, lubrication fluids for heavy equipment) are properly stored at work sites and temporary construction staging areas to avoid spills, releases, and leaks • Ensure that emergency response plans are in place for responding to releases, leaks, or spills of hazardous substances • Minimize the risk of uncontrolled leaks, spills, and releases through industry and Army accepted methods for spill prevention, containment, control, and abatement • Minimize the risk of human exposure to contaminated media through the use of a site-specific health and safety plan, engineering and administrative controls, and appropriate personal protective equipment (PPE) (e.g., indicating where eye-wash stations, fire extinguishers, etc., are located).		X	X	X	X	
Natural Resources Management (Terrestrial Focused)	• Achieve Integrated Natural Resources Management Plan (INRMP) obligations		X	X	X	X	X

BMP/SOP	Description	Phase		Resource			
		Design	Construction, Repair, Demolition	Geology and Soil	Water Resources	Biological Resources	Cultural Resources
Natural Resources Management (Marine Focused)	Minimize contamination of the marine environment from project-related activities through actions such as: • Achieve INRMP obligations • Comply with best management practices and standard operating procedures for marine mammals, turtles, and fish • Contractors are required to have and to implement a contingency plan to control and contain toxic spills, including petroleum products. Appropriate materials to contain and clean potential spills would be maintained and readily available at the work site. These materials would include absorbent pads and kitty litter and secondary containment absorbent booms. • All construction project-related materials and equipment placed in the water would be maintained so as not to release pollutants into the river and/or be used to control pollutants that may be released by the demolition and construction activities. The project manager and heavy equipment operators would perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations would be postponed or halted should a leak be detected, and would not proceed until the leak is repaired and equipment cleaned. This requirement is written into the construction contract conditions. • Fueling of construction project-related vehicles and equipment would take place at least 100 feet away from the water unless a bermed and lined refueling area is constructed. With respect to construction equipment that cannot be fueled out of the water, spill prevention booms would be employed to contain any potential spills. Any fuel spilled would be cleaned up immediately. • A plan would be developed and implemented to prevent construction debris from entering or remaining in the marine environment during the project		X		X	X	
Transportation Specific	Roadway project construction BMPs include the following recommendations: • A Traffic Control Plan would be prepared and implemented • Temporary equipment laydown or construction staging areas would be located in previously disturbed (paved, gravel, etc.) areas • Material from demolition of existing road pavements would be stored in previously disturbed areas whenever possible • An Erosion and Sediment Control Plan for roadway construction/work would be prepared and implemented in construction plans and practices to the maximum extent practicable • Prevent leaks or spills of contaminants by ensuring all temporary equipment laydown or construction staging areas are located in previously disturbed (paved, gravel, etc.) areas and constructed with secondary containment for storage of any hazardous or petroleum products		X	X	X	X	
Noise Abatement	BMPs to abate noise from roadway construction include the following: • Ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators, intact and operational • Inspect all construction equipment at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding) • Turn off idling equipment when no longer in use • Implement a construction noise monitoring program to limit potential effects • Plan noisier operations during times least sensitive to receptors • Avoid scheduling construction during nighttime hours (10:00 p.m. to 7:00 a.m.) and on weekends • Keep noise levels relatively uniform and avoid impulsive noises • Maintain good public relations with the community to minimize objections to the unavoidable construction effects • Provide frequent activity updates of all construction activities		X			X	
Cultural Resources	• Archaeological monitoring during construction in consultation with State Historic Preservation Office (SHPO) • For post-review discoveries, an assessment would be made for National Register of Historic Places (NRHP) eligibility in consultation with SHPO	X	X	X			X

BMP/SOP	Description	Phase		Resource			
		Design	Construction, Repair, Demolition	Geology and Soil	Water Resources	Biological Resources	Cultural Resources
Air Quality (Construction Emissions)	• Place a time restriction of five minutes on unnecessary heavy equipment idle time and incorporating unscheduled inspections to verify compliance with the restriction • Ensure equipment engines are maintained and tuned to perform at California Air Resources Board (CARB) and/or United States Environmental Protection Agency (EPA) certification levels, preventing tampering, and conducting unscheduled inspections to ensure these measures are followed • Lease new equipment, where practicable, that meets the most stringent of applicable Federal or California standards • Commit to the best available emissions control technology where practical and reasonable. Use of Tier 4 engines will be utilized as much as is feasible. For equipment that does not meet Tier 4 standards, CARB and EPA-verified controls such as particulate traps and oxidation catalysts will be used to reduce emissions of diesel particulate matter and other pollutants • Use of equipment powered with liquid propane gas, batteries, or direct plug-in will be implemented as feasible • Control fugitive dust, where appropriate, by covering soil piles and limiting equipment and haul truck speeds to 15 miles per hour onsite	X	X	X			
Other General Construction-Related	• To avoid new land disturbance and to the extent possible, construction within the cantonment area would occur in previously disturbed areas near existing roads and utilities. Individual projects would be limited to less than 5 acres. • To avoid new land disturbance and to the extent possible, the repair, maintenance, and additions to linear infrastructure, such as power and fiber lines, would occur in previously disturbed areas adjacent to or within the path of existing linear infrastructure • Vehicular traffic will be confined to existing roads and the proposed access routes • Construction staging areas would be sited on previously disturbed areas near construction activities • The project site will be maintained trash-free, and food refuse will be contained in secure bins and removed daily during construction • Access roads, staging areas, and in-water work areas shall be clearly identified in the field using orange construction fence, signage, buoys, or similar as appropriate. Work shall not be conducted outside designated work areas. • The majority of construction activities would occur between 7 a.m. and 8 p.m. Nighttime work will be avoided to the extent feasible. If nighttime work cannot be avoided, lighting will be directed to the work area. • No vehicles or equipment will be refueled within 100 feet of wetlands or aquatic habitats unless a bermed and lined refueling area is constructed. Any vehicles driven and/or operated within or adjacent to wetlands or aquatic habitats will be checked and maintained daily to prevent leaks of materials. Appropriate spill cleanup materials and equipment is to be available during fueling operations. • Use of chemicals, fuels, lubricants, or biocides will be in compliance with all local, state, and federal regulations. This is necessary to minimize the possibility of contamination of habitat or poisoning of wildlife. All uses of such compounds will observe label and other restrictions mandated by the U.S. Environmental Protection Agency, North Carolina Department of Environmental Quality, and other state and federal legislation.	X	X	X	X	X	